Response to Comments from
RWQCB
(dated June 11, 1993)
Draft Remedial Investigation Report
Operable Unit 5: East Side Aquifers
Naval Air Station Moffett Field
Mountain View, California

General Comments:

Leachate and Groundwater Interaction at Sites 1 and 2
Hydrogeological data from the OU1 RI have been incorporated into the OU5 RI as requested, with some additional assessment of hydrology around Sites 1 and 2. As a response to this general RWQCB comment, statistical comparisons of the analytical data for groundwater within the landfills (leachate) and groundwater from the A1-aquifer zone have been completed and used to discriminate between the leachate and potential impacts on the groundwater. The results of the statistical analysis have been incorporated into the appropriate sections of the Final OU5 RI Report.

At Site 1 a groundwater mound is present. Review of the boring logs for the landfill and A1-aquifer zone indicates that landfill materials appear to have subsided to depths of 8 feet below mean sea level (msl) (-8 feet, msl) at the Runway Landfill. The leachate wells indicate that water levels within the Runway Landfill leachate wells are about 3 to 7 feet higher than the water levels expected from the A1-aquifer zone wells (Figure 3.6.2). The leachate wells are screened in the depth interval above the A1-aquifer zone materials in a silt clay. The potentiometric head for the A1-aquifer zone is within this horizon; however, the aquifer materials are about 7 to 10 feet below the potentiometric surface, and 3 to 5 feet below the base of the landfill. The configuration of the water level within the landfill creates conditions favorable to radial flow from the high at W01-10(F); however, the natural clay barrier appears to be preventing the leachate from leaving the landfill. Subsidence of the clays below the landfill may have caused some compaction of the silty-clayey materials, further reducing the hydraulic conductivity, impeding the flow of water within the landfill, and creating the observed mound. Therefore, it can be assumed that the leachate is forming a perched zone above the A1-aquifer zone. Because of the large head differential between the leachate and groundwater, if the clay below the landfill were to be breached, leachate could migrate vertically downward and mix with the groundwater.

Site 1 chemical data from the A1-aquifer zone wells indicate that the composition of the leachate is distinctly different from the groundwater with regard to the major metals found in the samples, and that the numerous organic compounds found in the leachate at levels greater than 1000 parts per billion (ppb) are not found in the groundwater. Therefore, the chemical data confirm the conclusion, based on the hydrogeological data, that the leachate and groundwater do not commingle at the site.

At Site 2 there is no leachate mound developed. Review of the boring logs for this landfill indicates that the refuse layer does not extend more than 3 feet below msl (W02-08[F] and W02-11[F]). Fill materials below this depth are gravels and sands and appear to be devoid of

refuse (Appendix C). Groundwater occurs at depths of -5.6 feet msl or greater; therefore, the refuse layer is not saturated, and there is no leachate forming that can impact groundwater. As stated in the OU1 RI, rainwater that infiltrates through Site 2 may be captured by the nearby pumping station and discharged off site before impacting the A1-aquifer zone.

Monitoring for JP-5 and Hydrocarbon Products at Sites 4, 5, and 7

Total petroleum hydrocarbons (TPH) and jet fuels (JP-5) were not evaluated as such because there are no toxicity values available for these mixtures. Because these substances are composed of a variety of materials, the potentially toxic components (e.g., benzene, ethyl benzene, toluene, and xylenes [collectively known as BTEX]) were analyzed individually. These components were evaluated with respect to the criteria for selecting chemicals of potential concern and were carried through the risk assessment as appropriate. Additional text will be added to the descriptions of the chemicals of potential concern for Sites 4, 5, and 7 to clarify this issue.

All wells to be sampled during the Phase I and Phase II RIs were specified in the work plan submitted to the regulatory agency and none of these wells were omitted. However, as indicated in the Final Work Plan, three previously existing wells (W05-01, W05-02, and W05-03) were omitted from the sampling program during both the Phase I and Phase II RIs because construction details were not sufficient to determine which aquifer zone these wells were representative of, or these wells were not screened in an aquifer zone. (Refer to Table 1-3 of the Final Work Plan, IT, 1988.)

Free hydrocarbon product was expected to be encountered during monitoring well installation for the initial site characterization investigation (Phase I RI). As specified in the Final Work Plan (IT, 1988), if petroleum contamination was encountered at Site 5 during well bore drilling, an additional free-product well was to be installed adjacent to the well that was installed for groundwater sampling. Soils were in fact found to be contaminated by petroleum hydrocarbons, and the free-product wells were installed. However, during monitoring free-phase petroleum was not encountered in any of the wells. The wells installed to monitor the petroleum product were not to be sampled for groundwater quality. Free-product (4 millimeters [mm] of yellow gasoline) was observed in one monitoring well after a 24-hour pump test had been conducted in that well. Follow-up checks of the free-product wells did not indicate that free product was present.

Metals in Groundwater at OU5

Because metals are a natural component of groundwater and soil and because the levels of the metals naturally increase with proximity to the Bay, the groundwater metals data were evaluated for the trends that would indicate an anthropogenic source. Metals concentrations were sporadic, inconsistent, and generally only slightly above background. Therefore, it can be concluded that the east side groundwater at Moffett Field is not impacted by metals.

Risk Assessment Summary

In response to comments on the Draft OU5 RI report U.S. EPA specifically commented that, "The summary should present the results of the risk assessment in a concise manner without projecting conclusions about possible remediation decisions." Therefore, risk management statements will be deleted from the summary.

Location of the Agricultural Well

The irrigation well is located in the southeastern corner of Moffett Field and is shown in Figure 2.1-1 of the West Side Aquifer Characterization Report (IT, 1993b).

Specific Comments:

Page xxv — There is no evidence of actual mixing of the A1- and A2-aquifer zones. The statement refers to the absence of a continuous stratigraphic boundary between the A1- and A2-aquifer zones at Moffett Field. The evidence that the aquifer zones are not regionally separable includes the boring logs for the wells and soil borings, the geophysical logs, and the results for the observation wells monitored during the pump tests. In the soil borings, the depth of the first sand varies considerably across the facility, and the A1- and A2-aquifer zones appear to overlap. Examination of the geophysical logs provides similar results. During pump tests at Moffett Field, the response for monitoring wells in the A2-aquifer zone was similar to the response for monitoring wells in the A1-aquifer zone. The paragraph will be revised to note this similarity.

Page 1-11 — Tank 14 is not located within the OU5 Study Area and will not have an impact on groundwater at OU5, and therefore was omitted from the discussion. However, Tank 14 is included in Site 19, and for completeness, a description of Tank 14 will be added to the discussion of Site 19. Tank 14 is a 1,100-gallon steel underground storage tank used for storage of diesel fuel at Building 158. Tank 14 was removed in May 1990.

Page 2-8 — The discussion on page 2-8 of the metals concentration in groundwater and leachate in this section is a summary of the previous findings of the Solid Waste Assessment Test (SWAT) report and does not provide new information or new conclusions. However, the summary of the conclusions found in the SWAT report will be restructured to clarify the findings concerning the relationship between the leachate and groundwater compositions. The metals found at significant levels above the background wells were antimony and manganese in groundwater at Sites 1 and 2. While organic compounds were detected in leachate at Sites 1 and 2 these same compounds were not found in groundwater at Sites 1 or 2 or were found at estimated levels below the detection level. Additional data obtained as part of the OU1 and OU5 RIs are found in Chapter 4.0. Based on the findings of the SWAT and the OU1 and OU5 RIs, specifically the distinct differences between the leachate and groundwater composition, there is evidence to conclude that leachate has not had any impact on groundwater.

Page 2-14 — Soils data for the landfills are found in the OU1 RI Report. Text will be modified to reflect this finding.

Page 2-19 — As noted, Site 15 consists of a number of sumps scattered across Moffett Field. No wells were specifically installed for Site 15 sumps, but adequate coverage is provided by wells adjacent to the Site 15 sumps. Similarly, separate discussion

on the groundwater beneath the Site 15 sumps is not necessary (repeat of discussion for adjacent sites). Additionally, the Site 15 sumps have been dropped from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process and will be evaluated further as petroleum-related sites (regulated by leaking underground fuel tank [LUFT] requirements).

Page 3-2 The feature referred to as the Navy Channel (mentioned in the last sentence of the paragraph) is the Off-Site Canal, which directs the pumped water to San Francisco Bay. This channel will be referred to by name in this section the Final OU5 Final RI, and is referred to on page 3-4 and shown in Figure 3.3-1 of the Draft RI.

Page 3-4 The Off-Site Canal is not located off-site but carries discharge from the pump station off site.

Page 3-14 The irrigation well is located in the southeastern corner of Moffett Field and is shown in Figure 2.1-1 of the West Side Aquifer Characterization Report (IT, 1993b).

Page 3-20 The text will be modified to read "a remedial system has been required to be installed at the transfer point from the lift station to the Off-Site Canal. This proposed remediation system will consist of a cascade aeration system."

Page 4-10 The former waste water ponds are the most likely source for contaminants found in both the soils at this location and in the groundwater contaminant plume which appears to originate at the ponds. This paragraph does not state that contaminants found in the soils are not leaching to groundwater, rather that contamination found in both soils and groundwater originates at the former unlined ponds. The last sentence in this paragraph suggests that soils remain contaminated. This point will be clarified in the Final OU5 RI.

Page 4-12 Free hydrocarbon product was expected to be encountered during monitoring well installation for the initial site characterization investigation (Phase I RI). As specified in the Final Work Plan (IT, 1988), if petroleum contamination was encountered at Site 5 during well bore drilling, an additional free-product well was to be installed adjacent to the well that was installed for groundwater sampling. Soils were in fact found to be contaminated by petroleum hydrocarbons, and the free-product wells were installed. However, during monitoring, free-phase petroleum was not encountered in any of the wells. The wells installed to monitor the petroleum product were not to be sampled for groundwater quality. Free product (4 mm of yellow gasoline) was observed in one monitoring well after a 24-hour pump test had been conducted in that well. The free-product wells were periodically checked and no evidence of free product was noted.

Three previously existing wells (W05-01, W05-02, and W05-03) were omitted from the sampling program during both the Phase I and Phase II RIs because

construction details were not sufficient to determine which aquifer zone these wells were representative of, or were not screened in an aquifer zone. (Refer to Table 1-3 of the Final Work Plan, IT, 1988).

Page 4-14 Antimony concentrations are averaged for each site separately, and are compared to the background for each site separately. As stated in this section, the concentration ranges and means are given only for those sites where concentrations exceeded the concentration found in the aquifer-specific background well. Statistical summaries for each site are provided in Section 6.2

Page 4-14 Lead and selenium were detected most frequently in the A1-aquifer zone at Sites 1 and 2. Site-specific data will be added to the appropriate section of the RI for lead and selenium.

Page 4-19 The sites where metals were detected above the background concentrations will be indicated in Section 4.2.3.3. According to the Phase I and Phase II work plans the B3-aquifer zone was not a targeted aquifer for installation of monitoring wells; therefore, no new monitoring wells were installed nor were sampled.

Page 4-20 No organic contaminants were detected in the C aquifer below contract-required quantitation limits (CRQL). Paragraph 3 of Section 4.3 states that organic compounds are present at "very low concentrations," and the BTEX compounds are in fact present at levels less than 10 ppb. The presence of JP-5 at levels up to 2,800 ppb in the A1-aquifer zone will be noted in Section 4.3

Page 4-21 As stated in Section 4.2.2.3, some metals comprise water quality parameters or are typical of brackish waters and should be expected to exhibit wide variation (greater than two orders of magnitude) and are not discussed in the summary for this reason. Although the ranges of concentrations for many of the trace metals do exceed the concentrations found in background wells, the average concentrations for the trace for each site are not substantially above background levels. Refer to the second paragraph, first sentence of Section 4.2.2.3, which states that the average concentrations were calculated for each aquifer at each site, not for each aquifer over the entire OU5. The summary tables for this section provide information about the overall ranges of metals at OU5, the site-specific ranges, means, and standard deviations are presented in Section 6.2.

Page 5-9 The reader is referred to Table 5.3-1 in the first sentence of the paragraph, which provides the requested comparison. The five compounds will be included in the sentence to provide better substantiation.

The wells installed into the A1-aquifer zone around the landfills would indicate impact by organic compounds migrating from the landfill if compounds in the leachate were affecting the water quality. The flow here is predominantly horizontal and the flow has a slight upward gradient at the lift station (Building 191). Organic compounds in the leachate are present at sufficient concentrations

(e.g., 2-butanone as much as 49,000 ppb in leachate at Site 1 and not detected in any of the A1-aquifer zone wells) that if leachate were to impact the groundwater more than five compounds would be found in both leachate and groundwater. Groundwater contamination by sources other than the landfills is indicated by the presence of five compounds (provided in Table 5-3.1) in the groundwater but not in the leachate at Site 1. At Site 2 the relationship is similar, groundwater exhibits only four organic compounds in common, one of which, bis(2-ethylhexyl)phthalate, is present more frequently and at higher concentrations than in the groundwater in the leachate.

The water table at Site 2 is below the base of the refuse layer and within the A1-aquifer zone (from data available in the boring logs collected in Appendix C). The landfill at Site 1 exhibits a leachate mound. Precipitation water infiltrates into the landfill and the downward migration of the infiltrate appears to be impeded, resulting in development of a leachate mound. Review of the boring logs for Site 1 indicates that the refuse layer has subsided to depths of about -8 feet msl, and compaction of the silty/clayey materials may have reduced the hydraulic conductivity of the natural materials, thereby causing the observed groundwater mounding. The top of the A1-aquifer zone is between -10 and -20 feet msl, and there is between 3 and 6 feet of silty clay between the lowest point of the refuse layer and the top of the A1-aquifer zone. Therefore, while the potentiometric surface of the A1-aquifer zone is at a level above the base of the refuse layer, the groundwater is contained below it.

Groundwater and leachate collected from Site 1 have been analyzed for polychlorinated biphenyls (PCB) during the Phase I and Phase II RIs. PCBs have not been detected in either groundwater or leachate from this site (or any other site), thus it is very unlikely that PCB contamination in sediment at Building 191 has resulted from capture of either leachate or groundwater from Site 1.

Of the five compounds detected at Site 1 in both the leachate and groundwater, none are significant as outlined:

Acetone: This compound is a common laboratory contaminant.

Benzoic Acid: This compound was only detected in 1 of 24 groundwater samples at an estimated concentration of 6 ppb. The compound was also only detected in 7 of 25 leachate samples collected ranging from an estimated concentration of 20 to 11,000 ppb.

Phenol: This compound was detected in only one of 24 groundwater samples at a concentration of 33 ppb. The compound was only detected in 6 of 25 leachate samples with the highest concentration being 98 ppb.

Bis(2-ethylhexyl)phthalate: This compound is a common laboratory contaminant. The compound was only detected in 3 of 35 groundwater samples at

estimated concentrations of 3 and 4 ppb and in 3 of 25 leachate samples ranging from an estimated concentration of 4 to 31 ppb.

Di-n-octylphthalate: This compound was only detected in one of 24 leachate samples at a concentration of 48 ppb and in one of 24 groundwater samples at a concentration of 23 ppb.

At Site 2 the five compounds detected in both the leachate and groundwater, none are significant as outlined:

Toluene: This compound was detected in only 2 of 18 groundwater samples at an estimated concentration of 1 ppb. The compound was only detected in 5 of 18 leachate samples at estimated concentrations of 1 and 2 ppb.

Ethyl benzene: This compound was detected in only one of 18 groundwater samples at an estimated concentration of 1 ppb. The compound was only detected in 7 of 18 leachate samples at concentrations of 2 to 28 ppb.

Xylenes (total): This compound was detected in only 1 of 18 groundwater samples at a concentration of 8 ppb. The compound was only detected in 4 of 18 leachate samples at concentrations ranging from and estimated concentrations of 3 to 15 ppb.

Bis(2-ethylhexyl)phthalate: This compound is a common laboratory contaminant. The compound was only detected in 6 of 18 groundwater samples ranging from an estimated concentration of 4 to 66 ppb and in 1 of 18 leachate samples at an estimated concentration of 5 ppb.

A comparison of the inorganic constituents in the leachate and A1-aquifer zone groundwater will be incorporated into the report. An analysis of variance (ANOVA) has been completed for Site 1 in which the leachate and groundwater were treated as two separate populations. The results of this analysis indicate that there are no significant differences between the means for the two populations of samples. However when samples from the groundwater are included in an ANOVA of the leachate it was found that the two groups are distinctly different.

Page 6-15 The following statement appears in the descriptions of chemicals of potential concern for Sites 1 and 2 on pages 6-15 and 6-16, respectively: "Leachate from the landfill is not included in the chemicals of potential concern because the OU1 RI and this RI indicate that the leachate has not contaminated the groundwater at Site 1/Site 2." However, the leachate at Sites 1 and 2 is evaluated in the OU1 RI Report and this statement is added to the text.

It is further noted that because there is no barrier between the leachate and the groundwater at Site 2, it is possible that the lift station may draw in some contamination that may impact off-site surface water. Because the surface water,

by definition, is not part of OU5, this pathway was not evaluated in the risk assessment. Off-site surface water will be addressed in OU6. Therefore, it is anticipated that further analysis of fate and transport is not warranted in this RI. As discussed in the response to RWQCB's general comment, additional treatment of the hydrological and the chemical relationships between the leachate and groundwater at the landfill sites will be added to the report.

Page 6-19 Total petroleum hydrocarbons (TPH) and jet fuel (JP-5) were not evaluated as such because there are no toxicity values available for these mixtures. Because these substances are composed of a variety of materials, potentially toxic (e.g., benzene, ethyl benzene, toluene, and xylenes) were analyzed individually. These components were evaluated with respect to the criteria for selecting chemicals of potential concern and were carried through the risk assessment as appropriate. Additional text will be added to Section 6.2.3.4 to clarify this issue.

Page 6-31 Antimony was included as a chemical of potential concern at both Sites 1 and 2 as indicated on pages 6-15 and 6-17, respectively. Paragraph 2 in Section 6.2.4 refers to eight metals that were excluded as chemicals of potential concern in at least one aquifer zone because they were considered representative of naturally occurring background concentrations. These eight metals were selected for purposes of evaluating risks associated with metals at background concentrations.

Page 6-35 It is assumed that the Navy Channel refers to the canal (Off-Site Canal) that is located on the northern perimeter of the site and discharges into Guadalupe Slough. This channel will be added to the description of surface water features on page 6-35 because it receives pumped groundwater via the ditches in OU5.

Page 6-45 The pathway of groundwater and leachate into the storm drain system that is discharged into the Navy Channel was not evaluated. No migration of leachate has been demonstrated in either groundwater or surface water for Site 1. Site 2 contaminants associated with leachate may be pumped via the lift station into the Navy Channel. Because this surface water body, by definition, is not part of OU5, it will be evaluated as part of OU6.

Page 6-63 A statement will be added to clarify that risks to environmental receptors were not evaluated in full detail in the Draft OU5 RI Report. The ecological assessment for OU5 was qualitative; a more quantitative approach will be used in the site-wide ecological assessment.

The fourth sentence in the third paragraph on page 6-63, which states that, "Use of these aquifers is unlikely due to naturally elevated salinity of the water," will be deleted.

Page 6-65 The phrase "metals were not discharged at Moffett Field" and "metals were not used at Moffett Field" will be replaced with "substantial sources of inorganic contaminants are not known to be present at Moffett Field."

The potentially toxic components of JP-5 (e.g., benzene, ethyl benzene, toluene, and xylenes) were analyzed individually. These compounds were subjected to the selection criteria for the chemicals of potential concern and carried through the risk assessment, if appropriate.

Page 6-66 Paragraph 2 will be revised to specify the chemicals that exceed 10^{-6} risk levels at Sites 7 and 19.

Page 6-68 It has been reported that the San Francisco fork tail damsel fly has been found in the Marriage Road Ditch (Haas, 1992). A statement will be added to the text to indicate that this species is a potential environmental receptor. A more detailed ecological assessment will be performed as part of the site-wide risk assessment.

Page 6-72 The San Francisco fork tail damsel fly will be added to the list of rare and endangered species.

Page 7-3 The potentially toxic components of JP-5 (e.g., benzene, toluene, ethyl benzene, and xylenes) were analyzed individually. These compounds were subjected to the selection criteria for the chemicals of potential concern and carried through the risk assessment, if appropriate. A summary statement regarding the significance of these components will be added to the text to clarify the significance of JP-5 as a site contaminant.

References

Haas, Jim, 1992
Personal communication with Jim Haas, Environmental Division, Public Works Department, NAS Moffett Field.