

**NAVY RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT
OPERABLE UNIT II REMEDIAL INVESTIGATION REPORT**

The following are the Navy's responses to the comments of the regulatory agencies on the *Draft Operable Unit II Remedial Investigation Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California*. The first section contains the comments of the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) and associated Navy's responses to each. The second section contains the comments of the U.S. Environmental Protection Agency (EPA) and associated Navy responses. The third section contains the comments of the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) and associated Navy responses. Comments and proposed Navy responses were discussed with the regulatory agencies in a meeting on August 13, 1992.

I DTSC COMMENTS AND NAVY RESPONSES

A. GENERAL COMMENTS

Comment 1: The report is well organized. The large size plates were very helpful, however, the scale of the figures provided in Volume 1 must be changed for ease of review by the general public.

Response: Comment acknowledged.

Comment 2: There are extensive data gaps in OU II, particularly in IR 6 and IR 10. Some of these data gaps are mentioned in the RI, however no plan for further investigations is given. Please provide the scheduling for further investigations. As removals are proposed, will additional sampling be incorporated into these actions? How will removal actions be planned without a better idea of the quantities of soil affected?

Response: Additional sampling will be completed at a later date to address these data gaps as discussed in the meeting with the regulatory agencies on August 13, 1992; the results will be presented in the parcel-specific RI report. A schedule for this additional sampling has not been developed at this time. Removal actions requiring soil excavation will be planned by estimating the volume of soil to be removed using available soil chemistry data. Removal actions will include confirmation sampling as appropriate.

Comment 3: The changes to the Background Sampling Plan will necessitate updates to the RI.

Response: The use of background levels for PAHs will be discontinued due to data quality problems associated with data on which they are based. Background levels for metals will be used as a data analysis tool and will be referred to as "interim ambient levels" in the ASR as appropriate. As

discussed in the regulatory agency meeting on August 13, 1992, the results of the background study will be used as an interim indicator of ambient chemical conditions within the fill material. The Navy recognizes that the regulatory agencies have not approved the background study and that the levels presented in this report as representative of ambient conditions are subject to revision. Interim ambient levels are not intended to indicate risks or cleanup goals.

Comment 4: Hunters Point contamination levels should be compared to available health based and/or Title 22 hazardous waste levels in tables and text. Aquatic values should be used for portions of the site close to the Bay.

Response: The Title 22 hazardous waste levels and aquatic standards are part of the applicable or relevant and appropriate requirements (ARARs). They are presented in the Public Health and Environmental Evaluation (PHEE) Report and are being used in the Feasibility Study (FS) for establishing target cleanup levels.

Comment 5: The RI objectives listed on page 2 deviate from EPA's "Guidance for Conducting Remedial Investigation and Feasibility Study under CERCLA" (EPA, 1988) which requires full characterization of extent of contamination. This issue must be resolved between the regulators and the Navy.

Response: The Navy believes that the objectives of this RI fulfill the objectives presented in the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA, 1988)*. This document states the following: "The objective of the RI/FS process is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site."

Recent discussions between the Navy and the regulatory agencies indicate the objectives of the OU II RI report are consistent with this objective.

Reference:

U.S. Environmental Protection Agency (EPA), 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, October.

Comment 6: Comments questioning the validity and application of the hydrogeologic data should be considered during the RI revision and in the development of hydraulic models.

Response: The hydrogeologic data presented in the OU II RI report are considered adequate for the development of the conceptual and analytical models needed to assess risk and evaluate the need for interim remedial actions.

B. SPECIFIC COMMENTS

Comment 1: Sections 4.3.2.3; 5.3.2.3; 6.3.2.3, **Physical Properties of the Soil:** The physical properties mentioned in this section and in Table 7 should not be considered representative of the physical properties of IR-8 surface soils. Apparently, the fill at IR-8 is of a variety of material from different sources, and was randomly placed. Thus, it is likely that the physical properties of this fill varies greatly both laterally and with depth. In addition, the soils which were sampled are probably not the same material in which groundwater is found (i.e., the A-aquifer material). The soil samples were taken at a maximum depth of four feet. This material is probably soil which was engineered for the construction of roadways and buildings. The A-aquifer is in material which was either naturally placed or which was imported to fill the Site. Therefore, it is difficult to utilize these test results to characterize or define the physical or hydraulic characteristics of the A-aquifer.

Response: Physical testing results were not intended to characterize or define the physical or hydraulic characteristics of the A-aquifer. These samples were tested to provide information regarding the characteristics of the unsaturated zone. The data presented are adequate to develop conceptual and analytical models to assess risk and evaluate the need for interim remedial actions.

Comment 2: Sections 4.3.2.4; 5.3.2.4; 6.3.2.4, **Laboratory Testing for Vertical Hydraulic Conductivity:** The values for vertical hydraulic conductivity (K_v) presented in these sections should not be considered representative and should not be used for aquifer characterization. The sample(s) from which K_v was tested were taken in unsaturated material which is different material than the A-aquifer.

Response: See the response to Comment 1.

Comment 3: Sections 4.3.2.5; 5.3.2.5; 6.3.2.5, **Groundwater Flow Velocities:** It is premature to present groundwater flow velocities until a conceptual model is established for the A-aquifer.

Response: A localized conceptual model of groundwater flow at each IR site was presented in the draft report. The Navy acknowledges that a conceptual model of groundwater flow has not been developed for the entire HPA Facility. As a result, a range of groundwater flow velocities was presented in the draft report. As additional data are obtained and a better understanding of groundwater flow is developed, the estimates of groundwater velocities may be modified.

Comment 4: **General Comments on the Hydraulic Testing:** First, as previously requested, all transducer logs must be included. This information is necessary to check the drawdown vs. time curves (Plates F-54 through F-71). It is also not possible to check the results on our AQTESOLVE program nor is it possible to plot the results on paper the same scale as

our type curves. Thus, it is not possible to perform a comprehensive independent review of the results.

Second, the presentation of the plots of the Neuman analysis, presented in Plates F-54 through F-60 are difficult to review. The plates are captioned log t vs. log s, and log W (U, B) vs. 1/U. Also, the units of time (t) and drawdown (s) are not defined, and the scale of plates are linear (not logarithmic). It could be assumed that the scale of the log time vs. log drawdown graph could represent powers of ten. However, this would mean that the scale of the log W(U_a, B) vs. log 1/U_a plot would be an obscure and cumbersome log transformation (i.e. 10^{-0.02}, 10^{1.98}, etc.). If this is the case, it is an inappropriate way to present information in a public document and must be changed.

Third, the plot of the Theis recovery data cannot be verified. The abscissa of Plates F-61 through F-71 (plots of the residual drawdown) is log (time since pumping started/time since pumping stopped). Since the transducer logs are not included, the report does not say when pumping started and when pumping stopped.

Fourth, on page F-8, second paragraph, the report states "Both the Neuman drawdown and Theis recovery methods were considered appropriate for (analyzing pump test data) when simplifying assumptions were used". Thus, it appears that only these two methods were considered. Unfortunately, the apparent aquifer methods and the shape of the derived data curves indicate that Neuman analysis is not appropriate, especially at IR-6 and IR-10. This is further indicated by the comparison of the Neuman results to the Theis results (plates F-72, 73, and 74). This comparison shows that there is no correlation between the Neuman results and the Theis results.

Fifth, the significance of the values from the hydraulic testing is not discussed. This is important in that the aquifer which was tested, the A-Aquifer, does not meet the assumptions upon which all classical pump tests are based. It is not of seemingly infinite areal extent. Also, the hydrogeological characteristics vary greatly over short distances. It is heterogeneous, anisotropic and varying thickness. In many cases, the pumping wells are not fully penetrating. Given that none of the assumptions concerning pump tests apply at the OU II Sites, trying to determine precise values for the aquifer parameters is futile and the results should only be used for qualitative analyses, to gain a relative measure of the ability of the saturated material to transmit water (and contaminants). An analysis of the relative aquifer parameter values should be included in the report.

Response: Transducer logs are being provided to the DTSC under separate cover. Log-log plots of untransformed time-drawdown data are also being provided to permit independent review and analysis. Future reports will include necessary information to allow for independent analyses. Included with the transducer logs are hard copies of spreadsheet calculations used

for residual drawdown plots. These spreadsheets include pumping times as well as the time since pumping stopped.

Both the Neuman drawdown and Theis recovery methods are equally appropriate for the analysis of aquifer test data at OU II sites given the limitations of the data and the simplifying assumptions required for these methods. A comparison of the Neuman and Theis results indicates that the hydraulic conductivity values were generally within a factor of three (see Table F3). This variability is acceptable given the heterogeneity of the fill materials that comprise the A-aquifer at HPA and the inherent uncertainty associated with the subjective matching of theoretical aquifer responses to observed aquifer responses under nonideal conditions.

The Navy agrees that attempting to determine precise values for aquifer parameters may be futile given the heterogeneities of the fill materials and simplifying assumptions necessary to permit analysis of the data. It should be noted, however, that aquifer tests rarely, if ever, provide precise values but rather provide approximations of aquifer parameters. Sound hydrogeologic judgment must be used when applying these approximations to quantitative problems such as the estimation of groundwater flow velocities or groundwater extraction system design. Approximations of aquifer parameters will be used at HPA for the conceptual design of groundwater extraction systems. The conceptual design will be further tested by performing pilot-scale field testing with performance monitoring. The results of pilot testing will be used in the final design of groundwater extraction systems at HPA.

Comment 5: Page 10. An area study which investigated soil contamination at possible future construction sites is referenced. Please indicate which future construction sites this refers to.

Response: The area study conducted by EMCON in 1986 was a preliminary study designed to identify potentially contaminated areas throughout the facility where the public or construction workers could be exposed if the base were reactivated as a result of USS Missouri homeporting.

Comment 6: Page 10. Please revise the discussions pertaining to the "background" study throughout the report. First, as discussed in the June 9, 1992 meeting, contamination present in the fill materials imported to Hunters Point, as well as the metals concentrations in naturally occurring geologic units, should be referred to as threshold values. Second, it is confusing to refer to a background concentration for metals such as hexavalent chromium for which the background level is zero. Third, the Department does not agree with the existence of a "background" level for radiation in the groundwater. Fourth, naturally occurring versus man-made asbestos should be differentiated.

Response: See the response to General Comment 3 relative to the first two items in the above comment. The Navy acknowledges the third and fourth items in the above comment and will consider these items when preparing future

reports. Samples from OU II sites were not analyzed for asbestos and radiation.

Comment 7: Table 10: Many of the maximum detected concentrations for specific IRs are equal to the "background" concentrations. For example, for IR 9 the maximum level of nickel is equal to the background level in serpentinite bedrock and the beryllium detected is equal to the background level in serpentinite fill. This highlights some of the problems with the background sampling plan.

Response: If the concentration of a metal were equal to the threshold value, the concentration was at the upper end of the data distribution and within the background population. Maximum concentrations that equal "background" levels simply indicate that ambient conditions at OU II sites are equivalent to ambient conditions in the fill materials elsewhere at the HPA facility.

Comment 8: Page 14, Section 3.2: Add a discussion regarding all types of fill materials present at Hunters Point. This should also include mention of the background study (see comment #6 above).

Response: Appendix A includes a discussion of the different types of fill materials at HPA. Discussion of the background study is presented in Section 2.2.1 of the draft report.

Comment 9: Page 14, Section 3.3: The RI only includes data from two groundwater elevation monitoring events. Therefore, please state clearly that the current understanding of the hydrogeology is preliminary and will be updated after further elevation measurements are taken.

Response: Future reports will reflect modifications to the understanding of the facility-wide hydrogeology as additional data are obtained.

Comment 10: Page 18 Although it is described in further detail on page 31 of the RI, the basis for refuting the existence of the steamline should be provided in this section.

Response: The basis for refuting the existence of the steamline in the area of the PCB spill will be discussed in the parcel-specific RI report, as appropriate.

Comment 11: Page 20: As stated in the report, the polychlorinated biphenyl (PCB) removal was based on a cleanup level of 25 mg/kg. Please include the historic rationale for this cleanup level. Also, were samples from monitoring well W-6 analyzed for PCBs? Has the stratigraphy in this area been adequately defined? (PCBs are still present in the soils.) Is it necessary to install monitoring wells to replace W-1 and W-2, which were abandoned with construction of Building 606?

Response: The rationale for the cleanup level of 25 mg/kg was presented in the 1989 ERM-West report describing the investigation and cleanup of PCBs at the site. According to the report, the cleanup level of 25 mg/kg was approved by the California Department of Health Services. Monitoring

Well IR08MW42A was installed within 35 feet of the previous Well W-2 location. Monitoring Well IR08MW39A was installed in the same materials as Well W-6 but closer to the PCB Spill Area. This well and Borings IR08B028 and IR08B029 were drilled in the boulder fill for better evaluation of the stratigraphy in this area. No well was installed to replace Well W-1 because this area is now covered by Building 606.

1. Comments on Site IR-8

Comment 1: Comments on the Hydraulic Testing at IR-8: A review of the well logs of Site wells indicate that the relative values of aquifer parameters which were determined from the pump test can be applied to A-Aquifer to the south-southwest of Building 606. A data gap is indicated, however. The geology under IR08MW39A appears to be a buried channel which has been filled with very coarse material. This channel probably dictates groundwater flow at the Site, but its relative characteristics have not been determined because of the limited capacity of IR08MW39A. The relative values of the A-Aquifer in this area need to be determined before a conceptual model of groundwater flow and contaminant migration can be determined.

Response: The Navy agrees that the hydraulic parameters estimated from the constant-rate discharge test conducted at Monitoring Well IR08MW37A should not be used as an indication of the parameters at or near Monitoring Well IR08MW39A. Aquifer testing of the boulder fill at Site IR-8 is not feasible, however, due to the high discharge rate that would be needed to create a measurable drawdown. The boulder fill materials are assumed to have a relatively high transmissivity and storativity compared to other artificial fill materials that comprise the A-aquifer.

Comment 2: Page 21: Explain whether the "five new monitoring wells" replace W1 through W7. Please correlate approximate locations and give depths.

Response: A total of six monitoring wells were installed during the RI at Site IR-8. These monitoring wells were not installed to specifically replace the ERM-West wells but to characterize potential groundwater contamination at the site. In general, the wells installed during the RI were within 100 feet of the former ERM-West well locations. Monitoring Well IR08MW42A was installed near the former Well W-2 location during RI sampling to monitor the groundwater where PCBs were formerly detected. The following table lists the ERM-West and RI wells, the distances between the well locations, and the screen intervals.

RI Well	Screen Interval (ft BTOC)	ERM-West Well	Screen Interval (ft BTOC)	Approximate Distance Between Wells (feet)
IR08MW37A	7-22	W-3	10-15	75
IR08MW38A	6.5-24	W-3	10-15	80
IR08MW39A	6-36	W-6	10.5-20.5	150
IR08MW40A	8-28	W-4	10-15	25
IR08MW41A	5.5-25.5	W-5	10-15	45
IR08MW42A	10.5-20.5	W-2	9.5-14.5	35

Comment 3: Table 12: Compare air sampling results to available health based standards, i.e., occupational standards at a minimum.

Response: The air sampling results will be compared to permissible exposure limits (PELs) in the parcel-specific RI reports, if appropriate.

Comment 4: Table 18: The chemical concentrations found in each IR site cannot be compared across the board to background concentrations without identifying which geologic unit the IR site is in and matching the concentrations to the corresponding "background" geologic unit.

Response: Chemical concentrations were compared to lithology specific background levels in the draft report. Lithologies corresponding to individual samples and sample locations will be added to the parcel-specific RI reports, if appropriate.

Comment 5: Page 25: It will be necessary to fully define the bay mud unit in areas with groundwater contamination.

Response: PCB contamination within the Bay Mud Deposits at the site has been defined vertically to nondetect levels. The total thickness of the Bay Mud Deposits has not been defined but is known to exceed 50 feet at the two locations where the thickness has been explored at the site. No further investigation of the Bay Mud Deposits at IR-8 is warranted at this time.

Comment 6: Page 26: It is necessary to continue groundwater level measurements to develop a more accurate picture of site groundwater flow.

Response: Groundwater-level measurements will be continued as part of the quarterly groundwater monitoring program described in the *Facility Groundwater Monitoring Plan (HLA, 1992)*.

Reference:

Harding Lawson Associates, 1992. *Draft Final Facility Groundwater Monitoring Plan, Remedial Investigation/Feasibility Study, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California*. July 24.

Comment 7: Page 32: Add the non-Hunters Point related contaminated fill to the list of non-point sources or define this elsewhere.

Response: The artificial fill materials described in the OU II RI Report do not differentiate between fill derived from native geologic and imported materials; however, potentially contaminated fill materials may have been imported during filling operations. Imported fill materials will be included as a potential nonpoint source of contamination in the parcel-specific RI report.

Comment 8: Page 33: Please provide explanation for the conclusions from the air sampling. Indicated if any of the proposed flux measurement locations are planned for IR-8.

Response: Only air sampling results are presented on page 33; no conclusions are presented. Both an additional ambient air sampling station and a flux measurement station are proposed near Site IR-8. This sampling will be performed in accordance with the *Air Sampling Report and Work Plan, (HLA, 1992)*.

Reference:

Harding Lawson Associates, 1992. *Air Sampling Report and Work Plan, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. April 28.

Comment 9: Appendix G: Samples from Boring B003 were not analyzed for most analytes, including PCBs. Is the explanation included in the report?

Response: The explanation for the reduced analyte list with the exception of PCBs is included in Table 5 of the draft report. Samples from the backfill at this boring location were not analyzed for PCBs due to a communication problem with the laboratory.

Comment 10: Page 43: TOG levels should also be mentioned in the point source table, as possibly associated with the grease traps.

Response: The grease traps are not suspected point sources of TOG because the low mobility of these compounds and the widespread distribution relative to the grease traps, both of which indicate that the TOG is related to nonpoint sources.

Comment 11: Page 43: Revise the point source list to include copper, vanadium, and zinc.

Response: Copper, zinc, and vanadium were detected above interim ambient levels at Site IR-8; however, the distribution of these metals at Site IR-8 indicates that these levels are probably related to nonpoint sources (rather than point sources) that resulted in concentrations that slightly exceed interim ambient levels.

Comment 12: Provide an explanation for the presence of vanadium, copper, and zinc.

Response: The presence of copper, zinc, and vanadium does not appear to be related to any identified sources at Site IR-8. The occurrence is scattered, and the concentrations are only slightly above interim ambient levels; therefore, it appears that these metals are probably related to the fill materials and are not related to a point source.

Comment 13: Page 39, Section 4.4.4.7: This section must also include arsenic and aluminum which were also detected at concentrations greater than the lithologic "background" concentrations.

Response: Arsenic did not exceed the lithologic specific interim ambient levels for any samples at Site IR-8 and therefore was not included in the discussion. The process of comparing concentrations to interim ambient levels consisted of grouping the samples by lithology and comparing each sample to the lithology-specific levels; therefore, the maximum value reported in Table 18 may be greater than the minimum interim ambient concentration without exceeding the lithology-specific interim ambient levels. Aluminum did exceed interim ambient levels in one sample and will be added to the metals discussion in the parcel-specific RI Report, if appropriate.

2. Comments on Site IR-8 Data Gaps

Comment 1: Appendix G: Holding time exceedances occurred for Borings B004, B006, IR08B009, IR08B043 and IR08B051. Holding time exceedances may prevent this data from being used to define the outer boundaries of contamination. Also, samples from a depth of 5.75 detected SOVs, however, there is no further vertical definition.

Response: Holding time exceedances were evaluated following the EPA's Data Validation Functional Guidelines for Inorganic and Organic Analyses (EPA, 1988a,b). According to the guidelines, data that exceed the holding time criterion may be qualified with a "J" as estimated. Samples from the five borings mentioned above exceeded holding times by 6 to 7 days for the CLP Pesticides/PCBs analysis. This level of exceedance is not considered significant for such compounds of generally low volatility and biodegradation potential. Because EPA's Risk Assessment Guidance for Superfund Sites (EPA, 1989) states that "J" data are useable for quantitative risk assessments, the Navy believes that they are also useable for defining the nature and extent of contamination. The SOC contamination below

5.75 feet bgs represents saturated conditions; contamination in groundwater is characterized by monitoring well data.

References:

U.S. Environmental Protection Agency (EPA), 1988a. *Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses*. February 1. Draft.

U.S. Environmental Protection Agency (EPA), 1988b. *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses*. July 1. Draft.

U.S. Environmental Protection Agency (EPA), 1989. *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), (Interim Final)*. EPA/540/1-89/002. December.

Comment 2: Page 38: The extent of TPH as diesel contamination is not adequately characterized in areas such as:

- horizontally: South and West of IR08MW37A, adjacent to IR08B027
- high detection limits in many samples reduces the confidence level in vertical definition in areas such as: IR08B003, IR08B005, IR08B006, IR08B008, IR08B009, IR08B010, IR08B011, IR08B012.

Response: The Navy believes that the extent of TPH as diesel has been adequately characterized to assess risk and evaluate remedial actions.

Comment 3: Page 38: Total oil and grease (TOG) is not defined in areas such as:

- horizontally: IR08B045, IR08MW38A, IR08MW37, IR08B022;
- vertically: IR08B035.

Response: The majority of the oil and grease detected at Site IR-8 appears to be related to nonpoint sources of contamination. The definition of the vertical and lateral extent of contamination related to such nonpoint sources on a site-specific basis is not practical given that these contaminants are relatively ubiquitous across the HPA facility. Additional data on the distribution of TOG will be collected if it is needed to assess risk and evaluate remedial alternatives.

Comment 4: Investigation should be focused on the area around the former grease traps.

Response: No further investigations of the grease traps are proposed unless additional information is needed to assess risk or evaluate remedial alternatives.

3. Comments on Site IR-9

Comment 1: Page 47: First Paragraph: This paragraph states that pH and fluid level measurements for well IR09PPY1 indicate that the containment vault is not leaking. However, this same well had elevated levels of hexavalent chromium, which would indicate that the vault is leaking (see page 65, fifth paragraph). Please clarify.

Response: The hexavalent chromium detected in Well IR09PPY1 may be related to dripping from the metal plates and splash from the pickling tanks during operations at the site. In addition, the structural integrity of the pickling tanks and vault will be addressed further in the parcel-specific RI report.

Comment 2: Comments on the Hydraulic Testing at IR-9: During the pump test on IR09MW35A, a steady pump rate could not be maintained. Plate F-51, which is the plot of discharge vs. time, shows that the pumping rate of the well varied up to 30 percent during the course of the test. The effects of this variable pumping rate is shown in the plots of log drawdown vs. log time for observation wells IR09P35AA and IR09P35AB. The plots indicate that equilibrium was not achieved and as such, the data curves are not useful. Nevertheless, the authors attempted a curve match to a Neuman type curve, and determined aquifer parameters based upon this match. Due to the variable pumping rate and the poor data curve shape, the results from the Neuman method may not be very reliable. The Theis recovery test yielded three very different shape data curves for the pumping well and for the two observation wells, even though they are within forty feet of each other and installed at the same depth. This would indicate that the fill material under the Site is very heterogeneous and that aquifer parameters vary greatly over short distances. Therefore, pump tests may not provide reasonable estimates of the relative aquifer parameters. The slug tests, however, may be better suited for this purpose. Since the slug tests only give estimates of aquifer parameters within a few feet of the tested well, heterogeneous effects further from the well will not effect the results. Thus, the aquifer parameters from slug testing can be determined for each well. The relative aquifer parameters between any two wells could be estimated by interpolating the differences between the two wells over the distance between the wells.

Response: Discharge rates from Well IR09MW35A fluctuated between 0.9 and 1.3 gpm during the test due to fluctuations in the back pressure on the submersible pump. An average discharge rate of 1.0 gpm was estimated and used for the approximation of aquifer parameters. Time-drawdown data for Observation Wells IR09P35AA and IR09P35AB do not indicate that the variable pumping rate is responsible for the observed water level changes. Equilibrium conditions were not achieved in these wells because of an apparent "negative" boundary effect, which presumably resulted from the cone of depression intersecting fill materials of lower transmissivity. Drawdown data collected prior to the appearance of this boundary effect were used to estimate aquifer parameters. As a result, the aquifer parameters estimated are representative of the immediate vicinity of the pumping and observation wells. Slug tests also provide aquifer parameters

within a few feet of the tested well, and therefore have similar limitations. Constant-rate discharge tests were selected over slug tests because they provide valuable information on pumping rates that can be used for groundwater extraction system design, if deemed necessary.

Comment 3: **Plate 53: Hexavalent chromium. Revise the wording on the map from "areas above background" to "areas above detection limit" as there is no background concentration for hexavalent chromium.**

Response: Comment acknowledged. The suggested revision will be considered in future reports.

Comment 4: **Plate 56: Since PA 37 borders IR-9, ensure that the chemical analyses at PA 37 include contaminants found at IR-9.**

Response: On the basis of the draft final SI work plan, Volume III (*HLA, 1992*), samples collected from PA-37 sites will be analyzed for VOCs, SOCs, Metals, TPH as diesel and gasoline, TOG, and PCBs/Pesticides. This program covers the analytes detected at Site IR-9.

Reference:

Harding Lawson Associates, 1992. *Inspection Work Plan: Other Areas/Utilities Volume III or III: 26 Sites, Naval Station Treasure Islands, Hunters Point Annex, San Francisco, California.*

Comment 5: **Page 55: Please provide more interpretation for the wide range of values for transmissivity, hydraulic conductivity, and storativity.**

Response: Additional interpretation of the variability in aquifer hydraulic properties will be included in the future reports, as appropriate.

Comment 6: **Page 56: Provide explanation as to why samples were not analyzed for hexavalent chromium (only total chromium).**

Response: The samples collected as part of the Pickling and Plate Yard Removal Investigation were analyzed for hexavalent chromium, but the results were not quantified because of interference effects due to the color of the sample.

Comment 7: **Page 62: Again, concentrations should be compared to background levels in the relevant lithologic specific units. Revise the "slightly above" language. Also nickel and chromium should be included in this list.**

Response: Nickel and chromium were detected at concentrations equal to the interim ambient levels for bedrock and serpentinite fill. As stated in the response to specific comment 7 these values are not considered to be above interim ambient levels. A table indicating the lithologic grouping for each sample will be included in the parcel-specific RI reports as appropriate. The phrase "slightly above", will be avoided in future reports.

Comment 8: Page 64, Section 5.4.5.5: Revise this section to agree with the description on page 65 where it is stated that there is no background level for hexavalent chromium.

Response: Future reports will state that there is no "interim ambient level" for hexavalent chromium.

Comment 9: Table 22: Chromium was only analyzed as total and not hexavalent.

Response: Samples collected as part of EMCON's confirmation study were analyzed for total chromium only. This will be noted in the parcel-specific RI report.

Comment 10: Page 67: Revise the point source list to include lead, chromium, and zinc, at a minimum.

Response: Lead, chromium, and zinc are potential point sources; however, the distribution of these metals at the site does not indicate that their presence in the soil is related to site activities. The highest levels of chromium are observed at depths greater than 10 feet in soil samples. Zinc was detected above ambient levels in only two samples, and the distribution of both lead and zinc at the site does not indicate that these metals were from a point source release related to the pickling operations.

4. Comments on Site IR-9 Data Gaps

Comment 1: The Department agrees that there is probably enough data to start the removal action, however, confirmation sampling must be scheduled after the removal action is completed to ensure the removal action is complete and to provide further information regarding data gaps mentioned below.

Response: Confirmation sampling will be performed as part of any soil or groundwater remedial actions, as appropriate.

Comment 2: Plate 52: There is limited data for the total carcinogenic polyaromatic hydrocarbons (PAHs) in the 2.5 to 10 foot depths.

Response: The data for total carcinogenic PAHs at the 2.5- to 10-foot depth interval appear to be limited on the basis of the low number of samples with detectable concentrations. However, the data indicate that carcinogenic PAHs were not detected in most borings at this depth interval. The number of data points is the same as for the noncarcinogenic PAHs (Plate 50).

Comment 3: Page 62, Plate 53: Provide an explanation for the varied detection limits (5 to 2,700 ppm) for total petroleum hydrocarbons (TPH) as diesel concentrations. What is the impact of these detection limits on the Navy's ability to adequately delineate extent of concentration in this IR?

Response: The variable TPH as diesel detection limits are largely due to matrix effects. Soil extracts were often very dark and required dilution for

analysis. These matrix effects are unavoidable using standard analytical methods. PAHs are generally recognized as the primary toxic components of TPH diesel and were analyzed for in the CLP SOC analysis. Reporting limits for the CLP SOC method are lower than those for TPH diesel. The PAH results may be used to delineate the extent of contamination of the more toxic components that make up TPH diesel.

5. Comments on Sites IR-6 And IR-10

Comment 1: Comments on the Hydraulic Testing at IR-6: The Neuman analysis appears to be inappropriate for the aquifer conditions. The plots of the log drawdown vs. log time for the observation wells presented in Plates F-58 and F-59, show that equilibrium conditions had not been reached by the time that pumping ceased. That is, the drawdowns are still rising with time, and the curve has yet to flatten out. This is a problem in that the data curve is steeper than the type curve for the lowest value of β (i.e., $\beta = 0.001$). There may be several reasons for this. The slope of the bedrock under the Site is relatively steep (approximately 13 percent). With the shallow bedrock in the area, boundary conditions may come into play. The fractured bedrock may also be creating leaky conditions. Nevertheless, the authors matched the data curve to the Neuman's type curve for $\beta = 0.001$. Due to the poor curve match, the Neuman results should be disregarded. The data plots Theis recovery data yielded good residual drawdown vs. dimensionless time curves for all three wells. Therefore, the calculated values for transmissivity (approximately 12.5 ft²/day) and hydraulic conductivity (approximately 1.1 ft/day) are reasonable, and should be used as representative of the aquifer under the Site.

Response: The Navy agrees that boundary conditions are responsible for the nonequilibrium trend of the time-drawdown plots shown on Plates F58 and F59. This trend is most likely caused by boundary effects resulting from the cone of depression intersecting lower transmissivity bedrock or other materials of lower transmissivity than the pumped zone. Aquifer test analyses using the Neuman method used early-time drawdown data whenever possible to reduce the effects of boundary conditions on approximations of aquifer parameters. Consequently, hydraulic conductivities estimated using the Neuman method were generally within a factor of four of hydraulic conductivities approximated using the Theis Recovery method. This amount of variability is considered acceptable given the inherent uncertainties associated with nonunique solutions to aquifer test analyses. Also see response to next comment.

Comment 2: Comments on the Aquifer Testing at IR-10: For various reasons, IR10MW13A1 was the only well upon which a pump test was conducted at IR-10. In addition, only one well, IR10P13A, was used as an observation well for the test (even though the workplan states that at least two observation wells will be used). A significant amount of information could have been gathered by using IR10MW13A2 as the pumping well or as an observation well. IR10MW13A1 and IR10MW13A2 are paired wells installed down to about twenty feet and forty feet below grade,

respectively, and which are separated by what appears to be a laterally continuous clay layer at about twenty feet below grade. By using IR10MW13A2 during the test, the amount of groundwater movement between the upper and lower aquifer zones could have been estimated.

As the test was run, the early time portion log displacement vs. time curve for IR10P13A showed poor shape. After about two hours, the curve's shape started to stabilize into a relatively constant shape. It appears that the authors matched this apparent late time portion of the data curve to the Part A portion of the Neuman type curve. (The family of Neuman type curves have three distinct portions: the early-time portion (Part A) an intermediate portion and a late-time portion (Part B). The Part A portion is only to be matched to the early-time portion of the data curve). In addition, there are three other factors which were not accounted for: the effect of the partially penetrating well; the effects of the leaky aquitard; and/or the effect of the stratified nature of the aquifer. Neuman analysis is not appropriate for any of these effects. Thus, the results from the Neuman analysis may not be useful.

While the Theis recovery curves show good shape, the results of this analysis may be questionable. Even though the pumping well and the observation well are only twenty-one feet apart, and screened at the same depth, in the same material, the value of the pumping well's aquifer parameters are four times those of the observation well's parameters. In addition, even if these values are accepted, they only represent the upper 30% of the aquifer. The bottom 60% is still undefined.

Response:

Two observation wells, Wells IR10MW13A2 and IR10P13A, were monitored during the constant-rate discharge test of Well IR10MW13A1. The water-level data from all wells monitored during the test including IR10MW13A2 are shown as well hydrographs on Plate F8.

The time-drawdown data from Well IR10MW13A2 were not analyzed because this well is not screened in the same depth interval as the pumping well. Consequently, the assumption on page F-7 of Appendix F regarding horizontal flow to the pumping well did not apply, and the resulting estimation of aquifer parameters was not considered valid. A analysis using a type-curve fitting method designed for partial penetrating wells was also attempted to evaluate the effects of vertical flow components on aquifer parameters at Site IR-10. This partial penetration analysis did not yield useful results because partial penetration type curves fit time-drawdown data worse than the Neuman type curves for fully penetrating wells.

Estimation of vertical groundwater flux across the clay layer near Wells IR10MW13A1 and IR10MW13A2 was not considered appropriate for this analysis because the clay layer is laterally discontinuous, being absent at similar depths in Well IR10P13A, located only 21 feet from Well IR10MW13A1.

The Navy acknowledges that the aquifer parameters describing the bottom of the A-aquifer at this location have not been defined. However, the primary objective of the HPA aquifer testing program was to gain general information on the hydraulic parameters of the major aquifer zones, not to quantify the detailed spatial and lithologic variability of the hydraulic parameters. Aquifer testing was performed at a limited number of locations to characterize the hydraulic properties to the extent necessary to assess risk and evaluate remedial actions.

Comment 3: **Table 51: Please check this table as it doesn't include the maximum level of xylene at 8.1 ppm detected in Boring IR06B021 (the maximum is listed incorrectly as 4.1)**

Response: The maximum value detected for xylenes by the CLP VOC method was 4.1 mg/kg. The concentration of 8.1 mg/kg was detected using EPA Test Method 8020 as is reported in Table 51. The parcel-specific RI report or other future reports will indicate that analyses for BTEX were performed by two different methods as appropriate.

Comment 4: **Will treatability studies be proposed for IR-6 and -10 as part of the OU II Feasibility Study?**

Response: No treatability studies are proposed for Sites IR-6 and IR-10 at this time. Microbiology samples were collected and analyzed for hydrocarbon utilizers during the Reconnaissance Phase of RI Sampling. The results will be presented in the OU II Feasibility Study Report.

Comment 5: **The cross sections chosen for Plates 90 to 93 are not representative of the distribution of contamination in these areas.**

Response: The intent of the cross sections was to show contaminant distribution throughout both sites, not specifically in the areas of greatest contamination. Data are also presented on maps for various depth intervals for additional information on both the vertical and horizontal extent of contamination.

Comment 6: **Page 100: Add other metals, in addition to zinc and lead, which are present in soil above "background" in addition to zinc and lead (for example, arsenic, hexavalent chromium, and copper).**

Response: The arsenic, hexavalent chromium, and copper found in the soil at Sites IR-6 and IR-10 are not believed to be related to point sources on the basis of their distribution and relatively low concentrations.

Comment 7: **Page 100: Please break out the nonpoint sources into IR-specific categories as is done for point sources.**

Response: Comment acknowledged.

6. Comments on Site IR-6 And Site IR-10 Data Gaps

Comment 1: Plate 82: The extent of PCE contaminated soils is not defined. At Boring IR06B039 PCE was detected at 2.2 ppm (5.75 foot sample), and not analyzed for in the 10.25 foot sample. The horizontal extent TCE contaminated soil has also not been defined. For example, in Boring IR10B017 TCE was detected at 2.2 ppm (2.75 foot sample).

Response: The Navy believes that the vertical and lateral extent of TCE and PCE in soil have been adequately characterized for the purpose of assessing risk and evaluating remedial actions.

Comment 2: Page 87: Is Section 6.4.3.9 identified correctly as containing results of the review of tentatively identified compounds?

Response: No. The section containing the results of the review of tentatively identified compounds is Section 6.4.5.9.

Comment 3: Page 86-90: The VOC and SOC discussion must be expanded to include extent of vertical delineation of contamination.

Response: Comment acknowledged.

Comment 4: Is further work proposed in IR-6 as part of the referenced removals or further investigations? The following areas have not been defined:

- **Plate 85: For carcinogenic PAHs at 0-2 foot depths the horizontal extent of contamination is not defined W of Borings IR06SS01, IR06SS02, and IR06SS13. Vertical extent is not defined near IR06B037, IR06SS03, IR06SS02, IR06SS13.**

For noncarcinogenic PAHs vertical delineation is not complete in the following areas: IR06B031, IR06B039, IR06B037, IR06SS16, IR06SS12, IR06SS09, IR06SS11, IR06B013, IR06B012, IR06SS17, IR06SS14, IR06SS04, IR06SS08, IR06B017, IR06B009, IR06SS01, IR06SS03, IR06SS02, IR06SS13, IR06B033, IR06B036, IR06MW22A, IR06B015, IR06B001, IR06B002, IR06B005, IR06B003, and IR06B007.

- **The vertical delineation of TPH as diesel in soils is not complete in the following areas: IR06B001, IR06B002, IR06B004, IR06B025, IR06B026, IR06B003, IR06B002, IR06B005, IR06B007, IR06B010, IR06B012, IR06B021, IR06B033, IR06SS01 (high detection limits, J5 data), IR06SS04, IR06SS05, IR06SS06, IR06SS07, (J5 data), IR06SS08, IR06SS09, IR06SS10, IR06SS11, IR06SS12, IR06SS13, and IR06MW27A.**
- **The horizontal delineation of TPH as diesel in soils is not complete in the following areas: E of IR06B003, SW of IR06SS09, E of IR06SS12, E of IR06B002, N and W of IR06B031, N of IR06B039, area around IR10B006, IR10B008, IR10B004,**

IR10B005, S of IR06SS07, IR06B016, IR06SS04, W of IR06SS01, IR06SS13, N and E of IR06B010.

- The horizontal delineation of zinc and lead in soils is not complete in the following areas: IR06B031, IR06B021, IR06SS13, IR06SS02, IR06B020, IR06SS03, IR06SS01, IR06B019, IR06B008, IR06SS10, IR06SS11, IR06B002, IR06SS12, IR06SS09, IR06SS16, IR06B011, IR06SS08, IR06SS04, IR06B016 or 12, IR06SS07, IR06B010, IR06SS06, IR06B008, IR06B004
- The vertical delineation of zinc and lead in soils is not complete in the following areas: IR06B031, IR06B010, IR06SS13, IR06SS02, IR06SS03, IR06SS01, IR06SS05, IR06SS11, IR06SS10, IR06B025,

Response: It was not within the scope of the RI to define the lateral and vertical extent of contamination to the limit of detection at each boring or well location. The Navy believes that adequate data are presented in the draft report to assess risk and evaluate remedial alternatives. In addition, confirmation sampling will be considered as part of soil and/or groundwater remedial actions.

Comment 5: Groundwater has not been investigated completely in many areas of IR-6 and -10. First, when is further vertical delineation scheduled? Second, the investigation of plumes in the following areas must be expanded:

- N of Well IR06MW30A
- Area surrounding well IR06MW22A (especially for vinyl chloride and benzene)
- Area surrounding well IR06MW42A (especially for noncarcinogenic PNAs)
- Area surrounding well IR06MW35A
- Area surrounding well IR06MW34A

Response: The Navy agrees that the extent of groundwater contamination has not fully defined at this time. As agreed to in a meeting with the regulatory agencies on August 13, 1992, further characterizations will be conducted in the parcel-specific RIs.

Comment 6: There appears to be a problem with vinyl chloride detection in many IR-6 and -10 wells. As vinyl chloride is extremely volatile it is very difficult to detect, and extra precautions must be taken in the field to accurately measure concentrations. The detection limit is also too high and should be 0.5 ppb according to Method 8010. Monitoring wells which should be highlighted are: IR06MW48F, IR06MW2A, and IR06MW23A. Monitoring well IR06MW22A also has some fluctuating levels for benzene.

Response: The sampling and analysis for vinyl chloride at Sites IR-6 and IR-10 was conducted in accordance to the Quality Assurance Project Plan (QAPjP). EPA Publication SW-846 provides a practical quantitation limit (PQL) for EPA Test Method 8010 of 1.8 µg/l for vinyl chlorides. For this project, the achievable PQL is 1.0 µg/l for vinyl chloride.

The variability associated with detection of vinyl chloride at Sites IR-6 and IR-10 does not appear to be a problem given that vinyl chloride was detected in particular wells in multiple sampling rounds, confirming its presence. The concentrations of vinyl chloride and its parent chlorinated solvents (e.g., PCE, TCE, DCE, and DCA) appear to vary through time. It is possible that the low concentrations observed in samples collected in June 1990 and January 1991 are due to dilution by recharge.

Benzene was observed at concentrations of 55, 42, 72, and 4 µg/l in Monitoring Well IR06MW22A. With the exception of the 4 µg/l, this amount of variability is expected for groundwater monitoring data. The 4 µg/l sample was collected in January 1992 and may have been diluted by infiltrating rainwater; note that other frequently detected volatile organic compounds were not detected in this sampling round and that the lowest concentrations of several major ions (e.g., calcium, sodium, and potassium) were also observed indicating possible dilution effects. Subsequent quarterly monitoring of well IR06MW22A and other wells will continue to provide additional data on seasonal variability in groundwater concentrations.

Comment 7: Detection limits are a problem with the following data: IR06B002, IR06B005, IR06B015, IR06B017, IR06B019, IR06B020, IR06B025, IR06B033, IR06B036, IR06MW32A, IR06SS04, IR06SS09. If detection limits are high, these borings may not be used to define the outer limits of contamination.

Response: In general, all of the samples associated with these borings had elevated levels of TPH as diesel and TOG. Due to the high levels of TPH as diesel and TOG, the samples required dilution for the CLP SOC analyses, which resulted in increased detection limits for those analytes. Because of the high concentration of hydrocarbons, dilutions are unavoidable using standard CLP analytical methods. However, the TPH as diesel and TOG analyses, which measure SOC components, provided useable data to define the extent of hydrocarbon contamination.

Comment 8: Plate 98: It is difficult to read the well/boring numbers in the top left corner of the plate.

Response: Comment acknowledged.

7. Comments on Contaminant Fate and Transport (Appendix J)

Comment 1: Page J-2: Expand discussion with mention of the Bay as the final outfall regarding "soil or groundwater entering the storm . . . carried offsite to

discharge at the storm drain outfalls." Also, should flow across the site to the Bay be included?

Response: The effects of contaminants on San Francisco Bay will be assessed after completion of the Ecological Risk Assessment (ECA), the Tidal Influence Monitoring Program, and other facility-wide investigations. These studies will be included in the future parcel-specific RI/PHEE/FS reports.

Comment 2: Page J-2, J-6, J-7: Expand on the discussion of breakdown products. Include a chart which shows the degradation pathways for all VOCs, xylenes, ethylbenzenes, DDs, and PAHs found at the site.

Response: The discussion of breakdown products will be expanded in future parcel-specific RI/PHEE/FS reports as appropriate. A chart showing the degradation pathways for chlorinated VOCs will also be included. Degradation pathways for BTEX compounds, DDT, and PAHs will also be discussed.

Comment 3: Expand discussion of Total Oil and Gas, to include mobility and explanation for presence.

Response: The discussion of total oil and grease will be expanded in the parcel-specific RI reports as appropriate.

Comment 4: Page J-9: Other metals, in addition to those listed are found above background. Please revise.

Response: The list will be updated in the parcel-specific RI report to include all metals detected above interim ambient levels in soil as appropriate.

Comment 5: Page J-9 This section should be revised for better clarity.

Response: Comment acknowledged.

Comment 6: Page J-10: The sentence regarding hexavalent chromium starting with "the hexavalent species that are stable in aqueous . . ." is confusing and should be revised. Again, any time hexavalent chromium is mentioned please clarify that there is no background level.

Response: Comment acknowledged. Any detectable hexavalent chromium will be considered to be above interim ambient levels in future reports.

Comment 7: Page J-12: In the air pathways discussion, include mention of current surface conditions at the IRs, i.e., areas which are paved, areas with buildings (for example, IR-6).

Response: Current surface conditions will be included in the parcel-specific RI/PHEE/FS reports as appropriate.

II. EPA COMMENTS AND NAVY RESPONSES

EPA GENERAL COMMENTS

Comment 1: In our May 4, 1992 letter to the Navy transmitting comments on the Technical Memorandum for Background Soil and Groundwater Conditions, we stated that we did not believe the approach used to determine background conditions was appropriate. In our June 10th meeting with your staff and consultants, we requested that background levels not be used at this time. We requested that the risk assessment be performed first, and that metals would not be eliminated based on background values if they presented an elevated risk. It is our understanding that the Navy agreed to this approach. PAHs should be presented similarly.

However, this RI report continues to evaluate and present results based on comparison to background levels we have not agreed upon. We request that you eliminate the use of these background levels in the Draft Final RI report and simply present the data as directly as possible.

In addition, the Navy should present the data without attempting to distinguish hazards based on source (e.g., point source versus non-point source). It seems, based on the long and varied site history and the unknowns regarding releases and practices, that attempting to attribute contaminants to point versus non-point or anthropogenic sources is based on speculation. The report seems to minimize the importance of contamination from so-called non-point sources. The cleanup criteria for this site should be risk and ARARs (applicable or relevant and appropriate standards) driven regardless of source.

Response: The OU II RI report was nearly complete prior to the June 10, 1992 meeting, therefore it was not possible to revise the use of background levels in the Draft report. As discussed in the regulatory agency meeting on August 13, 1992, the results of the background study will be used as an interim indicator of ambient chemical conditions within the fill material. The Navy recognizes that the regulatory agencies have not approved the background study and that the levels presented in this report are representative of ambient conditions and are subject to revision. Interim ambient levels are not intended to indicate risks or cleanup goals.

The purpose of attributing contamination to point and nonpoint sources was not to minimize the importance of nonpoint sources but to distinguish between contaminants that could be characterized within the scope of the RI for OU II sites and constituents that are found throughout the HPA facility and therefore cannot be fully characterized (i.e., the lateral and

vertical extent defined) within the scope of the OU II RI. Risks and remedial alternatives associated with contamination from nonpoint sources will be investigated and addressed on a parcel-specific or facility-wide basis. The cleanup criteria for nonpoint sources will be based on risk calculations and ARARs.

Comment 2: This RI report must include Federal/State chemical and location specific ARARs and TBCs (to be considered) for all media. Action specific ARARs can be included in the Feasibility Study. The chemical specific ARARs must be compared to the chemical concentrations in the RI report.

Response: As agreed in the agency meeting on August 13, 1992, chemical data presented in future RI reports will be compared to relevant promulgated standards such as Maximum Contaminant Levels (MCLs) for groundwater. The analytical results for groundwater presented in the draft report are compared to MCLs promulgated prior to June 1, 1992, in attached Tables 1 through 8. Surface water results are compared to RWQCB Basin Plan Objectives (attached Tables 9 through 14) and air sample results are compared to Permissible Exposure Limits (attached Tables 15 and 17).

Comment 3: On pages ES-8, 5, 112, and 117, the report should include information on the Operable Unit Proposed Plan/public comment and ROD phases of the process. It is not in accordance with the Federal Facilities Agreement (FFA) to simply refer to the site-wide ROD. On page 5, it states that "Site-specific remedial actions, if necessary, may be implemented before the entire HPA facility is characterized." This language is misleading. It is intended that site-specific remedial actions will be implemented, if warranted, before the site-wide characterization and ROD are completed.

Response: Comment acknowledged. The Navy agrees that site-specific remedial actions will be implemented, if appropriate, before the facility-wide characterization and ROD are completed.

Comment 4: Page 1 states that the FFA was signed 1/22/92; it was originally signed in September, 1990, and amended in response to public comment on 1/22/92. This language should be changed to show the FFA has been in place and work has been being performed under its terms for a longer period of time.

Response: Comment acknowledged. Future reports will indicate that the FFA was originally signed in September, 1990.

Comment 5: On page 17, Section 3.9, the report states that the uses of 27 private wells within a two-mile radius of the geographic center of HPA are unknown. An explanation should be provided for why the uses of these wells are unknown. Also, more information regarding the Albion Mountain Spring Water Company well should be provided. Is this well

regularly monitored? How is it regulated? The report should explain the relationship of the site to the regional aquifer and address whether there could be any site related impacts to the private or Albion wells. Such information is important from a public disclosure standpoint.

Response: No data are available on the past usage of the 27 wells; at present these wells are listed as lost or abandoned by the San Francisco Department of Water Quality.

On the basis of existing hydrogeologic data, the spring on Innes Avenue which is used by Albion Mountain Spring Water, is not hydraulically connected with any aquifer of concern at HPA; it is upgradient both topographically and hydraulically of HPA. Additional information on the relationship of groundwater flow at HPA to regional groundwater flow and potential impacts to private or public groundwater supplies will be included in future RI reports, if appropriate.

Reference:

San Francisco Department of Health (DOH), Environmental Health Section, 1991. Personal communication with Lorraine Anderson. May 29.

Comment 6: This report identifies several data gaps but does not explain how and when these, or other gaps identified during the RI review process, will be filled relative to the schedule for this Operable Unit.

Response: See response to DTSC General Comment 2.

A. GENERAL COMMENTS

1. Comments on Limited Data Analysis

Comment 1: The level of data analysis in Sections 4, 5, and 6 is not sufficient. As was commented on in previous reports, the presentation of chemical concentration data as ranges (many times several orders of magnitude) or maxima does not adequately represent complex data sets. For larger data sets (e.g., more than 6 to 10 values), histograms presenting frequency of occurrence versus concentration and/or cumulative frequency versus concentration should be prepared. The geometric mean and/or median values of concentrations should also be computed and reported. In some instances, standard deviations should also be provided.

Response: The arithmetic means and standard deviations will be included in summary tables in parcel-specific RI reports as appropriate. The distributions of chemicals detected in more than 6 to 10 samples are generally presented on plates; therefore, histograms were not prepared for each data set that contained more than 6 values. Presentation of the arithmetic mean should be sufficient to evaluate whether the data are skewed to the high or low end.

Comment 2: The 8-1/2 x 11 copies are not useful. They reduce the "D" size drawing so much that they are barely readable. Using 11 x 17 reductions may improve legibility; otherwise the reductions should be eliminated altogether. In terms of data analysis, the reduced size plates presenting concentration contours are of no value because labels are too small to read.

Response: Comment acknowledged. Reduced-sized plates will not be included in future reports.

Comment 3: Terms used for data analysis are not well defined. In particular:

- A) Criteria for determining which compounds are "most consistently detected" should be specified.
- B) The term "elevated concentration" is used throughout the text. It should be more clearly defined and used consistently to mean either "detectable concentration" or "above background concentration."

Response: The term "most consistently detected" generally refers to those constituents detected at a frequency of 5 percent or greater. This term will be defined in future reports. The term "elevated concentration" will be defined if it is used in future reports.

2. Comment on Laboratory Contaminants

Comment 4: The report is very quick in stating that particular chemicals are "laboratory contaminants." Such assertions need to be supported by evidence. If, in fact, a laboratory contaminant is present, it should show up in field, trip and/or laboratory blanks, as well as samples. This type of supporting evidence needs to be included in the report.

Response: Laboratory blank contamination is described in Tables C6 through C11 of Appendix C. Field blank results for soil sampling equipment rinsate blanks are presented in Tables C10 and C11. Although laboratory preparation and method blank results are not presented directly, blank results were reviewed and qualifiers were assigned using methods described in Appendix C. CLP Organic results were qualified by the laboratory with a "B" when the associated laboratory blanks displayed contamination.

3. Comments on Nonpoint Sources

Comment 5: It is important that the authors and the Navy realize that all of the contamination on site has the potential to be harmful to humans and the environment. The report seems to minimize the importance of contamination from non-point sources. Many of the listed non-point sources are directly related to HPA activities (e.g., asphalt-paved

surfaces, on-site traffic emissions). The cleanup criteria must be risk driven, regardless of the source.

Response: The purpose of dividing contamination into point and nonpoint sources was not to minimize the importance of these sources but to distinguish between contaminants that could be characterized within the scope of the RI for OU II sites and constituents that are found throughout the HPA facility and therefore cannot be fully characterized (i.e., the lateral and vertical extent defined) within the scope of the OU II RI. Risks and remedial alternatives associated with contamination from nonpoint sources will be investigated and addressed on a parcel-specific or facility-wide basis.

4. Comments on the Definition of Aquifer

Comment 6: From the perspective of a hydrogeologist, the report uses the term "aquifer" incorrectly. Fetter defines an aquifer as "Rock or sediment in a formation, group of formations, or part of a formation which is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs." While any or all of the three hydrogeologic units discussed in the report may be aquifers, insufficient data exists to make a determination at this time. It is also possible that they are all units of the same aquifer. "Hydrogeologic unit" would be a better term to describe them. However, "aquifer" is acceptable if an alternative definition is provided the first time it is used.

Response: An aquifer, as defined at HPA, consists of saturated, relatively permeable, native geologic or man-made materials that occur at a similar elevation and is relatively continuous in lateral extent, of similar depositional origin, and appear to be in hydraulic continuity. For example, the A-aquifer consists of artificial fill materials and Undifferentiated Upper Sand Deposits that overlie Bay Mud Deposits or bedrock. In accordance with the definition, the A-aquifer consists of (1) relatively permeable saturated artificial or native geologic materials with localized areas of low-permeability clay fill, (2) materials that exist at similar elevations (i.e., local elevation greater than those of the Bay Mud Deposits or bedrock), (3) materials that have been deposited primarily by man (i.e., filling or dredging operations), and (4) saturated materials that exhibit spatially continuous hydraulic gradients and are not separated by relatively continuous layers of low-permeability materials (i.e., aquitards).

The definition of an aquifer as defined by HPA will be added to future reports as appropriate.

Comment 7: In general, the study would benefit from a more thorough description of the other two hydrogeologic units (B-hydrogeologic unit and bedrock hydrogeologic unit). More information is needed to define the two deeper hydrogeologic units. A tabulated summary table for vertical gradients (including well pairs, screen intervals, formation screened,

water levels, and gradient (magnitude and direction)) would be very useful.

Response: In comparison to the A-aquifer, information on the B-aquifer and the Bedrock Aquifer is limited. As additional information is obtained, the characteristics of these two lower aquifers will be expanded in future reports.

5. Comments on Fate and Transport

Comment 8: Generally, a fate and transport model should be prepared after the completion of a full site characterization. Fate and transport conclusions should be based on a full integration of specific site information such as geology, hydrogeology, chemical and biological activities, and any other pertinent information concerning possible health risk exposure. It must be clearly stated that the model in this report is based on the limited physical area and limited data collected for the OU II sites as compared to the entire HPA site. The model may not be applicable to HPA as a whole due to lack of data in crucial areas.

Response: The conceptual model presented in the fate and transport section is limited to data collected at OU II sites and may not represent the entire HPA facility. More detailed fate and transport models may be developed in future parcel-specific RI/PHEE/FS reports, if deemed necessary.

Comment 9: To be complete, the fate and transport model should identify potential receptors. Further, potential receptors should be separated from sensitive receptors. In order to identify sensitive receptors, a "zone of impact" or "zone of potential impact" should be identified. Some of the sensitive receptors are mentioned in the summary, but are not evaluated in this section.

Response: Identification of potential receptors was not within the scope of the OU II RI report. Potential receptors are identified and evaluated in the PHEE report for OU II sites.

Comment 10: Potential impact on the Bay in general is not identified. Some aquatic animals and plants are more sensitive than others to toxic substance releases.

Response: An evaluation of the potential impact to the Bay was not within the scope of the OU II RI report. Potential impacts to the Bay will be addressed during the implementation of the Environmental Sampling and Analysis Plan (ESAP) and the Ecological Risk Assessment Work Plan (ECA).

Comment 11: There is no discussion in the Fate and Transport section of the chemical pathway. The model should correlate specific site conditions to chemical movement in the soil and groundwater. The criteria of chemical pathway and parameters are discussed in the EPA seminar publication entitled

"Transport and Fate of Contaminants in the Subsurface" (EPA/625/4-89/019, September 1989).

Response: It is unclear what is meant by the term "chemical pathway." Such a term is not mentioned in the referenced EPA publication. Specific chemical and biological processes in soil and groundwater (e.g., sorption, retardation, and biodegradation) are discussed in Section 7.0 and Appendix J of the draft report for each chemical. Site-specific conditions that have a significant bearing on the movement of a particular chemical are pointed out in general terms where applicable. More extensive fate and transport modeling and correlations of site-specific conditions to chemical movement in soil and groundwater may be addressed, if necessary, on a parcel-specific or facility-wide basis in future reports.

B. SPECIFIC COMMENTS

1. Comments on the Executive Summary

Comment 1: Pages ES-1 and ES-2, final sentence continued to top of next page. It is incorrect to say that the commercial ship repair facility "operated at HPA." HPA (Naval Station, Treasure Island, Hunters Point Annex) did not exist from 1869 through 1939. More important, the peninsula shoreline has been reshaped and expanded by cut and fill activities following its purchase by the U.S. Navy. The areas in which previous commercial shipyard activities occurred may well have been destroyed, buried, or otherwise made unidentifiable at because of Navy civil engineering projects. The text in Section 1.2.1 correctly states that the commercial facility operated at "Hunters Point," i.e., the peninsula, not the Naval facility.

Response: Comment acknowledged.

Comment 2: Pages ES-5 through ES-7, Site Conditions. The extent and degree of contamination should be summarized in greater detail for each IR. For example:

- A)** The section discussing, IR-8 should also mention the Base Laundry and the TCA contamination which appears to be related to it.
- B)** For IR-9, the levels of contamination found for hexavalent chromium should be listed.
- C)** For IR-6/10, the summary fails to mention that PCBs were found.

Response: The parcel-specific RI reports will address the extent and degree of contamination in greater detail for each IR site, if appropriate.

Comment 3: Pages ES-5 through ES-7, Site Conditions. Although the list on page ES-4 mentions that a radiation survey was conducted for each site, no mention of the results is made. Either mention of the radiation survey should be removed from the Executive Summary or the Executive Summary should include a statement that the results of the radiation survey are not yet available, but will be presented in a separate report.

Response: Comment acknowledged.

Comment 4: Pages ES-7, Site Conditions IR-6 and IR-10, Paragraph 1. The second sentence in this paragraph states that chlorinated solvents were found at and near the Tank Farm. The text in Section 6.4 does not agree with this. This discrepancy needs to be corrected.

Response: Comment acknowledged. Chlorinated solvents were found at and near the tank farm.

Comment 5: Page ES-7, Conclusions. The criteria used to determine that the nature and extent of contamination have been adequately characterized should be presented.

Response: The criteria used to determine that the nature and extent of contamination were adequately characterized will be included in future parcel-specific RI reports as appropriate.

2. Comments on Section 1.0, Introduction

Comment 6: Page 3, Section 1.2.1, Paragraph 1. The text uses "landfill" in several places when what is probably meant is "backfill" or fill. Since parts of the facility are landfills (i.e., solid waste disposed of by burial in the ground) it would be much less confusing if the terms were used in line with their usual definitions.

Response: The term "fill" will be used in future reports except where the fill is industrial materials or refuse.

Comment 7: Page 5, Section 1.2.2, Paragraph 1. Based on interpretation of the maps of the facility, Hunters Point annex is bounded by the San Francisco Bay on the northeast, southwest, and southeast, and by the Hunters Point District on the northwest. In addition, it extends southeast into the bay. Use of these more accurate compass directions throughout the report would improve the descriptions of locations of facilities, activities, and physical features.

Response: More accurate compass directions will be used to clarify the location of HPA in future reports.

3. Comments on Section 3.0, Physical Characteristics of HPA

Comment 8: Page 13, Section 3.1, Sentence 3. This sentence describes the ridge as "moderately sloping" which disagrees with the Executive Summary which says "moderately to steeply sloping." Moderately to steeply sloping is the more accurate description.

Response: The text of future reports will state that the ridge is "moderately to steeply sloping."

Comment 9: Page 13, Section 3.1, Paragraph 1. A distinction should be made to indicate that portions of the lowlands were formed as the result of cut-and-fill or backfill and other portions by landfill (waste disposal).

Response: A distinction will be made in future reports between lowlands formed by cut-and-fill versus landfilling operations.

Comment 10: A) Page 13, Section 3.2. Capitalization of "Bay Mud" is not consistent throughout this section. Since Bay Mud is being used as the name of a stratigraphic unit, rather than a lithologic term, and other units are capitalized consistently throughout this section [e.g., Undifferentiated Upper Sand Deposits (Quus) and Artificial Fill (Qaf)], Bay Mud should also be capitalized consistently.

B) In following sections of the report, stratigraphic units described in this section should be capitalized consistently.

C) Page 14, Section 3.3. The term bay mud is used to describe two concepts in this section. In the second sentence, the phrase "separated by bay mud" should be "separated by Bay Mud Deposits" as it is a description of stratigraphic relationships. In the third sentence, which states that "bay mud...acts as an aquitard," what is meant is that "the fine-grained portions (clays and silts) of the Bay Mud Deposits act as an aquitard."

Response: A) Stratigraphic units are capitalized in the draft report when the complete formal name of the unit is used (e.g., Bay Mud Deposits). When only a portion of the formal name is used, the shortened version of the name is not capitalized (e.g., bay mud). HPA reports will continue to use this convention when describing stratigraphic units.

B) See above response.

C) The bay mud aquitard will be defined as the fine-grained portions of the Bay Mud Deposits in future reports as appropriate.

Comment 11: Page 14, Section 3.3, Paragraph 1. A more complete description of the hydrogeologic units at the facility is needed, including information noting that the B-hydrogeologic unit does not exist in parts of the facility, and that the Bedrock hydrogeologic unit is hydraulically connected to the A-hydrogeologic unit in some locations.

Response: A more complete description of the hydrogeologic units or "aquifers" found at the facility will be included in the parcel-specific RI reports as appropriate. The descriptions of the hydrogeologic units at HPA are evolving as further investigation occurs and may be revised in future reports as additional information becomes available.

Comment 12: Page 15, Section 3.5, Sentence 4. This sentence appears to contain two ideas which would be better presented in separate sentences, namely: "San Francisco Bay at HPA is characterized by strong tidal currents which has [fill in the blank] impact on the ecology. At HPA, the Bay shoreline is characterized by physical structures such as rip rap and docks which serve as artificial habitats for estuarine life."

Response: Comment acknowledged.

4. Comments on Section 4.0, RI of PCB Spill Area (Site IR-8)

Comment 13: Page 22, Section 4.2.3.4, Paragraph 1. A more thorough discussion of the changes in the sampling program should be included. The discussion provided, when combined with Table 4, is unclear.

Response: Comment acknowledged. Changes to the sampling program will be clarified in parcel-specific RI reports as appropriate.

Comment 14: Page 26, Section 4.3.2.1, Paragraph 1. Given that no borings were drilled through the Bay Mud, no evidence exists to confirm or deny the existence of either the B-hydrogeologic unit or the bedrock hydrogeologic unit. This section should be changed to reflect this fact.

Response: The existence of the B-aquifer and Bedrock Aquifer is expected but not confirmed beneath the bay mud at this site. This information will be included in the parcel-specific RI report as appropriate.

Comment 15: Page 26, Section 4.3.2.2, Paragraph 2. The first sentence discusses "pumpage out of the sanitary sewers." Does this refer to pumpage out of a sump at a pump station in or near IR-8, or exfiltration which recharges the hydrogeologic units?

Response: Pumpage of the sanitary sewers refers to pumpage of sewage at the main pump station at Building 819, not exfiltration into the A-aquifer.

Comment 16: Page 27, Section 4.3.2.4.1. This section states that one sample was collected, but one was tested and others could not be tested. The first sentence should state the correct total number collected.

Response: Comment acknowledged. Five samples were collected.

Comment 17: Page 29, Section 4.3.2.4.3, Paragraph 3. The references to Table 8 and Table 9 are reversed. Table 8 is slug test results and Table 9 is constant-rate discharge testing.

Response: Comment acknowledged.

Comment 18: Page 29, Section 4.3.2.4.3, Paragraph 3. Examination of the hydraulic conductivities calculated from the slug tests and the pump test shows that variation is a factor of between 0.25 (4.66/19) and 1.7(4.66/2.7) for Well IR08MW37A. This does not agree with the "factor of five to ten." Either the text should be corrected, or the exceptions should be noted.

Response: The factors referred to in this section, are based on the maximum value divided by the minimum value. On this basis, the slug test and constant-rate discharge test results for Well IR08MW37A differ by approximately a factor of 5 (12.7/2.7). Similarly the difference between slug test and constant-rate discharge test results for Well IR08MW38A differ by approximately a factor of 4 (24.6/6). As appropriate, the text of future reports will clarify the way factors are calculated.

Comment 19: Page 30, Section 4.3.2.5, Paragraph 2. As mentioned in the general comments, this section should provide more information on the vertical gradients.

Response: All wells installed at Site IR-8 are screened at approximately the same interval (the entire thickness of the uppermost aquifer). No well pairs were installed in the A-aquifer, and no wells were installed in a deeper aquifer unit; therefore, information is not available at this site for the calculation of vertical gradients.

Comment 20: A) Page 32, Section 4.4.1.3, Paragraph 1. Description of potential non-point sources should make a distinction between undisturbed, naturally occurring geologic materials and disturbed, naturally occurring geologic materials (i.e., cut and fill) which may well release different levels of chemicals to the environment. Disturbed, naturally occurring geologic materials are a form of anthropogenic source and, in the case of HPA, contaminants resulting from disturbed materials could be considered the responsibility of HPA.

B) Page 32, Section 4.4.1.2, Paragraph 2. This paragraph describes a non-point source, "landfilling," which is the result of HPA

activities. Contaminants resulting from this source on site should be considered the responsibility of HPA.

Response: As stated in the response to EPA general comment No. 5, contaminants associated with nonpoint sources are outside the scope of OU II. Risks associated with nonpoint sources and the need for remedial action should be assessed on a parcel-specific or a facility-wide basis.

Comment 21: Page 32, Section 4.4.1.3, Paragraph 2. The word "landfill" should be replaced with the word "backfill."

Response: The word "filling" will replace "landfilling" in future reports where appropriate.

Comment 22: Page 34, Section 4.4.4.1, Paragraph 1. A more in-depth analysis needs to be performed before all of the toluene data is eliminated from consideration. For example, does it occur in the same sample as benzene, ethyl benzene, and/or xylene, and at about the same levels? This would indicate a true reading rather than contamination. Are there a cluster of low readings and several higher ones? Again, this would indicate that the higher values are legitimate.

Response: A review of the Site IR-8 CLP VOC soil sampling results revealed that toluene was detected in 56 of the 98 analyses. The vast majority of the detected occurrences were qualified by the laboratory as unreliable due to toluene's history as a common laboratory contaminant. The detected toluene results were analyzed for a benzene, toluene, ethyl benzene, and xylene (BTEX) chemical signature typically associated with gasoline. Benzene, ethyl benzene, or xylene appeared with toluene in six samples from four borings (Borings IR08B010, IR08B032, IR08B035, and IR08MW38A). The limited occurrence of these compounds (6 of 56 samples or 10%) with associated toluene suggests localized gasoline contamination. These localized areas of contamination are identified by the presence of benzene, ethyl benzene, and xylene.

Most of the detected occurrences of toluene (50 of 56) had no associated BTEX signature and are considered unreliable due to sample contamination from the electrical tape used to seal the soil sample tubes. Sample contamination from electrical tape has been clearly substantiated as described to the regulatory agencies at the Technical Review Committee Meeting on October 18, 1991. The minutes from the meeting indicate that it was agreed by all parties that the ubiquitous presence of toluene in soil samples was due to the electrical tape. It was proposed that the frequency of detection of toluene in samples sealed with the tape would be compared to those without the tape. The majority of the OU II soil samples were collected and sealed with tape. Only 22 samples from Sites IR-6 and IR-10 were collected without the tape. To compare samples sealed with the tape to those without the tape, data from

Sites IR-1, IR-2, IR-3, IR-4, IR-5, IR-6, and IR-10 were reviewed and are summarized in the table below.

Site	Frequency of Detection of Toluene in Samples With Electrical Tape (# of Detects/# of Analyses)	Frequency of Detection of Toluene in Samples Without Electrical Tape (# of Detects/# of Analyses)
IR-1	88/190	14/127
IR-2	309/445	11/208
IR-3	51/65	6/28
IR-4	128/145	0/104
IR-5	46/108	2/127
IR-6	68/141	0/15
IR-10	56/70	0/7

These data support the conclusion that the electrical tape was the principal source of the toluene in the soil samples.

Comment 23: Page 35, Section 4.4.4.2, Paragraph 1. Sentence 4 is unclear. Does this mean the maximum detected in a sample, in a boring, or at the site?

Response: The sentence refers to the maximum detected in a sample.

Comment 24: Page 36, Section 4.4.4.2, Paragraph 4. Simply stating that phthalate is a laboratory contaminate is not sufficient. Some evidence must be provided.

Response: Several of the phthalates detected at Site IR-8 were also detected in laboratory blanks in at least one sample delivery group (SDG) associated with samples from IR-8. In addition, toluene (attributed to electrical tape contamination) was found in numerous Site IR-8 soil samples where phthalates were detected. Phthalates, which are common constituents of plastics, may have been introduced as contaminants during laboratory handling. The source of the phthalates may be electrical tape or other plastics that came in contact with the tape such as laboratory plastic gloves (e.g., during laboratory handling) and the caps used to seal the soil tubes. It is therefore suspected that the phthalates may be related to handling or laboratory contamination. This issue may be discussed further in future reports.

Comment 25: Page 36, Section 4.4.4.3, Paragraph 1. The 40 PCB samples were analyzed by two different methods, CLP and Modified EPA 8080. How does this effect the results? Please add a discussion of this subject to the text.

Response: The primary difference between the test method CLP Pesticides/PCBs and the Modified EPA Test Method 8080 is the elimination of the analysis of the organochlorine pesticides from the EPA method. The two methods are very similar in their analysis of the PCBs; both methods use a gas chromatograph with an electron capture device. The methods use the same extraction procedure. Subtle differences exist in the instrument calibration and compound verification methods. The method detection limits are essentially equal although the reporting limits appear to be different. The CLP method is reported at the contract-required quantitation limit (CRQL) while the modified EPA Test Method 8080 is reported at the method detection limit (MDL).

Comment 26: Page 36, Section 4.4.4.3, Paragraph 1. The second sentence is unclear. Does this mean that only one of the samples from 0 to 2.5 feet contained an Aroclor 1260 concentration above 1 mg/kg, and that only one of the samples from 2.5 to 6.5 feet contained an Aroclor 1260 concentration above 1 mg/kg? Please clarify this sentence.

Response: Only one sample from 0 to 2.5 feet bgs and only two samples from 2.5 to 6.5 feet bgs contained Aroclor 1260 above 1 mg/kg.

Comment 27: Page 37, Section 4.4.4.4, Paragraph 1. Table 15 indicates that 301 samples were analyzed, but the text indicated that only 248 were. This discrepancy should be corrected.

Response: The text stated that 301 samples were analyzed for pesticides, which is correct. An additional 53 samples should also have been analyzed for pesticides but were not analyzed due to laboratory error. A total of 354 samples were collected for pesticide analysis.

Comment 28: A) Page 40, Section 4.4.4.7. The relationship of metals concentrations to Toxicity Threshold Limit Concentrations (TTLC) would be appropriate as some of the concentrations detected are above these limits. This applies in particular to the discussion of lead concentrations on Page 40.

B) Page 39, Section 4.4.4.7, Paragraph 2. Sentence three states that the metals were present at "low concentrations." What is considered low? What criteria were used to determine this?

C) Page 40, Section 4.4.4.7, Paragraph 1. Sentence two states that "the occurrence of these metals is localized." This suggests point sources rather than non-point sources. Please explain or correct this discrepancy.

- Response: A) Only nickel exceeded TTLCs at this site. However, comparison of soil data to TTLCs is not particularly useful as a method of evaluation of soil chemistry data for the purpose of this RI. It indicates that metal concentrations exceed hazardous waste levels but does not indicate a level of risk.
- B) Qualifiers such as low, high, elevated, etc., will either be defined or avoided in future reports as appropriate.
- C) Although the occurrence may be localized at levels above ambient conditions, the distribution does not indicate that it is point source contamination. The distribution of metals observed at this site is more likely the result of nonpoint sources. Similar isolated areas where concentrations exceed interim ambient levels may be found at other sites.

Comment 29: Page 41, Section 4.4.5.1, Paragraph 1. The text states that xylene was detected at concentrations slightly above the detection limit, yet the reported values for xylene vary by almost one order of magnitude. Please explain or correct this discrepancy.

Response: Comment acknowledged. Xylenes were detected at concentrations from below the reporting limit to about 3 times above the reporting limit. The reporting limits varied from 1 $\mu\text{g}/\text{kg}$ to 6 $\mu\text{g}/\text{kg}$.

Comment 30: Page 41, Section 4.4.5.2, Paragraph 1. Sentence three states that Benzo(b)fluoranthrene was detected in both rounds. However, there were five rounds of sampling. Please explain this.

Response: Benzo(b)fluoranthrene was detected in Monitoring Well IR08MW42A, which was installed during the contingency phase of RI sampling and only sampled twice. Benzo(b)fluoranthrene was detected in both contingency phase sampling rounds (Rounds 4 and 5) in Well IR08MW42A.

Comment 31: Table 18. The table lists nine detects for hexavalent chromium and a minimum value greater than the background value; however, it only lists six values that are greater than background. Please correct this.

Response: Table 18 is correct. Hexavalent chromium was detected in nine samples, but only from six different borings. Hexavalent chromium was detected in more than one sample from some borings.

Comment 32: Table 20. This table lists six detects for beryllium, yet the maximum and minimum values are the same. Is this accurate? If it is not, please correct it.

Response: Table 20 is correct. All six detected values of beryllium were the same. Beryllium was detected in only one sampling round and at the same concentration in all wells.

5. Comments on Section 5.0, RI of Pickling and Plate Yard (Site IR-9)

Comment 33: Page 45, Section 5.1.2, Sentence 3. More information describing how one of the three acid storage tanks was located would provide a better picture of the possible location of the remaining two tanks. If the tank was located by visual inspection, this would suggest that the remaining two tanks may still be present, but not visible (buried, floored over, etc.). If the tank was located using geophysical methods, this would suggest that the remaining two tanks are not still present.

Response: According to HPA as built engineering drawings, there were two aboveground acid storage tanks at Site IR-9. The drawings do not indicate any below grade tanks. Based on visual inspection only one tank remains. Because these tanks were above ground, it is not likely that additional tanks are present that have not been located.

Comment 34: Page 51, Section 5.3.2.1. The information that the Undifferentiated Sedimentary Deposits form the B-hydrogeologic unit in other portions of the site should be reiterated here. Otherwise, this section contradicts the description of facility-wide hydrogeology presented in Section 3.3. In addition, this information may have an impact on fate and transport of groundwater contaminants, if present.

Response: The information that the Undifferentiated Sedimentary Deposits form the B-aquifer in other parts of the site will be included in future reports as appropriate.

Comment 35: Page 52, Section 5.3.2.2, Paragraph 1. More detail is needed concerning the relationship between the sewer and the groundwater. How deep is the sewer line? What is its relative depth with regard to the water table?

Response: The sanitary sewer line adjacent to Site IR-9 beneath Hussey Street is at an elevation of approximately -1 foot MSL (YEI, 1988). The sanitary sewer line is approximately 1 to 2 feet below the water table at Site IR-9 in the vicinity of the sewer line. The relationship between the sewer and groundwater will be investigated further during the implementation of the Site Inspection Work Plan for underground utilities.

Reference:

YEI Engineers, 1988a. *Utilities Technical Study, Phase 2, Naval Station, Treasure Island, Hunters Point annex, San Francisco, California, Volume V, Sanitary Sewer System.* Contact Number N62474-86-C-0969

prepared for Naval Facilities Engineering Command, Western Division, San Bruno, California. April.

Comment 36: Page 52, Section 5.3.2.2, Paragraph 2. Is there any explanation as to why the water-level elevations were higher in February? Were they caused by infiltration of rainwater?

Response: It is suspected that the water levels were higher in February because of the heavy rainfall during that month.

Comment 37: Page 52, Section 5.3.2.2, Paragraph 2. The references at the end of this paragraph should be to Plate 45 rather than to Plate 48.

Response: Comment acknowledged.

Comment 38: Page 53, Section 5.3.2.2, Paragraph 1. It should be noted in the text that the two piezometers were screened at different depths.

Response: Comment acknowledged.

Comment 39: Page 55, Section 5.3.2.4, Paragraph 3. Review of the hydraulic conductivities calculated from the slug tests and the pump test indicates that they vary by a factor of between 2 (42.7/24) and 6.4 (35.2/5.5) at Well IR09MW35A. The hydraulic conductivities calculated from the slug tests and the Theis Recovery Method for Well IR09MW35A vary by about 3/4 of an order of magnitude (5.5 versus 42.7). These exceptions to the stated factor of "5 to 10" should be noted.

Response: See response to Comment No. 8.

Comment 40: Page 57, Section 5.4.1.1. The statement that water-level differences suggest no hydraulic communications between the tanks may not be accurate. First, the measurements were corrected to depth below ground surface, but no statement is made to the effect that ground surface elevation is the same for all five measurements. Second, there may be some hydraulic communication between tanks 1 and 3 which are within 0.2 foot of the same measurement and have similar pH measurements.

Response: Hydraulic communication between Tanks 1 and 3 is not likely because the tanks sit in the containment vault, and, if there were communication between the two tanks, there would also be communication with the containment vault. The depth of water in the containment vault is 2 feet lower than the depth of water in the dipping tanks. The pH is also significantly higher (4.6 compared to 2.0) in the containment vault than in the pickling tanks.

Comment 41: Page 58, Section 5.4.1.2, Paragraph 2. There is no reference to when the wipe sample was conducted. Also, a listing of the metals found would provide a comparison with the residue on the drying racks.

Response: The date of the wipe sample and the results will be provided in the parcel-specific RI report as appropriate.

Comment 42: Page 60, Section 5.4.4.1, Last sentence. Forty samples out of 105 samples have detectable concentrations of toluene and methyl ethyl ketone (MEK). Therefore, they are not random and isolated cases as stated in the section. An additional statement should be included regarding the presence of MEK (if any) in triple blank and field blank samples. Without a more detailed explanation or data to support the conclusions presented, the presence of these contaminants cannot be disregarded.

Response: Comment acknowledged. The toluene and MEK distribution may not be random and isolated. Methyl ethyl ketone (MEK) is referred to by its synonym 2-butanone in Appendix C. Please see the response to comment 4 for the explanation of the presence of 2-butanone and the response to Comment 22 regarding the presence of toluene.

Comment 43: Page 60, Section 5.4.4.2, Paragraph 1. Sentence two mentions VOCs. It would be SOCs.

Response: Comment acknowledged.

Comment 44: Page 62, Section 5.4.4.5, Paragraph 2. Sentence two mentions that samples were collected down to 20 feet, whereas the first sentence of the section state that samples were collected down to 15 feet. Please correct this discrepancy.

Response: The deepest samples were collected from 15.5 to 16 feet below ground surface.

Comment 45: Page 64, Section 5.4.5.1. The text suggests that chloroform is a laboratory or field contaminate. Is there any evidence to support this? What were the results of the lab and field blanks?

Response: Chloroform was detected in the field blanks collected of decontamination source water used for cleaning the sampling equipment.

Comment 46: Page 66, Section 5.5, Bullet 3. The "shallow surface drainage lines" listed in this bullet are not referenced as a potential source in Section 5.4.1. Also, are these lines the same as the "shallow storm drain system" described at the top of page 46? Terminology should be consistent to avoid confusion.

Response: Comment acknowledged. The "shallow surface drainage lines" are the same as the "shallow storm drain system". The shallow drainage lines are considered a potential source.

Comment 47: Page 67, Section 5.5, Bullet 2. In reference to maximum concentration of delta-BHC in soil, there is no analytical result for the groundwater to support whether any pesticides are present in this area.

Response: The presence of pesticides in groundwater at Site IR-9 will be evaluated in the annual monitoring proposed in the *Facility Groundwater Monitoring Plan, (HLA, 1992)* and in parcel-related monitoring to be implemented in the future.

Reference:

Harding Lawson Associates, 1992. *Draft Final Facility Groundwater Monitoring Plan, Remedial Investigation/Feasibility Study, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California.* July 24.

Section 6.0 RI of Tank Farm (Site IR-6) and Battery and Electroplating Shop (Site IR-10)

Comment 48: Page 80, Section 6.3.2.2, Paragraph 1. As mentioned in the general comments, more information on the vertical gradients should be provided. This is particularly important in this area to assess the vertical extent of contamination.

Response: The results of vertical hydraulic gradient calculations will be provided in the parcel-specific RI reports as appropriate.

Comment 49: Page 83, Section 6.3.2.4, Paragraph 1. Review of the hydraulic conductivities calculated from the slug tests and the pump test indicates that they vary by a factor of between 1.3 (30.2/23) and 3.4 (2.78/0.81) at Wells IR06MW30A and IR10MW13A1. These exceptions to the stated factor of "5 to 10" should be noted.

Response: Comment acknowledged.

Comment 50: Page 83, Section 6.3.2.5. The flow velocity calculation is based on Darcy's Law using an assumed effective porosity of 0.10 to 0.35. The equation presented in the section is used to calculate the intrinsic velocity which considers the velocity within the pores. However, for RI purposes, we are more interested in the specific discharge (macroscopic velocity) which will serve as the basis to calculate the flow rate for the hydrogeologic units. Therefore, there is no need to consider porosity. If the intention of this section is to calculate intrinsic velocity, the effective porosity should be converted from the known porosity value instead of from assumption.

Response: Estimates of groundwater flow velocities will be provided in the parcel-specific RI reports to provide the reader with a general understanding of the range of groundwater flow velocities at each IR site and the potential velocity of contaminant transport in groundwater

assuming no retardation. In addition, groundwater flow velocities provide a basis for the prediction of contaminant travel times to potential receptors and the development of flow and transport models in the PHEE and FS reports, if needed. Published values of effective porosity were used for the estimation of groundwater flow velocities because (1) measured values were not available, (2) published values generally fall within a fairly narrow range, and (3) the heterogeneity of the artificial fill materials which comprise the A-aquifer preclude determination of precise values of effective porosity that are representative of the A-aquifer as a whole.

Comment 51: Page 83, Section 6.3.2.5, Paragraph 2. The two hydraulic gradients listed in sentence one, were accidentally reversed. Please correct this.

Response: Comment acknowledged. See response to Comment 8.

Comment 52: Page 85, Section 6.4.3. There are several inconsistencies between the statements and Tables 49 and 50.

- A) Bullet 2. Lead in the pre-storm water samples should be 12.9 $\mu\text{g/l}$ instead of 12.4 $\mu\text{g/l}$.
- B) Bullet 3. If "various stormwater samples" include storm drain water samples, then the statement should be revised to reflect the concentrations shown in Tables 49 and 50: Aroclor at 3.2 to 5.0 $\mu\text{g/l}$, TPH as diesel at ND to 5 mg/l, TPH as gasoline at ND to 5 mg/l, total oil and grease at ND to 65 mg/l.
- C) Bullet 3. The aluminum concentration is below detection in the runoff water samples and in the range of 0.5 to 1.65 mg/l in storm drain and pre-storm water samples, this means that the aluminum in the storm drain and pre-storm water samples may result from man-made sources. It should be noted whether this level of aluminum poses a concern.

Response: The text and tables were reviewed and will be revised as appropriate in the parcel-specific RI report. The evaluation of which chemicals are of concern is presented in the PHEE report.

Comment 53: Pages 86 and 87, Section 6.4.4.1, Paragraph 1. The sentence states that the samples had BTEX at concentrations up to 0.140, 0.500, 0.260, and 8.1 mg/kg, respectively. When compared to the data in Table 51, the first three maximum values are from CLP method, and the xylene maximum concentration is based on EPA method 8020. Since there are some differences between the CLP method (modified EPA method 8010) and EPA method 8020, the reported value should be made consistent only or the report should note that the concentrations are the results of different analytical methods.

Response: When more than one method was used for analysis of the same compound, it will be noted in future reports.

Comment 54: Page 87, Section 6.4.4.1, Paragraph 2. In reference to the numbers of soil samples with detectable concentration of BTEX, the numbers are not consistent with Table 51 and 52. For example, the total number of samples with detectable benzene concentration are six (three from IR-6 and three from IR-10) from Table 51 and 52, while the total number of samples stated in this paragraph for benzene are nine (one from 0 to 2 ft, three from 2 to 6 ft, and five from 6 to 20 ft).

Response: The text reported the total number of borings (not samples) in which a compound was detected by either method; therefore, the numbers reported in the text may not match tables that present the number of samples and detected values by method and compound.

Comment 55: Page 87, Section 6.4.4.1, Paragraph 3. The statement that "toluene was detected at low levels in soil samples throughout the site" does not take into account the possible relationship with BEX compounds. Comparison with the results in Tables 51 and 52 show that benzene, ethyl benzene, and xylene concentrations were also low. The low ethylbenzene and toluene concentrations may be caused by many means (man-made error, equipment error, etc.) but it is difficult to attribute the low toluene concentration only to the electrical tape used. This claim requires further substantiation.

Response: See the response to comment 22.

Comment 56: Page 88, Section 6.4.4.2, Paragraph 1. In reference to the statement that "Samples collected below 6 feet were generally not analyzed for SOCs," comparison with Plates 83 and 84 shows the extent of SOC contamination is greater in the lower zone (2 to 6 ft) than the upper zone (0 to 2 ft). In addition, if the wood fragments found in boring IR06MW42A (6 to 20 ft) are creosote treated wood, the PAHs may be desorbed from the wood to the surrounding environment and further adsorbed by the soils or transported by the groundwater. (The PAHs are major components in the creosote and have high affinity toward soils). Therefore, further investigation may be needed for the zone between 6 to 20 ft in order to determine the volume of contaminated soil.

Response: A comparison of the diesel and the oil and grease data with the PAH data from samples collected in the 0- to 6-foot depth interval (unsaturated soils) indicates that the PAHs detected are generally associated with diesel and oil and grease. It is, therefore, expected that the PAH distribution beneath the water table (saturated soils) would be similar to the distribution of diesel and oil and grease. Consequently, available data for diesel and oil and grease in soil can be used to estimate the volume of contaminated soil in the 6 to 20-foot depth interval.

Comment 57: Page 89, Section 6.4.4.2, Paragraph 2. The conclusion seems stretched based on the data shown in Plates 85 and 86. Based on the results shown on the two figures, the carcinogenic PAHs in the vicinity of Building 123 are correlated between the surface and lower zone samples. The carcinogenic PAH extent of contamination in the IR-6 between 0 to 2 feet has two separate contaminated zones. However, the lower zone (2 - 6 ft) of carcinogenic PAH contamination does not appear to be connected to the surface contaminated area. If the lower zone of carcinogenic PAH contamination is due to a non-point source, why is there no surface contamination? (Carcinogenic PAHs have very high partition coefficients.)

Response: Non-point contamination could be present in the subsurface without being present at the surface if it was emplaced during filling operations.

Comment 58: Page 91, Section 6.4.4.5, Paragraph 1. The description of the extent of contamination should include the fact that the lateral extent of contamination increases as the depth increases.

Response: Agreed, the lateral extent of diesel contamination appears to increase with depth. This will be noted in future reports that describe the nature and extent of contamination at Site IR-6.

Comment 59: Page 93, Section 6.4.4.7, Paragraph 2. The statement that "the source of lead and zinc in the surface soils may be related to diesel spills at the site" is unlikely. First, lead is used as a gasoline (not diesel) additive. Second, zinc is generally very low in crude oil and should not be present in diesel or lube oil. Lead at IR-10 could be attributed to lead battery acid spills.

Response: Comment noted. Diesel does generally contain low levels of lead and zinc (*Oak Ridge National Laboratory, 1990*), but the levels are significantly lower than the levels detected in soils within the bermed areas. The source of the lead and zinc above interim ambient levels at the Tank Farm is unknown. Lead at Site IR-10 could be attributed to lead battery acid spills.

Reference:

Oak Ridge National Laboratory, 1990. *The Installation Restoration Program Toxicology Guide, Volume 5*. Human Systems Division, Air Force Systems Command, Wright Patterson Air Force Base, OH.

Comment 60: Tables 53 through 55. As shown in Tables 53 and 54, the maximum hexavalent chromium concentrations in IR-6 and IR-10 are 1.1 mg/kg and 0.2 mg/kg, respectively. However, Table 55 shows that the maximum concentration for hexavalent chromium is 200 mg/kg.

These results should be verified and reconciled.

Response: Table 55 was incorrect. The table should read 1.1 mg/kg.

Comment 61: Page 94, Section 6.4.5.1, Paragraph 3. It is stated that the BTEX presence in Well IR06MW42A may be due to the treated wood debris in the "landfill." There is no reference to a landfill in areas IR-6 and IR-10. Could it be "backfill" rather than "landfill?"

Response: Ethylbenzene and xylenes may be related to treated wood debris buried with the fill materials near Site IR-6. This will be clarified in future reports.

Comment 62: Page 99, Section 6.5, Bullet 2. A description of the communication between the hydrogeologic units should be included in the summary.

Response: The potential hydraulic communication between the hydrogeologic units will be described in the parcel-specific RI reports as appropriate.

Comment 63: Page 99, Section 6.5, Bullet 3. Based on the discussion above concerning the unlikely presence of lead and zinc in diesel, the three suspected sources should be increased to four sources, including lead battery acid spills.

Response: Comment acknowledged. The suspected sources should include metals from unknown battery acid spills.

Comment 64: Page 100, Section 6.5. Since the potential sources for zinc and lead are more likely from the zinc chromate and lead battery process, the potential point source and associated concentrations in soil and groundwater should be revised.

Response: The potential sources of lead and zinc will be expanded in the parcel-specific RI report to include the battery shop operations.

Comment 65: Page 101, Section 6.5, Bullet 3. This RI report identified areas being investigated but did not estimate the extent of contamination and volume of the waste. It is the intention of the RI report to identify the problem and extent of the problem in order to proceed with the FS process. There appears to have been no attempt to estimate the volume of the waste.

Response: Waste volumes will be calculated as part of the feasibility study and will be presented in the FS report. Accurate estimates of waste volumes cannot be made without target cleanup levels, which are developed after completion of the PHEE.

7. Comments on Section 7.0, Contaminant Fate and Transport

Comment 66: At a minimum, Section 7 should be replaced entirely by Appendix J. Appendix J is only slightly more detailed than Section 7. In addition,

the discussion in the sections should incorporate the site investigation data, known facts, and the calculations from fate and transport theories described in Appendix J to support or make conclusions for the most probable pathways for fate and transport of contaminants. As this section is currently written, it is based on general discussions that can be adapted to any RI report. The following is an example of a site specific fate and transport discussion:

Diesel is a heavier product than gasoline and kerosene. The BTEX content should be very low in diesel. Priority pollutants commonly found in diesel are presented in Table J-5. The water solubility of BTEX compounds are 1750, 1550, 153 and 198 mg/l respectively. The partition coefficients based on organic carbon (K_{oc}) are 71.8, 327, 257, and 238 respectively. Based on the solubility and K_{oc} data, benzene exhibits the highest potential of mobility and ethyl benzene and xylene have the lowest mobility potential.

Based on these characteristics of BTEX compounds, soil and groundwater contamination due to BTEX should be minimal. This hypothesis is confirmed by the field investigation of IR-6 where BTEX concentrations are 0.14, 0.26, 0.5, and 4.1 mg/kg respectively in soils, and 72, 20, 14, and 56 µg/l respectively in groundwater. Assuming that the organic carbon content in the soils at HPA site is 0.1%, the BTEX concentration in groundwater can be calculated based on the relationship described in section 7.2.1 and Appendix J Section 3.3.

For $K_p = K_{oc} \cdot OC$
 $K_p = C_s / C_l$

Compound	Measured Concentration (µg/l)	Calculated Concentration (µg/l)
Benzene	72	20
Toluene	20	8
Ethyl benzene	14	20
Xylene	56	170

The calculated BTEX concentrations in the groundwater are in line with the measured concentration. The variation of the calculated concentrations vs. measured concentrations could be attributed to the measured K_{oc} organic carbon content in the soils, and soil sampling.

Response: A more thorough discussion of contaminant fate and transport will be included in parcel-specific RI/PHEE/FS reports, as appropriate. The report may include discussions of the most probable migration pathways for each contaminant on a site-specific basis, site-specific retardation factors for organic and inorganic constituents, and relative mobilities.

Comparisons of estimated groundwater concentrations (derived from distribution coefficients and site soil concentrations) to actual groundwater concentrations do not significantly improve the discussion of chemical fate and transport relative to the objectives of the RI report. Such discussions may be valuable in future PHEE reports to verify assumptions in the prediction of receptor point concentrations.

Comment 67: Page 102, Section 7.1. A detailed assessment of the importance of each migration pathway, by IR and by chemical class, should be made. Support this assessment with field data (i.e., concentration profiles, contours, etc.).

Response: The importance of migration pathways is discussed in the OU II PHEE report.

- Comment 68:**
- A) Page 102, Section 7.1.1. Discuss the potential pathways of pollutants to the air. The site surface soil conditions (soil compositions, particle sizes, etc.) and average wind speed should be taken into account for discussing entrainment.
 - B) The mass transfer rate of the high mobility (volatile) compounds should be estimated based on wind speed, Henry's constant/vapor pressure, and location of the monitoring point in order to determine whether the volatilization is a major pathway for BTEX fate.
 - C) A statement is made that "contaminants may enter the air through volatilization." Based on the nature of the soil in the upper three feet in the site vicinity, the report should state that volatilization will occur and should provide an estimate of the percentage or quantity of volatilization that may be expected.

Response:

- A) The potential pathways to air (volatilization and particulate entrainment) are discussed in Sections 7.1.1 and 7.3.1. Because OU II sites are largely covered by pavement or buildings with the exception of bermed areas at Site IR-6, the particulate entrainment pathway is not considered potentially significant except at Site IR-6. The parcel-specific RI report will incorporate this observation. For this reason, soil compositions, particle size, wind speeds, etc., are not addressed in the OU II RI report. Additional air sampling is proposed in the *Air Sampling Report and Work Plan (HLA, 1992)*. Upon completion of this work the importance of the air transport pathway will be further evaluated in the parcel-specific RI reports that will include each OU II site.

Reference:

Harding Lawson Associates, 1992. *Air Sampling Report and Work Plan, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* April 28.

- B) Further evaluation of the significance of the volatilization pathway for BTEX fate and mass transfer rate calculations is premature pending the collection of additional data as described above.
- C) The importance of volatilization will be further evaluated upon collection of additional air quality data.

Comment 69: Page 102, Section 7.1.1. If air sampling for particulates has been conducted, the results should be used to substantiate the claim that migration by particulate entrainment is not significant.

Response: No particulate sampling has been conducted to date.

Comment 70: A) Page 103, Section 7.1.2. Until the study on the storm drain and sewer is completed, no conclusions should be drawn in relation to the effect of surface water on fate and transport.

- B) Page 103, Section 7.1.2, Sentence 6. In reference to the leaking utility line and water exchange between the pipe and groundwater, the sentence indicated that one possibility is tidal fluctuations. In section 6.3.2.2 (Page 81), the first paragraph concluded that water levels were not influenced by the tidal fluctuations in San Francisco Bay. If the conclusion in Section 6 is true, there is no need to discuss tidal fluctuations in Section 7.1.2. Otherwise it is necessary to rewrite Section 6.3.2.2.

Response: A. Comment acknowledged. The conclusions presented in the report regarding surface water effects on fate and transport are tentative but are supported by the preliminary studies of the storm drains. Collection and interpretation of additional data from the ESAP, ECA, and the Site Inspection Work Plan: PA Other Areas/Utilities will assist in finalizing these conclusions.

- B. The conclusion in Section 6.3.2.2 refers to Sites IR-6 and IR-10. Tidal fluctuations were identified at Sites IR-8 and IR-9.

Comment 71: Pages 103 and 104, Section 7.1.3. There is a reference to density-driven transport of nonaqueous phase liquids (NAPLs). There is no mention of dense NAPLs in Section 6. If dense NAPLs have not been detected, the text should point this out and eliminate dense NAPLs from discussion. If dense NAPLs have been detected, the corresponding section should include the extent of NAPLs from the investigation results.

Response: Other than residual petroleum hydrocarbons such as diesel in several isolated areas at OU sites, NAPLs have not been observed. Section 3.3 of Appendix J briefly discusses the potential presence of NAPLs (including dense NAPLs such as Aroclor 1260) on the basis of comparisons of groundwater concentrations to 10 percent of the compound solubility. Included in the section is a brief discussion of the extent of dense and light NAPLs on the basis of the investigation results.

Comment 72: Page 106, Section 7.2.1.1. This section refers to biological degradation as a possible viable mechanism for degradation of chlorinated hydrocarbons (TCE, DCA, DCE, etc.).

- A) If microbial degradation of organics is occurring, evidence for this should be provided.
- B) The current research indicates that chlorinated hydrocarbon compounds can be biodegraded through methanotrophic process in which microorganisms utilize methane (high methane/chlorinated organics ratio) as the secondary substrate for the degradation of chlorinated hydrocarbons. Vinyl chloride, a presumed degradation product resulting from microbial action, is present in groundwater at a concentration of 38 µg/l in IR-6. There is no data indicating the level of methane and oxidation/reduction potential of groundwater. Further investigation for treatability will be needed to determine whether biodegradation of TCE and 1,1,1-TCA is occurring in IR-6.

Response: A) Because 1,2-DCE and vinyl chloride are not used as industrial solvents and because these compounds are common degradation products observed in controlled field and laboratory studies of biological degradation, the presence of these compounds in groundwater and soil samples is commonly taken as evidence that microbial degradation may occur at a site. For this reason, the presence of 1,2-DCE and vinyl chloride at OU II sites is considered evidence for microbial degradation as pointed out in Section 7.2.1.1 of the report.

- B) The comment is acknowledged. In future feasibility studies, if biodegradation of chlorinated solvents is considered a viable remedial action alternative, treatability studies and further investigation of geochemical conditions at the sites (e.g., methane and redox potential) may be required. The need for such an effort may be evaluated in future reports and is not addressed in the OU II RI report.

At Sites IR-8 and IR-9, the biodegradation products of chlorinated volatile organics such as 1,1-DCA, cis-1,2-DCE, and vinyl chloride are generally absent in the soil and groundwater. This suggests that the biodegradation of chlorinated

volatile organics is not significant at Sites IR-8 and IR-9. In contrast, 1,2-DCE and vinyl chloride, the degradation products of TCE and TCA, are present in the soil or groundwater at Sites IR-6 and IR-10. Under anaerobic (low oxygen) conditions, microbes may degrade chlorinated volatile organic compounds to vinyl chloride. The presence of vinyl chloride suggests that anaerobic biodegradation of chlorinated volatile organic compounds is a viable biodegradation mechanism at Sites IR-6 and IR-10.

As discussed in Appendix J, the degradation of petroleum hydrocarbons may produce anaerobic conditions in groundwater (as the aerobic organisms degrading the petroleum hydrocarbons consume all the oxygen). The presence of chlorinated volatile organic degradation products such as vinyl chloride at Sites IR-6 and IR-10 may be related, in part, to the creation of anaerobic conditions and the presence of a usable substrate (diesel) and may reflect cometabolic transformation of chlorinated volatile organic compounds by petroleum hydrocarbon (diesel) degrading microbes.

Comment 73: Page 107, Section 7.2.2, Paragraph 2, last sentence. The statement that "concentrations generally diminish with depth" suggests that downward migration is not significant. This is not true in all cases and possible future releases due to surface runoff and soil movement should not be eliminated.

Response: Diminishing concentrations with depth and a general lack of significant concentrations of lead, vanadium, copper, and zinc in groundwater suggest that downward migration (e.g., leaching) is not significant. Geochemical controls on metal mobility (e.g., pH, salinity, and physiochemical properties of soil) are not expected to significantly change in the future; thus the current conditions are expected to be generally maintained. The surface runoff and soil movement (suspension) pathways were indicated in Sections 7.1.2 and 7.3.2. These release pathways were not eliminated.

9. Comments on Section 9.0, Summary and Conclusions

Comment 74: This section tends to be more summary than conclusions. A better summary of the extent of contamination is needed. Also, once fate and transport is rewritten, the conclusions should be incorporated in this section.

Response: Comment acknowledged.

Comment 75: Page 116, Section 9.5, Bullet 2. The criteria used to rank the level of contamination of each IR should be discussed. Support the statement that IR-6 and IR-10 are more contaminated than IR-9, which is more

contaminated than IR-8. In addition, it is premature to imply that only IR-6 and IR-10 will require remediation.

Response: It was not the intent to imply that only IR-6 and IR-10 would require remediation rather than Sites IR-6 and IR-10 were relatively more contaminated than Sites IR-8 and IR-9.

The criteria used for the ranking of the level of contamination at IR sites were primarily the federal Maximum Cleanup Levels (MCLs) established prior to June 1, 1992 for groundwater (attached Tables 1 through 8). In addition, storm drain water samples and runoff samples were compared to the RWQCBs Basin Plan Objectives (Tables 9 through 14) and air sampling results were compared to Permissible Exposure Limits (PELs) (Tables 15 through 17).

10. Comments on Plates and Appendices

Comment 76: Plates 5 and 12. The water-level contours on these two plates are inconsistent with one another. The numbers for some of the wells do not agree, and several wells are shown on Plate 5 that are not shown on Plate 12. Please correct these discrepancies.

Response: Comment acknowledged.

Comment 77: Plates 5 and 45. The water-level contours on these two plates are inconsistent with one another. The numbers for some of the wells do not agree. Please correct these discrepancies.

Response: Comment acknowledged.

Comment 78: Plates 5 and 74. The water-level contours on these two plates are inconsistent with one another. The numbers for some of the wells do not agree. Please correct these discrepancies.

Response: The data used for contouring were not collected on the same date, which accounts for the differences in water-level elevations and contours.

Comment 79: Page F-3, Section 1.3.2, Paragraph 4. A more thorough discussion of the bases for selecting 24-hours as the pumping test duration is needed. The short duration test has resulted in an under-estimation of storativity. As listed in Appendix F and in the body of the report, estimation of storativity was one of the objectives of the pumping tests.

Response: The rationale for the 24-hour duration of constant-rate discharge tests is as follows:

- 1) The heterogeneity of the fill materials which comprise the majority of the A-aquifer at HPA result in aquifer hydraulic properties that vary considerably both horizontally and vertically.

Constant-rate discharge tests were designed primarily to obtain estimates of aquifer transmissivity and hydraulic conductivity in the vicinity of the pumping and observation wells. Estimates of aquifer storativity were of secondary interest because they are not required for the estimation of steady-state groundwater flow velocities, contaminant travel times, groundwater fluxes, etc.

- 2) The heterogeneity of the fill materials preclude the interpolation of aquifer hydraulic properties from one location to another. Therefore, the aquifer testing program at HPA was designed to test numerous locations to estimate aquifer hydraulic properties in various types of fill materials. In Phase I of the HPA aquifer testing program, approximately 85 wells were slug tested to estimate aquifer transmissivity and hydraulic conductivity of the fill materials within a few feet of the tested well. Phase II, consisted of performing constant-rate discharge and recovery testing of 30 wells at IR sites across the facility. To allow for the testing of this number of wells, the duration of the constant-rate discharge tests was limited to 24 hours.
- 3) Waste water storage constraints also played a role in determining the length of constant-rate discharge tests. Longer tests would have created logistical problems relative to the storage and handling of greater volumes of waste water.

Comment 80: Pages F-5 and F-6, Section 2.1. This section places too much emphasis on the ways in which the hydrogeologic units at HPA do not conform to the routinely-made assumptions used in pump test calculations. While it is useful to point out these differences, the way the section is currently written, it seems that the assumptions are violated too flagrantly for the analytical methods to work. This section should be rewritten to more clearly state the applicability of the methods used.

Response: See DTSC Specific Comment No. 4, and associated response.

Comment 81: Page F-7, Section 2.2, Paragraph 7. Please double check this statement (bullet #2). Heterogeneous fill usually has some difference between vertical and horizontal conductivities. However, it is generally not as great as in undisturbed soil or rock.

Response: Vertical hydraulic conductivities are usually significantly lower than horizontal hydraulic conductivities in unconsolidated alluvial materials. This results from two conditions as described in *Groundwater Hydrology* (Todd, 1980):

- 1) "Individual particles are seldom spherical so that when deposited underwater they tend to rest with their flat sides down."

- 2) "Alluvium typically consists of layers of different materials, each possessing a unique value of hydraulic conductivity. If the layers are horizontal, any single layer with a relatively low hydraulic conductivity causes vertical flow to be retarded, but horizontal flow can occur easily through any stratum of relatively high hydraulic conductivity."

Although the artificial fill materials at HPA cannot be considered alluvium, filling activities presumably deposited fill materials in horizontal lifts or layers resulting in localized layers of relatively low hydraulic conductivity materials. Consequently, the second condition described above is applicable to the fill materials at HPA.

Reference:

Todd, David K., 1980. *Groundwater Hydrology*, Second Edition. New York; John Wiley & Sons, P. 535.

Comment 82: Page J-12, Section 3.1. In reference to the upwind background sampling location, unless these background levels have been approved by the regulatory agencies, they must be considered theoretical only.

Response: Comment acknowledged. The background levels developed from upwind sampling stations will be considered "interim" until approval by the regulatory agencies.

Comment 83: Page J-13, Section 3.2. The full scale study on the storm drain and sewer systems should account for any breakdown of piping systems. The results of the storm drain and sewer study should be incorporated in the final, full-scale fate and transport conceptual model.

Response: Comment acknowledged. The results of additional storm drain and sanitary sewer investigations will be incorporated into the fate and transport conceptual models developed for each parcel, if appropriate.

Comment 84: Page J1-15, Section 3.3. Unless the assumed value of 0.0001 for organic carbon content is verified, it should not be used in calculating the distribution coefficient or K_d value.

Response: The assumed organic carbon value of 0.0001 is within the range (0.00005 to 0.0075) reported in the literature for sand and gravel aquifers (MacKay, 1990). Boulder fill materials such as those observed at OU II sites, are largely derived from local solid rock materials and are likely to have a fraction organic carbon (foc) value of about 0.0001. As indicated in Section 3.3, the fraction of residual petroleum hydrocarbons has a far greater control on distribution coefficients (and hence sorption and retardation estimates) than the assumed foc. Thus, more accurate

determinations of focs are unnecessary because the fraction of residual petroleum hydrocarbons is known.

Reference:

MacKay, Douglas M., 1990. *Characterization of the Distribution and Behavior of Contaminants to the Subsurface in Groundwater and Soil Contamination Remediation: Toward Compatible Science, Policy, and Public Perception*. Report on a Colloquium Sponsored by the Water Science and Technology Board. Colloquium 5 of a Series, Washington, D.C.; National Academy Press. p. 70-90.

III. RWQCB COMMENTS AND NAVY RESPONSES

A. GENERAL COMMENTS

Comment 1: The data presented in this report is insufficient to constitute a complete remedial investigation (RI) of Operable Unit (OU) II. The information from the Ecological Risk Assessment is a necessary component of this study. In addition, data from the Environmental Sampling and Analysis Plan (ESAP) is crucial to the understanding of the effects of activities in IR-10 on San Francisco Bay. The paucity of data on the hydrogeologic and physical characteristics of the fill materials underlying the four IRs in this operable unit may make the design of groundwater remediation systems premature. It is unclear as to how the feasibility study phase can proceed without additional information about the physical and hydrogeologic characteristics of the fill. The submission of RI reports for other OUs without all the information necessary on which to base a judgement about the need for additional data is strongly discouraged.

Response: As discussed with the regulatory agencies in the meeting on August 13, 1992, it was not within the scope of the OU II RI Report to assess the impact of OU II sites on San Francisco Bay. The Navy agrees that data from the Ecological Risk Assessment and ESAP are important components of an evaluation of effects on San Francisco Bay. However, the Navy believes that adequate data have been collected to assess health risks and interim remedial actions at OU II sites.

Comment 2: The questions of what IR sites will need to be remediated, and to what cleanup levels remediation may need to take place, have not yet been resolved. The assertion that only Sites IR-6 and IR-10 will need remediation has not yet been accepted by the staff of the SFRWQCB.

Response: The draft report did not assert that remediation would be needed at only Sites IR-6 and IR-10. It indicated that Sites IR-6 and IR-10 would probably need remediation. This statement was based on preliminary comparison to federal MCLs (attached Tables 1 through 8). This comparison will be added to future RI reports as appropriate.

Comment 3: The vertical and lateral extent of TPH contamination has not been defined at IR-6. Although removal actions and interim remedial actions may be initiated, what constitutes final remediation of the soils and groundwater at the site cannot be determined until the lateral and vertical extent of contamination have been defined. The lateral extent of TCE and 1,2-DCE contamination has not been defined. The effect of contaminant mixing on the mobility of various contaminants is a key issue in the design of proper groundwater remediation. Further

investigation is necessary before developing a final groundwater remediation strategy.

Response: Additional data may be collected in the future for evaluation of the lateral and vertical extent of contamination at Sites IR-6 and IR-10 if these contaminants are determined to be of concern and a need for remedial action has been defined. These additional data will be included in future parcel-wide or cumulative RI/PHEE/FS reports.

The effect of contaminant mixing on the mobility of various contaminants will be evaluated as part of the parcel RI/PHEE/FS reports, if needed.

Comment 4: The elevated detection limits for several organic compounds (e.g., DDT and TPHD) in some soil samples render the data unusable for evaluating the potential environmental effects, as well as for determining the lateral and vertical extent of contamination. Additional verification sampling will need to be performed in order to close these data gaps.

Response: Detection limits are raised due to matrix effects, which are beyond the control of the laboratory and are related to site conditions. Additional sampling and analyses will most likely experience the same problems observed in the analysis of existing samples.

Comment 5: The effects of tidal influence on contaminant fate and transport from a water body with fluxes in salinity are important from both the physical and chemical perspectives. Changes in the salinity, alone, can alter the solubility (and toxicity) of metal and organic contaminants in water. This issue was never addressed in the report. The design of a groundwater remediation system will need to take the dynamics of San Francisco Bay into account.

Response: The effects of salinity on contaminant fate and transport will be addressed relative to the prediction of receptor point concentrations in future parcel-specific RI/PHEE/FS reports, if deemed appropriate.

B. SPECIFIC COMMENTS

1. Comments on Site IR-8

Comment 1: p. 27, Section 4.3.2.3: Additional soil samples should be analyzed for physical properties before modeling or design efforts for groundwater cleanup at IR-8 are initiated. The data used to determine physical properties of the artificial fill materials in IR-8 are insufficient because the heterogeneity of the artificial fill is so great.

Response: The Navy believes that the data presented in this report are adequate to assess health risks and evaluate interim remedial actions at OU II sites.

Comment 2: p. 27, Section 4.3.2.4.1: Additional soil samples should be analyzed to estimate vertical hydraulic conductivity before modeling or design efforts for groundwater cleanup at IR-8 are initiated. The use of only "one shallow soil sample" to estimate vertical hydraulic conductivity is insufficient to evaluate the heterogeneous fill underlying IR-8.

Response 2: The need for groundwater remediation at Site IR-8 will be evaluated in the OU II PHEE and FS reports. Vertical hydraulic conductivity measurements are generally not an important parameter in the design of a groundwater extraction system.

Comment 3: p. 28, Section 4.3.2.4.3: Additional aquifer testing should be performed to more accurately estimate the hydrologic parameters at IR-8 before completion of modeling or the design for groundwater remediation. The 24 h time period for constant-rate discharge testing used to estimate these parameters was too short. This issue was discussed in conjunction with the Aquifer Testing Results document. With respect to IR-8, the rejection of data from IR08MW39A and the inadequacies of data generated from IR08MW37A suggest that there is only one estimate of hydrologic parameters for IR-8 (Table F2). This is of concern because the results of the Tidal Influence Monitoring Program (TIMP) demonstrated that the monitoring wells in IR-8 exhibited some tidal influence and, thus, water under this site may be in communication with San Francisco Bay.

Response: See response to EPA Comment No. 79.

Comment 4: p. 30, Section 4.3.2.5: What "similar geologic materials" were used to select the range of values for effective porosity used in the calculations of groundwater flow velocities? The estimates of groundwater flow velocities may need to be recalculated when the requested additional hydraulic parameter data becomes available.

Response 4: Specific yields are generally equivalent to effective porosities. Data presented in *Specific Yield-Compilation of Specific Yields for Various Materials, U.S. Geological Survey Water-Supply Paper 1662-D* were used to estimate the effective porosity of the fill materials at HPA (Johnson, 1967). This compilation contains laboratory-derived specific yields for various materials ranging from clays to coarse gravels including some fill materials. Values ranged from 0 percent for clays to 35 percent for coarse sands. A minimum value of 10 percent was selected for the fill materials at HPA due to the presence of some sand and gravel within clay fill materials. A maximum value of 35 percent was used to represent coarse-grained lithologies such as sand, gravel, and boulder fill. An explanation of these values will be included in future reports as appropriate.

Reference:

Johnson, A.I. 1967. *Specific Yield-Compilation of Specific Yields for Various Materials*, Geological Survey Water-Supply Paper 1662-D.

Comment 5: p. 32, Section 4.4.1.3: The question of what constitutes "background levels of metals in soil and groundwater" has yet to be established. The staff of the SFRWQCB supports the position that concentrations of chemical contaminants that pose a threat to the beneficial uses of the waters of the State will need to be remediated.

Response: See response to DTSC Comment No. 3.

Comment 6: p. 39, Section 4.4.4.6: Modify to read: "A comparison of the TOG and TRPH results from twenty-one samples analyzed for both compounds showed that, in six of eight samples where at least one of the compounds was detected, as much as half..."

Response: Comment acknowledged.

Comment 7: p. 39, Section 4.4.4.7: The use of the "random" to describe the distribution of metals in soils is inappropriate unless statistical tests for distribution were performed. If these tests were performed, the results should be reported. Otherwise, the word "scattered" or another non-technical term should be substituted.

Response: As suggested, the term "random" will not be used in future reports unless statistical tests are performed or the usage is suitably qualified.

Comment 8: p. 40, Section 4.4.4.7: Modify to read: "The occurrence of these metals is localized and appears to be related to nonpoint sources..."

Response: Comment acknowledged.

Comment 9: p. 41, Section 4.4.5.2: The "background" concentration of the detected PAHs at IR-8 is considered to be zero.

Response: The background concentrations of PAHs reported in the background study are no longer valid due to data quality problems; therefore, these background PAH values will not be used in future reports.

Comment 10: p. 41, Section 4.4.5.3: The concentrations of Aroclor 1260 detected in the groundwater samples from IR08MW2A were from 36 to 147 times higher than the San Francisco Bay Basin Plan water quality objective value of 30 ng/l total PCBs.

Response: Comparison of groundwater concentrations to the San Francisco Bay Basin Plan water quality objectives is not considered appropriate because the interaction of groundwater at OU II sites with the bay has not been

evaluated. However, stormwater data for samples from the storm drains were compared to the Basin Plan objectives. Groundwater quality data was compared to both state and federal maximum contaminant levels (MCLs) (Tables 1 through 14).

Comment 11: p. 42, Section 4.4.5.6: Data collected from groundwater samples from IR-8 show that the detected concentrations of copper and nickel consistently exceed the San Francisco Bay Basin Region Water Quality Objectives for the Protection of Aquatic Life ("Basin Plan," (Table III-2A).

Response: See the response to Specific Comment 10.

Comment 12: p. 43, Section 4.5: The summary of findings for groundwater contamination should include references to the inorganic and organic contaminants that exceed the Basin Plan objectives.

Response: See the response to Specific Comment 10.

2. Comments on Site IR-9

Comment 13: p. 53, Section 5.3.2.3: Additional data for the determination of physical properties of soil from the artificial fill are necessary. See above, Specific Comment 1.

Response: The Navy believes that the data presented in this report are adequate to assess health risks and evaluate interim remedial actions. Also see response to Specific Comment No. 1.

Comment 14: p. 54, Section 5.3.2.4.1: Additional data for the estimation of vertical hydraulic conductivity in the artificial fill are necessary. See above, Specific Comment 2.

Response: See response to Specific Comment No. 2.

Comment 15: p. 54, Section 5.3.2.4.3: Additional data for the estimation of hydrogeologic characteristics are necessary. The use of data from one well monitored for only 16 h may be insufficient to accurately estimate the hydrologic parameters for IR-9 (see also, Specific Comment 3).

Response: Hydrogeologic data presented in the report are adequate to assess risks and evaluate interim remedial actions. Estimates of aquifer parameters at Site IR-9 are based on four slug tests and one constant-rate discharge test which provided aquifer parameter estimates at the pumping well in addition to two observation wells.

Comment 16: p. 55, Section 5.3.2.5: See above, Specific Comment 4.

Response: See response to Specific Comment 4.

Comment 17: p. 57, Section 5.4.1.1: The fact that the groundwater pH was 6.1 suggests that material has leaked from the tanks. There is no way, at the present time, to know whether large or small quantities of acidic material may have entered the groundwater because there is no clear understanding of the groundwater flow dynamics under the site. The text should be modified to reflect this uncertainty.

Response: The integrity of the containment vault is not certain. However, groundwater chemistry data indicates that the groundwater quality at Site IR-9 is currently effected in a relatively small area around the containment vault and associated pickling tanks.

Comment 18: p. 61, Section 5.4.4.2: See above, Specific Comments 4 and 6.

Response: See response to Specific Comments 4 and 6.

Comment 19: p. 62, Section 5.4.4.5: See above, Specific Comment 4.

Response: See response to Specific Comment 4.

Comment 20: p. 64, Section 5.4.5.5: The concentrations of (total) chromium (chromium VI), nickel, copper detected in groundwater exceeded the Basin Plan water quality criteria for these metals in most of the wells at IR-9. In addition, the pH was relatively low (6.9) in IR09MW35A and IR09MW40A.

Response: See the response to Specific Comment 10.

Comment 21: p. 67, Section 5.5: See above, Specific Comment 11.

Response: See the response to Specific Comment 10.

3. Comments on Sites IR-6 AND IR-10

Comment 22: p. 81, Section 6.3.2.2: Modify to read, "The tidal influence monitoring data for selected wells at IR-6 and IR-10 showed that there were some extremely small changes in water levels in some wells (less than 0.1 ft). These results suggest slight but possible leakage from storm drains and/or sewer system. These small changes are not expected to influence groundwater flow direction at these sites."

Response: Comment acknowledged.

Comment 23: p. 81, Section 6.3.2.3: Additional data for physical properties of soil at IR-6 and IR-10 are necessary. See above, Specific Comment 1.

Response: See the response to Specific Comment 1.

Comment 24: p. 81, Section 6.3.2.4.1: Additional data for estimating the vertical hydraulic conductivity of soils at IR-6 and IR-10 are necessary. See above, Specific Comment 2.

Response: See the response to Specific Comment 2.

Comment 25: p. 82, Section 6.3.2.4.3: Additional data for the determination of hydrologic characteristics of soils at IR-6 and IR-10 are necessary. See above, Specific Comment 3.

Response: See the response to Specific Comment 3.

Comment 26: p. 83, Section 6.3.2.5: See above, Specific Comment 4.

Response: See the response to Specific Comment 4.

Comment 27: p. 91, Section 6.4.4.5: "Elevated concentrations" of TPH are those that are detected above the detection limit (1 ppm).

Response: The phrase "elevated concentrations" will not be used in future reports without quantification. The term "elevated" as used in Section 6.4.4.5 referred to concentrations greater than 1,000 mg/kg.

Comment 28: p. 97, Section 6.4.5.7: The concentrations of at least one of the following metals, copper, chromium (chromium VI), nickel, cadmium, and silver, exceeded the Basin Plan water quality criteria in groundwater from monitoring wells at IR-6 and IR-10. The pH of 6.6 in groundwater from IR06MW34A suggests a relatively high likelihood of mobilization of metals from soils and groundwater in the vicinity of this monitoring well.

Response: According to the Basin Plan the water quality objectives that apply to groundwater are those specified in Table III-2, Water Quality Objectives For Municipal or Agricultural Supply Waters (*RWQCB, 1991*). Beneficial uses applicable to groundwater are municipal supply, industrial process water supply, industrial service supply, and agricultural supply. Replenishment of surface waters is not specified as a beneficial use in the Basin Plan; therefore, water quality objectives for marine surface waters (Table III-2A) are not applicable for groundwater at HPA. The following table compares groundwater data from Sites IR-6 and IR-10 to the Table III-2 water quality objectives for the metals identified in the comment.

Metal	Municipal Goal ($\mu\text{g/l}$)	Agricultural Goal ^a ($\mu\text{g/l}$)	Site IR-6 ^b GW ($\mu\text{g/l}$)	IR-10 ^b GW ($\mu\text{g/l}$)
Copper	1,000	200	1.6-58.2 (0)	1.8-72.7 (0)
Chromium	50	100	3.5-101 (4.5)	55.5-328 (21)
Chromium VI	-- ^c	--	100-120 (7.3)	160-400 (15)
Nickel	--	200	17.3-117 (0)	14.1-63.6 (0)
Cadmium	10	10	4-6.4 (0)	3.4 (0)
Silver	50	--	ND (0)	10.3-20.7 (0)

a Lowest objective.

b Range of detected values; the number in parentheses is the percent of samples (detects and nondetects) that exceeded the lower of the two water quality goals.

c Because no chromium VI goal is listed in Table III-2, the municipal goal for chromium was used in the comparison.

GW = Concentration of metal in groundwater.

ND = Not detected.

With the exception of chromium, the Basin Plan water quality criteria for groundwater are not exceeded at Sites IR-6 and IR-10 for any of the metals listed above. All of the exceedances at Site IR-6 were in samples collected from Monitoring Well IR06MW49F. This well is screened in friable, deeply weathered serpentinite bedrock, a material shown to have very high natural levels of chromium (*Technical Memorandum, Background Soil and Groundwater Conditions, HLA, 1992*). The elevated chromium concentrations in this well are most likely due to the natural geochemical conditions of the surrounding bedrock.

All of the exceedances at Site IR-10 were for samples collected from Monitoring Well IR10MW12A. The concentrations of chromium and hexavalent chromium in this well have been steadily decreasing with time. Samples collected in the last sampling round (January 1992) contained chromium and hexavalent chromium at 55.5 $\mu\text{g/L}$ and ND(10) $\mu\text{g/l}$ respectively. These values are below or nearly below the Basin Plan objective for chromium (50 $\mu\text{g/l}$). Continued monitoring of this well for chromium and hexavalent chromium will further assess whether or not Basin Plan groundwater objectives are exceeded at this location, (*Facility Groundwater Monitoring Plan, HLA, 1992*).

In Table I2 of the draft report, the pH values for Monitoring Well IR06MW34A are listed as 7.7 and 7.5, not 6.6; pH values below approximately 6 to 6.5 are required to mobilize metals by such processes as desorption and mineral dissolution. At the pH encountered in this

well, the mobilization of metals due to pH conditions is not considered likely.

Reference:

California Regional Water Quality Control Board, San Francisco Bay Region, 1991. *Water Quality Control Plan, San Francisco Bay Basin, Region (2)*. December.

Harding Lawson Associates, 1992. *Technical Memorandum, Background Soil and Groundwater Conditions, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. March 19.

Harding Lawson Associates, 1992. *Draft Final Facility Groundwater Monitoring Plan, Remedial Investigation/Feasibility Study, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California*. July 24.

Comment 29: p. 99, Section 6.5: See above, Specific Comment 12.

Response: See the response to comment 12.

Comment 30: p. 104, Section 7.2.1: This section should also include a brief discussion of the influence of more water soluble organic contaminants on less soluble organic contaminants in a mixed contaminant plume, such as may exist at IR-6. The effects on the apparent K_{ow} s and K_{oc} s should be discussed.

Response: Research by the EPA indicates that partially miscible organic solvents (PMOSs) do not significantly increase the solubility of hydrophobic organic chemicals (HOCs) (cosolvency) unless the PMOS concentration is about 1 percent (v/v) or larger (*Solubility, Sorption, and Transport of Hydrophobic Organic Chemicals in Complex Mixtures*, EPA/600/M-91-009, March 1991).

For example, for TCE to have a cosolvent effect on the solubility and hence transport of sparingly soluble pyrene, the concentration of TCE in groundwater would have to be greater than about 15,000 mg/l (about 1 percent v/v). The maximum concentration of TCE at OU II sites is well below this value (0.013 mg/l at Site IR-10). The maximum concentration of any organic chemical or mixture in groundwater at OU II is 6.8 mg/l for total oil and grease (TOG). Assuming a density of TOG of about 0.8 g/ml (roughly equivalent to diesel oil/motor oil), the concentration of TOG in groundwater equivalent to 1 percent v/v is about 8,000 mg/l. Clearly, the concentration of TOG, TCE, and all organic chemicals in groundwater at OU II sites including Site IR-6 is significantly below the EPA's 1 percent (v/v) criterion. Thus cosolvency effects of "more water-soluble organic contaminants on less soluble organic contaminants" are not expected to be significant and will not be considered further at OU II sites.

Comment 31: p. 105, Section 7.2.1: The plural of "half-life" is "half-lives."

Response: Comment acknowledged.

Comment 32: p. 107, Section 7.2.2: The question of what constitutes "background" concentrations of metals in groundwater has not been established at HPA. The concentrations of several metals in groundwater exceeded the Basin Plan water quality criteria for these metals. These elevated concentrations of metals are believed to pose a potential threat to the beneficial uses of the waters of the State.

Response: See the responses to Specific Comments 5 and 10.

Comment 33: p. 109, Section 7.3.2: Please define the term "exfiltrate."

Response: Exfiltrate in this context is the movement of water from the storm drain or sanitary sewer into the surrounding fill materials.

Comment 34: p. 110, Section 7.3.3: This section should include a discussion of the mobility of metals in groundwater and the effects of dissolved or suspended organic carbon and the retardation factor on metal contaminant mobility.

Response: A discussion of metal mobility and retardation factors will be presented parcel-specific RI/PHEE/FS reports as appropriate. Theoretically, dissolved or suspended organic carbon in groundwater may enhance the mobility of metals in groundwater if (1) sufficient organic matter is present, (2) the metals are readily complexed or adsorbed by the organic matter, and (3) competing adsorption/fixation reactions are minimal. Such metals would tend to move at the same rate as groundwater and would not be retarded. The importance of organic material and metal transport is not resolved in the literature and is beyond the scope of this report. However, the presumed lack of organic matter in fill materials derived from native rock, suggests that facilitated transport is minimal.

Comment 35: p. 114, Section 9.3.1: The summary of the groundwater contaminants for IR-8 should mention the metals that exceed the Basin Plan water quality criteria.

Response: See the response to Specific Comment 10.

Comment 36: p. 115, Section 9.3.2: For IR-9 summary, see above, Specific Comment 35.

Response: See the response to Specific Comment 10.

Comment 37: p. 115, Section 9.3.3: For IR-6 and IR-10, see above, Specific Comment 35.

Response: See the response to Specific Comment 10.

Comment 38: p. 116, Section 9.4: **The effects of interactions between organic contaminants with higher mobilities and those with lower mobilities in mixed contaminant plumes should be presented.**

Response: See the response to Specific Comment 30.

Comment 39: p. 166, Section 9.5: **Will the Public Health and Environmental Evaluation contain the information to be gathered for the Ecological Risk Assessment and the Environmental Sampling and Analysis Plan? If not, there may not be sufficient risk assessment data to make the appropriate risk management decisions with respect to the necessary cleanup levels for OU II.**

Response: These data will be presented as part of the parcel-specific RI/PHEE/FS reports.

4. Comments on Appendix J

Comment 40: p. J-4, Section 2.0: **See above, Specific Comments 30 and 38.**

Response: See the response to Specific Comment 30.

Comment 41: p. J-9, Section 2.2: **The question of what constitutes the "background" concentrations of metals in groundwater at HPA has not been resolved. Concentrations of metal contaminants in surface and groundwater at HPA that exceed the Basin Plan water quality criteria for these metals pose a potential risk to the beneficial uses of the waters of the State.**

Response: See the response to Specific Comment 5 and DTSC Comment 3.

Comment 42: p. J-11, **The fact that small, but measurable, tidal influences were found at two of the four IR sites in this OU must be considered in evaluating the potential for mobility of metal contaminants. This potential pathway should be discussed, especially in conjunction with other factors, such as salinity and pH, that may increase the mobility of metal contaminants.**

Response: Tidal influences at Site IR-8 and IR-9 have been identified and are thought to be related to the tidal flooding of storm drains and resultant infiltration from the drains into groundwater. Direct seepage to the bay has not been identified. The infiltration of groundwater into storm drains represents the only recognized pathway to the bay. This pathway was discussed in the draft report; further evaluation of the importance of this pathway to the mobility of metals, including the roles of salinity and pH, awaits additional data collection and analysis to be performed during

ESAP, ECA, and SI, PA Other Areas/Utilities activities and will be addressed in parcel-specific RI reports.

Comment 43: p. J12, Section 3.2: See above, Specific Comment 33. This section is incomplete because it does not consider contaminant migration by way of biotic pathways.

Response: Contaminant migration via biotic pathways will be addressed in parcel-specific RI/PHEE/FS Reports.

Comment 44: p. J-14, Section 3.3: The retardation factors calculated for the soils at each site were based on insufficient physical characterization of the fill materials under the sites. See above, Specific Comments 1, 13, and 23.

Response: See the response to Specific Comment 1. Retardation factor (R) calculations are relatively insensitive to the minor variations identified in the bulk density and porosity values of the fill materials. The predominant control on the R value are the values for foc, foil, and Koc. Depending on the compound and the amount of organic carbon and/or residual hydrocarbon present, R values may vary significantly.

Comment 45: Table J10: Typo: Footnote "b" states "(average properties of Site IR-9 soils)." See above, Specific Comments 1 and 44.

Response: Comment acknowledged. See the response to Specific Comments 1 and 44.

Comment 46: Tables J11, J12 and J13: See above, Specific Comments 13, 23, and 44.

Response: See the response to Specific Comments 1 and 44.

TABLES

Table 1
 MCL Statistical Summary of Organic Compounds Detected in Groundwater Samples
 IR08 Wells
 Hunters Point Annex
 Date Range: 1/1/88 - 12/31/92
 Report Date: Sep 16, 1992

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations With Samples Exceeding Fed. MCL	State MCL	Number of Locations With Samples Exceeding State MCL
CLP-VOC (15)											
Toluene	ug/l	2	2.00	3.30	2.65	6	2	1000	0	NA	0
Ethyl benzene	ug/l	1	1.20	1.20	1.20	6	1	700	0	680	0
Xylenes	ug/l	3	1.00	8.00	3.53	6	3	10000	0	1750	0
CLP-PEST/PCB (16)											
Aroclor-1260	ug/l	3	1.10	4.40	2.57	6	1	0.5	1	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 2
 MCL Statistical Summary of Inorganic Compounds Detected in Groundwater Samples
 IR08 Wells
 Hunters Point Annex
 Date Range: 1/1/88 - 12/31/92
 Report Date: Sep 25, 1992

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations Exceeding Fed. MCL	State MCL	Number of Locations Exceeding State MCL
CLP-CVAA (29) Mercury	ug/l	1	0.80	0.80	0.80	6	1	2	0	2	0
CLP-FUAA (29) Arsenic	ug/l	15	1.50	4.70	2.97	6	5	50	0	50	0
CLP-ICP (29) Aluminum	ug/l	4	38.60	108.00	60.68	6	3	NA	0	1000	0
Barium	ug/l	29	37.40	408.00	166.68	6	6	1000	0	1000	0
Chromium	ug/l	1	1.90	1.90	1.90	6	1	50	0	50	0
EPA-300.0 (29) Nitrate as N	mg/l	2	2.50	8.70	5.60	6	2	10	0	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 3
MCL Statistical Summary of Organic Compounds Detected in Groundwater Samples
IR09 Wells
Hunters Point Annex
Date Range: 1/1/88 - 12/31/92
Report Date: Sep 17, 1992

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations With Samples Exceeding Fed. MCL	State MCL	Number of Locations With Samples Exceeding State MCL
CLP-VOC (23) Chloroform	ug/l	2	1.00	1.00	1.00	12	1	100	0	NA	0
EPA-8010 (22) Chloroform	ug/l	5	0.62	7.30	2.70	12	4	100	0	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 4
MCL Statistical Summary of Inorganic Compounds Detected in Groundwater Samples
IR09 Wells
Hunters Point Annex
Date Range: 1/1/88 - 12/31/92
Report Date: Sep 25, 1992

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations Exceeding Fed. MCL	State MCL	Number of Locations Exceeding State MCL
CLP-CVAA (45) Mercury	ug/l	2	0.20	0.22	0.21	12	2	2	0	2	0
CLP-FUAA (45) Arsenic	ug/l	24	2.10	9.60	4.66	12	8	50	0	50	0
Lead	ug/l	1	1.80	1.80	1.80	12	1	50	0	50	0
Selenium	ug/l	4	2.80	3.80	3.28	12	2	50	0	10	0
CLP-ICP (45) Aluminum	ug/l	4	16.60	1430.00	376.20	12	3	NA	0	1000	1
Barium	ug/l	43	33.50	563.00	145.97	12	11	1000	0	1000	0
Chromium	ug/l	18	4.60	395.00	130.33	12	6	50	2	50	2
Silver	ug/l	2	1.50	1.70	1.60	12	2	50	0	50	0
EPA-300.0 (45) Nitrate as N	mg/l	23	0.17	65.00	4.38	12	6	10	1	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 5
MCL Statistical Summary of Organic Compounds Detected in Groundwater Samples
IR06 Wells
Hunters Point Annex
Date Range: 1/1/88 - 12/31/92
Report Date: Sep 16, 1992

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations With Samples Exceeding Fed. MCL	State MCL	Number of Locations With Samples Exceeding State MCL
CLP-VOC (66)											
Vinyl chloride	ug/l	11	5.20	38.00	20.23	16	4	2	4	0.5	4
1,1-Dichloroethane	ug/l	1	2.10	2.10	2.10	16	1	NA	0	5	0
1,2-Dichloroethene (total)	ug/l	19	1.30	140.00	26.14	16	5	70	1	6	3
Chloroform	ug/l	2	1.00	1.00	1.00	16	2	100	0	NA	0
1,2-Dichloroethane	ug/l	1	1.30	1.30	1.30	16	1	5	0	0.5	1
Trichloroethene	ug/l	15	1.40	5.00	3.33	16	5	5	0	5	0
Benzene	ug/l	20	1.00	72.00	14.32	16	6	5	4	1	5
Tetrachloroethene	ug/l	5	1.00	3.00	1.80	16	1	5	0	5	0
Toluene	ug/l	10	1.30	20.00	5.68	16	5	1000	0	NA	0
Ethyl benzene	ug/l	8	1.10	14.00	9.41	16	2	700	0	600	0
Styrene	ug/l	1	1.20	1.20	1.20	16	1	100	0	NA	0
Xylenes	ug/l	8	14.00	56.00	27.25	16	2	10000	0	1750	0
CLP-SOC (66)											
1,4-Dichlorobenzene	ug/l	1	5.00	5.00	5.00	16	1	75	0	5	0
1,2-Dichlorobenzene	ug/l	2	2.90	18.00	10.45	16	1	600	0	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 6
MCL Statistical Summary of Inorganic Compounds Detected in Groundwater Samples
IR06 Wells
Hunters Point Annex
Date Range: 1/1/88 - 12/31/92
Report Date: Sep 25, 1992

Test Method (Number of Analyses) / Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations With Samples Exceeding Fed. MCL	State MCL	Number of Locations With Samples Exceeding State MCL
CLP-FUAA (66)											
Arsenic	ug/l	49	2.00	12.50	5.07	16	14	50	0	50	0
Lead	ug/l	2	1.90	2.40	2.15	16	2	50	0	50	0
Selenium	ug/l	3	2.30	3.10	2.60	16	3	50	0	10	0
CLP-ICP (66)											
Aluminum	ug/l	2	15.70	23.10	19.40	16	2	NA	0	1000	0
Barium	ug/l	66	11.90	929.00	236.38	16	16	1000	0	1000	0
Cadmium	ug/l	2	4.00	6.40	5.20	16	2	10	0	10	0
Chromium	ug/l	4	3.50	101.00	72.77	16	2	50	1	50	1
EPA-300.0 (65)											
Nitrate as N	mg/l	22	0.06	9.90	2.06	16	11	10	0	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 7
MCL Statistical Summary of Organic Compounds Detected in Groundwater Samples
IR10 Wells
Hunters Point Annex
Date Range: 1/1/88 - 12/31/92
Report Date: Sep 17, 1992

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations Exceeding Fed. MCL	State MCL	Number of Locations Exceeding State MCL
CLP-VOC (29)											
Vinyl chloride	ug/l	1	3.00	3.00	3.00	9	1	2	1	0.5	1
1,2-Dichloroethene (total)	ug/l	5	3.00	66.00	19.80	9	2	70	0	6	2
Trichloroethene	ug/l	6	2.00	38.00	19.33	9	3	5	2	5	2
EPA-8010 (13)											
1,2-Dichloroethene (total)	ug/l	7	1.30	38.00	14.26	5	3	70	0	6	2
Trichloroethene	ug/l	6	0.60	13.00	5.76	5	3	5	1	5	1
CLP-SOC (36)											
1,2-Dichlorobenzene	ug/l	1	2.00	2.00	2.00	9	1	600	0	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

Table 8
MCL Statistical Summary of Inorganic Compounds Detected in Groundwater Samples
IR10 Wells
Hunters Point Annex
Date Range: 1/1/88 - 12/31/92
Report Date: Sep 17, 1992

Test Method (Number of Analyses) / Analyte Name	Units	Number of Detected Values	Min Value	Max Value	Mean Value	Number of Locations Sampled	Number of Locations With Detected Values	Federal MCL	Number of Locations Exceeding Fed. MCL	State MCL	Number of Locations Exceeding State MCL
CLP-FUAA (35)											
Arsenic	ug/l	17	1.70	9.90	3.69	9	8	50	0	50	0
Lead	ug/l	2	2.10	3.00	2.55	9	1	50	0	50	0
Selenium	ug/l	3	2.60	7.30	5.50	9	3	50	0	10	0
CLP-ICP (35)											
Aluminum	ug/l	6	17.70	328.00	76.07	9	4	NA	0	1000	0
Barium	ug/l	34	10.70	370.00	140.93	9	8	1000	0	1000	0
Cadmium	ug/l	1	3.40	3.40	3.40	9	1	10	0	10	0
Chromium	ug/l	7	55.50	328.00	183.83	9	1	50	1	50	1
Silver	ug/l	5	10.30	20.70	15.66	9	5	50	0	50	0
EPA-300.0 (34)											
Nitrate as N	mg/l	14	0.05	0.33	0.15	8	6	10	0	NA	0

Notes: Units expressed in micrograms (ug) or milligrams (mg) of chemical per liter (l) of water.

NA - Not applicable.

Only constituents which were detected in at least one well in at least one sampling round are compared to California State and Federal Primary MCLs promulgated on or before June 1, 1992. This table does not include constituents which were detected but for which there is no promulgated State and Federal MCL.

**Table 9. Summary of Pre-Event Storm Drain Water Sample Results
Sites IR-8 & IR-9 (Location SW2)
OU II RI Report
Hunters Point Annex**

Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	Water Quality Objectives for the Protection of Aquatic	Number of Samples Exceeding	Water Quality Objectives for the Protection of Aquatic	Number of Samples Exceeding	Water Quality Objectives for the Protection of Aquatic	Number of Samples Exceeding	Water Quality Objectives for the Protection of Human	Number of Samples Exceeding
					Life -- 4-Day Average (1)	4-Day Average	Life -- Daily Average (1)	Daily Average	Life -- 1-Hour Average (1)	1-Hour Average	30-Day Average (1)	30-Day Average
CLP VOCs												
1,2-Dichloroethene (total)	1	µg/l	14	14	NA	--	NA	--	NA	--	NA	--
Trichloroethene	1	µg/l	17	17	NA	--	NA	--	NA	--	NA	--
METALS												
Aluminum	1	µg/l	2770	2770	NA	--	NA	--	NA	--	NA	--
Calcium	1	µg/l	344000	344000	NA	--	NA	--	NA	--	NA	--
Chromium (total)	1	µg/l	2380	2380	50 (3)	1	NA	--	1100 (3)	1	NA	--
Copper	1	µg/l	115	115	NA	--	NA	--	2.9	1	NA	--
Iron	1	µg/l	1220	1220	NA	--	NA	--	NA	--	NA	--
Lead	1	µg/l	23.6	23.6	5.6	1	NA	--	140	0	NA	--
Magnesium	1	µg/l	1110000	1110000	NA	--	NA	--	NA	--	NA	--
Manganese	1	µg/l	37.5	37.5	NA	--	NA	--	NA	--	NA	--
Mercury	1	µg/l	0.24	0.24	NA	--	NA	--	2.1	0	25	0
Potassium	1	µg/l	317000	317000	NA	--	NA	--	NA	--	NA	--
Sodium	1	µg/l	9040000	9040000	NA	--	NA	--	NA	--	NA	--

- (1) For marine surface waters with salinities greater than or equal to 5 parts per thousand (Source: California Regional Water Quality Control Board, Water Quality Control Plan - San Francisco Bay Basin, December, 1991).
- (2) Total PCBs; objective is unattainable using standard EPA analytical methods.
- (3) Objective for Chromium VI.
µg/l - micrograms per liter.
NA - Not applicable.

**Table 10. Summary of Runoff Water Sample Results
 Sites IR-8 & IR-9 (Location SW2)
 OU II RI Report
 Hunters Point Annex**

Test Method/ Analyte Name	Number of Samples Analyzed		Minimum Detected Value	Maximum Detected Value	Water Quality Objectives for the Protection of Aquatic Life -- 4-Day Average (1)		Water Quality Objectives for the Protection of Aquatic Life -- Daily Average (1)		Water Quality Objectives for the Protection of Aquatic Life -- 1-Hour Average (1)		Water Quality Objectives for the Protection of Human Health -- 30-Day Average (1)	
	units				Number of Samples Exceeding 4-Day Average	Number of Samples Exceeding Daily Average	Number of Samples Exceeding Daily Average	Number of Samples Exceeding 1-Hour Average	Number of Samples Exceeding 1-Hour Average	Number of Samples Exceeding 30-Day Average		
<u>CLP SOCs</u>												
Phenol	6	µg/l	3.0	3.0	NA	--	NA	--	NA	--	NA	--
<u>METALS</u>												
Barium	6	µg/l	44.4	82.8	NA	--	NA	--	NA	--	NA	--
Calcium	6	µg/l	3250	3250	NA	--	NA	--	NA	--	NA	--
Copper	6	µg/l	30.1	48.3	NA	--	NA	--	2.9	6	NA	--
Iron	6	µg/l	231	601	NA	--	NA	--	NA	--	NA	--
Lead	6	µg/l	19.7	40.1	5.6	6	NA	--	140	0	NA	--
Magnesium	6	µg/l	660	929	NA	--	NA	--	NA	--	NA	--
Manganese	6	µg/l	24.4	42.2	NA	--	NA	--	NA	--	NA	--
Vanadium	6	µg/l	2.5	2.5	NA	--	NA	--	NA	--	NA	--
Zinc	6	µg/l	163	232	86	6	NA	--	95	6	NA	--

µg/l - micrograms per liter.

NA - Not applicable.

(1) For marine surface waters with salinities greater than or equal to 5 parts per thousand (Source: California Regional Water Quality Control Board, Water Quality Control Plan - San Francisco Bay Basin. December, 1991).

**Table 11. Summary of Storm Drain Water Sample Results
Sites IR-8 & IR-9 (Location SW2)
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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	Water Quality Objectives for the Protection of Aquatic Life -- 4-Day Average (1)	Number of Samples Exceeding 4-Day Average	Water Quality Objectives for the Protection of Aquatic Life -- Daily Average (1)	Number of Samples Exceeding Daily Average	Water Quality Objectives for the Protection of Aquatic Life -- 1-Hour Average (1)	Number of Samples Exceeding 1-Hour Average	Water Quality Objectives for the Protection of Human Health -- 30-Day Average (1)	Number of Samples Exceeding 30-Day Average
					NA	NA	NA	NA	NA	NA		
<u>CLP VOCs</u>												
Benzene	7	µg/l	1.0	1.0	NA	--	NA	--	NA	--	21	0
<u>CLP PESTICIDES/PCBs</u>												
Aroclor 1260	7	µg/l	2.2	2.2	NA	--	0.030 (2)	1	NA	--	0.00007 (2)	1
<u>TPH</u>												
TPH as Diesel	7	µg/l	910	910	NA	--	NA	--	NA	--	NA	--
<u>METALS</u>												
Calcium	7	µg/l	6690	9450	NA	--	NA	--	NA	--	NA	--
Chromium (total)	7	µg/l	7.1	16.1	50 (3)	0	NA	--	1100 (3)	0	NA	--
Copper	7	µg/l	46.1	93.5	NA	--	NA	--	2.9	7	NA	--
Iron	7	µg/l	321	939	NA	--	NA	--	NA	--	NA	--
Lead	7	µg/l	25.2	70.6	5.6	7	NA	--	140	0	NA	--
Magnesium	7	µg/l	3020	8960	NA	--	NA	--	NA	--	NA	--
Manganese	7	µg/l	34.7	71.6	NA	--	NA	--	NA	--	NA	--
Potassium	7	µg/l	2030	3860	NA	--	NA	--	NA	--	NA	--
Sodium	7	µg/l	24200	76900	NA	--	NA	--	NA	--	NA	--
Vanadium	7	µg/l	3	3.6	NA	--	NA	--	NA	--	NA	--
Zinc	7	µg/l	176	575	86	7	NA	--	95	7	NA	--

µg/l - micrograms per liter.

NA - Not applicable.

(1) For marine surface waters with salinities greater than or equal to 5 parts per thousand (Source: California Regional Water Quality Control Board, Water Quality Control Plan - San Francisco Bay Basin, December, 1991).

(2) Total PCBs; objective is unattainable using standard EPA analytical methods.

(3) Objective for Chromium VI.

**Table 12. Summary of Pre-Event Storm Drain Water Sample Results
 Sites IR-6 (Location SW1)
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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	Water Quality Objectives for the Protection of Aquatic Life – 4-Day Average (1)	Number of Samples Exceeding 4-Day Average	Water Quality Objectives for the Protection of Aquatic Life – Daily Average (1)	Number of Samples Exceeding Daily Average	Water Quality Objectives for the Protection of Aquatic Life – 1-Hour Average (1)	Number of Samples Exceeding 1-Hour Average	Water Quality Objectives for the Protection of Human Health – 30-Day Average (1)	Number of Samples Exceeding 30-Day Average
					NA	NA	NA	NA	NA	NA		
<u>CLP SOCs</u>												
4-Methylphenol	1	µg/l	5.0	5.0	NA	--	NA	--	NA	--	NA	--
<u>CLP PESTICIDES/PCBs</u>												
Aroclor 1260	1	µg/l	3.8	3.8	NA	--	0.030 (2)	1	NA	--	0.00007 (2)	1
<u>TPH</u>												
TPH as Diesel	1	µg/l	900	900	NA	--	NA	--	NA	--	NA	--
<u>METALS</u>												
Aluminum	1	µg/l	1650	1650	NA	--	NA	--	NA	--	NA	--
Calcium	1	µg/l	346000	346000	NA	--	NA	--	NA	--	NA	--
Chromium (total)	1	µg/l	2360	2360	50 (3)	1	NA	--	1100 (3)	1	NA	--
Chromium VI	1	µg/l	43	43	50	0	NA	--	1100	0	NA	--
Iron	1	µg/l	616	616	NA	--	NA	--	NA	--	NA	--
Lead	1	µg/l	12.4	12.4	5.6	1	NA	--	140	0	NA	--
Magnesium	1	µg/l	1120000	1120000	NA	--	NA	--	NA	--	NA	--
Potassium	1	µg/l	285000	285000	NA	--	NA	--	NA	--	NA	--
Sodium	1	µg/l	9120000	9120000	NA	--	NA	--	NA	--	NA	--

µg/l - micrograms per liter.

NA - Not applicable.

- (1) For marine surface waters with salinities greater than or equal to 5 parts per thousand (Source: California Regional Water Quality Control Board, Water Quality Control Plan - San Francisco Bay Basin, December, 1991).
- (2) Total PCBs; objective is unattainable using standard EPA analytical methods.
- (3) Objective for Chromium VI.

**Table 13. Summary of Runoff Water Sample Results
 Sites IR-6 (Location SW1)
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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	Water Quality Objectives for the Protection of Aquatic Life – 4-Day Average (1)	Number of Samples Exceeding 4-Day Average	Water Quality Objectives for the Protection of Aquatic Life – Daily Average (1)	Number of Samples Exceeding Daily Average	Water Quality Objectives for the Protection of Aquatic Life – 1-Hour Average (1)	Number of Samples Exceeding 1-Hour Average	Water Quality Objectives for the Protection of Human Health – 30-Day Average (1)	Number of Samples Exceeding 30-Day Average
<u>CLP PESTICIDES/PCBs</u>												
Aroclor 1260	4	µg/l	3.2	3.2	NA	--	0.030 (2)	1	NA	--	0.00007 (2)	1
<u>METALS</u>												
Barium	4	µg/l	58.5	176	NA	--	NA	--	NA	--	NA	--
Calcium	4	µg/l	3480	3480	NA	--	NA	--	NA	--	NA	--
Copper	4	µg/l	52.6	89.9	NA	--	NA	--	2.9	4	NA	--
Iron	4	µg/l	167	472	NA	--	NA	--	NA	--	NA	--
Lead	4	µg/l	31.5	123	5.6	4	NA	--	140	0	NA	--
Magnesium	4	µg/l	614	956	NA	--	NA	--	NA	--	NA	--
Manganese	4	µg/l	49.8	66.3	NA	--	NA	--	NA	--	NA	--
Mercury	4	µg/l	0.23	0.23	NA	--	NA	--	2.1	0	25	0
Vanadium	4	µg/l	2.5	2.9	NA	--	NA	--	NA	--	NA	--
Zinc	4	µg/l	204	639	86	4	NA	--	95	4	NA	--

µg/l - micrograms per liter.

NA - Not applicable.

(1) For marine surface waters with salinities greater than or equal to 5 parts per thousand (Source: California Regional Water Quality Control Board, Water Quality Control Plan - San Francisco Bay Basin. December, 1991).

(2) Total PCBs; objective is unattainable using standard EPA analytical methods.

**Table 14. Summary of Storm Drain Water Sample Results
Sites IR-6 (Location SW1)
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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	Water Quality Objectives for the Protection of Aquatic Life -- 4-Day Average (1)	Number of Samples Exceeding 4-Day Average	Water Quality Objectives for the Protection of Aquatic Life -- Daily Average (1)	Number of Samples Exceeding Daily Average	Water Quality Objectives for the Protection of Aquatic Life -- 1-Hour Average (1)	Number of Samples Exceeding 1-Hour Average	Water Quality Objectives for the Protection of Human Health -- 30-Day Average (1)	Number of Samples Exceeding 30-Day Average
					NA	--	NA	--	NA	--	NA	--
<u>CLP PESTICIDES/PCBs</u>												
Aroclor 1260	5	µg/l	2.4	5.0	NA	--	0.030 (2)	4	NA	--	0.00007 (2)	4
<u>TPH</u>												
TPH as Diesel	5	µg/l	650	3400	NA	--	NA	--	NA	--	NA	--
TPH as Gas	5	µg/l	5000	5000	NA	--	NA	--	NA	--	NA	--
Oil & Grease	5	µg/l	6700	65000	NA	--	NA	--	NA	--	NA	--
<u>METALS</u>												
Arsenic	5	µg/l	2.2	2.2	36	0	NA	--	69	0	NA	--
Calcium	5	µg/l	3610	7820	NA	--	NA	--	NA	--	NA	--
Copper	5	µg/l	13.9	45.8	NA	--	NA	--	2.9	5	NA	--
Iron	5	µg/l	341	1640	NA	--	NA	--	NA	--	NA	--
Lead	5	µg/l	27.9	72.7	5.6	5	NA	--	140	0	NA	--
Magnesium	5	µg/l	982	6070	NA	--	NA	--	NA	--	NA	--
Manganese	5	µg/l	24.7	44.7	NA	--	NA	--	NA	--	NA	--
Potassium	5	µg/l	684	2800	NA	--	NA	--	NA	--	NA	--
Sodium	5	µg/l	16000	39100	NA	--	NA	--	NA	--	NA	--
Vanadium	5	µg/l	2.2	3.3	NA	--	NA	--	NA	--	NA	--
Zinc	5	µg/l	200	488	86	5	NA	--	95	5	NA	--

µg/l - micrograms per liter.

NA - Not applicable.

(1) For marine surface waters with salinities greater than or equal to 5 parts per thousand (Source: California Regional Water Quality Control Board, Water Quality Control Plan - San Francisco Bay Basin. December, 1991).

(2) Total PCBs; objective is unattainable using standard EPA analytical methods.

Table 15. Summary of Air Sampling Results, Site IR-8 (Location A8)
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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	California Permissible Exposure Limit (PEL)	Number of Samples Exceeding California PEL	Federal Permissible Exposure Limit (PEL)	Number of Samples Exceeding Federal PEL
<u>VOCs</u>								
Acetone	2	µg/m3	1.34E-04	1.41E-04	1.78E+06	0	2.40E+06	0
<u>SOCs</u>								
Naphthalene	1	ng/m3	1.41E-01	1.41E-01	5.00E+07	0	5.00E+07	0
<u>PESTICIDES</u>								
Dieldrin	1	µg/m3	3.90E-03	3.90E-03	NA	--	NA	--
Endrin	1	µg/m3	3.70E-03	3.70E-03	NA	--	NA	--
4,4'-DDT	1	µg/m3	3.48E-03	3.48E-03	1.00E+03	0	1.00E+03	0
<u>METALS</u>								
Lead	1	µg/m3	5.79E-02	5.79E-02	5.00E+01	0	NA	--
Mercury	1	µg/m3	6.31E-04	6.31E-04	1.00E+02	0	NA	--
<u>OTHER</u>								
Asbestos	1	s/cc	5.0E-03	5.0E-03	NA	--	NA	--

µg/m3 - micrograms per cubic meter of air.

ng/m3 - nanograms per cubic meter of air.

s/cc - structures per cubic centimeter of air (analysis by transmission electron microscopy).

NA - Not applicable.

Table 16. Summary of Air Sampling Results, Site IR-9 (Location A9)

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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	California Permissible Exposure Limit (PEL)	Number of Samples Exceeding California PEL	Federal Permissible Exposure Limit (PEL)	Number of Samples Exceeding Federal PEL
<u>VOCs</u>								
Acetone	1	µg/m3	2.00E-03	2.00E-03	1.78E+06	0	2.40E+06	0
Benzene	1	µg/m3	2.45E-04	2.45E-04	NA	--	3.20E+04	0
Ethylbenzene	1	µg/m3	1.11E-04	1.11E-04	4.35E+05	0	4.35E+05	0
Methylene chloride	1	µg/m3	4.16E-04	4.16E-04	3.50E+05	0	1.74E+06	0
Styrene	1	µg/m3	1.04E-04	1.04E-04	2.15E+05	0	4.26E+05	0
Tetrachloroethene	1	µg/m3	1.93E-04	1.93E-04	1.70E+05	0	6.78E+05	0
Toluene	1	µg/m3	1.63E-04	1.63E-04	3.75E+05	0	7.54E+05	0
1,1,1-Trichloroethane	1	µg/m3	1.71E-04	1.71E-04	1.90E+06	0	1.90E+06	0
Xylenes (total)	1	µg/m3	5.12E-04	5.12E-04	4.35E+05	0	4.35E+05	0
<u>METALS</u>								
Lead	1	µg/m3	1.11E-01	1.11E-01	5.00E+04	0	NA	--
Mercury	1	µg/m3	8.90E-04	8.90E-04	1.00E+05	0	NA	--

µg/m3 - micrograms per cubic meter of air.

NA - Not applicable.

**Table 17. Summary of Air Sampling Results, Site IR-6 (Location A7)
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Test Method/ Analyte Name	Number of Samples Analyzed	units	Minimum Detected Value	Maximum Detected Value	California Permissible Exposure Limit (PEL)	Number of Samples Exceeding California PEL	Federal Permissible Exposure Limit (PEL)	Number of Samples Exceeding Federal PEL
<u>VOCs</u>								
Acetone	1	µg/m3	5.20E-04	5.20E-04	1.78E+06	0	2.40E+06	0
Benzene	1	µg/m3	2.82E-04	2.82E-04	NA	--	3.20E+04	0
Ethylbenzene	1	µg/m3	3.04E-04	3.04E-04	4.35E+05	0	4.35E+05	0
Methylene chloride	1	µg/m3	1.48E-03	1.48E-03	3.50E+05	0	1.74E+06	0
Toluene	1	µg/m3	1.11E-03	1.11E-03	3.75E+05	0	7.54E+05	0
1,1,1-Trichloroethane	1	µg/m3	1.78E-04	1.78E-04	1.90E+06	0	1.90E+06	0
Xylenes (total)	1	µg/m3	1.41E-03	1.41E-03	4.35E+05	0	4.35E+05	0
<u>SOCs</u>								
Naphthalene	1	ng/m3	1.04E-01	1.04E-01	5.00E+07	0	5.00E+07	0
<u>METALS</u>								
Barium	1	µg/m3	1.11E-01	1.11E-01	5.00E+02	0	5.00E+02	0

µg/m3 - micrograms per cubic meter of air.

ng/m3 - nanograms per cubic meter of air.

NA - Not applicable.