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ALAMEDA POINT
SSIC NO. 5090.3

Department of Toxic Substances Control

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GROUNDWATER REMEDIAL INVESTIGATION/FEASIBILITY STUDY, ALAMEDA POINT SITE 25 AND ALAMEDA ANNEX IR-02, ALAMEDA, CALIFORNIA

Dear Mr. Macchiarella:

The Department of Toxic Substances Control (DTSC) has received the Groundwater Remedial Investigation/Feasibility Study (RI/FS) dated October 2003, for the Alameda Point, Site 25 and the Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex (FISCA), Installation Restoration Site-02 (IR-02). The RI/FS covers the groundwater for two adjoining areas of Alameda Point and FISCA where the contaminated plume overlaps. The Navy plans to prepare a Basewide Remedial Action Plan/Record of Decision for FISCA and the groundwater of Alameda Point Site 25. DTSC has reviewed the RI/FS and provides the following comments:

Comments by FISCA Remedial Project Manager

1. Facility Name: The RI/FS identifies Alameda Annex as the "Fleet and Industrial Supply Center Oakland" and abbreviated as FISCO. Please note that the correct name of the former Navy base is the "Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex" and abbreviated as either FISCA or Alameda Annex. The Fleet and Industrial Supply Center Oakland property, currently owned by the Port of Oakland, was a former Navy base located in the City of Oakland.

2. Site Identification: Are there any differences between Operable Unit 5 (OU5), Installation Restoration Site 25, and Parcel 181? If there are no differences,

please provide a statement indicating these nomenclatures identify the same area.

3. Pavement: Throughout the RI/FS, it reports that IR-02 is paved. The FISCA Basewide Environmental Baseline Survey (EBS), dated December 30, 1996, describes IR-02, or the screen lot and scrap yard, as an unpaved area. In 2001, the Navy completed surface soil remediation at IR-02, backfilled the excavation, and compacted the fill to original grade. The Navy has not paved IR-02 upon site restoration. IR-02 is currently unpaved. This discrepancy impacts the discussion of fate and transport, human health risk assessment, etc. in the RI/FS. The RI/FS should be revised based on the open bare soil condition at IR-02.

4. Site Boundary: Figure 1-5 shows the benzene plume with a 50 µg/L isoconcentration boundary. The plume would be larger if an 1 µg/L contour line were to be used. DTSC requests the RI/FS be revised to show the benzene plume with an 1 µg/L isoconcentration boundary.

   The outlined plume consists approximately 25% of Site 25, 15% of IR-02, 25% of Marina Village, 20% of FISCA IR-01, and remaining 15% distributes among FISCA's BRAC Parcels 22, 23, 27, 28, and 30, and the College of Alameda. Less than half of the plume is found at Site 25 and IR-02. The RI/FS should be renamed to avoid the impression that groundwater contamination is only found at Site 25 and IR-02.

5. Marina Village: The RI/FS identifies Marina Village as the "Alameda Point Residential Parcels" and indicates that the area includes mostly residential housing and a school. The RI/FS should also indicate the presence of a child care center (Building 258).

   The FISCA Resource Conservation and Recovery Act (RCRA) Part B Permit Application dated September 21, 1992 showed a property boundary compassing the current FISCA property the Marina Village area. On June 28, 1993, DTSC issued the Hazardous Waste Facility Permit to the Navy with an effective date from July 31, 1993 through July 31, 2003. The Hazardous Waste Facility Permit has two important components: (a) allowed the Navy to operate a hazardous waste storage facility at Building 5, and (b) imposed RCRA corrective action requirements for all areas within the FISCA property boundary as defined in the permit application.

   The Navy closed the hazardous waste storage facility at Building 5 in 1999 and obtained DTSC's clean closure concurrence for the storage facility on June 9,

1999. The Navy ceased the ability to operate as a hazardous waste treatment and a storage facility in 1999. However, the Navy and all subsequent landowners are required to comply with any remaining RCRA corrective action requirements imposed by the 1993 Hazardous Waste Facility Permit even the permit expired on July 31, 2003. RCRA corrective action requirements do not expire like the permit. All past, current, and future landowners for areas covered by the 1993 Hazardous Waste Facility Permit are responsible to cleanup any contamination caused by past activities at FISCA.

Sometime after receiving the1993 Hazardous Waste Facility Permit, the Navy transferred the operational control of the Marina Village from FISCA to Alameda Naval Air Station. Marina Village currently lies within the facility boundary of Alameda Naval Air Station, which later renamed as the Alameda Point.

Several big warehouses and storage areas hand occupied the Marina Village area before the Navy built houses and created the Marina Village. Past Navy operations may have caused soil and groundwater contamination in the Marina Village area. The Navy had to install a liner and import clean soil before constructing homes at the Marina Village. The ground surface at Marina Village is currently above other adjacent areas due to this added buffer. DTSC questions the rationale for such voluntary remedial activity and requests a full chronology of events leading to Marina Village construction. DTSC also requests submittal of all previous environmental investigations which prompted the Navy to perform the voluntary remedial action. Since the Marina Village coincides with the benzene plume as covered by the RI/FS, DTSC requests the Navy to address this issue as soon as possible.

6. Current Land Use at Marina Village: The environmental problems at the Marina Village, including homes, school, and child care center, have not been fully investigated; however, the village continues to be used by sensitive population. Please provide any documentation and regulatory agency's concurrence that the current land use of the Marina Village is appropriate. The Navy's response would directly impact the RI/FS schedule.

7. Section 1.1.2: The RI/FS states that the Alameda Annex comprises of 168 acres; however, the 1996 EBS reports the Alameda Annex amounts to 142.84 acres. Please correct the RI/FS accordingly.

8. Section 1.2.1: Please provide a figure showing Parcels 181, 182, and 183. Aerial photographs from 1947 and 1958 show housing units and some large structures of unknown use on the eastern half of Parcel 181. Please discuss

whether these large structures were located in the Kollmann Circle area. Please describe the land use between 1958 and 1968 for Parcel 181.

The Navy remediated the stained area near the intersection of Mayport and Kollmann Circles. Please discuss the kind of remediation being performed at the stained area, including types of the contaminations, concentrations, confirmation samples and results, overseeing regulatory agencies, etc. Please also discuss the relationship of this stained area with the benzene contaminated plume.

9. Section 2: The RI/FS identifies IR-02 as a 12.5-acre site; however, other Navy documents reference IR-02 to contain 10.65 acres. Please resolve the acreage discrepancy. Please also revise the RI/FS to accurately state that the Alameda Point Residential Parcels are comprised of residential housing, a school, and a child care center.

10. Section 3.1.3: The RI/FS expresses that the marsh crust was ruled out as a possible groundwater contamination source in the RI/FS because the Marsh Crust Feasibility Study concluded that the marsh crust did not merit remedial action. Please note the remedial action for the marsh crust is an institutional control prohibiting excavation below the threshold depth in accordance with the City of Alameda Ordinance No. 2824. Institutional control was selected for the marsh crush because other physical removal/treatment alternatives were impractical and economically infeasible. The marsh crust remains a possible groundwater contamination source and the RI/FS should be revised accordingly.

11. Figure 3-2: The location for P181-MW46 seems to be incorrectly identified in Figure 3-2. Please revise the figure accordingly.

12. Figure 3-4: Wells OU5-HP-37 and OS-HP-35 seem to be incorrectly depicted. Please revise the figure accordingly.

13. Sections 3.1.3, 3.1.4, and 3.2: The RI/FS has not included groundwater and soil gas data collected by other parties. For example, data from wells RA-1 through RA-5 sampled in February 2000, and wells ERM-HP-01 through ERM-HP-09 sampled in March 2001 are not reported. Benzene concentration for groundwater at ERM-HP-7 at 15 to 19 feet below ground surface (bgs) is 710 µg/L. This well reveals benzene contamination extending beyond IR-02 and into FISCA IR-01, and maybe the College of Alameda. DTSC requests the RI/FS to include all existing data for evaluation.

14. Section 3.2: The RI/FS discusses previous soil gas investigations from 1989 to 2002. The detected benzene soil gas concentrations range from around 10 to 17,000 $\mu g/m^3$. The Navy is also collecting soil gas periodically via soil gas monitoring probes. DTSC requests the RI/FS to include all soil gas data presented in tables and all sampling locations depicted in figures. These data must include soil gas sampling events by all parties.

15. Sections 3.2 and Section 6, and Appendix B: The U.S. Environmental Protection Agency (U.S. EPA) has published the *"Draft Guidance for Evaluation the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil"* (Subsurface Vapor Intrusion Guidance) in November 2002. Table 2c of this guidance shows that a target shallow (i.e., less than five feet bgs) benzene soil gas concentration of 3.1 $\mu g/m^3$ corresponds to a target indoor air risk of 1E-06, based on an attenuation factor of 0.1. A comparison with this target level would invalidate previous conclusions that the soil gas at the Site does not pose an indoor air risk since benzene soil gas concentrations range from around 10 to 17,000 $\mu g/m^3$. DTSC requires the Navy to perform a rigorous indoor air risk assessment using all existing soil gas data in accordance with the Subsurface Vapor Intrusion Guidance.

16. Section 4.1: Please discuss the soil contamination (i.e., benzene and other volatile contaminants) related to groundwater at Alameda Point Site 25. The 2002 OU5 Remedial Investigation Report does not seem to report any soil data for benzene or volatile organic compounds at Site 25.

17. Section 4.2.3 and Tables A-1 and A-3: The RI/FS states that the latest available, validated data was used during the writing of the report. However, Tables A-1 and A-3 do not include data from December 2002 and May 2003. Please update the tables and include the latest data in the RI/FS discussion.

18. Figure 4-12: The figure shows benzene concentration close to 0 µg/L in March 1999 for monitoring well S-12; however, Table A-1 does not have any information for this data point. Please revise the RI/FS accordingly.

19. Tables A-1 and A-3: Please provide benzene and naphthalene concentrations for wells M25-1 through M25-5 for Tables A-1 and A-3, respectively.

20. Sections 4.2.6, 4.3, 5.8.2, and 6: DTSC does not agree with the conceptual site model that benzene is not found in soil gas at the Site. DTSC requires a human health risk assessment using all existing soil gas data in accordance with the Subsurface Vapor Intrusion Guidance.

21. Section 4.4: Please clarify the meaning of the marsh crust being "ruled out" during the Marsh Crust Feasibility Study. The Marsh Crust Feasibility Study concluded that physical remediation of the marsh crust was not feasible; hence it was being ruled out for further evaluation.

22. Section 4.6: The RI/FS summaries that contamination does not appear to be migrating laterally or vertically, and is not volatilizing into vadose zone. DTSC disagrees with this conclusion. For example, benzene was detected at 710 µg/L at ERM-HP-7 and may laterally migrate to the College of Alameda, benzene was detected with highest concentration at around 20 feet bgs but deeper samples are not sufficient to support the absence of vertical migration, benzene soil gas in the vadose zone were found at around 400 $\mu g/m^3$, or to a maximum of 17,000 $\mu g/m^3$, suggesting an imminent indoor air risk based on the Subsurface Vapor Intrusion Guidance. DTSC believes the remedial investigation for groundwater and soil gas in the Alameda Point 25, FISCA IR-02, FISCA IR-01, Marina Village, the College of Alameda, and other adjacent areas are incomplete. Preparation of the feasibility study for the Site at this time is premature.

23. Section 5.8.4: Please discuss the depths of storm drain lines in various locations at the Site and their corresponding groundwater depths.

24. Section 6.1: The RI/FS used the acronym "Sepia" for "USEPA" in various sections. Please correct this typo in the document.

25. Section 6.1: The RI/FS presents that non-carcinogenic hazard indices ranged from 3.1 to 152 under potable water use; however these numbers are inconsistent with Table 6-1.

26. Tables 6-1 and ES.2 of Appendix B: The non-carcinogenic hazard indexes reported in Tables 6-1 and ES.2 of Appendix B are inconsistent. This comment may be moot since DTSC is requiring a revised human health risk assessment; nonetheless, please ensure consistent information is reported in future versions.

27. Section 6.4: Please provide a summary table within Section 6.4 listing all exposure point concentrations for benzene, naphthalene, and MTBE used in the human health risk assessment.

28. Section 8: DTSC requests the RI/FS to include the following technologies for screening in Section 8 and further analysis in Section 9: (a) vapor collection and venting for any newly constructed residential, commercial, and industrial

buildings, and (b) six-phase heating (SPH). The City of Alameda has proposed a sub-slab depressurization system for the 39-unit housing site as a voluntary action to support the removal of the interim land use restriction in advance of the remedy selection for the Site. DTSC believes a vapor collection and venting system should be evaluated in the feasibility study as well. SPH is reported to be a fast (on the order of months) and effective method of in-situ remediation of volatile and semi-volatile contaminants in soil and groundwater. Application of SPH could remediate the groundwater at IR-02 to cleanup goals within months, and may alleviate the need for a long term groundwater monitoring program.

29. Section 8.1: The RI/FS proposes groundwater remedial action objectives (RAOs) for benzene as the California maximum contaminant level of 1 µg/L and for naphthalene as the U.S. EPA Health Advisory of 100 µg/L. Please provide rationales for choosing these levels and not the California Regional Water Quality Control Board's environmental screening levels, the U.S. EPA, Region 9's tap water preliminary remediation goals, or the federal maximum contaminant levels. DTSC will review these rationales and determine the appropriate RAOs for benzene and naphthalene.

30. Section 8.3.2.1: Any liquid and groundwater from excavation at the Site presumably contain hazardous substances. Please discuss the construction dewatering procedures to ensure groundwater and any standing liquid from excavation are managed, analyzed, and disposed properly in accordance with all applicable regulations. The institutional control alternative must contain procedures/requirements for managing groundwater and any standing liquid during construction dewatering.

31. Section 8.3.8.2: The RI/FS presents that if air sparing were to be used at the Site, vapor extraction and treatment would be required to protect nearby residents from fugitive benzene emissions. This seems to suggest that if the air sparing area is away from residents, vapor extraction and treatment would not be necessary. DTSC disagrees and requires a vapor recovery system to capture and treat fugitive emissions generated by air sparing at all locations.

32. Section 8.3.8.3: The RI/FS states that biosparging is designed to push volatilized contaminants into vadose zone where they undergo treatment via biodegradation. At the Site, the bottom of vadose zone ranges from around five to ten feet bgs. Please discuss the effectiveness of biosparging at depths where the vadose zone is around five feet bgs.

The RI/FS informs that previous investigations at the Site have found the soils to be moderately permeable. Please specify the types of soil encountered at the Site. Would subsurface heterogeneity due to filling techniques and previous tidal channels inhibit the uniform distribution of air around the biosparging wells?

The RI/FS reports that benzene has had a low frequency of detection in the vadose zone indicating not only weathered contaminants, but also that vadose zone biodegradation has assisted in breaking down contaminants. Please substantiate this statement by providing a detection frequency for FISCA IR-02 and Alameda Point Site 25. The OU5 RI Report does not seem to contain any benzene data for soils in the Site 25 areas.

Please discuss the rationale for not collecting groundwater samples deeper than the 20-foot bgs depth.

Normally, air flow in a biosparging system is maintained at low pressure to minimize fugitive emissions; however, the RI/FS suggests that biosparging is designed to volatilize and push benzene into vadose zone where benzene vapor is undergoing biodegradation. Please discuss the balance between the required pressure, radius of influence, vadose zone thickness, fugitive emissions, etc., in order to achieve an optimal and effective treatment over time. Please provide a scaled diagram showing air flow paths from the sparge well, treatment zone in saturated and vadose zones, radius of influence, fugitive emission controls, etc., for the P181-MW47 location. Figure 9-1 does not contain this information.

33. Section 8.3.8.5: The RI/FS explains that previous studies have found that the microorganisms and nutrients typically need for in situ biological treatment are usually present in subsurface soils. Please provide a summary table showing the amount of nutrients and microorganisms in a decreasing dissolve oxygen conditions. Please also provide the reference to previous studies supporting this observation. DTSC will evaluate the information and may require the RI/FS to further analyze the nutrient/microorganism enhancement remedial technology in Section 9.

34. Section 8.3.8.6: Aerobic degradation with oxygen release compound (ORC) is not being retained for further analysis because of low to moderate effectiveness for large areas such as the Site, and other reasons. The RI/FS further details that the ORC injection well spacing is rather large (100 feet or more). How does ORC injection well spacing compare with the biosparging well spacing of around 80 feet (see page 9-24)? DTSC believes the well spacing for these two remedial

technologies are similar and the RI/FS should not favor one but not the others. DTSC requires ORC injection to be further analyzed in Section 9.

35. Section 8.3.8.7: The RI/FS claims that the presence of clays and other subsurface heterogeneities at the Site would hamper uniform application of the chemical oxidants. The presence of clays and other subsurface heterogeneities could reduce the biosparging's 40 feet radius of influence and render the biosparging technology ineffective. Please discuss whether biosparging would have the same limitation as in chemical oxidation considering the same subsurface geology at the Site.

36. Section 8.3.8.8: The RI/FS suggests that the steam-enhanced extraction technology would require a large field of steam injection wells. Please estimate the number of steam injection wells needed for the biosparge zones as depicted in Figure 9-2. How does this number compare with the 50 biosparging wells proposed for the same areas?

37. Section 8.3.8.8: The RI/FS has not retained steam-enhanced extraction because of low effectiveness for large areas, moderate to high cost, and low implementability for large areas and areas with heterogeneous subsurface. These constrains are not unique to steam-enhanced extraction. Biosparging and other active treatment technologies share the same constrains. The reasons for rejecting the steam-enhanced extraction option are unjust.

    The RI/FS discusses that the removal efficiency for mid- to heavy-weight petroleum hydrocarbons is less efficient than for volatile contaminants. The contaminants of concern in this RI/FS are benzene and naphthalene, which are not mid- to heavy-weight petroleum hydrocarbons. The removal efficiency for benzene and naphthalene is favorable when using steam-enhanced extraction.

38. Page 9-10: DTSC believes that the vertical extent of contamination (e.g., 20 to 30 feet bgs) at the Site has not been characterized. The lateral extent of contamination is unknown, at least in the southeastern direction toward the College of Alameda.

39. Page 9-10: Please discuss the difference between ethane and ethane by R.S. Kerr Standard Operating Procedure 175.

40. Page 9-11 and Section 6: Please consider the validity of an exposure pathway via human consumption of home grown produces with deep roots (e.g.,

tomatoes). If this is not a valid exposure pathway, please document the reasons for exclusion in the human health risk assessment.

41. Page 9-11, fifth paragraph, first sentence: Should "anaerobic" be replaced with "aerobic?"

42. Page 9-14, first bullet and Table 9-2: Please reconcile the discrepancy of the number of additional monitoring wells needed to create a 20-well monitoring network.

43. Page 9-14, second bullet: Please specify whether one year of sampling means four quarterly sampling events.

44. Page 9-14, third bullet: Please discuss the number of soil gas monitoring event within one year, and whether this monitoring frequency is consistent throughout the first five years.

45. Page 9-14 and Table 9-2: Please note that DTSC requires the Navy and all subsequent landowners to submit written requests with supportive data for any modification and/or termination of the monitored natural attenuation program. DTSC's concurrence on the RI/FS or approval of the remedial action plan does not constitute an acceptance of the monitoring schedule and the frequency outlined in Table 9-2.

46. Table 9-2: Please provide the soil gas monitoring schedule and frequency in Table 9-2.

47. Section 9.4 and Figure 9-2: Figure 9-2 is showing blue and light blue areas that are outside of Biosparge Zones 1, 2, and 3. The benzene concentrations in these outside areas range from 50 to 1,000 µg/L. Please evaluate the biodegradation timeframe for these areas and discuss whether monitored natural attenuation would reduce benzene contamination from 1,000 to 1 µg/L in nine years.

48. Page 9-23, first bullet: Please correct the typo "P181-MW457."

49. Page 9-23, second bullet: The RI/FS states that Biosparge Zone 2 is located in an open, unused paved area, and residential development is planned for Biosparge Zone 2 in the near future. Please note that IR-02 is unpaved and no asphalt cap is installed. The western one-third of IR-02 is planned for the 39-unit housing site. The Interim Covenant to Restrict Use of Property between DTSC

and the Navy recorded with the Alameda County on July 20, 2000 specifies the residential use area within IR-02 to be 2.5 acres. This 39-unit housing site is a rectangular shaped area measuring 341.05 feet by 319.31 feet. DTSC requests the Navy to superimpose the 39-unit housing site onto Figure 9-2. The 39-unit housing site boundary and Biosparge Zones 1 and 2 must be shown accurately.

50. Page 9-23: The RI/FS is not definitive about the vapor capture and treatment system for Biosparge Zones 1 and 3. If a radius of influence of 40 feet were to be maintained, pressurized air would have to be introduced to subsurface and fugitive benzene emission is inevitable. DTSC herein requires the biosparging system to include vapor collection and treatment system for Biosparge Zones 1, 2, and 3.

51. Page 9-24: The RI/FS argues that continued declining contaminant concentrations in monitoring wells would meet cleanup goals within nine years. Please estimate the benzene and naphthalene concentrations at the Biosparge Zones after two years of operation. The maximum detected benzene concentration was at 6,000 µg/L at well OS-HP-10. What would be the estimated benzene concentrations at this location two years and nine years after the commencement of the remedy?

52. Page 9-24 and Table 9-3: The RI/FS proposes 50 sparge wells and 13 soil gas monitoring probes for the three biosparge zones. Please submit a figure showing all sparge well and soil gas monitoring locations. DTSC understands the exact location would be determined in the field, but DTSC needs to evaluate the effectiveness of the biosparging technology for areas, especially around exiting residential buildings and the 39-unit housing unit site.

53. Table 9-3: Please provide a monitoring frequency for the soil gas probes.

54. Table 9-3: The RI/FS proposes groundwater monitoring frequency and staggered well abandonment schedule. DTSC understands such schedule is for cost estimation only. The Navy and all subsequent landowners must submit data for DTSC's review and approval before any modifications to the groundwater and soil gas monitoring programs.

55. Page 9-26: The RI/FS suggests that a large radius of influence (e.g., 40 feet or more) would be used for areas with surface obstructions (e.g., residential buildings), and a small radius of influence (e.g., 15 to 20 feet) would be used for areas with no surface obstructions (e.g., IR-02). Please discuss the feasibility of using a 40-foot radius of influence at areas with surface obstructions such as

residential buildings. DTSC believes a larger radius of influence requires a higher air injection pressure which would increase benzene volatilization.

56. Sections 9.4.2 and 7: Since DTSC requires a vapor extraction and treatment system for the biosparging technology, the Clean Air Act and the Bay Area Air Quality Management District Regulation Title 8 are applicable requirements.

57. Section 9.5.3: Please provide information to support that biosparging would reduce concentrations in the most contaminated areas within 1.5 years and that monitored natural attenuation would reduce residual concentrations to below cleanup goals. Please estimate the contaminants' concentrations after 1.5 years of biosparging operations at various locations with elevated contaminant concentrations.

58. Appendix F, Cost Table for Sparge Well System Controls: If a soil vapor extraction system is required, the RI/FS reveals that an extraction blower, some tubing, and one water knockout vessel would be added. This does not seem to be a complete vapor extraction system for capturing and treating fugitive emissions. Please revise the RI/FS accordingly.

59. Additional Comments: The enclosed comment memoranda prepared by DTSC's Geologic Services Unit (GSU) dated January 20, 2004, Engineering Services Unit (ESU) dated January 22, 2004, and Human and Ecological Risk Division (HERD) dated January 23, 2004 are included with this comment letter.

Comments by Alameda Point Remedial Project Manager

The reviewer concurs with the comments prepared by DTSC FISCA Remedial Project Manager and technical experts at GSU, ESU and HERD and provides the following additional comments.

1. Overall Comment: The document is concisely written, nicely organized and makes effective use of tables, figures and appendices to explain a rather complex set of data collected over a period of more than ten years by various contractors. However, many of the statements and/or conclusions are not necessarily supported by the data. Others are drawn from earlier studies or work by non-Navy entity where the status of DTSC concurrence is unclear. Substantial efforts to clarify and/or substantiate these conclusions or statements will be necessary.

2. Section 1 – Site Identification and Boundary: The affected area, as Page 1-1, Figures 1-2 and 1-3 of the document indicate, also underlies residential parcels 178, 179, 180 and 184 at Alameda Point. These parcels are currently used for a school (George Miller Elementary), a daycare center (Woodstock Child Development Center) and residential housing (Marina Village) and designated as Installation Restoration (IR) sites 30 and 31. They are not part of IR Site 25. The title of this RI/FS document is incorrect. Please revise it (please also see FISCA Comment #4).

3. Section 1 – Site History: It is worth noting that these residential parcels at Alameda Point (i.e. Parcels 178, 179, 180 and 184) were historically part of FISCA or Alameda Annex and are believed to have been impacted by industrial activities (see FISCA Comment #5). Given their close proximity, it is likely that IR Site 25, particularly the southeaster portion of Parcel 181, was also subject to industrial use at one time. Please:

   - Provide detailed site history for Parcels 178, 179, 180 and 184 in the report;

   - Make efforts (e.g. review of aerial photos and interview with former Alameda Naval Air Station employees) to identify the "large structures of unknown use on the eastern half of" IR Site 25 (see page 1-11, 3rd paragraph);

   - Discuss the possibility that the historical soil staining observed near present-day intersection of Mayport and Kollmann Circles at Parcel 181 of IR Site 25 is linked to past industrial activities extended from the FISCA site.

4. Section 2 – IR Site 25 Removal Action: Page 2-1 indicates that a park is located on the northern side of IR Site 25 and the park was the location of a previous Navy removal action to address polynuclear aromatic hydrocarbons (PAHs) in shallow soils. Similar references have been made at a number of places throughout this report (e.g. Section 4.4.1). Please note that the subject removal action, conducted between November 2001 and September 2002, encompassed a total area of approximately 25.6 acres, which is much more than just the park or the northern section of IR 25 as indicated in the report. Also note that the removal involved only top two feet of soil and did not address the PAH contamination in deeper soil. Please revise the report accordingly.

5. Section 2 – Fill Material: Please clarify if dredge spoils from the seaplane lagoon had been used as fill materials at the subject site (page 2-2). If indeed so, please provide further details such as periods of dredging and approximate locations of filling.

6. Section 2 – Fill Material: It appears that industrial wastes, in addition to dredge spoils from surrounding water bodies, may have been used as fill materials at the subject site (page 4-25). For clarity and completeness, please include this information in the discussion of fill origins in Section 2.1.

7. Section 3 – Previous Investigations: Please provide a list of agency concurrence status on all previous investigation reports referenced in this RI.

8. Section 3 – Previous Soil Investigation: This section does not include any discussion on previous soil investigations. Since spills/releases from past industrial activities and contaminated fill material are believed to be the sources of groundwater contamination, a discussion on previous soil investigation at the subject site -- such as those pertaining to chemicals of concern (COCs) -- is considered essential to the understanding of contaminant sources and should, therefore, be included in the RI (please refer to Comment #20 and DTSC's Geological Services Unit comments regarding COC selection). DTSC recommends that soil sampling maps for each COC be presented in this report. The maps should allow easy retrieval of pertinent information such as sampling depth and locations where the contaminant concentration exceeds the screening level.

9. Section 3 – Well Decommissioning: According to Sections 3.1.4 and 4.2.2, up to 49 monitoring wells have been destroyed at the subject site by remedial actions and construction activities. Please clarify if these wells have been decommissioned in accordance with California Water Well Standards, Bulletin 74-81 and supplemental bulletins including Bulletin 74-95.

10. Section 3.2 – Previous Soil Gas Investigation: Section 3.2 indicates that up to 355 soil gas samples have been collected in six different studies over a period of more than ten years at the subject site. However, Figure 3-5, the only pictorial presentation of previous soil gas investigation, depicts only the four soil gas probes installed in 2002. Please provide a map showing the locations and depths of all soil gas samples collected to date and highlight those where the vapor concentrations exceed the target levels listed in U.S. EPA's Subsurface Vapor Intrusion Guidance (see FISCA Comment #15).

11. Section 3.2 – Previous Soil Gas Investigation: The six studies reported in this section do not include the 1999 work by TtEMI entitled "Updated Alameda Point/Alameda Annex Benzene Soil-Gas Investigation." This particular TtEMI study is referenced in Section 4.3, in supportive of Navy's assertion that human health risks associated with benzene volatilization from groundwater is negligible (see Comment #14). Please clarify any agency concurrence status on this TtEMI study and determine if this document should be listed as one of the previous soil gas investigations in Section 3.2.

12. Section 4 – Soil Contamination/Sources of Contamination: Section 4.1 asserts that soil contaminants do not appear to correlate with groundwater contamination. Section 4.4 states that the source(s) of groundwater contamination has not been located despite several characterization efforts (page 4-24) and that these potential source area(s) (i.e. the past spills or contaminated fill materials) do not appear to be acting as ongoing source material continuing to leach contaminants to groundwater. It is, however, unclear if any soil samples (shallow as well at depth) had been collected at or near the plume center(s) and if they have conclusively demonstrated that the contaminant level at these potential source areas is negligible.

    Generally, DTSC believes that if soil contaminant level at the source area is non-detect or negligibly low, it may be concluded that contaminants at the source (e.g. past spills or contaminated fill material) have all been leached out from the soil matrix and dissipated into the groundwater (aqueous phase) and the source is "gone" or no longer releasing contaminants into groundwater. This reasoning, understandably, relies exclusively on the assumption that the soil was sampled and analyzed properly and the quality of the data is good enough to withstand scrutiny.

    In order to conclude with confidence that no known source of groundwater contamination can be located at the subject site and that soil is no longer acting as ongoing source material and is unrelated to groundwater contamination, it is necessary that this RI re-examines the existing data and presents a case satisfactory to the premises described above. It is recommended that this RI:

    - Provide maps illustrating previous soil sampling locations, depths and relevant chemical data (see Comment #8).

    - Discuss soil sampling and analysis methodology and the data quality (e.g. Was Encore used in soil VOC sampling? Was the soil sample taken at

the surface or at depth? What analytical method was used? How was the detection limit?)

13. Section 4 – Soil Gas Contamination: According to Section 4.3, approximately 10% of the 355 soil gas samples were detected for benzene. Many of these detections were located outside of the known groundwater plume. The highest reading was 17,000 ug/m^3, which the Navy considers as an anomaly (see page 3-12). Based on the low detection frequency and the observation that soil gas do not co-locate with the groundwater plume, the Navy concludes that there is little correlation between groundwater and soil gas contamination (see page 4-24), contaminants in groundwater do not volatilize into the vadose zone (page 4-28) and soil gas is not a complete exposure pathway (page 5-23 and Executive Summary Paragraph 4) and therefore poses no threat to human health.

These conclusions appear to be derived without first considering a few critical issues. For example, although the detection frequency has been low, benzene and other VOCs have, after all, been detected in the soil gas in numerous occasions throughout the past ten plus years. If they are not from the groundwater, where do they come from? Besides, this RI does not discuss field conditions that could have complicated soil gas sampling. It is unclear, for instance, if tight soil or high soil moisture has played a role in the low detection of soil vapor. Furthermore, this RI provides little specific discussion on underground utilities acting as preferential pathways for soil gas migration. Given that extensive underground utility systems are present within the site (see Section 2.4), it is important that utility lines be specifically evaluated for their potential roles in the detection of soil vapor, particularly at locations outside of known groundwater plume.

Because of the current and future expanded residential use of the subject site, soil gas contamination is a genuine concern and needs to be rigorously examined before concluding it is unrelated to the known groundwater contamination and does not pose threat to the on-site residents. DTSC requests that this RI:

- Provide all soil gas data collected to date.

- Depict soil gas sampling locations on a map (see Comment #10) and highlight those locations where VOCs were detected above the screening level.

- Discuss field conditions that might have impacted soil gas sampling (e.g. sampling depth, soil profile, depth to groundwater, soil moisture level, etc.).

- Locate the utility layout for the project site and determine if utilities act as preferential pathways assisting soil gas migration within the site.

- Provide indoor air sampling data as referenced on page 5-23 (Please also discuss sampling methods and the data quality).

- Present soil gas incremental risk and hazard in a more accessible and easily understood format (see Comment #18).

14. Section 4.3 – Soil Gas Contamination: This section states, "In addition, human-health risks associated with benzene volatilization have been found to be less than 10^{-6} (TtEMI, 1999a)." Please clarify if this is consistent with the health risk presented in this RI (Table 6-1 of this RI reports a cancer risk of 2×10^{-5} for residents and 3×10^{-6} for school children). Also, this statement is irrelevant to the understanding of nature and extent of contamination and may be deleted from Section 4.

15. Section 5.8 – Preferential Pathways for Groundwater Migration: Section 5.8 correctly states that contaminated groundwater could migrate into or along storm drain or other utility lines and eventually discharge into the Oakland Inner Harbor or trenches during site construction work. Little specific evidence was, however, presented in this RI to demonstrate that such migration does not or will not occur at the subject site. To help close the gap, DTSC requests this RI:

    - Provide sufficient details from the storm drain studies (Please include evaluations on bedding materials as well as leaks).

    - Clarify any agency concurrence status on the storm drain studies.

    - Clarify if subsurface utilities other than storm drains had been evaluated for their potential roles as preferential pathways.

16. Section 6 and Appendix B – Potential Receptors: Parcels 178, 179, 180, and 184 are presently used for homes, school and daycare (see Comment #2). Residents and school children are current receptors, not hypothetical or future potential receptors. Please correct it.

17 Section 6 and Appendix B – Presentation of Risk Assessment Results: This RI presents human health risk in a very brief synopsis in Section 6 and leaves all details to Appendix B, which is a compact disk, assessable only electronically. To make it easier for the stakeholder to decipher the information and provide input in the RI/FS process, DTSC requires the following:

- Include sufficient details in the main text (i.e. Section 6) to allow an average reader understand the risk and its derivation, without wading into the details in Appendix B. The reader should be able to know succinctly (a) the selection criteria of the chemical of potential concern (COPC), (b) the equations (illustrated by sample calculations) used to establish exposure point concentrations, (c) the definition and reason for using the 500 and 725-foot radius Kriging, (d) the description and justification for using Tier 1 and Tier 2 risk assessments, (e) the consistency and deviation between the Navy's risk assessment approach and U.S. EPA's 1989 Risk Assessment Guidance.

- Explicitly state that the risk presented herein is for groundwater only. It does not include the incremental risk posed by the soil and therefore represents only a portion of the total risk and hazard the residents and workers are exposed to.

18. Section 6, Integration of Soil and Groundwater Incremental Risks: DTSC understands and supports the Navy's approach to address the groundwater plumes jointly for all affected areas. But DTSC strongly believes that the baseline risk assessment should consider all environmental media (i.e. soil and groundwater) the receptors are exposed to. Given that some parcels in the affected areas have not been subjected to risk assessment and therefore do not have soil incremental risk results for ready integration, DTSC recommends that this RI explicitly state, for each of the affected areas or parcels, when and how (e.g. in the soil FS) the total incremental risks and/or hazards due to exposure to both soil and groundwater are going to be presented.

19. Section 6 and Appendix B, Risk Assessment Methodology: Please clarify the basis and agency concurrence on risk assessment methodology used in this study including COPC selection, two-tiered approach (i.e. Tier 1 and Tier 2), and block Kriging.

20. Section 6 and Appendix B: Detection Limit: Table 2 of Appendix B indicates that chemicals not detected or detected less than 5% of the time are eliminated from COPC consideration. However, the upper range of detection limits reported appears to be high – 2,000 µg/L or even 20,000 µg/L in some instances. Please

review the data and determine how wide-spread the high detection limit problem is. It is our opinion that non-detects are generally not meaningful if the detection limits are higher than the screening levels established for the study (e.g. PRG, MCL).

21. Section 6 – Ecological Risk: The possibility exists that storm drain or other subsurface utility lines act as preferential pathways for groundwater migration and result in the discharge of contaminants into the Oakland Inner Harbor, impacting the ecological resources in the area. Please discuss if this possibility has been considered in the ecological risk assessments conducted for the subject site (also see Comment # 15).

DTSC has provided extensive comments on the RI/FS. Please review this letter and the enclosed memoranda and contact Henry Wong at (510) 540-3770 or Marcia Liao at (510) 540-3767 for any clarification. Draft responses to comments should be prepared and provided to DTSC for consideration before any comment resolution meeting. DTSC looks forward to assist the Navy in completing the remedial investigation and the succeeding feasibility study.

Sincerely,

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Marcia Liao
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Enclosures

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FROM: James M. Polisini, Ph.D.
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DATE: January 23, 2004

SUBJECT: NAVAL AIR STATION ALAMEDA (ALAMEDA POINT) SITE 25/IR02
DRAFT GROUNDWATER REMEDIAL INVESTIGATION/FEASIBILITY STUDY
[SITE 201209-18 PCA 18040 H:57]

BACKGROUND

HERD reviewed the document titled *Draft, Groundwater Remedial Investigation/Feasibility Study, Alameda Point Site 25 and Alameda Annex IR-02, Alameda, California*, dated October, 2003. This document was produced by Engineering/Remediation Resources Group, Inc. of Concord, California.

The majority of the affected area within Alameda Annex is located in Installation Restoration (IR) site IR-02. The United States Coast Guard (USCG) residential housing and a park currently occupy Site 25. The primary Contaminants of Concern (COCs) are benzene and naphthalene in the shallow first water bearing zone (FWBZ). The Alameda Annex facility, also known as Fleet Industrial Supply Center Oakland (FISCO), occupies approximately 168 acres of land along the southern shore of the Oakland Inner Harbor adjacent to Naval Air Station (NAS) Alameda. Eight IR sites were identified at Alameda Annex. IR-02, the major focus of this report, was historically used as a screening lot and scrap yard.

Alameda was an active naval facility from 1940 to 1997. Operations included aircraft, engine, gun and avionics maintenance; fueling activities; and metal plating, stripping and painting. An unconfined landfill exists on the margin of San Francisco Bay in the western bayside area of NAS Alameda. Todd shipyard is located immediately adjacent

to Operable Unit 5 (OU5) on the Alameda Inner Harbor Channel. OU5, approximately 42 acres in size, was constructed in 1937 from fill material placed at NAS Alameda. All Navy activities ceased in 1997.

GENERAL COMMENTS

HERD defers to the comments made by the Geological Services Unit (GSU) in their January 20, 2004 memorandum regarding the adequacy of the sampling and the kriged water concentrations. HERD has concerns similar to those outlined by the GSU regarding the identification of the contributors to risk and/or hazard as outlined in specific comments below.

SPECIFIC COMMENTS

1. The existing school is considering expansion within the Alameda Annex site (Section 1.3, page 1-14). Any expansion of the existing school should be referred to the Department of Toxic Substances (DTSC) Schools Unit for evaluation. The toxicologists working within the Schools Unit indicate that parcels or areas which pass a residential use scenario would most probably not be a problem, however, review by the Schools Unit should be requested prior to any expansion.

2. The potential for preferential migration of COCs into Oakland Inner Harbor via the bedding in the 'extensive system of sanitary sewer and storm drain lines with the Site' (Section 2.4, page 2-6) should be evaluated. The absence of leaks in the storm drain system does not indicate that the bedding material doesn't serve as a preferential migration pathway.

3. Please define the term 'Sepia's acceptable risk management range.' (Section 6.1, page 6-1).

4. Use of the chemical transfer model for water to air using the DTSC 'shower scenario' guidelines would appear protective as shower water would be at a higher temperature than car wash water and the shower space would be much more confined than the space at an open air car wash (Section 6.3, page 6-3). The car wash scenario would therefore appear protective for inhalation exposure of workers in a car wash. In addition, most car wash water is recycled within the same facility so that the water concentration of Volatile Organic Compounds (VOCs) would drop perceptibly after the first use. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractors.

5. The basis for the estimate of irrigation rate for the irrigation/landscape worker scenario (Section 6.3, page 6-3) appears well supported (Center for Irrigation Technology, California State University-Fresno and the U.S. Bureaus of Reclamation).

6. The text description of the site-specific exposure characteristics (i.e., depth to groundwater and type of construction) and the version of the Johnson and Ettinger indoor air exposure model (i.e., including CalEPA toxicity values) appear appropriate for evaluation of human health risk (Section 6.3, page 6-4).

7. HERD agrees with the most likely list of primary exposure pathways as direct contact, incidental ingestion and food-web exposures (Section 6.5.1, page 6-5). However, the exclusion of the inhalation of volatile compounds in air must be documented by some demonstration, perhaps based on a generic demonstration with a Jury model, given the minimal depth to groundwater in OU5. A calculation of the incidental cancer risk and /or non-cancer hazard in the area of the highest groundwater concentration and/or minimal depth would be sufficient in the event the incremental cancer risk and/or non-cancer hazard are *de minimis.*

8. Biosparging with Institutional Controls (ICs) are the selected remedial alternative (Table 9-4, page 9-30). HERD has no objection to this Remedial Alternative, but defers to the Geological Services Unit in DTSC for final evaluation.

9. Please clearly define the proposed monitoring schedule to determine that 'volatile constituents are not released into the atmosphere but are biodegraded in the groundwater or vadose zone' (Appendix E, page 1). This monitoring, once approved, should be a condition of the Remedial Action Plan (RAP) or Record of Decision (ROD), especially in the area of the school and proposed school expansion.

10. HERD cannot locate any estimate of the potential drawdown of groundwater in support of the 500 foot or 750 foot radius for the kriged exposure point concentration (EPC) used in the Human Health Risk Assessment (HHRA) (Appendix E, Table ES.2). Please provide the basis for the assumed radii, or reference the location in the text. HERD defers to the Geological Services Unit (GSU) regarding the estimation of groundwater concentration and delineation of groundwater isopleths.

11. The HHRA scenarios used (i.e., residential, car wash worker, and landscape worker) appear to encompass protective estimations of human exposure to groundwater (Appendix E, Table 10). However, some estimation of the total incremental risk and/or hazard due to exposure to soil contaminants in addition to groundwater exposure must be provided for the residential scenario for consideration by the risk managers.

12. Benzene and naphthalene are identified as 'risk drivers' in the main body of the text (Section 1, page 1 and Section 3.1.5, page 3-5), yet multiple polycyclic aromatic hydrocarbons (PAHs) have Frequency of Detection (FODs) near or above 50 percent (Appendix E, Table 2). Other benzene-substituted compounds (e.g., 1,2,4-trimethylbenzene and m,p-xylene) are present in a significant number of groundwater samples. Please amend the text to indicate that while benzene

contributes the majority of incremental cancer risk and naphthalene accounts for the majority of noon-cancer hazard, there are other elements and compounds which contribute to the estimate of cancer risk and/or non-cancer hazard.

13. The central tendency groundwater concentrations (Appendix E, Table 3.5) were compared to the Reasonable Maximum Exposure (RME) groundwater concentrations (Appendix E, Table 3.6) and appear to be reasonably represent the appropriate range of concentrations for a HHRA.

14. The arithmetic average, as indicated in the column heading (Appendix E, Table 3.7) or some estimate of central tendency (e.g., median or mode) should be provided for the consideration of the risk managers. The column identified in this comment is completely blank.

15. Exposure parameters for the HHRA intake calculations (Appendix E, Tables 4.1 through 4.20) were checked at random, for each exposure scenario, and found to be acceptable with suitable justification and citations. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractors.

16. The oral cancer slope factors (SfO) were checked for benzene, which is identified as the 'risk driver' for cancer risk. The oral value listed, $3.0x10^{-03}$ mg/kg-day (Appendix E, Table 5.1, page 1 of 2), attributed to NCEA does not agree with the value used by the U.S. EPA Region 9 of $5.5x10^{-03}$ mg/kg-day (EPA Region 9 PRG table 2002), nor the California Office of Environmental Health Hazard Assessment (OEHHA) oral slope factor for benzene of $1.0x10^{-01}$ mg/kg-day. However, the inhalation cancer slope factor listed (Appendix E, Table 6.2, page 1 of 2) of $1.0x10^{-01}$ mg/kg/day does agree with the California OEHHA value. Please explain this discrepancy. Also, please check the cancer slope factors and Reference Doses (RfDs) to ensure that the most protective value is used, whether it is U.S. EPA, U.S. EPA NCEA, U.S. EPA Region 9, or California OEHHA.

17. Estimates of risk and/or hazard (Appendix E, table 7.1 through table 7.20) were checked at random and found to be arithmetically correct, given the values supplied. There, however, remains the issue of correct cancer slope factors or RfDs to be resolved.

18. When HERD requests, or is submitted, an electronic copy of the HHRA calculations please submit those files in the native spreadsheet format rather than an Adobe PDF file conversions of the file. An Adobe PDF formatted file merely means that HERD must print the files and re-enter the calculations into a spreadsheet to verify the calculations.

CONCLUSIONS

The HHRA for OU5 for soil indicates incremental cancer risk and non-cancer hazard in excess of the usual *de minimis* level. Incremental risk for the residential scenario exceeds one in a million ($1x10^{-6}$) and a hazard index of 1 in multiple locations within OU5. A total incremental cancer risk and hazard quotient for both soil and groundwater must be submitted to the project managers.

Monitoring of the groundwater concentrations during and after the proposed biosparging should be a requirement of the Feasibility Study (FS) work plan.

The potential for preferential migration of groundwater contaminants to the Oakland Inner Harbor through the bedding material of the extensive utility corridors should be evaluated for ecological hazard concerns.

HERD has previously strongly recommended that a signed Alameda City Council Ruling be obtained, and transmitted to DTSC, to define the limitations on the future use of property within OU5 boundary in perpetuity with regard to soil exposure, prior to DTSC acceptance of the reviewed Draft HHRA for soils in OU5. This same condition should apply to the area defined as the groundwater treatment area for Site 25/IR02 which lies within OU5 .

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MEMORANDUM

TO: Marcia Liao, Project Manager
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FROM: Marie McCrink, RG, HG
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REVIEWED BY: Mike Finch, R.G.
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DATE: January 20, 2004

SUBJECT: **REVIEW OF THE DRAFT GROUNDWATER REMEDIAL INVESTIGATION/FEASIBILITY STUDY, ALAMEDA POINT SITE 25 AND ALAMEDA ANNEX IR-02, ALAMEDA, CA, DATED OCTOBER, 2003** (Log # 031121)

ACTIVITY REQUESTED

Per your request, the Geologic Services Unit (GSU) has reviewed the *Draft Groundwater Remedial Investigation/Feasibility Study (RI/FS), Alameda Point Site 25 and Alameda Annex IR-02, Alameda, CA*. The document is dated October 8, 2003. The RI/FS was prepared by Engineering Remediation Resources Group, Inc., (ERRG) for the Department of the Navy, Southwest Division, Naval Facilities Engineering Command, San Diego. The GSU has been requested to review the technical adequacy of the characterization of nature and extent of contamination, the fate and transport evaluation, the identification and screening of technologies, the development and screening of remedial alternatives, and the conclusions and recommendations presented. Review activities consisted of reading the document, reviewing the file for background issues, and reviewing the sites within the framework of the ongoing base-wide groundwater monitoring program.

PROJECT SUMMARY

The purpose of this report is to present the findings of a focused RI/FS of groundwater contamination underlying two adjacent Navy properties in Alameda, CA, Operable Unit-5 (OU-5), Site 25, and Alameda Annex Installation Restoration Site-02 (IR-02). Historically, groundwater beneath the two sites has been characterized separately. This report evaluates these two sites together, since contaminant plumes beneath Site 25 and IR-02 are part of single groundwater plume. It is stated in the report that based on the risk assessment results, the proposed primary contaminants of concern (COCs) are dissolved-phase benzene and naphthalene. However, Section 13, Site 25, of the *Draft Final Work Plan for Base-wide Groundwater Monitoring Program (GMWP), Alameda Point, Alameda CA, Dated June 30, 2003* (Shaw Environmental, Inc., 2003) lists several other chemicals of concern: all PAHs, benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tertiary butyl ether (MTBE), chromium, lead, and nickel have been identified as primary COCs. The source of the contamination is believed to be previous point source discharges and contaminated fill used to create Alameda Point.

Contaminants are present in the shallow, unconfined first water bearing zone (FWBZ). The saturated thickness of the FWBZ beneath these sites averages 10 feet, the depth to groundwater is about 8 to 10 feet below ground surface (bgs), and the elevation of the water table in the FWBZ ranges from (-3) to (-12) feet above mean lower low water (MLLW) level. The bottom of the FWBZ is encountered approximately 20 feet bgs. Therefore, the saturated zone of interest comprises about 10 feet in thickness from 10'-20' feet bgs.

To address the contaminated groundwater at these sites, remedial technologies were identified and screened. Then, three alternatives were further developed: no action; monitored natural attenuation (MNA) with institutional controls (IC); and biosparging with MNA and ICs. The proposed remedial alternative to address contaminated groundwater in the FWBZ is biosparging with MNA and ICs. The estimated time to reduce groundwater contamination to below drinking water standards is estimated to be nine years, two years for biosparging at three plume centers, and seven for subsequent MNA. Biosparging with MNA could allow for unrestricted site use sooner and with less expense than MNA alone.

COMMENTS AND RECOMMENDATIONS

1. General Comment. The purpose of a remedial investigation (RI) is to define the extent of contamination in order to conduct an accurate assessment of human health and ecological risk. The GSU believes there are a few major deficiencies with this RI, which should be corrected before proceeding with an FS. First, we do not concur that the lateral and vertical extent of the benzene and naphthalene plumes has been adequately characterized. Therefore, we believe the RI report

should be separated from the FS in order to address the issues we have outlined in the specific comments that follow. Second, the GSU is concerned that the process of identifying COPCs and selecting final COCs is not described in enough detail for a reviewer to evaluate if all COCs have been adequately identified. Finally, because an RI is a document in which decisions are made to include or exclude contaminants from further consideration of risk, a clear demonstration must be provided of the impact of individual chemicals on groundwater.

2. Executive Summary. There is no statement in the Executive Summary (ES) about the chemicals that were identified as contaminants of potential concern (COPCs), and the final compounds that have been retained as chemicals of concern (COCs). The GSU recommends a complete list of COPCs and COCs be provided in the ES, not just primary risk drivers. In addition, the documents in which COPCs and COCs were developed and approved should be identified, and the process should be summarized.

3. Figures 1-2 and 1-3 – Investigation Areas. It is stated in Section 2.0 that there is a school located within the Alameda Point Residential Parcels. The location of the school must be shown on both Figures 1-2 and 1-3. In addition, it is GSU's understanding that there is a daycare center next to the school, which also must be shown on these figures.

4. Sections 2.1 and 2.2 – Geology and Hydrogeology. Only a written description of the geologic and hydrogeologic units beneath the sites is provided. Graphic displays, such as a statigraphic column and a site conceptual model (SCM), should be included that show the approximate thicknesses and depths in the vicinity of these sites. In particular, a clear understanding must be presented about the variation in thickness of the Bay Mud layer immediately underlying these sites. It is stated in the 3rd paragraph on page 2-2 that Bay Mud ranges in thickness from 10 to 95 feet, and is thin or absent in the southeastern region of the Site. It is difficult to visualize a SCM with a potential change in thickness up to 85 feet beneath the limited aerial extent of these sites.

   Also, only a written description of groundwater flow is provided. An acceptable groundwater gradient and flow direction map must be included with the discussion of hydrogeology. Plus, it is stated in the 2nd paragraph on page 2-3 that groundwater in the FWBZ flows in a north by northwest direction. This flow direction directly conflicts with the interpretation of flow direction shown on Figure 4-18. As currently presented in Section 4, Figure 4-18, is not acceptable to the GSU, and therefore can not be referenced for discussion in this section. The groundwater gradient and flow direction map must show the well names and locations used to construct the map, screen intervals, and each unique water level measurement used.

Finally, a discussion should be included about previous studies that have evaluated tidal influence in the FWBZ, and map should show the extent of tidally influenced groundwater. If a tidal influence study has not been conducted for the FWBZ in this area, the GSU recommends this be proposed and submitted for regulatory review as soon as possible. No evaluation of contaminant migration and impact to receptors can be conducted until the direction of groundwater flow is understood throughout the seasons of the year.

5. Section 3.13 – Previous Groundwater Investigations for Alameda Point & Annex. The 2nd paragraph discusses one of the conclusions from the Marsh Crust FS, which impacts this RI. In the Marsh Crust FS, it was concluded that since the Marsh Crust did not merit remedial action, it was ruled out as a possible groundwater contamination source in this RI. The GSU recommends a detailed summary be provided about the Marsh Crust. This summary should include, but not be limited to, a written and graphical description of the lateral and vertical physical extent of the Crust, a list of the COCs identified in the Crust, a map of the extent of COCs reported in the Marsh Crust, an explanation of why the Crust did not merit a remedial action, and a complete set of references to all primary documents approved and finalized about the Marsh Crust. This RI must provide the data necessary to independently evaluate and conclude whether or not the Marsh Crust is a continuing source of groundwater contamination at these sites.

6. Section 3.2 – Previous Soil Gas Investigation. On page 3-13 in the review of data from the *Alameda Point OU-5 RI* (IT, 2002), it is stated that soil gas samples co-located with groundwater samples could be correlated, but in general, there appeared to be little correlation. The GSU recommends the two statements be clarified or reworded, as they appear to directly conflict with each other. The inclusion of data tables or subsets of data tables and corresponding maps to show the recent soil gas data relative to the current configuration of groundwater monitoring wells and plume concentrations must be provided in this report to demonstrate the presence or absence of a correlation between the data.

7. Section 4.1 – Soil Contamination Related to Groundwater. It is stated in the 2nd paragraph that low level metal contamination does not appear to have significantly impacted groundwater. The GSU recommends a summary table and figure of metals detected in soil and groundwater be presented from previous investigations and discussed in this section to support this statement. A reference to a previous report or the compact disc (CD) containing all the analytical data is not appropriate. Use of the phrase, *'not significant',* must be defined. The discussion should include the methodology used to compare soil and groundwater data for evaluating the extent of impact, the regulatory standards and/or existing station-wide background values used to compare and evaluate the significance of the detected metal concentrations, and any available

leachate testing results for metals in soil. If leachate testing was not conducted to evaluate potential impact of metals on groundwater, an explanation should be provided. A clear demonstrate of the lack of impact of metals from soil on groundwater must be provided in the text.

8. Section 4.1 – Soil Contamination Related to Groundwater. It is stated in the 2nd paragraph that low level PAH contamination in shallow soils (less than approximately 20 feet bgs) does not appear to have affected groundwater. The GSU recommends this statement either be clarified and justified or removed. The FWBZ is acknowledged to be 20 feet thick with a saturated thickness of about 10 feet. It is difficult to visualize a SCM that proposes all PAH soil contamination impacting groundwater occurs entirely between 19 and 20 feet bgs. We recommend this section provide a summary data table and figure of all PAHs previously detected in soil and groundwater. The summaries should illustrate the nature and extent of PAHs reported in soil and groundwater beneath these sites, and present a clear demonstrate of the impact of PAHs on soil and groundwater.

9. Section 4.2 – Groundwater Contamination. It is stated in the first paragraph that results from previous groundwater characterization efforts have been presented in other reports and are summarized in this section. The GSU believes the summary of other characterization efforts is too brief for an RI. As previously stated, decision documents in which contaminants will be excluded from any further evaluation must include summary information in the specific sections to address specific COCs and issues.

   Furthermore, the GSU does not find the definition of the lateral extent of contamination has been completed, for benzene and naphthalene. Plus, it is impossible to assess if the lateral extent of other COCs has been adequately defined because it is unclear if a complete list of COCs has been identified, and the supporting data has not been presented. The GSU recommends an RI work plan addendum be developed using existing hydropunch data to determine locations for the installation of permanent monitoring wells to complete the definition of lateral extent of contamination of benzene and naphthalene.

10. Section 4.2 – Groundwater Contamination. In the 2nd paragraph, page 4-2, it is stated that no contamination was found in the second water bearing zone (SWBZ). The GSU finds no documentation to support this statement and to evaluate the vertical migration of contaminants below the FWBZ. We recommend this statement be removed and a new subsection of Section 4.0, *Evaluation of Vertical Extent*, be added in the next version of the document. This subsection should present complete documentation of the Navy's understanding of the extent of contamination in the Bay Sediments Unit (BSU) and the SWBZ. Defining extent of contamination is a critical component of an RI. The GSU can

not certify that characterization is adequate for a DTSC toxicologist to review the risk assessment until extent of contamination has been adequately defined.

On the contrary, the GSU finds unambiguous evidence to document that the extent of vertical contamination is ***not*** defined. It is stated in the 2nd bullet on page 4-2 that the highest detections of benzene are at approximately 20 feet bgs. Figure 4-5 – *2001 Benzene Contour Map, 16'-20' bgs Hydropunch Data* shows that all green and blues areas represent benzene concentrations greater than 100 µg/L, two orders of magnitude greater than the maximum contaminant level (MCL) for benzene. There is no benzene data presented, referenced, or discussed that demonstrates benzene is 1 µg/L or less immediately below this zone. Furthermore, Figure 4-5 compared to Figure 4-4 - *Benzene Contour Map, 12'-16' bgs Hydropunch Data* shows benzene concentrations are increasing with depth. In numerous cases the concentrations posted on these two figures show more than an order of magnitude increase in concentration. The data suggests that benzene could be migrating vertically downward, which is not characteristic of a stable or naturally attenuating plume. Furthermore, the occurrence and aerial extent of the Marsh Crust must be correlated with the occurrence of the benzene and naphthalene starting at 10 feet bgs. The possibility must be evaluated that the Crust is providing a continuing source to groundwater that causes the increase in benzene concentrations reported with depth.

Finally, according to Figure 3-1, Historical Groundwater Monitoring Wells, and Section 13, Site 25, of the *Draft Final Work Plan for Base-wide Groundwater Monitoring Program (GMWP), Alameda Point, Alameda CA, Dated June 30, 2003* (Shaw Environmental, Inc., 2003), there are only three wells the GSU can find that are screened below the FWBZ, wells D-01, D-02, and D-03. Well D-02, screened from 95'-105' bgs, was evaluated in the GMWP. Although the GMWP does not list specific concentrations detected in well D-02, it is stated that volatile organic contaminants (VOCs) were detected at 95'-105' bgs. Therefore, VOCs are present in the SWBZ, and contamination beneath the FWBZ has not been evaluated. Contamination below the FWBZ must be addressed in the next version of the document.

In summary, the vertical extent has not been defined in groundwater beneath Site 25 and Annex IR-02. The GSU can not certify the characterization is adequate to complete defensible risk assessments or evaluate remedial alternatives. We recommend reassessing the data quality objectives (DQOs), amending them if necessary, and continuing the remedial investigation to define the vertical extent of benzene and all potential COCs.

11. Section 4.2 – Groundwater Contamination. In the 4th bullet, page 4-2, it is stated that dissolved phase methyl tertiary butyl ether (MTBE) and 1,2-dichloroethane (1,2-DCA) were detected in the FWBZ, but at lower frequencies and

concentrations. The GSU recommends a summary table and figure be provided of all MTBE and VOCs previously detected in soil and groundwater. The table and figure should illustrate the nature and extent of MTBE and chlorinated VOCs reported beneath these sites. In addition, these contaminants have not been listed as COCs. Documentation must be provided to show MTBE and VOCs were formally evaluated as COPCs, and officially eliminated form the list of COCs.

12. Section 4.2 – Groundwater Contamination. In the 3rd paragraph, page 4-2, it is stated that benzene and naphthalene are used as the primary COCs for this investigation because they are co-located and because benzene is also the primary health risk driver. The GSU recommends a complete list of all specific COCs that have been identified, not just the general term, PAH or VOC, be included in this section. According to the GMWP, all PAHs, BTEX, MTBE, chromium, lead, and nickel have been identified as primary COCs. This potential discrepancy in the identification of COCs between different documents about the same sites should be resolved.

13. Section 4.2 – Groundwater Contamination. In the 4th paragraph, page 4-2, it is stated that MTBE and 1,2-DCA were detected in samples taken from areas that overlap with benzene, indicating the presence of less weathered products or possible older discharges. The GSU recommends that separate maps be prepared for the extent of MTBE and 1,2-DCA. The fate, transport, and degradation behavior of both compounds can be very different from benzene and naphthalene, especially for MTBE. In addition, if these chemicals represent different discharges, the definition of their extent may be different than that of benzene.

14. Section 4.2.2 – Computer Generated Contour Maps Produced for this Report. Listed in this section are the Surfer generated concentration contour maps, Figures 4-1 through 4-5. These maps are used to describe the extent of benzene and naphthalene contamination reported in the FWBZ. The GSU recommends several changes be made to these maps to enable better visual review and evaluation:

a. Two different color schemes are used to represent concentrations. We recommend all maps use the same color schemes to represent concentrations in order to visually compare the change in benzene concentrations over time and at different depths;

b. Reds and hot colors should begin at the 1000 µg/L contour. This concentration represents 1 mg/L of benzene in groundwater, and the figures should clearly show the widespread occurrence of benzene that is present three orders of magnitude above the MCL;

c. Color shading is not used for concentrations less than 50 µg/L, and should be used to visually show the area of benzene contamination greater than the MCL. We recommend the beige color used for the 50 to 100 µg/L interval on Figure 4-4 and 4-5 be used on all maps to represent the 1 to 50 µg/L interval. The extent of benzene in groundwater above the MCL should be clearly presented in an RI;

d. Contour intervals (CI) must be clearly labeled. Only Figure 4-1 has visible CI labels; and

e. No differentiation of well symbols is provided for the figures. The figures should clearly show which data points are permanent monitoring wells and which are temporary well points.

15. Section 4.2.2 – Computer Generated Contour Maps Produced for this Report. Figures 4-1 through 4-5 are presented to describe the stratification, lateral, and vertical distribution of benzene contamination reported in the FWBZ. The GSU finds the lateral extent of contamination has not been adequately defined. We understand a great deal of data has been collected, and a serious effort has been made to display the data in a meaningful manner. However, we do not believe the maps present realistic pictures of the extent of contamination beneath these sites. Plus, the extent of only one contaminant has been portrayed. Because this is an RI, a complete picture of all identified COCs must be provided, not just the primary risk driver.

The GSU proposes the BRAC Cleanup Team (BCT) consider using the following alternate approach to graphically show all identified COCs. The saturated zone containing the bulk of the contamination reported is about 10 feet thick, ranging in depth from approximately 10'-20' bgs. Ten feet is the optimal length of most screen intervals at many other CERCLA sites nation-wide. The GSU proposes one map for each COC be made at the same scale that contains all recent (1998 or later) monitoring well and hydropunch data. These separate maps would allow a more complete evaluation of the presence of each COC in the saturated zone, and a better determination if the additional characterization of lateral extent is necessary for each COC. Because this is a formal RI, the extent of characterization of all COCs must be evaluated. This requirement is not achieved by the graphical presentation provided in this draft document.

Showing the stratified nature of the benzene occurrence is an important part of the CSM. Therefore, the GSU recommends for COCs other than benzene, all data within the 10 foot saturated zone could be shown on one map. However, for benzene we recommend the following issues be addressed for the maps showing the stratified nature of benzene:

a. **Figures 4-1 and 4-2** are maps based on older data, 1994 and 1999, respectively. The lateral extent/shape of the northern lobe of the plume on figure 4-1 is not adequately defined. Only two data points, P181-MW46 and S-44, have been used to make this part of the map. The western box on figure 4-1 is not a realistic picture of the extent of contamination, which does not usually occur in right angle patterns. Also, data in the western box is too sparse to define the extent. On Figure 4-2, the western lobe of the main plume does not appear to be well supported by nearby data. Because these figures represent older data sets, the GSU recommends both the 1994 and 1999 benzene values simply be posted on clean maps without any Surfer interpretation and coloring. Then, the data can be more simply viewed and compared to concentrations detected in more recent sampling events.

b. On **Figure 4-3**, the lateral extent of contamination is not defined in the western, northern, and southern lobes of the benzene plume shown. In addition, the shapes of the lobes appear to be based on virtually no data. If the 11 data points shown are truly the only monitoring well data points for this interval, the GSU recommends posting the screen interval, and benzene and naphthalene concentrations in a text box next to each well. The figure label box should also define the range of depths representing 'shallow' on this map. Finally, we believe a map like this compromises the credibility of previous work by suggesting the need for a many additional wells to define the lateral extent. Therefore, the GSU recommends a work plan be developed for an amendment to the RI to complete the definition of extent in this zone.

c. **Figures 4-4 and 4-5** present the 12'-16' bgs hydropunch data and 16'-20' bgs hydropunch data, respectively. The lateral extents of the southeastern and western edges of the plumes shown are not defined. Additional drilling should be conducted to complete plume definition to the MCL for benzene. In addition, the 16'-20' bgs map clearly shows that the vertical extent has not been defined as well. Additional characterization efforts must be conducted to evaluate the extent of benzene in the BSU immediately below the FWBZ. If there are significant levels of benzene present below 20 feet bgs, as suggested by Figure 4-5, this could represent a large continuing source of benzene to groundwater, which must be fully evaluate before an FS can be valid.

16. Section 4.2.4 – Time-Series Evaluation of Benzene in Groundwater. This section describes the Mann-Kendall trend evaluations that were conducted on the three wells at the centers of the three plume lobes. It is stated that concentrations in all other wells were found to be decreasing, so Mann-Kendall tests were not performed. The GSU does not agree with this statement because visual inspection or numerical analysis is not an appropriate way to evaluate trends. Based on our visual analysis, we believe data from the last few years shows

considerable variability. Therefore, we recommend this statement be validated by conducting trend analysis on the wells located around the proposed plume edges, using data that include the most recent sampling events.

17. Section 4.2.4 – Time-Series Evaluation of Benzene in Groundwater. In the last paragraph, it is stated that the decreasing benzene concentrations at the outer edges of the plume indicate benzene contamination is not migrating beyond the monitoring well network and is being reduced in mass. Again, the GSU recommends this statement be verified by conducting trend analysis on the wells located around the proposed plume edges, using data that include the most recent sampling events.

18. Section 4.2.4 – Time-Series Evaluation of Benzene in Groundwater. In the last sentence of this section, Figure 4-18, site groundwater contour map is presented to aid in interpreting contaminant distribution.

    Figure 4-18 and the discussion of water levels must be revised. The revisions should include, but not be limited to: posting the well identification of all wells in which water levels were measured to make the map; posting the water level measurement; including a table of water level data, screen depths, and total well depths; showing with additional figures and explaining how water levels have changed over time beneath these sites; and discussing if this area is tidally influenced, and if so, the methodology used to correct the data. A reference to the groundwater monitoring program report for this information is not adequate for an RI. The data must be readily available in this report for any reviewer to access while reading. Finally, the statement that this map will aid in the interpretation of contaminant distribution must be explained. The GSU believes this is a very important concept for an RI to discuss. However, as currently presented, the map is difficult to interpret, and there are no points to show on what data the map is based. Therefore, the text should provide discussion to explain how the map aids in the interpretation of contaminant distribution.

19. Section 4.2.5 – Monitored Natural Attenuation (MNA) Parameters. In the first sentence of this section, it is stated that benzene groundwater analytical data indicates fate and transport mechanisms are reducing contaminant mass. The GSU finds absolutely no data or discussion about mass balance of chemical compounds that would be used to document reduction in the mass of one compound with a corresponding increase in the mass of another. This statement must be removed and replaced with a complete discussion of mass balance.

    Proposing MNA for any site must include data collected over several years that clearly demonstrates multiple lines of evidence of natural attenuation. The GSU recommends this section be expanded to include discussions of the following kinds of MNA information:

Documentation of ***Sequential Degradation and Loss of Contaminants*** as shown by statistically determined concentration trends, presence and concentrations of intermediate and end products in a degradation pathway, plume geometry changes, mass balance calculations, and documentation of a smaller plume length or area vs a longer or larger than expected plume size had MNA not been occurring;

Documentation of the ***Presence of Geochemical and Inorganic Indicators of Contaminant Degradation*** as shown by temperature, pH, conductivity, dissolved oxygen, oxidation-reduction potential, sulfate/sulfide, nitrate/nitrite, ferrous iron, ethene, ethane, methane, carbon dioxide, and/or chloride; and,

Documentation of ***Microbial Evidence*** such as anaerobic and aerobic heterotrophs and degraders (if present), and/or inorganic reducers.

20. Section 4.2.5 – Monitored Natural Attenuation (MNA) Parameters. In the last paragraph of this section, the recommendation is made to conduct additional MNA parameter monitoring to gain a better understanding of site conditions. The GSU concurs with this recommendation. We recommend a comprehensive work plan be developed to collect detailed MNA data specific to these sites, not just as part of the base-wide groundwater monitoring program. The end product of this data set should be to provide a detailed demonstration of the occurrence of MNA by documenting the multiple lines of evidence outlined in Comment No. 19. Finally, the GSU believes it is premature to conduct an FS for these sites until a detailed demonstration of MNA is complete. We can not approve a remedial alternative analysis that proposes and/or recommends MNA based on the existing data set.

21. Section 4.2.6 – Groundwater Conceptual Site Model (CSM). The GSU recommends a graphic illustration of the CSM be provided to help visualize the written description. In addition, the CSM must illustrate how the highest concentrations of contaminants are located at the base of the FWBZ and show the potential impact to the BSU in contact with the base of FWBZ.

22. Section 4.3 – Soil Gas Contamination. In the first paragraph of this section, Figures 4-70 to 4-84 from the Alameda Point OU-5 RI Report (IT, 2000) are referenced to make a critical argument about the lack of correlation between soil gas and groundwater contamination. These figures should be included in this report in order to make this argument. In addition, a summary table and map of soil gas data collected to date should be contained in this RI. The table should include the boring identification and depth (or depths) from which soil gas was collected, and the concentrations of contaminants detected.

In addition, although the frequency of detections for benzene is low, it is still present. Because the unsaturated portion of the vadose zone is less than or equal to five feet, regardless of concentrations, the GSU recommends indoor air

risk be evaluated for the school, the daycare center, and all housing units present in this area.

23. Section 4.4 – Evaluation of Possible Contaminant Sources. It is stated in the 2nd paragraph that the Marsh Crust was considered as a possible source of groundwater contamination but was ruled out during the Marsh Crust FS, as discussed in Section 3.0. As recommended in comment No. 5, this RI must provide the data necessary to independently evaluate and conclude whether or not the Marsh Crust is a continuing source of contamination to groundwater at these sites.

24. Section 4.4.2 – Point Source Discharges. In the fourth paragraph of this section, it is stated that if PAH contamination from contaminated fill were causing groundwater contamination, naphthalene would not be the only PAH with a high frequency of detection. The GSU recommends the text discuss the kind of CSM that would create this scenario with only naphthalene having a high frequency of detection for PAHs. The discussion should include potential kinds of past disposal practices and industrial or cultural activities that could result in this scenario. Finally, as stated earlier, we recommend a summary data table of PAH detections be included in this report so it can be referenced for this discussion. The GSU has not seen the necessary documentation to justify that naphthalene is the only PAH for which the DTSC would have human health or ecological concerns.

25. Section 4.5.1 – Hydropunch Sampling Depth Inconsistencies. It is stated in this section that hydropunch field data yielded sufficient data to characterize groundwater contamination as function of depth, but additional sampling depth intervals would have provided useful data. The GSU does not concur that sufficient data have been collected to characterize the vertical extent of groundwater contamination. As recommended in comment No. 10, additional characterization of vertical extent must be conducted before the GSU can approve this report and consider remedial alternatives.

26. Section 4.5.2 – MNA Parameter Monitoring. It is stated in this section that additional data are needed to better understand the MNA processes occurring at these sites, and a more rigorous statistical analysis needs to be conducted on MNA data being generated through the base-wide groundwater monitoring program. The GSU concurs that additional MNA data are needed. In comment No. 20, we have recommended a comprehensive MNA work plan be developed to collect detailed MNA data specific to these sites. However, as previously recommended, the GSU believes an MNA work plan should be independent of the base-wide groundwater monitoring program in order to evaluate MNA as a potential remedial alternative.

27. Section 4.6 – Summary of Nature and Extent of Contamination. It is stated in the summary that based on risk assessment results, the COCs are dissolved-phase benzene and naphthalene. The GSU recommends the process be summarized again in this section of how COPCs were identified and final COCs were selected. The summary of the risk assessment section in this document does not appear to contain those kinds of basic details. The issues of COPCs and COCs may be clearer if the Human Health Risk Assessment is more readily available by incorporating it into the text, rather than attached as an appendix on a CD.

    It is also stated in the summary that contamination does not appear to be migrating laterally or vertically. The GSU strongly disagrees that contamination is not migrating laterally or vertically, as the definition of lateral or vertical extent of contamination has not been completed. We do not concur with a non-statistical, visual assessment that data around the plume edges shows decreasing trends, which didn't include the use of the most recently collected data. This statement must be removed until conclusively documented as outlined in the recommendations above.

    Finally, it is stated in this summary that contaminants do not appear to be volatilizing into the vadose zone. This statement has not been documented with real data presented in this report, only summaries of other reports. In addition, VOCs have been reported in the vadose zone between 0 and 5 feet bgs. Therefore, until proven otherwise, volatilization from groundwater into the capillary fringe and vadose zone must be considered a potential source for the VOCs detected in the vadose zone. In addition, because the unsaturated portion of the vadose zone is so small, regardless of concentrations, the GSU recommends indoor air risk be evaluated for the school, the daycare center, and all housing units present in this area.

28. Section 5.4 – Previous Fate and Transport Study. It is stated at the end of this section that modeling performed by TtEMI (1998) predicted the benzene plume would recede by 2020, but residual contamination above 1.0 µg/L of benzene would still be present. The GSU recommends this section discuss the aerial extent and volume of residual contamination greater than 1.0 µg/L predicted by the model to still be present by 2020.

29. Section 5.5 – Evaluation of Fate and Transport Mechanisms – Current and Future. This section discusses Figures 5-1 through 5-7. The GSU has the following concerns about these figures that should be addressed. Figure 5-1 and 5-2 appear to exclude the last three sampling points as shown on Figures 4-8 and 4-9, respectively. Figure 5-3 appears to exclude the last five sampling points as shown on Figure 4-10. Figures 5-4, 5-5, 5-6, and 5-7 do not show sampling data collected in the last five years. The GSU recommends the figures be

redone with the inclusion of recent monitoring data, if they exist. If not, other wells with complete recent data sets should be used to document the occurrence of first order exponential decay patterns. If enough recent data from permanent monitoring wells does not currently exist, the presence of this decay pattern should be reevaluated after enough data have been collected. We are concerned that the conclusions drawn about biodegradation with an incomplete data set do adequately portray the dynamic nature of a shallow, thin water bearing zone and contaminant plumes within it.

30. Section 5.6 – Plume Stability Evaluation. It is stated in the 4th paragraph that numerical comparisons of benzene concentrations revealed an overall downward decreasing trend, and that the first order decay curves were also used to evaluate trends. The GSU is concerned that this same incomplete information keeps being repeated and used over and over. We do not believe numerical comparisons to determine a decreasing trend is the same as a statistically valid trend analysis like the Mann-Kendall analysis that was conducted on only three wells (Section 4.2.4). In addition, as commented on in comment No. 29, the first order decay curve plots have not included recent groundwater monitoring data. Therefore, again we recommend that Mann-Kendall trend analysis be conducted on the wells located around the proposed plume edges, using data that include the most recent sampling events.

31. Section 5.6 – Plume Stability Evaluation. On page 5-15 discussion is provided about various graphical comparisons that were made about the lateral extent of benzene concentrations based on the 1998 TtEMI fate and transport study, monitoring well data from 1994, 1999, and 2001, and hydropunch data collected in 1994, 1999, and 2001. The conclusion stated in the 3rd paragraph is that the benzene plume has remained relatively stable from 1994 to 2001. The GSU is confused by the potential incompatibility of conclusions presented in Sections 4 and 5. It is stated in Section 4 that data shows concentrations are decreasing. However, it is concluded in Section 5 that the benzene plume has remained relatively stable. Therefore, we recommend the text be clarified to better explain this situation. In general, a relatively stable plume does not exclusively indicative of a plume undergoing bioremediation. Due to the possibility that of a variety of non-point sources exist in the fill of the FWBZ, a stable plume could also indicate a continuing source to groundwater balanced by a continuous rate of dilution and/or dispersion.

32. Section 5.8.1 – Lateral Migration of Groundwater. It is concluded in this section that because contaminant plumes have been shown to be relatively stable, lateral migration of contaminated groundwater to potential receptors (Oakland Harbor, approximately 900 feet north to northwest) is unlikely. The GSU would like to concur with this conclusion. However, based on the total dissolved solids concentrations, groundwater could be tidally influenced. The impact to potential

receptors can not be evaluated until the presence or absence of tidal influence is conclusively determined. If tidal influence is present, an accurate gradient and flow direction of groundwater must be determined before the direction of contaminant transport and impact to receptors can be evaluated.

33. Section 5.8.2 – Soil Gas Migration. It is stated in this section that an indoor air survey was conducted by the United States Coast Guard and TtEMI, in which concentrations of benzene were reported near or below detection limits. The GSU recommends data from these indoor air studies data be summarized in tabular form, included in this section, and discussion be provided on the detection limits achieved and the methodology used to conduct the surveys. We also recommend, regardless of the results from the past surveys, additional indoor air samples be collected from the school and daycare facility and other residential areas before final conclusions about volatilization from groundwater and soil gas migration are drawn.

34. Section 8 – Identification and Screening of Technologies. The GSU believes the report has adequately screened treatment technologies to recommend appropriate remedies and conduct detailed analyses. However, the concurrence of Engineering Services Unit (ESU) should be obtained for evaluating the adequacy of the technology screening process.

    More important, the GSU finds the assessment of lateral and vertical extent is not yet adequate to proceed to the FS phase. As commented earlier, we recommend the RI be separated from the FS due to the need for additional characterization. In addition, the current level of understanding of natural attenuation processes occurring is not adequate for MNA to be an central part of two technologies being developed for selected remedial alternatives.

35. Section 8.1 – Remedial Action Objectives (RAOs). The only proposed RAO is for groundwater. The GSU recommends an RAO should also be considered for indoor air through volatilization from groundwater due to the presence of an elementary school, a daycare center, and several residential units. We do not find adequate evaluation has been conducted for the indoor air pathway. Although the highest concentrations of benzene are detected in the deeper part of the saturated zone, the entire vadose and saturated zone together is a maximum of 20 feet in thickness. Therefore, the limited evaluation that has been conducted for a health risk associated with this pathway is not adequate to close this issue. Finally, RAOs should be developed for all COCs. As previously stated, the RI does not conclusively document the process of identifying COPCs and COCs. Therefore, the GSU is not convinced that RAOs for only benzene and naphthalene are adequate.

36. Section 9 – Development and Screening of Remedial Alternatives. From the geologic and hydrogeologic perspective, the GSU concurs with the remedial alternatives selected for the detailed comparison and evaluation. However, the concurrence of Engineering Services Unit (ESU) should be obtained for evaluation of the development and screening of the selected remedial alternatives.

37. Section 9.3 – Alternative 2 – MNA with Institutional Controls. On page 9-8 in the discussion of Applicability of MNA, the ASTM guidance from *Section 5.7.2*, states that for sites with sufficient historical monitoring data, the primary lines of evidence will often be adequate to demonstrate remediation by natural attenuation. First, the GSU does not believe that sufficient historical monitoring data exists for these sites because the lateral extent of contamination has not been defined in several areas, and the vertical extent has not been defined at all. Second, the GSU does not support the use of only primary lines of evidence for demonstrating natural attenuation. As stated in comment No. 19, proposing MNA as part of a remedial alternative for any site must include data collected over several years that clearly demonstrates multiple lines of evidence of natural attenuation. Therefore, data to demonstrate multiple lines of evidence of natural attenuation must be collected for these sites before incorporating MNA into remedial alternatives.

38. Section 9 –Table 9-2 & 9-3, MNA System Components & Biosparging System Components. It is proposed in both tables to install nine additional monitoring wells to create a 20-well monitoring network. In addition, it is proposed in Table 9-3 to install 13 additional soil gas monitoring probes. Also, for both tables specific proposals are provided for exact numbers of monitoring wells to sampled at specific time intervals in the future and to be abandoned. The GSU recommends that the specific numbers of wells and soil gas probes to be installed, and the exact numbers of wells to be monitored during specific future time increments be considered guidelines and estimates. We understand for costing estimates, specific numbers must be used. However, the table should contain a footnote that site specific field conditions and data may require the need for installation of different numbers of wells or soil gas probes (more or less) than specified here.

39. Section 9 –Table 9-2 & 9-3, MNA System Components & Biosparging System Components. It is proposed in the last item on both tables that system review will be conducted every five years as per the National Contingency Plan (NCP). The GSU recommends that during the first five years a minimum of semi-annual monitoring be conducted along with a comprehensive annual review. The annual review must be initially conducted to evaluate and fine tune the frequency of monitoring, if the appropriate wells are being monitored, and if the monitoring program is adequately achieving the data quality objectives.

40. Section 9.3 – Alternative 2 – MNA with Institutional Controls. On page 9-9 in the discussion of Nature and Extent of Contamination, the text continues to reiterate that the nature and extent of groundwater contamination has been defined by numerous characterization efforts. As stated in numerous preceding comments, the GSU disagrees with this statement, and we recommend the characterization be completed before proceeding with an FS.

41. Section 10 –Conclusions and Recommendations. The recommended alternative is Alternative 3, biosparging with MNA and institutional controls. From the geologic and hydrogeologic perspective, the GSU concurs with the selected alternative, contingent on adequately responding to the preceeding comments and recommendations. As stated in our comments, the GSU recommends additional characterization be conducted to better define the lateral and vertical extent of contamination, and the understanding of natural attenuation processes occurring in groundwater at these sites.

Please feel free to contact me by telephone at (916) 255-3691 or by email at mmccrink@dtsc.ca.gov to discuss any questions you might have.

cc: Stewart Black, GSU Supervising Senior, DTSC, Sacramento

Terry Tamminen
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Arnold Schwarzenegger
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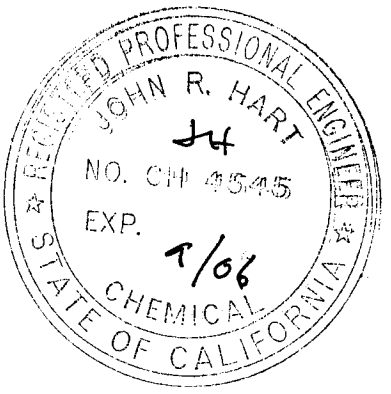
MEMORANDUM

To: Marcia Liao
Project Manager
Office of Military Facilities
Berkeley Office

Via: John Hart, P.E.
Chief, Engineering Services Unit

From: Mark Berscheid
Hazardous Substances Engineer
Engineering Services Unit



Date: January 22, 2004

Subject: DRAFT GROUNDWATER REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT FOR SITE 25 AND ALAMEDA ANNEX IR-02, ALAMEDA POINT, ALAMEDA, CALIFORNIA

This letter addresses conclusions and recommendations related to my review of the Draft Groundwater Remedial Investigation /Feasibility Study Report (RI/FS) for Site 25 and Annex IR-02, Alameda Point, Alameda California. The Report, dated October, 2003, has been prepared for the Department of the Navy (DON), Southwest Division, Naval Facilities Engineering Command, Environmental Division, by Engineering/ Remediation Resources Group, Inc., Concord, California.

SUMMARY/ RECOMMENDATIONS

The RI/FS contains the elements necessary to: 1. Assess the level of contamination; 2. Evaluate the fate and transport of contaminants of concern (COCs) along with determination of the associated risk at this site, and ; 3. Determine the most appropriate treatment for the COCs noted.

The Engineering Services Unit (ESU) considers the technology alternative chosen, a treatment train consisting of biosparging and monitored natural attenuation, as applicable for the COCs noted in the RI/FS.

However, the preliminary screening process for applicable technologies summarized in

Table 8-1 of the RI/FS, eliminates the in situ chemical oxidation (ISCO) alternative. The RI/FS indicates ISCO has been successful in reducing the level of contamination at multiple pilot locations on site. These COCs were more recalcitrant to the in situ oxidation process than the hydrocarbons noted in the RI portion of the document.

Therefore, the ESU recommends the ISCO technology be considered in the detailed analysis of alternatives. The ESU considers this treatment technology to be worthy, based on the pilot test assessments provided to DTSC by DOD, of treatability tests to adequately compare the biosparging/MNA and ISCO treatment technologies.

The time frame related to the reduction of the level of PAH contamination to comparative levels by use of ISCO and Biosparging/MNA treatment may also support the use of ISCO. In addition, a treatability test may be able to determine if MNA is required as an adjunct treatment to ISCO or ISCO may act as a stand alone treatment technology capable of reducing levels of COC contamination to acceptable levels.

In addition, the list of treatment technologies applicable for the initial screening process in the RI/FS does not include six-phase in situ heating. The ESU would consider this treatment technology as successfully demonstrated and a treatment technology that would appear to meet the ARARs specified. The ESU recommends this treatment technology be included in the RI/FS screening of treatment technologies and may warrant consideration in the detailed analysis of alternatives

The ESU considers the need to compare these two treatment technologies, in situ six phase heating and ISCO, as a major issue in adequately developing a final RI/FS. However, the specific comments listed below relating to the RI/FS should also be resolved prior to finalizing the RI/FS.

SPECIFIC COMMENTS

1. The RI/FS indicates a significant difference between air sparging and biosparging. However, the radius of influence (ROI) used for the biosparge design well placement is based on distances that appear to be rather optimistic and reflect aggressive injection of air. These ROIs in combination with the required injection pressure for a optimum injection depth of greater than 25 feet bgs, reflect injection pressures that would appear to relate to a significant volume of air (SCFM). The volume of air related to the design criteria appears to be sufficient to not only increase the level of dissolved oxygen to more advantageous levels but physically separate benzene from saturated zone soils at levels sufficient to require vadose zone control.

This possibility, in combination with the minimal vadose zone width (i.e., 8 to 10 feet bgs), indicates a need to plan for the SVE infrastructure in the cost estimates for the alternative. Specifically, the ESU recommends that as a minimum in areas in which the concentration of benzene is relatively high (i.e., Figure 4-5) the biosparging alternative

contain the infrastructure necessary to collect vadose zone COCs to prevent migration to the surface. This addition of SVE infrastructure should be reflected in the cost estimate for this alternative.

2. The RI/FS provides data regarding the evaluation of MNA parameters in Table 4-1. This table also provides data indicating the presence of elevated levels of methane dissolved in ground water at this site. The RI/FS does not address this compound in the evaluation of risk at the site. The ESU recommends the RI/FS address the presence of methane at this site related to: a. Indoor breathing spaces; b. Lower Explosive Limit.

The biosparging alternative, without the capacity to collect gases created by sparging activities in the vadose zone, may create elevated levels of methane in the vadose zone. The presence of these gases may lead to subsequent migration into buildings at levels capable of posing problems in these areas.

3. The RI/FS indicates that the most important element of MNA, a stable plume, is present at this site. This assumption is based on the accumulation of RI data taken from multiple investigations and summarized in a single data base used for this analysis. The ESU recommends the review of this analysis by a DTSC hydro-geologist to confirm the stability of the plume at this site. The ESU also recommends the addition of two mandatory elements of the MNA alternative: a. Point of compliance monitoring wells; and b. A contingency plan (i.e., containment wells).

4. Appendix E, Biosparging Description, contains a table with biosparging evaluative parameters. This table indicates, as a rule of thumb, the dissolved iron concentrations should be below 10 mg/L. The table indicates <u>some</u> of the data points at this site are below 10 mg/L. The need to further evaluate this issue would appear to further support the implementation of treatability tests as part of a final RI/FS.

6. Although the reuse designation indicates a residential scenario, the present status of some areas within the Alameda Annex property reflect open fields and are future candidates for residential construction.

The ESU would consider these areas as optimal areas for the pilot test evaluations or full scale implementation of treatment technologies, such as six phase heating, that may be more aggressive than biosparging, resulting in shorter remedy time lines but may be of greater risk to residences. The ESU recommends the final RI/FS make a distinction between these areas in the evaluation criteria used in the screening process of the RI/FS.

If there are any questions, please contact me at (916) 255-6672.

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