UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105
SFD 8-3

March 28, 2006

Mr. Thomas Macchiarella, Code 06CA.TM
Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

RE: **Draft Feasibility Study Report for OU-2A Site 9, 13, 19, 22, and 23, Alameda Point**

Dear Mr. Macchiarella:

EPA has reviewed the above referenced document, prepared by Sultech, and submitted by the Navy to the agencies on September 30, 2005. Due to the heavy workload on the BCT at the end of 2005, and the priority placed on Proposed Plans and Record of Decision documents during that time, the team agreed to extend the review of the OU 2A FS, with regulatory comments due on March 29, 2006.

After reviewing the OU 2A FS, we have concluded that the document does not contain a sufficient evaluation of various remedial alternatives, covering an adequate range of proposed RAOs to form the basis for a Proposed Plan and Record of Decision. Major problems in the document include: 1) a predetermination that all sites will be restricted from residential use with no evaluation of a remedy to implement this restriction and no evaluation of what would be involved to clean to unrestricted use; 2) development of only one remedial alternative for groundwater clean up at complex sites such as Site 13; 3) use of an unacceptably high clean up number for lead contamination in soil; and 4) eliminating COCs from consideration for remediation based on an HHRA in the RI that the regulators did not accept and which we believe consistently underestimates risk. We therefore request that a revised draft Feasibility Study Report for OU 2A be prepared in close consultation with the regulators.

Enclosed you will find a detailed list of the major and specific concerns with this Feasibility Study. Please call me at (415) 972-3029 to discuss how best to proceed with a revised document and new schedule.

Sincerely,

Anna-Marie Cook
Remedial Project Manager

enclosure

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EPA Review of the Draft Feasibility Study Report
for OU-2A Site 9, 13, 19, 22, and 23, Alameda Point

General Comments:

1. EPA agrees with the statement in the FS on page 1-5 that MCLs are RAOs . Regarding the site-specific groundwater RAOs, however, we do not consider the RAO that emphasizes prevention of domestic use of the groundwater to be sufficient, and we recommend adding an RAO of reducing concentrations to MCLs. Given that this groundwater is a potential and possibly current source of drinking water (p. 2-4), it should be remediated to MCLs (as stated, for example, on page 6-10).

2. A major problem with this report is the lack of a complete evaluation of remedial alternatives for soil at each site. There is an assumption that the sites will be restricted to commercial/industrial use. A restriction, or prohibition, on use is an Institutional Control, which is a remedy. Thus it is necessary to evaluate a no action remedial alternative to form a baseline, an alternative that implements ICs (which seems the default remedy here although it has not been evaluated), and at least one alternative to remediate each site to unrestricted use (which is a preference for EPA). Unless the FS analyzes the potential remedies using the nine criteria, it will not be possible to select an appropriate remedy in the ROD.

3. Since the maximum concentrations used in the risk assessment were generally one to three orders of magnitude less than the concentrations detected in site soil and groundwater, the risk calculated in the HHRA underestimates the actual risk. Therefore the calculated risk should not be used to make risk management decisions. Another method, such as a comparison to both residential and industrial PRGs and MCLs, should be used to establish risk drivers for these sites.

4. EPA requests in the revised draft that soil and groundwater remedies be evaluated separately for each site(s). There are two reasons for this request: 1) It has worked well in other FSs to separate the two media and evaluate them independently; 2) It precludes the evaluation of only one remedy as has been done for Sites 13 and 23 groundwater. The remedial alternatives presented for groundwater for this site consist of Alternative 1 (no action) and Alternative 2. It is unacceptable, especially ~~for a remedy costing $19 million,~~ to not include a range of remediation alternatives and a range of costs. For every site, an insufficient number of alternatives have been retained for evaluation against the nine criteria which makes it impossible for the risk managers and decision makers to make an informed decision regarding preferred remedy selection.

5. All risks in tables have been presented incorrectly. For example a 7^{-4} risk equates to 4.16×10^{-4}. Does the Navy mean that the risk is 7×10^{-4} or 4.16×10^{-4}? Please correct

these confusingly compiled tables and present the risk in the manner consistent with all other submittals, i.e in the format A x 10^{-B}.

6. The number derived for the lead clean up level is more than four times higher than EPA's industrial PRG for lead (800 mg/kg). EPA strongly opposes use of the Navy's proposed lead clean up level and requests that at a maximum 800 mg/kg be used with prohibitions on use of the property for recreational and residential. Additionally, we ask for an alternative using a residential clean up level to be included in the evaluation.

7. For all sites where groundwater monitoring will be performed to assess chemical concentrations, it will be necessary to have at a minimum annual monitoring and more likely semi-annual or quarterly monitoring to assess attenuation. Stating that monitoring will be done every five years provides no basis for assessing the effectiveness of the remedy at the five year reviews.

8. The FS discusses data gaps that will be addressed during the remedial design phase, and also states that the document evaluates remedies that are expected to address any contamination that may be identified during this sampling (p. ES-8, 1-8). However, the FS does not describe what further steps will be taken if soil contamination is found at Site 19 or if groundwater contamination is found at Site 22, both of which are included in the additional sampling plan (p. ES-9).

9. The FS indicates that there will be additional sampling for VOCs at Sites 13 and 23 (p. ES-8,9), but it is not clear whether the groundwater remedies discussed in Section 3, which are designed to address benzene and TPH, are also designed to address any VOC contamination that is found in the additional sampling. Please clarify what further steps will be taken if VOC contamination is found in the groundwater.

10. The alternatives do not address all of the data gaps identified by EPA and the RWQCB for inclusion in the Remedial Investigation (RI)/FS process. These data gaps include:
    - Site 9: The extent and source of arsenic, aluminum and lead in soil.
    - Site 13: Soil sampling in the vicinity of the former incinerator for metals, dioxins, and furans.
    - Site 19: Delineation of the extent of groundwater contamination in the vicinity of MWD13-4 and the former halogenated solvent storage area northwest of this well. Delineation of the extent of groundwater contamination in the solvent storage area in the northwestern part of the site.
    - Site 22: Definition of the potential sources of arsenic and lead in soil.
    - Site 23: Characterization of groundwater near generator accumulation point (GAP) 64 for volatile organic compounds (VOCs).

    Please revise the FS to indicate how and when these data gaps will be addressed.

Specific Comments:

Executive Summary:

1. **Page ES-3**: All alternatives for groundwater are the same for Sites 13 and 23. It is not satisfactory in an FS to evaluate only no action and one alternative for a contaminated media that presents such complexities to remediate.

2. **Page ES-5, third bullet**: It is unclear why future uses of Site 9 groundwater would need any restrictions once MCLs are met. Suggest adding to the end of the sentence "until MCLs are met".

3. **Executive Summary, Pages ES-4 through ES-8:** The summary of the comparative analysis of alternatives on this and subsequent pages lists costs as low, medium, or high; however, since a low cost should count favorably in terms of comparative ranking, the evaluation for costs in these tables should be opposite what is listed. In addition, both Alternatives 2 and 3 are costed at $19 million, but the ranking in the table for Sites 13 and 23 for Alternative 2 is Medium to High and the ranking for Alternative 3 is Medium. Please correct these discrepancies.

Section 1:

4. **Section 1.3.1, Risk Management, Page 1-2:** The FS uses results of the human health risk assessment (HHRA) to determine whether remedial action is warranted for specific constituents of concern (COCs) at the OU-2A sites; however, the HHRA was not approved by the regulatory agencies, who believe that the risk for each site has been consistently underestimated. The HHRA results should not be used to eliminate chemicals as COCs.

5. **Page 1-5, paragraph following bullets**: EPA disagrees that it is appropriate to evaluate remediation goals based on a planned reuse. At least one alternative should evaluate the property for use as residential and any ICs should be evaluated against the nine criteria.

6. **Section 1.3.3, Additional Sampling to be Conducted During Remedial Design Phase, Page 1-9:** The additional sampling proposed for Site 22 includes groundwater sampling to define the extent of the groundwater plume and soil and groundwater sampling to investigate the OWS; however, no further sampling is proposed to define the extent of lead in soil. Figure 4-2 indicates that the extent of lead contamination in soil is defined by only one soil boring. Please revise the FS to include further sampling to define the extent of the soil excavation area for lead, or clarify how the extent of the excavation will be determined.

Section 2:

7. **Page 2-2, third paragraph:** It would be helpful to include a figure that shows the location of the Marsh Crust as it relates to OU 2A.

8. **Section 2.4, Ecology, Page 2-5:** This section describes the current habitat conditions but does not consider the potential for future reuse as parks and open space. Please discuss the potential that habitat may exist in the future in this area.

9. **Page 2-5, Section 2.5**: EPA's understanding is that mixed use and public/institutional/school would fit a residential scenario and also a recreational scenario. Please provide justification for the assumption that these sites will only be used for commercial/industrial activities.

Section 3:

10. **Section 3.1.1.1, Risk Management Decisions for Site 13 - Former Oil Refinery, Pages 3-2 through 3-4:** Since the maximum concentrations used in the risk assessment were generally one to three orders of magnitude less than the concentrations detected in site soil and groundwater, the risk calculated in the HHRA underestimates the actual risk and the calculated risk should not be used to make risk management decisions. For example, the RI (page 6-34) indicates that benzene was detected at 31 milligrams per kilogram (mg/kg), but the maximum concentration used in the HHRA was only 1 mg/kg; since the Industrial preliminary remediation goal (PRG) is 1.4 mg/kg, benzene should be considered a COC. Similarly, the maximum concentration of lead was 2,000 mg/kg, compared to the Industrial PRG of 800 mg/kg, so lead should also be a COC. In groundwater, benzene was detected at 1,400 micrograms per liter (ug/l), but the maximum concentration used in the HHRA was only 44 ug/l. The maximum concentrations of ethylbenzene, toluene, xylenes, 1,2,4-trimethylbenzene, naphthalene, 2-methylnaphthalene, and lead in groundwater also were not used in the HHRA. Of these, the concentrations of benzene and lead exceed the MCLs and the concentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, xylenes, and naphthalene exceeded the tap water PRGs. Therefore, since the HHRA did not include the maximum concentrations of these analytes, the discussion of risk at Site 13 should be deleted. Another method, like comparison to the PRGs and MCLs, should be used to establish risk drivers for this site. Please delete the discussion of risk at Site 13 from the text and use another method to select risk drivers.

11. **Section 3.1.1.1, Risk Management Decisions for Site 13 - Former Oil Refinery, Page 3-3:** The discussion of risk management decisions for Site 13 does not include the risk posed by vapor intrusion. According to the information in Appendix A, it appears that benzene in groundwater at Site 13 may exceed the target groundwater concentration for vapor intrusion. Also, the requirement to address risk posed by vapor intrusion is

mentioned in section 3.1.4.2 under remediation goals for groundwater. It appears that the remedial goals for the vapor intrusion pathway are exceeded at Site 13. Further, the maximum concentration of benzene in groundwater that was used in the HHRA (44 ug/l) was two orders of magnitude less than the maximum concentration (1,400 ug/l) detected in groundwater. Please revise the FS to include a discussion of risk management decisions for the vapor intrusion pathway in this section.

12. **Section 3.1.1.2, Risk Management Decisions for Site 23 - Missile Rework Operations, Pages 3-6 through 3-8:** The maximum detected concentrations of contaminants were not used in the HHRA, so the risk for this site was also underestimated. For example, in soil, ethylbenzene and xylene were not included and the maximum concentration of zinc in the HHRA (79 mg/kg) was less than the maximum detected concentration (130 mk/kg). In groundwater, trichloroethene (TCE) was not included in the HHRA, and the maximum concentrations of benzene, ethylbenzene, toluene, lead, chromium, nickel, and zinc were not used in the HHRA. Since the maximum concentrations of the analytes listed above, secbutylbenzene, and naphthalene exceeded the MCLs and/or tap water PRGs, the calculated risk cannot be considered accurate. Another method, like comparison to the PRGs and MCLs, should be used to establish risk drivers for this site. Further, the risk from inhalation does not appear to have been considered; since the concentration of benzene in groundwater (67 ug/l) exceeds the risk-based remediation goal presented in Appendix A, benzene should be included as a COC. Please delete the discussion of risk at Site 23 from the text and use another method to select risk drivers. Please also consider inhalation risk. Based on the number of contaminants that exceed MCLs and the fact that risk exceeds 1×10^{-4}, EPA cannot concur with the decision that no action is warranted for groundwater at Site 23.

13. **Page 3-12, second to last paragraph**: EPA strongly disagrees with the number calculated for lead and requests that a maximum value of 800 mg/kg be used as the industrial RG.

14. **Section 3.1.5, Remedial Action Objectives, Page 3-13:** The maximum concentrations of xylenes, 1,2,4-trimethylbenzene 1,3,5- trimethylbenzene, and naphthalene in groundwater exceeded the tap water PRGs. Provide remedial goals for xylenes, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene.

15. **Section 3.4.2.3.5, Ex Situ Physical/Chemical (Assuming Excavation), Page 3-26:** In the discussion of Soil Saver™ technology, the FS reports the effectiveness, cost, and implementability as advertised by the vendor. In order to better compare Soil Saver™ with other technologies, the FS should provide an independent evaluation of the likely effectiveness and implementability of this technology with respect to site-specific contaminants and conditions, and quantify the unit cost of the technology. Please revise the FS to provide a discussion and evaluation of Soil Saver™ in terms of effectiveness, implementability and costs, other than the vendor's advertised claims.

16. **Page 3-26, last paragraph, second sentence**: What is meant by the phrase "inability to prevent treatment"?

17. **Page 3-27, first sentence and third to last sentence under Soil Washing section**: These two sentences seem to contradict each other, first stating that soil washing is widely used in America and then stating that there is limited use in the U.S.

18. **Page 3-29, second to last paragraph, first sentence**: Revise to state "...does not lessen the toxicity, mobility or volume of hazardous wastes through treatment..."

19. **Section 3.5.1**: All remedial alternatives are being screened against ORC rather than the nine criteria. This approach is predecisional and does not provide sufficient information to evaluate and choose the most effective, implementable, and cost-effective alternative.

20. **Section 3.5.2.3, Engineering Controls, Page 3-32:** This section states that engineering controls for groundwater contamination, such as vapor barriers or removal systems, are not needed for Site 13 based on the HHRA for the commercial/industrial receptor; however, on Page 3-19, the FS states that ICs will be implemented to require installation of vapor barriers or removal systems if concentrations of benzene or vinyl chloride in groundwater have not attained remediation goals based on inhalation risk when the property is transferred. Please revise the FS to correct this discrepancy.

21. **Section 3.5.2.4, Monitored Natural Attenuation, Page 3-33:** The FS states that consideration of Monitored Natural Attenuation (MNA) requires predicting contaminant concentrations at downgradient receptor points, especially when the plume is still expanding and migrating, and that MNA should be used only where there are no impacts on potential receptors. However, MNA is generally not considered appropriate unless the plume is stable (e.g., not migrating) and shrinking, among other considerations. Please revise the FS to clarify that MNA is generally not appropriate unless the plume is stable.

22. **Section 3.5.2.6.1, Ex Situ Treatment, Page 3-34:** Groundwater pumping is eliminated from consideration in the FS because other technologies are 'expected to be effective with shorter remediation times and lower cost.' However, the expected remediation time and costs are not provided in FS. Furthermore, the other technologies referred to are all in-situ technologies. Since pump and treat is implementable, and may be effective, it should be retained for comparison with in-situ technologies. Please revise the FS to retain pump and treat technologies for detailed analysis in the FS, or revise the FS to provide unit cost and time-frame data for comparison with other technologies.

23. **Page 3-42, top of the page and page 3-43**: Where are MCLs?

24. **Section 3.7.2.2, Compliance with Applicable or Relevant and Appropriate**

Requirements (ARARs), Page 3-42: The FS states the land disposal restriction (LDRs) for lead would be met by treatment; however, it is not clear why LDRs do not appear to be listed as ARARs in Appendix B. It appears that, even if soil is expected to be treated, LDRs are action-specific ARARs for lead in soil for both offsite disposal and onsite backfill. Please revise the FS to include LDRs in Appendix B.

25. **Section 3.7.4.6, Implementability, Page 3-48:** The text states that it would be moderately difficult to implement excavation and off-site disposal based on truck traffic. However, excavation is commonly used to address soil contamination because it is easily implemented and has been successful at other IR sites at Alameda Point. Please revise the text to indicate that Alternative 4 would be easy or moderately easy to implement. In addition, please revise Section 3.8.2.4, Table 3-7, and the appropriate table in the Executive Summary to reflect this change.

26. **Section 3.7.5.6, Implementability, Pages 3-50 and 3-51:** The text indicates that it would be difficult to recycle the TRW into asphalt because there is no market for the recycled product, but it does not appear that the potential for recycling this material into asphalt for use at Alameda Point during redevelopment was considered. Please clarify whether use of asphalt containing the TRW at Alameda Point was considered, and if not, discuss the potential for reuse at Alameda Point and revise the description of implementability as necessary.

27. **Page 3-51, Sec. 3.8.1.2.** It is not correct to say that all alternatives would comply with ARARs, because the no-action alternative would not comply with chemical-specific ARARs (benzene MCL and perhaps other MCLs).

28. **Section 3.8.2.2, Reduction of Mobility, Toxicity, or Volume through Treatment, Page 3-52:** This section discusses isolation of soil contaminants by recycling in asphalt or offsite disposal; however, this criterion is intended to evaluate the reduction of mobility, toxicity, or volume *through treatment*. Please revise this section to clarify which alternatives involve *treatment* to reduce mobility, toxicity, or volume of contaminants.

29. **Section 3.8.2.3, Short-Term Effectiveness, Page 3-52:** This section states that the estimated times to reach remediation goals for soil vary for each alternative, but the times are not provided. For clarity and completeness, please revise this section to provide the estimated times to reach remediation goals for soil for each alternative.

30. **Page 3-53, Section 3.6 and Section 3.8.2.5**: The FS needs to evaluate an appropriate range of options, and that was not accomplished here, where only one active alternative was presented for groundwater. For complex sites such as Site 13 it is essential to have a range of remedial alternatives and associated costs and timeframes to evaluate to decide which best meets the nine criteria.

31. **Table 3-7, Summary of Comparative Analysis of Remedial Alternatives for Sites 13 and 23:** The description of long-term effectiveness of Alternative 4 refers to recycling off site; however, since Alternative 4 includes disposal and Alternative 5 includes recycling, it appears that the discussions for these two alternatives are reversed in the table. Also, it appears that the cost 'scores' relate to the quantity of the cost rather than the relative rankings; the cost scores should be the opposite of those used in the table. Finally, the evaluation of short-term effectiveness should include a discussion of time-frame to reach remedial goals for each alternative. Please revise the FS to make these corrections to the table.

Section 4:

32. **Section 4.1.1.1, Risk Management Decisions for Site 22 - Former Service Station, Pages 4-2 through 4-4:** The maximum concentrations of 2-methylnaphthalene, benzene, and naphthalene detected in soil and for ethylbenzene, toluene, and xylene detected in groundwater at Site 22 were not used in the HHRA, so the risk for this site was underestimated. In addition, the maximum concentration of lead in surface soil, 9890 mg/kg, apparently was not used in the Lead-Spread calculation, since the remediation goal for lead-contaminated soil is the same as it is for Site 13. Since the Regulatory Agencies have not approved the risk calculations included in the RI, please either delete the text and tables describing the HHRA results from the RI or add a statement to the text to clarify that the Regulatory Agencies believe that the risk is underestimated because the maximum concentrations in soil and groundwater were not used in the HHRA.

33. **Page 4-3**: Lead has correctly been called out as a COC. The first sentence on the page, which states that only arsenic was a COC in soil, needs to be changed.

34. **Page 4-3, Potential Groundwater Use at Site 22**: EPA disagrees that the contamination at Site 22 is attributable to TPH contamination alone. The presence of TCE, pentachlorophenol and thallium should not be dismissed because a plume has not been adequately delineated. We request further discussion on this issue and at a minimum would insist that benzene be remediated to MCLs. Additionally, since no alternatives were analyzed for groundwater, the Navy needs to explain what processes will be followed if, during the further sampling, GW contamination that requires remediation is found.

35. **Section 4.1.1.1, Risk Management Decisions for Site 22 - Former Service Station, Page 4-4:** The text indicates that a corrective action that began in June 2004 is underway at Site 22, but the duration of this corrective action is not specified. Please revise the text to include the expected duration of this corrective action.

36. **Page 4-6, Section 4.3**: The volume of lead-impacted soil will be greatly increased using a

remedial goal of 800 mg/kg and so will the cost. Please revise the FS using this RG.

37. **Page 4-11, Sec. 4.7.1.2.** It is not correct to state that the no-action alternative will meet ARARs. Also, what is meant by an alternative "having the potential" to meet ARARs? Is there a question here as to whether Alternative 2 will meet ARARs?

Section 5:

38. **Section 5.1.1.1, Risk Management Decisions for Site 9 - Building 41, Paint Stripping Facility, Pages 5-2 through 5-4:** The maximum concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, arsenic, mercury and thallium detected in soil and the maximum concentrations of arsenic, manganese, thallium, benzo(a)anthracene, benzo(a)pyrene, chrysene, indeno(1,2,3-cd)pyrene, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, chloroform, chloromethane, ethylbenzene, methyl-tert-butyl ether (MTBE), toluene, xylene, and vinyl chloride detected in groundwater at Site 9 were not used in the HHRA, so the risk for this site was underestimated. Since the risk was underestimated, it is misleading to include the results of the HHRA in the text of the FS. Please delete the results of the HHRA from the text and use the MCLs and PRGs to screen the analytical data to establish the risk drivers and COCs for Site 9.

39. **Page 5-3, middle of the page,** statement, "Vinyl chloride was not selected as COC for groundwater" is misleading, because, based on exceedences of MCLs, vinyl chloride was in fact selected as a COC, as explained subsequently. We recommend modifying the statement in the middle of page 5-3 to say that "at the HHRA stage," vinyl chloride was not selected as a COC for groundwater.

40. **Page 5-3, Potential Groundwater Use and Page 5-4, Summary of Risk Management Decisions**: Stating that contaminants are not part of a plume and so can be eliminated as COCs is insufficient justification for eliminating them from clean up.

41. **Section 5.1.1.1, Risk Management Decisions for Site 9 - Building 41, Paint Stripping Facility, Pages 5-4 and 5-5:** The text describing the Time-Critical Removal Action (TCRA) for free-product removal at Site 9 does not include the expected timeframe for completion of this action. Since any contamination that remains after the free-product removal is completed will be addressed by a remedial action, and construction and implementation of the appropriate remedy will depend on the remaining chemicals and their concentrations, it is important to understand how the completion of the TCRA may impact the timing of the remedy. Please include the estimated duration of the TCRA and discuss the potential impact of this TCRA on the schedule for construction and implementation of the remedy for Site 9 groundwater.

42. **Section 5.1.1.1, Risk Management Decisions for Site 9 - Building 41, Paint Stripping Facility, Page 5-4:** The FS describes floating product found in four wells adjacent to Building 410; however, the well identifiers are not provided and the locations where free product was found are not shown on a figure. Please revise the FS to indicate the names and locations of wells where product was found or include a figure that shows the estimated extent of free product.

43. **Section 5.1.1.1, Risk Management Decisions for Site 9 - Building 41, Paint Stripping Facility, Page 5-5:** This section refers to the existing treatment systems at Building 397 and at Building 530, but these features are not shown on a figure. Please revise the FS to show the referenced buildings on a figure.

44. **Page 5-6, Table**: Naphthalene should be marked as an indoor vapor inhalation COC.

45. **Section 5.3, Volume of Contaminated Groundwater, Page 5-8:** Figure 5-2 is referenced in this section, but Figure 5-2 is not included in the FS. Please revise the FS to include Figure 5-2.

46. **Section 5.4.2.3, Monitored Natural Attenuation (MNA), Page 5-10 and Section 5.6.2, Monitored Natural Attenuation and Institutional Controls:** The effectiveness of MNA for degrading each of the COCs in Site 9 groundwater is not discussed. It is also likely that the timeframe for degradation of 29,000 ug/l of naphthalene will be quite long. Please discuss whether each of the COCs in Site 9 groundwater will degrade under MNA and specify the expected timeframe for degradation of each COC. If some of the COCs will not degrade in a reasonable timeframe, MNA should not be considered as an effective stand-alone technology, although it could be used as a component of a remedy after the more recalcitrant chemicals have been treated or after hot-spot removal.

47. **Section 5.4.2.4.2, In Situ Treatments, Page 5-12:** The last paragraph on this page refers to In-Situ Chemical Oxidation (ISCO) treatment of "hot spots" with concentrations higher than the remediation goals for domestic use of groundwater. It appears that hot spots are being defined as any areas exceeding MCLs. It is not clear why, if remediation goals for domestic use of groundwater are met with ISCO treatment, it would need to be followed by MNA with ICs for 20 years. Please revise this Section to clarify the definition of 'hot spots' used in the FS and the treatment goals for ISCO.

    In addition, since ISCO is being retained for shallow groundwater, the effectiveness of this technology for treating each of the COCs should be discussed. Further, the presence of benzene and other flammable contaminants is a concern because of the risk for fire and explosion if vapors build up in or around subsurface structures, so ISCO may not be appropriate for the entire site. Please discuss the effectiveness of ISCO for each of the COCs and clarify whether ISCO is being considered for portions of the plume that contain benzene and other flammable contaminants.

48. **Section 5.4.2.4.2, In Situ Treatments, Page 5-13**: The effectiveness of HRC™ for treating all of the COCs in Site 9 groundwater is not discussed. Please discuss whether HRC™ is effective for treating each of the COCs in Site 9 groundwater.

49. **Section 5.5, Remedial Alternatives for Groundwater at Site 9, Page 5-15:** Alternatives 1 and 4 are identified as 'restricted use', while Alternative 3 is identified as 'unrestricted use'. It is not clear what this means, given the statement on page 5-14 that GW remediation goals are for unrestricted use. Please clarify.

50. **Page 5-18, Section 5.6.2.7**: See General Comment # 7 regarding frequency of monitoring of attenuation.

51. **Section 5.6.3, Alternative 3: In Situ Chemical Oxidation, Enhanced In Situ Bioremediation with Hydrogen Release Compound, and ICs, Page 5-19:** The FS indicates that ISCO and HRC™ would treat benzene, chlorinated ethenes, and naphthalene, but it is not clear if ISCO or HRC™ would be effective in treating 1,1-dichloroethane (DCA) and 1,2-DCA because these chemicals are less reactive than the chlorinated ethenes. In addition, it is unclear if HRC™ would remediate napthalene or the benzo(a)pyrene and other PAHs present in groundwater. Please revise the FS to clarify the effectiveness of this alternative on each of the other COCs at Site 9.

52. **Section 5.6.3, Alternative 3: In Situ Chemical Oxidation, Enhanced In Situ Bioremediation with Hydrogen Release Compound, and ICs, Page 5-19:** The text states, "ISCO and HRC™ would be conducted concurrently," but ISCO is an oxidation process and HRC™ creates reducing conditions, so they may be incompatible if executed concurrently, depending on whether the shallow and intermediate zones are completely isolated by a sufficient aquitard. The cross-sections in the RI indicate that in portions of Site 9, the Bay Sediment Unit consists of clayey sands, so it is unlikely that the intermediate zone is isolated from the shallow zone. Please discuss Site 9 hydrostratigraphy and revise this alternative to indicate that these treatments will be done successively. Also, indicate whether ISCO or HRC™ will be conducted first. Please also consider the additional amount of the second treatment that will be required to change from oxidizing to reducing conditions or from reducing to oxidizing conditions and revise the cost estimate to include this additional amount.

53. **Section 5.6.3, Alternative 3: In Situ Chemical Oxidation, Enhanced In Situ Bioremediation with Hydrogen Release Compound, and ICs, Page 5-19:** It is unclear how the number of injections for each ISCO and HRC™ treatment has been determined or whether the proposed number of injections would be sufficient because calculations have not been provided. The total mass of each contaminant present in groundwater, including those contaminants that are not COCs, and the oxygen demand for each chemical should be used to calculate the amount of ISCO reagents necessary. In addition,

because there are a number of competing reactions and because of the presence of natural organic carbon in the subsurface, this estimate would underestimate the amount of reagents required to treat the contaminant mass. Please provide detailed calculations that specify the estimated mass of each contaminant, including both COCs and non-COCs, the oxygen demand for each chemical and calculate the amount of ISCO reagents that will be required for treatment. Please repeat this calculation for HRC™ . Then, please revise the cost estimate as necessary.

54. **Section 5.6.4, Alternative 4: In Situ Chemical Oxidation and Pump and Treat with Air Stripping and ICs, Page 5-22:** The FS indicates that ISCO would treat benzene, chlorinated ethenes, and naphthalene in shallow groundwater, and chlorinated ethenes would be treated by pumping and air stripping in the intermediate aquifer; however, it is not clear how the other COCs in groundwater at Site 9 would be addressed. Please revise the FS to clarify the effectiveness of Alternative 4 on the other COCs at Site 9.

In addition, it is not clear whether the proposed number of injections would be sufficient because calculations have not been provided. The total mass of each contaminant present in groundwater, including those contaminants that are not COCs, and the oxygen demand for each chemical should be used to calculate the amount of ISCO reagents necessary. In addition, because there are a number of competing reactions and because of the presence of natural organic carbon in the subsurface, this estimate would underestimate the amount of reagents required to treat the contaminant mass. Please provide detailed calculations that specify the estimated mass of each contaminant, including both COCs and non-COCs, the oxygen demand for each chemical and calculate the amount of ISCO reagents that will be required for treatment. Then, if necessary, please revise the cost estimate.

55. **Section 5.7.2.1, Long-Term Effectiveness and Permanence, Page 5-25:** The last paragraph in this section refers parenthetically to an expected 17-year timeframe before remediation goals are achieved for Alternative 2 and 4; however, the anticipated time frame for Alternative 2 is 25 years. Please revise this section to indicate expected timeframes of 25 and 17 years for Alternative 2 and 4 respectively.

56. **Table 5-5, Summary of Comparative Analysis of Remedial Alternatives for Site 9:** It appears that the cost 'scores' relate to the quantity of the cost rather that the relative rankings; the cost scores should be opposite. Please revise the table to indicate the relative ranking of alternatives in terms of cost.

<u>Section 6:</u>

57. **Section 6.1.1.1, Risk Management Decisions for Site 19 - Yard D-13, Pages 6-2 through 6-4:** The maximum detected concentrations of benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and arsenic in soils and the maximum concentrations of benzene, 1,1,1-trichloroethane, arsenic, barium, manganese, nickel,

thallium, and vanadium were not used in the HHRA, so the risk was underestimated. Since the risk was underestimated, it is misleading to include the results of the HHRA in the text of the FS. Please delete the results of the HHRA from the text and use the MCLs and PRGs to screen the analytical data to establish the risk drivers and COCs for Site 19.

58. **Page 6-4, top of the page and other similarly worded sections**: No further action implies action has already been taken. No action means that the site is acceptable for unrestricted use. Since neither of these circumstances fit the site being discussed, remedial alternatives need to be presented for soil and for groundwater.

59. **P. 6-5 remediation goals**. The FS should state why the California MCLs are selected, i.e., are they all more stringent than the Federal MCLs?

60. **Section 6.4.2.4.1, Ex Situ Treatment, Page 6-8:** Pump and treat is not retained at Site 19 because ISCO and enhanced in situ bioremediation using HRC™ are expected to be effective with shorter remediation times and lower cost; however the remediation time and cost for the different technologies are not provided. Also, pump and treat is an ex situ treatment option, and ISCO and HRC™ are in situ treatment options. It appears that pump and treat should be retained as an example of an ex situ treatment option for comparison with in situ options, and should not be screened out on the *expectation* that it will have a longer duration and higher cost. The remediation time and cost should be evaluated in the FS. Please revise the FS to retain pump and treat as a treatment technology at Site 19, or provide further detail justifying its elimination.

61. **P. 6-11, Alternatives chart**. Under Alternatives 3 and 4, it would appear that the last bullet should read "ICs to prohibit future residential use until RGs are reached." Or are the ICs based on soil contamination? (If so, there needs to be a soil remedy.)

62. **Section 6.5, Remedial Alternatives for Groundwater at Site 19, Page 6-11:** It is not clear why Alternatives 2 and 4 are identified in the table on this page as restricted use, while Alternative 3 is identified as unrestricted use. Alternatives 3 and 4 have essentially the same duration (4 years and 5 years or less, respectively). Please revise the FS to clarify this difference between the alternatives.

63. **Page 6-14, Section 6.6.2.7**: See General Comment # 7 regarding frequency of monitoring of attenuation.

64. **Section 6.9.2.3, Short-Term Effectiveness, Page 6-19:** This section discusses risks to the community and workers during remediation, but does not compare the timeframe to achieve remedial goals for the different alternatives. An important aspect of short-term effectiveness is how soon remedial goals are achieved. Please revise the FS to discuss and compare remedial timeframes for the different alternatives.

Section 7:

65. It is not clear how the Navy proposes to address any groundwater contamination that is found during the OWS investigation. Page 7-12, Sec. 7.6.1.1, suggests that contaminated groundwater would be removed under Alternative 3, but this is not discussed in the earlier analysis of Alternative 3. There does not appear to be any alternative under which the groundwater would be cleaned up to MCLs, which would appear to be a necessary alternative given that the groundwater in this OU is a potential source of drinking water (see p. 7-2).

66. **Page 7-3, Section 7.1.4 and first bullet Section 7.1.5**: Which PRGs are being used here? Groundwater needs to be cleaned to MCLs, and soil will need at a minimum an IC remedy to prohibit residential and recreational use if industrial PRGs are used.

67. **Section 7.2, General Response Actions, Page 7-4:** Since the extent of contamination in soil and groundwater in the vicinity of the OWSs in OU-2A is unknown, it is unclear why there are no general response actions for groundwater. As a contingency, general response actions for addressing groundwater contamination should be included. Please revise Section 7.2 to include general response actions for contaminated groundwater.

68. **Page 7-7, Section 7.5.2**: This alternative doesn't meet MCLs as ARARs.

69. **Page 7-7, Sec. 7.5.2.** EPA appreciates the assumption in the cost comparison that ICs will last for 100 years.

70. **Page 7-7, Sec. 7.5.2.2.** It is not clear how alternative 2 will comply with ARARs if contaminants are shown to exceed remediation goals (see sec. 7.5.2.3), and since Alternative 2 would not meet RAOs (Sec. 7.5.2.5).

71. **Section 7.6.2.2, Reduction in Toxicity, Mobility, and Volume, Page 7-12:** This section discusses the effectiveness of Alternatives 1 and 2 in reducing toxicity, mobility and volume of contaminants; however, the intent of this criterion is to evaluate alternatives with respect to reduction of toxicity, mobility, and volume, *through treatment*. Please revise the FS to clarify that neither Alternative 1 nor Alternative 2 will reduce toxicity, mobility, or volume through treatment.

72. **Table 7-1, Chemical specific ARARs.** Why are MCLs not included when this is considered potential drinking water (p. 7-2)?

73. **Section 7, Figures**: It would be helpful to include figures of all OWSs at Sites 9, 13, 22 and 23 in this section rather than having to flip back through the previous sections to find the figures depicting the OWSs for Sites 13, 22 and 23.

Appendix B, ARARs (comments also apply to ARARs charts and discussions for the individual sites)

74. **MCLs**: The table on page C-1, which compares State and Federal ARARs and selects the controlling ARAR, should be referenced in all the ARARs tables, both for the individual chapters and in Appendix B. The FS is inconsistent in that the ARARs Table in Appendix B includes both Federal and State ARARs, while the ARARs tables for the individual sites only include State ARARs. Also, why is the State ARAR selected for barium when the federal MCL is more stringent?

75. What specific requirements in the Bay Plan (CZMA) are considered to be ARARs?

76. Although the individual chapters generally include the Basin Plan as an ARAR, the discussion on page B-14 appears to limit the Basin Plan to provisions regarding groundwater. Does the Navy consider surface-water standards for the Bay to be triggered by the possibility that the ISCO and HRC alternatives could result in metals going into solution (see, e.g., p. 5-21 and 5-23 regarding short term effectiveness, where mention is made of affecting San Francisco Bay).

77. **UIC**. Why are requirements concerning Class I or Class IV wells considered relevant? Does the Navy consider ISCO, ORC and HRC to constitute injection of hazardous waste? Note that the discussion of ORC on page B-21 refers to Class V wells rather than the Class I or VI wells referenced in the ARARs tables.

78. **Action-specific ARARs**. Would any of the alternatives (e.g. excavation of contaminated soil) trigger NPDES stormwater requirements for construction sites greater than one acre (substantive portions of State general permit)?

Appendix C:

79. **Table C-1, Cost Summary for Site 13 and 23 Soil and Groundwater Remediation Alternatives:** The total project duration for Alternatives 2, 3, 4, and 5 is given in this table as 100 years; however, based on the information in the FS, the duration of MNA is anticipated to be 10 years or less. Also, the durations of the soil remedial actions vary between alternatives. The project durations should be the time to achieve remedial goals under each alternative. Please revise the cost estimates for Site 13 and 23 and the cost summary table to indicate the anticipated timeframe to reach remedial goals for each alternative. 100 years is appropriate to use for ICs that will be in place in perpetuity.

80. **Table C-1A, Alternative 2 Site 13 and 23 - Excavation with Soil Savers, Page 5 of 5:** The present value analysis lists two annual cost line items; one with a duration of 1 to 100 years and the other 1 to 9 years. The first appears to be the annual cost of ICs, but the second appears to be total annual cost, which includes ICs. It is not clear why ICs would

be implemented for 100 years, when the remedial goals are anticipated to be attained in 10 years. Also, it is not clear why ICs are counted twice. A similar discrepancy occurs in Table C-1B and C-1C. Please revise the cost estimates to correct this discrepancy.

81. **Table C-3A, Alternative 2 Site 9 - Monitored Natural Attenuation and Institutional Controls:** In the present value analysis, this table includes two line items for annual operations and maintenance (O&M) costs; $78,073 in year one, and $24,815 in years 2-25. The $78,073 cost is the total annual O&M cost, but it is not clear where the $24,815 cost came from or what it includes. Please revise the FS to clarify why there is a different annual O&M cost for years 2 through 25, and specify what this line item includes.

82. **Table C-3B, Alternative 3 Site 9- ISCO and HRC™ Treatment of Entire Plume to MCLs:** The O&M cost is $68,302, but the total annual O&M cost, including ICs, is given as $68,615. This appears to be an error. Also, in the present worth analysis, it is not clear why a different discount factor is used for year 1 through 3 than is used for years 4 and 5. Please revise the FS to clarify the calculation of the annual O&M costs.

83. **Table C-3C, Alternative 4 Site 9 - ISCO TRMT of Shallow Plume, Pump Treat W/Air Stripping of Deep Plume:** In the present worth analysis, it is not clear why different discount factors are used for years 1 to 2, years 3 to 15, and years 16 and 17. Please revise the FS to clarify the calculation of annual O&M costs.

84. **Table C-5, Cost Summary for OWS Remediation Alternatives:** It is not clear why a project duration of 100 years is assumed for Alternatives 2 and 3. Please revise the FS to clarify the expected timeframe to achieve remedial goals for OWS Alternatives 2 and 3.

Appendix D:

85. **Modeling to Evaluate Monitored Natural Attenuation as Remedial Action Alternatives for Sites 9, 13, and 19:** It is unclear why modeling to estimate the time required for more recalcitrant constituents like naphthalene to degrade did not reflect the **actual detected** maximum concentration of these constituents. For example, the maximum concentration of naphthalene in groundwater at Site 9 is 29,000 ug/l, but the model only used a maximum concentration of 390 ug/l. Please verify that the maximum concentration of each constituent was used for modeling the estimated time for MNA at each site.

Appendix E:

86. **Section E4.0, Evaluation, Page C-3:** In the table on this page, the "average all" concentration for 1,2-DCA (1.3 ug/l) exceeds the maximum detected concentration (0.7 ug/l) and the average detected concentration (0.6 ug/l). It is not clear how the average of all analyzed samples could exceed both the average of detected concentrations and the

maximum detected concentration, therefore, these values appear to be in error. A similar apparent error occurs in Section E4.2 (TCE and pentachlorophenol), E4.3 (1,2-dichloroethane), E4.4 (TCE), and E4.5 (vinyl chloride). Please correct these tables as necessary.

Minor typographical:

87. **Page ES-1, last paragraph**: Delete "wastes" and replace with "waste".

88. **Page 1-1, Section 1.0, third sentence**: Delete the word "Accordingly" as the third sentence does not follow from the second.

89. **Section 7.1.3.2, Location Specific, Page 7-3 and Section 7.1.5, Remedial Action Objectives, Page 7-3:** The text in both these sections refers to OWS at OU-2B, but this is the OU-2A FS. Please correct these typographical errors. Also, please search for and correct any additional references to OU-2B.