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LETTER AND COMMENTS FROM U S EPA REGION 1 REGARDING REVIEW OF DRAFT FEASIBILITY STUDY SITE 8 DISPOSAL AREA NS NEWPORT RI
10/18/2010
U S EPA REGION 1

File 2124-3.1
c: Parker
Ferrelli
ARWagner

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 1
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BOSTON, MASSACHUSETTS 02109-3912

October 18, 2010

Edward J. Corack, P.E.
Remedial Project Manager
NAVFAC MIDLANT
Northeast IPT, Code OPTE3-EC
9742 Maryland Avenue
Norfolk, VA 23511

Re: Draft Feasibility Study
Site 08, NUSC Disposal Area RI/FS
NAVSTA Newport, Rhode Island

Dear Mr. Corack:

EPA has completed its review of the "Draft Feasibility Study for Site 08, NUSC Disposal Area," dated August 2010, as prepared by Tetra Tech NUS, Inc., on behalf of Naval Station Newport, RI. The Draft Feasibility Study (FS) summarizes the site history, remedial action objectives, and develops and evaluates remedial alternatives designed to remediate site soils, groundwater, and sediments. EPA evaluated the Draft FS to determine if it was consistent with CERCLA, the NCP, EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (October 1998), and other applicable EPA guidance and policies. In addition, EPA evaluated the Draft FS for consistency, technical accuracy, and completeness.

EPA finds that the Draft FS is incomplete and does not present remedial alternatives that will achieve ARARs within a reasonable time frame. Some major concerns are:

- The Draft FS does not comply with the NCP requirement that contaminated groundwater be restored to beneficial use wherever practicable within a time frame that is reasonable given the particular circumstances of the site. EPA made this requirement clear during the NUSC Remedial Investigation effort.

- The Draft FS does not present an appropriate range of alternatives for soil remediation that uses various technology types and includes treatment technologies. For all practical purposes, Navy has only presented one viable soil alternative.

- The Draft FS does not present an appropriate range of alternatives for groundwater remediation that spans a range of costs, cleanup times, and technology types, and includes treatment technologies. None of the groundwater alternatives can achieve applicable PRGs within a reasonable time frame. None of the alternatives directly address metals contamination. Furthermore, the range of alternatives evaluated

should include more aggressive alternatives with the objective of shortening the time to achieve cleanup. EPA does not agree with eliminating groundwater extraction and ex situ treatment options. Groundwater extraction and treatment systems have been implemented successfully at hundreds of sites. Groundwater extraction is often essential to hydraulic containment and DNAPL recovery efforts, which may be important aspects of a groundwater remedy at this site.

- The Draft FS does not support that Monitored Natural Attenuation, either alone or in combination with other alternatives, will achieve applicable PRGs. In order for Monitored Natural Attenuation to be considered a viable option, the Navy must demonstrate that conditions in the aquifer are such that groundwater COCs will naturally attenuate and PRGs will be met within a reasonable time frame.

- The Draft FS assumes that Monitored Natural Recovery is presently occurring but does not present any data to support this. Alternatives should include Monitored Natural Recovery, only if the remedy will achieve sediment cleanup standards within a reasonable time frame.

Detailed comments are attached. EPA will not concur on a FS that does not present remedial alternatives that will achieve ARARs within a reasonable time frame.

EPA requests that the Navy issue a Revised Draft FS that addresses the enclosed comments and incorporates, as appropriate, the supplemental RI investigation data and offers a complete FS for the combined NUSC Disposal Area/Building 179 CUST site. In order for the Navy to meet its schedule obligations for this site, a Revised Draft FS should be issued by December 2010.

If you have any questions, please contact me at (617) 918-1754 or at lombardo.ginny@epa.gov.

Sincerely,

Ginny Lombardo

Ginny Lombardo
Remedial Project Manager

Attachment

cc: Gary Jablonski, RI DEM
Cornelia Mueller, NAVSTA Newport
James Forrelli, TtNUS
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Chau Vu, EPA
Bart Hoskins, EPA
Todd Finlayson, Gannett Fleming
David Peterson, EPA

**EPA Comments on**
**Draft Feasibility Study for**
**Site 8 – Naval Undersea Systems Center (NUSC) Disposal Area**
**August 2010**

**General Comments:** For all General Comments, revisions addressing the comments will need to be made throughout the document, where applicable. Significant revisions throughout the Draft FS will be necessary to address the comments adequately.

1. The NCP requires that contaminated groundwater be restored to beneficial use wherever practicable within a time frame that is reasonable given the particular circumstances of the site. As such, groundwater PRGs at the NUSC Disposal Site must be set at drinking water MCLs and non-zero MCLGs, unless there is a more stringent drinking water or risk-based standard. EPA made this requirement clear in its March 6, 2009 letter providing comments on the Draft NUSC RI and in our December 24, 2009 conditional concurrence letter on the Draft Final NUSC RI. In addition, on September 14, 2010, EPA transmitted the June 26, 2009 EPA HQ memo clarifying this position at the national level. This was also transmitted to the Navy on June 29, 2009 in response to an action item from the June 2009 RPM meeting, during which EPA made its position clear that the Navy must comply with the NCP requirement to restore groundwater at the NUSC Disposal Site to drinking water standards. EPA will not concur on a Feasibility Study (FS) that does not present remedial alternatives that will achieve MCLs within a reasonable time frame. If the Draft Final FS does not adequately address this requirement, EPA will consider the FS incomplete. In addition, the Draft FS references the State's groundwater classifications for the site. Refer to EPA's March 26, 2009 letter, which stated: "Note that RIDEM does not have an approved CSGWPP and these state groundwater classifications do not change the NCP requirement to meet MCLs." Therefore, these classifications have no bearing on the CERCLA groundwater cleanup requirements.

2. The FS presents the following ROA: "Prevent the ingestion of and direct contact with soil and groundwater containing site-specific COCs that exceed PRGs, as pertinent to the appropriate land use." Institutional controls (ICs) can be applied to land use under CERLCA, whereby the reasonably foreseeable future use of the site can be considered in setting cleanup goals and ICs can restrict certain land uses that are not protected by those cleanup levels. Therefore, referencing appropriate land use is acceptable for <u>soil</u> RAOs. However, land use is not applicable to groundwater RAOs. ICs restricting groundwater use are acceptable as an interim measure to prevent exposures until groundwater cleanup levels are met. ICs are not acceptable in lieu of active response measures as stated in EPA's June 26, 2009 groundwater memorandum.

3. The FS does not present an appropriate range of alternatives for soil remediation that uses various technology types and includes treatment technologies. For all practical purposes, Navy has only presented one viable soil alternative because the cost for SO2 as compared to SO3 makes that alternative economically impractical, as there is no apparent benefit for SO2 as compared to SO3 that would justify the additional cost to implement SO2. Consequently, without additional practical soil alternatives, EPA considers the FS to be incomplete.

4. The FS does not present an appropriate range of alternatives for groundwater remediation that spans a range of costs, cleanup times, and technology types, and includes treatment technologies. For all practical purposes, Navy has only presented one viable groundwater alternative because the cost for GW2 as compared to GW3 makes that alternative economically impractical, as there is no apparent benefit for GW2 as compared to GW3 that would justify the additional cost to implement GW2. In addition, none of the alternatives proposed can achieve PRGs within a reasonable time frame. Further, the time period for RAOs to be achieved needs a more accurate time estimate than >30 years or >100 years. Finally, none of the alternatives directly address metals contamination. Furthermore, although remediation of bedrock groundwater is more difficult and takes longer than overburden groundwater remediation, the range of alternatives evaluated should include more aggressive alternatives with the objective of shortening the time to achieve cleanup. With the limited range of inadequate groundwater alternatives, EPA considers the FS to be incomplete.

5. In order for Monitored Natural Attenuation (MNA) to be considered a viable option, the Navy must demonstrate that conditions in the aquifer are such that groundwater COCs will naturally attenuate and PRGs will be met within a reasonable time frame. This evaluation should be done in accordance with EPA Guidance: OSWER Directive 9200.4-17P, "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites," dated April 21, 1999, "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater," dated September 1998, and "Monitored Natural Attenuation of Inorganics in Groundwater," Volumes 1 and 2, dated October 2007. Note that the NCP Preamble states MNA may be used in certain situations when: the processes will allow ARARs to be met in a reasonable time frame compared to a more active remedy, there is a low potential that a plume will be generated and migrate, the contaminants do not degrade to more toxic byproducts, and, usually, there is source control. MNA is not just monitoring (Table 3-2). The Draft FS does not support that MNA, either alone or in combination with other alternatives, will achieve PRGs and the federal drinking water standards. There is some evidence in site groundwater data that reductive dechlorination is occurring based on the presence of the daughter products of trichloroethylene and 1,1,1-trichloroethane; however, only limited sampling of groundwater has occurred to date so the rate that dechlorination is occurring cannot be reasonably estimated from the existing data. Therefore, there is no acceptable basis in the Draft FS for postulating when or if the existing natural processes could achieve the proposed cleanup goals.

6. The FS must include calculations of the total residual risks for all media and all receptors based on the proposed PRGs. The purpose of this is to ensure that by remediating the site contaminants to the proposed PRGs, the total residual risks from remaining contamination will be within the acceptable risk range and will not exceed 1E-4.

7. While there apparently have been no detections of COCs in site surface water or sediment in excess of screening levels to date, the existence of migrating groundwater plumes at the site needs to be accounted for in evaluating site conditions going forward. The potential for surface water and sediment impacts from groundwater contamination are a real concern at this site so there needs to be monitoring criteria to determine if surface water or sediment

becomes impacted in the future. These criteria will be required in any monitoring plans developed for this site unless Navy can demonstrate that groundwater contamination cannot impact surface water or sediment to the point of exceeding protection criteria.

8. Throughout the FS there are statements related to the disposition of metals under reducing conditions suggesting that metals would not be mobilized under these conditions because they will precipitate. While there is some truth to that statement, it is also evident that some metals of concern, especially arsenic and manganese, will become more mobile under reducing conditions and will solubilize and migrate with groundwater. Please edit the referenced discussion throughout the FS to acknowledge that inducing reducing conditions will mobilize metals of concern with groundwater thereby exacerbating the groundwater quality.

9. This FS assumes that Monitored Natural Recovery (MNR) is presently occurring but does not present any data to support this. Without sediment core data to compare collocated deeper sediment with more recent shallow data, natural recovery cannot be assumed. If such data are not available they should be collected in order to support this alternative. Alternatives should include MNR, only if the remedy will achieve sediment cleanup standards within a reasonable time frame.

10. At a number of places throughout the text and in the cost tables reference is made to obtaining permits. Because this is a CERCLA site, permits are not required for on-site activities. Please clarify what permits are being referred to and why they would need to be obtained.

**Specific Comments:**

1. Cover and Pages ES-1 and 1-1: Identify that the site is "Operable Unit 07, Naval Education Training Center Superfund Site."

2. Page ES-2, RAOs, 3rd Bullet and Page 2-9, Section 2.3.1, 3rd Bullet, Section 3.5 and Section 6.0: This RAO is to prevent the migration of contamination to the surface water and sediment via groundwater transport. The Navy needs to establish how compliance with this RAO will be monitored and achieved and document the remediation goals relevant to this RAO. The remedial alternatives proposed in the FS do not meet this RAO. EPA agrees that an RAO for surface water and sediment is necessary because of the risk that existing groundwater contamination will migrate to impact surface water and sediment. Furthermore, soil alternatives that leave contamination in place and allow for leaching of contamination to groundwater provide additional opportunity for contaminants to migrate to and impact surface water and sediment. Any remedial action selected for this site should include long-term monitoring of surface water and sediment. Alternatively, point-of-compliance wells could be monitored in locations between known plumes and/or source areas and the pond, with PRGs set at the Ambient Water Quality Criteria or equivalent benchmarks.

3. Page ES-3, Contamination Volume Table: Revise the term "Construction" to "Commercial/Industrial."

4. Page ES-3: PRGs were not developed for surface water COCs since the HI is less than 1 and cancer risk is less than 1E-5 for exposures to surface water. Please remove the statement: "PRGs were not developed for surface water and fish tissue COCs. These concentrations are expected to reduce once the source of contamination (soil, groundwater, and sediment) is remediated." This statement is incorrect since there are PRGs derived for fish tissue COCs as presented in Table 2-7.

5. Table ES-3; Page 4-9, Section 4.2.3; Page 4-11, Section 4.2.3; and Page 6-15 and 6-17, Treatment Criterion: If SD2, SD3, and/or SD4 require stabilization of the sediment prior to disposal or treatment of dewatering liquid, these remedial elements may partially meet the criterion for treatment and should be noted.

6. Table ES-3: Since alternative SD2 relies in part on natural recovery it would only meet protectiveness and ARARs criteria if the time period to achieve PRGs is within a reasonable time frame. The time period it will take to reach RAOs reported in the fifth criterion should include the MNR period, rather than only 1.5 months.

7. Page 1-1, Section 1.0: In the 2nd paragraph, at the end of the last sentence, add "under the terms of a Federal Facilities Agreement (FFA) entered into by the three parties."

8. Page 1-1, Section 1.0: Add a footnote in the third paragraph after "(SARA)" with the citation for CERCLA: 42 U.S.C. §§ 9601 *et seq.*

9. Page 1-2, Section 1.1, item 4: Add at the end "through treatment."

10. Page 1-4, Section 1.4, and Figure 1-4: The text discusses the former disposal area at NUSC and refers to Figure 1-4. The disposal area is not shown on Figure 1-4.

11. Page 1-7, Section 1.5: Note there are 2 question marks in the text on this page.

12. Page 1-7, Section 1.6: Identify whether there is any 100 year floodplain at the Site, either along the freshwater waterways or from the adjacent Narragansett Bay.

13. Page 1-9, Section 1.7: The last sentence of this section is incomplete. In addition, the reference to Section 1.7 should be to 1.8 and the reference to 1.8 should be to 1.9.

14. Page 1-9, Section 1.8; Page 1-12, Section 1.8.2.1; and Appendix A: Section 1.8 states that "Contaminant distribution maps of the COCs identified in Section 2.0 herein are presented in Appendix A." The reference to Section 2.0 should be revised to Sections 1.10 and 1.11. Page 1-12 provides data for 1,1,1-trichloroethane (TCA) in groundwater. A contaminant distribution map should be added to Appendix A for TCA.

15. Page 1-9, Section 1.8.1: Report the nature and extent of contamination in separate sections for surface and subsurface soils as presented in the RI report.

16. Page 1-11, Section 1.8.2; Page 3-16, Section 3.4.2, Land Use Controls: The text refers to potential vapor intrusion issues. Based on the RI, cancer risk from VI for residential and industrial exposures are within EPA and RIDEM risk range and there are no non-cancer risks from VI. Revise the text here to be consistent with the RI. Text throughout the document related to VI should be revised, as appropriate.

17. Page 1-11, Section1.8.2.1: Correct the last sentence on this page.

18. Page 1-15, Section 1.8.5.1: This section refers to SB153 concentrations. Please clarify.

19. Page 1-17, Section 1.9.1, Fate and Transport of VOCs: With respect the LNAPL at MW100B, the groundwater remediation alternatives proposed in the FS may not adequately address the LNAPL. Oxidation as proposed in GW3 and shown in Figure 5-2 may be effective; however, it may be more appropriate to attempt to remove some LNAPL prior to injecting the oxidant to reduce the oxidant demand. The effectiveness of GW2 as shown in Figure 5-1 is questionable given that the LNAPL includes BTEX components and the injection wells do not appear to be placed to specifically address LNAPL but to address migrating contamination. The FS must adequately address remediation of the LNAPL in the vicinity of MW100B.

20. Page 1-19, Section 1.9.1, Fate and Transport of Metals: The text here states: "With the exception of chromium and lead, the distribution of metals at Site 8 suggests that their presence is largely not site related." However, the soil alternatives proposed are designed to remediate metal contamination, specifically arsenic.

21. Page 1-20, Section 1.10.1, and Page 1-21, Section 1.10.2: The text on page 1-20 states: "One uncertainty that may greatly over-estimate risk posed to potential future residents of the site in the assumption that the site groundwater will be used as drinking water. Currently, there is not plan for future use of groundwater at the NUSC Disposal Area as a drinking water source." Page 1-21 states: "The residential scenario and the use of groundwater as drinking water are considered unrealistic for future site use; however, it is included in the HHRA for purposes of completeness and to assist the risk managers regarding the need for deed restrictions." Refer to General Comment 1 above and General Comment 1 of EPA's March 26, 2009 letter on the Draft NUSC RI. Remove these sentences. Groundwater must be restored to federal drinking water and risk-based standards. Refer to General Comment 2. Deed restrictions can be used to restrict residential land use, but cannot be used to permanently restrict groundwater use in lieu of a remedial action.

22. Page 1-20, Section 1.10.1: Although EPA's blood lead models recommend use of the average lead concentrations and the results of the models are below the EPA's level of concern, the maximum detected lead concentrations in surface and subsurface soils are 2,870 mg/kg and 4,650 mg/kg, respectively, in the exposed area. In the paved area, the maximum detected lead concentration in subsurface soil is 27,200 mg/kg. These concentrations exceed EPA's screening level of 400 mg/kg and RIDEM residential direct contact criteria of 150 mg/kg for lead. Since PRGs were not developed for lead and these high concentrations are

proposed to be left in place without remediation, ICs are necessary to prevent any current or future exposures due to any potential development.

23. Page 1-21, Section 1.10.2: On page ES-2, the text indicates that the Navy planned to use the Site for limited recreational use. In Section 1.10.2, it states that RIDEM considers recreational use residential use and then states that the residential use scenario is unlikely. Please clarify what risk standards will apply to "limited recreational use." This should be addressed throughout the FS.

24. Page 1-25, Section 1.11.2: In the second paragraph please delete "and the streams" following "NUWC Pond" because COCs for the stream are presented in the subsequent paragraph.

25. Page 2-3 – 2-4, Section 2.1.4.1, Soil: The text notes the RIDEM Remediation Regulations soil leachability criteria. The groundwater beneath the site is classified federally as a drinking water resource. Therefore, RIDEM's leachability standards, applicable to protecting drinking water resources, would be an ARAR for soil remediation.

26. Page 2-4, Section 2.1.4.1, Sediment: Revise the text to: "Currently, there are no promulgated chemical-specific state ARARs that would provide limits for the concentrations of COCs in sediment at the site. The Federal Clean Water Act National Recommended Water Quality Criteria (NRWQC) are relevant and appropriate federal chemical-specific ARARs used in developing the sediment PRGs. The Navy has calculated site-specific risk-based criteria for sediment utilizing federal To Be Considered guidance (Section 2.2)."

27. Page 2-4, Section 1.2.4.1, Groundwater: Consistent with General Comment 1, revise the text to: "Federal MCLs and non-zero MCLGs for drinking water have been identified as chemical-specific ARARs for groundwater. In addition, any RIDEM Remediation Regulations that are more stringent than federal standards are also chemical-specific ARARs. Federal risk-based guidance was also used in developing PRGs for Site 8 groundwater."

28. Page 2-4, Section 1.2.4.1, Fish Tissue: Revise the text to: "Currently, there are no promulgated chemical-specific state ARARs that would provide limits for the concentrations of COCs in fish tissue at the site. The Federal Clean Water Act National Recommended Water Quality Criteria (NRWQC) are relevant and appropriate federal chemical-specific ARARs used in developing the sediment PRGs. The Navy has calculated site-specific risk-based criteria for fish tissue utilizing federal To Be Considered guidance (Section 2.2)."

29. Section 2.2.2, Human Health PRGs, Table 2-4: The selected soil PRGs for construction workers, industrial workers, lifelong recreational users, and hypothetical lifelong residents were set at target cancer risk level of 1E-5. These PRGs exceed RIDEM Direct Contact Criteria for almost all COCs. The RIDEM standards are ARARs that must be achieved by the soil remediation alternatives. For Hypothetical Lifelong Residents, all chemical risks except for naphthalene are based on RSLs (note the RSL should be 3.6). Please clarify why naphthalene is different.

30. Section 2.2.2, Human Heath PRGs, Table 2-5: The selected groundwater PRGs were set at either target cancer risk level of 1E-5 or target hazard index of 1. The selected PRGs for chromium, carbon tetrachloride, trichloroethene, barium, beryllium, copper, and thallium exceed existing federal drinking water standards and are not acceptable. The PRGs should be selected as the lowest levels of MCL, non-zero MCLGs, or risk-based levels. Please revise PRGs for the COCs mentioned above. In addition, 1,1-DCA has a PRG for both the hypothetical child and adult resident but not for the lifelong resident. Please correct the table to include 1,1-DCA for the lifelong resident.

31. Section 2.2.2, Human Health PRGs, Table 2-6: Please shade the selected sediment PRGs.

32. Section 2.2.2, Ecological PRGs: Unacceptable risk was identified in the RI for invertivorous birds and mammals from exposure to cadmium, chromium, and selenium in surface soil. Surface soil PRGs should be developed for these receptor groups in the FS. The Navy contends that actions taken to address human health concerns will address ecological concerns because contaminants are co-located. This assertion needs to be substantiated by developing PRGs for soil for ecological receptors, and showing how proposed actions will address these PRGs.

33. Section 2.2.2, Ecological PRGs, Table 2-8, Proposed Sediment PRGs: The sediment PRGs, based on LOEC and NOEC identified in the RI, are acceptable with one caveat. The stream sediment PRGs, derived by calculating the geometric mean of the NOEC and LOEC, should be based on the NOEC and LOEC for either growth or survival, as was done for the pond sediment. This was previously discussed between EPA and Navy risk assessors. EPA stated that the relatively small sample size, with an associated large number of possible confounding variables, did not allow for parcing the differences between growth and survival effects but recommended that samples be considered toxic if there was a survival or growth effect. The NOEC and LOEC should be derived by comparing COC concentrations in the toxic samples with those in the non-toxic samples, without separating the two toxic endpoints. The stream sediment PRGs for PCBs and lead should be recalculated in this manner. In addition, there is no PRG for lead in the pond. This is understandable, as lead was not identified as a player in the toxicity test. It should be noted, however, that the samples used in the toxicity tests did not capture the highest lead concentrations in pond sediment (e.g., SD116 [562 mg/kg]). For this reason, lead in pond sediment was not fully evaluated for sediment biota. It is recommended that the lead PRG derived for the stream be applied to the pond so that the higher hits in the pond can be addressed.

34. Page 2-12, Section 2.4, Fish Tissue: Fishing restrictions, rather than fish advisories, would need to be implemented as an effective IC.

35. Page 3-1, Section 3.0: In the first sentence, include fish tissue as a media of concern.

36. Page 3-2, Section 3.1, Containment: Revise this section to also discuss containment of groundwater.

37. Page 3-3, Section 3.2.2: Delete "Soil" from the title of this section. The information is for all media.

38. Page 3-10 – 3-11, Section 3.3.3: The Impermeable Cap option is eliminated because Navy contends that construction of an impermeable cap would not be possible at the Paved Storage Area due to access restrictions and because infiltration would increase in areas that are not capped. EPA does not accept the premise that Navy's operational access restrictions should prevent a CERCLA cleanup nor does EPA accept that construction of an impermeable cap should be eliminated from consideration as a viable remedy. The paved area could be considered an impermeable or low permeability cover or the cap could be constructed to allow it to be paved to restore its current use. Note that if an impermeable cap is needed to comply with RIDEM Remediation Regulations leachability criteria, the cap construction would need to comply with applicable requirements. An impermeable cap option should be evaluated in the FS.

39. Page 3-12, Section 3.3.4: The text states: "due to the mission critical use of the Paved Storage Area, only partial excavation is considered, which would exclude the material beneath the Paved Storage Area." EPA does not accept the premise that Navy's operational access restrictions should prevent a CERCLA cleanup. Site uses could be temporarily relocated while an excavation action is taken.

40. Page 3-16, Section 3.4.2, Land Use Controls: See General Comment 2.

41. Page 3-19, Section 3.4.3, Hydraulic Containment: EPA does not believe that there is enough evidence to conclude that hydraulic containment would be ineffective at this site. Certainly the area of groundwater impacted is large so containment if employed would likely have to focus on areas with greater concentrations of contaminants or to prevent migration of contaminants to surface water features, if warranted. In addition, EPA expects a plume to be contained even where full remediation within a reasonable time frame may not be feasible. The relatively long remedial time estimates presented in the FS suggest that hydraulic containment may be necessary, and should therefore not be eliminated.

42. Page 3-20, Section 3.4.4, Extraction Wells: EPA does not agree with eliminating groundwater extraction and ex situ treatment options. Groundwater extraction and treatment systems have been implemented successfully at hundreds of sites. It is inappropriate to eliminate the technology based on Navy's claim that extraction of contaminated groundwater located in bedrock and fractured bedrock is ineffective. The NUSC site groundwater contamination varies across the site and includes contamination in both overburden and bedrock. Groundwater extraction is often essential to hydraulic containment and DNAPL recovery efforts, which may be important aspects of a groundwater remedy at this site.

43. Page 3-20, Section 3.4.5: The bulleted technologies should include vapor phase GAC adsorption, consistent with Table 3-2, and a sub-section should be added to discuss this option.

44. Section 3.4.5: In several places in this section, the text states: "Because of the poor track record and high operations costs of pump-and-treat systems, Navy policy requires additional approval at the BRAC PMO level prior to the implementation of pump-and-treat systems." Remove this language since this is not relevant to the evaluation of alternatives under CERCLA. In addition, EPA does not agree with the statement that pump-and-treat systems have a poor track record. Pump-and-treat systems have been implemented successfully at hundreds of sites. Provide a copy of the referenced policy.

45. Page 3-30, Section 3.4.7, In-Situ Chemical Oxidation: Under "Effectiveness", the text states: "In-situ chemical oxidation…may not be cost effective for the removal of TCE to the very low concentrations that are typically required to meet groundwater PRGs and to restore aquifer quality. However, the relatively high PRGs in this case are favorable to this process." See General Comment 1. Navy does have to restore aquifer quality here.

46. Page 3-31, Section 3.4.8: It is unclear why onsite disposal into a waterbody was retained, but disposal to a POTW was eliminated.

47. Page 3-34, Section 3.5.2: Discuss whether MNR can achieve sediment PRGs within a reasonable time frame.

48. Page 3-35, Section 3.5.2, Conclusion: Unclear what the last sentence means since fish will be in contact with contaminated sediments for an extended period until natural process reduce sediment contaminants to acceptable levels. There is no "time of implementation" for a MNR remedy.

49. Page 3-35, Section 3.5.2, Institutional Controls: In the Conclusion section, note that ICs would apply for a MNR alternative as well as for "active" remedial processes.

50. Page 3-36, Section 3.5.3, Cover System and Section 6.1.3: In Section 3.5.3, under the "Consolidation and Cover System" option, the text states: "As a result, stormwater storage capacity of the pond would be reduced." Should this issue and associated water storage implications also be considered under the "Cover System" option? In Section 6.1.3, the sediment alternative, SD3, includes a 1 foot cover system. Again, should stormwater storage capacity implications be considered here? An additional consideration is the habitat alteration associated with capping sediment in the absence of any dredging. Given that the pond is already shallow, the addition of substrate to cover contamination could make areas too shallow to be suitable habitat for pond biota. Any site remediation should not accelerate the natural filling and possible eutrophication of the pond. Once the extent of the PRG exceedances is fully determined, it will be necessary to determine the pond depths in these areas to better decide on the appropriateness of capping. It may be necessary to use a combination of dredging and capping to ensure that habitat is not lost. Note that the sediment remedies may require mitigation for lost federal and State wetland resources, which would likely include creation/excavation of replacement pond/wetland resources.

51. Page 3-38, Section 3.5.3, Aquabloc Conclusion: The text is unclear why the alternative is not being considered. Groundwater needs to be remediated so that contamination is not migrating to the sediments.

52. Page 3-41, Section 3.5.4, Mechanical Dredging, Conventional Earth-Moving Equipment: Delete the reference to "the intertidal area."

53. Page 3-43, Section 3.5.4, Mechanical Dredging, Conclusions: EPA does not agree that mechanical dredging/excavation should be entirely eliminated from consideration. First, mechanical dredging/excavation will be viable for the stream sediment removal and second, it is likely that mechanical dredging will be necessary for the southern end of the pond which will likely be inaccessible for hydraulic dredging due to the very shallow water depths. The steep slopes along the eastern and western sides of the pond would make access by mechanical dredging equipment difficult; however, access roads could be constructed down the slopes to provide access or long reach cranes with drag lines could be used. However, access to the southern end of the pond does not appear to be difficult. Long-reach mechanical dredging/excavation equipment could work from shore and/or excavators could potentially enter the southern end of the pond to conduct the sediment removal.

54. Page 3-45, Section 3.5.5, Onsite Landfilling, Conclusions and Table 3-3: The text on page 3-45 states: "available space is limited and not expected to be sufficient enough to contain the sediment and sediment stabilization additives." Provide additional information on the location and specifications of the space that was considered in this evaluation. Table 3-3, page 7, states: " The inclusion of the waste disposal area adjacent to the Deerfield Pond makes for an ideal location to consolidate and dispose of the contaminated sediments within the limits of the IR site." This seems to contradict the cited conclusions.

55. Page 3-46, Section 3.6: Revise the text to read: "According to Section 121 of CERCLA, as amended by SARA, the statutory preference is for remedies…or volume of contaminants through treatment and will provide long-term protection."

56. Page 3-47, Section 3.6: In the last paragraph on this page, supplement the discussion regarding the purpose for a range of alternatives. A range of alternatives is required by CERCLA to develop alternatives that differ in time to cleanup, cost, scope of remediation, and to evaluate different remedial process options that provide differing benefits and detriments.

57. Page 4-1, Section 4.1: Please clarify the basis for the 79,900 cubic yards of soil referenced in this section. It does not appear to be supported by the calculations in Appendix B.

58. Page 4-2, Section 4.1.2: The text refers to "soil/debris containing concentrations of COCs greater than the residential PRGs that would remain onsite include the soil/debris below the Paved Storage Area and the adjacent area." This implies that all of the areas to be excavated will be cleaned up to residential PRGs. However, the "Verification Sampling" section indicates that verification samples will be compared to industrial PRGs. If the excavated areas will only be cleaned up to commercial/industrial PRGs, this needs to be clarified. The

"Soil Cover" section then states that the "soil cover will be constructed over any soil/debris containing COCs greater that residential PRGs." Clarify if soils above the residential PRG but below the industrial PRG will be covered. Please revise the discussion in the first paragraph to clarify the intent. In addition, the text refers to "*the* anomaly"; however, Figure 4-1 shows four anomalies that will be remediated. Please correct as appropriate.

59. Page 4-2, Section 4.2.1, Soil Cover: Revise the second sentence to read that the cover would prevent both ecological and human exposure. Also, supplement the text to explain that extensive regrading of the site would be required for this alternative following the soil removal.

60. Page 4-3, Section 4.1.2, Site Restoration Section: This is the first text that discusses that part of the soil excavation will be in wetlands. Remediation of wetland soils can pose implementability issues similar to sediments, so this alternative needs to add components for potential dewatering of wetland soils prior to disposal and treatment of groundwater or stormwater from excavation areas. Remove the last sentence, since wetland mitigation requirements are addressed in remedial design, after consultation with EPA, RIDEM and the wetland/wildlife resource agencies (comment also applies to SD3).

61. Sections 4.1.2 and 4.1.3: Any alternatives that leave contaminated soil in place need to be covered and meet the applicable or relevant and appropriate standards for covers, in this case likely the RI Remediation Regulations or the RI Solid Waste Regulations. The cover needs to address both contact and leachability risks posed by the contaminated soil.

62. Page 4-4, Section 4.1.3: Clarify what is meant by "ancillary soil contamination areas." The text states: "construction of a soil cover over the limits of the remaining soil that causes residential risk". The "Soil Cover" section then states that the "soil cover would be constructed over the identified limits where COCs are greater than the identified PRGs." Clarify if soils above the residential PRG but below the industrial PRG will be covered.

63. Page 4-9, ARARs Section: There also needs to be a determination as to which alternative poses the Least Environmentally Damaging Practicable Alternative for protecting wetland resources under the federal Clean Water Act.

64. Page 4-10, Section 4.2.2: In the second paragraph, if construction activities will take 8.5 months as stated, then it is very unlikely that SO2 could be implemented within one year if that time includes completion and approval of design plans. Please review and correct as appropriate. In the third paragraph, reconsider the statement that SO2 is relatively easy to implement given the extensive amount of excavation and regrading that will be required to complete this alternative.

65. Page 4-11, Section 4.2.3, Overall Protection: In the 2nd sentence, clarify what "clear of contamination" means.

66. Page 4-13, Section 4.3, Reduction…Through Treatment: A treatment alternative needs to be included in the range of soil alternative evaluated.

67. Page 5-2 – 5-3, Section 5.1.2, In-Site Enhanced Bioremediation and Page 5-5, Section 5.1.3, and Page 5-7, Section 5.2.2, and Page 5-10, Section 5.2.3: The text on pages 5-2 – 5-3 states: "The reducing condition would also immobilize certain metal contaminants" and "under the reducing conditions established from enhanced bioremediation, metal concentrations would continue to decrease by precipitation." Page 5-7 states: "Metal COCs, such as arsenic and iron, would also be immobilized through reductive precipitation as metal sulfides, if sufficient sulfate reduction occurs inside and downgradient of the EOS barriers." While some reduction in mobility might be expected for some metals due to precipitation, mobilization of metals is a concern for remedies that induce reducing conditions in the aquifer. Specifically, mobilization of arsenic and manganese is common when reductive dechlorination remedies are employed. Navy needs to supplement the discussion throughout the FS to acknowledge this fact.

68. Page 5-3, Section 5.1.2, MNA; Page 5-10, Section 5.2.3 and Page 5-13, Section 5.3, Long-Term Effectiveness and Permanence: The text on page 5-3 indicates that MNA would be effective at reducing metals concentrations via dispersion and dilution. Page 5-10 states: "chromium, in its oxidized hexavalent form, would remain mobile in the aqueous phase and may need natural attenuation processes to reduce its concentration in the long run" and page 5-13 states: "localized chromium contamination…will need to rely on natural attenuation to meet the PRG." Navy must provide data to support that MNA would attenuate metals in groundwater and that remedial goals would be achieved in a reasonable time frame.

69. Page 5-3, Section 5.1.2, LUCs: Revise the text to: "A LUC RD would be prepared…to establish and implement temporary methods and procedures that will be in place until federal drinking water and risk-based standards are achieved." ICs are not acceptable in lieu of active response measures, only as temporary measures.

70. Page 5-6, ARARs Section: Remove the fourth sentence and change the fifth sentence to: "There are no location- or action-specific ARARs or TBCs for this alternative."

71. Page 5-7, Treatment Section: Remove the second sentence since it does not pertain to the criterion.

72. Page 5-8, Section 5.2.2, and Page 5-11, Section 5.2.3, Reduction…Through Treatment: Explain the basis for the estimates of the amount of contamination that would be removed from the groundwater.

73. Page 5-9, Section 5.2.2, and Page 5-11, Section 5.2.3, Short-Term Effectiveness: Explain the basis for the estimate that it would take in excess of 100 years to attain groundwater PRGs. What modeling was performed to support this contention?

74. Page 5-13, Section 5.3, Compliance with ARARs: The text states: "Alternatives GW2 and GW3...would eventually achieve compliance as they attain MCLs through a combination of active treatment and natural attenuation." The text here implies that the groundwater alternatives would achieve MCLs. The groundwater remedies must achieve federal drinking water and risk-based standards within a reasonable time frame.

75. Page 6-2, Section 6.1.2, ENR Sediment Cover and Page 6-4, Section 6.1.3, Cover System Construction: Revise to indicate that pre- and post-remediation acoustic surveys will be implemented to verify that the proper placement of the cover material has been completed.

76. Page 6-3, Section 6.1.2, LUCs: The text should discuss how fishing restrictions will be maintained until fish tissue meets consumption risk standards. LUCs may also include requirements to maintain the dam for the pond to keep sediments from being released downstream.

77. Page 6-5, Section 6.1.3, LUCs: LUCs may also include requirements to maintain the dam for the pond to keep covered sediments from being released downstream.

78. Page 6-12, Section 6.2.3: Because of the very shallow depth of NUWC Pond at the southern end, it will be necessary to remove some sediment from the southern end of the pond in order to place the cover material without reducing the size of the pond by exceeding the water elevation.

79. Page 6-13, Section 6.2.3, Long-Term Effectiveness: Once capped, contaminated sediment will pose a risk so LUCs only needed to prevent disturbance of the cover, prevent fishing until fish tissue levels reach safe levels, and maintain the pond's dam.

80. Page 6-14, Cost Section: Cost calculation should include permanent maintenance of the pond dam.

81. Page 6-15, ARARs Section: This alternative is the Least Damaging Practicable Alternative under the federal Clean Water Act for protecting wetland resources since all contaminated sediment about risk levels is permanently removed from the Site.

82. Table 3-1: Low temperature thermal desorption (LTTD) should be retained for treatment of soil containing organics, and specifically PAHs which are a primary risk driver at the site and for which LTTD is an effective process option. Also, solidification/stabilization (S/S) would be viable for inorganic contaminants and should be retained. Also phytoremediation is particularly effective for arsenic remediation and should not be eliminated due to the elevated arsenic concentrations in soil throughout the site. Finally onsite backfill should not be eliminated because effectively treated soil (LTTD or S/S) should be reused at the site.

83. Table 3-2: The process options retained and eliminated seem appropriate; however, many of the retained options were not employed to develop groundwater remediation alternatives.

84. Table 3-3: Dredging and reconsolidation to reduce the sediment cover or cap size should not be eliminated. As discussed above, this may be the most appropriate approach for the pond and, contrary to the Navy's screening comments, reconsolidation of pond sediment within the pond would not reduce the storage capacity of the pond but would increase it compared to the alternatives evaluated by Navy.

85. Table 3-6: This table includes the technology "Consolidation and Onsite Containment" under the Containment GRO. However, this was eliminated in Table 3-3. Address this inconsistency.

86. Table 4-12, Table 5-12, and Table 6-15: For "Magnitude of Residual Risk", please edit the descriptions to indicate what receptor(s) that risk level refers to.

87. Figure 1-7: This figure should be revised to show a red arrow pointing along the stream toward the pond, as there is evidence of contamination moving down the stream toward the pond.

88. Figure 1-8: This figure does not present all the locations where soil samples were collected because soil samples were also collected from borings for monitoring wells, which are not included on this figure. Revise the figure to include all locations where soil samples were collected.

89. Figure 4-2: Regarding the soil cover, please clarify if this cover will be designed as a low permeability cover and provide a permeability value if known at this time. This figure makes reference to the 100-year flood elevation regarding the armored slope for the soil cover toe terminated. Please clarify how the 100-year flood elevation will be determined.

90. Figures 5-1 and 5-2: Please review and correct the proposed depth interval for the deeper injections called out on both of these figures. The 30-60 foot depth is not consistent with the description of the alternatives on pages 5-2 and 5-4 and in Appendix B.2.

91. Appendix A-1: No figure is provided for chromium. Please add one or clarify why it was not provided.

92. Figure A-5: Please correct the Legend for this figure: the concentrations shown are an order of magnitude too great.

93. Appendix A.2: No figure is provided for chromium. Please add one or clarify why it was not provided.

94. Figure A-16: Please clarify what effect consideration of the arsenic background concentrations has on the extent of contamination shown on this figure.

95. Figure A-30: Please clarify the basis for the concentration shown in the Legend. Table 2-5 identifies a PRG of 4.3 μg/L based on the hazard index.

96. Figure A-40: Revise the Figure title to Nickel.

97. Figure A-45: Please clarify the basis for the total PAH concentration of 1,100 μg/kg shown in this figure. This is not a human health PRG and is much lower than the ecological risk PRG.

98. Appendix B.1: On page 2 of 6: There are four anomalies within the paved area so the area of excavation should be identical to that for SO3: 500sf. Please review and correct. On page 3 of 6: In the third equation statement, correct *20 wells* to *20 ft*. On page 3 of 6: Note that the regrading required for SO3 will need to be extensive in order to manage the steep slopes and the areas adjacent to paved areas to allow placement of two feet of cover. On page 4 of 6: In the sixth equation statement, correct *20 wells* to *20 ft*.

99. Appendix B.2: Explain the technical basis for the assumptions and calculations included in this appendix. What site-specific information is available to support the alternatives proposed?

100. Appendix C.1: Page 1 of 12: Please supplement the description of alternative SO2 to indicate that extensive regrading of the site will be required because almost 50,000 cubic yards of soil/debris will be removed from the site but only about 12,000 cubic yards of soil will be used to construct the proposed cover. Page 9 of 12: For GW2, please note that a pilot test will be required for this alternative as well to at least determine the radius of influence of injection wells.

101. Appendix C.2: For SO2 at line 6.7, please delete the word *treated* because soil will not apparently be treated. The same comment applies to SO3.For SO2, please add verification sampling to the capital costs items. The same comment applies to SO3. For SO2, for annual costs, please add wetlands monitoring over the first five years after construction completion. The same comment applies to SO3. For SO2 and SO3, it is not apparent that the cost for monitoring well replacement should be the same for both alternatives. Please review and correct as appropriate.