



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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October 8, 2002

James Shafer, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Final Feasibility Study for the Old Fire Fighting Training Area

Dear Mr. Shafer:

EPA reviewed the *Final Feasibility Study for Soil and Marine Sediment for Old Fire Fighting Training Area, Naval Station Newport, Newport, Rhode Island* dated September 2002. Detailed comments are provided in Attachment A. Since EPA has also received responses to our letter dated July 11, 2002 and a draft Proposed Plan, EPA is aware of the Navy's preferred alternative.

As previously indicated at the June 2002 RAB meeting and in a July 11, 2002 comment letter, EPA does not believe that sediment Alternatives 1, 2, and 3 are protective of human health and the environment.

In a letter dated March 18, 2002, EPA requested that risks from dioxin be recalculated using a slope factor of $1E+6$ rather than the slope factor currently published in HEAST of $1.5E+5$. The Navy has attempted to comply with this request by performing a qualitative evaluation of the risks from dioxin in Section 1.9, last paragraph on Page 1-13. This paragraph contains numerous errors that require correction. These errors include:

- The slope factors for dioxin are listed as $1.5E-5$ (mg/kg/day)⁻¹ [current] and $1E-6$ (mg/kg/day)⁻¹ [revised]. As noted above, the exponent for these slope factors should be positive rather than negative. The correct slope factors are $1.5E+5$ (mg/kg/day)⁻¹ [current] and $1E+6$ (mg/kg/day)⁻¹ [revised].
- The paragraph indicates that dibenzofurans were detected at very low concentrations in surface soil from the site, while implying that 2,3,7,8-TCDD was not detected at low concentrations. This statement is in error. As can be seen in Appendix P-7 of the Draft Final RI Report for OFFTA (dated October 2000), 2,3,7,8-TCDD was nondetected in all samples and was therefore excluded from the calculation of TEQ concentrations. Whether dibenzofurans were detected at "very low concentrations" is a matter of opinion and does not contribute to an evaluation of the possible risk change resulting from revisions to the dioxin slope factor and Toxicity Equivalency Factors.

- Possibly because of the errors noted above, this section concludes that dioxin would not be selected as a COPC. This statement is incorrect even if the revised slope factor, which would effectively lower the RBC for dioxin, is not applied. The toxicity equivalency concentration of dioxin exceeds RBCs and, therefore, dioxin would be selected as a COPC.

Based on the numerous errors identified in this section, the paragraph discussing dioxin on page 1-13 of the FS must be completely revised. Because of on-going concerns with dioxin, EPA requests that the Navy re-calculate risks from exposure to dioxin in surface soil using both the proposed slope factor of $1E+6$ (mg/kg/day)⁻¹ and the revised TEQ Factors published in the document at <http://cfpub.epa.gov/ncea/cfm/dioxin.cfm?ActType=default>. EPA's recalculation of these risks for the recreational receptors (child, pre-adolescent, adult and cumulative lifetime) suggest that the risk will only increase by a factor of approximately 2, but the Navy should perform their own analysis to ensure that risks from dioxin will be addressed in the CERCLA process for the OFFTA.

A central argument in the FS is that groundwater contaminants at the site are relatively immobile, and that the mass flux to the nearshore environment is minimal. Because sample turbidity and groundwater geochemical conditions are critical to this argument, the relevant parameters should be summarized in the document. The field parameters obtained during "low-flow" sampling should be tabulated and presented in the FS, particularly since this is not done in the RI. Navy argues that elevated concentrations of inorganics (particularly arsenic, lead, and manganese) are in many cases due to turbid samples, and this indeed seems to be the case. In addition, site groundwater is generally oxidizing (see, e.g., RI Table 2-5), and this will minimize the mobility of redox-sensitive species (e.g., elements sorbed on hydrous ferric oxides). A table of all available field sampling parameters (e.g., turbidity, ORP, DO, pH, etc.) would provide the necessary support for these key conclusions.

Table 2-13 presents the current MCL for arsenic, a value of 50 µg/L, as the PRG for groundwater. The revised MCL for arsenic of 10 µg/L has been issued and will come into effect on January 23, 2006. This value may be found online at the following website: <http://www.epa.gov/OGWDW/mcl.html>.

Although the arsenic MCL value of 10 µg/L will not be enforceable in public water supply systems until January 23, 2006, CERCLA actions should consider this revised MCL as an ARAR. This revision is needed to ensure that the remedy selected will be applicable for the 30 year period following issuance of the ROD. The revised MCL for arsenic of 10 µg/L should be used as a PRG for the OFFTA site. The highest arsenic concentration detected in site groundwater is 49.8 micrograms, just below the stated PRG, but well above the new MCL. EPA recognizes that this will not change the proposed groundwater remedy for this site.

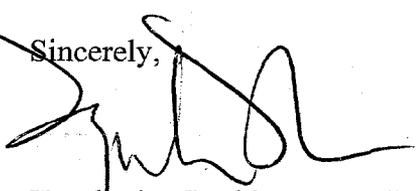
Throughout the document "restoration" is used in reference to practices used to mitigate the effects of remedial action on eelgrass and other marine ecosystems. This is misleading. The term "restoration" should be used only to describe activities that seek to restore biological resources damaged in the course of remediation. Activities designed to prevent such damage should be referred to by other terms, such as "mitigation" or "damage minimization."

The FS contradicts itself in many places the presumed source of contamination in near-shore sediment. The Fate and Transport section of the document suggests that migration of PAHs from on-site soil to near-shore sediments is unlikely (page 1-12). Other portions of the document suggest that "source removal" should reduce sediment contamination. If the Navy is not certain whether the contaminants in the sediment are from the soils, there should be no presumption that any soil removal will result in a reduction of contamination in sediment

EPA noted numerous errors in various tables throughout the FS - most notably the ARARs tables and tables that compared the alternatives retained for detailed analysis in light of the NCP criteria. Once these tables are revised, the text will must also be revised so that the tables and text are consistent.

Owing to past outstanding comments that still have not been adequately addressed and the additional comments included in this letter based on the new information provided, EPA does not accept this version of the FS as a final document and therefore does not concur on it. EPA recommends that the Navy reissue this FS. Please notify EPA within thirty days if the Navy plans to withdraw this document as a final document and make EPA's recommended revisions. I look forward to working with you and the Rhode Island Department of Environmental Management toward the cleanup of the Old Fire Fighting Training Area Superfund site and its environs. Please contact me at (617) 918-1385 to arrange a meeting.

Sincerely,



Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Paul Kulpa, RIDEM, Providence, RI
Melissa Griffin, NETC, Newport, RI
Dennis Gagne, USEPA, Boston, MA
David Peterson, USEPA, Boston, MA
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Jennifer Stump, Gannet Fleming, Harrisburg, PA

Ken Finkelstein, NOAA, Boston, MA
Steven Parker, Tetra Tech-NUS, Wilmington, MA

ATTACHMENT A

Page

Comment

ES

The Executive Summary should be revised to incorporate the comments provided herein and also previous comments by EPA that were not adequately addressed, particularly regarding the discussion of risk and the descriptions of the alternatives.

p. 1-10, §1.7

The fifth sentence in the second paragraph indicates that the highest concentrations of PAHs in marine sediment were detected nearshore in the central portion of the site. Actually, the greatest concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene were found at SD-410 in the western portion of the site. Station OFF-3, in the western portion of the site, has PAH concentrations approximately equal to those in the central portion of the site. Please revise the sentence to correct the misconception created by the existing text.

p. 1-11, §1.7

The last sentence in the first full paragraph on this page states the elevated arsenic concentrations are believed to be attributable to site and regional bedrock. This statement needs further justification because the arsenic detections correlate with PAH detections. A brief review of the soil data presented in Tables 2-11 and 2-12 indicates that in surface soil there was only one arsenic PRG exceedance for which PAHs did not also exceed the PRG, but there were six locations where both arsenic and PAHs exceeded the PRG. Similarly, in subsurface soil, there were more instances where both arsenic and PAHs exceeded the PRG than instances where only arsenic exceeded the PRG. This brief assessment appears to indicate that high levels of arsenic and PAHs are co-located more often than not in these two media, and contradicts the Navy's hypothesis that arsenic can be attributed to the natural geological formations at the site.

What is Navy's hypothesis for linking the arsenic in site soils to bedrock? What is the conceptual model? In a previous comment-and-response exchange with Navy (as part of the review of the Draft Background Soil Investigation Report for Old Fire Fighting Training Area, Naval Station Newport, Newport, Rhode Island), additional information describing bedrock lithology was requested. Navy reported that the underlying Rhode Island Formation is a calcareous, shaly, and carboniferous unit, a rock type likely to contain minerals with high trace-metals content (e.g., sulfides of iron and other metals). It is apparent that much of the native (non-fill) site soil is glacial till, which may have been derived locally, from bedrock in the immediate vicinity. As is common in glacial soils throughout the

northeast, post-depositional chemical alteration of unconsolidated glacial overburden redistributes trace metals in response to changes in pH and oxidation-reduction potential (ORP). Iron, manganese, arsenic, and other pH- and redox-sensitive elements are often associated due to their mobility in groundwater under reducing conditions (low ORP) and precipitation through adsorption onto hydrous ferric oxides (HFO) under oxidizing conditions. In Appendix P-8 (Subsurface Soil Analytical Results), data from the subsurface soils show a good correlation between arsenic and iron ($R^2 = 0.87$, $n=14$), and it is apparent that several other elements (including lead, manganese, chromium, and zinc, trace metals that also commonly sorbed by HFO surfaces) are also correlated with iron. Navy should clarify in the text the hypothesized relationship between metals in bedrock and in the overburden.

Elevated arsenic concentrations are being addressed in subsurface soil, surface soil and beach sediment through applying the arsenic PRG. If there is not an active remediation that achieves the arsenic PRG per applicable media, the geochemical conceptual model becomes more important.

p 1-12, §1.8

This section states that migration of PAHs from site soils into near-shore sediment is unlikely. This statement appears to contradict Appendix A and unfounded claims in the FS regarding sediment Alternative 2.

p. 1-16, ¶2

In the last sentence, also explain that the two sea turtle species note are listed under federal and state endangered species acts.

p. 14, ¶1

This section should be clarified to state that land use restrictions potentially would still be required for groundwater (if not treated), which could restrict excavating soil to avoid groundwater contact.

p.2-15, §2.2.3.3

EPA has not adopted the State groundwater classification system, therefore its State classification as GB does not establish the groundwater's required cleanup level.

p. 2-28, §2.3.3

The summary of sediment areas and volumes does not include the area and volume of beach (intertidal) sediment that exceeds both human health and ecological PRGs. This information would correspond to the possible action area based on residential and ecological exposures depicted on Figure 2-6.

Table 2-1, p. 2

For the State Remediation Regulations under "Consideration" add "and groundwater" after "soil."

Table 2-1, p. 2	Move Water Pollution Control, Hazardous Waste, and Air Quality to the Action-specific table.
Table 2-1, p. 2	Remove the Oil Contaminated Soil Policy as it is not covered by CERCLA.
Table 2-2, p. 1	<p>For Floodplain Management under Requirement Synopsis, the last sentence should be revised to say: "Requires the Navy to make a determination that its proposed remedial action is the least damaging practicable alternative and the Navy must solicit public comment on this finding through the Proposed Plan."</p> <p>Under "Consideration," change the last sentence to say public comments will be sought through the Proposed Plan.</p>
Table 2-2, p. 2	<p>For the Wetland Executive Order under "Requirement Synopsis," use the same text as was used for the Floodplain Management Executive Order.</p> <p>Under "Consideration" replace the last sentence with: The Navy will select the least damaging practicable alternative, after soliciting public comments through the Proposed Plan."</p>
Table 2-3, p. 1	Remove the Remediation Regulations from Action-Specific - They are chemical-specific, relevant and appropriate standards for groundwater (<i>see</i> previous comment to Table 2-1).
Table 2-13	The entry in Table 2-13 for the PRG for copper should be listed as 300 µg/L. It is currently mis-typed as 1300 µg/L.
Table 2-17	This table is not consistent with Figure 2-6 because the beach sediment has both human health and ecological risk exceedances according to the figure. The table lists only human health direct contact PRGs for beach sediment. The FS should list the PRGs by each of the specific media of interest. If Table 2-17 is to serve that purpose, it should be edited to indicate that the ecological PRGs are applicable to beach sediment. The human health PRG for dibenzo(a,h)anthracene would supercede the ecological PRG.
Table 2-18	There are several errors in this table in the Maximum Detected column based on comparison of the values in this table to the data in the tables in Appendix D. All the maximum detected concentrations for contaminants associated with human recreational exposure to sediment are significantly too small based on comparison to the data in Table 4.1A in Appendix D. Benzo(a)anthracene should be 4900J, benzo(a)pyrene should be 3900J,

benzo(b)fluoranthene should be 5100J, dibenzo(a,h)anthracene should be 480J, and arsenic should be 14.9. Another error was noted for ecological exposure to sediment where the maximum detected value should be 470 for 2-methylnaphthalene (sample SD-410). Please review all the values in this table and make the appropriate corrections.

- Table 2-19 On page 2 of 2, the concentrations listed for 2-methylnaphthalene for samples SD-414, SD-432d, and SD-442 are all incorrect according to Appendix D, Table 4.1.C. It appears that the listed values were extracted from the row for acenaphthalene. Please correct.
- Figures 2-6 Indicate that there is an outfall pipe located between OFF-2 and OFF-3. Please indicate, possibly with a note, the relative location of OFF-18 to locations-SD-468 and SD-469. The same comments apply to Figures 6-1, 6-2 and 6-4.
- p. 3-69, §3.4.2.7 This section uses the term “natural restoration” in reference to measures that would be used to minimize damage to eelgrass beds. Please use the term “restoration” only to describe activities that attempt to restore eelgrass beds that have been damaged.
- p. 4-11, §4.3 In the bullet at the top of the page, please edit the discussion to clarify that the present worth cost analysis is based on the project life for each alternative (not necessarily a 30-year performance period) because not all the soil alternatives proposed have a 30-year project life. Therefore, the discount rate used will vary with the project life according to the requirements of OMB Circular A-94, Appendix C. Delete the reference to a single discount rate of 3.9 percent.
- p. 4-18, §4.4.2 The last sentence in the first full paragraph incorrectly states that bench and pilot testing is not anticipated. Pilot testing of these technologies has been added to the scope of the alternative (refer to page 4-4). Please delete this sentence and any others that state that pilot testing will not be conducted.
- Tables 4-1, 4-2, & 4-12 The tables are not consistent with respect to the need for a 5-year review for Alternatives 2 & 3.
- Table 4-3 For the “Action to be Taken,” state that the alternative will not meet neither the CSF nor the RfDs.

Table 4-6	For the “Action to be Taken” for the CSF and RfDs add: “This alternative addresses this standard because risks from soil will be addressed through treatment.”
Table 4-9	For the “Action to be Taken” for the CSF and RfDs add: “This alternative addresses this standard because risks from soil will be addressed through excavation and disposal at a TSDF.”
Table 4-12, p. 1	For Compliance with Location-Specific ARARs, state that Alternatives 2 and 3 will meet wetland, wildlife, and historic preservation regulations but these standards are not listed in the previous ARARs tables.
Table 4-12, p. 1	<p>For Compliance with Action-Specific ARARs, change the text for Alternative 2 to: “Excavation and treatment systems will meet all action-specific standards.</p> <p>For Compliance with Action-Specific ARARs, change the text for Alternative 2 to: “Excavation and transportation systems will meet all action-specific standards.</p>
Table 5-2, p. 1	For Alternatives 2 & 3, Are Environmental Risks Reduced by Alternative change to “No risks to the environment from groundwater have been identified.”
Table 5-3, p. 1	<p>Add the federal Safe Drinking Water Act, and state that the alternative does not meet it.</p> <p>For the “Action to be Taken,” state that the alternative will not meet either the CSF or the RfDs.</p> <p>For the Remediation Regulation, Status is “Relevant and Appropriate” and Action to Be Taken should state: These standards were used to develop groundwater PRGs based on use as water supply and contact. This alternative does not satisfy these standards. For the “Action to be Taken,” state that the alternative will not meet either the CSF or the RfDs.</p> <p>For the Remediation Regulation, Status is “Relevant and Appropriate” and Action to Be Taken should state: These standards were used to develop groundwater PRGs based on use as water supply and contact. This alternative does not satisfy these standards.</p>
Table 5-6	Add federal Safe Drinking Water Act and state that the alternative will meet it through institutional controls (move from Table 5-8).

For the "Action to be Taken" need to state that the alternative will meet both the CSF and the RfDs through institutional controls that will prevent exposure."

For the Remediation Regulation, Status is "Relevant and Appropriate" and Action to Be Taken should state: These standards were used to develop groundwater PRGs based on use as water supply and contact. This alternative satisfies these standards through institutional controls that will prevent exposure."

Table 5-7 Add floodplain ARARs if any monitoring wells will be constructed or maintained in the 100-year floodplain.

Table 5-9 Safe Drinking Water Act is "Applicable." Change Action to be Taken to: "Groundwater will be treated to meet these standards."

For the "Action to be Taken," state that the alternative will meet both the CSF and the RfDs through treatment of the groundwater."

Table 5-10 Add floodplain standards. If any discharge structure will be constructed in the Bay, add wetlands, endangered species, and habitat protection standards.

Table 5-11 Add federal/state hazardous waste standards for any filters/residue generated that exceeds standards. Air standards should be added because the treatment has air emissions.

Table 5-12 See applicable comments for Table 5-2.

§6.2.2 *Sediment Alternative 2: Limited Action:* The first paragraph states that monitoring of sediment would continue "until the effects of the selected soil alternatives on the sediments can be realized." This statement suggests that site soils are a continuing source of contamination to near-shore sediments. This is in direct contradiction to the statements on page 1-12 of the FS.

p. 6-7, §6.2.3 This section states that monitoring would be used to evaluate whether re-contamination was occurring following "source removal." Please clarify what the presumed "source" would be in this instance. Is the "source" the intertidal sediment? On-site soil? What evidence exists to determine whether re-contamination is likely? EPA maintains that the long-term effectiveness of removing contaminated sediment outweighs the short-term disruption to the near-shore habitat (excluding eelgrass beds).

- p. 6-7, §6.2.4 The second sentence states that sediment in and adjacent to the eelgrass beds would not be removed in this alternative. This is not true according to Figure 6-2, which shows removal of contaminated sediment adjacent to the eelgrass beds near sample location OFF-3 and south of sample location SD-410. Please review and correct.
- p. 6-11 It is unclear why the volume estimates for alternatives 4 and 5 are the same when alternative 4 proposes dredging of a smaller area.
- p. 6-17, §6.4 Delete the last sentence in the discussion under Cost because all sediment alternatives have a 30-year performance period.
- p. 6-20 It is inappropriate to rely on “individual compliance” for protectiveness of a Superfund remedy. EPA incorporates by reference its previous letters that raise questions about the enforceability of the swimming ban.
- p. 6-21 Pursuant to EPA guidance, all alternatives retained for detailed comparison in a FS must be compared against the NCP criteria. It is not appropriate to postpone the analysis and then state in later documents that long-term effectiveness and permanence will be achieved by this remedy.
- As the responsible party at a Superfund site, it is the Navy’s responsibility to ensure that long-term restrictions on recreational use remain in place. Jurisdictional issues should be addressed under the Implementability criterion.
- p. 6-23, §6.5.3 Under Overall Protection of Human Health and the Environment, please note in the discussion that Sediment Alternative 3 does not satisfy the RAO to protect against the ingestion of contaminated shellfish from the near-shore and offshore areas.
- p. 6-24, §6.5.3 Under Long-Term Effectiveness and Permanence, please edit the last sentence in the first paragraph to read “Ecological risk would still exist from contaminated sediment left in and around the eelgrass beds and in near-shore sediment in the central portion of the site. Human health risk would remain for ingestion of already contaminated shellfish.”
- p. 6-27 & Appendix F It is unclear why Alternative 3 does not cost more than Alternatives 2 and 4. Alternative 3 presumably combines the costs from dredging, fencing, and monitoring. Please explain.
- p. 6-29, §6.5.4 Under Long-Term Effectiveness and Permanence, please edit the last sentence in the first paragraph to read “Ecological risk would still exist

from contaminated sediment left in the eelgrass beds. Human health risk would remain for ingestion of already contaminated shellfish.”

- p. 6-34, §6.5.5 Under Long-Term Effectiveness and Permanence, please edit the first sentence to read “Alternative 5 would eliminate the potential human health risks and risks to ecological receptors posed by exposure to contaminated marine sediment in the beach and near-shore areas. Human health risk would remain for ingestion of already contaminated shellfish in the areas further offshore.”
- p. 6-38, §6.6 Under Long-Term Effectiveness and Permanence, statements in this section that characterize effectiveness without consideration of the alternatives’ failure to mitigate the risk associated with ingestion of contaminated shellfish should be corrected.
- p. 6-39, §6.6 The discussion of Alternative 5 in the last paragraph on the page states that no long-term monitoring or 5-year reviews are required. This contradicts the cost table on page 6-36; Table 6-2, page 3 of 3; Table 6-15, page 4 of 7; and Table 6-15, page 7 of 7. Also, Table 6-2, page 1 of 3 states that no long-term monitoring is required for Alternative 5, but this contradicts the text on page 6-34 under Long-Term Monitoring, which states that Long-term monitoring would be conducted to assure that the remediated areas are not being recontaminated. Please review and correct these inconsistencies and review the entire FS to eliminate similar inconsistencies.
- p. 6-40, §6.6 Under Short-Term Effectiveness, none of the alternatives will be effective in eliminating the risk due to ingestion of contaminated shellfish. This risk will remain for a substantial time period. Shellfish already contaminated above tissue PRG risk levels will remain contaminated. Shellfish will continue to ingest contamination at concentrations up to the sediment PRGs, potentially causing exceedance of the tissue PRG in other specimens. Please edit the discussion accordingly.
- p. 6-42, §6.6 In the cost table under Alternative 5, there should not be a requirement/cost for 5-year reviews for sediment. Please correct.
- Table 6-2, p. 1 For Alternatives 2 and 3 under “Are Environmental Risks Reduced,” change to “No.” For Alternative 4 change to “Yes.”
- For Alternatives 3, Compliance with Chemical-specific ARARs, change to “No.”

For Alternative 3, Location-specific ARARs change to “No.”

For Alternative 4, Location-specific ARARS add: “This is the least damaging practicable alternative under federal floodplain and wetlands protection standards.”

For Alternatives 2, Does Alternative Provide Adequate Remedial Controls change to “No.”

- Table 6-2, p. 2 For Alternative 2, Reliability of Technology change text to: Implementing a fencing system that will keep people off the beach may be difficult. A rail fence will be insufficient and a chain link fence will pose aesthetic issues.
- Table 6-2 On page 3 of 3, under Alternative 5, 5-year reviews are listed. However, this is not consistent with the FS text on page 6-39 that states that no 5-year reviews are required for this alternative. Please correct.
- Table 6-3, p. 1 For the “Action to be Taken” need to state that the alternative will not meet neither the CSF nor the RfDs.
- Table 6-3 For all alternatives, correct the Clean Water Act reference from 40 U.S.C. 1314 to 33 U.S.C. 1314.
- Table 6-10 Add Section 404 of the Clean Water Act and the federal wetlands executive order (and state that this is not the least damaging practicable alternative to address contamination of wetland resources).
- Table 6-12 For federal Clean Water Act and state Water Pollution Control, Action to be Taken change the second sentence to: “This alternative meets these standards through removal of contaminated sediment. Any remaining contaminated sediments left in place associated with eelgrass beds will be monitored to assess reductions in contamination over time.”
- Table 6-13, p. 1 For Clean Water Act, Sec. 404, Action to be Taken add: “Alternative 4 has been determined to be the least damaging practicable alternative since it balances the removal of the most contaminated sediment while preserving the small area of ecologically sensitive eelgrass bed.”
- Table 6-14, p. 1 The Human Health section needs to discuss human health risks from shellfish consumption.
- For Alternative 2, Human Health change “Health” to “Limited health.”

For Alternative 2, Environment change to "None."

For Alternative 4, Environment change the third paragraph to: "RAOs for protection of the environment would be achieved immediately everywhere except in the small area of contaminated eel grass bed. Within this are RAOs are expected to be achieved over time."

Table 6-15, p. 2

For Alternative 2, Chemical Specific, change "May not" to "Will not." For Alternative 3 change the first sentence to "Will not meet chemical specific ARARs except in the limited areas excavated. For Alternative 4 change to "Will meet chemical-specific ARARs immediately in the excavated areas and over time in the limited area of contaminated eelgrass bed that will not be excavated."

For Alternative 4, Location-Specific replace the first paragraph with: "Will meet all Location-specific standards and is the least damaging practicable alternative under federal floodplain and wetland standards because it takes out the most contaminated sediment while preserving the small area of ecologically sensitive eelgrass bed."

Table 6-15

On page 7 of 7, under Alternative 5, 5-year reviews are listed; however, this is not consistent with the FS text on page 6-39 which states that no 5-year reviews are required for this alternative. Please review and correct.

Figures 6-2 & 6-4

Please show the shoreward side of the causeway on the figures. Depending on how the causeway is constructed and what it is used for, the ramp will have to extend approximately 30 to 60 feet shoreward from the low tide line.

Appendix A,
p. A-2, ¶ 3

Appendix A acknowledges that organic-contamination in groundwater was likely greater in the past when the site was active. It should be noted in the following discussion of inorganics that the same may well have been true for arsenic. If arsenic is sorbed on hydrous ferric oxide (HFO) surfaces within the aquifer, it could have been mobilized by dissolution of the HFO under reducing conditions created by degradation of hydrocarbons. It is possible that reducing conditions were prevalent in the past when the release of hydrocarbons to groundwater was greater. Low-ORP groundwater, with elevated concentrations of iron, arsenic, and other associated metals may have flowed to the nearshore area, discharged through the sediment, and the metals may have accumulated in the sediment due to precipitation at a redox interface. Nonetheless, it is recognized that there is no suggestion of elevated arsenic in sediment, where concentrations were found to be comparable to those in onshore

soils. Furthermore, current conditions are moderately oxidizing (e.g., ORP measured in the Phase II RI range from +129 to +233 mV; RI Table 2-5), and dissolved arsenic concentrations are generally low.

Appendix A,
p. A-3, ¶ 2 & 6

The text states that "... concentrations of these inorganics in groundwater were two to five orders of magnitude lower than their concentrations in sediments ..." and "... groundwater concentrations of lead are as many as five orders of magnitude less than those in sediments ..." The meaning of these statements is not clear, as the basis of concentrations in aqueous solution and that of concentrations in sediment (and/or soil) are quite different. Low dissolved concentrations alone do not exonerate groundwater as a transport medium to a "sink" in solid phases. The mass flux and the time scale over which aqueous transport has occurred are better measures of potential impact to sediment than is the concentration in groundwater. Please clarify.

Appendix F

For Soil Alternative #2, Line Item 9.2: the note "no compaction" should be deleted; compaction will be required and the volume used assumes compaction will be done. Please correct. This comment also applies to Soil Alternative 3.

Appendix F

For Soil Alternative #2, in the Present Worth Analysis, as presented, Soil Alternative 2 has a five-year project life. The discount rate that should be used for a project with a five-year life is 2.8% not 3.9%, according to the February 2002 OMB Circular No. A-94, Appendix C. Please adjust the calculation accordingly. This comment also applies to Soil Alternative 3.

Appendix F

On page 1 of the Calculation Sheet for Sediment Alternative #4, there are errors in Capital Cost Assumption 5 related to the calculations for the causeway. First, with a 20-foot wide top and a 1:1 side slope, the base width will be 44 feet with a 12-foot height, not 42 feet. Second, the volume cannot be calculated without assuming a length. If the length is assumed to be 20 feet at the top, the shape would be the frustum of a pyramid. With the dimensions cited, the volume of the causeway would be 476 cubic yards. However, it is unlikely that a 1:1 side slope would allow access to the top of the causeway, so that a ramp with a shallower slope would be required. This would require even more crushed stone to construct. Consequently, the cost of the causeway has been significantly under-calculated, perhaps by a factor of three or more. Also, please verify that a 1:1 slope will be adequate to support the anticipated live load. If a shallower slope is required to support the load, that will impact the cost of the causeway and the reach required by the excavator (which is already approximately 30 feet). Please review the calculations and the

assumptions for the size of the causeway, and correct the cost calculations. This comment also applies to Sediment Alternative 5 except the causeway for Alternative 5 will be longer than for Alternative 4 according to Figures 6-2 and 6-4. There the estimated volume is even further under-calculated.

Appendix G

Navy's overall conclusion from the flushing model (Appendix G) is that elevated inorganics (arsenic, lead, and manganese) in site groundwater will require up to hundreds of years to reach the PRGs. It is cautioned that the flushing model carries very large uncertainties inherent to the idealization of the complex transport processes that control mobility of the inorganics, and the exact cleanup times estimated for these elements should be viewed circumspectly. Nonetheless, the general conclusion is undoubtedly quite robust. More detailed characterization and/or modeling would almost certainly confirm that arsenic, lead, and manganese concentrations in groundwater will not decline substantially over a very long time scale. Indeed, there is some evidence in the existing data that the arsenic and manganese are naturally occurring in the form of sorbed fractions on hydrous ferric oxides. In this case, arsenic and manganese might be expected to persist in site groundwater more or less indefinitely. Lead is likely present in site soils due to historical site activities, but it should be noted that lead sorption is essentially irreversible, and "flushing" is not an effective attenuation mechanism. Lead observed in site groundwater is probably due to sample turbidity. Historical sampling (*i.e.*, Phase I and II RI) encountered very high turbidity (typically off-scale on the turbidimeter). Even filtered ("dissolved") samples may contain colloid-size (*i.e.*, sub-0.45 micron) particulates with sorbed lead. Thus, lead present in site soils is not mobile in groundwater, and the transport pathway to adjacent sediment is not significant.

Appendix G presents estimates of cleanup times for various COCs in the aquifer, based on a "continuous flushing model." The model calculations use an analytical solution for transient, one-dimensional, transport with reversible, linear sorption. The calculations yield cleanup time estimates of the order of tens of years for SVOCs and hundreds of years for inorganics (arsenic, lead, and manganese). The qualitative results are likely to be fairly robust, *i.e.*, that the organics may desorb and "flush" from the system in decades, while the inorganics may remain elevated over a much longer time scale. However, these results should not be regarded as quantitative; the predicted cleanup times have very large uncertainty, particularly for the inorganics. The linear sorption model is highly idealized, and cannot capture the complexity of the processes that control the mobility of inorganics. The text acknowledges that a very wide range of distribution coefficients for metals can be found in the literature; those

chosen for the OFFTA modeling appear to be rather arbitrary (e.g., $K_d = 0.276 \text{ ft}^3/\text{kg}$ for arsenic, from a range of 0.005 to $2.76 \text{ ft}^3/\text{kg}$ cited in one reference). The text further notes, "The flushing model results are very sensitive to changes in the ... distribution coefficient," and that "... there are no site-specific data to constrain ..." K_d .

The EPA guidance document, *Understanding Variation in Partition Coefficient, K_d Values* (EPA 402-R-99-004A, August 1999) clearly emphasizes the uses of, and limitations to, the K_d concept. The Foreword (p. iii) states that:

"It is important to note that soil scientists and geochemists knowledgeable of sorption processes in natural environments have long known that generic or default partition coefficient values found in the literature can result in significant errors when used to predict the absolute impacts of contaminant migration or site-remediation options. Accordingly, one of the major recommendations of this report is that for site-specific calculations, partition coefficient values measured at site-specific conditions are absolutely essential."

And elsewhere (e.g., p. 90, Section 3.5) this document states: "It is incumbent upon the transport modeler to understand the strengths and weaknesses of the different K_d methods and perhaps more importantly the underlying assumption of the methods in order to properly select K_d values from the literature. The K_d values reported in the literature for any given contaminant may vary by as much as *6 orders of magnitude*. An understanding of the important geochemical processes and knowledge of the important ancillary parameters affecting the sorption chemistry of the contaminant of interest is necessary for selecting appropriate K_d value(s) for contaminant transport modeling."

Volume I of the EPA report discusses in detail the reasons K_d s should be used with circumspection. Among these, a K_d is applicable only for a particular sorbent (the solid to which a constituent of interest is bound, by adsorption, absorption, or as a 3-dimensional molecular precipitate), and only for a particular set of chemical conditions. These conditions include the aqueous adsorbate concentration, the solution matrix, temperature, and redox conditions. Further, the reversibility of sorption is assumed (which is not the case for some elements such as Pb).

Modelers usually invoke K_d values taken from the literature. Ideally, values used in transport modeling should be those that were determined under conditions similar to the site of interest. However, subtle

differences in the properties of the solid, such as clay content and cation-exchange capacity, quantity and type of organics present, mass of HFO, etc., can have profound effects on the K_d .

Groundwater conditions, including Eh, pH, and concentrations of ligands such as Cl^- , SO_4^{2-} , CO_3^{2-} , etc., determine the distribution of species of an element of interest, and each of these species sorbs differently to a given surface. For example, total dissolved lead may contain species that are positively-charged (e.g., Pb^{+2} , PbOH^+ , PbCl^+); species with neutral charge (Pb(OH)_2^0 , PbSO_4^0 , PbCO_3^0); and/or negatively-charged species (Pb(OH)_3^- , $\text{Pb(CO}_3)_2^{2-}$). In the presence of organic complexants, the concentration of total dissolved Pb would also include the concentrations of aqueous organometallic complexes such as lead citrate, acetate, EDTA, HEDTA, etc. The K_d term is applied equally to all of these in describing the transport behavior of lead, yet the retardation of all lead species will not be the same in a given medium.

Additionally, the K_d concept may not capture the relevant processes at the site of interest. It is also stated in the EPA guidance (Vol. II) that key parameters controlling sorption are applicable only under oxidizing conditions. Obviously, a K_d is irrelevant when other well known geochemical processes prevail – for example, the dissolution of HFO under reducing conditions, accompanied by the release of sorbed arsenic and other trace metals. Given that current conditions in site groundwater are oxidizing (e.g., ORP reported in Phase II RI, Table 2-5 ranges from +129 mV to +266 mV), this is not a concern in the present application of the sorption model. The text might note that stable redox conditions are assumed.

Appendix G, p. 2, ¶3 The discussion of the conceptual model for controls on arsenic mobility notes that precipitation of arsenic sulfides will limit concentrations in strongly reducing groundwater. It might be noted, too, that iron sulfide is likely to play a significant (or even the predominant) role in this process, as arsenic is either adsorbed onto the Fe-sulfide surface or co-precipitated with the iron.

Appendix G, p. 2, ¶3 The text refers to K_d values for arsenic cited by Spitz and Moreno (1996) that span three orders of magnitude, and presents the modelers' choice with reference to the Eh/pH conditions of the site. Better support should be given for this choice of K_d . What are the conditions reported by Spitz and Moreno for the apparent K_d s cited, and how do those conditions compare to the OFFTA? Given the potential importance of iron in controlling the transport of arsenic, are the iron contents of the literature-

cited soils comparable to those of OFFTA soils?

Appendix G, p. 3, top The document acknowledges that site-specific data to support the K_d estimates would reduce uncertainty in the model predictions, and this is certainly the case. Can existing data for site soils (*e.g.*, As, Mn, and Pb concentrations in solid phases) be reconciled with existing groundwater data (*e.g.*, co-located, or roughly co-located, groundwater samples for which “dissolved” metals analyses are available)? Testing of the model to the extent possible against site data would add to its credibility.

Appendix G,
Calculation
Worksheet

This worksheet presents calculations performed with the WHPA model to develop a configuration for extraction wells that would capture essentially all groundwater flow emanating from the site. As a simple check on the results, the total groundwater flux through the site can be estimated, and, given a pumping rate for each extraction well, the number of wells is easily inferred. The total ambient flow through the site is simply $Q = T \cdot i \cdot W$, where T = transmissivity, i = hydraulic gradient, and W is the width of the site normal to the flow (*i.e.*, parallel to the shoreline). The calculations described in the document take $T = 225 \text{ ft}^2/\text{d}$, $i = 0.01 \text{ ft/ft}$, and $W = 900 \text{ ft}$. -Using these parameters, the total flow across the site is estimated to be $2025 \text{ ft}^3/\text{d}$, or 10.5 gpm . The extraction wells are assumed to operate at 1.3 gpm . This verifies the estimate of 8 (*i.e.*, $10.5 \text{ gpm} / 1.3 \text{ gpm}$) wells to capture all overburden groundwater across the width of the site. The gradient mapped across the eastern portion of the site (*e.g.*, FS Fig. 2-5) is somewhat steeper than that used in the calculations. If the transmissivity estimate is valid across the entire site, a somewhat higher density of wells may be required in the eastern area. Should this alternative be given further consideration, the site hydrogeology will have to be considered in greater detail.