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U S NAVY RESPONSES TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION COMMENTS TO FEASIBILITY STUDY FOR OPERABLE UNIT 4 (OU4) 3 AUGUST 2010 NSY PORTSMOUTH KITTERY ME

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RESPONSES TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION COMMENTS DATED AUGUST 3, 2010
FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 (JULY 2010)
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1. **Comment:** As discussed in my 16 July 2010 comment letter concerning the Round 10 and Rounds 1-10 Monitoring Program Reports, NOAA's primary remedial interest is Monitoring Station-12. And the FS takes note of the need for a potential remedy there. Given the high organic and inorganic concentrations at all three long-term locations, especially locations 1 (organic) and 3 (inorganic), NOAA prefers a complete removal at MS-12A (i.e., MS 12A-04 as in Figure 7-3). Figure 2-3 showing concentrations above the PRGs both on the ramp and in the area surrounding the eelgrass supports such a remedy. Specifically, very high concentrations of lead and HMW PAHs are found here as shown in Figures 1-14 and 1-15, respectively. Of particular concern is the lead at AS12-SD107. Additionally, the complete removal is less expensive than the partial removal as subsequent annual costs for monitoring are not necessary.

   Response: Comment noted. Navy will consider NOAA's recommendations when it proposes a preferred alternative and presents it in the Proposed Remedial Action Plan.

2. **Comment:** As for MS-12B, dredging with off-yard disposal (MS-12B-03) as shown in Figure 7-5 is supported by the elevated lead in sediment concentrations shown on Figures 1-14 and 2-3. Of particular concern are locations AS12-SD12, AS12-SD109, and AS12-SD108, all showing high to very elevated lead concentrations.

   Response: Please see the Navy's response to NOAA Comment No. 1.

3. **Comment:** Given the high subtidal organic contamination at Monitoring Station-1, NOAA recommends Alternative MS 01-03: hydraulic dredging and off-yard disposal.

   Response: Please see the Navy's response to NOAA Comment No. 1.

4. **Comment:** MS-11, adjacent to the DRMO Storage Yard AOC, shows extremely high lead copper, and nickel at one intertidal location of three when reviewing the Trend Plots in Appendix B. Granted, there is little sediment and the sediment size is likely coarse. The latter results in much bioavailability, the former means that little needs to be removed; hence, NOAA recommends that the Navy remove this small area.

   Response: The Navy agrees that elevated levels or lead, copper, and nickel were detected in the sediment samples collected from MS-11, Loc. 3. Sediment was not available at the other two locations at MS-11 except for a little sediment (eroded soil) that was collected behind the rip-rap at Loc. 2 during Round 1, before shoreline erosion controls were placed in this area.

   Although the sediment is coarse in this area, the metals were not bioavailable when toxicity tests were conducted on sediment collected from MS-11 as discussed in the following paragraph from Section 6.6 of the Additional Scrutiny Report (Tetra Tech, 2007):

   - "As part of the development of the PRGs for OU4 during Round 2 of the Interim Offshore Monitoring Program, whole sediment and pore water sediment toxicity tests were conducted on the sediment sample collected at MS-11, Loc. 3 (TtNUS, November 2001). No significant toxicity was observed in amphipod survival in the whole sediment toxicity test or sea urchin larval development in the pore water toxicity test. Although the metals concentrations during Round 2 were not as great as the concentrations during some of the other rounds, the lack of toxicity at this station indicates that the metals in the sediment do not appear to be bioavailable. This is expected because the elevated levels of metals are likely due to small pieces of metal fragments

in the sediment, which are typically not very bioavailable. Because the river current is fast in the area adjacent to MS-11, Loc. 3, little sediment is present at this location, so the amount of habitat available for sediment invertebrates is small."

Because the metals were not bioavailable at this location and the amount of sediment is small, the Navy does not believe removal of the sediment present in this area is warranted. Also, the placement of erosion controls along the shoreline is preventing erosion of contaminated soil to the offshore area so concentrations are expected to decrease over time.

Having Monitored Natural Recovery (MNR) as the only alternative evaluated for MS-11 (other than the No Action alternative) is consistent with the recommendation in the Rounds 1 through 10 report (Tetra Tech, 2010), which stated: "It is recommended that interim offshore monitoring be conducted during the five-year sampling events (next scheduled for 2013) until a final remedy for OU4 is implemented. The parameters to be monitored should only include copper, lead, and nickel because these were identified as the primary chemicals of concern for the Phase I Additional Scrutiny Investigation (TtNUS, August 2007)."

As presented in Attachment 1 to this response to comment (RTC) document, based on the Round 11 interim offshore monitoring data at MS-11, it appears that MNR is already working at this monitoring station. Therefore, the Navy does not plan on including an active removal alternative for MS-11, such as dredging in the FS based on this comment.

TtNUS, August 2007. Additional Scrutiny Report for Operable Unit 4, Portsmouth Naval Shipyard, Kittery, Maine. TtNUS, King of Prussia, Pennsylvania.

TtNUS, February 2010. Rounds 1 through 10 Interim Offshore Monitoring Program Report for Operable Unit 4, Portsmouth Naval Shipyard, Kittery, Maine. TtNUS, King of Prussia, Pennsylvania.

5. **Comment:** Other locations that need attention but in the form of a Monitored Natural Recovery remedy include MS-3, 4, 5, 8, and 9. We need to soon discuss the trigger that would either eliminate these locations from further monitoring or move them towards an engineered remedy.

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Response: Please see the Navy's response to NOAA Comment No. 1. The Navy agrees that should MNR be selected as the remedy at MS-03/MS-04, the monitoring plan would need to have triggers that would either eliminate these locations from further monitoring or move them towards an engineered remedy. This is indicated in the following sections of the draft FS report:

- The first paragraph in Section 5.1.2.1 states: "Monitoring would be conducted in accordance with a long term monitoring plan that would provide the data needs and decisions for determining when risks are reduced to acceptable levels."
- The second paragraph in Section 5.1.2.1 states: "During the 5-year reviews, analytical data would be evaluated to determine the progress of natural recovery. If it is determined that contaminant trends are not reducing as expected, changes in the remedial action would be considered."

However, as indicated in Sections 1.6.4, 1.6.7, and 1.6.8 of the draft FS report, alternatives were not developed for MS-05, MS-08, or MS-09, because there are no current exceedances of PRGs that indicate an ecological risk at these stations. Therefore, a MNR remedy alternative was not evaluated for these monitoring stations.

RESPONSES TO FISH AND WILDLIFE SERVICE COMMENTS DATED AUGUST 25, 2010
FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 (JULY 2010)
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1. **Comment:** Thank you for the opportunity to review the Draft FS for OU4 PNS. We have conducted a summary review of the issues presented in the document and we are in agreement with the recommendations provided by NOAA. NOAA has outlined the areas/locations of highest concern, their contaminants of concern and remedial actions that will best address those issues. We are interested to see some of the long-standing PAH and metals issues resolved via remedial action and look forward to decisions on the remaining areas involved in the ILTM program.

   Please let us know when there are further discussions or meetings related to remedial actions at OU4 sites.

   Response: Please see the Navy's responses to NOAA comments. The Navy will invite the Fish and Wildlife Service in further discussions or meetings related to remedial actions at OU4 sites.

RESPONSES TO MEDEP COMMENTS DATED SEPTEMBER 20, 2010
DRAFT FEASIBILITY STUDY FOR OU4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1. **Comment:** The MEDEP disagrees with the Navy's decisions for No Further Action remedies at MS-05, MS-07, MS-08 and MS-09. The February 2010 Rounds 1 Through 10 Interim Offshore Monitoring Program Report for OU4 recommends continued monitoring at all these stations until a final remedy is implemented for OU4. Even though we're now at the final remedy selection stage the Navy can't declare no further action is necessary at these sites without addressing the issues that were the basis for recommending further monitoring. While we ultimately may be willing to cease monitoring at these stations, additional discussion is necessary.

   As stated in emails to the Navy dated 9/21/09 and 10/8/2009 MEDEP agreed with the Rounds 1 Through 10 Interim Offshore Monitoring Program Report recommendations as presented in Table 6-1 of that document. At no point have we indicated the Navy could stop monitoring at any monitoring station without discussion with the regulators.

   Response: It is not the intent of the Navy to stop monitoring the identified monitoring stations prior to the selection of the final remedy for OU4. The text will be revised to clarify that alternatives are not being developed for these locations because COC concentrations have decreased to levels less than the PRGs and that there are no longer risks associated with the sediments at these locations. The text will also be clarified to indicate that even though alternatives are not developed for these monitoring stations, the OU4 interim monitoring will continue at these locations until a final remedy is in place for OU4.

2. **Comment:** 1.2, Scope and Objectives, p. 1-1.

   "Based on the results of the human health risk assessment, risks for ingestion of sediment, dermal contact with sediment, and ingestion of surface water were less than regulatory guidelines…therefore, human health is not considered in this FS."

   The HHRA is 16 years old – has the Navy determined if its conclusions are still valid? Have items such as reference doses/concentrations, regulatory guidelines, or exposure factors/default values changed for OU4 COCs in that time period? In addition, the 1994 HHRA showed high risk to some human receptors from ingestion of seafood. How has the Navy addressed this risk? Also, the 1994 HHRA did not look at dermal risks for exposure to organics in surface water. Have later studies evaluated the potential risk for this exposure? These issues must be addressed in the FS (or perhaps in the ROD).

   In addition, the Navy may want to revise the McLaren/Hart, March 1994 reference to May 1994. The March 1994 document did not address offshore risks to human health. Offshore risks were addressed in the May 1994 Final Human Health Risk Assessment Report for Off-shore Media for Portsmouth Naval Shipyard (an addendum to the March 1994 document).

   Response: The Navy does not believe that it is necessary to revise the human health risk assessment because the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a Public Health Assessment (PHA) for PNS, which was finalized in November 2007. The following exposure scenarios that pertain to the offshore area were evaluated in PHA: 1) Consumption of contaminated fish and shellfish, and, 2) Contact with contaminated water and sediment from the Lower Piscataqua River. Therefore, the exposure pathways of concern mentioned in the comment are addressed in the PHA. To conduct the PHA, ATSDR reviewed data from many of the previous investigations conducted at PNS including data from the Interim Offshore Monitoring Program. Therefore, the later studies were used to evaluate risks to humans. The PHA concluded the following:

- For both an adult and a child, the doses estimated for exposure to contaminants, including mercury and PCBs, in *flounder and lobster (meat)* are lower than those contaminants' screening values (ATSDR Minimal Risk Level or EPA Reference Doses), and below levels associated with adverse health effects, suggesting that they have not accumulated chemical contaminants to levels known to cause health effects. Based on this evaluation, ATSDR has determined that consumption of flounder (and similar fish) and lobster meat from the Lower Piscataqua River near PNS is not likely to result in adverse health effects in adults and children.

- Estimated exposure doses using the maximum levels for adult lobster tomalley and mussels showed levels above some comparison values. The maximum concentration of mercury in mussels was 2.31 mg/kg found in the Interim Offshore Monitoring Data at MS-05 and was above the Food and Drug Administration (FDA) action level of 1 ppm. However, if the mean or average concentration is used, the mean mercury concentration of (0.29 mg/kg) does not exceed the FDA action level. Additionally, this mean value is similar to the mean concentration of mercury found in the reference samples (i.e., 0.27 mg/kg). As a whole this indicates that the mussels found within the river, are on average, less than the FDA action level.

- Fish and shellfish data show that levels of chemical contaminants near PNS is similar to other areas of the Piscataqua River.

- Exposure to contaminants in surface water or sediment would be by way of dermal contact (e.g., wading) and accidental ingestion. Exposures would likely be less than daily and of short duration due to the cold temperature of the water. Surface water and sediment data collected since 1991 indicate that low levels of contaminants were measured in the surface water and sediment samples on site. These levels are sufficiently below levels that have been shown to cause adverse effects following short-term contact. ATSDR concludes use of the estuary, which might result in exposure to contaminated surface water and sediments, is not likely to be a public health hazard.

To address this comment, the following sentence will be inserted after the referenced sentence in Section 1.2: "In addition, as presented in the Public Health Assessment for Portsmouth Naval Shipyard, Kittery, Maine, EPA Facility ID: ME7170022019 (ATSDR, 2007), adults and children consuming fish or shellfish or wading in the surface water and sediment are not likely to experience adverse health effects from the levels of chemical in those media."

ATSDR (2007) will be added to the reference section. Also, the following reference will be referenced in the text and added to the reference section: "McLaren/Hart, May 1994. Final Human Health Risk Assessment Report for Offshore Media, Portsmouth Naval Shipyard. Addendum to Public Health and Environmental Risk Evaluation Part A (McLaren/Hart, March 1994). McLaren/Hart Environmental Engineering Corporation, Albany, New York.

3. **Comment:** 1.4.2.4, Ecology, p. 1-7. "No known endangered…species…are located with the boundaries of PNS, including OU4." The endangered shortnose sturgeon exists in the Piscataqua River and therefore should be considered potentially present within OU4.

   Response: The referenced sentence will be changed in Section 1.4.3.4, Ecology, page 1-7 as follows: "No known endangered…species…are located with the boundaries of PNS. However, the federally endangered shortnose sturgeon exists in the Piscataqua River and is potentially present within OU4."

4. **Comment:** 1.4.2.4, Ecology, p. 1-7. Change Maine Fisheries and Wildlife to Maine Inland Fisheries and Wildlife.

   Response: The reference will be changed to "Maine Department of Inland Fisheries and Wildlife" in Section 1.4.3.4 and the reference section.

5. **Comment:** 1.4.2.4, p. 1-7. "PNS is not included in the critical habitats…" Clarify the term "critical habitats" as it can refer to Federally designated Critical Habitat. This would be a good place to mention that PNS is also not included in State designated Essential Habitat. These terms should also be defined.

   The Navy needs to mention that the Piscataqua River, as with most estuaries in Maine, is considered to be among the top 25% most important saltmarsh/saltwater habitat for US Fish and Wildlife Service Priority Trust Species in the Gulf of Maine.

   Also, the Maine IF&W January 1989 and NFEC August 1993 references are very outdated. Please use the most recent references available. See http://www.beginningwithhabitat.org/the_maps/index.html and http://www.fws.gov/northeast/gulfofmaine/projects/habitat_analysis.htm for recent data and more information.

   Response: The first paragraph of section 1.4.3.4 will be revised to read as follows:

   "No known endangered, threatened, or protected species or critical habitats are located within the boundaries of PNS, including OU4. Critical habitats are designated for all species listed under the Endangered Species Act and include areas occupied by the species or areas determined to be essential for conservation of the species. Also, PNS does not include areas designated as Essential Habitat by the State of Maine (BwH, 2010). Essential habitats are habitats necessary to the conservation of endangered or threatened species as determined by Maine Endangered Species Act and Regulations based on observation of the species and confirmed habitat use. The nearby Piscataqua River is among the top 25 percent most important saltmarsh/saltwater habitats for USFWS Priority Trust Species (BwH, 2010b). Priority Trust species are migratory species that cross state or national boundaries. Also, Clark's Island, located on the eastern side of PNS offshore of MS-09, requires special consideration because of its use by colonial nesting seabirds (nesting season is from April 1 to August 15)."

   BwH (Beginning with Habitat), 2010a. High Value Plant and Animal Habitats. http://www.beginningwithhabitat.org/the_maps/map2-high_value_habitat.html. Accessed October 2010.

   BwH (Beginning with Habitat), 2010b. USFWS Priority Trust Species Habitat Map. http://www.beginningwithhabitat.org/the_maps/map2-high_value_habitat.html. Accessed October 2010.

6. **Comment:** 1.4.4.1, Potential Sources of Contamination, p. 1-8. "Contaminated groundwater migration to sediment could have occurred from onshore at OU3 and OU7 to the offshore areas." Such migration could have occurred from any PNS IRP site, except perhaps Building 184. Please revise this statement.

   Response: The Navy concurs that the offshore contaminated sediment could have resulted from groundwater migration from any of the IRP sites. The text will be revised to read as follows;

   "Contaminated groundwater migration to sediment could have occurred from any of the near shore IRP sites (including but not limited to OU1, OU2, OU3, and OU7) within the limits of PNS in the past. Investigations of these onshore OUs indicate they are not current or future potential sources based on current conditions."

7. **Comment:** 1.4.4 Conceptual Site Model, p. 1-7. This section discusses contaminant sources, release mechanisms, transport mechanisms and receptors in a general sense. However, details for each MS (or group of MS, e.g. 03 and 04) need to be added. This information is provided in a couple instances (Site 5, OU2), and is presented in other parts of the FS, but it should be discussed for each

station in the CSM section. Fig. 1-5 is cluttered and doesn't provide the necessary details for each MS. This information could possibly be presented as a table.

Response: The following table will be included in Section 1.0 to summarize the potential contaminant sources, release mechanisms, and transport mechanisms at each MS.

Monitoring Station	Associated Onshore Site	Potential contaminant sources, release mechanisms, and transport mechanisms
MS-01	OU9 - Site 34	Ash was generated from the combustion of coal as part of the oil gasification activities (kerosene converted to illuminating gas) and as part of a blacksmith shop. Ash was deposited on site near the shore but was subsequently removed in 1999 (limited removal) and 2007. While some of the ash may have been released to the offshore area through runoff and erosion, Site 34 is not likely to be a current primary source of PAHs to the offshore area.
MS-02, MS-07, MS-10, MS-13, and MS-14	None	There are no known contaminant sources onshore of these monitoring stations and chemical concentrations in sediment do not indicate any impacts from IRP sites.
MS-03 and MS-04	OU7- Site 32	Foundry slag associated with fill material at Site 32 has been identified in the intertidal areas of MS-03 and MS-04, and it is likely the source of elevated metal and PAH concentrations at these stations.
MS-05, MS-06, MS-08, and MS-09	OU3	Current potential sources of contamination from the offshore area include groundwater migration from OU3 to the offshore area. Also, contaminated soil that eroded during OU3 construction activities was contained to the sediment within the turbidity curtains placed in Jamaica Cove and Clark Cove. Current erosion of contaminated soil is not occurring because of the controls placed along the shoreline.
MS-11	OU2 – Sites 6 and 29	Past DRMO and waste disposal activities led to soil contamination at OU2. Physical movement of contaminated soil such as snow plowing and erosion of contaminated soil have resulted in contamination of the offshore area adjacent to OU2 in the past. Current erosion of contaminated soil is not occurring because of the controls placed along the shoreline.
MS-12	Sites 5 and 10	Sediment is present on the floor of Building 178 in areas that are inundated with water during high tide. Dredging activities have occurred at MS-12 and in the main channel of the Piscataqua River. Past releases from Site 5 and Site 10 resulted in offshore contamination.

8. **Comment:** 1.5, p. 1-10 last paragraph. In the first sentence change "a ROD" to "an Interim ROD."

   Response: The suggested change will be made to the text.

9. **Comment:** 1.6.1, MS-01, p. 1-14: This section indicates that there is generally "20 to 40 feet between mean high and mean low tide elevations" at MS-01. Please clarify this statement. There are no such tidal ranges in Maine south of Washington County. Mean low water at MS-01 is 92.23 feet and mean high water is 100.36 feet (2002 PNS Datum).[1] Therefore, there are only 8.13 feet between mean high and mean low tide elevations.

   Maine DEP has not noticed the error before but it appears that the 20 to 40 feet figure has been cited since at least the Aug. 2004 SSI Report for Site 34. It is important to ensure that it is not included in future documents.

[1] Interim RI Items for OU9_March 5 2010.pdf

Response: The text is actually referring to the width of the intertidal zone, not the height of the zone. The referenced sentence will be reworded as follows to clarify the text: "The width of the intertidal area is relatively narrow, with approximately 20 to 40 feet of intertidal sediment exposed between the water and the bank from the mean high tide line to the mean low tide line."

10. **Comment:** 1.6.4, MS-05, p. 1-20. "MS-05 will not be considered further in this FS and NFA will be conducted at this MS." MEDEP disagrees with this decision. The February 2010 Rounds 1-10 Interim Offshore Monitoring Program Report stated, "Having additional samples before the next five-year sampling event will allow the Navy to determine whether concentrations are decreasing." MEDEP agrees with this statement. Why has the Navy switched its recommendation from additional sampling to NFA?

    Response: Please refer to the Navy's response to MEDEP Comment No. 1. It is not the intent of the Navy to discontinue the MS-05 sampling that is required in the 1999 Interim ROD for OU4 prior to establishing a final remedy for OU4. The last paragraph in Section 1.6.4 identified in the comment, will be revised to read as follows to clarify the Navy's approach for MS-05 for the OU4 FS:

    "The analytical data and concentration trends associated with the investigations presented above are provided in Appendix B. A summary of the sediment sampling data in comparison to the cleanup goals is located in Table 1-4. There are no current exceedances of IRGs or twice the ER-M (for lead) that indicate an ecological risk at MS-05 and the OU3 remedy has removed all contaminated soil near MS-05. As a result, no remedial alternatives have been developed for MS-05 in this FS. However, periodic monitoring will continue at MS-05 in accordance with the approved sampling and analysis plan for interim monitoring until a final remedy is selected for OU4 as required by the May 1999 Interim ROD."

11. **Comment:** 1.6.6, MS-07, p. 1-21. "MS-07 will not be considered further in this FS and NFA will be conducted at this MS." MEDEP disagrees with this decision. The February 2010 Rounds 1-10 Interim Offshore Monitoring Program Report stated, "…to provide nearby reference concentrations for MS-08 and MS-09, samples should be collected at the five-year sampling for PAHs, 4,4'-DDT, dioxins/furans, PCBs, and metals." MEDEP agrees with this recommendation. Why has the Navy changed its recommendation?

    Response: Please refer to the Navy's response to MEDEP Comment No. 1. It is not the intent of the Navy to discontinue the MS-07 sampling that is required in the 1999 Interim ROD for OU4 prior to establishing a final remedy for OU4. The last paragraph in Section 1.6.6 identified in the comment will be revised to read as follows to clarify the Navy's approach for MS-07 for the OU4 FS.

    "The analytical data and concentration trends associated with the investigations presented above are provided in Appendix B. A summary of the sediment sampling data in comparison to the cleanup goals is located in Table 1-6. There are no current or past exceedances of IRGs or other screening criteria that indicate an ecological risk at MS-07. As a result, no remedial alternatives have been developed for MS-07 in this FS. However, periodic monitoring will continue at MS-07 in accordance with the approved sampling and analysis plan until a final remedy is selected for OU4 as required by the May 1999 Interim ROD."

12. **Comment:** 1.6.7, MS-08, p. 1-22. "MS-08 will not be considered further in this FS and NFA will be conducted at this MS." MEDEP disagrees with this decision. The February 2010 Rounds 1-10 Interim Offshore Monitoring Program Report stated, "Sampling is recommended even though no concentrations currently exceed their IRGs and lead concentrations do not exceed its ER-M. Having additional samples before the next five-year sampling event will allow the Navy to determine whether concentrations are decreasing over time." MEDEP agrees with this recommendation. Why has the Navy changed its recommendation?

Response: Please refer to the Navy's response to MEDEP Comment No. 1. It is not the intent of the Navy to discontinue the MS-08 sampling that is required in the 1999 Interim ROD for OU4 prior to establishing a final remedy for OU4. The last paragraph in Section 1.6.7 identified in the comment will be revised to read as follows to clarify the Navy's approach for MS-08 for the OU4 FS.

"The analytical data and concentration trends associated with the investigations presented above are provided in Appendix B. A summary of the sediment sampling data in comparison to the cleanup goals is located in Table 1-7. There are no current exceedances of IRGs, twice the ER-M (for lead), or the PRG (for 4,4'-DDT) that indicate an ecological risk at MS-08. As a result, no remedial alternatives have been developed for MS-08 in this FS. However, periodic monitoring will continue at MS-08 in accordance with the approved sampling and analysis plan until a final remedy is selected for OU4 as required by the May 1999 Interim ROD."

13. **Comment:** 1.6.8, MS-09, p. 1-24. "MS-09 will not be considered further in this FS and NFA will be conducted at this MS." MEDEP disagrees with this decision. The February 2010 Rounds 1-10 Interim Offshore Monitoring Program Report stated, "Sampling is recommended even though no concentrations currently exceed their IRGs. Also, although the concentration of lead was greater than its ER-M during Round 10, lead concentrations have generally decreased each round from Round 7. Having additional samples before the next five-year sampling event will allow the Navy to determine whether concentrations are decreasing over time." MEDEP agrees with this recommendation. Why has the Navy changed its recommendation?

    Response: Please refer to the Navy's response to MEDEP Comment No. 1. It is not the intent of the Navy to discontinue the MS-09 sampling that is required in the 1999 Interim ROD for OU4 prior to establishing a final remedy for OU4. The last paragraph in Section 1.6.8 identified in the comment, will be revised to read as follows to clarify the Navy's approach for MS-09 for the OU4 FS.

    "The analytical data and concentration trends associated with the investigations presented above are provided in Appendix B. A summary of the sediment sampling data in comparison to the cleanup goals is located in Table 1-8. There are no current exceedances of IRGs, twice the ER-M (for lead), or the PRG (for 4,4'-DDT) that indicate an ecological risk at MS-09. As a result, no remedial alternatives have been developed for MS-09 in this FS. However, periodic monitoring will continue at MS-09 in accordance with the approved sampling and analysis plan until a final remedy is selected for OU4 as required by the May 1999 Interim ROD."

14. **Comment:** Figures 1-6 – 1-16. The titles of all these figures need to indicate the sample collection date for the results represented by the markers.

    Response: The information presented on the figures includes samples collected from different investigations with different dates. The sample dates for each sample are provided in the associated tables in Section 1. For Example, Table 1-1 presents the dates of the samples collected for MS-01. Adding the dates to the figures is not necessary to show the extent of contamination (the purpose of the figures). For that reason, the sample collection dates will not be added to the figure titles.

15. **Comment:** Figs 1-6, 1-7, 1-14, 1-15 and 1-16. The tables on these figures are misleading as they represent only three of many sample locations and don't always show the maximum concentrations of all samples collected. Either add the results of the other sample locations or remove the tables.

    Response: The tables on the referenced figures will be deleted because the data for each sample are provided in the associated tables in Section 1. They were initially included because they are the only locations where multiple rounds of data were collected.

16. **Comment:** 2.1.2 Location-Specific ARARs and TBCs, p. 2-6. Add the following State location-specific ARARs/TBCs to this section and to all other applicable ARARs tables.

    Maine Wetland Protection (06-096 CMR 310). Standards are provided for wetlands protection. Activities that have an unreasonable impact on the wetlands are prohibited.

    Ch. 315, Assessing and Mitigating Impacts To Existing Scenic and Aesthetic Uses (06-096 CMR 335). This chapter describes the process for evaluating impacts to existing scenic and aesthetic uses resulting from activities in, on, over, or adjacent to protected natural resources subject to the Natural Resources Protection Act, pursuant to 38 M.S.R.A. § 480-D (1).

    Ch. 335, Maine Significant Wildlife Habitat Rules (06-096 CMR 335). These rules outline requirements associated with a NRPA permit for an activity impacting significant wildlife habitat, including certain seabird nesting islands.

    Response: Maine Wetland Protection (06-096 CMR Part 310) and Assessing and Mitigating Impacts to Existing Scenic and Aesthetic Uses (06-096 CMR Part 315) will be added as a State location-specific ARARs to Section 2.0 and Table 2-2. The Assessing and Mitigating Impacts To Existing Scenic and Aesthetic Uses regulation will be evaluated at all of the monitoring stations where an active remedy could occur (MS-01, MS-03, MS-04, MS-12a, and MS-12b). However, this regulation is unlikely be pertinent because the areas by the monitoring stations would not be considered scenic or aesthetic areas. Maine Significant Wildlife Habitat Rules (06-096 CMR Part 335) would apply for remedial actions at MSs near Clark's Island. MS-07, MS-08, MS-09, and MS-10 are the only monitoring stations located near Clark's Island. However, because no remedial actions, and, therefore, no activities are proposed for any of these MSs, 06-096 CMR Part 335 does not apply and will not be included as an ARAR.

17. **Comment:** 2.1.2 Location-Specific ARARs and TBCs, p. 2-7. "Federal and State of Maine wetlands regulations have been determined not to be ARARs because no known wetlands are present at OU4."

    This is incorrect. As Maine DEP has stated before the entire offshore area of PNS is coastal wetland. Therefore, OU4 is wetland in its entirety and any coastal wetlands regulations certainly are ARARs or TBCs.

    We also note that any wetlands ARARs/TBCs would also apply to the Jamaica Cove constructed wetland, whether or not it is considered to be part of OU4.

    Response: The Navy agrees that the offshore area of PNS is a coastal wetland, and the text will be revised to acknowledge it as such. Please refer to the Navy's response to MEDEP Comment No. 16 for the addition of ARARs/TBCs relating to coastal wetland regulations and associated monitoring stations. The Navy does not agree that wetland ARARs/TBCs would also apply to the Jamaica Cove constructed wetland because no remedial actions are being evaluated for MS-05 or MS-06, which are the only two monitoring stations located in Jamaica Cove.

18. **Comment:** 2.1.3 Action-Specific ARARs and TBCs, p. 2-7. Add the following State action-specific ARAR to this section and to all other applicable ARARs tables as necessary.

    Maine Waste Discharge Licenses (38 M.R.S.A. § 413 et seq.) and Waste Discharge Permitting Program (06-096 C.M.R. Chapter 520-529). These standards regulate the discharge of pollutants from point sources and would be applicable to alternatives that require water management during soil excavation and where discharges of treated water to a surface water body may occur. The substantive requirements would need to be met if any discharges of treated water to surface water bodies are required.

Response: The Navy generally concurs with MEDEP's recommendation, but the suggested citations are too broad. To reduce the amount of administrative sections and other sections that do not apply to the remedial actions, the following ARARs are proposed: Maine Waste Discharge Licenses (38 M.R.S.A. § 413) and Waste Discharge Permitting Program (06-096 C.M.R. Chapters 520 (Definitions), 523 (Waste Discharge License Conditions), 524 (Criteria and Standards for Waste Discharge Licenses), and 525 (Effluent Guidelines and Standards). These will be added to the Action-Specific ARARs in Section 2 of the FS and in the appropriate Action-Specific ARAR tables. The tables will also note that these regulations would be applicable for activities where discharge of treated water to a surface water body may occur. The substantive requirements would be met if any discharges of treated water to surface water bodies are required.

19. **Comment:** 2.3 Remedial Action Objectives, p. 2-10. The RAO must include a time frame, e.g. reduce risks within 10 years, in order to evaluate MNA effectiveness.

    Response: Attachment 1 to this RTC document presents an evaluation that was conducted to support MNR as a viable remedial alternative. Based on this evaluation, it appears that MNR is a viable alternative at the monitoring stations for which it was evaluated in the FS. Because this RTC document will be included as Appendix D to the FS, references to the MNR evaluation in Appendix D will be made in the FS report when discussing this alternative.

20. **Comment:** 2.4 PRGs for OU4, p. 2-11. "…reference sample data were incorporated in to the PRG process…" The Navy should determine whether or not the reference data have been updated.

    Response: The chemical concentration trend plots for the reference samples for the first 7 (for metals) and 8 (for PAHs) rounds of monitoring are presented in Appendix D of the Rounds 1 through 10 Report for PNS (Tetra Tech, February, 2010). As can be seen from the trend plots, the chemical concentrations remained remarkably consistent over the rounds. The only exception was one outlier for lead. However, the PRG for lead does not incorporate the reference sample data.

21. **Comment:** 2.5 Extent of Contamination, p. 2-12. The table indicates sediment thickness at MS-01 is 2 feet. What is the source of this value? We can't find data indicating sediment there is more than 12 cm deep.

    Response: The chemical of concern summary tables provided in Section 1 contain the depth intervals for the sediment samples collected at each of the MSs. The depth of 2 feet was used as a conservative sediment thickness taken from the deepest sediment sample in Table 1-1 where chemical concentrations exceeded PRGs. The text will be revised to indicate the average sediment thickness for each MS.

22. **Comment:** 3.0 Identification and Screening of Technologies and Development of Alternatives, p. 3-2. Under Implementability add a bullet referring to sustainable remediation issues.

    Response: The Navy disagrees with providing a specific bullet item to discuss sustainable remediation issues. In accordance with FS guidance document (1988 Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA), this section of the report should evaluate technologies on effectiveness, implementability, and cost. Based on this guidance the most appropriate location to discuss sustainability would be in the short-term effectiveness portion of alternative evaluation. A quantitative assessment (using SiteWise) will be added to the short-term effectiveness evaluation text for each FS alternative.

23. Comment: 3.3.2.3 Natural Recovery, p. 3-7. What evidence exists that natural recovery processes at OU4 are sufficient to meet the RAO in a reasonable amount of time? COC trends may not necessarily reflect natural recovery processes.

Since there has been no formal evaluation of natural recovery at OU4 how will the Navy determine if this alternative is appropriate?

Response: The following discusses the evidence of natural recovery at OU4.

The natural recovery process for contaminated sediment sites considers both the location of contaminated sediment and the reduction/control of contamination sources located within the watershed that contributes sediment laden storm water runoff to that location via river flow or erosion. As a result, natural recovery will occur when clean sediment accumulates over contaminated sediment (reducing direct contact potential), when the migration of contaminated sediment from upgradient sources is controlled (reducing contaminant loading to an area), or when contaminant concentrations decrease to acceptable concentrations (natural processes that reduce COC concentrations). Remedial actions at PNS, including interim and final actions, have begun to control onshore contaminant sources attributed to the Navy. For example, the ash has been removed from Site 34 (near MS-01), and erosion controls have been placed along the shoreline at Site 32 (near MS-03 and MS-04) and OU2 (near MS-11). COC concentrations have decreased at MS-5, MS-8, and MS-9 after the remedial actions at OU3 occurred. The same pattern could occur at other monitoring stations, although the timeline would probably be different based on site-specific factors such as deposition rates. Therefore, the combination of upgradient source control and associated sediment contamination reduction in adjacent MSs is evidence of natural recovery within OU4. In addition, this reduction has occurred in less than a 10 year monitoring period, which is evidence that natural recovery within a time frame that is considered a reasonable amount of time by the Navy, is occurring within OU4.

Please also see the Navy's response to MEDEP Comment No. 19.

24. Comment: 3.3.2.3 Natural Recovery, p. 3-7. The Navy should include discussion of enhanced natural recovery such as installing flow control structures to encourage deposition. See Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, USEPA, Dec. 2005, OSWER 9355.0-85 for more information.

Response: The Navy agrees to add technologies that would enhance the natural recovery processes for OU4. The technologies that will be added to the technology screening will include structures constructed in the river to reduce flow velocities and promote sediment deposition at each MS. These structures will include but will not be limited to breakwaters, jetties, and cove construction. In addition the creation of a depositional area will allow for the inclusion of technologies that include the placement of clean sediments into the river to enhance the natural sedimentation rate occurring in the river. However currently the Navy will not retain any technologies that will add obstructions to navigable waters or that would restrict dredging operations critical to the facilities mission. As a result, these technologies may be screened out of consideration prior to alternative development.

25. Comment: 3.3.2.3 Effectiveness, p. 3-8. "…effective in providing a natural cover…" What is generally considered to be a sufficient natural cover thickness? We note that an artificial cover is typically at least 2 feet thick.

Response: Defining an appropriate cover thickness to prevent direct contact with contaminated sediment on the bed of a body of water is dependent upon the use of the water, water flow velocities, scour potential (natural and propeller wash), and the specific receptors (human and ecological) that run a risk from direct contact. For foraging aquatic receptor a cover thickness of 1 foot is typically considered a sufficient cover thickness. However, high water flow areas that are susceptible to prop washing and high scour forces, a thickness of 2 feet may be more appropriate. Typically, areas

where channel configuration promotes the natural deposition of sediment, channel velocities and scour energy is minimal. As a result, these areas typically receive artificial cover thicknesses of 1 foot. When considering the effectiveness of natural sediment deposition, the time requirement to generate 6 inches to 1 foot of sediment (sedimentation rates) is typically considered. The text identified in the comment will be updated to indicate that the effectiveness of natural cover generation is often subjective based on the time frame required to generate and effective cover thickness.

26. Comment: 3.3.3 Containment, p. 3-8: "The only technology considered under this GRA is covering."

The Navy considered containment in the form of a barrier at MS-12A. Revise section 3.3.3 to reflect this.

Response: Section 3.3.3 will be revised to evaluate a barrier as a form of containment. In addition, a barrier will be added as a remedial technology in Table 3-1.

27. Comment: 3.3.5.2 Conclusion, p. 3-16. "…ex-situ sediment washing/chemical extraction is eliminated from further consideration." Table 3-1, page 3 of 4, indicates that this technology has been retained. This same contradiction exists for chemical stabilization/solidification.

Response: In accordance with the guidance for the development of Feasibility Studies (1988 Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA), Table 3-1 is an accumulation of general technologies identified as part of an initial technology screening process. This process identifies applicable technologies that should be considered for remedial alternatives based on their ability to effectively eliminate risks due to the identified contaminants. This step does not consider the ability to implement the technology or the effectiveness of the technology when implemented under site specific conditions. Technologies retained in Table 3-1 are then further evaluated in a technology evaluation section. In this case, that technology evaluation is in Section 3.3 of the FS report. Section 3.3 presents the evaluation all of the retained technologies in Table 3-1 for their effectiveness, implementability, and cost when considering specific site application. The result of this process is that some technologies retained from the preliminary technology screening process (Table 3-1) are often eliminated from consideration during the technology evaluation (Section 3.3).

28. Comment: Table 3-2. Monitoring Stations 5, 7, 8 and 9 should be added to this table with the Monitoring option retained.

Response: Please refer to the Navy's responses to MEDEP Comment Nos. 1, 10, 11, 12, and 13.

29. Comment: 4.1.2.1 Description, p. 4-3. At the top of p. 4-3 the Navy states, "Observations have identified the MS-01 offshore area as a sediment dispersion area and not a deposition area." At the bottom of p. 4-3 the Navy writes, "…if sampling does not identify continued accumulation of cleaner sediment over the contaminated areas…" Based on the first statement why would the Navy consider accumulation of cleaner sediment to be a possibility?

Response: The Navy believes that the area associated with MS-1 is a dispersion area. The text referring to sediment accumulation in the remaining text will be removed.

30. Comment: 4.1.2.2 Reduction of Toxicity… p. 4-4. "Reduction of contamination toxicity, mobility, and volume would occur as a result of naturally occurring processes." MEDEP understands that the Navy is using this phrase with respect to the NCP selection criteria however it is important to note that at MS-01 reduction of contamination toxicity is partly dependent on mobility (dispersion) of the contaminated sediment, i.e. if mobility is reduced then the remedy may not be effective. In addition, the potential for this mobile contaminated sediment to accumulate in a depositional area at unacceptable levels downstream is a real concern and needs to be evaluated.

Response: The Navy disagrees that the only way contamination reduction at MS-01 is occurring is by sediment dispersion. Reduction of contaminated sediment at MS-01 is also attributable to controlling/removing the on shore contamination (OU9) that has contributed to the contaminated sediment over the years. The potential for contaminated sediment to accumulate in a depositional area at unacceptable levels downstream is not a significant concern for several reasons.

1. The impacted area at MS-01 is relatively small compared to the Piscataqua River and the sediment would not migrate all at once but would migrate slowly over time along with less contaminated sediment from other areas.
2. The PAHs in the majority of the impacted sediment possessed many features observed in local runoff (i.e., residual range petroleum, plant waxes, middle diesel range petroleum, and pyrogenic PAH residues), and diagnostic indicators suggest that the pyrogenic PAHs were not derived from the ash. Therefore, the downstream areas are already being impacted by the same or similar local runoff that is impacting some of the sediment at MS-01.

Please also see the Navy's response to MEDEP Comment No. 19.

31. Comment: Table 4-1. Change "…will be used to develop PRGs" to "…were used to develop PRGs", as appropriate.

Response: The requested change will be made to all of the appropriate tables.

32. Comment: 5.1.2.1, Alternative MS0304-02, p. 5-3. This section mentions the shoreline stabilization activities at this location. As a reminder, the shoreline stabilization was considered to be temporary. Does the Navy intend to make this stabilization permanent as part of Site 32 or as part of OU4?

Response: The shoreline stabilization is part of the onshore areas associated with OU7 (Site 32). With the regulators' desire to keep the OU4 areas separate from the adjacent onshore areas the shoreline revetment will not be addressed as part of OU4, and remedial activities for MS-3 and MS-4 will not be conducted until the onshore OU7 contamination is addressed.

33. Comment: 6.1 Comparison of Remedial Alternatives for MS-11, p. 6-1. "…there is not a sufficient amount of sediment located at MS-11 to cause an unacceptable risk to ecological receptors." Please indicate the approximate area or volume of sediment at this sampling location.

Also, please discuss how the Navy determined that there was no unacceptable risk at MS-11. Any mussels anchored to the substrate in the area of contaminated sediment could have unacceptable exposure to contaminants.

Response: The referenced sentence will be changed as follows: "However, the only sediment that was present in the area was sediment that settled in between the large rocks along the shoreline. Therefore, there is not a sufficient amount of sediment located at MS-11 to cause an unacceptable risk to ecological receptors."

Please also see the Navy's response to NOAA Comment No. 4.

34. Comment: 6.1 Comparison of Remedial Alternatives for MS-11, p. 6-1. This section lists only two alternatives, No Action or MNA. The Navy should also evaluate mechanical removal. Depending on the volume of contaminated sediment, complete removal could have a lower cost than MNA.

Response: The Navy respectfully disagrees that mechanical removal should be evaluated for MS-11. Sediment removal will not be added to the list of alternatives. Please refer to the Navy's response to NOAA Comment No. 4 for justification.

35. **Comment:** 6.1.2.1, Alternative MS11-02, p. 6-3. This section states that naturally occurring processes at MS11 are limited to biodegradation and dispersion. As the only COCs at MS-11 are metals biodegradation is not a factor in reducing COC concentrations.

    Response: The text will be revised to state that natural recovery processes at MS11 are limited to onshore source control and sediment dispersion.

36. **Comment:** 7.0, MS-12, p. 7-1. Either here or in the CSM section please include a cross-section figure showing the depth of the sediments on the ramp and in the building, the height of the ramp over the riverbed, the location of the eelgrass bed and any other pertinent information.

    Response: The suggested figure will be added to the text.

37. **Comment:** 7.1.2 Alternative MS12A-02. This alternative is unacceptable as written. It is described as Containment, LUCs and Monitoring. The monitoring apparently is only intended to address integrity and performance of the containment barrier. The Navy mentions that over time natural processes would reduce the COC concentrations found in the sediment on the boat ramp but there is no discussion of Monitored Natural Attenuation of the sediments on the ramp. Any alternative without a remedy component specifically addressing the ramp sediments is unacceptable.

    Response: The text will be revised to include monitoring of contaminant concentrations in sediment. Alternative MS12A-02 will include Monitored Natural Recovery of the sediments on the boat ramp.

38. **Comment:** This barrier wall will be constructed to prevent incoming water from breaching it and entering the building. Is it possible for water to enter the area behind the wall through cracks in the floor? Will the floor be sealed?

    Response: Text will be added to the FS to indicate the barrier wall and cracks in the concrete will be sealed to prevent migration of water accumulating within Building 178 from reentering the river prior to treatment.

39. **Comment:** 7.1.2.2 Implementability, p. 7-5. Given the current condition of the building has the Shipyard discussed demolishing/removing it? If so, a physical removal alternative would make more sense than a barrier since the sediment would have to be removed as part of building demolition.

    Response: The shipyard is considering varying options for the building. Although physical removal of sediment may ultimately be selected as the remedy for the site, the purpose of the FS is to present the possible alternatives, not only the ones that are likely to be selected.

40. **Comment:** 7.1.3.1 Alternative MS12A-03, Partial Removal, Off-Yard Disposal, Containment, and LUCs, p. 7-6. Please clarify why the Navy is evaluating a “partial removal” alternative. Partial removal would remove most but not all of the contaminated sediment at MS12A. This makes no sense given that sediment contaminant concentrations inside the building are as elevated as, or more elevated than sediment contaminant concentrations outside the building.

    Response: The inclusion of this alternative is based on implementation issues associated with the removal of sediment from inside Building 178. Future removal plans are dependent upon both the future plans for Building 178 and the structural integrity of the building. The Navy will clarify why partial removal is an appropriate alternative in the FS text.

41. **Comment:** This section mentions that sediment in the eelgrass bed does not have elevated concentrations of PAHs or lead. It then states that once sediment on the ramp is removed the sediment within the eelgrass bed would not present an unacceptable risk to ecological receptors. Please clarify the apparent contradiction.

Response: The second and third sentences in Section 7.1.4.1, Hydraulic Dredging will be revised as follows to clarify the text: "Based on the Phase II Additional Scrutiny Investigation sediment present within 15 feet of the ramp drop-off, in the eelgrass bed, does not have elevated concentrations of PAHs or lead so it will not be dredged. Once the remaining sediment on the ramp is removed, risks to ecological receptors in this area will be acceptable."

42. Comment: 7.4.3 Alternative MS12B-02, p. 7-18. "…it is expected that contaminant concentrations would begin to decrease as a result of recent removal of potential onsite contaminant sources. With this removal, contaminants will no longer be deposited in the MS-12B offshore area as a result of erosion." This statement is contradictory to the Navy's assertion that there is no ongoing migration of contaminants from Site 10 to the offshore. If migration is not a current issue then the statement should not be used to support an MNA alternative.

Response: The following sentence, which was inadvertently included in the text, will be deleted: 'With this removal, contaminants will no longer be deposited in the MS-12B offshore area as a result of erosion."

43. Comment: 7.4.4, p. 7-21. Change references to Fig. 7-7 to Fig. 7-5.

Response: The indicated reference change will be made.

44. Comment: Fig. 7-1. This figure represents Alt. MS-12A-02 which does not include dredging. Therefore, limits of dredging should be removed from this figure.

Response: For Figure 7-1, the legend will be revised to read as follows;

Blue hatched areas will be described as "Limits of Contamination inside Building 178"
Red hatched areas will be described as "Limits of Contamination outside Building 178"

45. Comment: Fig. 7-4. This figure shows both a Limit of Contamination and an Estimated Limit of Contamination. One of these should be removed. There is a similar issue with Fig. 7-5.

Response: The purpose of the dashed line on the identified figures is to indicate that a full delineation of this contamination is not complete and that additional samples would need to be collected to determine this delineation. The purpose of the hatch pattern is to identify the contamination area for the purpose of volume estimates and cost estimation. The text in the legend for the hatched area on the indicated figures will be revised to read "FS Contamination Area"

46. Comment: App. C. Cost Estimates for MS12A-03 and MS12A-04. Section 7 states that there is approximately 750 cy of contaminated sediment outside the building and 150 cy inside the building. Why do the cost estimates show a quantity of 1585 cy of sediment to be dredged?

Response: The sediment quantity shown in the cost estimates is incorrect. The cost estimate should be 900 cy. As part of preparing the Draft Final FS, the reported quantities will be checked and the cost estimates will be revised to reflect the reported sediment quantities.

RESPONSES TO USEPA COMMENTS DATED JANUARY 13, 2011
OU4 DRAFT FEASIBILITY STUDY
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1. **Comment:** Section 1.5.1: In the third paragraph of this section it is stated that the Interim Remediation Goal (IRG) for lead was the value of its ER-M (Effects Range-Median) times two because the IRGs for copper and nickel were approximately twice their respective ER-M values. Although this approach was agreed upon, please provide a citation for this agreement and summarize the rationale for taking this approach. This is necessary to enhance transparency and clarity in this stand-alone document for the unfamiliar reader.

   Response: Section 1.4 of the Additional Scrutiny Report for OU4 (Tetra Tech, August 2007) states that: "In the case of lead, two times the value of its ER-M (218 mg/kg) is used, because the IRGs for copper and nickel were approximately twice the ER-M value." In addition, this issue was addressed in MEDEP Response to Comment 1 on the Draft Rounds 1-10 Interim Offshore Monitoring Program Report for OU4, which states that: "Twice the ER-M value was used as the benchmark value for lead because the IRGs for copper and nickel were approximately twice their respective ER-M values. The rationale was that even though an IRG was not developed for lead, it would likely be twice its ER-M, similar to the IRGs for copper (486 mg/kg) and nickel (124 mg/kg) which are approximately twice their ER-M values (270 mg/kg for copper and 51.6 mg/kg for nickel). This is supported by reviewing the data from Long et al., (1995). In that document, it was reported that the incidence of effects for samples with copper and lead concentrations greater than their respective ER-M values are 83.7 and 90.2 percent, respectively. This indicates that the ER-M for both metals is relatively accurate predictor of adverse effects in lieu of site-specific data. Because the IRG for copper is approximately twice the ER-M, the metals at PNS in sediment are less bioavailable that they were in the studies used to develop the ER-M. Therefore, the bioavailability of lead would be expected to follow a similar pattern."

2. **Comment:** Section1.6.10: Although EPA concurs with the tentative selection of monitored natural recovery for MS11, EPA requests revision of the ecological-based and area-based rationale used to eliminate MS11 from any remedial consideration other than monitored natural recovery (MNR). The exceedances of IRGs for copper and lead in the two locations shown in Figure 1-13 indicate unbounded exceedance of IRGs over at least 700 feet of shoreline prior to installation of shoreline controls, with no post-construction subtidal data available to evaluate whether IRGs are still exceeded. Since epibenthic organisms also exist in rocky intertidal habitat, including riprap, and could contact finer sediments between rocks during foraging, this 700 foot area does not represent an ecologically insignificant area, especially when compared with the smaller subtidal and intertidal areas that have been tentatively selected for active remediation. Due to uncertainty about what constitutes ecological significance at this site, EPA prefers that the rationale be based primarily on the following: 1) shoreline controls have already been constructed on most of the shoreline of this area, 2) the whole area is primarily non-depositional due to high adjacent tidal currents, 3) it is difficult to obtain fine sediment samples from the small area of about 150 feet of non-riprap habitat to the east of the riprap area because it is primarily rocky habitat. Please revise the discussion concerning MS11 accordingly throughout the document, including the language in Section 6.1.2.1 that the volume of sediment in the 'small intertidal area that contains sediment is not large enough to represent an ecological risk' and the footnote for "NA" in Section 2.5 (page 2-12) For transparency and clarity in this stand-alone document, please summarize in Section 1.6.10 the shoreline controls that were constructed and the rationale for discontinuing sampling after Round 7.

   Response: As discussed in the Additional Scrutiny Report for OU4, sediment was consistently only available at MS-11 Loc. 3. Only a small amount of sediment was found within the rocks along the slope at MS-11 Loc. 2 during Round 1. The shoreline where MS-11 Loc. 2 was located is within the area addressed by a 1999 emergency removal action (shoreline erosion controls). In November 2005, erosion controls similar to those placed along the shoreline to the west in 1999 were placed along approximately 100 feet of shoreline west of the seawall. In addition, because of the steep slope,

the shoreline controls in the 100-foot section of shoreline west of the seawall were upgraded in 2008. There has been no sediment or eroded soil at MS-11 Loc. 2 in subsequent sampling rounds, which is why no post-construction data are available; it is not because sediment that was present was not sampled.

Therefore, currently, sediment with chemical concentrations that may exceed IRGs is limited to the area near MS-11 Loc. 3. However, as presented in the MNR evaluation in Attachment 1 to this RTC document, concentrations of copper, lead, and nickel were less than IRGs in the Round 11 samples. In June 2006, surficial debris in the soil by MS-11 Loc. 3 was removed, the area was covered, and erosion controls were placed along the shore at this time. The Navy believes that the rationale for evaluating contamination at MS-11 is justified by stating that: 1) sediment in the offshore area is only present in a small, intertidal area on the eastern portion of the MS (Loc. 3) and, 2) because of to the nature of the fast currents in this area, it is not expected that significant amounts of sediment would deposit here in the future.

Accordingly, the first paragraph in Section 6.1.2.1 will be changed as follows (the significant changes are in bold/italicize and deletions in strikeout mode):

The results of the Round 11 interim offshore monitoring program sampling for OU4 showed that the concentrations of copper, lead, and nickel were less than IRGs at MS-11 Loc 3. Alternative MS11-02 would consist of allowing naturally occurring processes to further reduce the COC concentrations within sediment over time ***at MS-11 Loc. 3***. ***Sediment is not present at MS-11 Locs. 1 and 2 because of the shoreline activities that were conducted in this area as described below eliminated soil erosion in this area.*** Based on the location of MS-11, the naturally occurring processes ***by MS-11 Loc. 3*** are limited to reduction in contamination concentrations due to ~~biodegradation and~~ dispersion. Although sedimentation modeling has not been completed for MS-11 ***Loc. 3***, it is expected that contaminant concentrations would ~~begin to~~ decrease ***further*** as a result of recent shoreline stabilization activities and ~~would decrease further~~ once the remedy for the onshore area is implemented. ***The shoreline activities include: 1) a 1999 emergency removal action (shoreline erosion controls) by MS-11, Loc. 2; 2) November 2005 erosion controls (similar to the 1999 controls) that were placed along approximately 100 feet of shoreline west of the seawall; 3) an upgrade of the shoreline controls in the 100-foot section of shoreline west of the seawall in 2008; and 4) removal of surficial debris in the soil by MS-11 Loc. 3 in June 2006, in which the area was covered, and erosion controls were placed along the shore. Therefore, with the shoreline stabilization activities and on-shore remedial actions complete, contaminants will no longer be deposited in the MS-11 Loc. 3 offshore area as a result of erosion. In addition, due to the nature of the currents within the limits of MS-11, it is not expected that contaminated sediment would settle out in this area. Observations have identified the MS-11 offshore area as a sediment dispersion area and not a deposition area.*** ~~However,~~ Further concentration reduction is not needed to meet RAOs for MS-11, because ***concentrations of metals are already less than IRGs and sediment is only located*** ~~there is only~~ in a small intertidal area ***so most ecological receptors in this area would not be exposed to the contaminated sediment.*** ~~exposure that contains sediment. so and this volume is not large enough to represent an ecological risk. As a result,~~ Alternative MS11-02 would be used to ensure that there is not an accumulation of sediment with COC concentrations greater than PRGs (change in habitat that would represent a risk). To assure that the area of the intertidal habitat where COC exceedances are located does not increase, sediment samples would be collected and analyzed periodically. Three sediment samples would be collected from within the boundaries of MS-11 ***Loc. 3***, as shown on Figure 6-1. Monitoring would be conducted in accordance with a long term monitoring plan that would provide the data needs and decisions for determining when monitoring could be stopped or additional action would be required. ~~These samples would be analyzed for the COCs, and sediment thickness would be measured. Chemical , location , and action specific ARARs and TBCs associated with Alternative MS11-02 are presented in Table 6-2.~~

3. **Comment:** Section 2.5: After the second sentence, please add a sentence explaining why no figure was provided for MS11

   Response: A sentence will be added to Section 2.5 which states that: "A figure is not included for MS-11 because there is not a sufficient amount of sediment to cause an ecological risk; therefore, a figure defining the extent of contaminated sediment at MS-11 is not applicable."

   The footnote at the bottom of the table in Section 2.5 will be modified as follows:

   "The NA indicates that the area and volume of contaminated sediment are not presented in this table for MS-11 because although there are PRG exceedances there is not currently sufficient sediment at MS-11 to cause a ***great enough*** ecological risk ***to warrant a remediation***. ***For that reason, a figure showing the extent of sediment exceeding PRGs is not presented. However, Figure 1-13 shows the range of copper and lead concentrations in sediment at MS-11.***"

4. **Comment:** Appendix B.11: The figures for MS11 do not show the exceedances of IRGs by acenaphthylene, anthracene, fluorene, and HMW-PAH that are identified in Table 1-11. Please revise or explain in the figures, as appropriate.

   Response: Table 1-11 corresponds to the COCs detected in sediment at MS-12, while Table 1-10 corresponds to the COCs detected in sediment at MS-11. No exceedances of IRGs were identified for acenaphthylene, anthracene, fluorene, or HMW-PAHs at MS-11. No changes are necessary to Appendix B as a result of this comment.

5. **Comment:** Ex-situ treatment (other than dewatering) is screened out, but somewhat weakly (e.g., the text of Section 3.3.5 says that sediment washing, chemical stabilization, and incineration are screened out, but Table 3-1 p.3 says that they are retained for later).

   CERCLA remedies are supposed to use permanent solutions to the maximum extent practicable, and if these more permanent solutions are practicable, they should be considered (obviously, with the attendant increases in cost and implementability issues). Also, by excluding ex-situ treatment from all of the "Alternative 3"s (i.e., the active treatment alternatives), the Navy appears to have neutralized the preference for reduction of toxicity through treatment as one of the balancing factors. This would seem to bias the FS towards "Alternative 2" (MNA).

   Response: Section 3.2 (where Table 3-1 is first mentioned) presents a summary of the technologies and treatment options that are evaluated further in the FS. In accordance with the guidance for the development of Feasibility Studies (1988 Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA), Table 3-1 is an accumulation of general technologies identified as part of an initial technology screening process. This process identifies applicable technologies that should be considered for remedial alternative based on their ability to effectively eliminate risks due to the identified contaminants. This step does not consider the ability to implement the technology or the effectiveness of the technology when implemented under site specific conditions. Technologies retained in Table 3-1 are then further evaluated in a technology evaluation section. In this case, that technology evaluation is Section 3.3 of the FS. Section 3.3 presents the evaluation all of the retained technologies in Table 3-1 for their effectiveness, implementability, and cost when considering specific site application. The result of this process is that some technologies retained from the preliminary technology screening process (Table 3-1) are often eliminated from consideration during the technology evaluation (Section 3.3).

   The Navy does not believe that impractical alternatives should be carried through the FS. Sediment washing/solvent extraction, chemical stabilization/solidification, and incineration do not meet the criteria (effectiveness, implementability, and cost) required to be retained as technologies used in the development remedial alternatives so they are eliminated as discussed in Sections 3.3.5.2, 3.3.5.3, and 3.3.5.4, respectively. In summary, sediment washing/solvent extraction and chemical stabilization/solidification are impracticable due to the variety and variability of COCs in site sediment.

Incineration is impractical because of the low volumes of sediment being considered for removal and the limited number of facilities equipped to provide the necessary services. Therefore, the Navy does not believe it is biasing the FS toward MNR.

6. **Comment:** EPA's 1999 MNA guidance says that the MNA processes must be well understood, with a remediation timeframe that's reasonable compared to active treatment. The description of the MNA processes is very general ("biodegradation and/or dispersion") and has no estimate of a remediation timeframe, and the active remedies (removal) are very fast, so there's a high bar for being a reasonable timeframe under the circumstances.

   Response: Please see the Navy's response to MEDEP Comments No. 19 and 23.

7. **Comment:** The Navy's discussion of "sustainability" under "implementability" should be removed.

   Response: The Navy agrees removing the discussion of "sustainability" under "implementability." However, in accordance with FS guidance document (1988 Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA), the most appropriate location to discuss sustainability is in the short-term effectiveness portion of alternative evaluation. Therefore, the Navy will include a quantitative assessment of sustainability to the short-term effectiveness evaluation text for each FS alternative. The sustainability analysis will be conducted using SiteWise.

8. **Comment:** P.2-6, first full paragraph: Typo: "citing" should be "siting."

   Response: The requested change will be made to the text.

9. **Comment:** Section 2.1.3: Add as a federal action-specific TBC: EPA Office of Solid Waste and Emergency Response, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, OSWER Directive 9200.4-17P (Apr. 1999).

   Response: The Navy respectfully disagrees that the subject document should be added to the ARARs/TBC list. The subject document applies to contaminated soil and groundwater. Although the document notes that the principles can be broadly applied to sediments, the document also noted that (at the time the document was published) a similar document for sediment was being prepared. The subject document is too broad and general to be an ARAR or TBC for monitored natural recovery of sediments.

10. **Comment:** Sections 2.3 & 2.4: Section 2.4 should explain whether the PRGs on p.2-12 are final cleanup levels, how they correspond to ecological risk, and how they correspond to ARARs (including FDA action levels).

    As an example, for a copper level of 486 mg/kg, what is the ecological hazard index? If a shellfish lives in soil with a copper level of 486, what does that translate into in the shellfish itself and how does that compare to the FDA action levels? Put another way, what are the FDA action levels for shellfish? Are there cumulative impact issues? Please include a discussion of both ecological risk and levels from the ARARs.

    The RAO should be revised to something more like:
    Prevent exposure to predators of benthic inverterbrates (including humans) from tissue concentrations in benthic invertebrates above the following levels: [then list the unsafe tissue concentration levels]

    Prevent exposure to benthic invertebrates from COCs in sediment above the following levels: [then list the level in sediment for each COC]

Response: The PRGs on page 2-12 are to be used as final cleanup levels. The PRGs are values that are protective of benthic invertebrates. They do not correspond to FDA action levels or other ARARs because risks to humans from the consumption of shellfish were not identified at OU4. Please see the Navy's response to MEDEP Comment No. 2 to see how Section 1.2 will be changed to support the fact that humans are not at adverse risk from chemicals in surface water, sediment, of shellfish located at PNS. The following changes will be made to the text to clarify that PRGs are values that are protective of benthic invertebrates (the changes are in bold/italicize and deletions in strikeout mode):

- The first two sentences in Section 2.4 will be changed to: "The sediment-based IRGs and PRGs were developed as part of the Interim Offshore Monitoring Program to determine where COCs are present within the sediment at concentrations causing unacceptable risks to sensitive ecological receptors ***(i.e., benthic invertebrates) exposed to the COCs in sediment*** (Tetra Tech, November 2001). Site-specific ***sediment and pore-water*** toxicity testing was conducted to develop the PRGs."

- The first sentence in the third paragraph in Section 2.4 will be changed to: "The objective of PRG/IRG development was to establish a sediment-based concentration that represents a threshold below which adverse effects on ***benthic invertebrates*** ~~ecological receptors~~ are not expected to occur."

- The following sentences will be added as the last sentence in the Section 2.4, after the PRG table: "These PRGs are to be used as the final cleanup levels. PRGs are not based on human health risks because as discussed in Section 1.2, there were no unacceptable risks to humans from exposure to sediment or shellfish at OU4."

There is no ecological hazard index associated with a copper level of 486 mg/kg, or for any of the other PRGs. A hazard index is a site concentration divided by a PRG so a PRG by itself does not have an associated hazard index. As discussed above, the FDA action levels are not applicable because they were not used to develop the PRGs. The approach used to develop the PRGs does not account for cumulative impacts. In the PRG development process, it is assumed that implementing a PRG for a chemical causing the highest risk will lead to reduction of lesser risks caused by other CoCs. Secondly, it is assumed that those CoCs selected as PRGs adequately represent risks posed by all site-related CoCs, ***e.g.,*** there does not exist novel chemicals at high concentrations that have not yet been detected or are present in a form that is more bioavailable than has been previously measured.

The additional suggested RAO "to prevent exposure to predators of benthic invertebrates (including humans) from tissue concentrations in benthic invertebrates" will not be included because unacceptable risks were not identified for predators of benthic invertebrates and the PRGs were not developed to address risks to those receptors. The current RAO will be modified as follows to address the comment: "Reduce, to the extent practicable, unacceptable risk to ecological benthic receptors exposed to COCs in sediment at concentrations greater than PRGs."

11. **Comment:** Section 3.3.2.1: The discussion of LUCs seems to focus entirely on onshore LUCs. The Navy should discuss offshore LUCs as well.

    Response: The Navy believes that the discussion of LUCs includes offshore activities. For example, the last sentence in the first paragraph of the referenced section states that LUCs for OU4 MS would be used to prevent the disturbance of implemented remedies.

12. **Comment:** Section 3.3.2.3: Please provide as much detail as is known or knowable regarding the timeframe for natural attenuation and the relative contribution of biodegradation vs. dispersion.

    Response: Section 3.3.2.3 is just a general discussion of the Natural Recovery process and is not the appropriate place to discuss the timeframe for natural attenuation or the contribution of

biodegradation vs. dispersion. This information will be discussed in Sections 4, 5, 6, and 7 of the text. Please refer to the Navy's response to EPA Comment No. 6 and MEDEP Comment No. 19.

13. **Comment:** P.3-14, bottom sentence: Change "the substantive requirements of an NPDES permit" to "the substantive requirements of Maine's waste discharge license law" or something similar.

    Response: The referenced sentence will be revised as follows: "Also, the substantive requirements of Maine's Waste Discharge Permitting Program might have to be met for surface discharge of the treated drainage water."

14. **Comment:** P.3-23, discussion of ARARs compliance: Add to the end of the last sentence "...or the alternative must be modified or eliminated from further consideration if it cannot ensure ARARs compliance."

    Response: The Navy respectfully disagrees with the addition of this text. The current text is identical to that used in the OU2 FS. In any case, the principle behind the proposed additional text is understood during the assembly of the alternatives and the FS process. The alternatives are developed so that the threshold criteria (e.g., compliance with ARARs) are met.

15. **Comment:** P.4-3: MS01-02: Consider the appropriateness of LUCs to prevent disturbance of the sediment and/or to prevent shellfishing. (The same comment applies for all MNA alternatives.)

    Response: Text will be added to all monitored natural recovery alternatives to include LUCs to prevent unauthorized disturbance of sediment. There are no unacceptable risks to humans associated with shellfishing (refer to the Navy's response to MEDEP Comment No. 2). Therefore, no LUCs are needed to prevent shellfishing.

16. **Comment:** P.4-4: Short-term effectiveness includes "time until protection is achieved" as a factor. Please provide an estimate of when MNA would lead to protective levels being attained, or if not, explain that the Navy does not know how long it would take for MNA to result in protective levels being attained.

    Response: Please refer to the Navy's response to EPA Comment No. 6 and MEDEP Comment No. 19.

17. **Comment:** Section 6.1: Consider an alternative that includes removal. While the sediment levels may be small at MS-11, perhaps removal could be combined with removal at another AOC (e.g., MS 12) to get the benefit of scale on mobilization costs.

    Response: The Navy respectfully disagrees that an alternative including removal should be evaluated for MS-11. Sediment removal will not be added to the list of alternatives. Please refer to the Navy's response to NOAA Comment No. 4 for justification.

ATTACHMENT 1

MONITORED NATURAL RECOVERY EVALUATION

OU4 DATA EVALUATION OF MONITORED NATURAL RECOVERY POTENTIAL AT SEVERAL MONITORING STATIONS PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

The draft Feasibility Study (FS) Report for Operable Unit (OU) 4 at Portsmouth Naval Shipyard (PNS), Kittery, Maine (Tetra Tech, July 2010) described the formulation and evaluation of remedial alternatives to address unacceptable risks at OU4 based on the conclusions and recommendations from the Rounds 1 through 10 Interim Offshore Monitoring Report (Tetra Tech, February 2010). The FS addresses sediment contamination at OU4, which includes areas offshore of PNS that potentially were affected by PNS onshore Installation Restoration Program (IRP) sites. The objective of the evaluation provided herein is to provide support that Monitored Natural Recovery (MNR) is a viable remedial alternative for portions of OU4.

Background

OU4 consists of Site 5, Former Industrial Waste Outfalls, and six areas of concern (AOCs). Monitoring stations (MSs) were selected to provide coverage of the offshore AOCs for interim monitoring purposes and remedial alternatives in the FS were evaluated based on MSs or groups of nearby MSs. There are 14 MSs located at OU4 (see Figure 1). Remedial alternatives were not evaluated for MSs that were shown in the Rounds 1 through 10 Interim Offshore Monitoring Program Report to warrant no further action (NFA). In the OU4 FS, alternatives were developed to address contamination at MS-01, MS-03/MS-04, MS-11, and MS-12. Alternatives were not developed for MS-02, MS-05, MS-06, MS-07, MS08, MS-09, MS-10, MS-13, and MS-14, because there are no current exceedances of preliminary remediation goals (PRGs). Because of the difference in physical settings, the development of remedial alternatives for MS-12 was divided into two areas, MS-12A and MS-12B. MS-12A includes the sediment found on the ramp that extends from the Piscataqua River up into Building 178. The second area, referred to as MS-12B, includes the sediment located at the base of the bulkhead east of Building 178.

MNR is one of the remedial alternatives retained for consideration at MS-01, MS-03/MS-04, MS-11, and MS-12B. This evaluation considers the likelihood that natural recovery of the sediment is occurring, and estimates a time frame in which chemical concentrations would decrease to less than PRGs. The natural recovery process for contaminated sediment sites considers both the location of contaminated sediment and the reduction/control of contamination sources located within the watershed that contributes sediment laden storm water runoff to that location via river flow or erosion. As a result, natural recovery will occur when clean sediment accumulates over contaminated sediment (reducing direct contact potential), when the migration of contaminated sediment from upgradient sources is controlled (reducing contaminant loading to an area), or when contaminant concentrations decrease to acceptable concentrations (natural processes that reduce contaminant concentrations). The primary recovery mechanisms are dispersion at

MS-01, MS-11, and MS-12B, and a mixture of dispersion and burial at MS-03/MS-04. MS-01, MS-11, and MS-12B are not depositional areas, based on the fast flow of the current in these areas, while some deposition can occur at MS-03/MS-04, because the flow it slower. This is supported by the fact that the bottom substrate at MS-01, MS-11, and MS-12B is rocky, while there is a large mudflat at MS-03/MS-04.

The primary line of evidence that was used to determine whether MNR is occurring at the MSs was a decrease in chemical concentrations in the sediment after onshore actions were taken (if post sampling data were available). Remedial actions at PNS, including interim and final actions, which control the onshore contaminant sources attributed to the Navy IRP sites provide another line of evidence that MNR can occur. For example, the ash has been removed from Site 34 (near MS-01), and erosion controls have been placed along the shoreline at Site 32 (near MS-03 and MS-04) and OU2 (near MS-11). Therefore, because the sources of contamination at those MSs were eliminated, chemicals concentrations should decrease over time given some of the recovery mechanisms discussed above.

The following presents this evaluation by MS. As discussed in the OU4 FS Report, interim remediation goals (IRGs) were developed for chemicals potentially causing the greatest offshore impact [i.e., copper, nickel, acenaphthylene, anthracene, fluorene, and high molecular weight (HMW) polycyclic aromatic hydrocarbons (PAHs)]. These IRGs were used as the PRGs for the OU4 FS. For lead, the value of its effects range-median (ER-M) (218 mg/kg) times two was used as the PRG for the OU4 FS.

MS-01

MS-01 is located in the western portion of the Back Channel AOC, offshore of Site 34 (OU9). Previous investigations have indicated that Site 34 is not a current source, but was a historical source of PAHs to the offshore area (Tetra Tech, February 2010). A non-time critical removal action was completed in November 2007 in which source material at Site 34 (primarily ash) was removed around the buildings and along the shoreline.

A total of eight rounds of sediment samples have been collected at MS-01 as part of the Interim Offshore Monitoring Program. These eight rounds include Rounds 1 through 7 (collected from September 1999 to August 2003) and Round 11 (collected in April 2011). In addition, sediment samples were collected in August 2005 as part of an Additional Scrutiny Investigation and in August 2009 as part of a Remedial Investigation (RI) for Site 34. Figure 2 shows the sample locations and Table 1 presents the analytical results for each sample.

Trend plots presenting the Rounds 1 through 11 PAH data were prepared as part of the Second Five-Year Review Report (Tetra Tech, January 2012). Only data from the three Interim Offshore Monitoring

locations (MS-01 Loc. 1, MS-01 Loc. 2, and MS-01 Loc. 3) were included in the plots because those were the only locations where samples were collected from multiple rounds. Figure 2 presents the Interim Offshore Monitoring locations as well as locations of 2005 Additional Scrutiny and 2009 RI samples collected near the offshore monitoring locations. Table 2 is a subset of the data in Table 1, presenting the PAH data for the eight rounds of Interim Offshore Monitoring and the 2005 and 2009 samples that were near the Interim Offshore Monitoring locations.

The trend plots for acenaphthylene and HMW PAHs were then modified to show the results of the 2005 and 2009 data as well as the completion date of the removal action (see Attachment A, Figures A.1 and A.2). Anthracene and fluorene concentrations showed the same pattern as HMW PAHs (see Table 2). Note that the 2005 and 2009 data were manually added to the trend plots in Attachment A so the exact locations of the sample concentration are approximate.

The concentrations of acenaphthylene varied during the first seven rounds, with about half of the concentrations being greater than the PRG. Acenaphthylene concentrations in both additional scrutiny samples, collected before the removal action, also exceeded the PRG. However, only one of the three RI samples collected in 2009, after the removal action, had an acenaphthylene concentration that exceeded the PRG and none of the Round 11 samples had acenaphthylene concentrations that exceeded the PRG. The same general trend was observed for HMW PAHs, except that none of the 2009 RI or the Round 11 samples had HMW PAH concentrations that exceeded the PRG.

As shown on the trend plots, PAH concentrations at the MSs reduced to less than PRGs after the onshore source removal action. Based on this evaluation, natural recovery is a viable alternative at this MS because there was a significant decrease in PAH concentrations in sediment after the Site 34 removal action was completed. This decrease in concentrations occurred at, and near the MS locations. The locations represent three spatially distinct areas of the MS, with the intertidal area on the western part of the shoreline by sample locations MS-01-SD104, -SD105, -SD106, -SD107, and -SD100 not represented by MS samples. However, the sediment in this intertidal area is expected to follow a similar trend as was observed at MS-1, Loc. 2, which is also an intertidal location. Because the PAH concentrations have decreased to less than the PRGs within 2 to 4 years of the removal action, PAH concentrations at other locations within this MS should decrease to less than PRGs within this same time-range, now that the onshore source of PAH contamination has been removed. As discussed above, the primary mechanisms for the decrease in concentrations is the fact that the onshore source of contamination (i.e., ash) has been removed and the contaminated sediment is being dispersed and then replaced with cleaner sediment.

MS-03 and MS-04

MS-03 and MS-04 are located in the eastern portion of the Back Channel AOC, offshore of Site 32 (OU7). Foundry slag associated with fill material at Site 32 has been identified in the intertidal areas of MS-03 and MS-04, and is likely the source of elevated metal and PAH concentrations at those stations (Tetra Tech, February 2010). Slag mapping in 2003 indicated that slag was generally in the mid- to high-tide portion of the intertidal area, and potentially impacted finer-grained sediment was found in the mid- to low-tide portion of the intertidal area.

In June 2006, the Navy conducted an emergency removal action to address shoreline erosion north of Building 306. Because of the presence of debris, including foundry slag, the Navy removed surface debris and placed shoreline controls (e.g., geotextile fabric covered with rip-rap) along the entire length of the Site 32 shoreline (approximately 1,200 linear feet), in the mid- to high-tide area (TtEC, June 2008).

A total of eight rounds of sediment samples have been collected at MS-03 and MS-04 as part of the Interim Offshore Monitoring Program consisting of Rounds 1 through 7 (collected from September 1999 to August 2003) and Round 11 (collected in April 2011). During Round 4, three additional sediment samples were collected near MS-04 Loc. 1 (MS-04 Loc. 4, MS-04 Loc. 5, and MS-04, Loc. 6) because elevated concentrations of metals were found at this location in the Round 3 sample. In addition, sediment samples were collected for analysis of copper and nickel in May 2003 as part of the Phase I RI for Site 32. Based on the results of the Interim Offshore Monitoring Program and Phase I RI data, the Navy conducted additional sediment sampling as part of the Phase II RI in December 2008 to determine the extent of copper and PAH PRG exceedances in the mid-to low-tide area of the Site 32 shoreline. Some of the RI samples were collected from 0 to 4 inches to be consistent with the depth of sediment collected during the Interim Offshore Monitoring Program while other samples were collected from deeper intervals to determine extent of contamination. Figure 3 shows the all of sample locations, and Table 3 presents the analytical results for each sample.

Trend plots with Rounds 1 through 11 copper and PAH data were prepared as part of the Second Five-Year Review Report (Tetra Tech, 2012). Only data from the three Interim Offshore Monitoring locations (Loc. 1, Loc. 2, and Loc. 3) at MS-03 and MS-04 were included in the plots; separate plots were generated for each MS. The results from the closest 2003 and 2008 RI samples were added to the trend plots to observe concentration trends (see Attachment A). Table 4 is a subset of the data in Table 3 and presents the copper and PAH data for the eight rounds of Interim Offshore Monitoring and the 2003 and 2008 RI samples that were near the Interim Offshore Monitoring locations.

Only trends in copper concentrations were evaluated at MS-03 because this was the only chemical which had concentrations that exceeded its PRG (see Table 4). The concentrations of copper at MS-03 Loc. 2 exceeded the PRG for all eight Interim Offshore Monitoring rounds but copper concentrations in the other two MS locations were less than the PRG for all rounds. The copper concentration in the nearby sample TPSD105 collected in 2008 also exceeded the PRG. Because the copper concentrations at MS-03, Loc. 2 have varied over time, it is difficult to determine whether copper concentrations have actually decreased since the removal action (see Attachment A, Figure A.3). However, there is some evidence to suggest that natural recovery may be occurring in this area. For example, as seen on Figure 3, sediment samples from TP-SD04 and TP-SD101 were collected from the same location. The copper concentration in the sample at TP-SD04 (collected in 2003) was 2,080 mg/kg, while the copper concentration in the sample at TP-SD101 (collected in 2008) was 700 mg/kg (see Table 3). In addition, the intertidal portion of MS-03 is located within the mudflat, where finer sediment can deposit on the surface. Assuming the MNR is occurring at the site, it is likely that the copper concentrations at MS-03, Loc. 2 will be less than the PRG within 5 years, because the copper concentration at this location is only slightly greater than the PRG less than 5 years after the removal action. At other locations, where the copper concentrations were greater than they were at MS-03, Loc. 2, it could take up to 10 years.

At MS-04, trends in copper, anthracene, and HMW PAH concentrations were evaluated because these were the only chemicals which had concentrations that exceeded their PRGs in recent rounds (see Table 4). The concentrations of copper at MS-04 Loc. 1 exceeded the PRG for the first seven Interim Offshore Monitoring rounds, as did the concentration in the nearby sample TPSD112 collected in 2008 (see Attachment A, Figure A.4). The copper concentrations in the other two MS locations were less than the PRG for all rounds. The copper concentrations at MS-04 Loc. 1 had increased from round to round, until the emergency removal action was conducted in 2006. In 2008, the copper concentration at TPSD112 was 1,274 mg/kg, which was much lower that the concentration of 7,000 mg/kg detected during Round 7, and the concentrations between 2,000 and 4,000 mg/kg detected in Round 4 through 6. The copper concentration of 390 mg/kg during Round 11 was less than the PRG. Copper concentrations in two adjacent locations (MS-04, Loc. 5 and Loc. 6) exceeded the PRG with concentrations of approximately 4,000 mg/kg. As discussed above, these samples were collected during Round 4, in 2001. Assuming that the same concentration trend that was observed at MS-4, Loc. 1 is observed at these two locations, copper concentrations should already be less than the PRG or should be less than the PRG within a few years.

The concentration trends for anthracene and HMW PAH are similar, with only three samples having concentrations that exceeded their PRGs (in Round 4, 6, and 7) (see Attachment A, Figures A.4 and A.5). All of the samples collected after the 2006 removal action had lower PAH concentrations that were less than the PRG.

Recent copper concentrations at MS-03 and MS-04 are either less than its PRG, or are anticipated to be less than the PRG within 5 to 10 years. Therefore, it appears that MNR is a viable alternative at these MSs to determine whether copper concentrations will decrease to less than its PRG (at MS-03) or to ensure that concentrations remain less than the PRG (at MS-04). Because the PAH concentrations at MS-04 are already less than PRGs, MNR could be conducted to ensure that concentrations remain less than their PRGs. As discussed above, the primary mechanisms for the decrease in concentrations is a combination of dispersion of the contaminated sediment and burial with cleaner sediment and the shoreline erosion controls which are preventing onshore source of contamination from continuing to contaminate the sediment.

MS-11

MS-11 is located in the DRMO Storage Yard AOC offshore of OU2. Before shoreline erosion controls were in place along the entire OU2 shoreline, erosion of metals-contaminated soil along a portion of the OU2 shoreline (by Site 6) was identified in 1999 and along the eastern portion of OU2 shoreline (eastern portion of Site 29) in 2005. Time-critical removal actions were conducted in 1999, 2005, and 2006 to prevent further erosion of contaminants by placing shoreline erosion controls along the portions of the OU2 shoreline where erosion controls were needed. The Piscataqua River offshore of OU2 has a fast current and there is only a small area of potential sediment accumulation adjacent to the OU2 shoreline within MS-11 (at MS-11, Loc. 3 on Figure 4).

A total of eight rounds of sediment samples have been collected at MS-11 as part of the Interim Offshore Monitoring Program consisting of Rounds 1 through 7 (collected from September 1999 to August 2003) and Round 11 (collected in April 2011). Figure 4 shows the all of sample locations, and Table 5 presents the analytical results for each sample. Sediment was not available at MS-11, Loc. 1 during any sampling event (not shown on Figure 4 but approximately 150 west of MS11, Loc. 2). Sediment was only available at MS-11, Loc. 2 during the first sampling event. The sediment at this location was actually soil that eroded from the adjacent hillside and was trapped between the rip-rap. After the 1999 erosion controls were placed along the shoreline, soil erosion was controlled and sediment was no longer found at MS-11, Loc. 2. Sediment was collected for all eight rounds at MS-11, Loc. 3, but sediment at this location was present in only a very small area.

Trend plots with Rounds 1 through 11 copper, lead, and nickel data were prepared as part of the Second Five-Year Review report (Tetra Tech, 2012). Only data from MS-11, Loc. 3 were included in the plots because this was the only location where multiple rounds of sediment data were collected. The trend plots are presented in Attachment A, Figures A.7, A.8, and A.9.

Round 11 concentrations were less than PRGs and much less than previous rounds (Rounds 1 through 7), indicating a decrease in concentrations of these metals since the 2006 removal action. Remedial alternatives were developed for this MS in the FS report because the Round 11 data were not available to show a decrease in metals concentrations when the FS report was prepared. Based on the low current concentrations of metals at this location, combined with the fact that sediment is only found at this location in a small area, the data supports a NFA for MS-11. As discussed above, the primary mechanisms for the decrease in concentrations is dispersion of the contaminated sediment and that is replaced with cleaner sediment and the shoreline erosion controls which are preventing onshore sources of contamination from continuing to contaminate the sediment.

MS-12 Evaluation

MS-12 is located in the Dry Dock AOC, offshore of Site 10 (OU1) and Building 178. One industrial waste outfall (part of Site 5) discharged in the offshore area of Site 10, apparently from past Site 10 operations and other operations nearby. Site 5 and Site 10 are no longer sources of contamination to the offshore area. Therefore, there are no current IRP sources to MS-12.

MS-12 was divided into two areas for evaluation in the FS because of the difference in COCs and physical setting between the two areas. The first area, referred to as MS-12A, includes the sediment found on the boat ramp that extends from the Piscataqua River up into Building 178 (contamination in this area is related to historical activities at Building 178). The second area, referred to as MS-12B, includes the sediment located at the base of the bulk-head wall east of Building 178 (contamination in this area is related to historical releases from Site 5 and Site 10). Refer to Figure 5 for the locations of MS-12A and MS-12B. MNR was not evaluated for MS-12A so it is not discussed further in this technical memorandum.

Multiple rounds of sediment data have not been collected at MS-12B, so concentration trends over time cannot be evaluated to determine whether MNR is a viable alternative. MS-12B is not likely a significant sediment depositional area, based on its location along the main channel of the Piscataqua River. This is supported by the fact that it was difficult collecting sediment in the area because the bottom was rocky and there was little fine-grained sediment. Most of the lead concentrations in sediment samples collected at MS-12B were either less than the PRG or less than 1.5 times greater than the PRG, with the exception of the lead concentration in one sample (3,120 mg/kg at AS12-SD12), which was about 7 times greater than the PRG. No current IRP sources of contamination to the sediment in this area are known. However, it is possible the lead in the sediment from MS-12A is a source of lead to this area, if the sediment were to migrate to MS-12B. Therefore, if sediment is removed from MS-12A, it is expected that the lead concentrations at MS-12B would begin to decrease. The primary mechanisms for the decrease

in concentrations are dispersion of the contaminated sediment and that is replaced with cleaner sediment and a remedial action at MS-12A, which would remove a potential source of lead contaminated sediment.

Summary/Conclusions

The COC concentrations at some MSs are already lower than their respective PRGs or expected to be lower than their PRGs within 2 to 10 years. A timeframe could not be established for lead at MS-12B, but lead concentrations at this MS are expected to decrease after the sediment is removed from MS-12A. Table 7 presents a summary of the concentration trends observed at each MS along with the overall conclusion regarding the MNR potential.

References

Tetra Tech, February 2010. Rounds 1 through 10 Interim Offshore Monitoring Program Report for Operable Unit 4, Portsmouth Naval Shipyard, Kittery, Maine. Tetra Tech, Inc., King of Prussia, Pennsylvania.

Tetra Tech, July 2010. Draft Feasibility Study Report for Operable Unit 4 at Portsmouth Naval Shipyard, Kittery, Maine. Tetra Tech, Inc., King of Prussia, Pennsylvania.

Tetra Tech, January 2012. Draft Second Five-Year Review Report for Portsmouth Naval Shipyard, Kittery, Maine. Tetra Tech, Inc., King of Prussia, Pennsylvania.

TtEC, June 2008. Closeout Report for Site 29 Removal of Waste Debris and Site 32 Shoreline Stabilization at Portsmouth Naval Shipyard, Kittery, Maine. Tetra Tech EC, Inc., Langhorne, Pennsylvania.

TABLE 1

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 1
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 1 OF 2

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						PRG 210	PRG 1236	PRG 500	PRG 13057	PRG 486	PRG 436	PRG 124
MS-01	LOC.1	OU4-SD-M01-199A	01	19990910	0 - 0.33	72 J	100	25	940	47 J	158 J	24
MS-01	LOC.1	OU4-SD-M01-100B	02	20000504	0 - 0.33	**295**	276	187 J	5179	44	77	30
MS-01	LOC.1	OU4-SD-M01-100A	03	20000828	0 - 0.33	151 J	**1471 J**	**761 J**	**17965**	35	63	13 J
MS-01	LOC.1	OU4-SD-M01-101B	04	20010508	0 - 0.33	76 J	215 J	73 J	2316	25	63	19
MS-01	LOC.1	OU4-SD-M01-101A	05	20010819	0 - 0.33	**592 J**	**1852 J**	**518 J**	**19158**	53	253	17
MS-01	LOC.1	OU4-SD-M01-102A	06	20020813	0 - 0.33	**231 J**	245 J	53 J	3328	24	146	11
MS-01	LOC.1	OU4-SD-M01-103A	07	20030809	0 - 0.33	**805**	**8747**	**5546**	**54452**	68	63	19 J
MS-01	LOC.1	OU4-SD-M01-111B	11	20110419	0 - 0.33	12 J	68 J	52	2168	-	-	-
MS-01	LOC.1	OU4-SD-M01-111B-AVG	11	20110419	0 - 0.33	17 J	50 J	42	2111	-	-	-
MS-01	LOC.1	OU4-SD-M01-111B-D	11	20110419	0 - 0.33	21 J	32 J	31	2053	-	-	-
MS-01	LOC.2	OU4-SD-M01-299A	01	19990909	0 - 0.33	189 J	766	202	8204	29 J	116 J	22
MS-01	LOC.2	OU4-SD-M01-200B	02	20000504	0 - 0.33	160	614	182 J	7113	44	174	25
MS-01	LOC.2	OU4-SD-M01-200A	03	20000828	0 - 0.33	114	146	22	1536	26	100	20 J
MS-01	LOC.2	OU4-SD-M01-201B	04	20010507	0 - 0.33	**219**	533	139 J	6094	43	**453**	29
MS-01	LOC.2	OU4-SD-M01-201A	05	20010819	0 - 0.33	**213**	306 J	90 J	3635	18	83	18
MS-01	LOC.2	OU4-SD-M01-202A	06	20020811	0 - 0.33	**600 J**	1184	**552 J**	**23700**	23	114	19 J
MS-01	LOC.2	OU4-SD-M01-203A	07	20030811	0 - 0.33	117	288	104	2443	85 J	90 J	32
MS-01	LOC.2	OU4-SD-M01-211B	11	20110419	0 - 0.33	23 J	37	15 J	2268	-	-	-
MS-01	LOC.3	OU4-SD-M01-399A	01	19990910	0 - 0.33	166	508 J	195	7360	44 J	106 J	27
MS-01	LOC.3	OU4-SD-M01-300B	02	20000504	0 - 0.33	**544 J**	**2650 J**	**1660 J**	**22509**	200	209	31
MS-01	LOC.3	OU4-SD-M01-300B-AVG	02	20000504	0 - 0.33	**371 J**	**1575 J**	**915 J**	**14257**	175	196	30
MS-01	LOC.3	OU4-SD-M01-300B-D	02	20000504	0 - 0.33	198 J	499 J	169 J	6005	150	182	29
MS-01	LOC.3	OU4-SD-M01-300A	03	20000828	0 - 0.33	**449 J**	846 J	215 J	9382	37	137	15 J
MS-01	LOC.3	OU4-SD-M01-300A-AVG	03	20000828	0 - 0.33	**451 J**	616 J	174 J	9312	48	120	20 J
MS-01	LOC.3	OU4-SD-M01-300A-D	03	20000828	0 - 0.33	**453 J**	385 J	133	9242	58 J	102 J	24 J
MS-01	LOC.3	OU4-SD-M01-301B	04	20010508	0 - 0.33	**796**	**3471 J**	**2109 J**	**37252**	101 J	269 J	20
MS-01	LOC.3	OU4-SD-M01-301B-AVG	04	20010508	0 - 0.33	**1116 J**	**2522 J**	**1350 J**	**34591**	81 J	196 J	21
MS-01	LOC.3	OU4-SD-M01-301B-D	04	20010508	0 - 0.33	**1435 J**	**1573 J**	**590 J**	**31930**	60 J	123 J	22
MS-01	LOC.3	OU4-SD-M01-301A	05	20010819	0 - 0.33	**242**	363 J	68 J	4538	161 J	137 J	24
MS-01	LOC.3	OU4-SD-M01-301A-AVG	05	20010819	0 - 0.33	181 J	**1419 J**	**722 J**	**17999**	114	215 J	23
MS-01	LOC.3	OU4-SD-M01-301A-D	05	20010819	0 - 0.33	120 J	**2475 J**	**1377 J**	**31461**	67	294 J	21
MS-01	LOC.3	OU4-SD-M01-302A-D	06	20020810	0 - 0.33	**884 J**	**5643 J**	**2220 J**	**46554**	89	110 J	20
MS-01	LOC.3	OU4-SD-M01-302A	06	20020813	0 - 0.33	**370 J**	655	298 J	11016	95	224 J	22
MS-01	LOC.3	OU4-SD-M01-302A-AVG	06	20020813	0 - 0.33	**627 J**	**3149 J**	**1259 J**	**28785**	92	167 J	21
MS-01	LOC.3	OU4-SD-M01-303A	07	20030809	0 - 0.33	189	276	98	4676	85	172	16 U
MS-01	LOC.3	OU4-SD-M01-303A-AVG	07	20030809	0 - 0.33	195	304	116	4800	88	170	17 J
MS-01	LOC.3	OU4-SD-M01-303A-D	07	20030809	0 - 0.33	202	332	135	4925	91	168	25 J
MS-01	LOC.3	OU4-SD-M01-311B	11	20110419	0 - 0.33	34	210	110	6920	-	-	-
MS-01	SD01	AS01-SD-SD01	ASP1	20050822	0 - 0.33	17	26 J	6 J	527	-	-	-
MS-01	SD01	AS01-SD-SD01-AVG	ASP1	20050822	0 - 0.33	22 J	42 J	12 J	693	-	-	-
MS-01	SD01	AS01-SD-SD01-D	ASP1	20050822	0 - 0.33	27 J	58	17 J	858	-	-	-
MS-01	SD03	AS01-SD-SD03	ASP1	20050822	0 - 0.33	**560**	**1500**	**690**	**25330**	-	-	-
MS-01	SD03	AS01-SD-SD03-AVG	ASP1	20050822	0 - 0.33	**560**	**1500**	**690**	**25330**	-	-	-
MS-01	SD05	AS01-SD-SD05	ASP1	20050822	0 - 0.33	**1000**	**1400**	**550**	**14400**	-	-	-
MS-01	SD07	AS01-SD-SD07	ASP1	20050822	0 - 0.33	16	23	5	437	-	-	-
MS-01	SD100	MS01-SD-SD100-0000	OU9PI	20090825	0 - 0.33	**16000**	**10000**	**6800**	**170000**	-	-	-
MS-01	SD100	MS01-SD-SD100-0000-AVG	OU9PI	20090825	0 - 0.33	**13000 J**	**8650**	**6100**	**134150**	-	-	-
MS-01	SD100	MS01-SD-SD100-0000-D	OU9PI	20090825	0 - 0.33	**10000 J**	**7300**	**5400**	**98300**	-	-	-
MS-01	SD100	MS01-SD-SD100-0102	OU9PI	20090825	1 - 2	**710 J**	250	220 J	3340	-	-	-
MS-01	SD100	MS01-SD-SD100-0102-AVG	OU9PI	20090825	1 - 2	**520 J**	215	180 J	3115	-	-	-
MS-01	SD100	MS01-SD-SD100-0102-D	OU9PI	20090825	1 - 2	**330 J**	180	140 J	2890	-	-	-
MS-01	SD101	MS01-SD-SD101-0000	OU9PI	20090825	0 - 0.33	130 J	89 J	53 J	2580	-	-	-

TABLE 1

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 1
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						PRG 210	PRG 1236	PRG 500	PRG 13057	PRG 486	PRG 436	PRG 124
MS-01	SD102	MS01-SD-SD102-0000	OU9PI	20090825	0 - 0.33	**340**	270	210 J	7670	-	-	-
MS-01	SD102	MS01-SD-SD102-0102	OU9PI	20090825	1 - 2	27	18	13 J	441	-	-	-
MS-01	SD103	MS01-SD-SD103-0000	OU9PI	20090825	0 - 0.33	**260**	150	110 J	3600	-	-	-
MS-01	SD104	MS01-SD-SD104-0000	OU9PI	20090825	0 - 0.33	140 J	260	110	4700	-	-	-
MS-01	SD104	MS01-SD-SD104-0102	OU9PI	20090825	1 - 2	**720**	**1700**	330	**20300**	-	-	-
MS-01	SD105	MS01-SD-SD105-0000	OU9PI	20090825	0 - 0.33	**2300**	1100	**1100**	**38000**	-	-	-
MS-01	SD105	MS01-SD-SD105-0102	OU9PI	20090825	1 - 2	**1200**	340	260	**26780**	-	-	-
MS-01	SD106	MS01-SD-SD106-0000	OU9PI	20090825	0 - 0.33	**1600**	1000	460	**22830**	-	-	-
MS-01	SD106	MS01-SD-SD106-0102	OU9PI	20090825	1 - 2	**3900 J**	**2100**	**1000**	**58800**	-	-	-
MS-01	SD107	MS01-SD-SD107-0000	OU9PI	20090825	0 - 0.33	**4000 J**	**2500**	**2000**	**54200**	-	-	-
MS-01	SD108	MS01-SD-SD108-0000	OU9PI	20090825	0 - 0.33	**220 J**	240	110	5400	-	-	-
MS-01	SD108	MS01-SD-SD108-0102	OU9PI	20090825	1 - 2	6 J	4 J	4 U	92	-	-	-
MS-01	SD109	MS01-SD-SD109-0000	OU9PI	20090825	0 - 0.33	57 J	49	25	1183	-	-	-
MS-01	SD109	MS01-SD-SD109-0102	OU9PI	20090825	1 - 2	5 J	4 U	4 U	51	-	-	-
MS-01	SD110	MS01-SD-SD110-0000	OU9PI	20090825	0 - 0.33	110 J	140	130	2193	-	-	-
MS-01	SD110	MS01-SD-SD110-0102	OU9PI	20090825	1 - 2	5 J	4 U	4 U	33	-	-	-
MS-01	SD111	MS01-SD-SD111-0000	OU9PI	20090824	0 - 0.33	98 J	100	57	2200	-	-	-
MS-01	SD112	MS01-SD-SD112-0000	OU9PI	20090826	0 - 0.33	23 J	27	11	560	-	-	-
MS-01	SD113	MS01-SD-SD113-0000	OU9PI	20090824	0 - 0.33	150 J	230	88	5090	-	-	-
MS-01	SD113	MS01-SD-SD113-0102	OU9PI	20090824	1 - 2	7 J	11	5	163	-	-	-
MS-01	SD114	MS01-SD-SD114-0000	OU9PI	20090824	0 - 0.33	**240 J**	160 J	130 J	4030	-	-	-
MS-01	SD114	MS01-SD-SD114-0000-AVG	OU9PI	20090824	0 - 0.33	195 J	150 J	90 J	3935	-	-	-
MS-01	SD114	MS01-SD-SD114-0000-D	OU9PI	20090824	0 - 0.33	150 J	140	49 J	3840	-	-	-
MS-01	SD114	MS01-SD-SD114-0102	OU9PI	20090824	1 - 2	**540 J**	470	160	12530	-	-	-
MS-01	SD114	MS01-SD-SD114-0102-AVG	OU9PI	20090824	1 - 2	**540 J**	460	195	12090	-	-	-
MS-01	SD114	MS01-SD-SD114-0102-D	OU9PI	20090824	1 - 2	**540 J**	450	230	11650	-	-	-
MS-01	SD115	MS01-SD-SD115-0000	OU9PI	20090824	0 - 0.33	**1000**	810	380	**16400**	-	-	-
MS-01	SD116	MS01-SD-SD116-0000	OU9PI	20090825	0 - 0.33	**700**	320	230	8300	-	-	-
MS-01	SD116	MS01-SD-SD116-0102	OU9PI	20090825	1 - 2	190 J	75 J	43 J	1642	-	-	-
MS-01	SD117	MS01-SD-SD117-0000	OU9PI	20090825	0 - 0.33	130 J	140	79	3080	-	-	-
MS-01	SD117	MS01-SD-SD117-0102	OU9PI	20090825	1 - 2	59 J	110	73	1250	-	-	-
MS-01	SD118	MS01-SD-SD118-0000	OU9PI	20090825	0 - 0.33	150 J	77	39	2010	-	-	-
MS-01	SD119	MS01-SD-SD119-0000	OU9PI	20090826	0 - 0.33	61 J	72	32	1352	-	-	-
MS-01	SD120	MS01-SD-SD120-0000	OU9PI	20090825	0 - 0.33	68 J	54	29	1590	-	-	-
MS-01	SD120	MS01-SD-SD120-0102	OU9PI	20090825	1 - 2	24 J	77	23	859	-	-	-
MS-01	SD121	MS01-SD-SD121-0000	OU9PI	20090825	0 - 0.33	68 J	200	95	2672	-	-	-
MS-01	SD122	MS01-SD-SD122-0000	OU9PI	20090825	0 - 0.33	180 J	260	120	5320	-	-	-
MS-01	SD122	MS01-SD-SD122-0102	OU9PI	20090825	1 - 2	8 J	4 J	5 UJ	115	-	-	-
MS-01	SD122	MS01-SD-SD122-0102-AVG	OU9PI	20090825	1 - 2	7 J	11 J	9 J	133	-	-	-
MS-01	SD122	MS01-SD-SD122-0102-D	OU9PI	20090825	1 - 2	6 J	19 J	15 J	152	-	-	-
MS-01	SD123	MS01-SD-SD123-0000	OU9PI	20090825	0 - 0.33	37 J	270	130	2263	-	-	-
MS-01	SD124	MS01-SD-SD124-0000	OU9PI	20090826	0 - 0.33	90 J	**1700**	**930**	**14870**	-	-	-
MS-01	SD124	MS01-SD-SD124-0102	OU9PI	20090826	1 - 2	36 J	92	32	1312	-	-	-
MS-01	SD125	MS01-SD-SD125-0000	OU9PI	20090826	0 - 0.33	110 J	1000	340	10530	-	-	-
MS-01	SD125	MS01-SD-SD125-0102	OU9PI	20090826	1 - 2	110 J	1200	420	12470	-	-	-

Shaded values exceed their PRG or 2 times the ER-M (for lead only).

MS - Monitoring station
COC - Chemical of concern
PRG - Preliminary remediation goal

ug/kg - Micrograms/kilogram
mg/kg - Milligrams/kilogram

J - Estimated value
U - Not detected at the indicated value.

TABLE 2

SUMMARY OF COCs DETECTED IN SELECT SEDIMENT SAMPLES AT MONITORING STATION 1
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 1 OF 2

Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)			
					ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS
					PRG 210	PRG 1236	PRG 500	PRG 13057
LOC.1	OU4-SD-M01-199A	01	19990910	0 - 0.33	72 J	100	25	940
	OU4-SD-M01-100B	02	20000504	0 - 0.33	**295**	276	187 J	5179
	OU4-SD-M01-100A	03	20000828	0 - 0.33	151 J	**1471 J**	**761 J**	**17965**
	OU4-SD-M01-101B	04	20010508	0 - 0.33	76 J	215 J	73 J	2316
	OU4-SD-M01-101A	05	20010819	0 - 0.33	**592 J**	**1852 J**	**518 J**	**19158**
	OU4-SD-M01-102A	06	20020813	0 - 0.33	**231 J**	245 J	53 J	3328
	OU4-SD-M01-103A	07	20030809	0 - 0.33	**805**	**8747**	**5546**	**54452**
	OU4-SD-M01-111B	11	20110419	0 - 0.33	12 J	68 J	52	2168
	OU4-SD-M01-111B-AVG	11	20110419	0 - 0.33	17 J	50 J	42	2111
	OU4-SD-M01-111B-D	11	20110419	0 - 0.33	21 J	32 J	31	2053
	AS01-SD-SD05	ASP1	20050822	0 - 0.33	**1000**	**1400**	**550**	**14400**
	MS01-SD-SD116-0000	OU9RI	20090825	0 - 0.33	**700**	320	230	8300
	MS01-SD-SD117-0000	OU9RI	20090825	0 - 0.33	130 J	140	79	3080
	Average Concentration for SD116 and SD117				**415**	230	155	5690
LOC.2	OU4-SD-M01-299A	01	19990909	0 - 0.33	189 J	766	202	8204
	OU4-SD-M01-200B	02	20000504	0 - 0.33	160	614	182 J	7113
	OU4-SD-M01-200A	03	20000828	0 - 0.33	114	146	22	1536
	OU4-SD-M01-201B	04	20010507	0 - 0.33	**219**	533	139 J	6094
	OU4-SD-M01-201A	05	20010819	0 - 0.33	**213**	306 J	90 J	3635
	OU4-SD-M01-202A	06	20020811	0 - 0.33	**600 J**	1184	**552 J**	**23700**
	OU4-SD-M01-203A	07	20030811	0 - 0.33	117	288	104	2443
	OU4-SD-M01-211B	11	20110419	0 - 0.33	23 J	37	15 J	2268
	MS01-SD-SD109-0000	OU9RI	20090825	0 - 0.33	57 J	49	25	1183

TABLE 2

SUMMARY OF COCs DETECTED IN SELECT SEDIMENT SAMPLES AT MONITORING STATION 1
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 2 OF 2

Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)			
					ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS
					PRG 210	PRG 1236	PRG 500	PRG 13057
LOC.3	OU4-SD-M01-399A	01	19990910	0 - 0.33	166	508 J	195	7360
	OU4-SD-M01-300B	02	20000504	0 - 0.33	**544 J**	**2650 J**	**1660 J**	**22509**
	OU4-SD-M01-300B-AVG	02	20000504	0 - 0.33	**371 J**	**1575 J**	**915 J**	**14257**
	OU4-SD-M01-300B-D	02	20000504	0 - 0.33	198 J	499 J	169 J	6005
	OU4-SD-M01-300A	03	20000828	0 - 0.33	**449 J**	846 J	215 J	9382
	OU4-SD-M01-300A-AVG	03	20000828	0 - 0.33	**451 J**	616 J	174 J	9312
	OU4-SD-M01-300A-D	03	20000828	0 - 0.33	**453 J**	385 J	133	9242
	OU4-SD-M01-301B	04	20010508	0 - 0.33	**796**	**3471 J**	**2109 J**	**37252**
	OU4-SD-M01-301B-AVG	04	20010508	0 - 0.33	**1116 J**	**2522 J**	**1350 J**	**34591**
	OU4-SD-M01-301B-D	04	20010508	0 - 0.33	**1435 J**	**1573 J**	**590 J**	**31930**
	OU4-SD-M01-301A	05	20010819	0 - 0.33	**242**	363 J	68 J	4538
	OU4-SD-M01-301A-AVG	05	20010819	0 - 0.33	181 J	**1419 J**	**722 J**	**17999**
	OU4-SD-M01-301A-D	05	20010819	0 - 0.33	120 J	**2475 J**	**1377 J**	**31461**
	OU4-SD-M01-302A-D	06	20020810	0 - 0.33	**884 J**	**5643 J**	**2220 J**	**46554**
	OU4-SD-M01-302A	06	20020813	0 - 0.33	**370 J**	655	298 J	11016
	OU4-SD-M01-302A-AVG	06	20020813	0 - 0.33	**627 J**	**3149 J**	**1259 J**	**28785**
	OU4-SD-M01-303A	07	20030809	0 - 0.33	189	276	98	4676
	OU4-SD-M01-303A-AVG	07	20030809	0 - 0.33	195	304	116	4800
	OU4-SD-M01-303A-D	07	20030809	0 - 0.33	202	332	135	4925
	OU4-SD-M01-311B	11	20110419	0 - 0.33	34	210	110	6920
	AS01-SD-SD03	ASP1	20050822	0 - 0.33	**560**	**1500**	**690**	**25330**
	MS01-SD-SD114-0000	OU9RI	20090824	0 - 0.33	**240 J**	160 J	130 J	4030
	MS01-SD-SD114-0000-AVG	OU9RI	20090824	0 - 0.33	195 J	150 J	90 J	3935
	MS01-SD-SD114-0000-D	OU9RI	20090824	0 - 0.33	150 J	140	49 J	3840

Shaded values exceed their PRG.

COC - Chemical of concern
MS - Monitoring station
PRG - Preliminary remediation goal
ug/kg - Micrograms/kilogram
J - Estimated value

TABLE 3

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 1 OF 4

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER		LEAD	NICKEL	
										EPA METHOD	NOAA METHOD		EPA METHOD	NOAA METHOD
						PRG 210	PRG 1236	PRG 500	PRG 13057	-	PRG 486	PRG 436	-	PRG 124
MS-03	LOC.1	OU4-SD-M03-199A-D	01	19990909	0 - 0.33	116 J	314	60	3891	-	236 J	126 J	-	48
MS-03	LOC.1	OU4-SD-M03-199A	01	19990910	0 - 0.33	107 J	248	51	3867	-	173 J	128 J	-	43
MS-03	LOC.1	OU4-SD-M03-199A-AVG	01	19990910	0 - 0.33	112 J	281	56	3879	-	205 J	127 J	-	46
MS-03	LOC.1	OU4-SD-M03-100B	02	20000504	0 - 0.33	143	621	176 J	6416	-	185	133	-	45
MS-03	LOC.1	OU4-SD-M03-100A	03	20000827	0 - 0.33	153	274 J	62 J	3322	-	186 J	164	-	39 J
MS-03	LOC.1	OU4-SD-M03-101B	04	20010506	0 - 0.33	152	576	83 J	5898	-	182	127	-	43
MS-03	LOC.1	OU4-SD-M03-101A	05	20010819	0 - 0.33	97	500 J	65 J	5468	-	309	127	-	41
MS-03	LOC.1	OU4-SD-M03-102A	06	20020810	0 - 0.33	88 J	388	62 J	6628	-	231	168	-	47 J
MS-03	LOC.1	OU4-SD-M03-103A	07	20030809	0 - 0.33	70	912	479	8821	-	215	135	-	26 J
MS-03	LOC.1	OU4-SD-M03-111B	11	20110418	0 - 0.33	16 J	76	38 J	3352	127	161	-	-	-
MS-03	LOC.2	OU4-SD-M03-299A	01	19990910	0 - 0.33	77 J	353	126	4442	-	**3720**	206 J	-	86 J
MS-03	LOC.2	OU4-SD-M03-200B	02	20000504	0 - 0.33	78	281	79 J	3556	-	**1090**	229	-	79
MS-03	LOC.2	OU4-SD-M03-200A	03	20000827	0 - 0.33	63	126 J	34 J	1841	-	**1902** J	292	-	102 J
MS-03	LOC.2	OU4-SD-M03-201B	04	20010506	0 - 0.33	74	266	51 J	2858	-	**564**	184	-	63
MS-03	LOC.2	OU4-SD-M03-201A	05	20010819	0 - 0.33	118	774 J	87 J	3713	-	**664**	180	-	72
MS-03	LOC.2	OU4-SD-M03-202A	06	20020810	0 - 0.33	134 J	668	67 J	12055	-	**975**	272	-	110
MS-03	LOC.2	OU4-SD-M03-203A	07	20030809	0 - 0.33	66	242	69	3412	-	**732**	180	-	**315** J
MS-03	LOC.2	OU4-SD-M03-211B	11	20110418	0 - 0.33	22 J	310	120	6780	551	**636**	-	-	-
MS-03	LOC.3	OU4-SD-M03-399A	01	19990910	0 - 0.33	62 J	150	33	2407	-	125	79 J	-	30 J
MS-03	LOC.3	OU4-SD-M03-300B	02	20000504	0 - 0.33	88	247	74 J	2989	-	106	81	-	27
MS-03	LOC.3	OU4-SD-M03-300A	03	20000827	0 - 0.33	62	182 J	73 J	1909	-	27	52	-	15 J
MS-03	LOC.3	OU4-SD-M03-301B	04	20010506	0 - 0.33	54	142	31 J	1612	-	30	51	-	19
MS-03	LOC.3	OU4-SD-M03-301A	05	20010819	0 - 0.33	113	408 J	73 J	3848	-	115	93	-	30
MS-03	LOC.3	OU4-SD-M03-302A	06	20020810	0 - 0.33	44 J	190	39 J	2014	-	23	52	-	20 J
MS-03	LOC.3	OU4-SD-M03-303A	07	20030809	0 - 0.33	42	124	26	1420	-	61	41	-	12 U
MS-03	LOC.3	OU4-SD-M03-311B	11	20110418	0 - 0.33	12 J	55	26 J	1506	23	45	-	-	-
MS-04	LOC.1	OU4-SD-M04-199A	01	19990910	0 - 0.33	80 J	197	41	2939	-	**565**	110 J	-	61 J
MS-04	LOC.1	OU4-SD-M04-100B	02	20000504	0 - 0.33	**345**	715	157	7053	-	**1780**	316	-	**193**
MS-04	LOC.1	OU4-SD-M04-100A	03	20000827	0 - 0.33	**216**	621 J	137 J	9530	-	**20507** J	**788**	-	**197** J
MS-04	LOC.1	OU4-SD-M04-101B	04	20010506	0 - 0.33	**217** J	**2408** J	**557** J	**17894**	-	**2225**	**522**	-	**282**
MS-04	LOC.1	OU4-SD-M04-101B-AVG	04	20010506	0 - 0.33	**387** J	**4165** J	**889** J	**30823**	-	**2452**	**462**	-	**297**
MS-04	LOC.1	OU4-SD-M04-101B-D	04	20010506	0 - 0.33	**557** J	**5921** J	**1221** J	**43753**	-	**2680**	402	-	**313**
MS-04	LOC.1	OU4-SD-M04-101A	05	20010819	0 - 0.33	162	**1399** J	179 J	8604	-	**2697**	**450**	-	**389**
MS-04	LOC.1	OU4-SD-M04-101A-AVG	05	20010819	0 - 0.33	156	1136	171 J	9854	-	**2450**	**566**	-	**422**
MS-04	LOC.1	OU4-SD-M04-101A-D	05	20010819	0 - 0.33	149	874	162 J	11104	-	**2203**	**682**	-	**455**
MS-04	LOC.1	OU4-SD-M04-102A	06	20020810	0 - 0.33	**216** J	**2305** J	176 J	**25264**	-	**3100**	**510**	-	**591** J
MS-04	LOC.1	OU4-SD-M04-102A-AVG	06	20020810	0 - 0.33	141 J	**1483** J	152 J	**16873**	-	**3466**	**519** J	-	**480** J
MS-04	LOC.1	OU4-SD-M04-102A-D	06	20020810	0 - 0.33	65 J	662 J	127	8482	-	**3831**	**528** J	-	**369**
MS-04	LOC.1	OU4-SD-M04-103A	07	20030809	0 - 0.33	131	1009 J	125 J	12126	-	**6421**	**747**	-	**385** J
MS-04	LOC.1	OU4-SD-M04-103A-AVG	07	20030809	0 - 0.33	157	**1466** J	240 J	**17232**	-	**7073**	**790**	-	**336** J
MS-04	LOC.1	OU4-SD-M04-103A-D	07	20030809	0 - 0.33	183	**1923** J	355 J	**22337**	-	**7725**	**834**	-	**287** J
MS-04	LOC.1	OU4-SD-M04-111B	11	20110418	0 - 0.33	14 J	150	56	2501	331	390	-	-	-
MS-04	LOC.2	OU4-SD-M04-299A	01	19990909	0 - 0.33	53 J	120	17	1237	-	22	47 J	-	19 J
MS-04	LOC.2	OU4-SD-M04-200B	02	20000504	0 - 0.33	61	160	37 J	1695	-	60	47	-	23
MS-04	LOC.2	OU4-SD-M04-200A	03	20000827	0 - 0.33	78	123 J	32	1472	-	33 J	58	-	17 J
MS-04	LOC.2	OU4-SD-M04-201B	04	20010506	0 - 0.33	53	152	31 J	1449	-	34	62	-	22
MS-04	LOC.2	OU4-SD-M04-201A	05	20010819	0 - 0.33	98	343 J	42 J	2390	-	27	54	-	21
MS-04	LOC.2	OU4-SD-M04-202A	06	20020810	0 - 0.33	55 J	137	26 J	1639	-	24	51	-	21 J
MS-04	LOC.2	OU4-SD-M04-203A	07	20030810	0 - 0.33	56	150	41	1821	-	59	66	-	7 U
MS-04	LOC.2	OU4-SD-M04-211B	11	20110418	0 - 0.33	10 J	24 J	14 J	1037	36	60	-	-	-
MS-04	LOC.3	OU4-SD-M04-399A	01	19990910	0 - 0.33	26 J	61	9	1903	-	140	67 J	-	39 J
MS-04	LOC.3	OU4-SD-M04-300B	02	20000504	0 - 0.33	9	25	4	300	-	393	145	-	**158**
MS-04	LOC.3	OU4-SD-M04-300A	03	20000827	0 - 0.33	18	29 J	5	1108	-	118 J	123	-	25 J
MS-04	LOC.3	OU4-SD-M04-301B	04	20010506	0 - 0.33	8	22	4 J	376	-	243	156	-	39
MS-04	LOC.3	OU4-SD-M04-301A	05	20010819	0 - 0.33	9	25 J	3 J	243	-	149	75	-	32
MS-04	LOC.3	OU4-SD-M04-302A	06	20020810	0 - 0.33	17 J	27	6 J	549	-	176	71	-	28

TABLE 3

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 2 OF 4

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER		LEAD	NICKEL	
										EPA METHOD	NOAA METHOD		EPA METHOD	NOAA METHOD
						PRG 210	PRG 1236	PRG 500	PRG 13057	-	PRG 486	PRG 436	-	PRG 124
MS-04	LOC.3	OU4-SD-M04-303A	07	20030809	0 - 0.33	13	29	6	488	-	139	63	-	34 J
MS-04	LOC.3	OU4-SD-M04-311B	11	20110418	0 - 0.33	2 J	22 J	5 J	849	77	105	-	-	-
MS-04	LOC.4	OU4-SD-M04-401B	04	20010508	0 - 0.33	-	-	-	-	-	121	80	-	35
MS-04	LOC.5	OU4-SD-M04-501B	04	20010508	0 - 0.33	-	-	-	-	-	**4281**	**589**	-	**508**
MS-04	LOC.6	OU4-SD-M04-601B	04	20010508	0 - 0.33	-	-	-	-	-	**3728**	401	-	**286**
TP	D120	TPSD1200004		20081216	0 - 0.33	-	-	-	-	147	166	-	-	-
TP	D120	TPSD1201216		20081216	1 - 1.33	-	-	-	-	181	208	-	-	-
TP	D120	TPSD1201216-AVG		20081216	1 - 1.33	-	-	-	-	182	208	-	-	-
TP	D120	TPSD1201216-D		20081216	1 - 1.33	-	-	-	-	182	209	-	-	-
TP	SD01	TPSD010006		20030522	0 - 0.5	-	-	-	-	174 J	199	-	41	59
TP	SD01	TPSD010612		20030522	0.5 - 1	-	-	-	-	159 J	181	-	39	57
TP	SD01	TPSD010612-AVG		20030522	0.5 - 1	-	-	-	-	166 J	189	-	39	57
TP	SD01	TPSD010612-D		20030522	0.5 - 1	-	-	-	-	173 J	198	-	39	58
TP	SD02	TPSD020006		20030522	0 - 0.5	-	-	-	-	79 J	83	-	26	46
TP	SD03	TPSD030006		20030813	0 - 0.5	-	-	-	-	140	158	-	32	51
TP	SD03	TPSD030006-AVG		20030813	0 - 0.5	-	-	-	-	155	176	-	34	53
TP	SD03	TPSD030006-D		20030813	0 - 0.5	-	-	-	-	170	194	-	35	54
TP	SD03	TPSD030612		20030813	0.5 - 1	-	-	-	-	184	211	-	40	58
TP	SD04	TPSD040006		20030522	0 - 0.5	-	-	-	-	1840 J	**2080**	-	352	**330**
TP	SD04	TPSD040612		20030522	0.5 - 1	-	-	-	-	1660 J	**1878**	-	67	81
TP	SD05	TPSD050006		20030522	0 - 0.5	-	-	-	-	115 J	127	-	28	48
TP	SD05	TPSD050612		20030522	0.5 - 1	-	-	-	-	101 J	110	-	26	46
TP	SD06	TPSD060006		20030522	0 - 0.5	-	-	-	-	169 J	193	-	25	45
TP	SD06	TPSD060006-AVG		20030522	0 - 0.5	-	-	-	-	132 J	147	-	24	44
TP	SD06	TPSD060006-D		20030522	0 - 0.5	-	-	-	-	94 J	101	-	23	43
TP	SD06	TPSD060612		20030522	0.5 - 1	-	-	-	-	65 J	66	-	20	41
TP	SD07	TPSD070006		20030522	0 - 0.5	-	-	-	-	231 J	269	-	34	53
TP	SD07	TPSD070612		20030522	0.5 - 1	-	-	-	-	469 J	**559**	-	51	67
TP	SD09	TPSD090006		20030522	0 - 0.5	-	-	-	-	72 J	75	-	18 J	39
TP	SD09	TPSD090612		20030522	0.5 - 1	-	-	-	-	9 J	-2	-	13 J	35
TP	SD09	TPSD090612-AVG		20030522	0.5 - 1	-	-	-	-	57 J	56	-	17 J	38
TP	SD09	TPSD090612-D		20030522	0.5 - 1	-	-	-	-	105 J	115	-	21	42
TP	SD10	TPSD100006		20030522	0 - 0.5	-	-	-	-	206 J	238	-	26	46
TP	SD10	TPSD100612		20030522	0.5 - 1	-	-	-	-	195 J	225	-	27	47
TP	SD12	TPSD120006		20030521	0 - 0.5	-	-	-	-	270 J	316	-	23	43
TP	SD12	TPSD120612		20030521	0.5 - 1	-	-	-	-	228 J	265	-	37	56
TP	SD12	TPSD120612-AVG		20030521	0.5 - 1	-	-	-	-	1174 J	**1334**	-	31	50
TP	SD12	TPSD120612-D		20030521	0.5 - 1	-	-	-	-	2120 J	**2394**	-	24	44
TP	SD12	TPSD120612-RE		20030521	0.5 - 1	-	-	-	-	320	377	-	24	44
TP	SD12	TPSD120612-RE-AVG		20030521	0.5 - 1	-	-	-	-	382	452	-	24	44
TP	SD12	TPSD120612-RE-D		20030521	0.5 - 1	-	-	-	-	443	**527**	-	24	44
TP	SD13	TPSD130006		20030522	0 - 0.5	-	-	-	-	56 J	55	-	20 J	41
TP	SD13	TPSD130612		20030522	0.5 - 1	-	-	-	-	13 J	2	-	14 J	36
TP	SD14	TPSD140006		20030521	0 - 0.5	-	-	-	-	104 J	114	-	22	42
TP	SD14	TPSD140612		20030521	0.5 - 1	-	-	-	-	88 J	95	-	19	40
TP	SD15	TPSD150006		20030522	0 - 0.5	-	-	-	-	59 J	58	-	25	45
TP	SD15	TPSD150006-AVG		20030522	0 - 0.5	-	-	-	-	34 J	29	-	20 J	40
TP	SD15	TPSD150006-D		20030522	0 - 0.5	-	-	-	-	10 J	-1	-	14 J	36
TP	SD15	TPSD150612		20030522	0.5 - 1	-	-	-	-	17 J	7	-	16 J	38
TP	SD16	TPSD160006		20030521	0 - 0.5	-	-	-	-	320 J	377	-	24	45
TP	SD16	TPSD160612		20030521	0.5 - 1	-	-	-	-	86	91	-	23	43
TP	SD17	TPSD170006		20030521	0 - 0.5	-	-	-	-	61	61	-	22	43
TP	SD17	TPSD170612		20030521	0.5 - 1	-	-	-	-	65	66	-	24	44
TP	SD18	TPSD180006		20030521	0 - 0.5	-	-	-	-	113	125	-	25	45
TP	SD18	TPSD180612		20030521	0.5 - 1	-	-	-	-	70	72	-	25	45
TP	SD19	TPSD190006		20030521	0 - 0.5	-	-	-	-	60	59	-	27	47

TABLE 3

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 3 OF 4

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER		LEAD	NICKEL	
										EPA METHOD	NOAA METHOD		EPA METHOD	NOAA METHOD
						PRG 210	PRG 1236	PRG 500	PRG 13057	-	PRG 486	PRG 436	-	PRG 124
TP	SD19	TPSD190612		20030521	0.5 - 1	-	-	-	-	56 J	55	-	22	43
TP	SD19	TPSD190612-AVG		20030521	0.5 - 1	-	-	-	-	119 J	131	-	26	46
TP	SD19	TPSD190612-D		20030521	0.5 - 1	-	-	-	-	181 J	208	-	31	50
TP	SD20	TPSD200006		20030521	0 - 0.5	-	-	-	-	103	112	-	28	48
TP	SD20	TPSD200612		20030521	0.5 - 1	-	-	-	-	135	151	-	33	52
TP	SD21	TPSD210006		20030521	0 - 0.5	-	-	-	-	51	49	-	24	44
TP	SD21	TPSD210612		20030521	0.5 - 1	-	-	-	-	98	106	-	18	39
TP	SD22	TPSD220006		20030520	0 - 0.5	-	-	-	-	127 J	142	-	31	50
TP	SD22	TPSD220612		20030520	0.5 - 1	-	-	-	-	125 J	139	-	30	49
TP	SD23	TPSD230006		20030521	0 - 0.5	-	-	-	-	82	87	-	27	47
TP	SD23	TPSD230612		20030521	0.5 - 1	-	-	-	-	157	178	-	31	50
TP	SD24	TPSD240006		20030520	0 - 0.5	-	-	-	-	100 J	108	-	31	51
TP	SD24	TPSD240612		20030520	0.5 - 1	-	-	-	-	195 J	225	-	28	48
TP	SD25	TPSD250006		20030521	0 - 0.5	-	-	-	-	124	138	-	33	52
TP	SD25	TPSD250612		20030521	0.5 - 1	-	-	-	-	234	272	-	30	49
TP	SD25	TPSD250612-AVG		20030521	0.5 - 1	-	-	-	-	217	251	-	29	49
TP	SD25	TPSD250612-D		20030521	0.5 - 1	-	-	-	-	199	229	-	29	49
TP	SD26	TPSD260006		20030520	0 - 0.5	-	-	-	-	111 J	122	-	32	51
TP	SD26	TPSD260612		20030520	0.5 - 1	-	-	-	-	182 J	209	-	29	49
TP	SD27	TPSD270006		20030521	0 - 0.5	-	-	-	-	85	90	-	26	46
TP	SD27	TPSD270612		20030521	0.5 - 1	-	-	-	-	98	107	-	25	45
TP	SD28	TPSD280006		20030520	0 - 0.5	-	-	-	-	267 J	312	-	44	62
TP	SD28	TPSD280612		20030520	0.5 - 1	-	-	-	-	274 J	321	-	34	53
TP	SD29	TPSD290006		20030521	0 - 0.5	-	-	-	-	101	110	-	28	48
TP	SD29	TPSD290612		20030521	0.5 - 1	-	-	-	-	120 J	133	-	35	54
TP	SD30	TPSD300006		20030520	0 - 0.5	-	-	-	-	282 J	331	-	49	66
TP	SD30	TPSD300612		20030520	0.5 - 1	-	-	-	-	342 J	404	-	35	54
TP	SD33	TPSD330006		20030521	0 - 0.5	-	-	-	-	111 J	122	-	31	50
TP	SD33	TPSD330612		20030521	0.5 - 1	-	-	-	-	59 J	59	-	22	42
TP	SD34	TPSD340006		20030520	0 - 0.5	-	-	-	-	317 J	373	-	47	64
TP	SD34	TPSD340612		20030520	0.5 - 1	-	-	-	-	35 J	29	-	17	38
TP	SD35	TPSD350006		20030521	0 - 0.5	-	-	-	-	135 J	151	-	31	50
TP	SD35	TPSD350612		20030521	0.5 - 1	-	-	-	-	189 J	217	-	33	52
TP	SD35	TPSD350612-AVG		20030521	0.5 - 1	-	-	-	-	205 J	236	-	33	52
TP	SD35	TPSD350612-D		20030521	0.5 - 1	-	-	-	-	220 J	255	-	33	52
TP	SD36	TPSD360006		20030520	0 - 0.5	-	-	-	-	150 J	170	-	30	50
TP	SD37	TPSD370006		20030521	0 - 0.5	-	-	-	-	126 J	140	-	33	52
TP	SD37	TPSD370612		20030521	0.5 - 1	-	-	-	-	263 J	308	-	37	55
TP	SD38	TPSD380006		20030521	0 - 0.5	-	-	-	-	90 J	96	-	26	46
TP	SD38	TPSD380612		20030521	0.5 - 1	-	-	-	-	191 J	220	-	35	54
TP	SD101	TPSD1010004		20081216	0 - 0.33	-	-	-	-	585	**700**	-	-	-
TP	SD101	TPSD1011216		20081216	1 - 1.33	-	-	-	-	969	**1104**	-	-	-
TP	SD102	TPSD1020004		20081216	0 - 0.33	-	-	-	-	521	**622**	-	-	-
TP	SD102	TPSD1021216		20081216	1 - 1.33	-	-	-	-	1140	**1296**	-	-	-
TP	SD103	TPSD1030004		20081216	0 - 0.33	-	-	-	-	914	**1043**	-	-	-
TP	SD103	TPSD1031216		20081216	1 - 1.33	-	-	-	-	68	70	-	-	-
TP	SD104	TPSD1040004		20081216	0 - 0.33	-	-	-	-	438	**521**	-	-	-
TP	SD104	TPSD1041216		20081216	1 - 1.33	-	-	-	-	68	70	-	-	-
TP	SD105	TPSD1050004		20081216	0 - 0.33	-	-	-	-	710	**814**	-	-	-
TP	SD105	TPSD1051216		20081216	1 - 1.33	-	-	-	-	946	**1079**	-	-	-
TP	SD106	TPSD1060004		20081216	0 - 0.33	-	-	-	-	1120	**1274**	-	-	-
TP	SD106	TPSD1061216		20081216	1 - 1.33	-	-	-	-	1160	**1318**	-	-	-
TP	SD107	TPSD1070004		20081216	0 - 0.33	-	-	-	-	442	**526**	-	-	-
TP	SD107	TPSD1071216		20081216	1 - 1.33	-	-	-	-	599	**717**	-	-	-
TP	SD108	TPSD1080004		20081216	0 - 0.33	-	-	-	-	229	266	-	-	-
TP	SD108	TPSD1081216		20081216	1 - 1.33	-	-	-	-	14	4	-	-	-

TABLE 3

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER		LEAD	NICKEL	
										EPA METHOD	NOAA METHOD		EPA METHOD	NOAA METHOD
						PRG 210	PRG 1236	PRG 500	PRG 13057	-	PRG 486	PRG 436	-	PRG 124
TP	SD109	TPSD1090004		20081216	0 - 0.33	-	-	-	-	675	**810**	-	-	-
TP	SD109	TPSD1091216		20081216	1 - 1.33	-	-	-	-	21	12	-	-	-
TP	SD110	TPSD1100004		20081216	0 - 0.33	-	-	-	-	1130	**1285**	-	-	-
TP	SD110	TPSD1101216		20081216	1 - 1.33	-	-	-	-	14	4	-	-	-
TP	SD111	TPSD1110004		20081216	0 - 0.33	-	-	-	-	340	402	-	-	-
TP	SD111	TPSD1111216		20081216	1 - 1.33	-	-	-	-	11	0	-	-	-
TP	SD112	TPSD1120004		20081216	0 - 0.33	83 J	160 J	44 J	2760	1120	**1274**	-	-	-
TP	SD112	TPSD1121216		20081216	1 - 1.33	4 UJ	1 J	4 UJ	35	12	1	-	-	-
TP	SD113	TPSD1130004		20081216	0 - 0.33	64	150	65	2498	407	483	-	-	-
TP	SD113	TPSD1131216		20081216	1 - 1.33	15	52	24	781	115	127	-	-	-
TP	SD114	TPSD1140004		20081216	0 - 0.33	38	74	29	1195	175	200	-	-	-
TP	SD114	TPSD1141216		20081216	1 - 1.33	6	7	2 J	178	5	-7	-	-	-
TP	SD115	TPSD1150004		20081216	0 - 0.33	72	91	24	1530	113	125	-	-	-
TP	SD115	TPSD1151216		20081216	1 - 1.33	10	12	5 J	180	26	18	-	-	-
TP	SD116	TPSD1160004		20081216	0 - 0.33	63	75	17	1432	118	131	-	-	-
TP	SD116	TPSD1160004-AVG		20081216	0 - 0.33	59	74	19	1326	119	132	-	-	-
TP	SD116	TPSD1160004-D		20081216	0 - 0.33	55	73	21	1219	120	133	-	-	-
TP	SD116	TPSD1161216		20081216	1 - 1.33	59	68	17	1149	47	44	-	-	-
TP	SD117	TPSD1170004		20081216	0 - 0.33	-	-	-	-	64	65	-	-	-
TP	SD117	TPSD1171216		20081216	1 - 1.33	-	-	-	-	97	105	-	-	-
TP	SD118	TPSD1180004		20081216	0 - 0.33	-	-	-	-	281	330	-	-	-
TP	SD118	TPSD1181216		20081216	1 - 1.33	-	-	-	-	14	4	-	-	-
TP	SD119	TPSD1190004		20081216	0 - 0.33	-	-	-	-	114	126	-	-	-
TP	SD119	TPSD1190004-AVG		20081216	0 - 0.33	-	-	-	-	100	108	-	-	-
TP	SD119	TPSD1190004-D		20081216	0 - 0.33	-	-	-	-	85	91	-	-	-
TP	SD119	TPSD1191216		20081216	1 - 1.33	-	-	-	-	17 J	7	-	-	-
TP	SD119	TPSD1191216-AVG		20081216	1 - 1.33	-	-	-	-	25 J	17	-	-	-
TP	SD119	TPSD1191216-D		20081216	1 - 1.33	-	-	-	-	33 J	27	-	-	-

Shaded values exceed their PRG or 2 times the ER-M (for lead only).

COC - Chemical of concern
MS - Monitoring station
PRG - Preliminary remediation goal
ug/kg - Micrograms/kilogram
mg/kg - Milligrams/kilogram
J - Estimated value
U - Not detected at the indicated value.

TABLE 4

SUMMARY OF COCs DETECTED IN SELECT SEDIMENT SAMPLES AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)
					ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER
									NOAA METHOD
					PRG 210	PRG 1236	PRG 500	PRG 13057	PRG 486
MS-03 Loc. 1	OU4-SD-M03-199A-D	01	19990909	0 - 0.33	116 J	314	60	3891	236 J
	OU4-SD-M03-199A	01	19990910	0 - 0.33	107 J	248	51	3867	173 J
	OU4-SD-M03-199A-AVG	01	19990910	0 - 0.33	112 J	281	56	3879	205 J
	OU4-SD-M03-100B	02	20000504	0 - 0.33	143	621	176 J	6416	185
	OU4-SD-M03-100A	03	20000827	0 - 0.33	153	274 J	62 J	3322	186 J
	OU4-SD-M03-101B	04	20010506	0 - 0.33	152	576	83 J	5898	182
	OU4-SD-M03-101A	05	20010819	0 - 0.33	97	500 J	65 J	5468	309
	OU4-SD-M03-102A	06	20020810	0 - 0.33	88 J	388	62 J	6628	231
	OU4-SD-M03-103A	07	20030809	0 - 0.33	70	912	479	8821	215
	OU4-SD-M03-111B	11	20110418	0 - 0.33	16 J	76	38 J	3352	161
	TPSD140006		20030521	0 - 0.5	-	-	-	-	114
	TPSD160006		20030521	0 - 0.5	-	-	-	-	377
	Average Concentration								245
MS-03 Loc. 2	OU4-SD-M03-299A	01	19990910	0 - 0.33	77 J	353	126	4442	**3720**
	OU4-SD-M03-200B	02	20000504	0 - 0.33	78	281	79 J	3556	**1090**
	OU4-SD-M03-200A	03	20000827	0 - 0.33	63	126 J	34 J	1841	**1902** J
	OU4-SD-M03-201B	04	20010506	0 - 0.33	74	266	51 J	2858	**564**
	OU4-SD-M03-201A	05	20010819	0 - 0.33	118	774 J	87 J	3713	**664**
	OU4-SD-M03-202A	06	20020810	0 - 0.33	134 J	668	67 J	12055	**975**
	OU4-SD-M03-203A	07	20030809	0 - 0.33	66	242	69	3412	**732**
	OU4-SD-M03-211B	11	20110418	0 - 0.33	22 J	310	120	6780	**636**
	TPSD1050004		20081216	0 - 0.33	-	-	-	-	**814**
MS-03 Loc. 3	OU4-SD-M03-399A	01	19990910	0 - 0.33	62 J	150	33	2407	125
	OU4-SD-M03-300B	02	20000504	0 - 0.33	88	247	74 J	2989	106
	OU4-SD-M03-300A	03	20000827	0 - 0.33	62	182 J	73 J	1909	27
	OU4-SD-M03-301B	04	20010506	0 - 0.33	54	142	31 J	1612	30
	OU4-SD-M03-301A	05	20010819	0 - 0.33	113	408 J	73 J	3848	115
	OU4-SD-M03-302A	06	20020810	0 - 0.33	44 J	190	39 J	2014	23
	OU4-SD-M03-303A	07	20030809	0 - 0.33	42	124	26	1420	61
	OU4-SD-M03-311B	11	20110418	0 - 0.33	12 J	55	26 J	1506	45
	TPSD090006		20030522	0 - 0.5	-	-	-	-	75

TABLE 4

SUMMARY OF COCs DETECTED IN SELECT SEDIMENT SAMPLES AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)
					ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER
									NOAA METHOD
					PRG 210	PRG 1236	PRG 500	PRG 13057	PRG 486
MS-04 Loc. 1	OU4-SD-M04-199A	01	19990910	0 - 0.33	80 J	197	41	2939	**565**
	OU4-SD-M04-100B	02	20000504	0 - 0.33	**345**	715	157	7053	**1780**
	OU4-SD-M04-100A	03	20000827	0 - 0.33	**216**	621 J	137 J	9530	**20507** J
	OU4-SD-M04-101B	04	20010506	0 - 0.33	**217** J	**2408** J	**557** J	**17894**	**2225**
	OU4-SD-M04-101B-AVG	04	20010506	0 - 0.33	**387** J	**4165** J	**889** J	**30823**	**2452**
	OU4-SD-M04-101B-D	04	20010506	0 - 0.33	**557** J	**5921** J	**1221** J	**43753**	**2680**
	OU4-SD-M04-101A	05	20010819	0 - 0.33	162	**1399** J	179 J	8604	**2697**
	OU4-SD-M04-101A-AVG	05	20010819	0 - 0.33	156	1136	171 J	9854	**2450**
	OU4-SD-M04-101A-D	05	20010819	0 - 0.33	149	874	162 J	11104	**2203**
	OU4-SD-M04-102A	06	20020810	0 - 0.33	**216** J	**2305** J	176 J	**25264**	**3100**
	OU4-SD-M04-102A-AVG	06	20020810	0 - 0.33	141 J	**1483** J	152 J	**16873**	**3466**
	OU4-SD-M04-102A-D	06	20020810	0 - 0.33	65 J	662 J	127	8482	**3831**
	OU4-SD-M04-103A	07	20030809	0 - 0.33	131	1009 J	125 J	12126	**6421**
	OU4-SD-M04-103A-AVG	07	20030809	0 - 0.33	157	**1466** J	240 J	**17232**	**7073**
	OU4-SD-M04-103A-D	07	20030809	0 - 0.33	183	**1923** J	355 J	**22337**	**7725**
	OU4-SD-M04-111B	11	20110418	0 - 0.33	14 J	150	56	2501	390
	TPSD1120004		20081216	0 - 0.33	83 J	160 J	44 J	2760	**1274**
MS-04 Loc. 2	OU4-SD-M04-299A	01	19990909	0 - 0.33	53 J	120	17	1237	22
	OU4-SD-M04-200B	02	20000504	0 - 0.33	61	160	37 J	1695	60
	OU4-SD-M04-200A	03	20000827	0 - 0.33	78	123 J	32	1472	33 J
	OU4-SD-M04-201B	04	20010506	0 - 0.33	53	152	31 J	1449	34
	OU4-SD-M04-201A	05	20010819	0 - 0.33	98	343 J	42 J	2390	27
	OU4-SD-M04-202A	06	20020810	0 - 0.33	55 J	137	26 J	1639	24
	OU4-SD-M04-203A	07	20030810	0 - 0.33	56	150	41	1821	59
	OU4-SD-M04-211B	11	20110418	0 - 0.33	10 J	24 J	14 J	1037	60
MS-04 Loc. 3	OU4-SD-M04-399A	01	19990910	0 - 0.33	26 J	61	9	1903	140
	OU4-SD-M04-300B	02	20000504	0 - 0.33	9	25	4	300	393
	OU4-SD-M04-300A	03	20000827	0 - 0.33	18	29 J	5	1108	118 J
	OU4-SD-M04-301B	04	20010506	0 - 0.33	8	22	4 J	376	243
	OU4-SD-M04-301A	05	20010819	0 - 0.33	9	25 J	3 J	243	149
	OU4-SD-M04-302A	06	20020810	0 - 0.33	17 J	27	6 J	549	176
	OU4-SD-M04-303A	07	20030809	0 - 0.33	13	29	6	488	139
	OU4-SD-M04-311B	11	20110418	0 - 0.33	2 J	22 J	5 J	849	105

TABLE 4

SUMMARY OF COCs DETECTED IN SELECT SEDIMENT SAMPLES AT MONITORING STATIONS 3 AND 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)
					ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER
									NOAA METHOD
					PRG 210	PRG 1236	PRG 500	PRG 13057	PRG 486
MS-04 Loc. 4	OU4-SD-M04-401B	04	20010508	0 - 0.33	-	-	-	-	121
	TPSD1150004		20081216	0 - 0.33	72	91	24	1530	125
MS-04 Loc. 5	OU4-SD-M04-501B	04	20010508	0 - 0.33	-	-	-	-	**4281**
	TPSD1140004		20081216	0 - 0.33	38	74	29	1195	200
MS-04 Loc. 6	OU4-SD-M04-601B	04	20010508	0 - 0.33	-	-	-	-	**3728**
	TPSD1130004		20081216	0 - 0.33	64	150	65	2498	483

Shaded values exceed their PRG.

1 - Value was calculated using a regression equation to extrapolate the concentration from a result determined using the EPA analytical method.

COC - Chemical of concern
MS - Monitoring station
PRG - Preliminary remediation goal
ug/kg - Micrograms/kilogram
mg/kg - Milligrams/kilogram
J - Estimated value
U - Not detected at the indicated value.

TABLE 5

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 11
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Polycyclic Aromatic Hydrocarbons (ug/kg)				Inorganics (mg/kg)		
					ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
					PRG 210	PRG 1236	PRG 500	PRG 13057	PRG 486	PRG 436	PRG 124
LOC.2	OU4-SD-M11-299A	01	19990909	0 - 0.33	20 J	52	11	688	**17495 J**	**16250 J**	**5601**
LOC.3	OU4-SD-M11-399A	01	19990909	0 - 0.33	8	13	5	228	139 J	206 J	69
	OU4-SD-M11-300B	02	20000506	0 - 0.33	48 J	214 J	53 J	1980	**541**	**554**	76
	OU4-SD-M11-300A	03	20000830	0 - 0.33	21 J	67	17	1030	**1479 J**	**1265 J**	56 J
	OU4-SD-M11-301B	04	20010508	0 - 0.33	45 J	237 J	65 J	1478	**747**	**1225**	105
	OU4-SD-M11-301A	05	20010820	0 - 0.33	32	174	81	1137	461 J	**1528**	**156**
	OU4-SD-M11-302A	06	20020812	0 - 0.33	7	16 J	5	211	298	**1239**	70
	OU4-SD-M11-303A	07	20030809	0 - 0.33	85	335	166	2920	**2628**	**1843**	**172**
	OU4-SD-M11-311B	11	20110421	0 - 0.33	-	-	-	-	88 J	57	35

Shaded values exceed their PRG or 2 times the ER-M (for lead only).

COC - Chemical of concern
MS - Monitoring station
PRG - Preliminary remediation goal
ug/kg - Micrograms/kilogram
mg/kg - Milligrams/kilogram
J - Estimated value

TABLE 6

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 12
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	LEAD (mg/kg)
						PRG 436
MS-12	SD107	AS12-SD-SD10700	ASP1	20081217	0 - 0.33	417
MS-12	SD108	AS12-SD-SD10800	ASP1	20081217	0 - 0.33	**647**
MS-12	SD109	AS12-SD-SD10900	ASP1	20081217	0 - 0.33	**598**
MS-12	SD12	AS12-SD-SD12	ASP1	20050822	0 - 0.33	**3120**
MS-12	SD13	AS12-SD-SD13	ASP1	20050822	0 - 0.33	148

Shaded values exceed the PRG

MS - Monitoring station
COC - Chemical of concern
PRG - Preliminary remediation goal
mg/kg - Milligrams/kilogram

TABLE 7

SUMMARY OF MNR EVALUATION FOR EACH MONITORING STATION
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 1 of 2

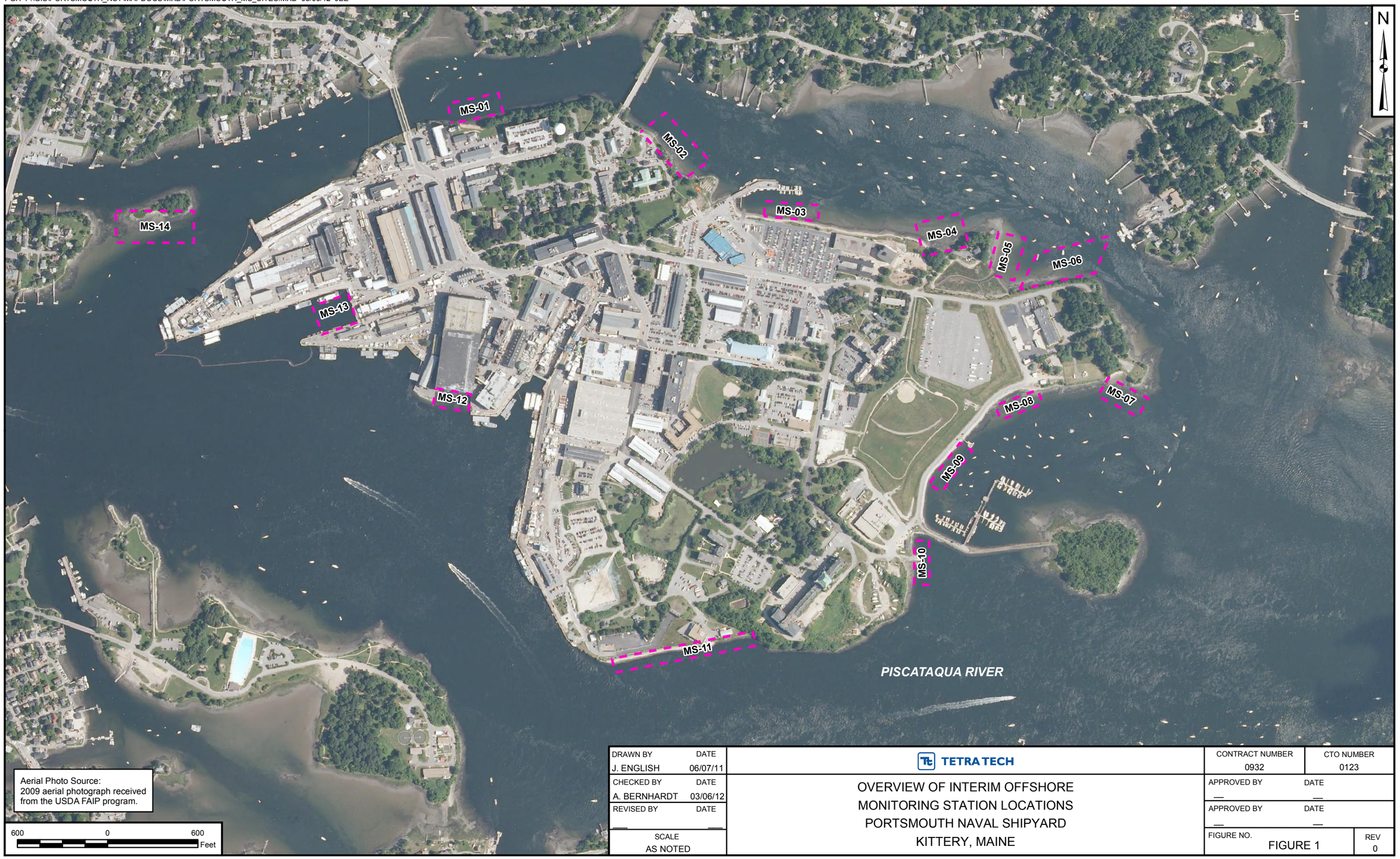
Location/COCs	Trend	Source Removal	Mechanism for MNR	Conclusion
MS-01/PAHs	PAH concentrations at MS locations reduced to less than the PRG within 2 to 4 years after onshore source removal action.	Removal of ash/contaminated soil onshore at Site 34.	Dispersion of contaminated sediment/replacement with cleaner sediment.	PAH concentrations at other locations should decrease to less than PRGs within 2 to 4 years now that the onshore source of PAH contamination has been removed.
MS-03/Copper	Copper concentrations at MS-03, Loc. 2 have varied over time; cannot determine whether concentrations have decreased since the removal action. Some evidence suggests natural recovery may be occurring in this area.	Placement of shoreline erosion controls.	Combination of dispersion of contaminated sediment/replacement with cleaner sediment and burial by cleaner sediment.	Estimated that copper concentrations at MS-03, Loc. 2 will be less than the PRG within 5 years. At other locations, it is estimated that copper concentrations will be less than the PRG within 10 years.
MS-04/Copper	Significant reduction in copper concentration at MS04, Loc. 1 following shoreline stabilization.			The copper concentrations in most recent round are less than the PRG. Concentrations should continue to decrease or remain the same because the shoreline is stabilized.
MS-04/PAHs	Significant reduction in PAH concentration at MS04, Loc. 1 following shoreline stabilization.			The PAH concentrations in most recent rounds are less than the PRGs. Concentrations should continue to decrease or remain the same because the shoreline is stabilized.
MS-11/Copper, Lead, Nickel	Metals concentrations were lower than PRGs in most recent round and much lower than concentrations in previous rounds, indicating a decrease since the 2006 removal action.	Placement of shoreline erosion controls.	Dispersion of contaminated sediment/replacement with cleaner sediment.	The metals concentrations in the most recent round are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

TABLE 7

SUMMARY OF MNR EVALUATION FOR EACH MONITORING STATION
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Location/COCs	Trend	Source Removal	Mechanism for MNR	Conclusion
MS-12/Lead	Multiple rounds of sediment data have not been collected at MS-12B, so concentration trends over time cannot be evaluated.	Potential future removal of contaminated sediment at MS-12A.	Dispersion of contaminated sediment/replacement with cleaner sediment.	MS-12B is not likely a significant sediment depositional area but most of the lead concentrations collected were less than 1.5 times greater than the PRG, with one exception. No current IRP sources to the sediment in this area but lead in the sediment from MS-12A may be a source of lead to this area. If sediment is removed from MS-12A, it is expected that the lead concentrations at MS-12B would begin to decrease.

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\PORTSMOUTH_MS_SITES.MXD 03/06/12 JEE



DRAWN BY J. ENGLISH	DATE 06/07/11	TETRA TECH	CONTRACT NUMBER 0932 / CTO NUMBER 0123
CHECKED BY A. BERNHARDT	DATE 03/06/12	OVERVIEW OF INTERIM OFFSHORE MONITORING STATION LOCATIONS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —
REVISED BY —	DATE —		APPROVED BY — DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 1 / REV 0

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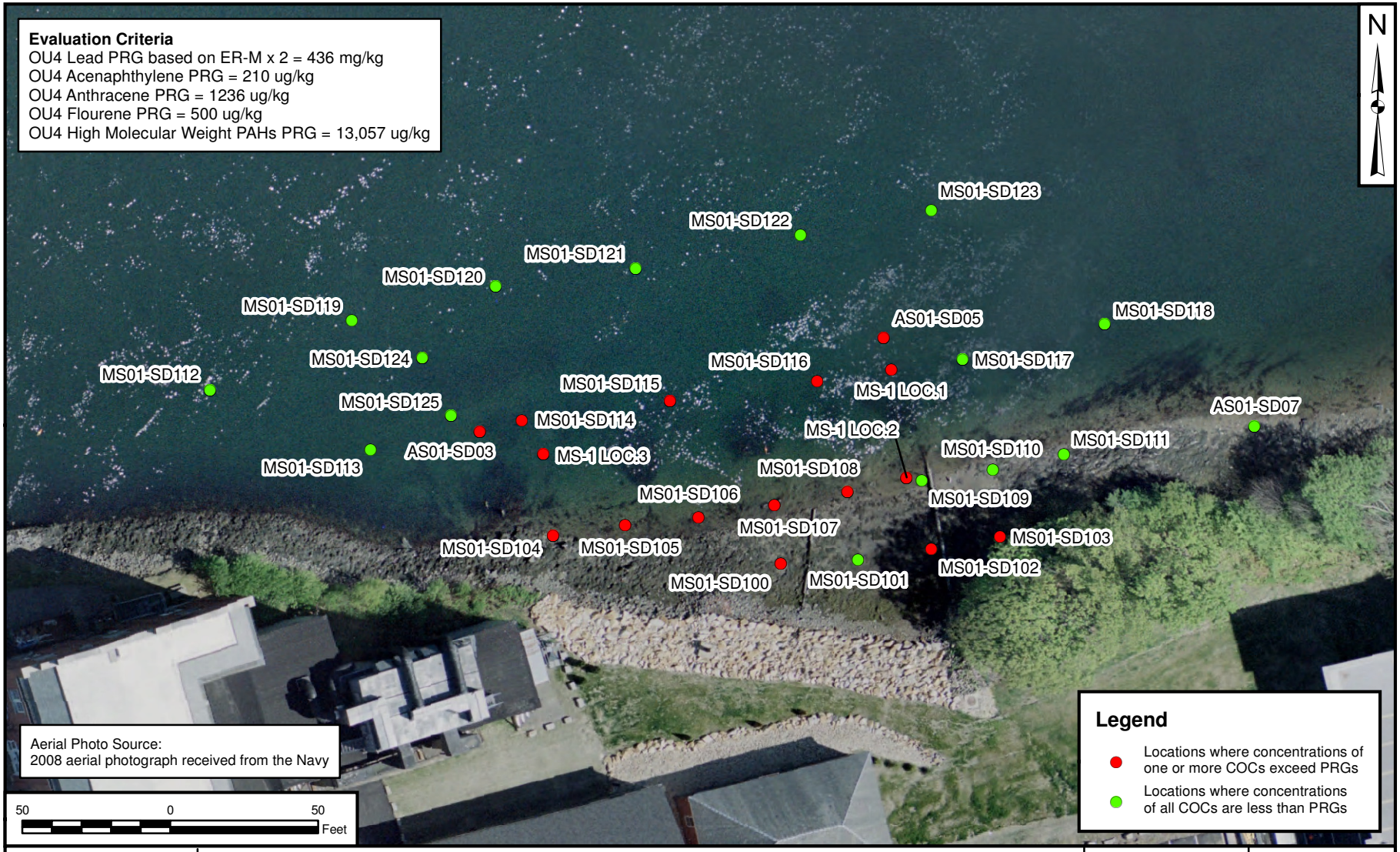


DRAWN BY: J. ENGLISH	DATE: 03/06/12	TETRA TECH	CONTRACT NUMBER: 0932 / CTO NUMBER: 0123
CHECKED BY: A. BERNHARDT	DATE: 03/14/12	SEDIMENT SAMPLES AT MS-01 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY: ___ DATE: ___
REVISED BY: ___	DATE: ___		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			FIGURE NO.: FIGURE 2 / REV: 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\SITE32_SEDIMENT_PRG_EXC_2012.MXD 03/14/12 KM

Evaluation Criteria
OU4 Copper PRG based on NOAA analysis method = 486 mg/kg

N

TP-SD01
TP-SD03
TP-SD05
TP-SD07
TP-SD09
MS-3 STA. 3
TP-SD12
TP-SD13
TP-SD15
TP-SD17
TP-SD19
TP-SD21
TP-SD23
TP-SD25
TP-SD27
TP-SD116
TP-SD115
TP-SD29
MS-4 STA. 4
TP-SD119
TP-SD33
TP-SD37
TP-SD38
TP-SD35
MS-4 STA. 6
MS-4 STA. 5
TP-SD34
TP-SD118
MS-4 STA. 1
TP-SD36
MS-4 STA. 3
MS-4 STA. 2
TP-SD02
TP-SD120
MS-3 STA. 2
TP-SD06
TP-SD109
TP-SD111
TP-SD04
TP-SD101
TP-SD103
TP-SD106
TP-SD10
TP-SD102
TP-SD104
TP-SD107
TP-SD108
TP-SD110
TP-SD14
TP-SD16
MS-3 STA. 1
TP-SD18
TP-SD20
TP-SD22
TP-SD24
TP-SD26
TP-SD28
TP-SD30
TP-SD117
TP-SD31

Aerial Photo Source:
2008 aerial photograph received from the Navy

Legend

- Locations where concentrations of one or more COCs exceed PRGs
- Locations where concentrations of all COCs are less than PRGs
- Mean High Water (100.36 ft, PNS 2002 Datum)
- Mean Low Water (92.23 ft, PNS 2002 Datum)

100 0 100 Feet

DRAWN BY / DATE	J. ENGLISH 03/06/12
CHECKED BY / DATE	A. BERNHARDT 3/14/12
REVISED BY / DATE	___ ___
SCALE	AS NOTED

TETRA TECH

SEDIMENT SAMPLES AT MS-03 AND MS-04
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	0932
CTO NUMBER	0123
APPROVED BY / DATE	___ ___
APPROVED BY / DATE	___ ___
FIGURE NO.	FIGURE 3
REV	0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\MONITORING_SITE_MAPS\MS-11_COPPER_LEAD_2012.MXD 03/14/12 KM

DRAWN BY: J. ENGLISH	DATE: 03/06/12	TETRA TECH	CONTRACT NUMBER: 0932 / CTO NUMBER: 0123
CHECKED BY: A. BERNHARDT	DATE: 03/14/12	SEDIMENT SAMPLES AT MS-11 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY: ___ DATE: ___
REVISED BY: ___	DATE: ___		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			FIGURE NO.: FIGURE 4 / REV: 0

PGH P:\GIS\PORTSMOUTH\MAPDOCS\MXD\MS12_SEDIMENT_PRG_EXC_2012.MXD 03/14/12 KM

Evaluation Criteria
OU4 Lead PRG based on ER-M x 2 = 436 mg/kg
OU4 Acenaphthylene PRG = 210 ug/kg
OU4 Anthracene PRG = 1236 ug/kg
OU4 Flourene PRG = 500 ug/kg
OU4 High Molecular Weight PAHs PRG = 13,057 ug/kg

N

MS-12A

AS12-SD12

AS12-SD13

AS12-SD109

AS12-SD107

AS12-SD108

MS-12B

100 0 100 Feet

Legend

- Locations where concentrations of one or more COCs exceed PRGs
- Locations where concentrations of all COCs are less than PRGs

Aerial Photo Source:
2008 aerial photograph received from the Navy

DRAWN BY / DATE	J. ENGLISH 03/06/12
CHECKED BY / DATE	A. BERNHARDT 03/14/12
REVISED BY / DATE	___ ___
SCALE	AS NOTED

TETRA TECH

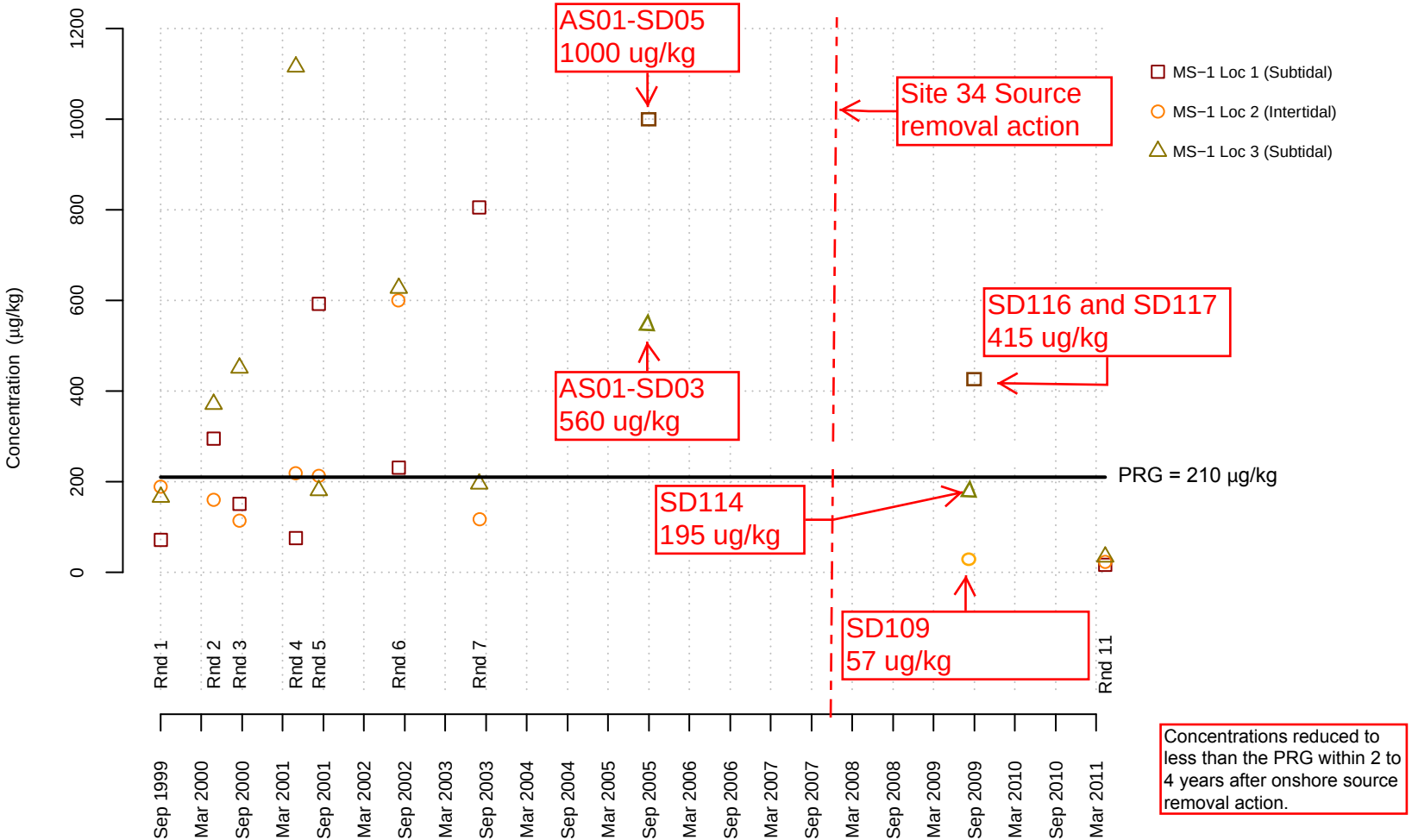
SEDIMENT SAMPLES AT MS-12A AND MS-12B
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	0932
CTO NUMBER	0123
APPROVED BY / DATE	___ ___
APPROVED BY / DATE	___ ___
FIGURE NO.	FIGURE 5
REV	0

ATTACHMENT A

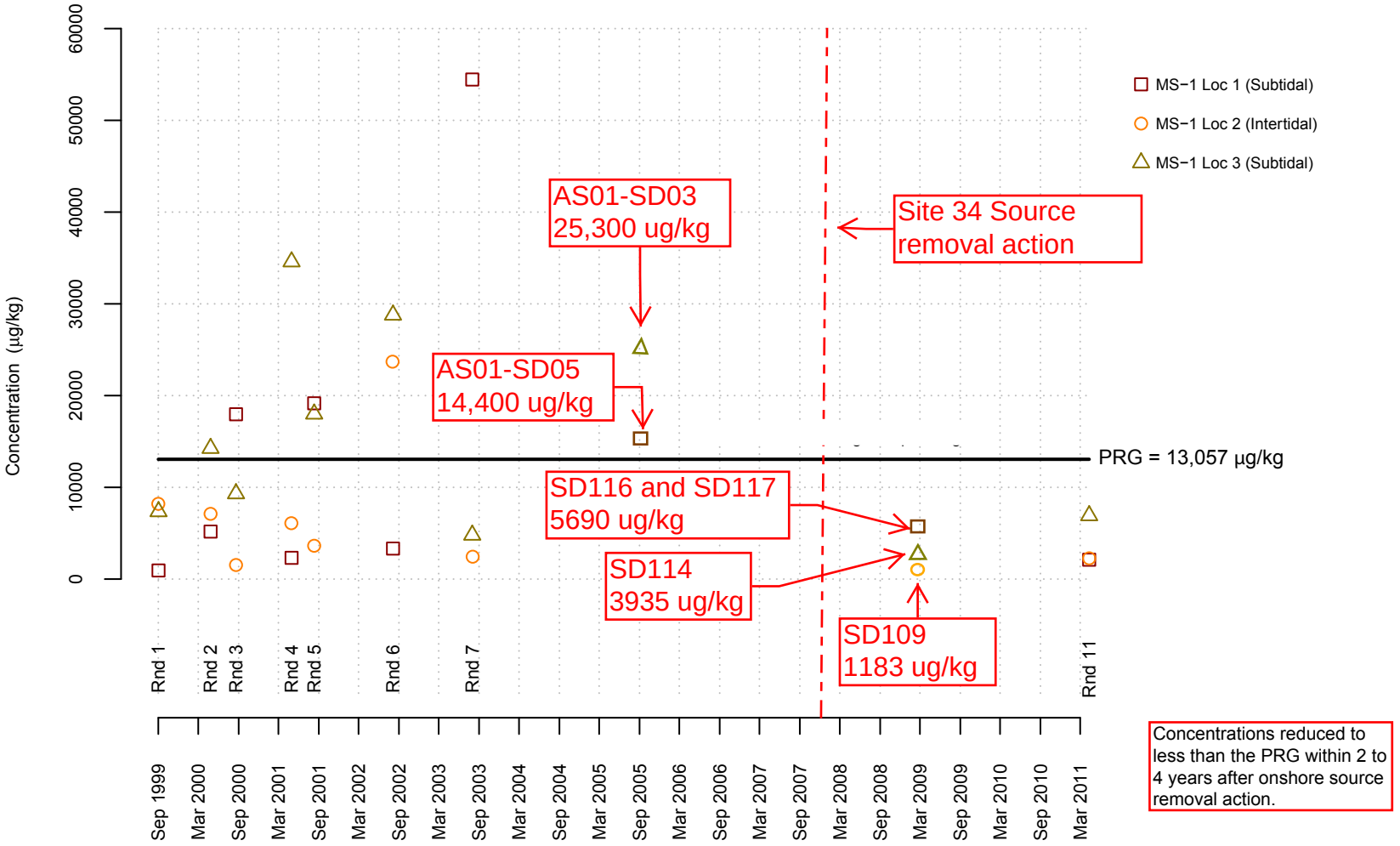
CONCENTRATION TREND PLOTS

ATTACHMENT FIGURE A.1
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR ACENAPHTHYLENE AT MS-01
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

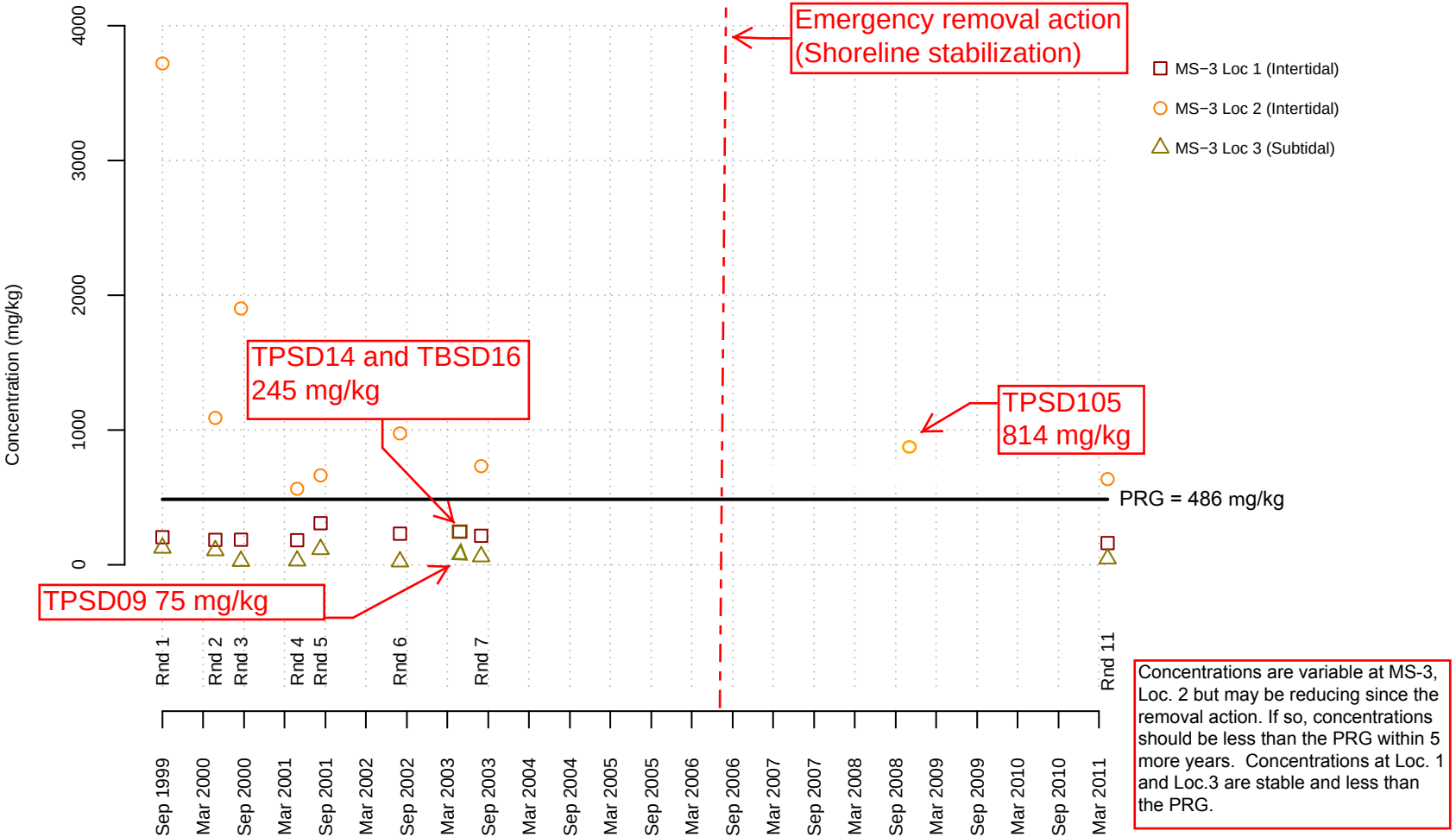


Concentrations reduced to less than the PRG within 2 to 4 years after onshore source removal action.

ATTACHMENT FIGURE A.2
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR HIGH MOLECULAR WEIGHT PAHS AT MS-01
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

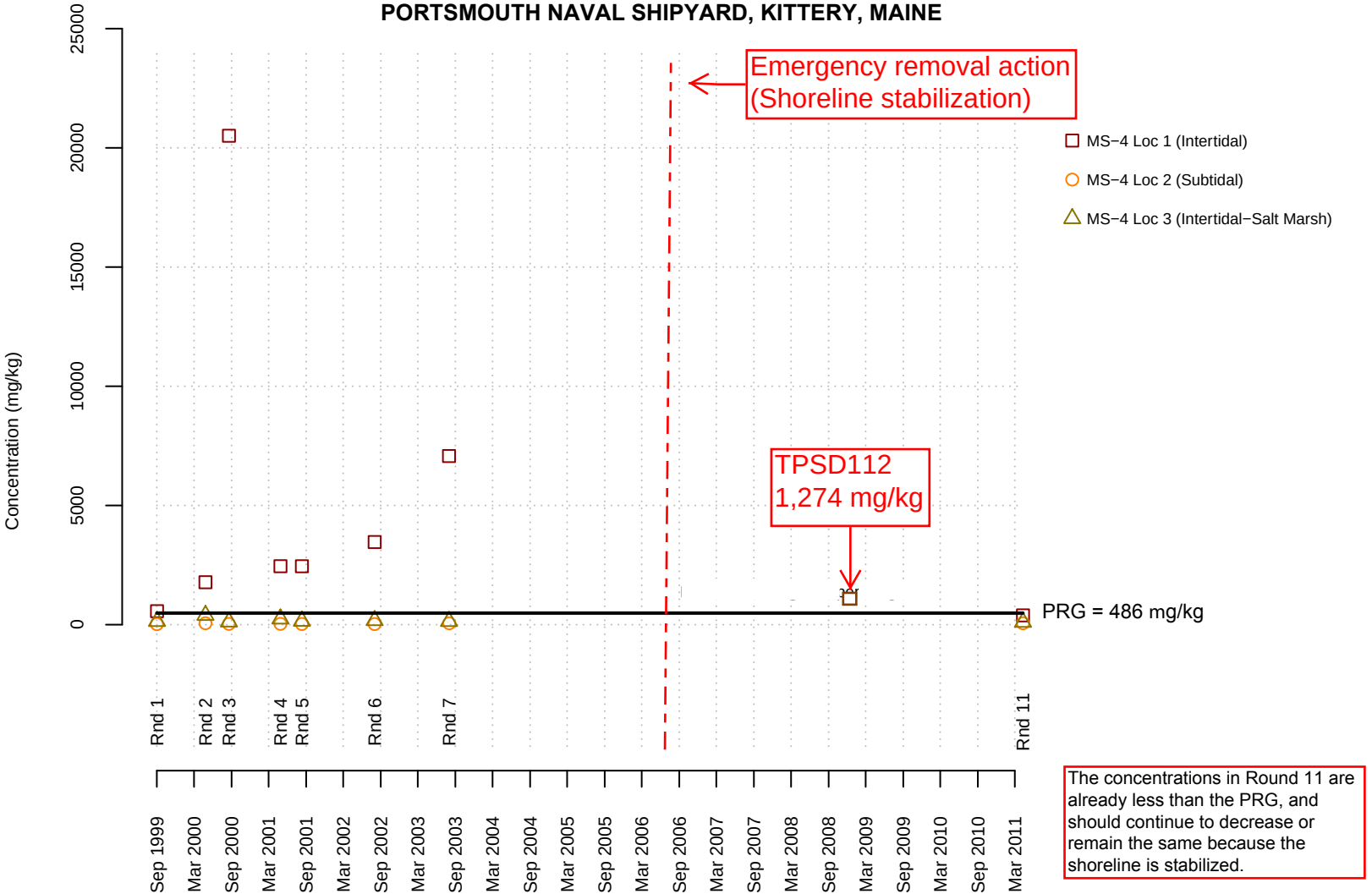


ATTACHMENT FIGURE A.3
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR COPPER AT MS−03
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



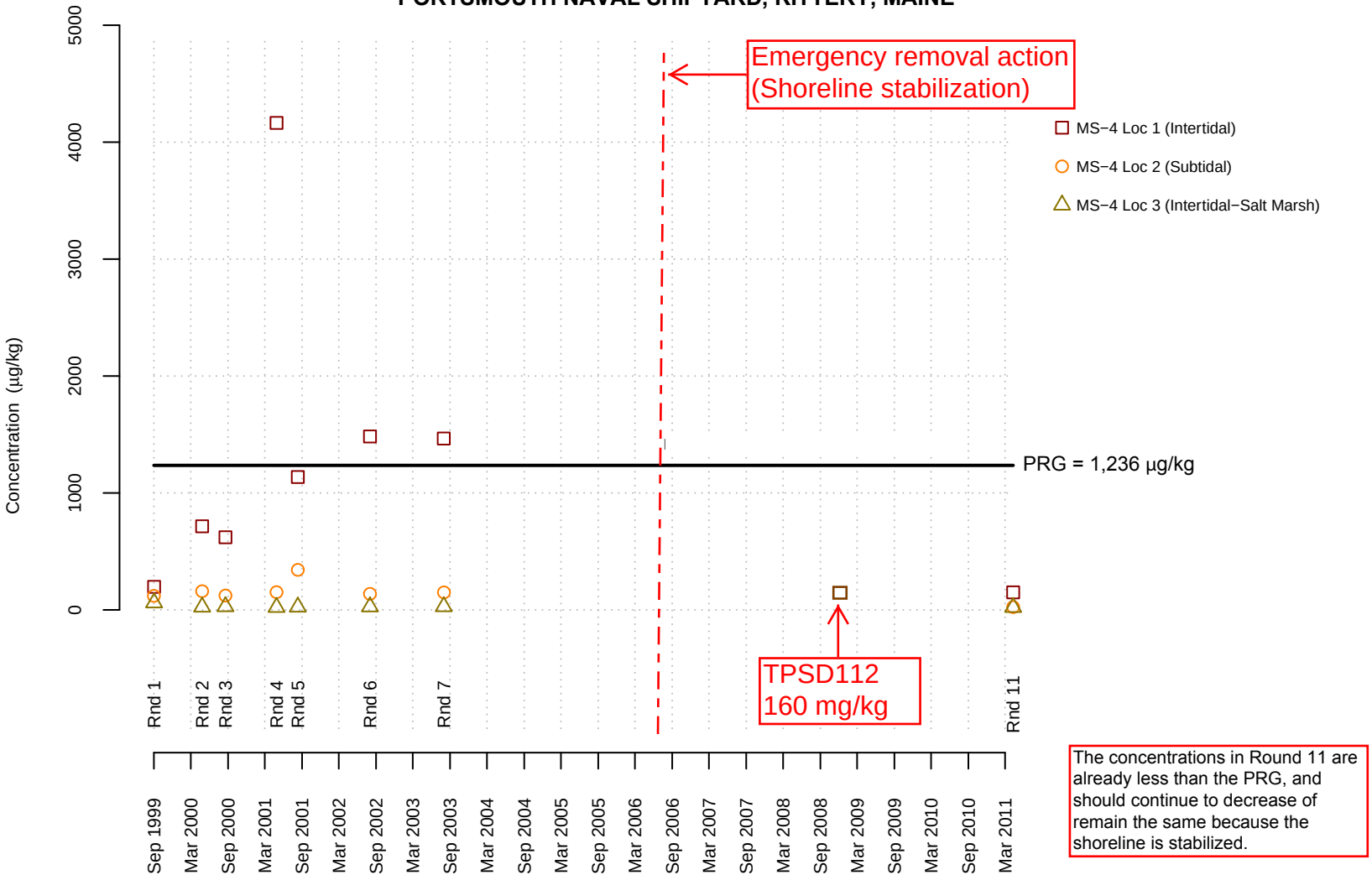
Concentrations are variable at MS-3, Loc. 2 but may be reducing since the removal action. If so, concentrations should be less than the PRG within 5 more years. Concentrations at Loc. 1 and Loc.3 are stable and less than the PRG.

ATTACHMENT FIGURE A.4
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR COPPER AT MS-04
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



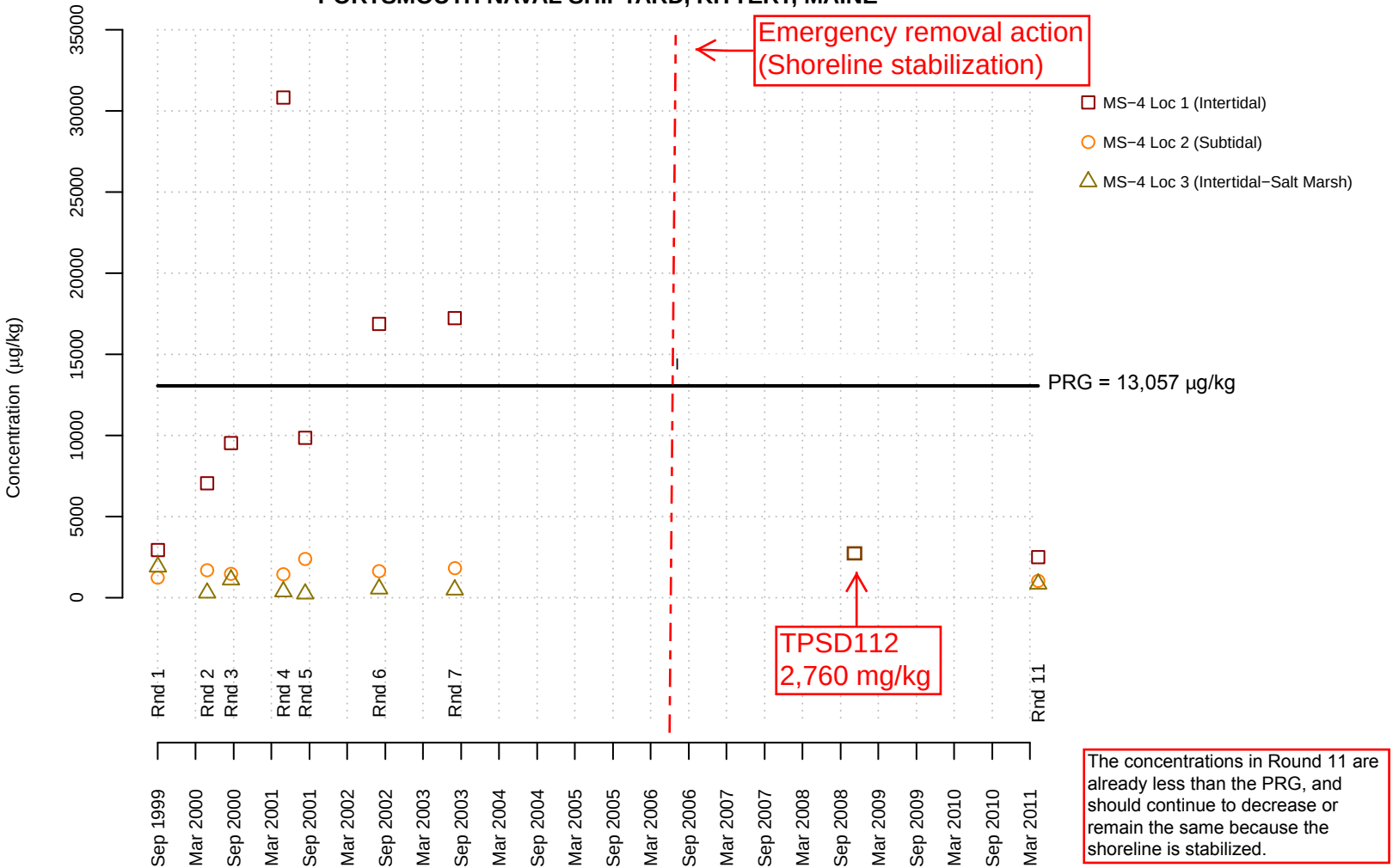
The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

ATTACHMENT FIGURE A.5
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR ANTHRACENE AT MS-04
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



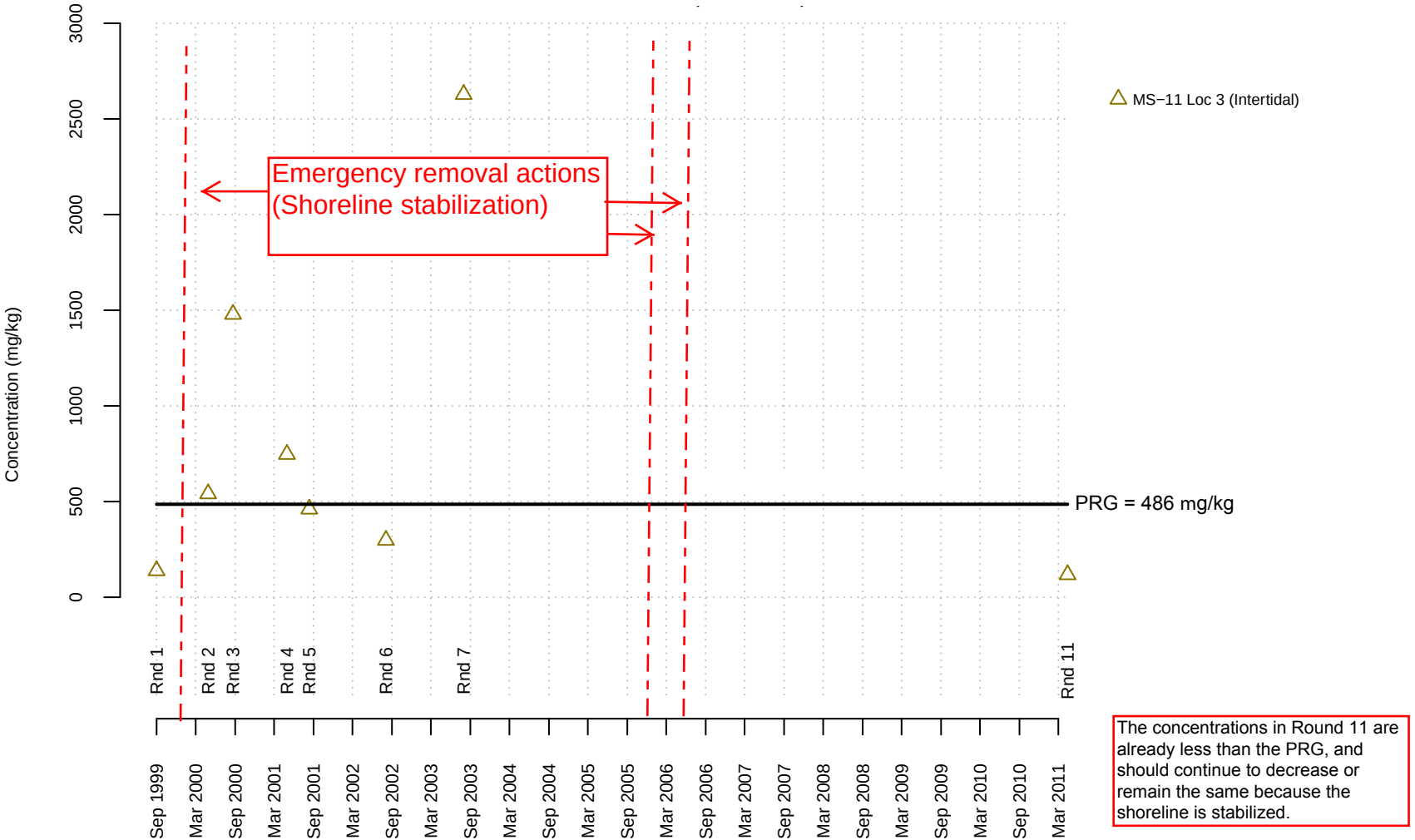
The concentrations in Round 11 are already less than the PRG, and should continue to decrease of remain the same because the shoreline is stabilized.

ATTACHMENT FIGURE A.6
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR HIGH MOLECULAR WEIGHT PAHs AT MS−04
SECOND FIVE−YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



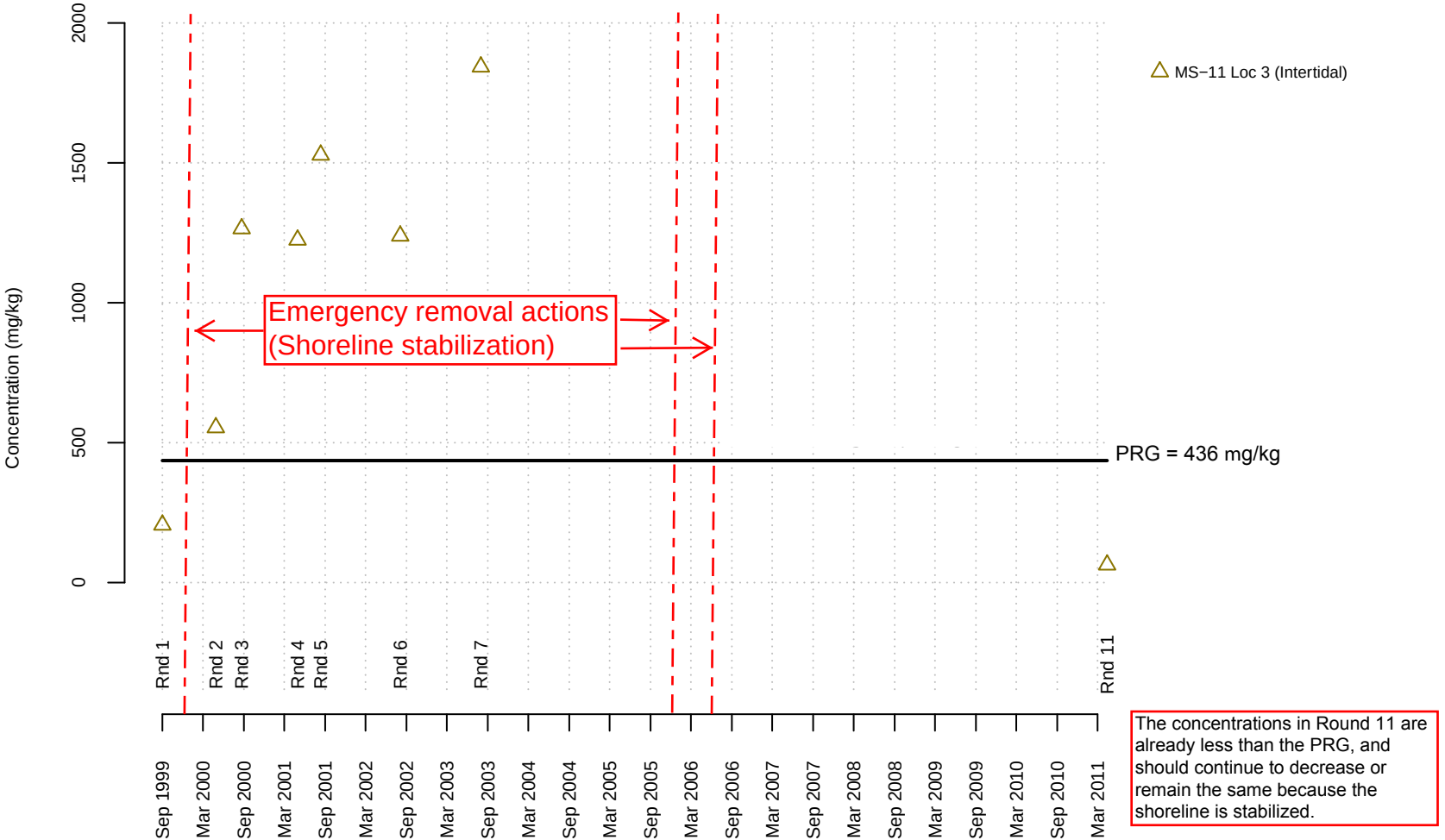
The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

ATTACHMENT FIGURE A.7
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR COPPER AT MS-11
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

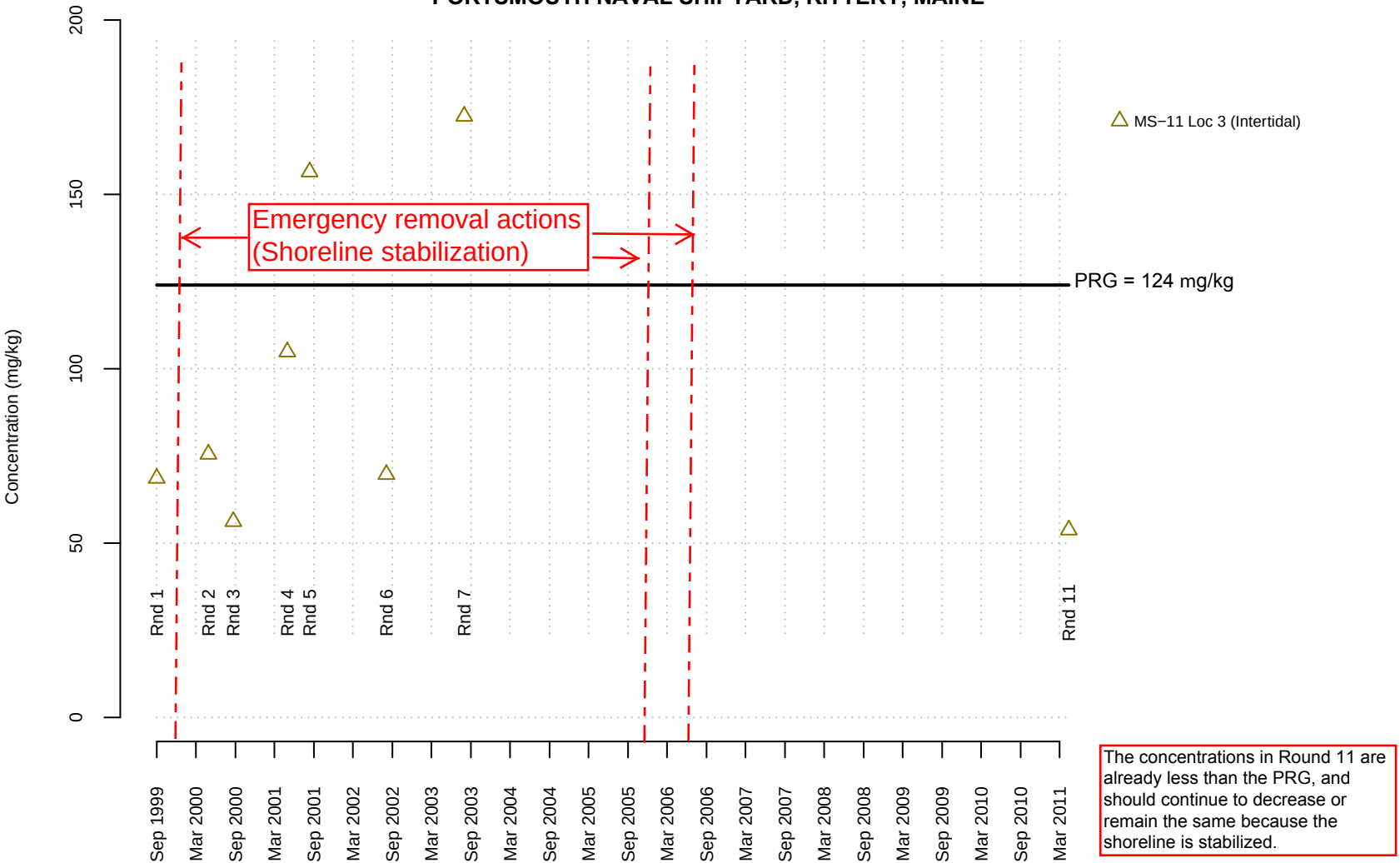


The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

ATTACHMENT FIGURE A.8
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR LEAD AT MS-11
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



ATTACHMENT FIGURE A.9
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR NICKEL AT MS-11
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.