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FINAL FEASIBILITY STUDY REPORT OPERABLE UNIT 4 (OU4) NSY PORTSMOUTH ME

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TETRA TECH

Final
Feasibility Study Report for Operable Unit 4

Portsmouth Naval Shipyard

Kittery, Maine

Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62472-03-D-0057
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FINAL
FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4

PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Mid-Atlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

Submitted by:
Tetra Tech
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406

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PREPARED UNDER THE DIRECTION OF:

AARON BERNHARDT
PROJECT MANAGER
TETRA TECH
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH
KING OF PRUSSIA, PENNSYLVANIA

I hereby acknowledge that this document, Feasibility Study for Operable Unit 4, Portsmouth Naval Shipyard, Kittery, Maine, was prepared with my consultation and review.

STATE OF MAINE
JAMES R. FORRELLI
No. 8053
LICENSED
PROFESSIONAL ENGINEER

September 2012
James R. Forrelli, P.E.
State of Maine Professional Engineer 8053

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ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
cm	Centimeter
CMR	Code of Maine Rules
CO_2	Carbon Dioxide
COC	Chemical of Concern
CSM	Conceptual Site Model
CTO	Contract Task Order
CWA	Clean Water Act
cy	Cubic yards
DDT	Dichlorodiphenyltrichloroethane
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EERA	Estuarine Ecological Risk Assessment
ER-L	Effects Range-Low
ER-M	Effects Range- Median
FCS	Final Confirmation Study
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
ft	Feet
ft^2	Square feet
FY	Fiscal Year
GAC	Granular Activated Carbon
GRA	General Response Action
HHRA	Human Health Risk Assessment
HMW	High Molecular Weight

HSWA	Hazardous and Solid Waste Amendments
IAS	Initial Assessment Study
IRG	Interim Remediation Goal
IRP	Installation Restoration Program
LUC	Land Use Control
MEDEP	Maine Department of Environmental Protection
mg/kg	Milligram per kilogram
MNR	Monitored Natural Recovery
MRSA	Maine Revised Statutes Annotated
MS	Monitoring Station
NAVFAC	Naval Facilities Engineering Command
NCCOSC	Naval Command, Control and Ocean Surveillance Center
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NERP	Navy Environmental Restoration Program
NFA	No Further Action
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPW	Net Present Worth
NRWQC	National Recommended Water Quality Criteria
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Act
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PNS	Portsmouth Naval Shipyard
POTW	Public Owned Treatment Works
PPE	Personal Protective Equipment
PRAP	Proposed Remedial Action Plan
PRG	Preliminary Remediation Goal
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RFI	RCRA Facilities Investigation

RS	Reference Station
SHPO	State Historic Preservation Officer
SMP	Site Management Plan
SWMU	Solid Waste Management Unit
TBC	To be considered
TCLP	Toxicity Characteristic Leaching Procedure
TP	Topeka Pier
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
TSDF	Treatment/Storage/Disposal Facility
TtNUS	Tetra Tech NUS
UCL	Upper confidence limit
µg/kg	Microgram per kilogram
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

EXECUTIVE SUMMARY

INTRODUCTION

This Feasibility Study (FS) Report for Operable Unit (OU) 4 at Portsmouth Naval Shipyard (PNS), Kittery, Maine, was prepared by Tetra Tech for the United States Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract Number N62472-03-D-0057, Contract Task Order (CTO) 123. This report describes the formulation and evaluation of remedial alternatives to address potentially unacceptable risks at OU4, based on the conclusions and recommendations from the Rounds 1 through 10 Interim Offshore Monitoring Report (February 2010, Tetra Tech). The Interim Offshore Monitoring Program for OU4 is being conducted in accordance with the Interim Record of Decision (ROD) for OU4 (Navy, May 1999). This FS was prepared to fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

This FS addresses sediment contamination at OU4. OU4 includes areas offshore of PNS that potentially were affected by PNS onshore Installation Restoration Program (IRP) sites. OU4 consists of Site 5, Former Industrial Waste Outfalls, and six areas of concern (AOCs). The offshore AOCs at PNS include pelagic, channel bottom/subtidal, eelgrass, intertidal mudflat, rocky intertidal, and salt marsh habitats. Monitoring stations (MS) were selected to provide coverage of the offshore AOCs for interim monitoring purposes. There are 14 MSs located at OU4. For the FS, remedial alternatives were evaluated based on MSs or groups of nearby MSs. MSs that were shown in the Rounds 1 through 10 Interim Offshore Monitoring Program Report to warrant no further action (NFA) are discussed in the FS; however, remedial alternatives are not developed for these MSs.

The FS was prepared to establish Remedial Action Objectives (RAOs), to screen remedial technologies, and to assemble, evaluate, and compare remedial alternatives that will be used in selecting the remedial actions for OU4 to address ecological risk. Based on the results of the human health risk assessment (HHRA), risks for ingestion of sediment, dermal contact with sediment, and ingestion of surface water were less than regulatory guidelines (McLaren/Hart, May 1994); therefore, human health is not considered in this FS. A Proposed Remedial Action Plan (PRAP) will be prepared based on the information provided in the final FS for the Navy's recommended remedial actions for OU4.

CONCEPTUAL SITE MODEL

Areas offshore of PNS were potentially affected by PNS and non-PNS sources of contamination through a variety of migration pathways.

Contaminants from onshore PNS IRP sites were released to soil and groundwater at onshore sites primarily through spills, placement on soil, and burying in soil. These contaminants were then released to the offshore area through erosion, runoff, and groundwater discharge. Also, contaminants from some sites were directly discharged to the offshore area. Based on investigations conducted at PNS IRP sites to date, there is little potential for current significant releases of contaminants to the offshore area from these sites, but investigations at some sites are ongoing or have not yet been initiated.

The area along the Piscataqua River has a large amount of industry and urbanization. The contaminants detected in sediments at PNS, primarily metals and polycyclic aromatic hydrocarbons (PAHs), can be found to varying degrees in non-PNS discharges and operations along the Piscataqua River from sources such as local industries, urban non-point source runoff, municipal water treatment discharges, and fuel or oil terminals. PAHs from the use of petroleum products in fuels and road surfaces can reach sediment through surface runoff from PNS and non-PNS areas. Polychlorinated biphenyls (PCBs) may be attributed to past activities in the watershed, and although numerous potential sources of contamination were identified, their relative contributions to sediment contamination adjacent to PNS could not be definitively established.

Although various ecological and human receptors may be present and come into contact with sediment in the offshore area, it was determined through previous investigations that the primary receptors of concern for offshore sediment were benthic invertebrates.

REMEDIAL ACTION OBJECTIVES

RAOs are media-specific goals for protecting human health and the environment. RAOs specify the chemicals of concern (COCs), exposure routes and receptors of concern, and an acceptable chemical level or range of levels for each exposure route. Acceptable contaminant levels are based on site-specific preliminary remediation goals (PRGs), after which a final remediation goal is determined when a remedy is selected. The following RAO has been developed for OU4:

- Reduce risks to benthic invertebrates from exposure to bioavailable/bioaccessible COCs in sediment at OU4 MSs to acceptable levels.

The PRGs are the chemical-specific goals (based on the exposure concentration) that, when achieved, will result in MS concentrations that pose no unacceptable risk for the targeted receptor. PRGs were developed to be protective of benthic invertebrates from exposure to sediment contaminants. Section 2.4 of the FS details the development of the PRGs. The developed PRGs were used to determine the remediation areas and volumes to be addressed by the FS. The following table presents the COCs at each OU4 MS and the PRGs.

Contaminant	PRG	COCs at Retained Monitoring Stations				
		MS-01	MS-03 & MS-04	MS-11	MS-12A	MS-12B
Copper	486 mg/kg		X	X		
Lead	436 mg/kg			X	X	X
Nickel	124 mg/kg			X		
Acenaphthylene	210 µg/kg	X	X		X	
Anthracene	1,236 µg/kg	X	X		X	
Fluorene	500 µg/kg	X	X		X	
HMW PAHs	13,057 µg/kg	X	X		X	

DEVELOPMENT OF ALTERNATIVES

The primary objective of this phase of the FS was to develop an appropriate range of remedial alternatives from applicable technology types and process options. For OU4, alternatives have been 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, MS-08, MS-09, MS-10, MS-13, and MS-14, because there are no current exceedances of PRGs that indicate an ecological risk.

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.

The following table presents the technologies used for each alternative:

Technology	MS-01 Alternatives			MS-03 & MS-04 Alternatives			MS-11 Alternatives		MS-12A Alternatives				MS-12B Alternatives		
	01	02	03	01	02	03	01	02	01	02	03	04	01	02	03
No Action	X			X			X		X				X		
Land Use Controls		X			X					X	X			X	
Monitoring		X			X			X		X				X	
Containment Barrier										X	X				
Natural Recovery		X			X			X		X				X	
Mechanical Removal												X			
Hydraulic Dredging			X			X					X	X			X

Technology	MS-01 Alternatives			MS-03 & MS-04 Alternatives			MS-11 Alternatives		MS-12A Alternatives				MS-12B Alternatives		
	01	02	03	01	02	03	01	02	01	02	03	04	01	02	03
Dewatering			X			X					X	X			X
Off-yard Landfilling			X			X					X	X			X

DETAILED ANALYSIS OF ALTERNATIVES

In the detailed analysis section of this FS, each set of alternatives are evaluated against seven of the nine CERCLA criteria. In selecting a remedy in accordance with CERCLA, overall protectiveness of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs) are "threshold criteria" that *must* be satisfied for an alternative to be eligible for selection. Reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, long-term effectiveness and permanence, implementability, and cost are "balancing criteria" that are used to weigh trade-offs between alternatives. Two of the nine CERCLA criteria (state and community acceptance), not evaluated as part of this FS, are "modifying criteria." Once a preferred alternative has been identified and submitted for public comment, the modifying criteria are taken into account during preparation of the ROD.

DETAILED ANALYSIS OF ALTERNATIVES

Alternatives MS01-01, MS0304-01, MS12A-01, and MS12B-01 are No Action alternatives that would not be protective of the environment and would not meet the threshold criteria and, as a result, will not be discussed further in the executive summary.

MS-01 – Alternatives MS01-02, Monitored Natural Recovery, and MS01-03, Hydraulic Dredging with Off-yard Disposal, would be protective of the environment and would comply with ARARs. Alternative MS01-02 would not reduce the toxicity, mobility, or volume of contaminants through treatment, because treatment is not a component of this alternative. Alternative MS01-03 would reduce toxicity, mobility, or volume of contaminants if treatment is required to meet transportation or disposal requirements. Alternative MS01-02 would provide long-term effectiveness and permanence once contaminant concentrations are reduced to acceptable concentrations by naturally occurring processes, and would have the least short-term effectiveness and implementability concerns. Alternative MS01-03 would provide the most long-term effectiveness and permanence by removing contaminated sediment; however, it would have the most short-term effectiveness and implementability concerns. Alternative MS01-02 would be the easiest to implement, because this alternative only relies on the implementation of a monitoring program. Alternative MS01-03 would be considered the most difficult because this alternative involves the excavation, processing, and off-yard transportation and disposal of contaminated sediment.

Estimated costs for MS01-02 and MS01-03 remedial alternatives are as follows:

Alternative	Capital	Annual Costs	30 Year Net Present Worth (NPW)
MS01-02 Monitored Natural Recovery	$17,094	$19,333/yr plus $25,300/5 yr	$311,538
MS01-03 Hydraulic Dredging, and Off-yard Disposal	$917,661	$0	$917,661

MS-03 and MS-04 - Alternatives MS0304-02, Monitored Natural Recovery, and MS0304-03, Hydraulic Dredging with Off-yard Disposal, would be protective of the environment and would comply with ARARs. Alternative MS0304-02 would not reduce the toxicity, mobility, or volume of contaminants through treatment because treatment is not a component of this alternative. Alternative MS0304-03 would reduce toxicity, mobility, or volume of contaminants if treatment is required to meet transportation or disposal requirements. Alternative MS0304-02 would provide long-term effectiveness and permanence once contaminant concentrations are reduced to acceptable concentrations by naturally occurring processes, and would have the least short-term effectiveness and implementability concerns. Alternative MS0304-03 would provide the most long-term effectiveness and permanence by removing contaminated sediment; however, it would have the most short-term effectiveness and implementability concerns. Alternative MS0304-02 would be the easiest because this alternative only relies on the implementation of a monitoring program. Alternative MS0304-03 would be considered the most difficult because this alternative involves the excavation, processing, and off-yard transportation and disposal of contaminated sediment.

Estimated costs for MS0304-02 and MS0304-03 are as follows:

Alternative	Capital	Annual Costs	30 Year NPW
MS0304-02 Monitored Natural Recovery	$17,094	$20,295/yr plus $25,300/5 yrs	$323,481
MS0304-03 Hydraulic Dredging and Off-yard Disposal	$745,410	$0	$745,410

MS-11 – There is not a sufficient amount of sediment located at MS-11 to cause an unacceptable risk to ecological receptors. Therefore, Alternatives MS11-01, No Action, and MS11-02, Monitored Natural Recovery, would be protective of the environment and would comply with ARARs, because currently there are no unacceptable risks to the environment associated with MS-11. Neither alternative would reduce the toxicity, mobility, or volume of contaminants through treatment because treatment is not a

component of these alternatives. Alternatives MS11-01 and MS11-02 would provide long-term effectiveness and permanence, because concentrations of COCs are currently (Round 11) less than PRGs. Alternative MS11-01 would be readily implementable because there would be nothing to implement. Alternative M11-02 would also be relatively easy to implement because this alternative only relies on the implementation of a monitoring program.

There are no costs associated with Alternative MS11-01. Estimated costs for MS11-02 are as follows:

Alternative	Capital	Annual Costs	30 Year NPW
MS11-02 Monitored Natural Recovery	$17,094	$18,755/yr plus $25,300/5 yrs	$304,372

MS-12A – Alternatives MS12A-02, Containment, LUCs, and Monitoring, MS12A-03 Partial Removal, Off-yard Disposal, Containment and LUCs, and MS12A-04, Complete Removal and Off-yard Disposal, would be protective of the environment and would comply with ARARs. Alternative MS12A-02 would not reduce the toxicity, mobility, or volume of contaminants through treatment because treatment is not a component of this alternative. Alternatives MS12A-03 and M12A-04 would reduce toxicity, mobility, or volume of contaminants if treatment is required to meet transportation or disposal requirements. Alternative MS12A-02 would provide long-term effectiveness and permanence once contaminant concentrations are reduced to acceptable concentrations by naturally occurring processes, and would have the least short-term effectiveness and implementability concerns. Alternative MS12A-03 would provide more long-term effectiveness and permanence than MS12A-02 by removing some of the contaminated sediment; however, it would have more short-term effectiveness and implementability concerns than MS12A-02. Alternative MS12A-04 would provide the most long-term effectiveness and permanence by removing all of the contaminated sediment; however, it would have the most short-term effectiveness and implementability concerns. Alternative MS12A-02 would be the easiest of the three alternatives because it does not involve the removal of a large amount of sediment, and construction activities would be kept to a minimum with the construction of a concrete block wall. Alternative MS12A-04 would be considered the most difficult because this alternative involves the excavation, processing, and off-yard transportation and disposal of all contaminated sediment. Alternative MS12A-03 would be more difficult than MS12A-02 because it would require the excavation, processing, and off-yard transportation and disposal of some contaminated sediment.

Estimated costs for MS12A-02, MS12A-03, and MS12A-04 are as follows:

Alternative	Capital	Annual Costs	30 Year NPW
MS12A-02 Containment, LUCs and Monitoring	$369,626	$20,174/yr plus $25,900/5 yrs	$675,807
MS12A-03 Partial Removal, Off-yard Disposal, Containment, and LUCs	$1,305,682	$19,327/yr plus $25,900/5 yrs	$1,601,353
MS12A-04 Complete Removal and Off-yard Disposal	$1,134,478	$0	$1,134,478

MS-12B – Alternatives MS12B-02, Monitored Natural Recovery, and MS12B-03, Hydraulic Dredging with Off-yard Disposal, would be protective of the environment and would comply with ARARs. Alternative MS12B-02 would not reduce the toxicity, mobility, or volume of contaminants through treatment because treatment is not a component of this alternative. Alternative M12B-03 would reduce toxicity, mobility, or volume of contaminants if treatment is required to meet transportation or disposal requirements. Alternative MS12B-02 would provide long-term effectiveness and permanence once contaminant concentrations are reduced to acceptable concentrations by naturally occurring processes, and would have the least short-term effectiveness and implementability concerns. Alternative MS12B-03 would provide the most long-term effectiveness and permanence by removing contaminated sediment; however, it would have the most short-term effectiveness and implementability concerns. Alternative MS12B-02 would be the easiest, because this alternative only relies on the implementation of a monitoring program. Alternative MS12B-03 would be considered the most difficult, because this alternative involves the excavation, processing, and off-yard transportation and disposal of contaminated sediment.

Estimated costs for MS12B-02 and MS12B-03 are as follows:

Alternative	Capital	Annual Costs	30 Year NPW
MS12B-02 Monitored Natural Recovery	$17,094	$19,140/yr plus $25,300/5 yrs	$309,149
MS12B-03 Dredging with Off-yard Disposal	$428,824	$0	$428,824

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This Feasibility Study (FS) Report for Operable Unit (OU) 4 at Portsmouth Naval Shipyard (PNS), Kittery, Maine was prepared by Tetra Tech for the United States Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract Number N62472-03-D-0057, Contract Task Order (CTO) 123. This report describes the formulation and evaluation of remedial alternatives to address the 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 Interim Offshore Monitoring Program for OU4 is being conducted in accordance with the Interim Record of Decision (ROD) for OU4 (Navy, May 1999). This FS was prepared to fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). As required by CERCLA, primary consideration is given to remedial alternatives that provide adequate protection of human health and the environment, and alternatives that attain or exceed the regulatory requirements and guidance that may potentially govern remedial activities (see Section 2.0). Therefore, in addition to CERCLA requirements, this FS was also prepared with consideration of other regulatory requirements and guidance, as appropriate.

1.2 SCOPE AND OBJECTIVES

This FS addresses sediment contamination at OU4. OU4 includes areas offshore of PNS that potentially were affected by PNS onshore Installation Restoration Program (IRP) sites. OU4 consists of Site 5, Former Industrial Waste Outfalls, and six areas of concern (AOCs), as further discussed in Section 1.4.2. The offshore AOCs at PNS include pelagic, channel bottom/subtidal, eelgrass, intertidal mudflat, rocky intertidal, and salt marsh habitats. Fourteen monitoring stations (MSs) were selected to provide coverage of the offshore AOCs for interim monitoring purposes. Four reference stations (RSs) located in the Piscataqua River were sampled to provide information about non-PNS impacted areas. For this FS Report, remedial alternatives are evaluated based on MSs or groups of nearby MSs rather than based on Site 5 and AOCs.

This FS was prepared to establish Remedial Action Objectives (RAOs), to screen remedial technologies, and to assemble, evaluate, and compare remedial alternatives that will be used in selecting remedial actions for OU4 to address ecological risk. Based on the results of the human health risk assessment (HHRA), risks for ingestion of sediment, dermal contact with sediment, and ingestion of surface water were less than regulatory guidelines (McLaren/Hart, May 1994); therefore, human health is not considered in this FS. In addition, as presented in the Public Health Assessment for Portsmouth Naval

Shipyard, Kittery, Maine, EPA Facility ID: ME7170022019 [Agency for Toxic Substances and Disease Registry (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. MSs that were shown in the Rounds 1 through 10 Interim Offshore Monitoring Program Report to warrant no further action (NFA) are discussed in Section 1.0, and remedial alternatives were not developed for these MSs.

The FS will be used by the Navy to select remedial actions for OU4. A Proposed Remedial Action Plan (PRAP) will be prepared based on the information provided in the final FS for the Navy's recommended remedial actions for OU4.

This FS fulfills the requirements of CERCLA and is consistent with United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, October 1988) and the Navy Environmental Restoration Program (NERP) Manual, Chapter 8, Remedial Investigation (RI)/FS (Navy, August 2006).

1.3 REPORT ORGANIZATION

This report has been divided into the following seven sections:

- Section 1.0 – Introduction: This section provides a description of the purpose, scope, and objectives of the FS. In addition, this section provides a summary of previous investigations and the extent of contamination at OU4.

- Section 2.0 – Remedial Action Objectives: This section presents applicable or relevant and appropriate requirements (ARARs), the medium of concern, RAOs, preliminary remediation goals (PRGs), and areas and volumes of sediment to be addressed by the remedial alternatives for OU4.

- Section 3.0 – Identification and Screening of Technologies, and Development of Alternatives: This section discusses the general response actions (GRAs) identified to attain the RAOs, screening of technology types and process options, description and evaluation of technologies, and development of alternatives.

- Section 4.0 – MS-01 Remedial Alternatives: This section introduces the detailed process descriptions of each alternative being considered to address the contamination issues with MS-01, discusses the detailed analysis of the alternatives using seven of the nine criteria of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and compares the various MS-01 alternatives with one another.

- Section 5.0 – MS-03 and MS-04 Remedial Alternatives: This section introduces the detailed process descriptions of each alternative being considered to address the contamination issues with MS-03 and MS-04, discusses the detailed analysis of the alternatives using seven of the nine criteria of the NCP, and compares the various MS-03 and MS-04 alternatives with one another.

- Section 6.0 – MS-11 Remedial Alternatives: This section introduces the detailed process descriptions of both alternatives being considered to address the contamination issues with MS-11, discusses the detailed analysis of the alternatives using seven of the nine criteria of the NCP, and compares the MS-11 alternatives with one another.

- Section 7.0 – MS-12 Remedial Alternatives: This section introduces the detailed process descriptions of each alternative being considered to address the contamination issues with MS-12, discusses the detailed analysis of the alternatives using seven of the nine criteria of the NCP, and compares the various MS-12 alternatives with one another.

Appendix A contains the Rounds 1 through 10 Interim Offshore Monitoring Program Report (Tetra Tech, February 2010). Appendices B and C provide the following information related to MS-01 through MS-14 as appropriate: concentration trend plots, cost estimates for alternatives, and remediation area and quantity calculations.

1.4 FACILITY AND OU4 BACKGROUND INFORMATION

A description of PNS and the history of the facility, as well as a description and history of OU4 and the conceptual site model (CSM), are provided in this section.

1.4.1 Facility Description and History

PNS is a military facility with restricted access on an island located in the Piscataqua River, as shown on Figure 1-1. PNS is referred to on the National Oceanic and Atmospheric Administration (NOAA) nautical charts as Seavey Island, with the eastern tip given the name Jamaica Island. Clark's Island is to the east attached by a rock causeway to Seavey Island. The Piscataqua River is a tidal estuary that forms the southern boundary between Maine and New Hampshire. PNS is located in Kittery, Maine, north of Portsmouth, New Hampshire, at the mouth of the Great Bay Estuary (commonly referred to as Portsmouth Harbor).

PNS is engaged in the conversion, overhaul, and repair of submarines for the Navy. The long history of shipbuilding in Portsmouth Harbor dates back to 1690, when the first warship launched in North America,

the Falkland, was built. PNS was established as a government facility in 1800, and it served as a repair and building facility for ships during the Civil War. The first government-built submarine was designed and constructed at PNS during World War I. A large number of submarines have been designed, constructed, and repaired at this facility since 1917. PNS continues to service submarines as its primary military focus.

Prior to CERCLA and Resource Conservation and Recovery Act (RCRA) regulation, years of shipbuilding and submarine repair work at PNS resulted in hazardous substances being released into soil, groundwater, surface water, and sediment on and around Seavey Island. As a result, investigation and remediation activities were performed under the Department of Defense (DoD) IRP. Paralleling CERCLA, the IRP focuses on the cleanup of contamination from past hazardous waste operations and past hazardous material spills. The IRP is further discussed in the Site Management Plan (SMP) for PNS [Amended Fiscal Year (FY) 12] (Navy, February 2012).

Investigations of substance releases at PNS began in 1983 with the Initial Assessment Study (IAS) (Weston, June 1983). USEPA became involved with PNS in 1985 when the agency requested information on PNS hazardous wastes and conducted a visual site inspection under the authority of RCRA. Since 1988, Maine Department of Environmental Protection (MEDEP) has also provided oversight of investigation and remediation at PNS. In March 1989, USEPA issued a Corrective Action Permit under the RCRA Hazardous and Solid Waste Amendments (HSWA) of 1984 (USEPA, March 1989) that required PNS to investigate 13 Solid Waste Management Units (SWMUs) and take appropriate corrective action. Until the mid-1990s, investigations at PNS were conducted under RCRA authority. Effective May 31, 1994, PNS was included on the National Priorities List (NPL), and subsequent studies have been conducted under the authority of CERCLA, commonly known as Superfund. Consistent with the transition from RCRA to CERCLA, the SWMU terminology was replaced with “site.” Ongoing work meets the intent of the HSWA Permit, but the ongoing studies to develop and evaluate remedial activities are conducted as part of the FS (CERCLA terminology) and combine both RCRA and CERCLA criteria.

The Federal Facility Agreement (FFA) for PNS was signed by USEPA and the Navy in September 1999, became effective February 2000, and supersedes the HWSA Permit. The State of Maine has elected not to be a party to the FFA at this time. However, the state is afforded a participatory role in the site remediation process by virtue of CERCLA. Among other things, the FFA outlines roles and responsibilities, establishes deadlines/schedules, outlines work to be performed, and provides a dispute resolution process for primary documents. The FFA for PNS ensures that CERCLA decisions will be consistent with RCRA and other federal and state hazardous waste statutes and regulations, as appropriate for the sites at PNS. USEPA, MEDEP, and the Navy continue to work toward site cleanup at PNS under CERCLA.

1.4.2 OU4 Description and History

OU4 is divided into six AOCs, identified in the Estuarine Ecological Risk Assessment (EERA) Report [Naval Command, Control and Ocean Surveillance Center (NCCOSC), May 2000] as nearshore habitats adjacent to PNS that may have been affected by onshore IRP sites. A conceptual model developed as part of the EERA was used to identify AOCs, including Clark Cove, Sullivan Point, Defense Reutilization and Marketing Office (DRMO) Storage Yard, Dry Docks, Back Channel, and Jamaica Cove. The AOC and IRP site locations are shown on Figure 1-2.

Two IRP sites, Site 5 - Former Industrial Waste Outfalls and Site 26 - Portable Oil/Water Tanks, were considered sites that had offshore impacts but no onshore impacts. In August 2001, a Decision Document was signed indicating that NFA under CERCLA is necessary for Site 26; therefore, Site 26 is no longer included in OU4 (Navy, August 2001). Site 5 is located within the Dry Docks AOC, and any impacts that the site may have had offshore will be addressed as part of the Dry Dock AOC. Site 5 consisted of numerous discharge points along the Piscataqua River at the western end of PNS in the dry dock area. The outfalls are believed to have been used from 1945 to 1975 to discharge liquid industrial wastes before the Industrial Waste Treatment Plant was constructed. The wastewaters may have contained heavy metals (mercury, lead, cadmium, chromium, copper, and zinc), oils and grease, and polychlorinated biphenyls (PCBs). In 1978, dredging was conducted offshore in the vicinity of the outfalls (in the berth areas by the dry docks), and maintenance dredging is conducted periodically in the berth areas.

As stated in Section 1.2, interim monitoring is being conducted at 14 MSs adjacent to PNS and at four RSs (representing non-PNS impacted areas) in the Piscataqua River. Figures 1-3 and 1-4 present the locations of the monitoring and RSs, respectively. As part of the interim monitoring program, chemical concentrations detected in sediment samples from MSs were compared to concentrations in reference samples to determine whether the contamination was site-related or similar to reference concentrations. Table 3-3 in the Interim Offshore Monitoring Plan (Tetra Tech, October 1999) presents the rationale for the location of each station.

For this report, the number after the MS designates the sample location for that station. For example, MS-01, Loc. 3, is location 3 at MS-01. Complete nomenclature is described in Section 5.2 of the Interim Offshore Monitoring Plan (Tetra Tech, October 1999).

1.4.3 Site Characteristics

Site characterization information including regional and site-specific information on demography, land use, surface features, climatology, hydrology, and ecology is provided in this section.

1.4.3.1 Demography and Land Use

PNS has approximately 90 officers and enlisted personnel and about 3,900 civilian employees (PNS, June 2007). Kittery, Maine, is a residential community of 9,500 people, and Portsmouth, New Hampshire, has a population of approximately 21,000 (based on the 2000 Census). Area industries include retail and wholesale trades, textiles, manufacturing, fishing, shipbuilding, power plants, and gas storage facilities. The countryside north and west of Kittery consists of forests and some farmland. Along the coast south of Portsmouth are small communities and seasonal dwellings.

OU4 includes 14 MSs and their sampling locations, all of which are offshore or along the shore of PNS.

1.4.3.2 Physical Characteristics

All of the MSs are located at sea level, with any changes in elevations being caused by the tide. Climatology information was obtained from the NOAA internet site for the National Climatic Data Center Office for the Portland, Maine weather station, which is the NOAA coastal weather station closest to PNS. The climatological data for Portland, Maine are based on mean observations from 1975 to 2006 (NOAA, January 2007). Precipitation (including liquid water equivalent for snowfall) is fairly evenly distributed over the year, with approximately 3 to 5 inches falling per month, for an annual total of approximately 46 inches for Portland. Monthly average temperatures for Portland range from approximately 20 to 40 degrees Fahrenheit (°F) from November through April, and from approximately 50 to 70°F from May through October. Snowfall occurs mostly from November to April, with little snow occurring in October and May. The annual snowfall is approximately 24 inches. Portsmouth climate tends to be similar to Portland; however, because of its proximity to the ocean, there tends to be slightly less snow and more rainfall in Portsmouth than Portland.

1.4.3.3 Hydrology

Semi-diurnal tidal currents, the horizontal motions associated with tidal changes in water levels, predominate in Portsmouth Harbor. Near Seavey Island, the mean tidal range is 8.1 feet. The overall ebb and flood currents in the vicinity of PNS are high. The average flood currents range from 3.0 knots south of Seavey Island to 3.3 knots southwest of Badgers Island (located approximately 1,000 feet east of PNS). The average ebb currents are 3.8 knots south of Seavey Island and 3.7 knots southwest of Badgers Island. Because of the strong currents, most ships wait for favorable tides before moving up and

down the narrow Piscataqua River. The estimated flushing rates of Portsmouth Harbor and the lower reaches of the Great Bay Estuary range from 3.3 to 6.3 tidal cycles (McLaren/Hart, March 1994).

1.4.3.4 Ecology

No known endangered, threatened, or protected species or critical habitats are located within the boundaries of PNS. However, the federally endangered shortnose sturgeon exists in the Piscataqua River and is potentially present within 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 [Beginning with Habitat (BwH), 2010a,b]. 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).

The offshore areas at PNS include pelagic, channel bottom/subtidal, eelgrass, intertidal mudflat, rocky intertidal, and salt marsh habitats. The pelagic habitat around PNS is the open water of the Piscataqua River, which includes the back channel of the river, Jamaica Cove, and Clark Cove. The channel bottom/subtidal habitat is the bottom of the pelagic area and includes hard-bottom areas and fine-grained depositional areas. A hard-bottom area occurs where the river experiences tidal scouring and active erosion such as offshore of PNS in the main flow of the Piscataqua River. The fine-grained depositional areas occur outside the main flow of the Piscataqua River, along the Back Channel, Jamaica Cove, and Clark Cove. Eelgrass habitats, characterized by the presence of the rooted marine angiosperm *Zostera marina*, occur in subtidal areas by Jamaica Cove, Clark Cove, Sullivan Point, the Dry Docks, and in the Back Channel. Intertidal mudflats are generally muddy-sand or sandy-mud areas fringing the shoreline along the Back Channel, off Jamaica Island (in Jamaica Cove), and around Clark's Island. The rocky intertidal habitat occurs in many locations along Seavey and Jamaica Islands where the shoreline is exposed to river currents and where there are no appreciable fine-grained sediment accumulations (such as offshore of the DRMO, Site 6). Salt marsh habitats have been identified in Clark Cove, by Clark's Island, and in the Back Channel (including Jamaica Cove).

1.4.4 Conceptual Site Model

The CSM for the Interim Offshore Monitoring Program focuses on potential sources of contaminants and exposure routes for organisms (i.e., receptors) potentially exposed to sediment in the offshore area. The CSM for OU4 is summarized on Figure 1-5. Sediment is emphasized because contaminants that migrate via various mechanisms described below generally accumulate in sediment either through direct deposition as particulates or through preferential partitioning from surface water to sediment.

The Piscataqua River is part of the tidal Great Bay Estuary, and in the vicinity of PNS, the water is predominantly saline (salinities greater than 20 parts per thousand). The water from the river is not used for human consumption, but the river is used for commercial and recreational boating along with many other activities. There are several potential Navy and non-Navy sources of contamination to the offshore area, which are described below.

1.4.4.1 Potential Sources of Contamination

Table 1-1 presents a summary of the potential sources of contamination, release mechanisms, and transport mechanisms for each monitoring station. The key environmental release, transport, and dispersion mechanisms that have resulted in contamination at OU4 are as follows:

Historically, contaminants such as heavy metals, oils (potentially containing PCBs), and grease, were released into the Piscataqua River through outfalls. Specifically, Site 5, the Former Industrial Waste Outfalls, released contaminants to surface water at the Dry Docks AOC. With the activation of an Industrial Waste Treatment Plant at PNS, no hazardous wastes have been discharged through these outfalls since about 1975.

Physical movement of contaminated soil (e.g., through snow plowing) at IRP sites, prior to paving over or vegetation of such soil, was a secondary release mechanism that could have resulted in contamination of the offshore area. Snow was historically plowed over the shoreline into the Piscataqua River. Snow plowing activities have been recorded at OU2, DRMO, which is adjacent to the offshore area MS-11. Currently, contaminated soil at PNS is either paved over or covered by vegetation; therefore, physical movement of contaminated soil is not a current release mechanism.

Offshore sediment dredging activities that took place at PNS, without the use of turbidity curtains, could have resulted in the migration of contaminated sediment to offshore areas that were previously uncontaminated. Dredging activities have occurred at MS-12 and in the main channel of the Piscataqua River. Runoff from contaminated dredged materials placed onshore for dewatering, without monitoring or treatment of the runoff water, could also have resulted in contamination of offshore areas.

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.

Tidal erosion and storm water runoff from any IRP site at PNS could have resulted in contamination of offshore sediment. Suspended and dissolved contaminants carried by erosion or storm water could have been deposited in offshore areas. Erosion controls have been installed along the shoreline at MS-03, MS-04, MS-05, MS-06, MS-08, MS-09, and MS-11.

Tidal erosion and storm water runoff from non-IRP sites at PNS could have resulted in contamination of offshore sediment. Contaminants carried by erosion or storm water could include contaminants from historical shipbuilding operations, materials used to construct buildings (e.g., roof shingles and tar paper), ambient background levels, or motor oils and gasoline that leak from vehicles.

Non-PNS related activities, such as boating and fishing activities, could result in contamination of offshore sediment, including in reference areas. Contaminants could be released from spills during fueling activities, illegal dumping of waste, and possibly other mechanisms. Non-PNS contamination affecting reference areas, currently and in the future, would not have an impact on site environmental decisions. RSs are no longer sampled because it was determined that chemical of concern (COC) reference concentrations are less than COC concentrations in areas affected by onshore activities (Tetra Tech, February 2010). However, future non-PNS contamination (e.g. oil tanker spill) could affect site decisions in those areas already affected by onshore activities.

As part of the Rounds 1 through 7 Interim Offshore Monitoring program report (Tetra Tech, November 2004), a statistical comparison was conducted at the MSs (where necessary) to determine whether the chemical concentrations at those MSs were greater than the chemical concentrations at the RSs. It was determined that concentrations of some chemicals were greater at the MSs than they were at the RSs.

1.4.4.2 Potential Exposure Routes and Receptors

The primary ecological risk to benthic invertebrates is from exposure to bioavailable/bioaccessible COCs in sediment. Exposure routes of contaminants in sediment to benthic invertebrates include direct contact, ingestion of sediment, and ingestion of prey. The biologically active zone in sediment varies depending on season, grain size, and currents. Sediment from 0 to 10 centimeters (cm) includes the biologically active zone (benthic organisms are living and mixing sediment within this depth) and was the general depth of surficial sediment investigation during previous sediment investigations around PNS.

1.4.4.3 Overall Conceptual Site Model

In summary, areas offshore of PNS were potentially affected by PNS and non-PNS sources of contamination through a variety of migration pathways.

Contaminants from onshore PNS IRP sites were released to soil and groundwater at onshore sites primary through spills, placement on soil, and burying in soil. These contaminants were then released to the offshore area through erosion, runoff, and groundwater discharge. Also, contaminants from some sites were directly discharged to the offshore area. Based on investigations conducted at PNS IRP sites to date, there is little potential for current significant releases of contaminants to the offshore area from these sites, but investigations at some sites are ongoing or have not yet been initiated.

The area along the Piscataqua River has a large amount of industry and urbanization. The contaminants detected in sediments at PNS, primarily metals and polycyclic aromatic hydrocarbons (PAHs), can be found to varying degrees in non-PNS discharges and operations along the Piscataqua River from sources such as local industries, urban non-point source runoff, municipal water treatment discharges, and fuel or oil terminals. PAHs from the use of petroleum products in fuels and road surfaces can reach sediment through surface runoff from PNS and non-PNS areas. PCBs may be attributed to past activities in the watershed, and although numerous potential sources of contamination were identified, their relative contributions to sediment contamination adjacent to PNS could not be definitively established.

Although various ecological and human receptors may be present and come into contact with sediment in the offshore area, it was determined through previous investigations (summarized in Section 1.5) that the primary receptors of concern for offshore sediment were benthic invertebrates.

1.5 SUMMARY OF OU4 ENVIRONMENTAL INVESTIGATIONS AND ACTIONS

Various investigations have been conducted at PNS beginning with the IAS (Weston, June 1983), conducted in 1983 that identified and assessed sites posing a potential threat to human health and the environment. The final phase of this study was completed in 1986 with the issuance of a Final Confirmation Study (FCS) [Loureiro Engineering Associates (LEA), 1986], which evaluated the sites identified in the IAS to confirm the presence of contamination. In accordance with the HSWA Permit requirements, a RCRA Facility Investigation (RFI) was performed. The RFI consisted of several phases of investigations spanning from October 1989 to February 1992, and the results of the RFI were assembled into the RFI Report (McLaren/Hart, July 1992). The RFI “Approval with Conditions” was issued by the USEPA in March of 1993 and the Addendum to the RFI report (McLaren/Hart, March 1993) was prepared to address the requirements of the “Approval with Conditions” to the extent possible.

Several requirements needed additional field investigation, which was conducted as part of the RFI Data Gap field work. The results of the field work are provided in the RFI Data Gap Report (Halliburton NUS, November 1995) and are considered supplemental to the RFI report. A risk assessment of onshore media (e.g., soil, groundwater) was conducted using the analytical data collected during the RFI and the results are provided in the Public Health and Environmental Risk Evaluation: Part A Human Health Risk Assessment, (McLaren/Hart, March 1994). The offshore area was investigated and risks evaluated as part of the EERA (NCCOSC, May 2000) and Human Health Risk Assessment for Offshore Media (McLaren/Hart, May 1994).

In May 1999, an Interim ROD for OU4 (Navy, May 1999) was signed requiring the Navy to conduct monitoring in the offshore area of PNS in the interim period before completion of the offshore FS and implementation of the final remedy for OU4. The results of the HHRA showed that risks for ingestion of sediment, dermal contact with sediment, and ingestion of surface water were less than regulatory guidelines [USEPA target risk range (10^{-6} to 10^{-4}) and MEDEP maximum incremental risk guidelines (10^{-5}) for carcinogenic risks, and a Hazard Index of 1.0 for noncarcinogenic risks] (McLaren/Hart, May 1994). Therefore, only risks to ecological receptors were considered during interim monitoring.

1.5.1 Interim Offshore Monitoring Program for OU4

The Interim Offshore Monitoring Program provides information on the condition of the offshore MSs in the interim period before completion of the offshore FS and implementation of a final remedy for OU4. Data collected as part of the monitoring program provide the information necessary to determine whether the RAOs for the interim period, as presented in the Interim ROD, are being met. The interim RAOs were developed so that the protection of ecological offshore communities can be ensured by identification of exposure to COCs at concentrations greater than acceptable levels. The Interim Offshore Monitoring Program was developed to provide a basis for any monitoring program that may be required as part of the remedial action for OU4. Upon implementation of the remedy for OU4, the current Interim Offshore Monitoring Program will be discontinued.

Interim offshore monitoring is being conducted in accordance with the Interim Offshore Monitoring Plan for OU4 (Tetra Tech, October 1999), with several modifications throughout the first 10 rounds of monitoring (Tetra Tech, November 2010). Initially, monitoring was conducted at 14 MSs adjacent to PNS and at four RSs (representing non-PNS impacted areas) in the Piscataqua River. Several of these MSs have not been sampled since Round 7, because of the modifications to the program.

As part of the monitoring program, 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) PAHs] (Tetra Tech, November 2001). The IRGs were

developed using the sediment-based PRGs developed for OU4. Although pesticides were not identified as COCs for OU4, PRGs were developed for endosulfan II (3.95 µg/kg), trans-nonachlor (3.99 µg/kg), and 4,4'-dichlorodiphenyltrichloroethane (DDT) (66.4 µg/kg). The PRGs developed for pesticides were not used as IRGs, because pesticides were not identified as COCs for OU4; however, the PRGs were considered when evaluating pesticides data. Lead was not identified as a limiting COC during PRG development, so a PRG was not developed for lead. However, because onshore sources of lead contamination exist at some of the sites, a literature value similar to an IRG, the effects range-median (ER-M), was used to evaluate the data. For lead, the value of its ER-M (218 milligrams/kilograms (mg/kg)) times two was used, because the IRGs for copper and nickel were approximately twice their respective ER-M values. Chemical concentrations detected in sediment samples from MSs were compared to concentrations in reference samples to determine whether the contamination is site-related or similar to reference concentrations.

The monitoring program was designed to include sampling and analysis of surficial sediment (0 to 4 inches) as the primary measure of exposure to determine whether the interim RAOs are being met. Sampling and analysis of mussel and juvenile lobster tissue to confirm the comparability between sediment and biota concentrations were also implemented as a secondary measure in satisfying the interim RAOs; the juvenile lobster sampling was discontinued after Round 5 and mussel samples were discontinued after Round 7.

At each MS, three sediment samples (with the exception of MS-11), one to three mussel samples (Rounds 1 through 7 only), and one juvenile lobster sample (Rounds 1 through 5 only) were collected during each monitoring event. At MS-11, sediment was not present in a large portion of the MS; therefore, only one sediment sample was typically collected at this MS. Four sediment samples, two mussel samples (Rounds 1 through 7 only), and one juvenile lobster sample (Rounds 1 through 5 only) were collected at each RS. The 10 rounds of monitoring were conducted between September 1999 and December 2008. During this period, changes were made to sampling locations at MS-05 and MS-09 to provide better monitoring of the stations.

The data from the first seven rounds were evaluated and documented in the Rounds 1 through 7 Interim Offshore Monitoring Program Report (Tetra Tech, November 2004). The main objective of that report was to determine the appropriate frequency of monitoring at each MS for the next 5 years, and to determine whether additional scrutiny was needed at any MS. Additional scrutiny was required at MS-01, MS-03, MS-04, MS-05, MS-09, MS-11, and MS-12. A summary of the Additional Scrutiny Investigation is presented in Section 1.5.2. The data from Rounds 1 through 10 were evaluated and documented in the Rounds 1 through 10 Interim Offshore Monitoring Program Report (Tetra Tech, February 2010). The report is included as an appendix to this document and can be found in Appendix A. The objective of the

Rounds 1 through 10 report was to summarize the results of the offshore investigations that have been conducted at each MS to date, and present recommendations and the associated rationale for modifications to the monitoring program after Round 10.

1.5.2 Additional Scrutiny Investigation for OU4

A two phase Additional Scrutiny Investigation was conducted with Phase I beginning in 2005, based on the recommendations in the Rounds 1 through 7 report. Additional sediment sampling for MSs offshore of OU7 and OU9 was conducted as discussed in Sections 1.5.2.1 and 1.5.2.2, respectively. The results were presented in the Additional Scrutiny Investigation Report (Tetra Tech, August 2007). Two main chemical groups (i.e., metals and PAHs) were identified as target analytes for this additional scrutiny. The objective of the additional scrutiny was to assess existing data and to collect and assess additional data at MSs where concentrations of chemicals were greater than IRGs and were projected to continue to exceed IRGs for the next 5 years. This investigation focused primarily on additional scrutiny of MS-01, MS-05, MS-09, MS-11, and MS-12, as provided in the Additional Scrutiny Quality Assurance Project Plan (QAPP) (Tetra Tech, August 2005).

The Phase II Additional Scrutiny Investigation was conducted in 2007 to collect and evaluate additional data from MS-01 and MS-12. The Phase II Additional Scrutiny Investigation at MS-01 was conducted to determine the nature of the river bed substrate and whether a significant amount of sediment was present in this area. At MS-12, the investigation was conducted to determine the extent of contamination inside and outside of Building 178. The results were presented in the Rounds 1 through 10 Interim Offshore Monitoring Report.

1.5.2.1 OU7 (Site 32) Remedial Investigation

The results for the Interim Offshore Monitoring Program for OU4 showed that concentrations of copper, nickel, and PAHs exceeded the OU4 IRGs at the MSs offshore of Site 32 (MS-03 and MS-04), and that additional sampling to determine the extent of contamination in sediment was necessary. Additional sampling for copper and nickel was conducted as part of the Phase I RI in 2005. A removal action was conducted in 2006 to address shoreline erosion, at which time surficial metallic debris and slag were removed from the shoreline, and the mid- to high-tide portion of the shoreline was covered with shoreline controls. The removal action addressed the shoreline area where nickel and the majority of copper sediment contamination were found; however, several mid- to low-tide zone sediment samples had concentrations of copper that exceeded the IRG. Additional sampling to determine the extent of copper and PAH contamination in sediment in the mid- to low-tide zone was conducted during the Phase II RI in 2008.

1.5.2.2 OU9 (Site 34) Remedial Investigation Sampling and Analysis Plan

The results of the Phase I and II Additional Scrutiny Investigation indicated that sufficient sediment was present with concentrations of PAHs exceeding the OU4 IRG at the MS offshore of Site 34 and that additional sampling to determine the extent of PAH contamination in sediment was necessary. The additional sampling was conducted as part of the OU9 RI in 2009. A systematic grid sampling design was selected for MS-01 to delineate the extent of PAH concentrations in sediment greater than IRGs (Tetra Tech, July 2009).

1.6 SUMMARY OF MONITORING STATION INVESTIGATIONS

The following sections present the data evaluations and the determination of the extent of contamination for the 14 MSs monitored under the OU4 Interim Offshore Monitoring Program.

Sediment analysis for metals was conducted using two different methods at some stations during various sampling events: 1) the NOAA analytical method and, 2) the USEPA Analytical method. An evaluation was conducted to determine whether to continue to use the NOAA analytical method for metals analysis of sediment, or to use USEPA analytical method (Tetra Tech, February 2010). The NOAA results were consistently greater than USEPA results, suggesting that some of the metals are bound in the sediment matrix and are extracted in the complete digestion using the NOAA method, but are not extracted in the recoverable digestion used in the USEPA method. Regression equations were developed, which related the metals concentrations determined using one analytical method to the metals concentrations determined using the other analytical method. In order to compare the data, a regression equation was used to convert metals concentrations from standard USEPA analytical method to results derived from the NOAA method. This was needed because the IRGs were developed with data obtained using the NOAA analytical method, but it was agreed by the project team that future analyses could be done using the USEPA analytical method. The regression equations can be found in Appendix E in the Rounds 1 through 10 Interim Offshore Monitoring Report for OU4.

Appendix B of this FS contains the concentration trend plots for each of the MSs and for the combined RS data set for data collected as part of the Interim Offshore Monitoring Program. Note that at some stations, only seven or eight rounds of interim offshore monitoring data were collected, while at other stations, ten rounds of data were collected.

1.6.1 MS-01

MS-01 is located in the western portion of the Back Channel AOC, offshore of Site 34 (OU9) and adjacent to the bridge leading to Gate No. 1. 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. This MS is located in an area where the width of the channel decreases, and the water velocity is very fast during the incoming and outgoing tides. As a result, the average silt content in the sediment at this station is less than 9 percent, whereas the average sand content is greater than 80 percent (Tetra Tech, November 2004). The greatest percentage of silt is found in the intertidal location.

The primary environmental concern for MS-01 is PAH contamination in sediment that may be a result of disposal of ash from Site 34 operations around Building 62. The ash was characterized as having concentrations of PAHs much greater than acceptable risk levels. A removal action was conducted at Site 34 in 2007 and included ash removal around Building 62 and Building 62 Annex, and stabilization of a portion of the shoreline. As part of the removal action, ash and soil mixed with ash were removed by excavating the ground surface until native material with no ash was observed. Native and non-native materials were identified based on their color. The excavated area was backfilled and covered with asphalt or vegetation. One area of Site 34, a grassy area with large trees, was not included in the 2007 removal action. Based on the ash extent investigation conducted in April 2004, ash was generally found in the top 0.5 to 2 feet of soil and was found in relatively thin layers in the grassy area. Also, the adjacent shoreline (bedrock ledge) is stable, so erosion of ash along the shoreline is not likely. Therefore, the Navy determined that excavation of the ash in the grassy area was not warranted as part of the removal action.

Seven rounds of interim offshore monitoring and two phases of Additional Scrutiny Investigations were conducted at MS-01. At one location, lead slightly exceeded twice its ER-M during Round 4; the exceedance was co-located with PAH contamination. Because lead concentrations in other rounds were less than twice its ER-M, lead is not considered a COC in the development of remedial alternatives. Additional scrutiny was recommended at this MS because concentrations of PAHs exceeded IRGs during the first seven rounds and because trend plots indicated that concentrations were increasing (Tetra Tech, November 2004). Also, PAH concentrations in site sediment samples were greater than concentrations in reference samples. In accordance with the Additional Scrutiny QAPP (Tetra Tech, August 2005), sediment samples were collected at MS-01 to determine whether Site 34 was a primary source of PAHs at MS-01. The data from the sediment samples were evaluated in the Additional Scrutiny Investigation (Tetra Tech, August 2007), which concluded that Site 34 was not likely a current primary source, but was likely a historical source, of PAHs to the offshore area. This conclusion was based in part on a PAH forensics investigation conducted on sediment samples collected from the offshore area at MS-01, in catch basins along storm water pipes that discharge to the offshore area, and on soil samples collected from Site 34. In particular, a limited area of contamination near one sediment sample location may be related to past sources of PAHs from Site 34.

A technical meeting with the Navy, regulators, and Tetra Tech was held April 26, 2007, to discuss the Draft Additional Scrutiny Investigation Report. The minutes from this meeting are included in Appendix D of the Additional Scrutiny Investigation Report (Tetra Tech, August 2007). During the technical meeting, it was agreed that additional data were needed to understand the substrate and possibly determine the extent of PAH contamination in sediment at MS-01. It was recommended that the Navy continue the investigation in a phased approach and determine whether sufficient sediment is present at MS-01 to warrant consideration of a sediment removal action. It was noted during the meeting that if there was a significant amount of sediment at MS-01, sediment samples for PAH analysis could be collected as part of the RI for Site 34 or as part of a subsequent OU4 investigation.

The Phase II Additional Scrutiny QAPP was prepared to present the methodologies to determine whether sufficient sediment was present at MS-01 to warrant consideration of a removal action (Tetra Tech, September 2007). The studies in the Phase II Additional Scrutiny QAPP were implemented in November 2007 and a Technical Memorandum was prepared to summarize the investigation results and is included in the Rounds 1 through 10 Interim Offshore Monitoring Report. The results showed there was sufficient sediment to warrant remediation; however, the extent of contaminated sediment was not delineated.

A SAP for the OU9 RI was prepared (Tetra Tech, July 2009) that included delineation of PAH contamination in sediment. Surface and subsurface sediment samples were collected and analyzed in 2009. Figures 1-6 and 1-7 show the maximum acenaphthylene and HMW PAH concentration, respectively, at each sampling location. The two types of PAHs shown on the figures are co-located with other PAH exceedances. Therefore, only the exceedances shown on Figures 1-6 and 1-7 are used to demonstrate the extent of contamination at MS-01. The 2009 sediment data were combined with the MS-01 data collected during the Interim Offshore Monitoring Program (1999 to 2004) and the Additional Scrutiny Investigation (2005). Offshore sediment is contaminated with PAHs at concentrations greater than IRGs, indicating that ecological risks are unacceptable. However, various biota/organisms were found on and in sediment during sampling.

A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-2. The concentration trend plots showing the Rounds 1 through 7 interim offshore monitoring program results are located in Appendix B. PAH concentrations exceeded IRGs over the first seven rounds of monitoring and trend plots indicate that concentrations are not decreasing. Additional scrutiny and delineation of the extent of PAH contamination indicate there is sufficient sediment contamination to warrant remedial action. Therefore, RAOs and remedial alternatives for MS-01 are developed and evaluated in this FS.

1.6.2 MS-02

MS-02 is located in the central portion of the Back Channel AOC, between Topeka Pier and the bridge leading to Gate No. 2. There are no known IRP sites immediately onshore of MS-02.

Seven rounds of interim offshore monitoring were conducted at this station. As presented in the Rounds 1 through 7 Report (Tetra Tech, November 2004), concentrations of PAHs and metals were less than IRGs in the first seven rounds and were predicted to remain less than IRGs in the future. Concentration trend plots illustrating the low levels of contamination are located in Appendix B. Also, the ranges of PAH and metals concentrations detected at MS-02 were similar to, or within the ranges of, concentrations in reference samples (Tetra Tech, November 2004). Additional scrutiny was not recommended for this MS in the Rounds 1 through 7 Report because chemical concentrations were much less than their respective IRGs.

The analytical data and concentration trends associated with the investigations presented above are provided in Appendix B. Based on the analytical results presented in the Rounds 1 through 7 Report, no additional offshore monitoring or actions are needed for MS-02. A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-3. There are no current or past exceedances of IRGs that indicate an ecological risk at MS-02, and the data do not indicate any impacts from IRP sites. Therefore, MS-02 is not considered further in this FS and NFA will be conducted at this MS.

1.6.3 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).

Seven rounds of interim offshore monitoring were conducted at MS-03 and MS-04, along with Site 32 RI sampling, as described below. Several chemicals were detected in sediment at MS-03 and MS-04 at concentrations exceeding IRGs and reference samples.

During Site 32 Phase I RI sampling in 2003, the presence of foundry slag, and copper and nickel concentrations in sediment in the intertidal area of Site 32 were further investigated. Slag mapping 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. Concentrations of copper and nickel in sediment samples located further away from the shoreline were

less than IRGs. Samples with exceedances of IRGs were located in the mid-tide area and were bounded by samples to the east, west, and north.

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 riprap) along the entire length of the Site 32 shoreline (approximately 1,200 linear feet), in the mid- to high-tide area (Tetra Tech, June 2008).

Based on the results of the Interim Offshore Monitoring Program and Phase I RI, the Navy conducted additional sediment sampling as part of the Phase II RI in December 2008 to determine the extent of copper and PAH IRG exceedances in the mid-to low-tide area of the Site 32 shoreline. Copper and PAH concentrations exceeded IRGs in some samples. The elevated levels of PAH and nickel are co-located with the elevated levels of copper. Therefore, using the copper data to determine the area included in the remedial activity will account for areas of elevated PAH and nickel concentrations. Figure 1-8 shows the maximum copper concentrations detected at each sampling location.

A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-4. The concentration trend plots showing the Rounds 1 through 7 Interim Offshore Monitoring Program results are located in Appendix B. MS-03 and MS-04 sediment sample concentrations consistently exceeded their respective IRGs. Concentration trend plots indicate that concentrations of copper, nickel, and PAHs are not decreasing. The Phase I and II RI sediment sampling showed sufficient sediment contamination to warrant remedial action. Therefore, RAOs and remedial alternatives for MS-03 and MS-04 are developed and evaluated in this FS.

1.6.4 MS-05

MS-05 is located in the subtidal area of OU3 in Jamaica Cove, and is adjacent to the wetland constructed as part of the remedy for OU3. As part of the remedy for OU3, contaminated soil adjacent to Jamaica Cove was excavated and wetlands were constructed in the excavated area. Although there is no longer contaminated soil adjacent to Jamaica Cove, various remedial activities led to the release of contaminants to the subtidal area. During OU3 construction activities, turbidity curtains were used in Jamaica Cove to minimize the size of the area in each cove potentially impacted by the release of contaminants. The impacted area appears to be within the approximate location of the curtains as discussed herein (Tetra Tech, August 2005).

Ten rounds of sampling have been conducted at MS-05. The analytical data generated by these rounds of sampling are presented in Appendix B. The following summarizes samples with concentrations that exceeded IRGs (and were twice the ER-M for lead):

- Concentrations of PAHs and nickel did not exceed their respective IRGs at any location during any round.

- Copper was detected at concentrations that exceeded its IRG at one location during each of Rounds 7 through 9.

  - Copper concentrations at Loc. 1 began increasing in Round 6 as a result of the OU3 construction activities. Concentration exceedance was found in Round 7, concentration peaked in Round 8 and decreased to less than the copper IRG in Rounds 9 and 10 at Loc. 1.

  - In Round 9, the exceedance occurred at Loc. 2. This location was moved closer to OU3 after Round 8 because greater copper concentrations were identified in the sediment closer to OU3 during the Additional Scrutiny Investigation. In Round 10, the copper concentration at Loc. 2 decreased to less than its IRG and was similar to concentrations in Rounds 1 through 5.

- Lead was detected at concentrations that exceeded twice its ER-M at one location during each of the Rounds 6 through 9.

  - In Rounds 6 through 8, the exceedances occurred at Loc. 1. Lead concentrations at Loc. 1 increased in Rounds 6 through 8 as a result of OU3 construction activities, but decreased to less than twice the ER-M in Round 10, and were similar to concentrations in Rounds 1 through 5.

  - In Round 9, the exceedance occurred at Loc. 2. This location was moved closer to OU3 after Round 8 because greater lead concentrations were identified in the sediment closer to OU3 during the Additional Scrutiny Investigation. In Round 10, the lead concentration at Loc. 2 decreased to less than twice the ER-M and was similar to concentrations in Rounds 1 through 8.

Sediment samples were collected from Loc. 4 in Rounds 9 and 10. Copper and lead concentrations during both of these rounds were much lower than the IRG for copper, and lower than twice the ER-M for lead. The concentration trend plots showing the trends of contaminant concentrations are located in Appendix B.

Additional scrutiny was conducted at MS-05 to determine the extent of copper and nickel concentrations in sediment that exceed IRGs, and the extent of lead concentrations in sediment that exceed two times the ER-M. Most of the Additional Scrutiny samples were collected in August 2005, concurrently with sampling for Round 8 of the Interim Offshore Monitoring Program. One Additional Scrutiny sediment sample (at location AS05-SD15) was collected in November 2007 during the Round 9 sampling event from the area northwest of MS-05, Loc. 1, to better refine the extent of contamination in this area.

The following is a summary of the results of the Additional Scrutiny Investigation and an evaluation of Round 10 data for MS-05:

- The concentrations of copper (27 mg/kg) and lead (40 mg/kg) in the sample from AS05-SD15 were less than the IRG and less than twice the ER-M, respectively. Therefore, the extent of contamination is defined in the area northwest of MS-05, Loc. 1.

- Concentrations of copper and nickel in the Additional Scrutiny samples were less than IRGs at all sampling locations.

- Concentrations of lead in the Additional Scrutiny samples were less than twice the ER-M.

In summary, chemical concentrations were less than IRGs (for PAHs, copper, and nickel) and less than twice the ER-M (for lead) in sediment samples at MS-05 collected during the most recent sampling event (Round 10). Also, concentrations of copper, nickel, and lead in Additional Scrutiny samples were less than their respective IRGs, or less than twice the ER-M (for lead) at all sampling locations. Figures 1-9 and 1-10 show the concentrations of lead and copper contamination, respectively, at MS-05.

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 IRGs (and twice the ER-M for lead) is located in Table 1-5. 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 would 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.

1.6.5 MS-06

MS-06 is located in the offshore area of OU3 in the Jamaica Cove AOC. Seven rounds of interim offshore monitoring were conducted at this station. As presented in the Rounds 1 through 7 Report

(Tetra Tech, November 2004), concentrations of PAHs and metals were less than IRGs in the first seven rounds and were predicted to remain less than their IRGs for the next 5 years. Also, the range of PAH and metals concentrations detected at MS-06 were similar to, or within the range of, concentrations in reference samples (Tetra Tech, November 2004).

Concentration trend plots illustrating the low levels of contamination are located in Appendix B. A summary of the sediment analytical data compared to the IRGs (and twice the ER-M for lead) is shown on Table 1-6. Based on the analytical results presented in the Rounds 1 through 7 Report, no additional offshore monitoring or actions are needed for MS-06. There are no current or past exceedances of IRGs that indicate an ecological risk at MS-06, and the OU3 remedy has removed all contaminated soil near MS-06. Therefore, MS-06 will not be considered further in this FS and NFA will be conducted at this MS.

1.6.6 MS-07

MS-07 is located in a recreational area in the Clark Cove AOC, but is not immediately offshore of OU3. There are no known IRP sites immediately onshore of MS-07. MS-07 acted as a nearby RS for MS-08 and MS-09, which are also located in Clark Cove.

Seven rounds of interim offshore monitoring were conducted at this station. As presented in the Rounds 1 through 7 Report (Tetra Tech, November 2004), concentrations of PAHs and metals were less than IRGs in the first seven rounds and were predicted to remain less than their IRGs in the future. Concentration trend plots illustrating the low levels of contamination are located in Appendix B. Additional scrutiny was not recommended for this MS in the Rounds 1 through 7 Report (Tetra Tech, November 2004) because chemical concentrations were significantly less than IRGs.

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 IRGs (and twice the ER-M for lead) is located in Table 1-7. There are no current or past exceedances of IRGs (or twice the ER-M for lead) 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 would 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.

1.6.7 MS-08

MS-08 is located in the offshore area of OU3 in the Clark Cove AOC. The intertidal area near MS-08 was excavated as part of the OU3 remedial activities in 2004, and the excavated area was backfilled with clean material.

Ten rounds of interim offshore monitoring were conducted at this MS. Based on evaluation of the first seven rounds of data (metals and PAHs were detected at concentrations that exceeded IRGs and reference concentrations), and because of offshore impacts from OU3 construction activities, it was recommended in the Rounds 1 through 7 Report (Tetra Tech, November 2004) that interim offshore monitoring be continued on an annual basis until at least Round 10 (when the monitoring program was to be re-evaluated).

The following summary lists the samples with concentrations that exceeded IRGs, the PRG for 4,4'-DDT, and two times the ER-M for lead:

- PAHs were detected at a concentration that exceeded their respective IRGs at one location during Round 7, but the duplicate sample collected during that round did not exceed the IRGs and there were no exceedances during Rounds 8 through 10.

- Copper was detected at concentrations that exceeded its IRG at one location during each of Rounds 2 and 5, and at two locations during Round 7. Concentrations in Rounds 8 through 10 decreased to less than the copper IRG.

- Concentrations of nickel generally followed a similar pattern as copper, with concentrations that exceeded the nickel IRG at one location during each of the Rounds 1, 2, 3, and 5, and at two locations during Round 7. Concentrations in Rounds 8 through 10 decreased to less than the nickel IRG.

- During Round 7, lead concentrations in samples collected from two MS-08 locations were greater than twice the ER-M; the concentration at Loc. 1 was much greater than twice the ER-M. Lead concentrations in all of the other rounds were less than twice the ER-M.

- Concentrations of 4,4'-DDT were greater than its PRG at one or two locations during each of the Rounds 1, 2, 3, 4, and 7. Concentrations in Rounds 8 through 10 decreased to less than the 4,4'-DDT PRG.

In summary, although chemical concentrations were greater than IRGs, the PRG (for 4,4'-DDT), or twice the ER-M (for lead) at some MS-08 locations during a few rounds, chemical concentrations decreased to less than the IRGs, PRG, or twice the ER-M during the last two to three monitoring rounds.

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 IRGs (and twice the ER-M for lead) 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-08. As a result, no remedial alternatives have been developed for MS-08 in this FS. However, periodic monitoring would 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.

1.6.8 MS-09

MS-09 is located in the offshore area of OU3 in Clark Cove AOC. Three sediment locations were sampled in each round at MS-09 as part of the Interim Offshore Monitoring Program. As part of OU3 remedial activities, shoreline erosion controls were installed in the small intertidal areas that existed at MS-09 and the area was covered with riprap, so there is no longer an intertidal area associated with MS-09. As a result, all three sediment locations are now subtidal.

Based on evaluation of the first seven rounds of data (metals and PAHs were detected at concentrations that exceeded IRGs and reference concentrations), and because of the offshore impacts from the OU3 construction activities, it was recommended in the Rounds 1 through 7 Report (Tetra Tech, November 2004) that interim offshore monitoring be continued on an annual basis until at least Round 10 (when the monitoring program was to be re-evaluated). It was also recommended in the Rounds 1 through 7 Report that additional scrutiny be conducted at this MS.

Ten rounds of sampling have been conducted at this MS, although some sample locations were moved during the rounds (see Section 2.3.5, Rounds 1 through 10 Interim Offshore Monitoring Report, Tetra Tech, February 2010). Additional scrutiny was conducted in August 2005 at MS-09 to determine the extent of PAH, copper, and nickel concentrations in sediment that exceed IRGs.

The following summary lists the samples with concentrations that exceed the IRGs, twice the ER-M (for lead), and the PRG (for 4,4'-DDT):

- Fluorene and HMW PAHs were detected at concentrations that exceeded their respective IRGs at one or more locations during Rounds 7 and 8. Concentrations decreased to less than IRGs in Rounds 9 and 10, but were slightly greater than concentrations in Rounds 1 through 5.

- Concentrations of HMW PAHs slightly exceeded its IRG at three locations along the shoreline. The approximate size of the area with elevated HMW PAH concentrations could not be determined because there were relatively few sediment samples collected at this MS. However, because the

magnitude of exceedances of the IRGs was low, it is unlikely that the concentrations greater than the IRG extend very far from the shoreline. Also, two samples adjacent to one of the samples with an elevated HMW PAH concentration had low HMW PAH concentrations, providing further support that the elevated levels may not be widespread. Figure 1-11 shows concentrations of HMW PAHs at each sampling location.

- Concentrations of HMW PAHs exceeded the IRG at two Round 8 MS locations (Loc. 1 and Loc. 3) and one Additional Scrutiny location (AS09-SD03).

- In Round 10, HMW PAH concentrations at Loc. 1 and Loc. 3 were less than the IRG. Also, Loc. 2 is at the location of AS09-SD03, and the HMW PAH concentration at this location was less than its IRG.

- Copper was detected at a concentration that exceeded its IRG at all three locations during Round 7. Copper concentrations at Loc. 1 also exceeded the IRG in Rounds 2 and 8. In Rounds 9 and 10, concentrations decreased to less than the copper IRG, and were similar to the copper concentrations in Rounds 1 through 6.

- Nickel was detected at concentrations that exceeded its IRG at one location during Round 2 and at all three locations during Round 7. Concentrations of nickel were variable across the rounds. Round 7 had the greatest concentration of nickel at all locations and Rounds 2 and 8 had elevated concentrations of nickel at Loc. 1.

- Concentrations of 4,4'-DDT were greater than its PRG at one or two locations during Rounds 6 and 7, but concentrations decreased in Rounds 9 and 10 to levels similar to Rounds 1 through 5. (The 4,4'-DDT data from Round 8 were rejected, so the data do not appear on the plot.)

- Concentrations of lead were greater than twice its ER-M at one or more locations during Rounds 7 and 8. There was a decreasing trend in concentrations between Rounds 7 to 10, and no lead concentrations in Rounds 9 or 10 were greater than twice its ER-M.

- At MS-09, the area with copper, nickel, and fluorene concentrations (around Loc. 1) greater than their respective IRGs is likely less than 50 feet by 200 feet (0.2 acre). Copper contamination is co-located with lead and nickel contamination. Figure 1-12 shows the copper concentrations at MS-09.

In summary, chemical concentrations were less than IRGs (for PAHs, copper, and nickel) and the PRG for 4,4'-DDT in sediment samples collected at MS-09 during the most recent sampling event (Round 10).

The lead concentration at one location was less than twice its ER-M during the most recent sampling event.

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 IRGs (and twice the ER-M for lead) is located in Table 1-9. 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 would 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.

1.6.9 MS-10

MS-10 is the only MS within the Sullivan Point AOC, which is located in the southeastern corner of PNS. Eight rounds of interim offshore monitoring were conducted at MS-10. Analytical data from the first eight rounds of sediment sampling at MS-10 were evaluated in a technical memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (Tetra Tech, September 2007). It was recommended in that memorandum that interim offshore monitoring at MS-10 be discontinued after the Round 8 sampling event. Therefore, no sediment samples were collected at this station during Round 9. In addition, no sediment samples were collected at this station during Round 10, in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (Tetra Tech, September 2008).

The following summary lists the samples with concentrations that exceed the IRGs and PRG (for 4,4'-DDT):

- PAH concentrations in most of the sediment samples at MS-10 were less than their respective IRGs.
    - Concentrations of acenaphthylene were greater than its IRG at two locations during Rounds 1 and 2.
    - Concentration of anthracene were greater than its IRG at one location during Rounds 2 and 4.
    - Concentrations of fluorene were less than its IRG during all eight rounds, and concentrations of HMW PAHs were only greater than the IRG at one location during one round.

- Most IRG exceedances occurred at subtidal station MS-10, Loc. 2. No IRG exceedances occurred in Rounds 7 or 8.

- The intertidal location, MS-10, Loc. 1, consistently had the lowest concentrations of PAHs, which were significantly less than IRGs.

- All 4,4'-DDT concentrations in MS-10 sediment samples were less than the sediment PRG of 66.4 µg/kg.

- Concentrations of copper and nickel were much less than their respective IRGs.

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 IRGs (and twice the ER-M for lead) is located in Table 1-10. Based on the analytical results presented in the Rounds 1 through 7 Report, no additional offshore monitoring or actions were needed for MS-10. There are no current exceedances of IRGs that indicate an ecological risk at MS-10. Past exceedances occurred before Round 7, and the data do not indicate any impacts from IRP sites. Therefore, MS-10 will not be considered further in this FS and NFA will be conducted at this MS.

1.6.10 MS-11

MS-11 is the only MS within the DRMO Storage Yard AOC, which is located in the main channel of the Piscataqua River, just offshore of OU2 (Sites 6 and 29). Initially, three sampling locations were included within MS-11.

Seven rounds of interim offshore monitoring and Phase I Additional Scrutiny sampling were conducted at this station. Additional scrutiny was recommended at this station because concentrations of copper and nickel in sediment exceeded their IRGs (and reference concentrations), and because contaminant concentration trend lines for offshore sediment indicated that concentrations were increasing. Also, concentrations of lead exceeded two times the ER-M multiple rounds at this station, and trend lines indicated that concentrations were increasing. Exceedances of lead were co-located with exceedances of copper and nickel. Figure 1-13 shows the concentrations of copper and lead at MS-11.

Additional scrutiny was conducted at MS-11 to determine whether an IRP site was the source of metals in sediment (Tetra Tech, August 2005). It was concluded in the Additional Scrutiny Investigation Report that eroding soil from OU2 was likely the primary source of metals in sediment at MS-11 (Tetra Tech, August 2007). Erosion of contaminated soil and metal debris was observed along the shoreline east and west of the seawall at MS-11 during the Additional Scrutiny Investigation, and elevated levels of metals were

detected in soil samples collected from these areas onshore at OU2 (Tetra Tech, August 2007). No offshore sediment sampling was conducted as a part of the Additional Scrutiny Investigation at MS-11.

A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-11. The concentration trend plots showing the Rounds 1 through 7 interim offshore monitoring program results are located in Appendix B. Although COC concentrations exceed PRGs in sediment based on data collected before placement of shoreline controls, data are not available to determine whether COC concentrations still exceed PRGs. Sediment in the offshore area is only present in a small, intertidal area on the eastern portion of the MS. Currently, there is not sufficient sediment to cause unacceptable risk. There is future potential for unacceptable risk if the amount of sediment increases and COC concentrations remain above PRGs. Therefore, RAOs and remedial alternatives for MS-11 are developed and evaluated in this FS.

1.6.11 MS-12

MS-12 is located in a depositional area that includes the area offshore of Site 5, Site 10, and Building 178 within the Dry Docks AOC. The floor of Building 178, in the southern portion of the building (closest to the water), is concrete and slopes down into the water. As a result, sediment is present on the floor of the building in areas that are inundated with water at high tide. Known IRP sites located near MS-12 include Site 5 (Former Industrial Waste Outfalls), and Site 10 (Former Battery Acid Tank No. 24). Three sediment locations are sampled at MS-12 as part of the interim offshore monitoring program; MS-12, Loc. 1 is intertidal and MS-12, Locs. 2 and 3 are subtidal. The intertidal location is a few feet south of Building 178. The subtidal locations are located within a large eelgrass bed. The shoreline is steep at the approximate ends of the walls on either side of Building 178, just south of sample locations AS12-SD02 through AS12-SD04 (see Figure 1-14).

Seven rounds of interim offshore monitoring and two Additional Scrutiny investigations were conducted at MS-12. Additional scrutiny was conducted at this MS because concentrations of PAHs exceeded their respective IRGs and reference concentrations during the first seven monitoring rounds, and trend lines indicated that concentrations were increasing (Tetra Tech, November 2004).

In accordance with the Additional Scrutiny QAPP (Tetra Tech, August 2005), sediment samples were collected at MS-12 to determine whether either elevated lead or PAH concentrations in MS-12 sediments could be linked to a current or historical IRP source or to a non-IRP source. The results of this determination are presented in the Additional Scrutiny Investigation Report (Tetra Tech, August 2007), which had the following conclusions:

- The location and PAH composition of one sediment sample inside Building 178 suggest that the PAHs were possibly related to historical shipbuilding operations or the materials used to construct the building (e.g., roof shingles and tar paper).

- The source of PAHs in the offshore area appears to be a mixture of PAHs from historical shipbuilding operations in Building 178, materials used to construct the building, and ambient background. These are not IRP sources.

- Sites 5 and 10 are historical sources of lead to the offshore area, and impacts are apparent at one sediment location.

- Sites 5 and 10 are not current sources of lead to the offshore. Industrial waste discharges as part of Site 5 were discontinued by 1974. Investigation of groundwater at Site 10 shows that it is not a current source of lead to the offshore area.

A technical meeting with the Navy, regulators, and Tetra Tech was held on April 26, 2007, to discuss the Draft Additional Scrutiny Investigation Report. The minutes from this meeting are included in Appendix D of the Additional Scrutiny Investigation Report (Tetra Tech, August 2007). Based on the recommendations from the meeting, additional sediment samples were collected to address data gaps (i.e., delineation of the spatial extent of contamination and approximate depth of sediment), and an eelgrass survey was conducted to determine the approximate size and location of the eelgrass bed as part of the Phase II Additional Scrutiny Investigation, as summarized below.

The following is a summary of the Phase II Additional Scrutiny Investigation conducted at MS-12. It was determined that sediment was present within 15 feet of the ramp drop-off, but the PAH concentrations in sediment samples from this area were less than IRGs, and the lead concentrations were less than twice the ER-M. Therefore, it is concluded that the sediment does not have elevated concentrations of PAHs or lead.

As part of the Phase II Additional Scrutiny, three surface (0 to 4 inches) sediment samples (AS12-SD107, through AS12-SD109) were collected near AS12-SD12 (a Phase I Additional Scrutiny sample) because the lead concentration in the sediment from AS12-SD12 was elevated (3,120 mg/kg). The lead results in these three samples were 417 mg/kg, 647 mg/kg, and 598 mg/kg, so the lead concentrations in two of the three samples were greater than twice the ER-M. The location closest to the ramp drop-off was AS12-SD107, which had the concentration of 417 mg/kg.

Maximum PAH concentrations were detected in sediment samples inside and immediately outside Building 178. Also, concentrations inside Building 178 decreased with increasing depth, but increased with depth in samples outside Building 178. Figures 1-15 and 1-16 show the concentrations of HMW PAHs and fluorene, respectively, at MS-12. Other PAH contaminants, not included on the figures, are acenaphthylene and anthracene. The exceedances of acenaphthylene and anthracene are co-located with HMW PAHs; therefore, they are not shown on a figure. The only exceedance of copper occurred in Round 7 and is co-located with exceedances of lead and PAHs. Concentrations of lead generally followed the same pattern as PAHs, with maximum concentrations in samples inside and immediately outside Building 178. Figure 1-14 shows the concentrations of lead at MS-12. Many of the concentrations of PAHs were greater than their IRGs, and concentrations of lead were greater than twice the ER-M.

A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-12. The concentration trend plots showing the Rounds 1 through 7 interim offshore monitoring program results are located in Appendix B. PAH and lead concentrations exceeded IRGs and twice the ER-M (for lead) over the first seven rounds of monitoring and in several additional samples. Therefore, RAOs and remedial alternatives for MS-12 are developed and evaluated in this FS.

1.6.12 MS-13

MS-13 is located outside of a dry dock in the Dry Docks AOC, offshore of IRP Site 5 (Former Industrial Waste Outfalls) and Site 31 (Former West Timber Basin). Seven rounds of interim offshore monitoring were conducted at this station for parameters listed in the Interim Offshore Monitoring Plan for OU4 (Tetra Tech, October 1999), and one round (Round 8) of offshore monitoring was conducted at MS-13 with analysis of PAHs in sediment.

Offshore monitoring of sediment during Rounds 8 and 9 was recommended for MS-13 in the Rounds 1 through 7 Report because the upper confidence limit (UCL) for fluorine exceeded the IRG, partially based on the wide confidence interval caused by variability in the data. It was anticipated that having additional data before the next 5-year sampling event would provide a higher level of confidence regarding exceedance of the IRG. Analytical data from the first eight rounds of sediment sampling at MS-13 were evaluated in the Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (Tetra Tech, September 2007), which recommended that interim offshore monitoring at MS-13 be discontinued after the Round 8 sampling event. Therefore, no sediment samples were collected at this station during Round 9. In addition, no sediment samples were collected at this station during Round 10, in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (Tetra Tech, September 2008).

Concentration trend plots presenting the first eight rounds of PAH data compared to IRGs are presented in Appendix B. The following summarizes IRG exceedances during Rounds 1 through 8:

- PAH concentrations in most samples were less than IRGs.
  - Concentrations of acenaphthylene and anthracene were greater than PRGs during three and four rounds, respectively, at one location during each round.
  - Concentrations of fluorene and HMW PAHs were greater than IRGs at one location during each of the Rounds 2 and 3. The duplicate sample collected during Round 8 at Loc. 1 exceeded IRGs for HMW PAHs, but the original sample and average of the two samples did not.
  - Concentrations of all four PAHs were less than their respective IRGs during Rounds 7 and 8, except for the duplicate sample collected at Loc. 1 during Round 8 that exceeded the IRG for HMW PAHs.
- Concentrations of copper and nickel were less than IRGs in all samples, but there was an increase in concentrations during Round 6. In addition, the only exceedance of twice the lead ER-M occurred during Round 6 at one sampling location. Copper concentrations decreased during Round 7.

Maintenance dredging, which occurs periodically in the dry dock area where MS-13 is located, is a likely cause for at least a portion of the variability in the data. In fact, maintenance dredging was performed in the berth areas by the dry docks between Rounds 5 and 6, which may account for the spike in copper and nickel concentrations during Round 6.

The analytical data and concentration trends associated with the investigations presented above are provided in Appendix B. Based on the analytical results from Rounds 1 through 8, no additional offshore monitoring or actions were needed for MS-13. A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-13. There are no current exceedances of IRGs that indicate an ecological risk at MS-13. Past exceedances occurred before Round 5 and contaminant concentrations have shown an overall decreasing trend since the exceedance. Therefore, MS-13 will not be considered further in this FS and NFA will be conducted at this MS.

1.6.13 MS-14

MS-14 is located in the westernmost part of the back channel in the Dry Docks AOC to monitor sediment potentially impacted by Site 5 (Former Industrial Waste Outfalls) and Site 31 (Former West Timber Basin). Seven rounds of interim offshore monitoring were conducted at this station for parameters listed in the

Interim Offshore Monitoring Plan for OU4 (Tetra Tech, October 1999), and Round 8 offshore monitoring was conducted at MS-14 for analysis of PAHs in sediment. Offshore monitoring of sediment during Rounds 8 and 9 was recommended for this station because UCLs for acenaphthylene and anthracene were predicted to increase to greater than IRGs within the next 5 years, partially based on the wide confidence interval caused by variability in the data. It was anticipated that having additional data before the next 5-year sampling event would provide a higher level of confidence regarding IRG exceedances.

Analytical data from the first eight rounds of sediment sampling at MS-14 were evaluated in the Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (Tetra Tech, September 2007), which recommended that interim offshore monitoring at MS-14 be discontinued after the Round 8 sampling event. Therefore, no sediment samples were collected at this station during Round 9. In addition, no sediment samples were collected at this station during Round 10 in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (Tetra Tech, September 2008).

The following summarizes IRG exceedances during Rounds 1 through 8:

- PAH concentrations in most samples are less than IRGs.
    - Concentrations of acenaphthylene were greater than its IRG at Loc. 1 during Round 5, whereas concentrations of both acenaphthylene and anthracene were greater than their IRGs at Loc. 2 during Round 6.
    - Concentrations of fluorene and HMW PAHs were less than IRGs during all eight rounds.
    - No concentrations of acenaphthylene have been greater than the IRG since Round 6.
    - Concentrations of acenaphthylene were slightly greater than the IRG for Rounds 5 and 6, but concentrations were less than the IRG during Rounds 7 and 8.
- Concentrations of copper and nickel were less than IRGs in all samples.

The analytical data and concentration trend plots associated with the investigations presented above are provided in Appendix B. Based on the analytical results from Rounds 1 through 8, no additional offshore monitoring or actions are needed for MS-14. A summary of the sediment sampling data in comparison to the IRGs (and twice the ER-M for lead) is located in Table 1-14. There are no current exceedances of IRGs that indicate an ecological risk at MS-14. Concentrations of acenaphthylene and anthracene were

only slightly greater than the IRG during Rounds 5 and/or 6. Therefore, MS-14 will not be considered further in this FS and NFA will be conducted at this MS.

TABLE 1-1

SUMMARY OF POTENTIAL CONTAMINANT SOURCES, RELEASE MECHANISMS, AND TRANSPORT MECHANISMS AT EACH MONITORING STATION
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Monitoring Station (MS)	Associated Onshore Site	Potential Contaminant Sources, Release Mechanisms, and Transport Mechanisms
MS-01	Operable Unit (OU)9 - 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 polycyclic aromatic hydrocarbons (PAHs) to the offshore area.
MS-02, MS-07, MS-10, MS-13, and MS-14	None	There are no known onshore contaminant sources of these monitoring stations and chemical concentrations in sediment do not indicate any impacts from Installation Restoration Program (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 restricted 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 Defense Reutilization and Marketing Office (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 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.

TABLE 1-2

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 1
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 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.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.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	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	OU9RI	20090825	0 - 0.33	16000	10000	6800	170000	-	-	-
MS-01	SD100	MS01-SD-SD100-0000-AVG	OU9RI	20090825	0 - 0.33	13000 J	8650	6100	134150	-	-	-
MS-01	SD100	MS01-SD-SD100-0000-D	OU9RI	20090825	0 - 0.33	10000 J	7300	5400	98300	-	-	-
MS-01	SD100	MS01-SD-SD100-0102	OU9RI	20090825	1 - 2	710 J	250	220 J	3340	-	-	-
MS-01	SD100	MS01-SD-SD100-0102-AVG	OU9RI	20090825	1 - 2	520 J	215	180 J	3115	-	-	-
MS-01	SD100	MS01-SD-SD100-0102-D	OU9RI	20090825	1 - 2	330 J	180	140 J	2890	-	-	-
MS-01	SD101	MS01-SD-SD101-0000	OU9RI	20090825	0 - 0.33	130 J	89 J	53 J	2580	-	-	-
MS-01	SD102	MS01-SD-SD102-0000	OU9RI	20090825	0 - 0.33	340	270	210 J	7670	-	-	-
MS-01	SD102	MS01-SD-SD102-0102	OU9RI	20090825	1 - 2	27	18	13 J	441	-	-	-

TABLE 1-2

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 1
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-01	SD103	MS01-SD-SD103-0000	OU9RI	20090825	0 - 0.33	260	150	110 J	3600	-	-	-
MS-01	SD104	MS01-SD-SD104-0000	OU9RI	20090825	0 - 0.33	140 J	260	110	4700	-	-	-
MS-01	SD104	MS01-SD-SD104-0102	OU9RI	20090825	1 - 2	720	1700	330	20300	-	-	-
MS-01	SD105	MS01-SD-SD105-0000	OU9RI	20090825	0 - 0.33	2300	1100	1100	38000	-	-	-
MS-01	SD105	MS01-SD-SD105-0102	OU9RI	20090825	1 - 2	1200	340	260	26780	-	-	-
MS-01	SD106	MS01-SD-SD106-0000	OU9RI	20090825	0 - 0.33	1600	1000	460	22830	-	-	-
MS-01	SD106	MS01-SD-SD106-0102	OU9RI	20090825	1 - 2	3900 J	2100	1000	58800	-	-	-
MS-01	SD107	MS01-SD-SD107-0000	OU9RI	20090825	0 - 0.33	4000 J	2500	2000	54200	-	-	-
MS-01	SD108	MS01-SD-SD108-0000	OU9RI	20090825	0 - 0.33	220 J	240	110	5400	-	-	-
MS-01	SD108	MS01-SD-SD108-0102	OU9RI	20090825	1 - 2	6 J	4 J	4 U	92	-	-	-
MS-01	SD109	MS01-SD-SD109-0000	OU9RI	20090825	0 - 0.33	57 J	49	25	1183	-	-	-
MS-01	SD109	MS01-SD-SD109-0102	OU9RI	20090825	1 - 2	5 J	4 U	4 U	51	-	-	-
MS-01	SD110	MS01-SD-SD110-0000	OU9RI	20090825	0 - 0.33	110 J	140	130	2193	-	-	-
MS-01	SD110	MS01-SD-SD110-0102	OU9RI	20090825	1 - 2	5 J	4 U	4 U	33	-	-	-
MS-01	SD111	MS01-SD-SD111-0000	OU9RI	20090824	0 - 0.33	98 J	100	57	2200	-	-	-
MS-01	SD112	MS01-SD-SD112-0000	OU9RI	20090826	0 - 0.33	23 J	27	11	560	-	-	-
MS-01	SD113	MS01-SD-SD113-0000	OU9RI	20090824	0 - 0.33	150 J	230	88	5090	-	-	-
MS-01	SD113	MS01-SD-SD113-0102	OU9RI	20090824	1 - 2	7 J	11	5	163	-	-	-
MS-01	SD114	MS01-SD-SD114-0000	OU9RI	20090824	0 - 0.33	240 J	160 J	130 J	4030	-	-	-
MS-01	SD114	MS01-SD-SD114-0000-AVG	OU9RI	20090824	0 - 0.33	195 J	150 J	90 J	3935	-	-	-
MS-01	SD114	MS01-SD-SD114-0000-D	OU9RI	20090824	0 - 0.33	150 J	140	49 J	3840	-	-	-
MS-01	SD114	MS01-SD-SD114-0102	OU9RI	20090824	1 - 2	540 J	470	160	12530	-	-	-
MS-01	SD114	MS01-SD-SD114-0102-AVG	OU9RI	20090824	1 - 2	540 J	460	195	12090	-	-	-
MS-01	SD114	MS01-SD-SD114-0102-D	OU9RI	20090824	1 - 2	540 J	450	230	11650	-	-	-
MS-01	SD115	MS01-SD-SD115-0000	OU9RI	20090824	0 - 0.33	1000	810	380	16400	-	-	-
MS-01	SD116	MS01-SD-SD116-0000	OU9RI	20090825	0 - 0.33	700	320	230	8300	-	-	-
MS-01	SD116	MS01-SD-SD116-0102	OU9RI	20090825	1 - 2	190 J	75 J	43 J	1642	-	-	-
MS-01	SD117	MS01-SD-SD117-0000	OU9RI	20090825	0 - 0.33	130 J	140	79	3080	-	-	-
MS-01	SD117	MS01-SD-SD117-0102	OU9RI	20090825	1 - 2	59 J	110	73	1250	-	-	-
MS-01	SD118	MS01-SD-SD118-0000	OU9RI	20090825	0 - 0.33	150 J	77	39	2010	-	-	-
MS-01	SD119	MS01-SD-SD119-0000	OU9RI	20090826	0 - 0.33	61 J	72	32	1352	-	-	-
MS-01	SD120	MS01-SD-SD120-0000	OU9RI	20090825	0 - 0.33	68 J	54	29	1590	-	-	-
MS-01	SD120	MS01-SD-SD120-0102	OU9RI	20090825	1 - 2	24 J	77	23	859	-	-	-
MS-01	SD121	MS01-SD-SD121-0000	OU9RI	20090825	0 - 0.33	68 J	200	95	2672	-	-	-
MS-01	SD122	MS01-SD-SD122-0000	OU9RI	20090825	0 - 0.33	180 J	260	120	5320	-	-	-
MS-01	SD122	MS01-SD-SD122-0102	OU9RI	20090825	1 - 2	8 J	4 J	5 UJ	115	-	-	-
MS-01	SD122	MS01-SD-SD122-0102-AVG	OU9RI	20090825	1 - 2	7 J	11 J	9 J	133	-	-	-
MS-01	SD122	MS01-SD-SD122-0102-D	OU9RI	20090825	1 - 2	6 J	19 J	15 J	152	-	-	-
MS-01	SD123	MS01-SD-SD123-0000	OU9RI	20090825	0 - 0.33	37 J	270	130	2263	-	-	-
MS-01	SD124	MS01-SD-SD124-0000	OU9RI	20090826	0 - 0.33	90 J	1700	930	14870	-	-	-
MS-01	SD124	MS01-SD-SD124-0102	OU9RI	20090826	1 - 2	36 J	92	32	1312	-	-	-
MS-01	SD125	MS01-SD-SD125-0000	OU9RI	20090826	0 - 0.33	110 J	1000	340	10530	-	-	-
MS-01	SD125	MS01-SD-SD125-0102	OU9RI	20090826	1 - 2	110 J	1200	420	12470	-	-	-

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

COC - Chemical of concern
IRG - Interim remediation goal
ER-M - Effects-range median

MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons

ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram

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

TABLE 1-3

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 2
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-02	LOC.1	OU4-SD-M02-199A	01	19990910	0 - 0.33	65 J	161	36	1764	32 J	69 J	28
MS-02	LOC.1	OU4-SD-M02-100B	02	20000504	0 - 0.33	80 J	191 J	41 J	1997	65	202	26
MS-02	LOC.1	OU4-SD-M02-100A	03	20000828	0 - 0.33	13	22	5	201	39	36	23 J
MS-02	LOC.1	OU4-SD-M02-101B	04	20010506	0 - 0.33	71	152	33 J	1605	33	73	28
MS-02	LOC.1	OU4-SD-M02-101A	05	20010819	0 - 0.33	6	18 J	5 J	185	13	31	19
MS-02	LOC.1	OU4-SD-M02-102A	06	20020810	0 - 0.33	58 J	170	28 J	1744	34	69	25 J
MS-02	LOC.1	OU4-SD-M02-103A	07	20030809	0 - 0.33	80	397	186	1747	58	68	17 U
MS-02	LOC.2	OU4-SD-M02-299A	01	19990910	0 - 0.33	60 J	118	33	1678	31 J	128 J	31
MS-02	LOC.2	OU4-SD-M02-200B	02	20000504	0 - 0.33	76	190	35 J	2119	51	170	35
MS-02	LOC.2	OU4-SD-M02-200A	03	20000828	0 - 0.33	79	110	33	1386	68	146	28 J
MS-02	LOC.2	OU4-SD-M02-201B	04	20010506	0 - 0.33	69	258	102 J	2182	53	146	37
MS-02	LOC.2	OU4-SD-M02-201A	05	20010819	0 - 0.33	38	107 J	19 J	1082	34	121	29
MS-02	LOC.2	OU4-SD-M02-202A	06	20020810	0 - 0.33	54 J	183	28 J	1807	45	116	28 J
MS-02	LOC.2	OU4-SD-M02-203A	07	20030809	0 - 0.33	31	75	15	858	76	136	19 J
MS-02	LOC.3	OU4-SD-M02-399A	01	19990910	0 - 0.33	67 J	178	44	2138	43 J	142 J	33
MS-02	LOC.3	OU4-SD-M02-300B	02	20000504	0 - 0.33	70	161	40	2000	46	95	27
MS-02	LOC.3	OU4-SD-M02-300A	03	20000828	0 - 0.33	46	83	22	867	37	88	24 J
MS-02	LOC.3	OU4-SD-M02-301B	04	20010506	0 - 0.33	81	184	38 J	1978	39	81	30
MS-02	LOC.3	OU4-SD-M02-301A	05	20010819	0 - 0.33	69	197 J	33 J	2035	34	72	23
MS-02	LOC.3	OU4-SD-M02-302A	06	20020810	0 - 0.33	63 J	118	25 J	1652	22	67	25 J
MS-02	LOC.3	OU4-SD-M02-303A	07	20030809	0 - 0.33	97	251	47	2391	64	97	9 U

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

MS - Monitoring station
COC - Chemical of concern
IRG - Interim remediation goal
ER-M - Effects-range median
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value
U - Not detected at the indicated value.

TABLE 1-4

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD	NICKEL[1]	
										USEPA METHOD	NOAA METHOD		USEPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	2x ER-M 436	-	IRG 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.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.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-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.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.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
MS-04	LOC.3	OU4-SD-M04-303A	07	20030809	0 - 0.33	13	29	6	488	-	139	63	-	34 J
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	-	-	-

TABLE 1-4

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD	NICKEL[1]	
										USEPA METHOD	NOAA METHOD		USEPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	2x ER-M 436	-	IRG 124
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	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	-	-	-
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	-	-	-

TABLE 1-4

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD	NICKEL[1]	
										USEPA METHOD	NOAA METHOD		USEPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	2x ER-M 436	-	IRG 124
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	-	-	-
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
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

TABLE 1-4

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATIONS 3 AND 4
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD	NICKEL[1]	
										USEPA METHOD	NOAA METHOD		USEPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	2x ER-M 436	-	IRG 124
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

1 - Sediment samples were analyzed for copper and nickel using two methods: a USEPA method and a NOAA method. If a sample was analyzed using both methods, only the NOAA results are shown on this table because the IRGs were developed using the NOAA results. However, if a sample was only analyzed using the USEPA method, then the USEPA result was used to estimate a NOAA result, using the following regression questions from the Rounds 1 through 10 Report (Tetra Tech, February 2010):

Copper
USEPA Concentrations <700 mg/kg: NOAA result = (1.22 * USEPA result) - 13.3
USEPA Concentrations >700 mg/kg: NOAA result = (1.12 * USEPA result) + 19.14

Nickel
All Results: NOAA result = (0.87 * USEPA result) + 23.41

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
NOAA - National Oceanic and Atmospheric Administration
PAH - Polycyclic aromatic hydrocarbons
TP - Topeka Pier
USEPA - United States Environmental Protection Agency
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram

TABLE 1-5

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 5
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 1 OF 2

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)					
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD[1]		NICKEL[1]	
										EPA METHOD	NOAA METHOD	EPA METHOD	NOAA METHOD	EPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	-	2x ER-M 436	-	IRG 124
MS-05	LOC.1	OU4-SD-M05-199A	01	19990908	0 - 0.33	87 J	295	63	4928	-	105	-	187 J	-	32 J
MS-05	LOC.1	OU4-SD-M05-100B	02	20000504	0 - 0.33	73 J	177 J	45 J	2167	-	64	-	135	-	34
MS-05	LOC.1	OU4-SD-M05-100B-AVG	02	20000504	0 - 0.33	100 J	344 J	85 J	3754	-	63	-	133	-	33
MS-05	LOC.1	OU4-SD-M05-100B-D	02	20000504	0 - 0.33	126 J	511 J	125 J	5340	-	62	-	130	-	33
MS-05	LOC.1	OU4-SD-M05-100A	03	20000827	0 - 0.33	46 J	63 J	19 J	1226	-	65 J	-	116	-	25 J
MS-05	LOC.1	OU4-SD-M05-100A-AVG	03	20000827	0 - 0.33	77 J	119 J	31 J	1773	-	61 J	-	117	-	26 J
MS-05	LOC.1	OU4-SD-M05-100A-D	03	20000827	0 - 0.33	107 J	175 J	43 J	2320	-	57	-	118	-	26 J
MS-05	LOC.1	OU4-SD-M05-101B	04	20010506	0 - 0.33	53	130	32 J	1771	-	51	-	108	-	29
MS-05	LOC.1	OU4-SD-M05-101A	05	20010819	0 - 0.33	71	276 J	46 J	2617	-	56	-	117	-	32
MS-05	LOC.1A	OU4-SD-M05-102A	06	20020811	0 - 0.33	119 J	326	124	4056	-	325	-	**474**	-	50 J
MS-05	LOC.1A	OU4-SD-M05-103A	07	20030811	0 - 0.33	52	215	94	2146	-	**685**	-	**694** J	-	76
MS-05	LOC.1A	OU4-SD-M05-105A	08	20050820	0 - 0.33	24 J	210	130	4964	-	**988**	-	**829** J	-	107
MS-05	LOC.1A	OU4-SD-M05-105A-AVG	08	20050820	0 - 0.33	25 J	225	135	5207	-	**983**	-	**824** J	-	110
MS-05	LOC.1A	OU4-SD-M05-105A-D	08	20050820	0 - 0.33	26 J	240	140	5450	-	**977**	-	**819** J	-	113
MS-05	LOC.1A	OU4-SD-M05-107A	09	20071107	0 - 0.33	7 U	7 U	7 U	84	-	174 J	-	175 J	-	38 J
MS-05	LOC.1A	OU4-SD-M05-108A	10	20081217	0 - 0.33	53	59 J	17 J	1218	-	85	-	102	-	25
MS-05	LOC.1A	OU4-SD-M05-108A-AVG	10	20081217	0 - 0.33	67	100 J	34 J	1704	-	92	-	103	-	26
MS-05	LOC.1A	OU4-SD-M05-108A-D	10	20081217	0 - 0.33	81	140 J	51 J	2190	-	99	-	104	-	26
MS-05	LOC.2	OU4-SD-M05-299A	01	19990909	0 - 0.33	63 J	123	22	1762	-	32	-	60 J	-	29 J
MS-05	LOC.2	OU4-SD-M05-200B	02	20000504	0 - 0.33	81	271	88 J	2749	-	39	-	49	-	29
MS-05	LOC.2	OU4-SD-M05-200A	03	20000827	0 - 0.33	103	173 J	41 J	1891	-	33 J	-	67	-	25 J
MS-05	LOC.2	OU4-SD-M05-201B	04	20010507	0 - 0.33	67	169	33 J	1626	-	32	-	64	-	26
MS-05	LOC.2	OU4-SD-M05-201A	05	20010819	0 - 0.33	93	363 J	60 J	2564	-	29	-	57	-	27
MS-05	LOC.2	OU4-SD-M05-202A	06	20020810	0 - 0.33	76 J	184	38	2567	-	37	-	72	-	26 J
MS-05	LOC.2	OU4-SD-M05-205A	08	20050820	0 - 0.33	22	89	37	2507	-	31 J	-	58 J	-	23
MS-05	LOC.2A	OU4-SD-M05-203A	07	20030810	0 - 0.33	83	244	61	2384	-	83	-	78	-	14 U
MS-05	LOC.2A	OU4-SD-M05-207A	09	20071106	0 - 0.33	51	110	31	1641	-	**501**	-	**509** J	-	61 J
MS-05	LOC.2A	OU4-SD-M05-208A	10	20081217	0 - 0.33	7 U	8	7 U	54	-	57	-	61	-	37
MS-05	LOC.3	OU4-SD-M05-399A	01	19990908	0 - 0.33	56 J	118	23	1583	-	24	-	47 J	-	30 J
MS-05	LOC.3	OU4-SD-M05-300B	02	20000504	0 - 0.33	57	142	37	1669	-	23	-	47	-	28
MS-05	LOC.3	OU4-SD-M05-300A	03	20000827	0 - 0.33	71	99 J	31 J	1524	-	31 J	-	65	-	23 J
MS-05	LOC.3	OU4-SD-M05-301B	04	20010506	0 - 0.33	56	203	64 J	2145	-	15	-	43	-	22
MS-05	LOC.3	OU4-SD-M05-301A	05	20010819	0 - 0.33	76	202 J	33 J	1532	-	23	-	63	-	24
MS-05	LOC.3	OU4-SD-M05-302A	06	20020811	0 - 0.33	55 J	110	24	1542	-	17	-	47	-	22 J
MS-05	LOC.3	OU4-SD-M05-303A	07	20030809	0 - 0.33	19	88	39	1096	-	51	-	42	-	13 U
MS-05	LOC.3	OU4-SD-M05-305A	08	20050821	0 - 0.33	13	29	18	1238	-	14 J	-	30 J	-	22
MS-05	LOC.3	OU4-SD-M05-307A	09	20071107	0 - 0.33	9	23	7	427	-	17 J	-	33 J	-	21 J
MS-05	LOC.3	OU4-SD-M05-308A	10	20081217	0 - 0.33	19	31	10	596	-	12	-	30	-	19
MS-05	LOC.4	OU4-SD-M05-407A	09	20071106	0 - 0.33	-	-	-	-	-	64	-	68	-	-
MS-05	LOC.4	OU4-SD-M05-408A	10	20081217	0 - 0.33	-	-	-	-	-	45	-	57	-	23
MS-05	SD01	AS05-SD-SD01	ASP1	20050821	0 - 0.33	-	-	-	-	231	269	235	287	39	58
MS-05	SD01	AS05-SD-SD01-AVG	ASP1	20050821	0 - 0.33	-	-	-	-	196	225	211	254	34	53
MS-05	SD01	AS05-SD-SD01-D	ASP1	20050821	0 - 0.33	-	-	-	-	160	182	186	222	28	48
MS-05	SD02	AS05-SD-SD02	ASP1	20050820	0 - 0.33	-	-	-	-	228	265	223	271	42	60
MS-05	SD02	AS05-SD-SD02-AVG	ASP1	20050820	0 - 0.33	-	-	-	-	188 J	215	201	242	35 J	54
MS-05	SD02	AS05-SD-SD02-D	ASP1	20050820	0 - 0.33	-	-	-	-	147 J	166	179	212	28 J	47
MS-05	SD03	AS05-SD-SD03	ASP1	20050820	0 - 0.33	-	-	-	-	423	**503**	426	**541**	58	74
MS-05	SD04	AS05-SD-SD04	ASP1	20050820	0 - 0.33	-	-	-	-	355	420	390	**493**	50	67
MS-05	SD05	AS05-SD-SD05	ASP1	20050820	0 - 0.33	-	-	-	-	43	39	58	52	20	41
MS-05	SD06	AS05-SD-SD06	ASP1	20050820	0 - 0.33	-	-	-	-	34	29	56	49	17	38
MS-05	SD07	AS05-SD-SD07	ASP1	20050820	0 - 0.33	-	-	-	-	57	57	86	88	23	43
MS-05	SD08	AS05-SD-SD08	ASP1	20050820	0 - 0.33	-	-	-	-	408	484	361	**454**	51	68
MS-05	SD09	AS05-SD-SD09	ASP1	20050820	0 - 0.33	-	-	-	-	71	73	98	104	21	41

TABLE 1-5

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 5
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)					
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD[1]		NICKEL[1]	
										EPA METHOD	NOAA METHOD	EPA METHOD	NOAA METHOD	EPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	-	2x ER-M 436	-	IRG 124
MS-05	SD10	AS05-SD-SD10	ASP1	20050820	0 - 0.33	-	-	-	-	116	128	152	176	26	46
MS-05	SD13	AS05-SD-SD13	ASP1	20050820	0 - 0.33	-	-	-	-	122 J	136	124	139	27	47
MS-05	SD15	AS05-SD-SD15-00	09	20071107	0 - 0.33	-	-	-	-	27	20	40	27	-	-

1 - Sediment samples were analyzed for copper, lead, and nickel using two methods: a USEPA method and a NOAA method. If a sample was analyzed using both methods, only the NOAA results are shown on this table because the IRGs were developed using the NOAA results. However, if a sample was only analyzed using the USEPA method, then the USEPA result was used to estimate a NOAA result, using the following regression questions from the Rounds 1 through 10 Report (Tetra Tech, February 2010):

Copper
USEPA Concentrations <700 mg/kg: NOAA result = (1.22 * USEPA result) - 13.3
USEPA Concentrations >700 mg/kg: NOAA result = (1.12 * USEPA result) + 19.14

Nickel
All Results: NOAA result = (0.87 * USEPA result) + 23.41

Lead
All Results: NOAA result = (1.33 * USEPA result) - 25.8

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

ASP1 - Additional scrutiny Phase I
COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
NOAA - National Oceanic and Atmospheric Administration
PAH - Polycyclic aromatic hydrocarbons
USEPA - United States Environmental Protection Agency
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value
U - Not detected at the indicated value

TABLE 1-6

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 6
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-06	LOC.1	OU4-SD-M06-199A	01	19990908	0 - 0.33	71 J	120	25	1511	25	61 J	21 J
MS-06	LOC.1	OU4-SD-M06-100B	02	20000504	0 - 0.33	26	88	35	2343	15	37	21
MS-06	LOC.1	OU4-SD-M06-100A	03	20000829	0 - 0.33	42	84	22	1566	14	49	15 J
MS-06	LOC.1	OU4-SD-M06-101B	04	20010506	0 - 0.33	79	291	81 J	4359	14	42	17
MS-06	LOC.1	OU4-SD-M06-101A	05	20010819	0 - 0.33	15	246 J	78 J	3547	15	30	18
MS-06	LOC.1	OU4-SD-M06-102A	06	20020811	0 - 0.33	11 J	21	8	500	6	23	13 J
MS-06	LOC.1	OU4-SD-M06-103A	07	20030811	0 - 0.33	24	86	31	2118	86 J	55 J	30
MS-06	LOC.2	OU4-SD-M06-299A	01	19990908	0 - 0.33	73 J	260	50	2721	27	59 J	23 J
MS-06	LOC.2	OU4-SD-M06-299A-AVG	01	19990908	0 - 0.33	90 J	256	58	3002	26	65 J	24 J
MS-06	LOC.2	OU4-SD-M06-299A-D	01	19990908	0 - 0.33	107 J	252 J	67 J	3283	26 J	71 J	25
MS-06	LOC.2	OU4-SD-M06-200B	02	20000504	0 - 0.33	97	186	49 J	2637	28	46	27
MS-06	LOC.2	OU4-SD-M06-200A	03	20000827	0 - 0.33	116	192 J	45 J	2171	31 J	65	18 J
MS-06	LOC.2	OU4-SD-M06-201B	04	20010507	0 - 0.33	136	352	56 J	3250	17	49	20
MS-06	LOC.2	OU4-SD-M06-201A	05	20010819	0 - 0.33	64	428 J	57 J	2901	19	48	17
MS-06	LOC.2	OU4-SD-M06-202A	06	20020810	0 - 0.33	95 J	315	81	3623	19	54	21 J
MS-06	LOC.2	OU4-SD-M06-203A	07	20030810	0 - 0.33	59	141	33	2212	82	54	27 J
MS-06	LOC.3	OU4-SD-M06-399A	01	19990908	0 - 0.33	10 J	24	6	428	10	19 J	26 J
MS-06	LOC.3	OU4-SD-M06-300B	02	20000502	0 - 0.33	5	19	7	265	16	19	37
MS-06	LOC.3	OU4-SD-M06-300A	03	20000827	0 - 0.33	5	6 J	1 J	79	13 J	26	27 J
MS-06	LOC.3	OU4-SD-M06-301B	04	20010506	0 - 0.33	11	35	10 J	357	25	94	57
MS-06	LOC.3	OU4-SD-M06-301A	05	20010819	0 - 0.33	18	61 J	13 J	614	17	55	26
MS-06	LOC.3	OU4-SD-M06-302A	06	20020811	0 - 0.33	12 J	26	8	345	12	47	24 J
MS-06	LOC.3	OU4-SD-M06-303A	07	20030809	0 - 0.33	16	54	18	524	79	65	16 U

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value
U - Not detected at the indicated value.

TABLE 1-7

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 7
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-07	LOC.1	OU4-SD-M07-199A	01	19990909	0 - 0.33	21 J	37 J	10	713	20	39 J	26 J
MS-07	LOC.1	OU4-SD-M07-100B	02	20000504	0 - 0.33	31	92	23	1304	48	43	26
MS-07	LOC.1	OU4-SD-M07-100A	03	20000828	0 - 0.33	24	57	16	1025	18	51	19 J
MS-07	LOC.1	OU4-SD-M07-101B	04	20010506	0 - 0.33	23	74	17 J	931	22	70	23
MS-07	LOC.1	OU4-SD-M07-101A	05	20010819	0 - 0.33	25	74	28	1438	19	38	22
MS-07	LOC.1	OU4-SD-M07-102A	06	20020810	0 - 0.33	40 J	436	90	2517	17	31	21 J
MS-07	LOC.1	OU4-SD-M07-103A	07	20030811	0 - 0.33	18	64	18	1032	31	35	22
MS-07	LOC.2	OU4-SD-M07-299A	01	19990908	0 - 0.33	59 J	121	26	1595	32	60 J	31 J
MS-07	LOC.2	OU4-SD-M07-200B	02	20000503	0 - 0.33	74	168	42	2007	35	51	32
MS-07	LOC.2	OU4-SD-M07-200A	03	20000827	0 - 0.33	94	169 J	90 J	2375	36 J	70	20 J
MS-07	LOC.2	OU4-SD-M07-201B	04	20010507	0 - 0.33	83	273	54 J	2648	30	43	31
MS-07	LOC.2	OU4-SD-M07-201A	05	20010820	0 - 0.33	96	175	41	2165	25 J	59	22
MS-07	LOC.2	OU4-SD-M07-202A	06	20020810	0 - 0.33	102	215 J	44	2687	28	58	25 J
MS-07	LOC.2	OU4-SD-M07-203A	07	20030810	0 - 0.33	97	182	40	2181	38	66	27
MS-07	LOC.3	OU4-SD-M07-399A	01	19990908	0 - 0.33	116 J	280	73	4093	43	68 J	26 J
MS-07	LOC.3	OU4-SD-M07-300B	02	20000503	0 - 0.33	56 J	66	22 J	684	23	44	25
MS-07	LOC.3	OU4-SD-M07-300A	03	20000827	0 - 0.33	61	95 J	33 J	1423	20 J	53	16 J
MS-07	LOC.3	OU4-SD-M07-301B	04	20010507	0 - 0.33	71	215	44 J	2277	29	59	23
MS-07	LOC.3	OU4-SD-M07-301A	05	20010820	0 - 0.33	88	175	39	2027	23 J	53	22
MS-07	LOC.3	OU4-SD-M07-302A	06	20020810	0 - 0.33	73	151 J	27	1579	19	43	23
MS-07	LOC.3	OU4-SD-M07-303A	07	20030810	0 - 0.33	67	138	34	1837	28	67	22

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram

TABLE 1-8

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 8
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-08	LOC.1	OU4-SD-M08-199A	01	19990908	0 - 0.33	54 J	233	72	3181	370	428 J	83 J
MS-08	LOC.1	OU4-SD-M08-100B	02	20000503	0 - 0.33	67	225	56	2434	455	245	93
MS-08	LOC.1	OU4-SD-M08-100A	03	20000828	0 - 0.33	83	214	48 J	2864	280	183	55 J
MS-08	LOC.1	OU4-SD-M08-100A-AVG	03	20000828	0 - 0.33	87	213	62 J	2923	311	201	77 J
MS-08	LOC.1	OU4-SD-M08-100A-D	03	20000828	0 - 0.33	91 J	212	76	2983	341 J	218 J	98 J
MS-08	LOC.1	OU4-SD-M08-101B	04	20010508	0 - 0.33	82 J	267 J	53 J	2809	420	254	85
MS-08	LOC.1	OU4-SD-M08-101B-AVG	04	20010508	0 - 0.33	66 J	243 J	46 J	2437	382	253	75
MS-08	LOC.1	OU4-SD-M08-101B-D	04	20010508	0 - 0.33	51	219 J	39 J	2066	343	252	66
MS-08	LOC.1	OU4-SD-M08-101A	05	20010819	0 - 0.33	52	227	61 J	2791	289	208	69
MS-08	LOC.1	OU4-SD-M08-101A-AVG	05	20010819	0 - 0.33	67	256	50 J	2823	311	249	72
MS-08	LOC.1	OU4-SD-M08-101A-D	05	20010819	0 - 0.33	81	284	39 J	2855	333	290	76
MS-08	LOC.1	OU4-SD-M08-102A	06	20020810	0 - 0.33	74	248 J	50 J	3516	365	295	114
MS-08	LOC.1	OU4-SD-M08-102A-AVG	06	20020810	0 - 0.33	51 J	217 J	56 J	3359	405	288 J	102
MS-08	LOC.1	OU4-SD-M08-102A-D	06	20020810	0 - 0.33	29 J	186 J	63	3203	444	280 J	90
MS-08	LOC.1	OU4-SD-M08-103A	07	20030810	0 - 0.33	**232 J**	1088 J	366	12955	**1958**	**2187**	**197**
MS-08	LOC.1	OU4-SD-M08-103A-AVG	07	20030810	0 - 0.33	172 J	853 J	293	10540	**1918**	**2082**	**194**
MS-08	LOC.1	OU4-SD-M08-103A-D	07	20030810	0 - 0.33	112 J	617 J	220	8125	**1878**	**1976**	**190**
MS-08	LOC.1	OU4-SD-M08-105A	08	20050823	0 - 0.33	3 U	2 J	3 U	43	13 J	20 J	8
MS-08	LOC.1	OU4-SD-M08-105A-AVG	08	20050823	0 - 0.33	3 U	2 J	3 U	42	13 J	20 J	8
MS-08	LOC.1	OU4-SD-M08-105A-D	08	20050823	0 - 0.33	3 U	3 U	3 U	42	-	-	-
MS-08	LOC.1	OU4-SD-M08-107A	09	20071107	0 - 0.33	4 U	7	4 U	152	27 J	31 J	12 J
MS-08	LOC.1	OU4-SD-M08-108A	10	20081217	0 - 0.33	6	12	5 U	245	35	47	15
MS-08	LOC.2	OU4-SD-M08-299A	01	19990908	0 - 0.33	108 J	286	75	4518	95	178 J	36
MS-08	LOC.2	OU4-SD-M08-200B	02	20000503	0 - 0.33	89	276	77	2317	78	66	31
MS-08	LOC.2	OU4-SD-M08-200A	03	20000827	0 - 0.33	87	180 J	50 J	2173	118 J	78	25 J
MS-08	LOC.2	OU4-SD-M08-201B	04	20010507	0 - 0.33	102 J	410 J	92 J	4155	100	105	30
MS-08	LOC.2	OU4-SD-M08-201A	05	20010820	0 - 0.33	81	270	93	3218	57 J	75	28
MS-08	LOC.2	OU4-SD-M08-202A	06	20020810	0 - 0.33	100	464 J	71	6396	104	93	31
MS-08	LOC.2	OU4-SD-M08-203A	07	20030810	0 - 0.33	101	403	113	5337	446	**439**	64
MS-08	LOC.2	OU4-SD-M08-205A	08	20050820	0 - 0.33	25 J	370	75	5424	129 J	117 J	30
MS-08	LOC.2	OU4-SD-M08-205A-AVG	08	20050820	0 - 0.33	25 J	370	75	5424	129 J	117 J	30
MS-08	LOC.2	OU4-SD-M08-207A	09	20071106	0 - 0.33	45 J	100 J	37 J	1714	115 J	137 J	27 J
MS-08	LOC.2	OU4-SD-M08-208A	10	20081217	0 - 0.33	33	74	19	1284	97	96	26
MS-08	LOC.3	OU4-SD-M08-399A	01	19990909	0 - 0.33	80 J	285	62	3811	282	141 J	**174 J**
MS-08	LOC.3	OU4-SD-M08-300B	02	20000503	0 - 0.33	22 J	75 J	9 J	1050	441 J	207	124
MS-08	LOC.3	OU4-SD-M08-300B-AVG	02	20000503	0 - 0.33	60 J	231 J	24 J	2653	**756 J**	207	**131**
MS-08	LOC.3	OU4-SD-M08-300B-D	02	20000503	0 - 0.33	99 J	387 J	39 J	4256	**1070 J**	207	**137**
MS-08	LOC.3	OU4-SD-M08-300A	03	20000828	0 - 0.33	22	44	8	563	407	164	**130 J**
MS-08	LOC.3	OU4-SD-M08-301B	04	20010508	0 - 0.33	21 J	66 J	9	726	434	219	112
MS-08	LOC.3	OU4-SD-M08-301A	05	20010819	0 - 0.33	29	75	13	1344	**1207**	385	**130**
MS-08	LOC.3	OU4-SD-M08-302A	06	20020810	0 - 0.33	90	258 J	15	3772	354	265	119
MS-08	LOC.3	OU4-SD-M08-303A	07	20030809	0 - 0.33	56	309	93	3619	**666**	310	**160**
MS-08	LOC.3	OU4-SD-M08-307A	09	20071107	0 - 0.33	8	25	5	454	112 J	66 J	29 J

TABLE 1-8

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 8
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-08	LOC.3	OU4-SD-M08-308A	10	20081217	0 - 0.33	24	52	15	1028	179	163	37
MS-08	LOC.3A	OU4-SD-M08-305A	08	20050823	0 - 0.33	1 J	23	9	402	39 J	35 J	14
MS-08	LOC.4	OU4-SD-M08-400B	02	20000506	0 - 0.33	91 J	302 J	79 J	3480	157	104	53

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value
U - Not detected at the indicated value.

TABLE 1-9

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 9
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD	NICKEL[1]	
										EPA METHOD	NOAA METHOD		EPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	2x ER-M 436	-	IRG 124
MS-09	LOC.1	OU4-SD-M09-199A	01	19990909	0 - 0.33	6 J	26	12	429	-	98	66 J	-	114 J
MS-09	LOC.1	OU4-SD-M09-100B	02	20000503	0 - 0.33	5	12	2	62	-	**511**	188	-	**160**
MS-09	LOC.1	OU4-SD-M09-100A	03	20000830	0 - 0.33	7 J	13	7	209	-	413 J	88 J	-	72 J
MS-09	LOC.1	OU4-SD-M09-101B	04	20010508	0 - 0.33	16 J	133 J	26	886	-	227	165	-	79
MS-09	LOC.1	OU4-SD-M09-101A	05	20010820	0 - 0.33	16	42	7	735	-	58 J	50	-	77
MS-09	LOC.1	OU4-SD-M09-102A	06	20020810	0 - 0.33	30 J	868 J	180 J	8083	-	128	85	-	107
MS-09	LOC.1	OU4-SD-M09-107A	09	20071106	0 - 0.33	57	220	96	3319	-	376 J	233 J	-	102 J
MS-09	LOC.1A	OU4-SD-M09-103A	07	20030811	0 - 0.33	146	1199	474	**15651**	-	**1145**	**762**	-	**228**
MS-09	LOC.1A	OU4-SD-M09-108A	10	20081217	0 - 0.33	70 J	210 J	59 J	3622	-	159	110	-	51
MS-09	LOC.1A	OU4-SD-M09-108A-AVG	10	20081217	0 - 0.33	70 J	210 J	59 J	3622	-	168 J	133 J	-	54 J
MS-09	LOC.1A	OU4-SD-M09-105A	08	20050820	0 - 0.33	42 J	1200	**530 J**	**19370**	-	**892 J**	**506 J**	-	**188**
MS-09	LOC.1A	OU4-SD-M09-105A-AVG	08	20050820	0 - 0.33	39 J	980	415 J	**17210**	-	**892 J**	**506 J**	-	**188**
MS-09	LOC.1A	OU4-SD-M09-105A-D	08	20050820	0 - 0.33	36 J	760	300 J	**15050**	-	-	-	-	-
MS-09	LOC.2	OU4-SD-M09-299A	01	19990909	0 - 0.33	14 J	83	15	1601	-	119	190 J	-	41 J
MS-09	LOC.2	OU4-SD-M09-200B	02	20000503	0 - 0.33	9	79	15	709	-	207	142	-	62
MS-09	LOC.2	OU4-SD-M09-200A	03	20000829	0 - 0.33	55	128	36	1779	-	101	98	-	32 J
MS-09	LOC.2	OU4-SD-M09-201B	04	20010508	0 - 0.33	47 J	194 J	41	2047	-	132	109	-	62
MS-09	LOC.2	OU4-SD-M09-201A	05	20010820	0 - 0.33	64	194	67	2965	-	80 J	93	-	41
MS-09	LOC.2	OU4-SD-M09-202A	06	20020810	0 - 0.33	27	109 J	23	1861	-	211	121	-	43
MS-09	LOC.2A	OU4-SD-M09-203A	07	20030810	0 - 0.33	96	1009	**540**	11517	-	**526**	**519**	-	**140**
MS-09	LOC.2A	OU4-SD-M09-205A	08	20050820	0 - 0.33	31 J	200	66	5080	-	229 J	198 J	-	62
MS-09	LOC.2B	OU4-SD-M09-207A	09	20071106	0 - 0.33	59	280	86	4300	-	202 J	349 J	-	49 J
MS-09	LOC.2B	OU4-SD-M09-207A-AVG	09	20071106	0 - 0.33	61	265	78	4300	-	214 J	374 J	-	53 J
MS-09	LOC.2B	OU4-SD-M09-207A-D	09	20071106	0 - 0.33	63	250	70	4300	-	225 J	398 J	-	56 J
MS-09	LOC.2B	OU4-SD-M09-208A	10	20081217	0 - 0.33	89	250	61	4690	-	150	271	-	45
MS-09	LOC.3	OU4-SD-M09-399A	01	19990908	0 - 0.33	66 J	252	81	3065	-	106	102 J	-	42 J
MS-09	LOC.3	OU4-SD-M09-300B	02	20000503	0 - 0.33	61 J	208 J	69 J	2564	-	73	100	-	39
MS-09	LOC.3	OU4-SD-M09-300A	03	20000827	0 - 0.33	101 J	224 J	88 J	3210	-	77 J	100	-	32 J
MS-09	LOC.3	OU4-SD-M09-300A-AVG	03	20000827	0 - 0.33	113 J	258 J	101 J	3634	-	78 J	100	-	33 J
MS-09	LOC.3	OU4-SD-M09-300A-D	03	20000827	0 - 0.33	125	291	114	4057	-	79	99	-	34 J
MS-09	LOC.3	OU4-SD-M09-301B	04	20010507	0 - 0.33	97	395 J	116 J	4386	-	73	89	-	34
MS-09	LOC.3	OU4-SD-M09-301B-AVG	04	20010507	0 - 0.33	88 J	415 J	106 J	4117	-	77	92	-	35
MS-09	LOC.3	OU4-SD-M09-301B-D	04	20010507	0 - 0.33	80 J	435 J	95 J	3848	-	82	94	-	36
MS-09	LOC.3	OU4-SD-M09-301A	05	20010820	0 - 0.33	84 J	210 J	72 J	3080	-	88 J	92	-	33
MS-09	LOC.3	OU4-SD-M09-301A-AVG	05	20010820	0 - 0.33	93	293 J	93	4168	-	77	88 J	-	34 J
MS-09	LOC.3	OU4-SD-M09-301A-D	05	20010820	0 - 0.33	101	375 J	114	5255	-	66	84 J	-	35 J
MS-09	LOC.3	OU4-SD-M09-302A	06	20020810	0 - 0.33	118 J	536 J	113 J	6508	-	78	95	-	39
MS-09	LOC.3	OU4-SD-M09-302A-AVG	06	20020810	0 - 0.33	97 J	428 J	111 J	5846	-	73	91 J	-	36
MS-09	LOC.3	OU4-SD-M09-302A-D	06	20020810	0 - 0.33	77 J	320 J	109	5184	-	69	87 J	-	34
MS-09	LOC.3	OU4-SD-M09-303A	07	20030810	0 - 0.33	165	967	334	11946	-	**785**	**704**	-	**208**
MS-09	LOC.3	OU4-SD-M09-303A-AVG	07	20030810	0 - 0.33	156	915	311	11261	-	**761**	**707**	-	**202**
MS-09	LOC.3	OU4-SD-M09-303A-D	07	20030810	0 - 0.33	147	863	289	10575	-	**737**	**710**	-	**195**
MS-09	LOC.3	OU4-SD-M09-305A	08	20050820	0 - 0.33	55 J	600	180	**13640**	-	408 J	415 J	-	120 J
MS-09	LOC.3	OU4-SD-M09-307A	09	20071106	0 - 0.33	91	410	110	5660	-	232 J	225 J	-	62 J
MS-09	LOC.3	OU4-SD-M09-308A	10	20081217	0 - 0.33	82	550	270	9190	-	169	174	-	50
MS-09	LOC.4	OU4-SD-M09-400B	02	20000506	0 - 0.33	42 J	243 J	66 J	2620	-	152	162	-	50

TABLE 1-9

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 9
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)				
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER[1]		LEAD	NICKEL[1]	
										EPA METHOD	NOAA METHOD		EPA METHOD	NOAA METHOD
						IRG 210	IRG 1236	IRG 500	IRG 13057	-	IRG 486	2x ER-M 436	-	IRG 124
MS-09	SD01	AS09-SD-SD01	ASP1	20050820	0 - 0.33	21 J	160 J	78 J	3875	161 J	183	-	41 J	59
MS-09	SD02	AS09-SD-SD02	ASP1	20050820	0 - 0.33	28 J	170	62	4094	81 J	85	-	27 J	47
MS-09	SD03	AS09-SD-SD03	ASP1	20050820	0 - 0.33	69 J	780	250	16850	180 J	206	-	39 J	58
MS-09	SD04	AS09-SD-SD04	ASP1	20050820	0 - 0.33	22	80	31	2334	40 J	36	-	23 J	44
MS-09	SD05	AS09-SD-SD05	ASP1	20050820	0 - 0.33	23 J	280	120	5570	57 J	56	-	23 J	43
MS-09	SD06	AS09-SD-SD06	ASP1	20050820	0 - 0.33	26	95	33	2754	38 J	34	-	21 J	42

1 - Sediment samples were analyzed for copper and nickel using two methods: a USEPA method and a NOAA method. If a sample was analyzed using both methods, only the NOAA results are shown on this table because the IRGs were developed using the NOAA results. However, if a sample was only analyzed using the USEPA method, then the USEPA result was used to estimate a NOAA result, using the following regression questions from the Rounds 1 through 10 Report (Tetra Tech, February 2010):

Copper
USEPA Concentrations <700 mg/kg: NOAA result = (1.22 * USEPA result) - 13

Nickel
All Results: NOAA result = (0.87 * USEPA result) + 23.41

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

ASP1 - Additional scrutiny Phase I
COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
NOAA - National Oceanic and Atmospheric Administration
PAH - Polycyclic aromatic hydrocarbons
USEPA - United States Environmental Protection Agency
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value
U - Not detected at the indicated value

TABLE 1-10

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 10
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-10	LOC.1	OU4-SD-M10-199A	01	19990907	0 - 0.33	3 J	14	4	252	21 J	31 J	42
MS-10	LOC.1	OU4-SD-M10-100B	02	20000503	0 - 0.33	16	119	30	1214	27	68	29
MS-10	LOC.1	OU4-SD-M10-100B-AVG	02	20000503	0 - 0.33	26	115	27	1086	28	57	29
MS-10	LOC.1	OU4-SD-M10-100B-D	02	20000503	0 - 0.33	36	111	24	958	28	47	29
MS-10	LOC.1	OU4-SD-M10-100A	03	20000829	0 - 0.33	24	43 J	12 J	646	19 J	65 J	24 J
MS-10	LOC.1	OU4-SD-M10-100A-AVG	03	20000829	0 - 0.33	27	60 J	17 J	1045	20 J	82 J	21 J
MS-10	LOC.1	OU4-SD-M10-100A-D	03	20000829	0 - 0.33	30 J	77 J	23 J	1444	21 J	99 J	18 J
MS-10	LOC.1	OU4-SD-M10-101B	04	20010508	0 - 0.33	20 J	60 J	15 J	824	23 J	47	29
MS-10	LOC.1	OU4-SD-M10-101B-AVG	04	20010508	0 - 0.33	16 J	63 J	15 J	850	32 J	42	33
MS-10	LOC.1	OU4-SD-M10-101B-D	04	20010508	0 - 0.33	11 J	65 J	16 J	875	40 J	37	36
MS-10	LOC.1	OU4-SD-M10-101A	05	20010820	0 - 0.33	51	353	54	3141	21 J	48	24
MS-10	LOC.1	OU4-SD-M10-101A-AVG	05	20010820	0 - 0.33	59	464	72	4811	26	60 J	29 J
MS-10	LOC.1	OU4-SD-M10-101A-D	05	20010820	0 - 0.33	68	574	89	6481	31	73 J	34 J
MS-10	LOC.1	OU4-SD-M10-102A	06	20020810	0 - 0.33	20	101 J	32	1078	22	102 J	29
MS-10	LOC.1	OU4-SD-M10-102A-AVG	06	20020810	0 - 0.33	23	130 J	30	1694	22	76 J	29
MS-10	LOC.1	OU4-SD-M10-102A-D	06	20020810	0 - 0.33	25	159 J	28	2311	23	50 J	29
MS-10	LOC.1	OU4-SD-M10-103A	07	20030812	0 - 0.33	22 J	90 J	34 J	1428	130 J	47	53 J
MS-10	LOC.1	OU4-SD-M10-103A-AVG	07	20030812	0 - 0.33	17 J	69 J	23 J	985	76 J	48	41 J
MS-10	LOC.1	OU4-SD-M10-103A-D	07	20030812	0 - 0.33	12 J	48 J	12 J	542	23 J	49	28 J
MS-10	LOC.1	OU4-SD-M10-105A	08	20050823	0 - 0.33	4	17	5	614	-	-	-
MS-10	LOC.2	OU4-SD-M10-299A	01	19990907	0 - 0.33	157 J	806	163	7857	17 J	73 J	21
MS-10	LOC.2	OU4-SD-M10-200B	02	20000503	0 - 0.33	**237**	**1650**	386	9694	34	56	21
MS-10	LOC.2	OU4-SD-M10-200A	03	20000829	0 - 0.33	114	494	117	4861	20 J	79 J	19 J
MS-10	LOC.2	OU4-SD-M10-201B	04	20010507	0 - 0.33	129	**1541 J**	288 J	7494	18	99	16
MS-10	LOC.2	OU4-SD-M10-201A	05	20010820	0 - 0.33	160	668	135	7605	19 J	40	14
MS-10	LOC.2	OU4-SD-M10-202A	06	20020810	0 - 0.33	113 J	922 J	170 J	**23828**	15	46	16
MS-10	LOC.2	OU4-SD-M10-203A	07	20030810	0 - 0.33	94	839	131	5890	19	82	18
MS-10	LOC.2	OU4-SD-M10-205A	08	20050820	0 - 0.33	50	710	150	7710	-	-	-
MS-10	LOC.3	OU4-SD-M10-399A	01	19990908	0 - 0.33	**217 J**	592	67	11462	105 J	116 J	28
MS-10	LOC.3	OU4-SD-M10-300B	02	20000503	0 - 0.33	94	1130	82	2465	31	55	29
MS-10	LOC.3	OU4-SD-M10-300A	03	20000829	0 - 0.33	135	251	39	2174	37 J	105 J	23 J
MS-10	LOC.3	OU4-SD-M10-301B	04	20010507	0 - 0.33	146 J	623 J	100 J	4182	27	56	25
MS-10	LOC.3	OU4-SD-M10-301A	05	20010820	0 - 0.33	45	101	23	1580	43 J	89	25
MS-10	LOC.3	OU4-SD-M10-302A	06	20020810	0 - 0.33	148	417 J	56	4597	32	71	27
MS-10	LOC.3	OU4-SD-M10-303A	07	20030810	0 - 0.33	122	374	68	3015	41	80	26
MS-10	LOC.3	OU4-SD-M10-305A	08	20050820	0 - 0.33	29	100	46	2817	-	-	-

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value

TABLE 1-11

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 11
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

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

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram

TABLE 1-12

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 12
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-12	LOC.1	OU4-SD-M12-199A	01	19990909	0 - 0.33	217 J	2880	1393	39579	162 J	190 J	51
MS-12	LOC.1	OU4-SD-M12-100B	02	20000505	0 - 0.33	116	1220	680 J	13329	88	118	40
MS-12	LOC.1	OU4-SD-M12-100A	03	20000829	0 - 0.33	303 J	2205	2434	46931	375 J	330 J	73 J
MS-12	LOC.1	OU4-SD-M12-101B	04	20010508	0 - 0.33	168 U	2432 J	1246 J	22195	266	379	69
MS-12	LOC.1	OU4-SD-M12-101A	05	20010821	0 - 0.33	160	4036	1389	38253	166 J	240	47
MS-12	LOC.1	OU4-SD-M12-102A	06	20020812	0 - 0.33	513 J	9286 J	4011 J	106039	269	307	70
MS-12	LOC.1	OU4-SD-M12-103A	07	20030809	0 - 0.33	303	7419	4061	87938	421	410	101
MS-12	LOC.2	OU4-SD-M12-299A	01	19990909	0 - 0.33	69 J	355	146	5353	27 J	53 J	25
MS-12	LOC.2	OU4-SD-M12-200B	02	20000505	0 - 0.33	98	1140	666 J	13073	35	57	23
MS-12	LOC.2	OU4-SD-M12-200B-AVG	02	20000505	0 - 0.33	93	1078	650 J	12252	37	55	23
MS-12	LOC.2	OU4-SD-M12-200B-D	02	20000505	0 - 0.33	88 J	1016 J	634 J	11431	40	54	23
MS-12	LOC.2	OU4-SD-M12-200A	03	20000829	0 - 0.33	191 J	1031	1057	26371	128 J	142 J	28 J
MS-12	LOC.2	OU4-SD-M12-200A-AVG	03	20000829	0 - 0.33	217 J	1053	1056	26105	191 J	173 J	39 J
MS-12	LOC.2	OU4-SD-M12-200A-D	03	20000829	0 - 0.33	242 J	1075	1055	25839	254 J	204 J	50 J
MS-12	LOC.2	OU4-SD-M12-201B	04	20010508	0 - 0.33	167	2267 J	1513 J	23074	90	103	29
MS-12	LOC.2	OU4-SD-M12-201B-AVG	04	20010508	0 - 0.33	142	2500 J	1641 J	22950	85	98	28
MS-12	LOC.2	OU4-SD-M12-201B-D	04	20010508	0 - 0.33	117	2733 J	1769 J	22827	79	94	27
MS-12	LOC.2	OU4-SD-M12-201A	05	20010820	0 - 0.33	123 J	1778 J	835 J	19866	172 J	306	42
MS-12	LOC.2	OU4-SD-M12-201A-AVG	05	20010820	0 - 0.33	179 J	2213	1119 J	23823	213	254 J	52 J
MS-12	LOC.2	OU4-SD-M12-201A-D	05	20010820	0 - 0.33	236 J	2648	1403 J	27779	253	203 J	61 J
MS-12	LOC.2	OU4-SD-M12-202A	06	20020813	0 - 0.33	80 J	1608 J	585 J	15578	37	152	15
MS-12	LOC.2	OU4-SD-M12-202A-AVG	06	20020813	0 - 0.33	69 J	1233 J	488 J	12789	33	126	16
MS-12	LOC.2	OU4-SD-M12-202A-D	06	20020813	0 - 0.33	58	858 J	390	9999	30	100	16
MS-12	LOC.2	OU4-SD-M12-203A	07	20030809	0 - 0.33	138	2195	1105	25428	119	147	39
MS-12	LOC.2	OU4-SD-M12-203A-AVG	07	20030809	0 - 0.33	141	2039	1048	23440	121	135	44
MS-12	LOC.2	OU4-SD-M12-203A-D	07	20030809	0 - 0.33	143	1884	991	21452	123	122	48
MS-12	LOC.3	OU4-SD-M12-399A	01	19990909	0 - 0.33	79 J	479	151	6475	51 J	88 J	27
MS-12	LOC.3	OU4-SD-M12-399A-AVG	01	19990909	0 - 0.33	73 J	399	139	6135	47 J	85 J	27
MS-12	LOC.3	OU4-SD-M12-399A-D	01	19990909	0 - 0.33	68 J	318	126	5795	44 J	83 J	26
MS-12	LOC.3	OU4-SD-M12-300B	02	20000505	0 - 0.33	64 J	258 J	70 J	3916	111	124	40
MS-12	LOC.3	OU4-SD-M12-300B-AVG	02	20000505	0 - 0.33	80 J	420 J	96 J	5253	95	116	37
MS-12	LOC.3	OU4-SD-M12-300B-D	02	20000507	0 - 0.33	96	582	121	6589	80	107	35
MS-12	LOC.3	OU4-SD-M12-300A	03	20000829	0 - 0.33	85	196	117	3372	77 J	201 J	28 J
MS-12	LOC.3	OU4-SD-M12-301B	04	20010508	0 - 0.33	103 J	498 J	251 J	5605	83	126	33
MS-12	LOC.3	OU4-SD-M12-301A	05	20010820	0 - 0.33	83	762 J	424	8985	85 J	175	37
MS-12	LOC.3	OU4-SD-M12-302A	06	20020813	0 - 0.33	63 J	372 J	83 J	6497	99	148	34
MS-12	LOC.3	OU4-SD-M12-303A	07	20030809	0 - 0.33	77	1050	606	13206	689	555	91
MS-12	SD01	AS12-SD-SD01	ASP1	20050822	0 - 0.33	99	840	380	12100	-	409	-
MS-12	SD02	AS12-SD-SD02	ASP1	20050823	0 - 0.33	270	3200	1900	52030	-	128 J	-
MS-12	SD020	AS12-SD-SD20-00	ASP2	20080414	0 - 0.17	850 UJ	7700 J	4500 J	119200	-	422 J	-
MS-12	SD027	AS12-SD-SD27-00	ASP2	20080414	0 - 0.25	850 UJ	15000 J	8200 J	172700	-	369 J	-
MS-12	SD028	AS12-SD-SD28-00	ASP2	20080414	0 - 0.33	87 UJ	650 J	340 J	11060	-	608 J	-
MS-12	SD029	AS12-SD-SD29-00	ASP2	20080414	0 - 0.33	44 UJ	500 J	340 J	7190	-	761 J	-
MS-12	SD03	AS12-SD-SD03	ASP1	20050823	0 - 0.33	-	-	-	-	-	51 J	-
MS-12	SD030	AS12-SD-SD30-00	ASP2	20080414	0 - 0.33	100 UJ	1300 J	970 J	26940	-	278 J	-
MS-12	SD031	AS12-SD-SD31-00	ASP2	20080415	0 - 0.33	39 U	560	400	7400	-	41600 J	-
MS-12	SD032	AS12-SD-SD32-00	ASP2	20080415	0 - 0.33	320 U	3700	2500	48480	-	324 J	-
MS-12	SD032	AS12-SD-SD32-01	ASP2	20080415	0.67 - 1	180 U	2100	1600	36760	-	305 J	-
MS-12	SD033	AS12-SD-SD33-00	ASP2	20080415	0 - 0.33	93	420 J	210 J	11700	-	823 J	-
MS-12	SD033	AS12-SD-SD33-00-AVG	ASP2	20080415	0 - 0.33	94	1060 J	580 J	18895	-	805 J	-

TABLE 1-12

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 12
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-12	SD033	AS12-SD-SD33-00-D	ASP2	20080415	0 - 0.33	94	**1700 J**	**950 J**	**26090**	-	**786 J**	-
MS-12	SD033	AS12-SD-SD33-01	ASP2	20080415	0.75 - 1.25	49	230	130	3710	-	**719 J**	-
MS-12	SD034	AS12-SD-SD34-00	ASP2	20080415	0 - 0.33	40	92	51	1875	-	**1820 J**	-
MS-12	SD034	AS12-SD-SD34-01	ASP2	20080415	0.83 - 1.42	33	65	25	1008	-	**1270 J**	-
MS-12	SD035	AS12-SD-SD35-00	ASP2	20080415	0 - 0.33	1500 U	**16000**	**12000**	**249100**	-	230 J	-
MS-12	SD035	AS12-SD-SD35-01	ASP2	20080415	0.33 - 1	34	370	280	6660	-	261 J	-
MS-12	SD036	AS12-SD-SD36-00	ASP2	20080415	0 - 0.33	150	1100	**840**	**20150**	-	345 J	-
MS-12	SD037	AS12-SD-SD37-00	ASP2	20080416	0 - 0.33	430 U	**5900**	**4200**	**86400**	-	**3160 J**	-
MS-12	SD038	AS12-SD-SD38-00	ASP2	20080416	0 - 0.25	460 U	**5500**	**3900 J**	**99700**	-	**2530 J**	-
MS-12	SD038	AS12-SD-SD38-00-AVG	ASP2	20080416	0 - 0.25	335 U	**4050**	**2800 J**	**80250**	-	**2130 J**	-
MS-12	SD038	AS12-SD-SD38-00-D	ASP2	20080416	0 - 0.25	210 U	**2600**	**1700 J**	**60800**	-	**1730 J**	-
MS-12	SD039	AS12-SD-SD39-00	ASP2	20080416	0 - 0.33	25	190	130	4340	-	**690 J**	-
MS-12	SD04	AS12-SD-SD04	ASP1	20050823	0 - 0.33	-	-	-	-	-	116 J	-
MS-12	SD040	AS12-SD-SD40-00	ASP2	20080416	0 - 0.25	42 U	490	260	7850	-	**1090 J**	-
MS-12	SD041	AS12-SD-SD41-00	ASP2	20080416	0 - 0.33	67 J	200 J	100 J	4930	-	231 J	-
MS-12	SD042	AS12-SD-SD42-00	ASP2	20080416	0 - 0.25	79 U	760	480	**13500**	-	**777 J**	-
MS-12	SD05	AS12-SD-SD05	ASP1	20050823	0 - 0.33	-	-	-	-	-	63 J	-
MS-12	SD06	AS12-SD-SD06	ASP1	20050823	0 - 0.33	-	-	-	-	-	118 J	-
MS-12	SD06	AS12-SD-SD06-0004	ASP1	20050823	0 - 0.33	29 J	1200 J	**640 J**	**15870**	-	-	-
MS-12	SD06	AS12-SD-SD06-0412	ASP1	20050823	0.33 - 1	44 J	**1500 J**	**750 J**	**17940**	-	**610 J**	-
MS-12	SD06	AS12-SD-SD06-1220	ASP1	20050823	1 - 1.66	61 J	**1300 J**	500 J	**22270**	-	**544 J**	-
MS-12	SD06	AS12-SD-SD06-2031	ASP1	20050823	1.66 - 2.58	110 J	**3600 J**	**3000 J**	**54600**	-	**681 J**	-
MS-12	SD07	AS12-SD-SD07	ASP1	20050823	0 - 0.33	88	990	500	**16330**	-	297 J	-
MS-12	SD07	AS12-SD-SD07-0412	ASP1	20050823	0.33 - 1	47 J	**1700 J**	**950 J**	**24190**	-	**534 J**	-
MS-12	SD07	AS12-SD-SD07-1220	ASP1	20050823	1 - 1.66	39 J	1100 J	**640 J**	**13190**	-	**1350 J**	-
MS-12	SD07	AS12-SD-SD07-2028	ASP1	20050823	1.66 - 2.33	37 J	**1500 J**	**2100 J**	**21660**	-	**651 J**	-
MS-12	SD07	AS12-SD-SD07-AVG	ASP1	20050823	0 - 0.33	88	990	500	**16330**	-	**533 J**	-
MS-12	SD07	AS12-SD-SD07-D	ASP1	20050823	0 - 0.33	-	-	-	-	-	**768 J**	-
MS-12	SD08	AS12-SD-SD08	ASP1	20050823	0 - 0.33	-	-	-	-	-	**757 J**	-
MS-12	SD09	AS12-SD-SD09	ASP1	20050822	0 - 0.33	200	**2500**	**1500**	**47540**	-	144	-
MS-12	SD09	AS12-SD-SD09-AVG	ASP1	20050822	0 - 0.33	200	**2500**	**1500**	**47540**	-	154	-
MS-12	SD09	AS12-SD-SD09-D	ASP1	20050822	0 - 0.33	-	-	-	-	-	163	-
MS-12	SD10	AS12-SD-SD10	ASP1	20050823	0 - 0.33	-	-	-	-	-	290 J	-
MS-12	SD100	AS12-SD-SD100-00	ASP2	20080416	0 - 0.33	900 U	**13000**	**11000**	**172200**	-	**7810 J**	-
MS-12	SD100	AS12-SD-SD100-01	ASP2	20080416	0.67 - 0.83	930 U	**18000**	**14000**	**231800**	-	**6970 J**	-
MS-12	SD101	AS12-SD-SD101-00	ASP2	20080416	0 - 0.33	110	370	260	7660	-	**736 J**	-
MS-12	SD102	AS12-SD-SD102-00	ASP2	20080416	0 - 0.25	490 U	**5200**	**4100**	**85500**	-	**1110 J**	-
MS-12	SD103	AS12-SD-SD103-00	ASP2	20080416	0 - 0.33	12	42 J	39 J	2171	-	202 J	-
MS-12	SD103	AS12-SD-SD103-00-AVG	ASP2	20080416	0 - 0.33	12	671 J	370 J	9141	-	171 J	-
MS-12	SD103	AS12-SD-SD103-00-D	ASP2	20080416	0 - 0.33	77 U	**1300 J**	**700 J**	**16110**	-	140 J	-
MS-12	SD103	AS12-SD-SD103-01	ASP2	20080416	0.67 - 1.25	44 U	670	**570**	9300	-	114 J	-
MS-12	SD104	AS12-SD-SD104-00	ASP2	20080416	0 - 0.33	190 U	**2100**	**1600**	**41220**	-	**874 J**	-
MS-12	SD105	AS12-SD-SD105-00	ASP2	20080416	0 - 0.33	170 U	**1900**	**1500**	**34340**	-	**608 J**	-
MS-12	SD106	AS12-SD-SD106-00	ASP2	20080416	0 - 0.33	44 U	390	330	10920	-	288 J	-
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	SD11	AS12-SD-SD11	ASP1	20050823	0 - 0.33	-	-	-	-	-	155 J	-
MS-12	SD12	AS12-SD-SD12	ASP1	20050822	0 - 0.33	-	-	-	-	-	**3120**	-
MS-12	SD13	AS12-SD-SD13	ASP1	20050822	0 - 0.33	-	-	-	-	-	148	-

TABLE 1-12

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 12
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-12	SD14	AS12-SD-SD14	ASP1	20050822	0 - 0.33	-	-	-	-	-	42	-
MS-12	SD15	AS12-SD-SD15	ASP1	20050824	0 - 0.33	**670**	**11000**	**6400**	**157600**		**643 J**	-
MS-12	SD16	AS12-SD-SD16	ASP1	20050824	0 - 0.33	120	**1500**	**880**	**24410**	-	423 J	-
MS-12	SD16	AS12-SD-SD16-AVG	ASP1	20050824	0 - 0.33	110	**1350**	**785**	**21870**	-	423 J	-
MS-12	SD16	AS12-SD-SD16-D	ASP1	20050824	0 - 0.33	100	1200	**690**	**19330**	-	-	-
MS-12	SD21	AS12-SD-SD21-00	ASP2	20071108	0 - 0.33	24	280	160	3485	-	58 J	-
MS-12	SD21	AS12-SD-SD21-01	ASP2	20071108	0.33 - 0.67	17	110	63	1504	-	68 J	-
MS-12	SD22	AS12-SD-SD22-00	ASP2	20071108	0 - 0.33	84 J	270 J	150 J	4698	-	70 J	-
MS-12	SD22	AS12-SD-SD22-00-AVG	ASP2	20071108	0 - 0.33	80 J	220 J	108 J	3850	-	73 J	-
MS-12	SD22	AS12-SD-SD22-00-D	ASP2	20071108	0 - 0.33	76 J	170 J	66 J	3002	-	75 J	-
MS-12	SD23	AS12-SD-SD23-00	ASP2	20071107	0 - 0.33	100 J	420 J	220 J	7440	-	100 J	-
MS-12	SD23	AS12-SD-SD23-01	ASP2	20071107	0.33 - 0.83	23	130	73	2782	-	124 J	-
MS-12	SD24	AS12-SD-SD24-00	ASP2	20071105	0 - 0.33	43	460	290	5570	-	240	-
MS-12	SD24	AS12-SD-SD24-01	ASP2	20071105	0.33 - 1	74	**1900**	**1300**	**21770**	-	340	-
MS-12	SD25	AS12-SD-SD25-00	ASP2	20071108	0 - 0.33	77 J	850 J	**620 J**	10420	-	236 J	-
MS-12	SD25	AS12-SD-SD25-01	ASP2	20071108	0.33 - 1	65	510	260	8680	-	327 J	-
MS-12	SD26	AS12-SD-SD26-00	ASP2	20071108	0 - 0.33	14 J	170 J	98 J	2114	-	104 J	-
MS-12	SD43	AS12-SD-SD43-00	ASP2	20071105	0 - 0.33	35	250	160	3808	-	58	-
MS-12	SD44	AS12-SD-SD44-00	ASP2	20071109	0 - 0.33	51	640	360	12710	-	54 J	-
MS-12	SD45	AS12-SD-SD45-00	ASP2	20071105	0 - 0.33	27	190	100	3117	-	45	-
MS-12	SD46	AS12-SD-SD46-00	ASP2	20071105	0 - 0.33	46	260	140	3287	-	55	-
MS-12	SD49	AS12-SD-SD49-00	ASP2	20071106	0 - 0.33	59	220	74	2632	-	280	-
MS-12	SD50	AS12-SD-SD50-00	ASP2	20071106	0 - 0.33	75	520	200	4845	-	86	-

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

ASP1 -Additional scrutiny Phase I
ASP2 - Additional scrutiny Phase 2
COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value

TABLE 1-13

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 13
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-13	LOC.1	OU4-SD-M13-199A	01	19990911	0 - 0.33	85 J	453	160	6094	47	60 J	32 J
MS-13	LOC.1	OU4-SD-M13-100B	02	20000506	0 - 0.33	**212 J**	**2269 J**	**3752 J**	**16634**	54	51	33
MS-13	LOC.1	OU4-SD-M13-100A	03	20000828	0 - 0.33	**215 J**	**1283 J**	**834 J**	**19342**	45 J	71 J	25 J
MS-13	LOC.1	OU4-SD-M13-101B	04	20010507	0 - 0.33	162	**1237 J**	197 J	10331	45	61	25
MS-13	LOC.1	OU4-SD-M13-101A	05	20010820	0 - 0.33	**222**	1041 J	388	12386	40 J	73	24
MS-13	LOC.1	OU4-SD-M13-102A	06	20020813	0 - 0.33	81	332 J	99	5386	67	109	33
MS-13	LOC.1	OU4-SD-M13-103A	07	20030813	0 - 0.33	66	202	104	2232	111 J	98 J	28
MS-13	LOC.1	OU4-SD-M13-105A	08	20050822	0 - 0.33	26 J	83	36 J	4518	-	-	-
MS-13	LOC.1	OU4-SD-M13-105A-AVG	08	20050822	0 - 0.33	32 J	162 J	98 J	11243	-	-	-
MS-13	LOC.1	OU4-SD-M13-105A-D	08	20050822	0 - 0.33	37 J	240 J	160 J	**17968**	-	-	-
MS-13	LOC.2	OU4-SD-M13-299A	01	19990911	0 - 0.33	123 J	463	87	5271	46	56 J	38
MS-13	LOC.2	OU4-SD-M13-200B	02	20000506	0 - 0.33	188	625	156	5894	52	49	31
MS-13	LOC.2	OU4-SD-M13-200A	03	20000828	0 - 0.33	150	340	65	3778	36 J	64 J	23 J
MS-13	LOC.2	OU4-SD-M13-201B	04	20010507	0 - 0.33	133 J	560 J	97 J	4896	42	77	24
MS-13	LOC.2	OU4-SD-M13-201A	05	20010820	0 - 0.33	107	298 J	63	3038	43 J	164	28
MS-13	LOC.2	OU4-SD-M13-202A	06	20020813	0 - 0.33	121 J	**1597 J**	334	8006	357	**469**	56
MS-13	LOC.2	OU4-SD-M13-203A	07	20030813	0 - 0.33	111	584	222	2900	115 J	77 J	32
MS-13	LOC.2	OU4-SD-M13-205A	08	20050822	0 - 0.33	35	150	52	3660	-	-	-
MS-13	LOC.2	OU4-SD-M13-205A-AVG	08	20050822	0 - 0.33	37	135	65	3427	-	-	-
MS-13	LOC.2	OU4-SD-M13-205A-D	08	20050822	0 - 0.33	39	120	78	3194	-	-	-
MS-13	LOC.3	OU4-SD-M13-399A	01	19990911	0 - 0.33	109 J	348	94	4609	62	70 J	31
MS-13	LOC.3	OU4-SD-M13-300B	02	20000506	0 - 0.33	119	749	287	6556	119	85	35
MS-13	LOC.3	OU4-SD-M13-300A	03	20000828	0 - 0.33	131	359	116	3964	87 J	88 J	29 J
MS-13	LOC.3	OU4-SD-M13-301B	04	20010507	0 - 0.33	103 J	384 J	111 J	3969	63	89	29
MS-13	LOC.3	OU4-SD-M13-301A	05	20010820	0 - 0.33	125	428 J	101	5061	63 J	74	38
MS-13	LOC.3	OU4-SD-M13-302A	06	20020813	0 - 0.33	121	380 J	66	4018	57	82	25
MS-13	LOC.3	OU4-SD-M13-303A	07	20030813	0 - 0.33	79 J	277 J	86	2893	153 J	70 J	26
MS-13	LOC.3	OU4-SD-M13-305A	08	20050822	0 - 0.33	25 J	200 J	110 J	4080	-	-	-

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value

TABLE 1-14

SUMMARY OF COCs DETECTED IN SEDIMENT AT MONITORING STATION 14
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

MS Number	Sample Location	Sample ID	Round	Sample Date	Depth Interval (Feet)	Semivolatile Organics (ug/kg)				Inorganics (mg/kg)		
						ACENAPHTHYLENE	ANTHRACENE	FLUORENE	HIGH MOLECULAR WEIGHT PAHS	COPPER	LEAD	NICKEL
						IRG 210	IRG 1236	IRG 500	IRG 13057	IRG 486	2x ER-M 436	IRG 124
MS-14	LOC.1	OU4-SD-M14-199A	01	19990911	0 - 0.33	42 J	90	23	1515	27	57 J	27
MS-14	LOC.1	OU4-SD-M14-100B	02	20000504	0 - 0.33	115 J	197 J	44 J	2226	60	185	30
MS-14	LOC.1	OU4-SD-M14-100A	03	20000828	0 - 0.33	117	166	35	1926	44 J	94 J	23 J
MS-14	LOC.1	OU4-SD-M14-101B	04	20010507	0 - 0.33	179 J	416 J	65 J	4391	37	82	20
MS-14	LOC.1	OU4-SD-M14-101A	05	20010821	0 - 0.33	**245**	408 J	57	4020	34 J	85	23
MS-14	LOC.1	OU4-SD-M14-102A	06	20020811	0 - 0.33	159	276 J	44	4165	30	119	22
MS-14	LOC.1	OU4-SD-M14-103A	07	20030811	0 - 0.33	43	78	17	993	86 J	65 J	28
MS-14	LOC.1	OU4-SD-M14-105A	08	20050821	0 - 0.33	14	44	16	1508	-	-	-
MS-14	LOC.2	OU4-SD-M14-299A	01	19990911	0 - 0.33	120 J	307	74	4465	25	65 J	19
MS-14	LOC.2	OU4-SD-M14-200B	02	20000505	0 - 0.33	103	409	107	5209	29	53	20
MS-14	LOC.2	OU4-SD-M14-200A	03	20000828	0 - 0.33	189	433	142	4206	16 J	54 J	17 J
MS-14	LOC.2	OU4-SD-M14-201B	04	20010508	0 - 0.33	164 J	549 J	113 J	4061	29	66	19
MS-14	LOC.2	OU4-SD-M14-201A	05	20010821	0 - 0.33	172	674 J	163	5310	25	71 J	17 J
MS-14	LOC.2	OU4-SD-M14-202A	06	20020811	0 - 0.33	**230 J**	**1838 J**	205 J	11688	21	65	17
MS-14	LOC.2	OU4-SD-M14-203A	07	20030811	0 - 0.33	72 J	180 J	39 J	2502	68	51	24 J
MS-14	LOC.2	OU4-SD-M14-205A	08	20050821	0 - 0.33	41	400	120	5930	-	-	-
MS-14	LOC.3	OU4-SD-M14-399A	01	19990911	0 - 0.33	77 J	145	30	2140	38	58 J	27
MS-14	LOC.3	OU4-SD-M14-300B	02	20000505	0 - 0.33	173	396	99	4669	31	44	27
MS-14	LOC.3	OU4-SD-M14-300A	03	20000828	0 - 0.33	130 J	353	85	3631	29 J	67 J	25 J
MS-14	LOC.3	OU4-SD-M14-301B	04	20010508	0 - 0.33	113 J	373 J	108 J	2785	27	60	22
MS-14	LOC.3	OU4-SD-M14-301A	05	20010821	0 - 0.33	165	437 J	93	4387	24 J	57	25
MS-14	LOC.3	OU4-SD-M14-302A	06	20020810	0 - 0.33	151 J	570 J	93	4882	26	88	20
MS-14	LOC.3	OU4-SD-M14-303A	07	20030811	0 - 0.33	101	254	51	2332	82 J	56 J	30
MS-14	LOC.3	OU4-SD-M14-305A	08	20050821	0 - 0.33	43	680	74	3867	-	-	-

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

COC - Chemical of concern
ER-M - Effects-range median
IRG - Interim remediation goal
MS - Monitoring station
PAH - Polycyclic aromatic hydrocarbons
ug/kg - Microgram/kilogram
mg/kg - Milligram/kilogram
J - Estimated value

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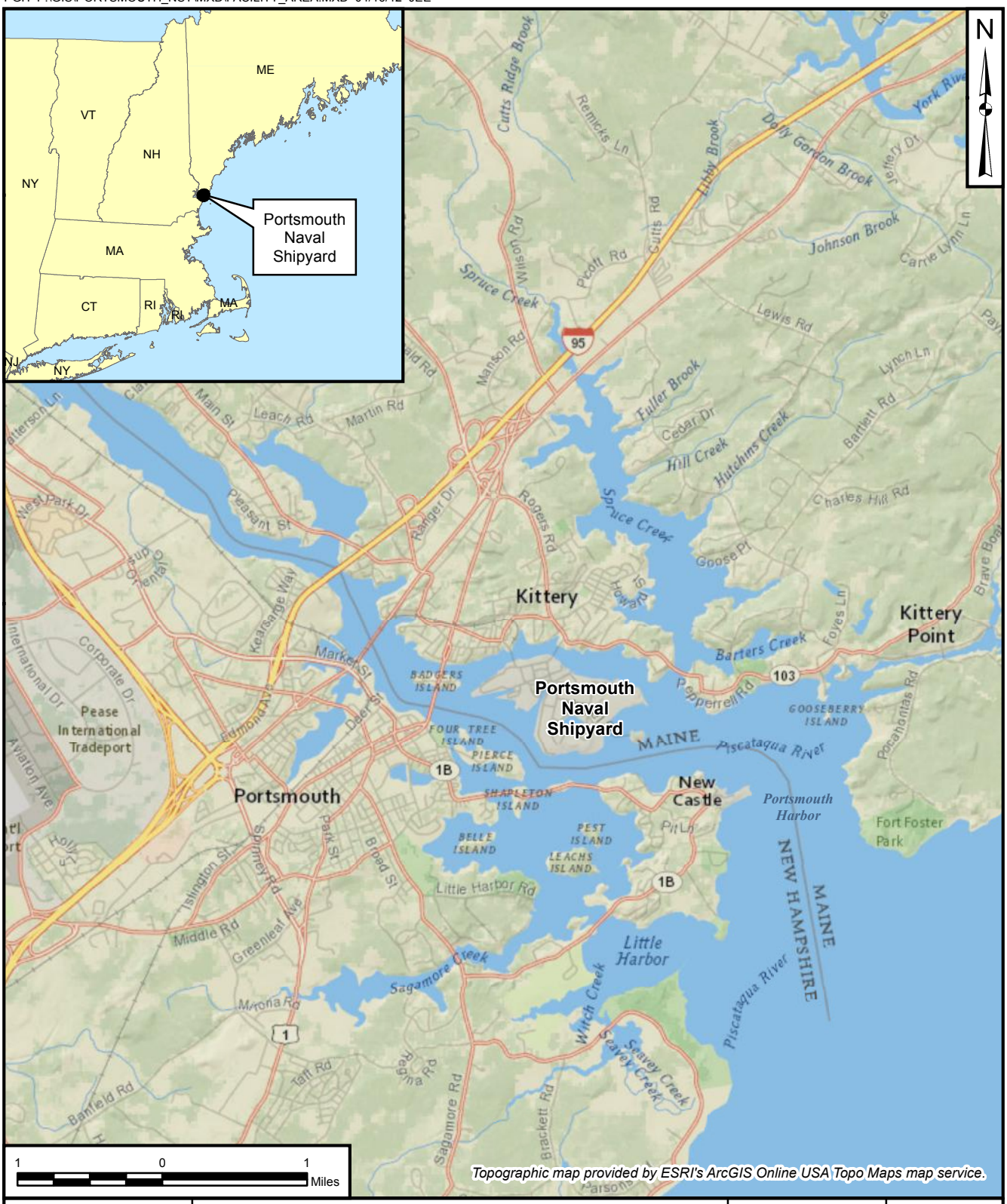

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
K. MOORE	04/03/12		0932	123
CHECKED BY	DATE	VICINITY MAP FEASIBILITY STUDY FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
A. BERNHARDT	04/16/12		___	___
REVISED BY	DATE		APPROVED BY	DATE
___	___		___	___
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-1	0

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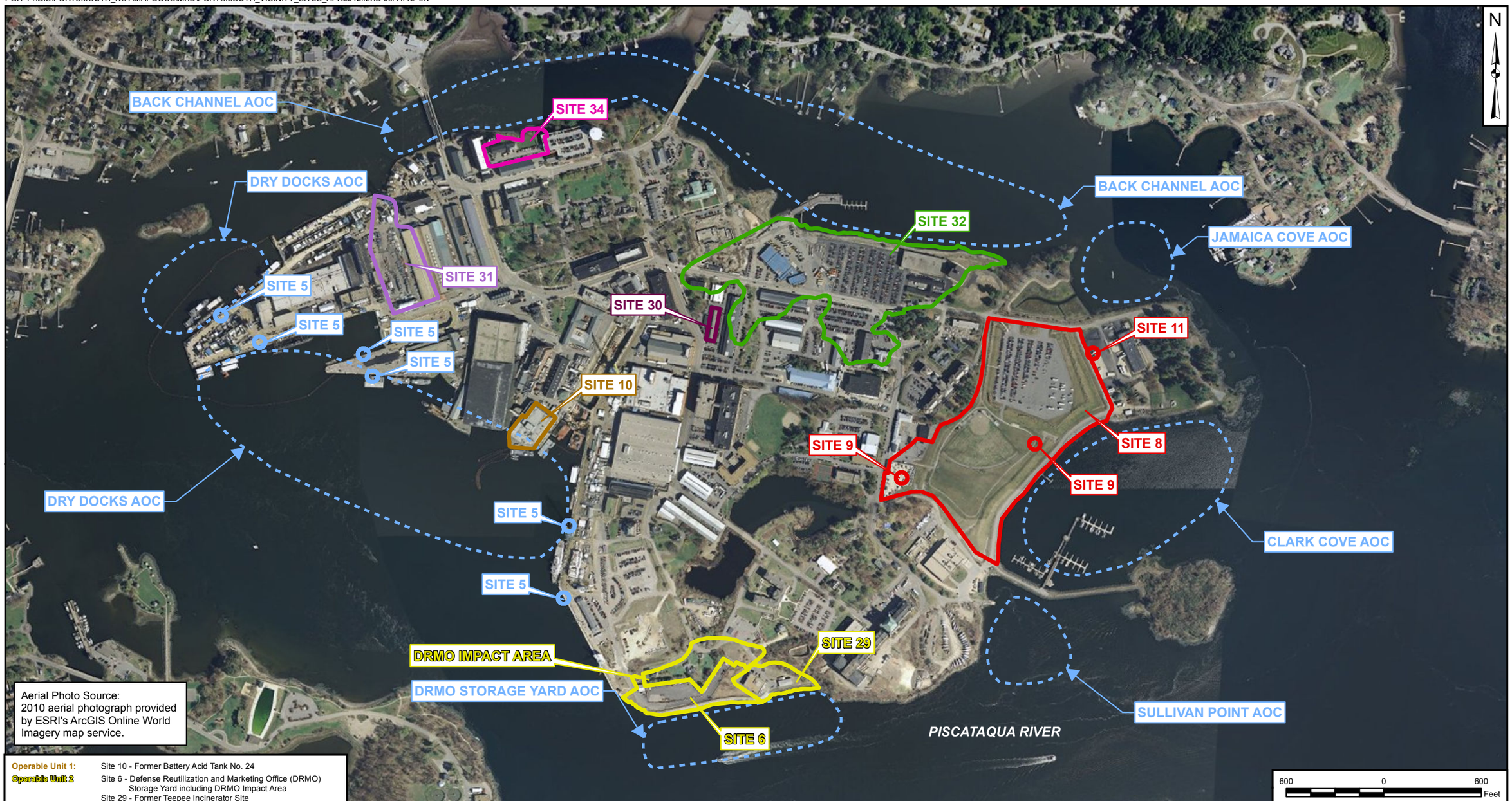

Aerial Photo Source:
2010 aerial photograph provided by ESRI's ArcGIS Online World Imagery map service.

Operable Unit 1:	Site 10 - Former Battery Acid Tank No. 24
Operable Unit 2	Site 6 - Defense Reutilization and Marketing Office (DRMO) Storage Yard including DRMO Impact Area Site 29 - Former Teepee Incinerator Site
Operable Unit 3	Site 8 - Jamaica Island Landfill (JILF) Site 9 - Former Mercury Burial Site Site 11 - Former Waste Oil Tanks Nos. 6 & 7
Operable Unit 4	Site 5 - Former Industrial Waste Outfalls Offshore Areas potentially impacted by onshore IRP sites (Six Areas of Concern have been delineated)
Operable Unit 7	Site 32 - Topeka Pier Site
Operable Unit 8	Site 31 - West Timber Basin
Operable Unit 9	Site 34 - Former Oil Gasification Plant, Building 62
Site Screening Area	Site 30 - Galvanizing Plant, Building 184

DRAWN BY J. ENGLISH	DATE 04/20/12	TETRA TECH	CONTRACT NUMBER 0932 / CTO NUMBER 123
CHECKED BY L. GANSER	DATE 09/11/12	FACILITY SITE MAP FEASIBILITY STUDY FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
REVISED BY J. NOVAK	DATE 09/11/12		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 1-2 / REV 0

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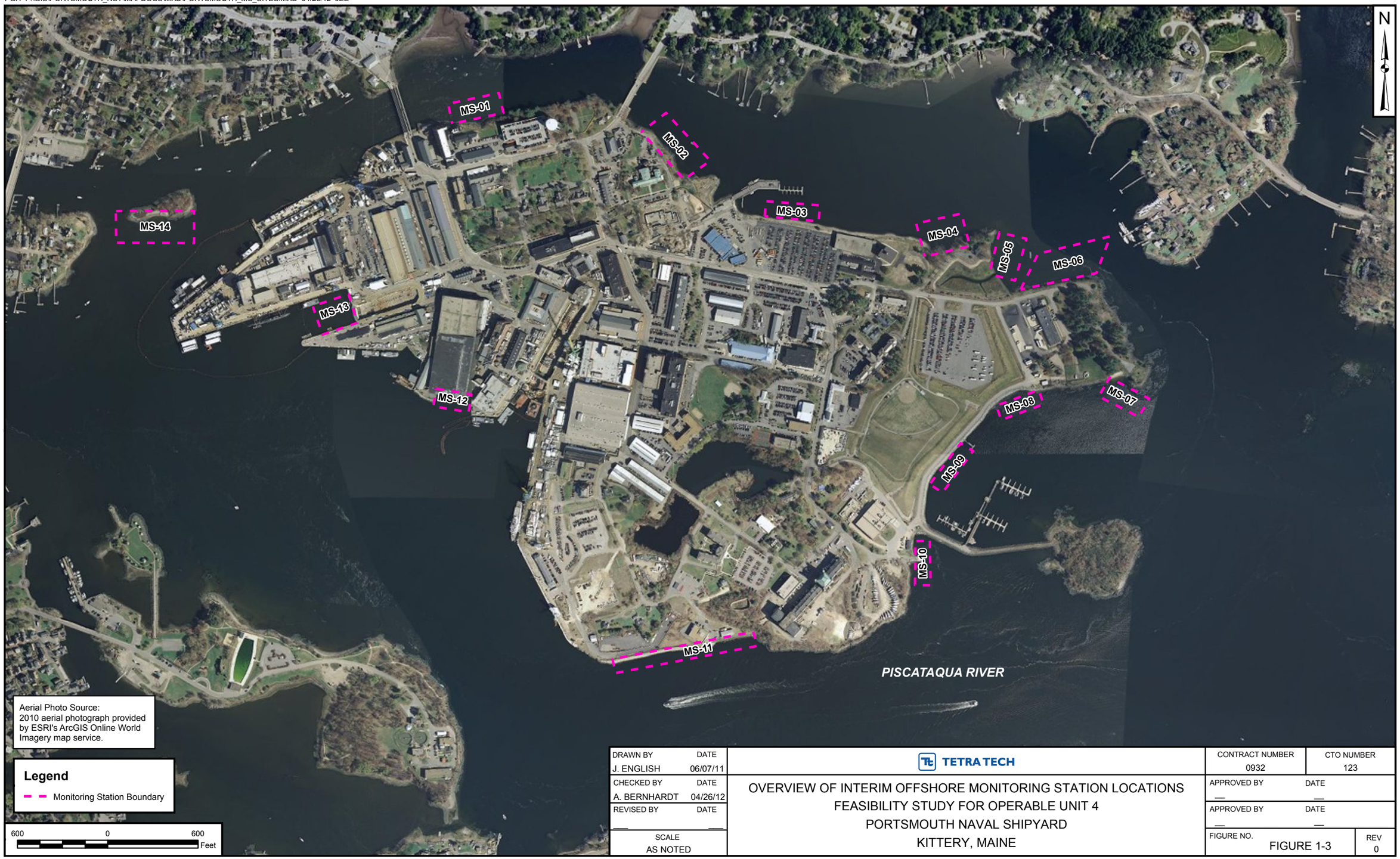

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	06/07/11		0932	123
CHECKED BY	DATE	OVERVIEW OF INTERIM OFFSHORE MONITORING STATION LOCATIONS	APPROVED BY	DATE
A. BERNHARDT	04/26/12	FEASIBILITY STUDY FOR OPERABLE UNIT 4	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-3	0

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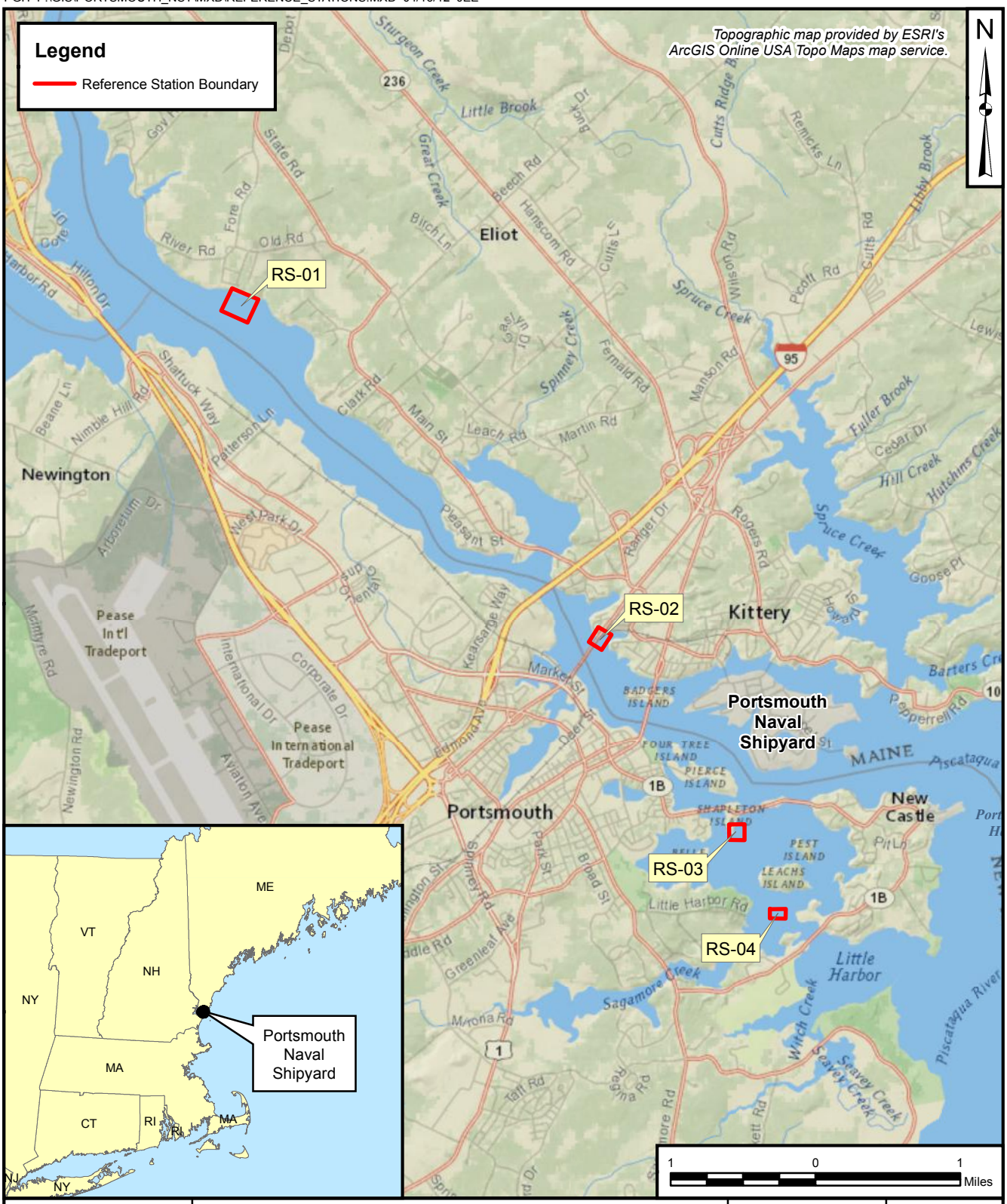
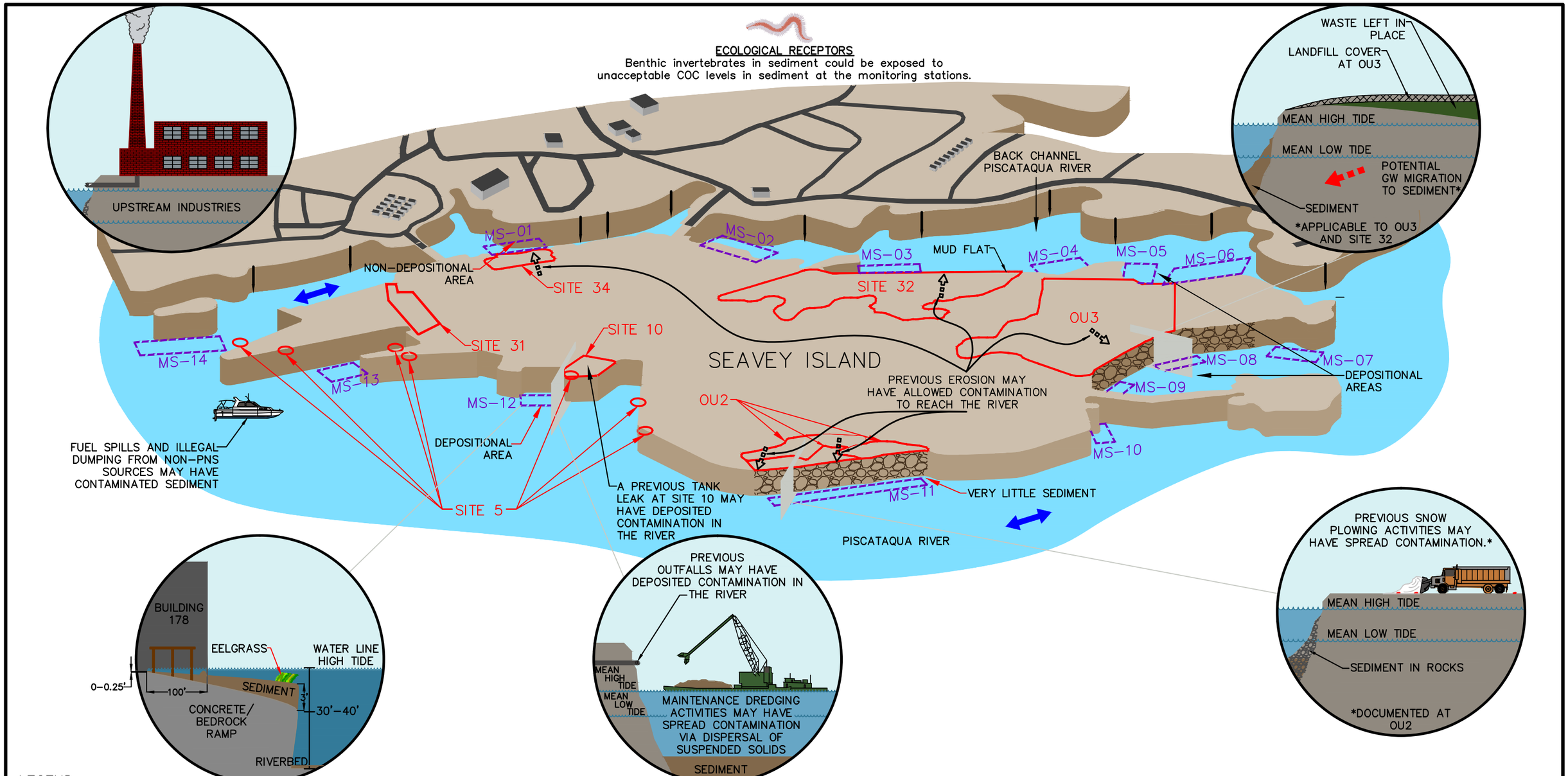


DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	04/16/12		0932	123
CHECKED BY	DATE	OVERVIEW OF REFERENCE STATION LOCATIONS FEASIBILITY STUDY FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
A. BERNHARDT	04/16/12		___	___
REVISED BY	DATE		APPROVED BY	DATE
___	___		___	___
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-4	0



LEGEND

- PREVIOUS CONTAMINATION PATHWAY
- POTENTIAL CONTAMINATION PATHWAY
- HIGH FLOW DURING TIDE CHANGES
- RUNOFF
- RIPRAP/EROSION CONTROLS

TETRA TECH
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661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
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PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONCEPTUAL SITE MODEL FEASIBILITY STUDY FOR OPERABLE UNIT 4

SCALE: NOT TO SCALE

DATE:	4/12/12
CONTRACT NO.:	CTO 123
DESIGNED BY:	
DRAWN BY:	ND
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SHEET: 1 OF 1	
SIZE: B	FIGURE 1-5

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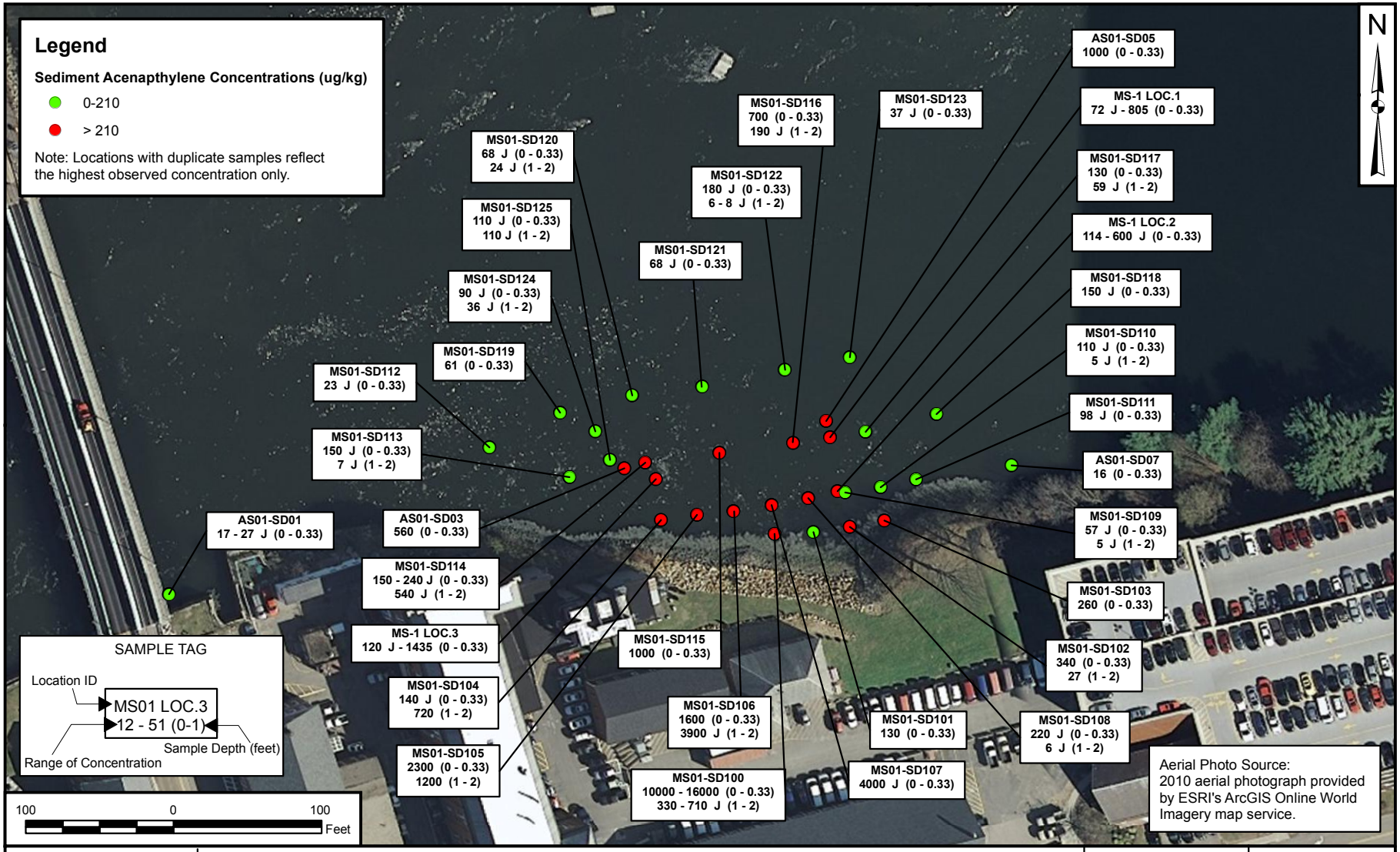

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J. ENGLISH	04/16/12		0932	123
CHECKED BY	DATE	CONCENTRATIONS OF ACENAPHTHYLENE IN SEDIMENT AT MS-01	APPROVED BY	DATE
A. BERNHARDT	04/16/12	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-6	0

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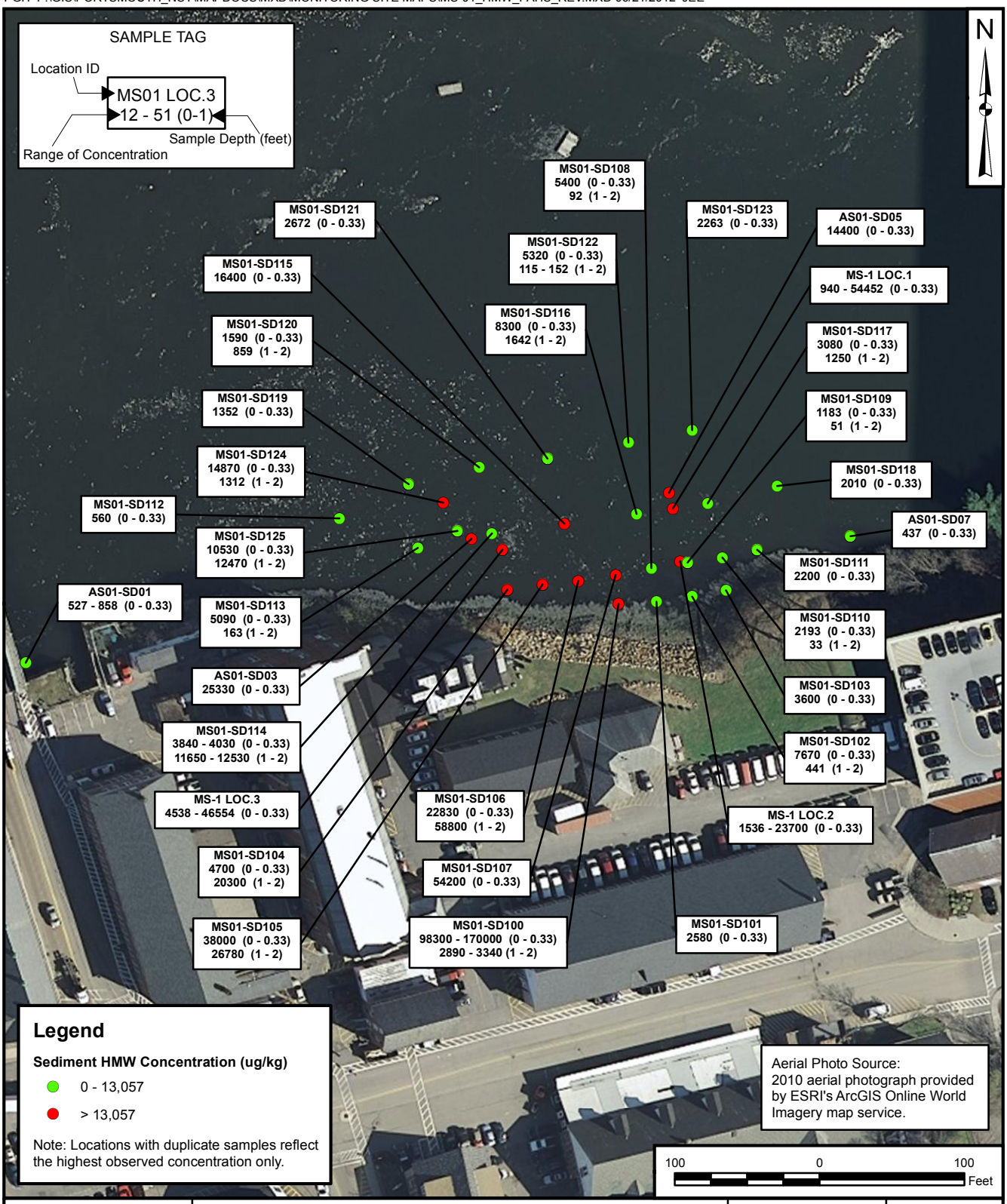

DRAWN BY J. ENGLISH	DATE 04/16/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 06/21/12	CONCENTRATIONS OF HMW PAHs IN SEDIMENT AT MS-01 FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___	DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___	DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 1-7	REV 0

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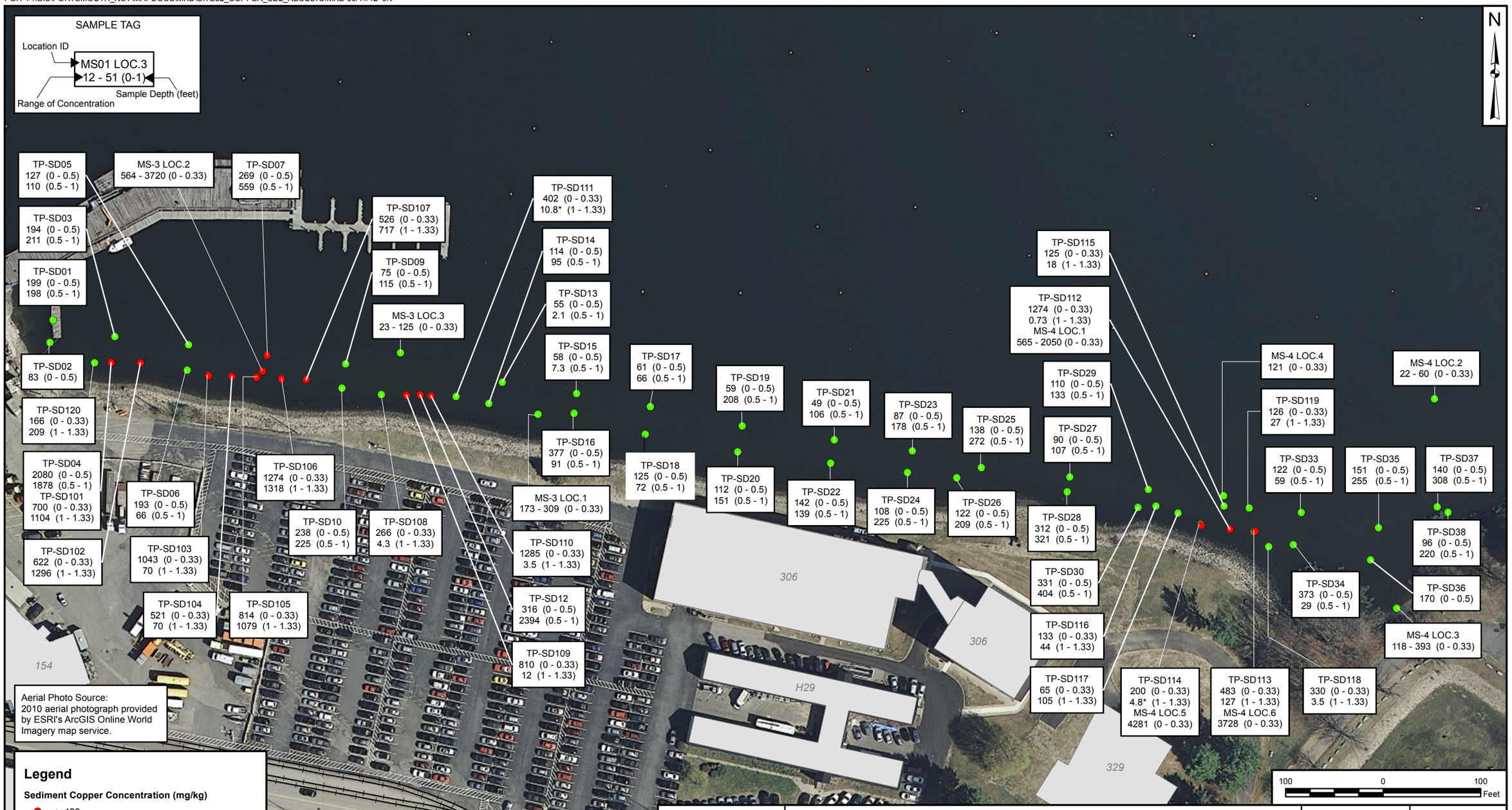

DRAWN BY	DATE
J. ENGLISH	06/06/12
CHECKED BY	DATE
L. GANSER	09/11/12
REVISED BY	DATE
J. NOVAK	09/11/12
SCALE	
AS NOTED	

TETRA TECH

CONCENTRATIONS OF COPPER AT MS-03 AND MS-04
FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
0932	123
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO.	REV
FIGURE 1-8	0

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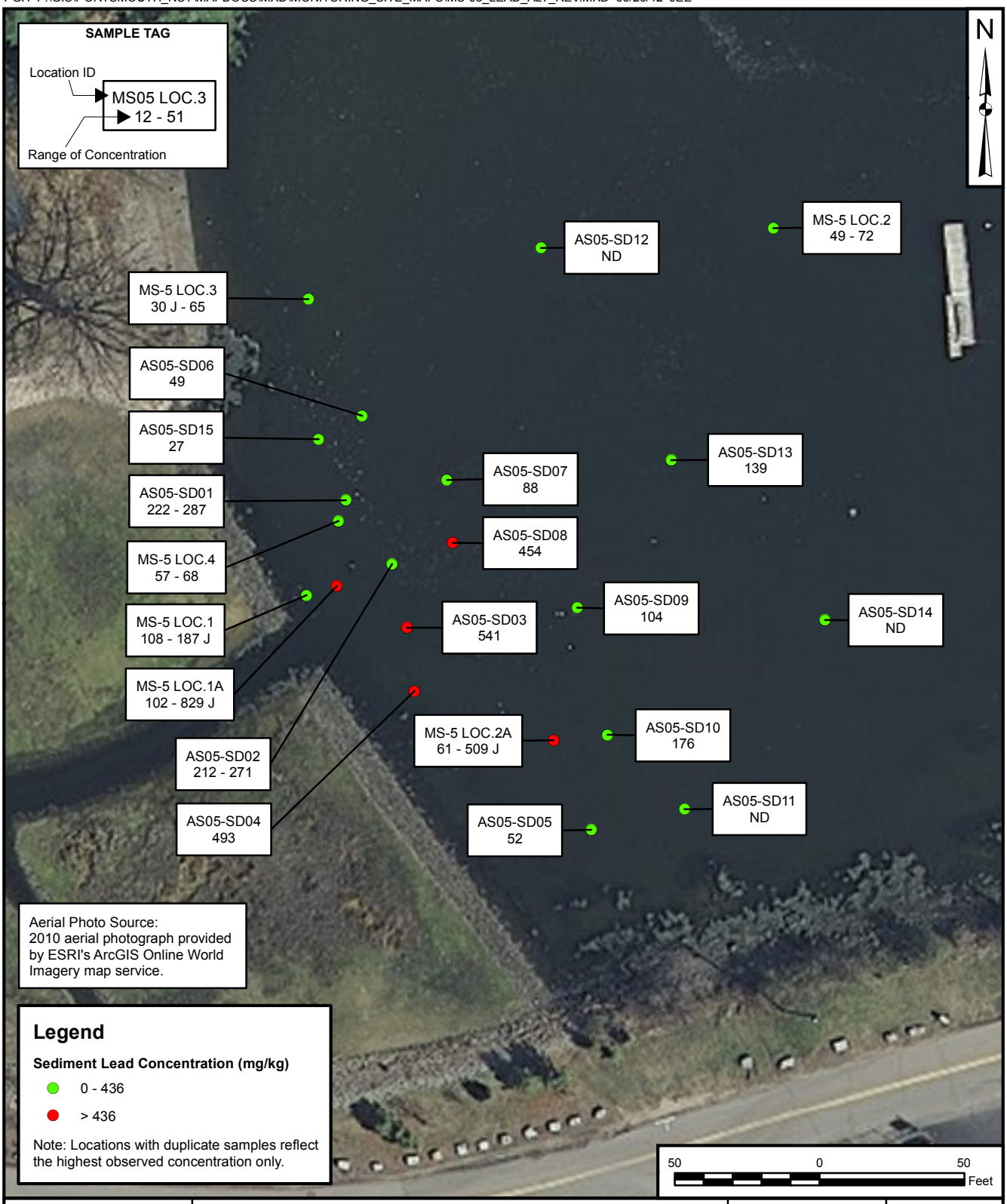

DRAWN BY J. ENGLISH	DATE 04/16/12	TETRA TECH	CONTRACT NUMBER 0932 / CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 06/26/12	CONCENTRATIONS OF LEAD IN SEDIMENT AT MS-05 FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ / DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 1-9 / REV 0

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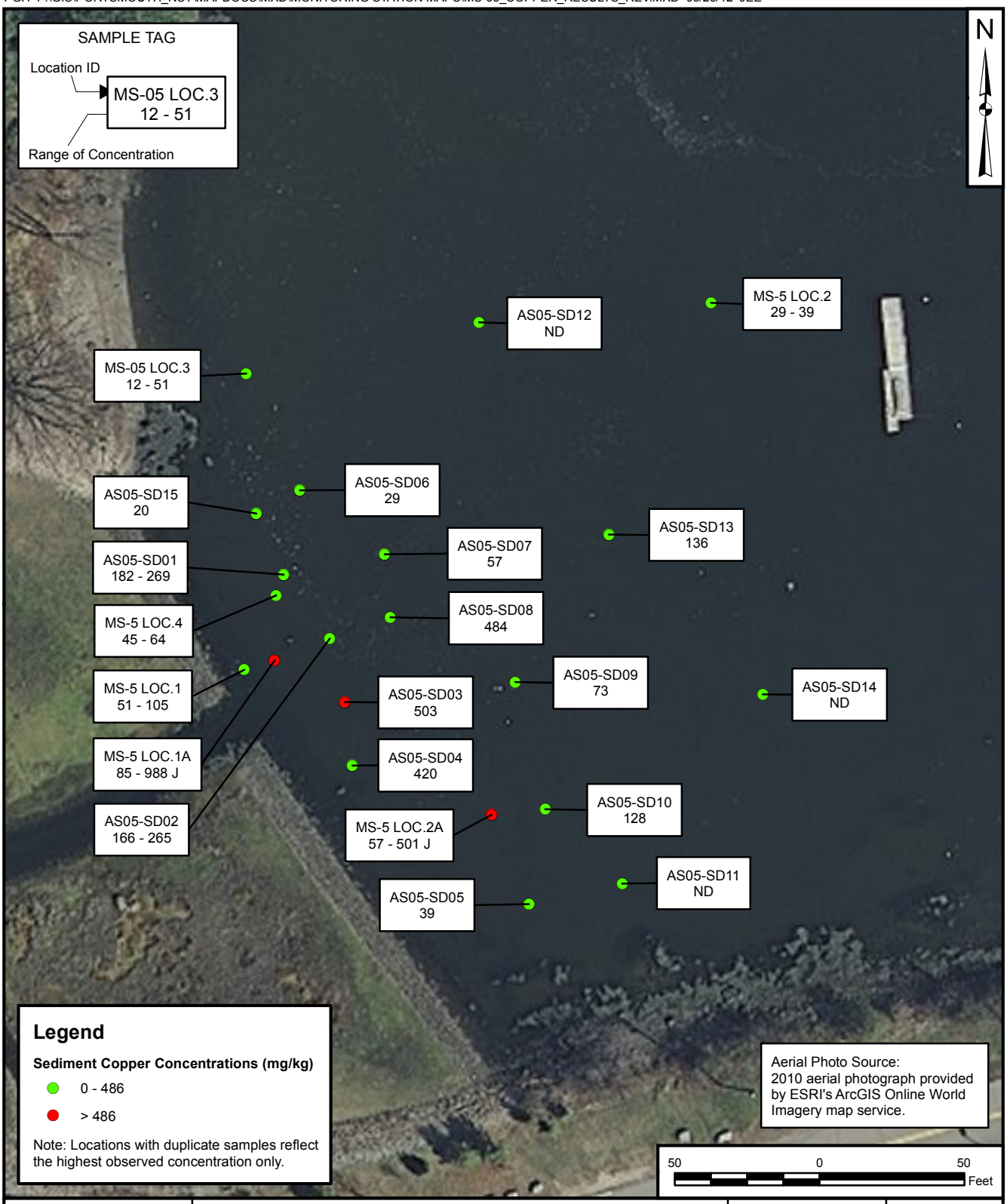

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
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CHECKED BY	DATE	CONCENTRATIONS OF COPPER IN SEDIMENT AT MS-05 FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
A. BERNHARDT	06/26/12		___	___
REVISED BY	DATE		APPROVED BY	DATE
___	___		___	___
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-10	0

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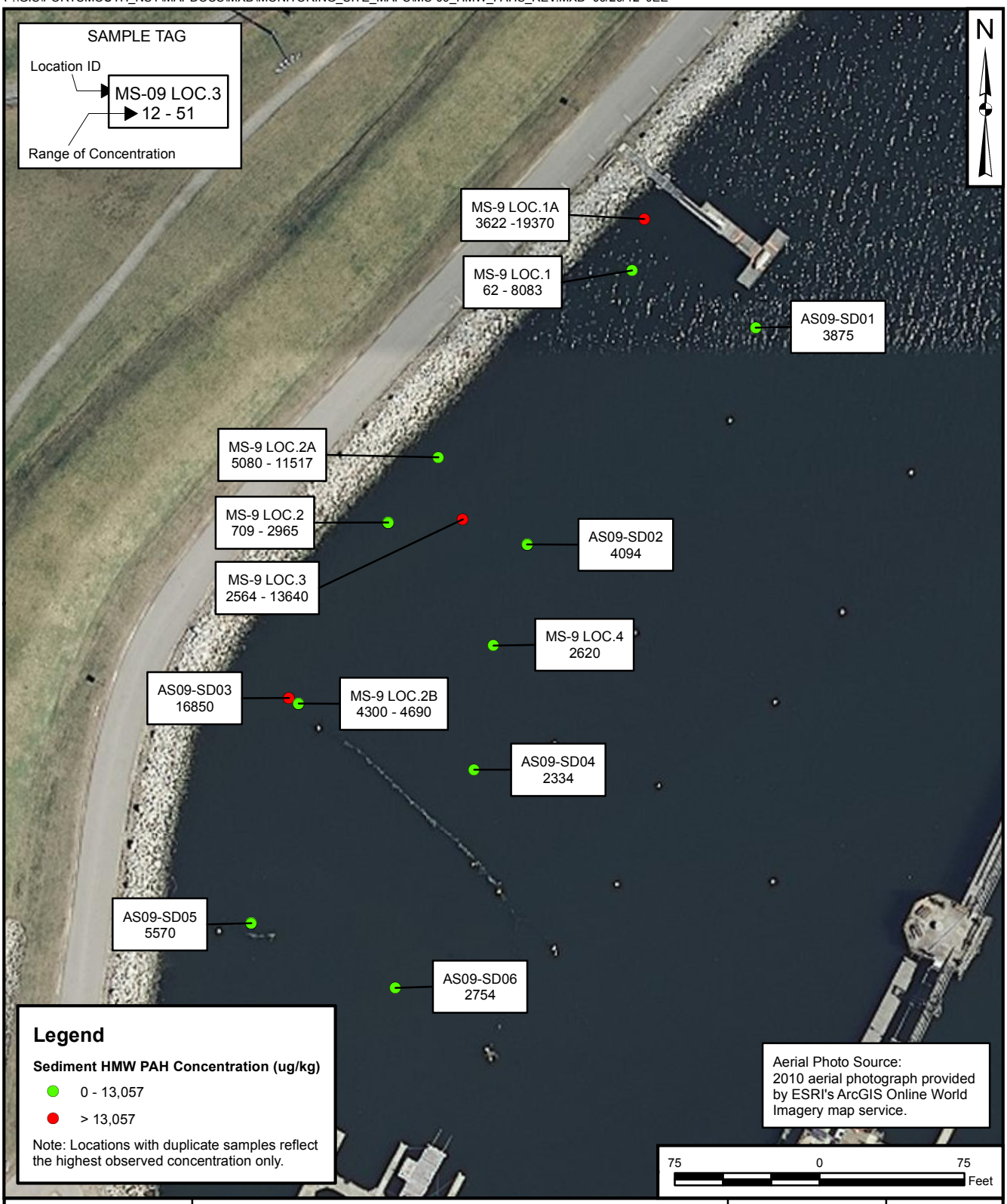

DRAWN BY J. ENGLISH — DATE 04/18/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY A. BERNHARDT — DATE 06/26/12	CONCENTRATIONS OF HMW PAHs IN SEDIMENT AT MS-09 FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ — DATE ___	
REVISED BY ___ — DATE ___		APPROVED BY ___ — DATE ___	
SCALE AS NOTED		FIGURE NO. FIGURE 1-11	REV 0

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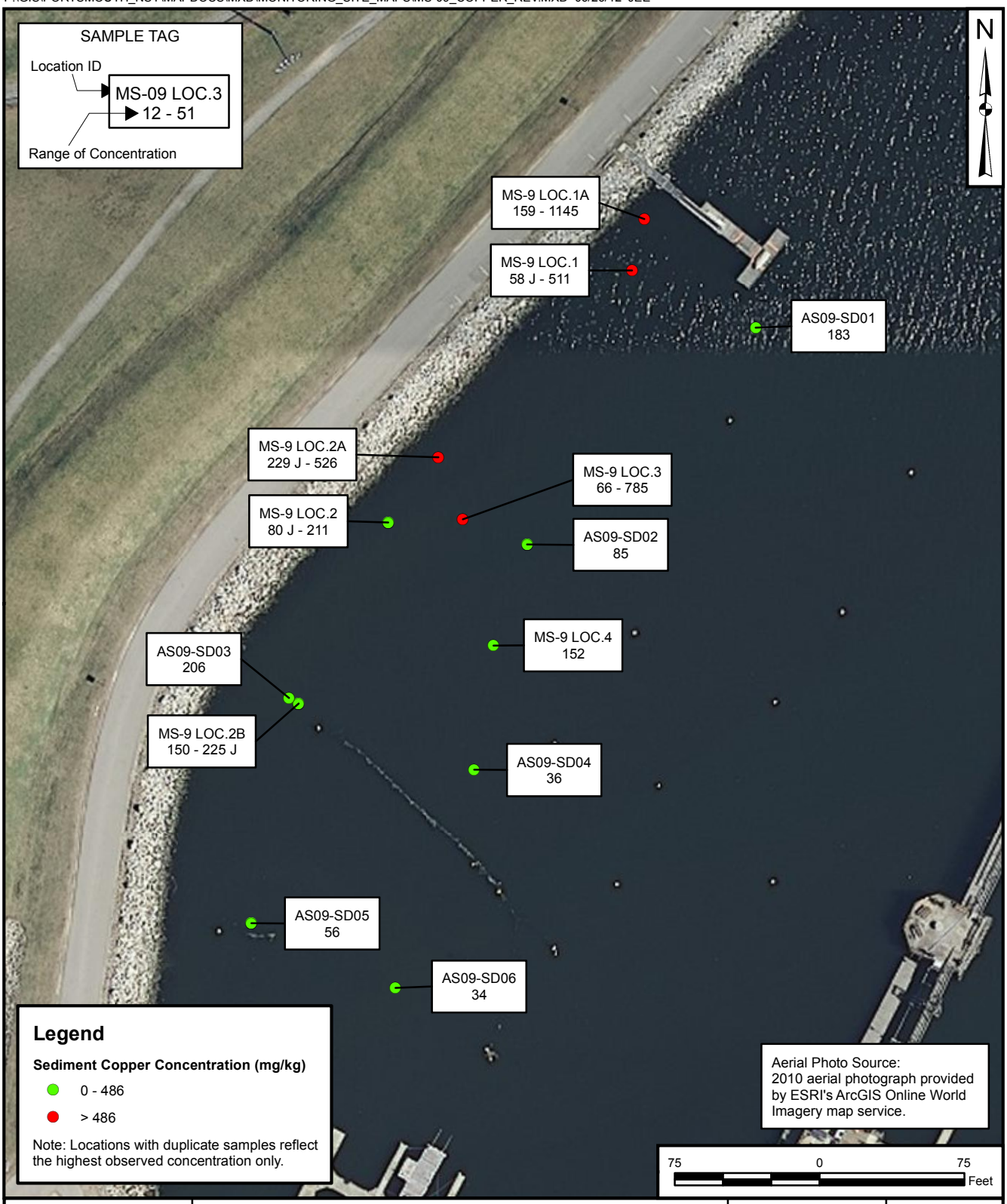

DRAWN BY J. ENGLISH — DATE 04/18/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY A. BERNHARDT — DATE 06/26/12	CONCENTRATIONS OF COPPER IN SEDIMENT AT MS-09 FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE	
REVISED BY — DATE		APPROVED BY — DATE	
SCALE AS NOTED		FIGURE NO. FIGURE 1-12	REV 0

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DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	04/18/12		0932	123
CHECKED BY	DATE	CONCENTRATIONS OF COPPER AND LEAD IN SEDIMENT AT MS-11	APPROVED BY	DATE
A. BERNHARDT	04/26/12	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-13	0

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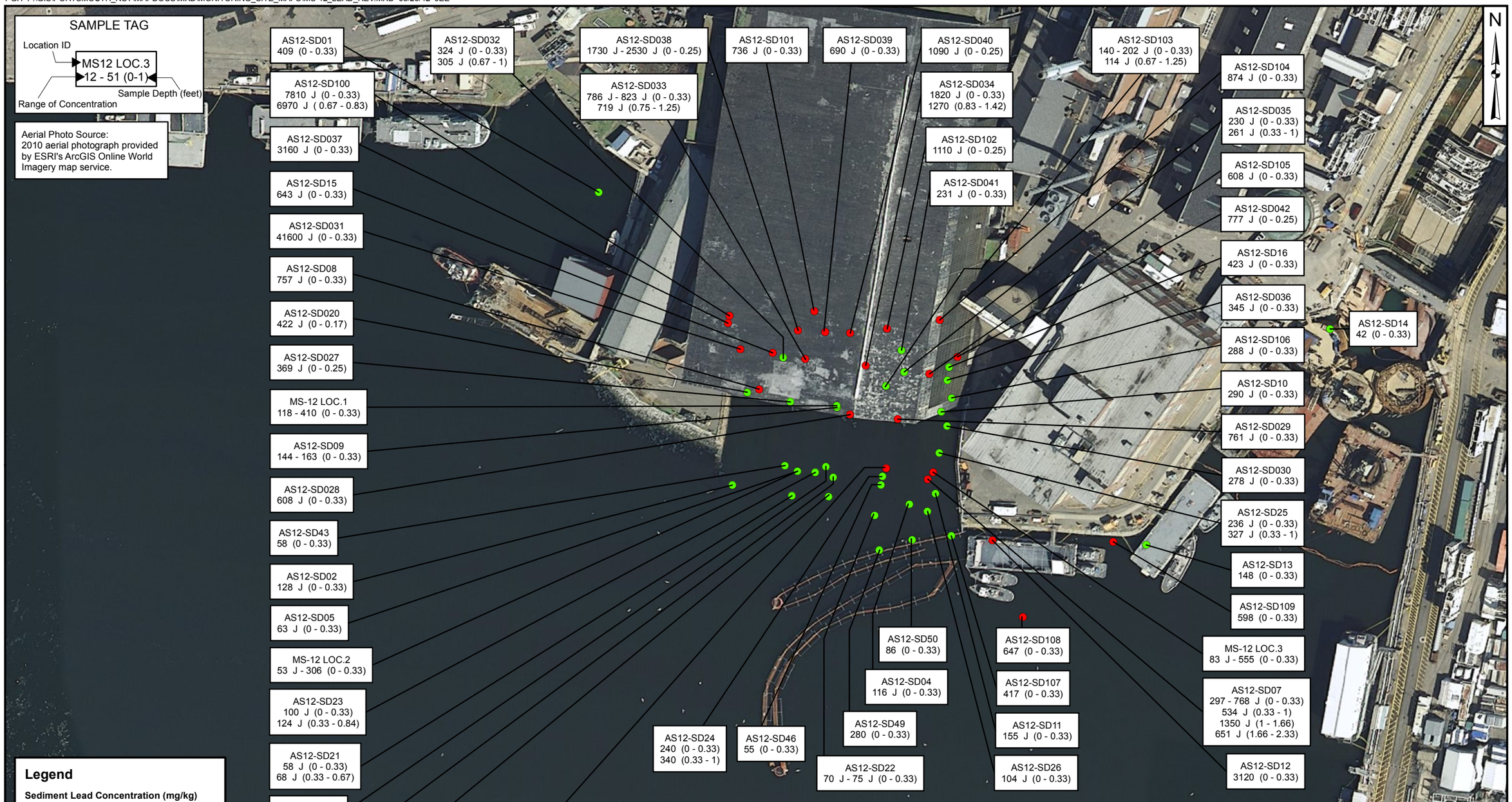

DRAWN BY	DATE
J. ENGLISH	04/18/12
CHECKED BY	DATE
A. BERNHARDT	06/26/12
REVISED BY	DATE
SCALE	
AS NOTED	

TETRA TECH

CONCENTRATIONS OF LEAD IN SEDIMENT AT MS-12
FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
0932	123
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO. FIGURE 1-14	REV 0

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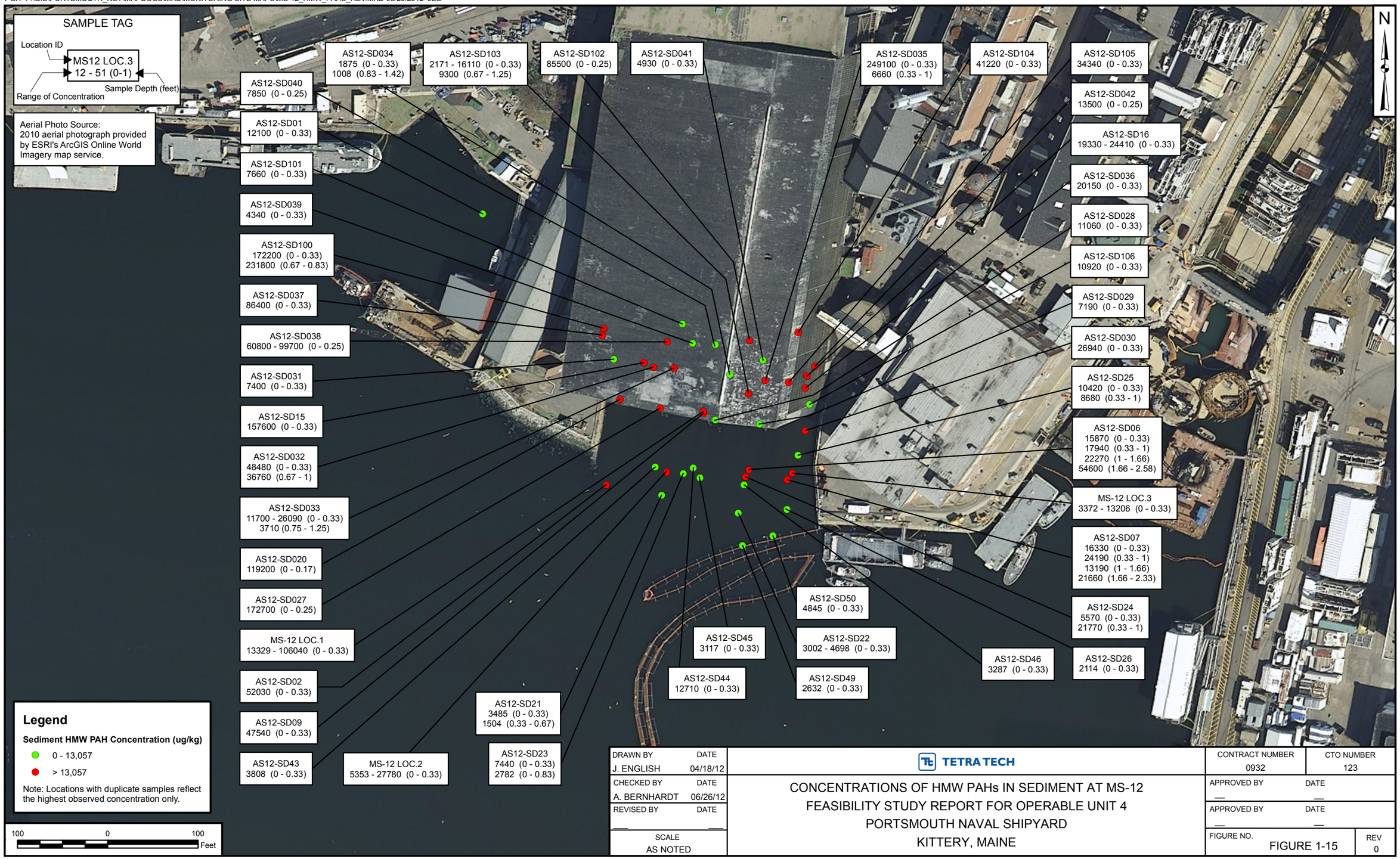

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	04/18/12		0932	123
CHECKED BY	DATE	CONCENTRATIONS OF HMW PAHs IN SEDIMENT AT MS-12	APPROVED BY	DATE
A. BERNHARDT	06/26/12	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-15	0

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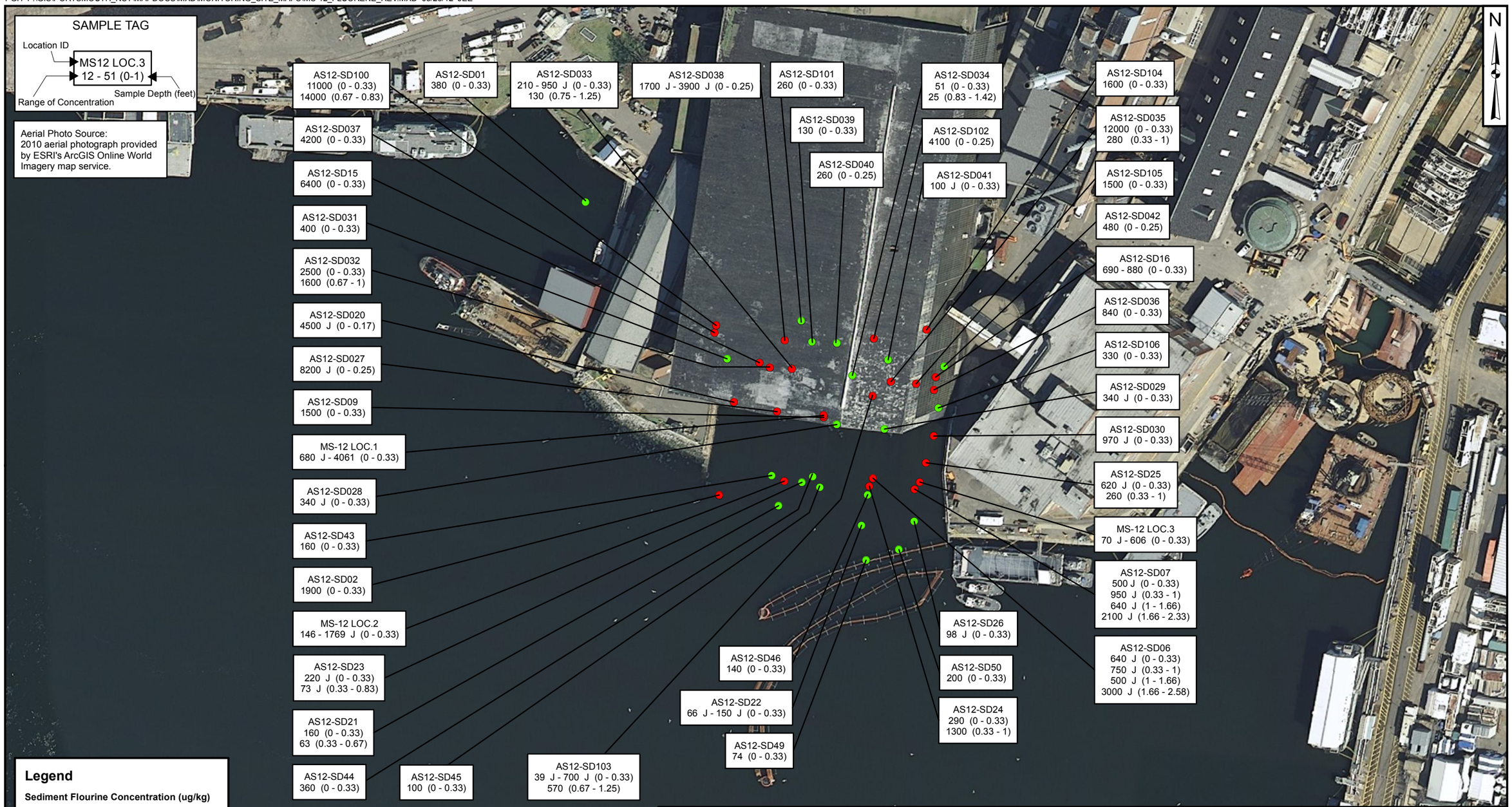

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	04/18/12		0932	123
CHECKED BY	DATE	CONCENTRATIONS OF FLUORENE IN SEDIMENT AT MS-12	APPROVED BY	DATE
A. BERNHARDT	06/26/12	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-16	0

2.0 REMEDIAL ACTION OBJECTIVES

This section identifies the ARARs, discusses the medium of concern, and develops the RAOs for remedial activities at OU4. ARARs are regulatory requirements and guidance that govern remedial activities. The medium of concern at OU4 is defined along with the volume of the contaminated medium. RAOs are medium-specific goals that define the objectives of conducting remedial actions, and are developed to allow consideration of a range of remedial alternatives.

2.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED CRITERIA

Tables 2-1, 2-2, and 2-3 present a summary of federal and State of Maine ARARs and “to be considered” (TBC) criteria for OU4. Under CERCLA, the two primary criteria that remedial alternatives must meet are: (1) Protection of Human Health and the Environment and (2) Compliance with ARARs. Remedial alternatives must attain or exceed conformance with all ARARs unless a waiver of an ARAR is justified, as described further in this section.

ARARs address a chemical, location, or action at a site and are defined as any standard, requirement, criterion, or limitation under federal environmental law, or any promulgated standard, requirement, criterion, or limitation under a state environmental or facility-siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation, that is either legally applicable to the CERLCA hazardous substance(s) at the site, or is relevant and appropriate under the circumstances of the hazardous substance release. Section 121 of CERCLA requires that primary consideration be given to remedial alternatives that attain or exceed ARARs. The purpose of this requirement is to make CERCLA response actions consistent with other pertinent federal and state environmental requirements.

Definitions of the two types of ARARs, as well as TBC criteria, are as follows:

- Applicable Requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

- Relevant and Appropriate Requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, although not "applicable," address problems or situations sufficiently similar

(relevant) to those encountered at the CERCLA site that their use is well suited (appropriate) to the particular site.

- TBC Criteria are non-promulgated, non-enforceable guidelines or criteria that may be useful for developing remedial action alternatives, and for determining action levels that are protective of human health and/or the environment.

Section 121(d)(4) of CERCLA allows the selection of a remedial alternative that will not attain all ARARs if any of six conditions for a waiver of ARARs exist. These six conditions are as follows: (1) the remedial action is an interim measure whereby the final remedy will attain the ARAR upon completion; (2) compliance will result in greater risk to human health and the environment than other options; (3) compliance is technically impracticable; (4) an alternative remedial action will attain the equivalent of the ARAR; (5) for state requirements, the state has not consistently applied the requirement in similar circumstances; or (6) compliance with the ARAR will not provide a balance between protecting public health, welfare, and the environment at the facility with the availability of fund money for response at other facilities (fund-balancing). The last condition only applies to Superfund-financed actions.

ARARs and TBCs fall into three categories. The characterization of these categories is not conclusive because many requirements are combinations of the three types of ARARs and TBCs. These categories are as follows:

- Chemical-Specific: Health- or risk-based numerical values or methodologies that establish concentration or discharge limits for particular contaminants within the media of concern.

- Location-Specific: Restrictions based on the concentrations of hazardous substances or the conduct of activities in specific locations. These may restrict or preclude certain remedial actions or may apply only to certain portions of a site. Location-specific ARARs and TBCs pertain to special features, examples include wetland, floodplain, and coastal zone requirements.

- Action-Specific: Technology- or activity-based controls or restrictions on activities related to management of hazardous substances. Action-specific ARARs and TBCs pertain to implementing a given remedy. Examples are RCRA requirements for management of hazardous waste that may be generated as part of remedial actions.

2.1.1 Chemical-Specific ARARs and TBCs

This section summarizes the federal and State of Maine chemical-specific ARARs and TBC criteria for OU4, which are presented in Table 2-1. The identified chemical-specific ARARs and TBCs provide some

medium-specific guidance on "acceptable" or "permissible" concentrations of contaminants that were considered during the PRG development process.

Federal

Clean Water Act (CWA) National Recommended Water Quality Criteria (NRWQC) (33 United States Code (USC) 1251) are aquatic life and health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water, as well as from ingestion of aquatic biota for the protection of freshwater and saltwater aquatic life. These criteria were used to develop PRGs related to the protection of saltwater aquatic life.

NOAA Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995) provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and ER-M represent the tenth and fiftieth percentile of reported effects. These TBC criteria were used as appropriate when developing PRGs.

State of Maine

Maine Surface Water Quality Criteria for Toxics Pollutants (06-096 Code of Maine Rules (CMR) 584) set statewide water quality criteria for toxic pollutants and procedures necessary to control levels of toxic pollutants in surface water. Statewide criteria are set at federal NRWQC levels. These guidelines were used to develop PRGs.

2.1.2 Location-Specific ARARs and TBCs

This section summarizes federal and State of Maine location-specific ARARs and TBCs for OU4, which are presented in Table 2-2.

Federal

Coastal Zone Management Act [16 USC 1451 et seq.] provides for the preservation and protection of coastal zone areas, management of coastal zones to be the state's responsibility, and that management of coastal zone development be done in such a way as to minimize the effects on coastal zone resources. Section 304(1) excludes federal lands from the coastal area if those lands are subject solely to the discretion of, or are held in trust by, the federal government. Under Section 307 (c), Paragraphs (1) and (2), federal activities and development projects in or directly affecting the coastal zone must be

consistent, to the maximum extent practicable, with a federally-approved state management program. This act is applicable as OU4 is a coastal area, so any remedial action would need to be in compliance with this act.

Rivers and Harbors Act – 33 USC 403; 33 Code of Federal Regulations (CFR) 322 and 323 prohibits unauthorized obstruction or alteration of navigable waters. Activities involving excavation or deposition of materials in navigable waters or affecting such waters must serve the public interest, and benefits must outweigh adverse impacts on natural resources, aesthetics, and navigation. These regulations are applicable if remedial actions for OU4 involve work in the Piscataqua River, and such actions would need to be designed to meet the substantive requirements of the act.

CWA Section 404(b) (1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230) regulate the discharge of dredged or fill material into U.S. waters, including wetlands and vegetated shallows (such as eelgrass beds). The purpose of Section 404 is to ensure that proposed discharges are evaluated with respect to impacts on the aquatic ecosystem. Guidelines and regulations related to permitting under the CWA Section 404 program for discharges of dredged or fill material are provided in 40 CFR 230. Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230) are applicable to the dredge and fill of wetland and vegetated shallows environments. If a remedial action involves the discharge of dredge or fill into the waters of the United States, including wetlands and vegetated shallows, the substantive requirements of this section may need to be met. Discharge of dredged material includes addition of materials incidental to excavation activities. Activities that adversely affect the aquatic ecosystem are prohibited unless there are no practical alternatives. In addition, activities that may affect water quality, violate toxic effluent standards, adversely affect any endangered or threatened species, or cause significant degradation of the waters of the United States (includes significant adverse effects to human health or welfare, aquatic life and other wildlife, and wetlands) are prohibited. This act would be applicable to remedial actions that could potentially include discharge of excavated material or wastewater to the offshore area.

Floodplain Management and Protection of Wetlands (44 CFR 9) regulations that set forth the policy, procedure, and responsibilities to implement and enforce Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands. (Floodplain management is part of this set of regulations, but is not required for this site.) Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative, and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

The National Historic Preservation Act (16 USC 470 et seq., 36 CFR 800) establishes requirements relating to potential loss or destruction of significant scientific, historical, or archaeological data as a result

of any proposed remedy. Prehistoric and historic archeological resource sensitivity for OU4 is low. This act would be applicable if excavation or construction activities are included as part of a remedial action at OU4 that could impact a building of historic significance (Building 178).

The Fish and Wildlife Coordination Act (16 USC 661 et seq.) provides for consideration of the impacts of remedial actions on bodies of water. The act requires that federal agencies, before issuing a permit or undertaking federal action for the modification of any body of water, consult with the appropriate state agency exercising jurisdiction over wildlife resources to conserve those resources. Consultation with NOAA, United States Fish and Wildlife Service (USFWS), and the State of Maine would be required. However, remedial activities would be conducted so as to minimize impacts to wetlands and natural habitats like the eelgrass bed at OU4.

The Endangered Species Act of 1973 (16 USC Chapter 1531 et seq) provides for consideration of impacts to endangered and threatened species and their critical habitats, and requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. As discussed in Section 1.0, there are no known endangered or threatened species at OU4; however, the federally endangered shortnose sturgeon exists in the Piscataqua River and is potentially present within OU4. Remedial activities would be conducted so as not to adversely impact the shortnose sturgeon under this act..

State of Maine

Maine Natural Resources Protection Act (38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 CMR 305, Sections 1, 2, and 8) regulates any activity conducted in, on, or over any protected natural resource or any activity conducted on land adjacent to any freshwater or coastal wetland, great pond, river, stream, or brook that operates in such a way that material or soil may be washed into them. Activities include dredging; bulldozing; removal or displacement of soil or other materials; draining or other dewatering; and construction, repair, or alteration of any permanent structure. The activity must not cause unreasonable erosion of soil or sediment, nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment; cause unreasonable harm to any significant wildlife habitat, freshwater wetland, estuarine or marine fisheries, or other aquatic life; or interfere unreasonably with natural water flow. In addition, the activity must not lower water quality or cause or increase flooding in the activity area or adjacent properties.

Disturbance of soil material adjacent to a wetland or water body may be permitted by rule. The substantive provisions of this act would be potentially applicable to any remedial action at OU4 that could disturb soil or sediment near the shoreline of PNS.

Maine Coastal Management Policies (38 MRSA 1801 et seq.) provide for the regulation, conservation, beneficial use, and management of coastal resource use by federal, state, regional, and local governments. The coastal area incorporates all coastal municipalities and unorganized townships on tidal waters and all coastal islands. The substantive environmental requirement of these standards would be addressed, in consultation with MEDEP.

Maine Wetland Protection Rules (06 096 CMR Part 310) provides standards for protection of wetlands, as defined in MEDEP Chapter 1000 Guidelines for Municipal Shoreline Zoning Ordinances. Jurisdiction under the rules includes the area adjacent to the wetlands, which is the area within 75 feet of the normal high-water line. Activities that have an unreasonable impact on wetlands are prohibited. Remedial activities would be conducted to avoid impacts to wetlands and coastal wetlands, which include tidal and subtidal lands.

2.1.3 Action-Specific ARARs and TBCs

This section presents a summary of federal and State of Maine action-specific ARARs and TBC criteria. Table 2-3 presents a list of federal and State of Maine action-specific ARARs and TBCs for OU4.

Federal

CWA (33 USC 1251 et seq.); NRWQC (40 CFR 122.44) are used to establish water quality standards for the protection of aquatic life. These standards would be relevant and appropriate to alternatives that may impact the water quality of the Piscataqua River. Remedial activities would be conducted to reduce adverse impacts to the offshore. Stormwater management, erosion controls, and management of water discharges would be included in remedial activities, as appropriate.

CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45). NPDES permits are required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be applicable. For OU4, these regulations would be applicable to alternatives requiring water management during sediment excavation, dewatering, and sump discharges where discharges 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.

CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5) The regulations provide general pretreatment requirements for discharge to a publically owned treatment works (POTW). These regulations would be applicable for alternatives that require water management during sediment excavation, dewatering, and sump discharges where discharges to the sanitary sewer

system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.

NPDES (Stormwater Permitting) 40 CFR 122.26 describes stormwater discharge requirements from construction activities that disturb more than 1 acre. Stormwater management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit.

State of Maine

Identification of Hazardous Wastes (06-096 CMR 850) refers to the federal RCRA regulations for Identification and Listing of Hazardous Wastes (40 CFR 261), which identify those solid wastes that are subject to regulation as hazardous wastes. Hazardous wastes are listed, and test procedures are outlined to determine characteristic hazardous wastes. Requirements in 40 CFR 261.24 identify the regulatory levels for classifying a solid waste as a RCRA characteristic hazardous waste based on Toxicity Characteristic Leaching Procedure (TCLP) results. These regulations are applicable if remedial actions involve the generation of solid wastes.

Standards for Generators of Hazardous Waste (06-096 CMR 851) require that a generator of hazardous waste must comply with these standards, which include manifest requirements, pre-transport requirements (i.e., packaging, labeling, placarding), recordkeeping, reporting, and accumulation requirements. These standards are applicable if remedial actions involve generation of hazardous waste.

Erosion and Sedimentation Control (38 MRSA 420-C) regulations require erosion control measures be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. These regulations are applicable if remedial activities include earth moving at OU4. Substantive requirements of these regulations would need to be met to minimize erosion of material into the Piscataqua River.

Stormwater Management (38 MRSA) Part 420-D; 06-096 CMR Part 500) regulations require that stormwater management measures be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre. Applicable plans would be coordinated with MEDEP before implementation.

Maine Visible Emissions Regulations (38 MSRA 584; 06-096 CMR 101) establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities. These regulations would be considered for alternatives that have the potential to impact air quality.

These standards would be met if any of the alternatives result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).

Maine Waste Discharge Licenses (38 MRSA 413) 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.

Waste Discharge Permitting Program (06-096 CMR Chapters 520 (Definitions), 523 (Waste Discharge License Conditions), 524 (Criteria and Standards for Waste Discharge Licenses), and 525 (Effluent Guidelines and 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.

2.2 MEDIUM OF CONCERN

The medium of concern that poses a potential unacceptable risk is the sediment at OU4. Contaminated sediment around PNS is assumed to be the result of shipyard-related chemical contamination, and concentrations of COCs are at levels greater than acceptable ecological risk levels for benthic invertebrates.

The volume of sediment is based on the horizontal and vertical extent of the remediation areas based on PRGs. The PRGs are discussed further in Section 2.4, and the corresponding volumes of sediment to be addressed at each MS are discussed in Section 2.5.

2.3 REMEDIAL ACTION OBJECTIVES

RAOs are media-specific goals for protecting human health and the environment. RAOs specify the COCs, exposure routes and receptors of concern, and an acceptable contaminant level or range of levels for each exposure route. Acceptable contaminant levels are based on site-specific PRGs, and a final remediation goal is determined when a remedy is selected.

As discussed in Section 1.5, ecological risk concerns have been identified for benthic invertebrates that may be exposed to sediment contaminants at OU4. Based on an understanding of these potential environmental risks, the following RAO has been developed for OU4.

- Reduce, to the extent practicable, unacceptable risk to ecological benthic receptors exposed to COCs in sediment at concentrations greater than PRGs.

The following table presents the COCs at each OU4 MS:

Contaminant	COCs at Retained Monitoring Stations				
	MS-01	MS-03 & MS-04	MS-11	MS-12A	MS-12B
Copper		X	X		
Lead			X	X	X
Nickel			X		
Acenaphthylene	X	X		X	
Anthracene	X	X		X	
Fluorene	X	X		X	
HMW PAHs	X	X		X	

Note: For the purposes of this FS, MS-12 was divided into two areas because of the distribution of sediment contamination. One of the two areas, MS-12A, has sediment contamination on a concrete ramp that extends from the shallow surface water through the tidal zone into Building 178. The second area, MS-12B, has sediment contamination at depths of approximately 30 to 40 feet along the bulkhead wall east of MS-12A.

The PRGs are the chemical-specific goals (based on the exposure concentration) that, when achieved, will result in MS concentrations that pose no unacceptable risk for the targeted receptor. PRGs were developed to be protective of benthic invertebrates from exposure to sediment contaminants. Section 2.4 of this FS details the development of the PRGs. The PRGs were then used to determine the remediation areas and volumes to be addressed by this FS. The PRGs and associated remediation areas and volumes are discussed in the following sections.

2.4 PRELIMINARY REMEDIATION GOALS FOR OU4

The sediment-based IRGs and PRGs were developed as part of the Interim Offshore Monitoring Program to address COCs present within the sediment at concentrations causing unacceptable risks to sensitive ecological receptors (i.e., benthic invertebrates) exposed to COCs in sediment (Tetra Tech, November 2001). Site-specific sediment and pore-water toxicity testing was conducted to develop the PRGs. In addition, reference sample data with the exception of lead sample data was incorporated into the PRG process to ensure that resulting PRGs were not lower that reference concentrations. As discussed in Section 1.5, the IRGs for the Interim Offshore Monitoring Program were based on the 2001 PRGs.

NOAA analytical methods were used for analysis of metals in the sediment samples used to develop the 2001 PRGs. Therefore, regression equations developed in the Rounds 1 through 10 report can be used to either adjust the PRGs or the sample results when USEPA analytical methods are used for chemical analysis of sediment samples. This is because concentrations of metals are generally greater when sediment samples are analyzed using the NOAA method, which includes a complete digestion of the sediment matrix, versus USEPA methods, which include a partial digestion of the sediment matrix. Lead is a COC at multiple MSs, but a PRG was not developed for lead for OU 4. The value of its ER-M (218 mg/kg) times two was used as a PRG for this FS, because the IRGs for copper and nickel were approximately twice their respective ER-M values.

The objective of PRG development was to establish a sediment-based concentration that represents a threshold below which adverse effects on benthic invertebrates are not expected to occur. For the purposes of developing limits and volumes of sediment containing COCs at unacceptable concentrations, the IRGs, and two times ER-M values were combined and are referred to as PRGs for the remainder of this report. The following table presents the risk-based PRGs for the OU4 MSs:

Contaminant	PRG	Basis
Copper	486 mg/kg	IRG
Lead	436 mg/kg	2 X ER-M
Nickel	124 mg/kg	IRG
Acenaphthylene	210 µg/kg	IRG
Anthracene	1,236 µg/kg	IRG
Fluorene	500 µg/kg	IRG
HMW PAHs	13,057 µg/kg	IRG

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.

2.5 EXTENT OF CONTAMINATION

Based on the OU4 Rounds 1 through 10 offshore data, all of the retained MSs had COC concentrations greater than the PRGs in the last round of sampling (MS-01, MS-03 and 04, MS-11, and MS-12). The extent of the COC concentration exceedances for these locations is presented on Figures 2-1 through 2-3. The figures also present the square footage for each contaminated area. A figure is not included for MS-11 because, based on the Round 11 Interim Offshore Monitoring Program data, there are no current PRG exceedances at this MS and there is not a sufficient amount of sediment to cause a great enough ecological risk to warrant a remediation. Calculations were performed to determine the volume of the

identified contaminated sediment with COC concentrations greater than PRGs at each of these MSs Contaminated sediment thicknesses for each MS are based on historical sediment core sample results. For the area inside Building 178 at MS-12, it was assumed that the average sediment depth was 2.5 inches. Although there were deeper piles of sediment (2 to 3 feet) in some areas closer to the southern end of the building, there was just a thin layer of sediment over most of the area where water enters the building, and there are many concrete/wooden structures set into the floor where no sediment is present. Using the area identified as exceeding ecological PRGs (Figures 2-1 through 2-3) and the average thickness of contaminated sediments, the approximate volume of contamination at each MS was determined and is shown below.

Monitoring Station	Remediation Area [square feet (ft^2)]	Average Sediment Thickness [feet (ft)]	Volume of Contaminated Sediment (cy)
MS-01	23,700	2	1,760
MS-0304 (Area 1)	12,400	2	920
MS-0304 (Area 2)	3,940	1	150
MS-0304 (Area 3)	2,700	2	200
MS-11	NA	NA	NA
MS-12A (Outside Bldg)	28,500	1.5	1585
MS-12A (Inside Bldg)	19,100	0.2	150
MS-12B	18,100	0.5	340

NA The NA indicates that the area and volume of contaminated sediment are not presented in this table for MS-11 because there are no current PRG exceedances and 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.

TABLE 2-1

CHEMICAL-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL				
Water	Clean Water Act (CWA) National Recommended Water Quality Criteria (NRWQC), 33 United States Code (USC) 1251 et seq,	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate
STATE				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL				
Coastal Zone	Coastal Zone Management Act [16 United States Code (USC) 1451 et seq.]	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for onshore and offshore remedial actions at Operable Unit (OU) 4 that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Navigable Waters	Rivers and Harbors Act Section 10 [33 USC 403; 33 Code of Federal Regulations (CFR) 322 and 323]	Applicable	These regulations control unauthorized obstruction or alteration of navigable waters. Activities involving structures or work in or affecting navigable waters, excavation or deposition of materials in navigable waters are regulated under these requirements.	Excavation of sediment would be performed so as to not discharge excavated material to the offshore area.
Wetlands and US Waters	Clean Water Act (CWA) Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters including wetlands and vegetated shallows. No activity that adversely affects a wetland is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	A wetlands functions and values assessment would be conducted to guide mitigative efforts if wetlands or vegetated shallows could be adversely impacted during remedial activities.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Historic Preservation	National Historic Preservation Act (16 USC 470 et seq., 36 CFR 800)	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historic, or archaeological data due to remedial actions at a site.	Prehistoric and historical archeological resource sensitivity for OU4 is low. MS-12A (Building 178) is the area that is identified as having historic or archeological value. The Navy would contact the State Historic Preservation Officer (SHPO) to determine the necessary actions, if any, to meet the substantive requirements of this act. The requirements of the act would continue to apply during the operation and maintenance of the remedy.
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 170 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities including excavation and disposal, land use controls (LUCs), and monitoring would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon. The requirements of the act would continue to apply during the operation and maintenance of the remedy.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of offsite remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions at OU4 that may impact the coastal floodplain or adjacent river. Remedial activities would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design. The requirements of the act would continue to apply during the operation and maintenance of the remedy.
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	These regulations set forth the policy, procedure, and responsibilities to implement and enforce Executive Order 11990, Protection of Wetlands.	Remedial activities conducted within federal jurisdictional wetlands would be implemented in compliance with these standards.
STATE				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards [38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 Code of Maine Rules (CMR) 305 1, 2, and 8]	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Excavation and construction near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river or adjacent wetlands during construction.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities such as excavation and backfilling that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.
Wetlands	Maine Wetland Protection Rules (06 096 CMR Part 310)	Applicable	Standards are provided for protection of wetlands, as defined in MEDEP Chapter 1000 Guidelines for Municipal Shoreline Zoning Ordinances. Jurisdiction under the rules includes the area adjacent to the wetlands, which is the area within 75 feet of the normal high-water line. Activities that have an unreasonable impact on wetlands are prohibited.	A wetlands functions and values assessment would be conducted that would be used to guide restorative efforts for adjacent wetlands that may be adversely impacted by remedial activities, if necessary. Remedial activities would be conducted to avoid impacts to wetlands and coastal wetlands which include tidal and subtidal lands.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL				
Surface Water	Clean Water Act (CWA), 33 United States Code (USC) 1251 et seq; National Recommended Water Quality Criteria (NRWQC)	To be considered.	These criteria are used to establish water quality standards for the protection of aquatic life.	Stormwater management and erosion control practices would be used to prevent sediment and contamination from entering the river during construction. Water from sediment dewatering would be treated before discharge to meet these criteria.
Water Management	CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	These regulations would be applicable to alternatives that require water management during sediment excavation and where discharges 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.
Water Management	NPDES (Storm water Permitting) 40 CFR 122.26	Applicable	Describes storm water discharge requirements from construction activities that disturb more than 1 acre.	Storm water management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit. Individual areas may be less than 1 acre, but collectively may be greater than 1 acre.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to a publically owned treatment works (POTW).	These regulations would be applicable for alternatives that require water management during sediment excavation and where discharges to the sanitary sewer system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.
STATE				
Hazardous Waste	Identification of Hazardous Wastes Code of Maine Rules (CMR) 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements.
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site according to the regulation until disposed of offsite.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	Maine Discharge Licenses (38 Maine Revised Statutes Annotated (MRSA) 413 *et seq*.) and Waste Discharge Permitting Program [06-096 CMR 523 (Waste Discharge License Conditions) Sections 2, 5, and 6; and 06-096 CMR 528 (Pretreatment Program) Section 6]	Applicable	These standards regulate the discharge of pollutants from point sources to surface water or POTW.	These regulations would be applicable to alternatives that require water management during sediment excavation and where discharges of treated water to a surface water body or POTW may occur. The substantive requirements would be met if any discharges of treated water to surface water bodies or POTW are required.
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior Maine Department of Environmental Protection (MEDEP) approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to excavations and stockpiling dredged material. Applicable plans would be coordinated with MEDEP before implementation.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	Although the individual disturbed areas and areas needed for dewatering are each less than 1 acre, the combined area for the Operable Unit (OU) 4 remedial action may be greater than 1 acre. Applicable plans would be coordinated with MEDEP before implementation.
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for alternatives that have the potential to impact air quality through material handling. These standards would be met if any of the alternatives result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).

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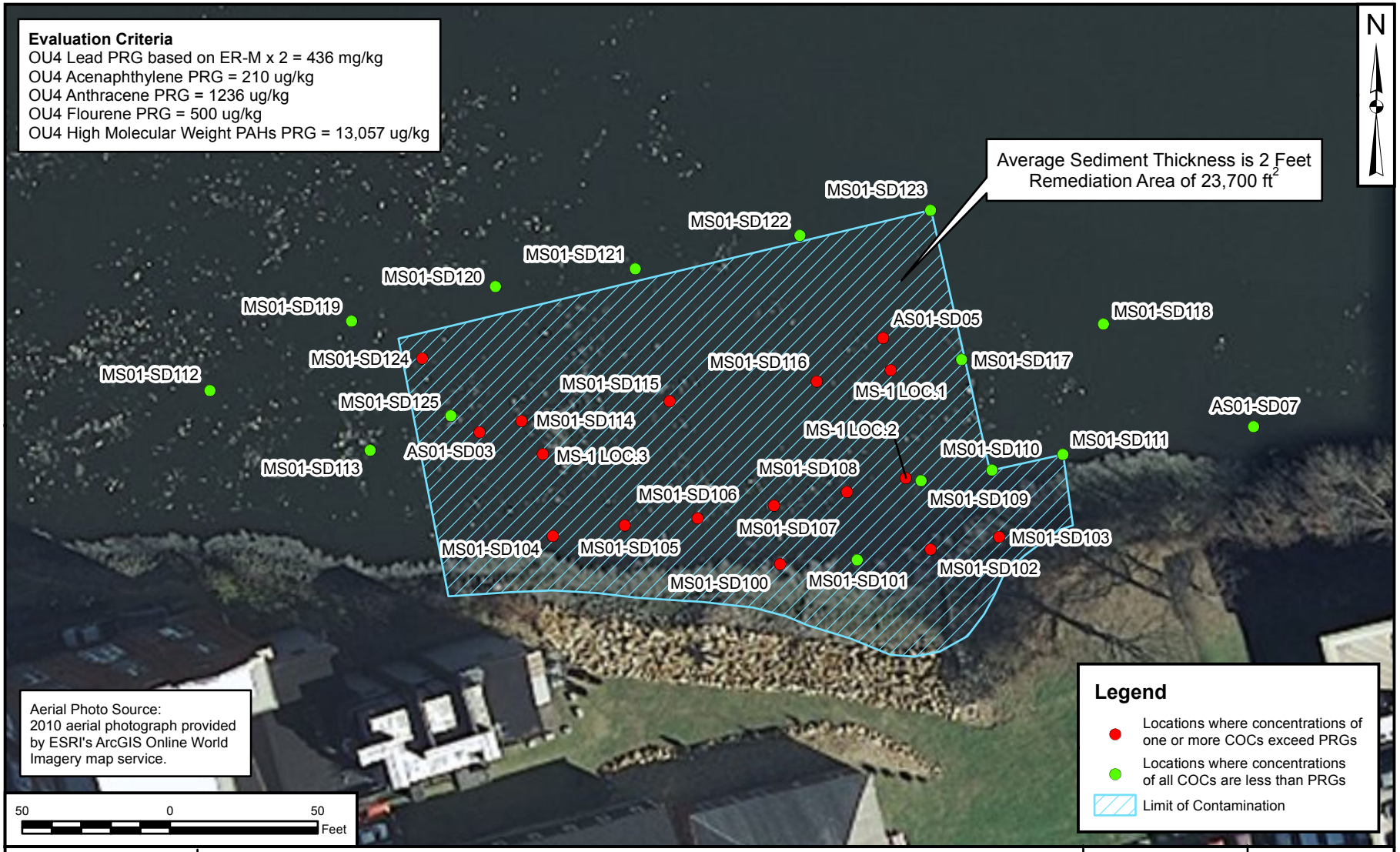

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	04/18/12		0932	123
CHECKED BY	DATE	EXTENT OF CONTAMINATED SEDIMENT AT MS-01	APPROVED BY	DATE
L. GANSER	09/11/12	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
J. NOVAK	09/11/12	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 2-1	0

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DRAWN BY	DATE
J. ENGLISH	04/18/12
CHECKED BY	DATE
L. GANSER	09/11/12
REVISED BY	DATE
J. NOVAK	09/11/12
SCALE	
AS NOTED	

TETRA TECH

EXTENT OF CONTAMINATED SEDIMENT AT MS-03 AND MS-04
FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
0932	123
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO.	REV
FIGURE 2-2	0

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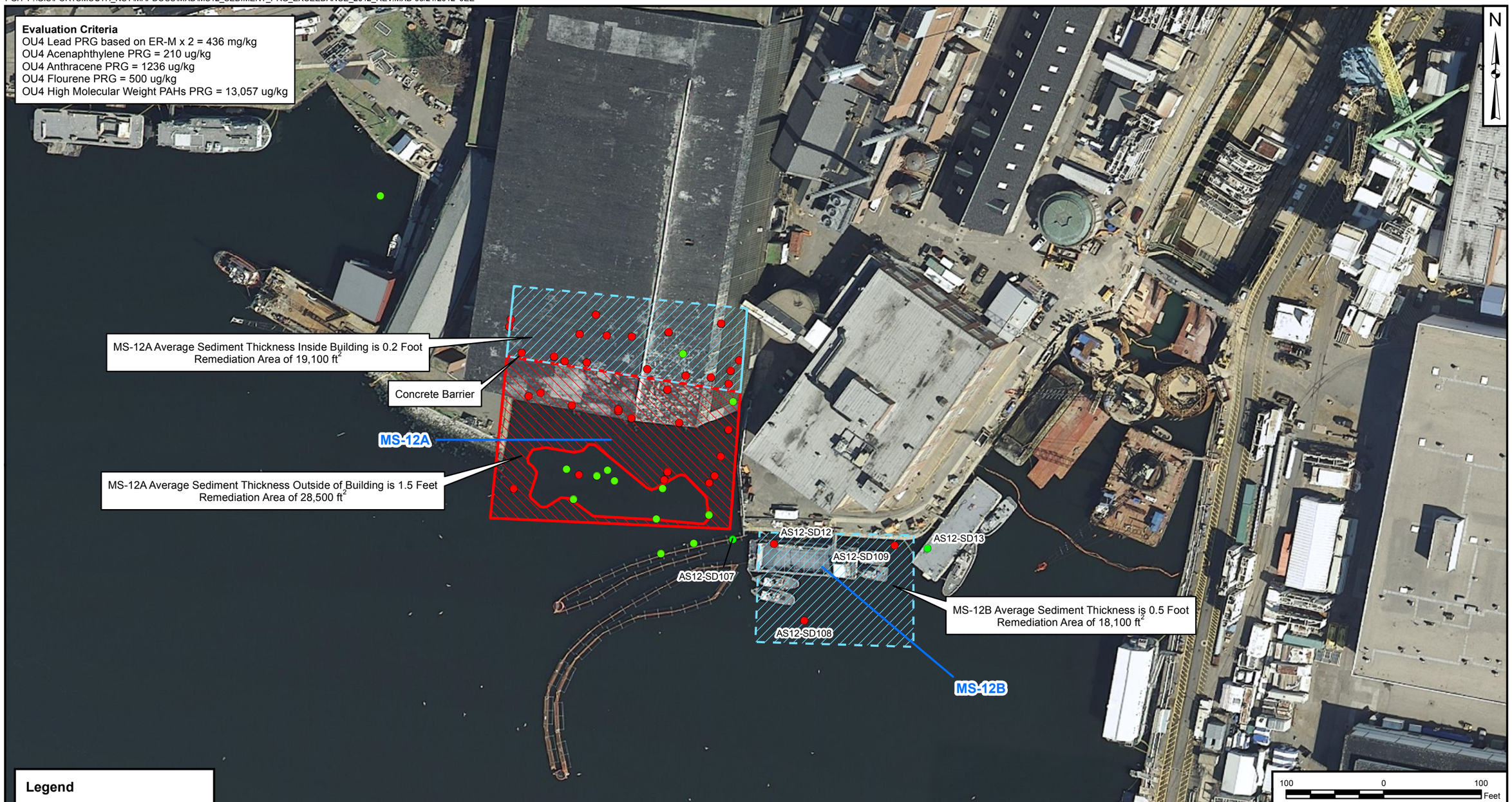

Legend

- Locations where concentrations of one or more COCs exceed PRGs
- Locations where concentrations of all COCs are less than PRGs
- Limit of Sediment Contamination Inside Building 178
- Limits of Sediment Contamination Outside Building 178

Aerial Photo Source:
2010 aerial photograph provided by ESRI's ArcGIS Online World Imagery map service.

DRAWN BY J. ENGLISH	DATE 04/18/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 0123
CHECKED BY C. MILLER	DATE 06/21/12	EXTENT OF CONTAMINATED SEDIMENT AT MS-12A AND MS-12B FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY —	DATE —
REVISED BY —	DATE —		APPROVED BY —	DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 2-3	REV 0

3.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES AND DEVELOPMENT OF ALTERNATIVES

This section identifies and screens potential technologies and process options for the assembly of remedial alternatives for MS-01, MS-03, MS-04, MS-11, and MS-12. The primary objective of this phase of the FS is to develop an appropriate range of remedial technologies and process options to be used for developing remedial alternatives. Technologies for sediment remediation are discussed, and remedial alternatives are assembled in this section. The description of the sediment remedial alternatives and a detailed analysis of these alternatives are provided in Sections 4.0 through 10.0.

Sediment remediation technology identification and screening consider the ARARs, COCs, RAO, and PRGs discussed in Section 2.0, and include identification of GRAs (Section 3.1), preliminary screening of technologies and process options (Section 3.2), and evaluation of representative remedial technologies (Section 3.3). Alternatives are developed using the retained technologies and process options. The selection of remediation technologies and process options for initial screening is based on USEPA and Navy guidance (October 1988 and August 2006). The screening is first conducted at a preliminary level to focus on relevant remediation technologies and process options, then the screening is conducted at a more detailed level based on three broad evaluation criteria. Finally, process options are selected to represent the remediation technologies that have passed the detailed evaluation and screening.

The evaluation criteria for the detailed screening of sediment remediation technologies and process options retained after the preliminary screening are effectiveness, implementability, and cost. The following are descriptions of these evaluation criteria:

- Effectiveness

  - Protection of human health and environment; reduction in toxicity, mobility, or volume; and permanence of solution.
  - Ability of the technology to address the estimated areas and volumes of the contaminated medium.
  - Ability of the technology to meet the RAOs.
  - Technical reliability (innovative versus well proven) with respect to contaminants and site conditions.

- Implementability

  - Overall technical feasibility of the technology at the site.
  - Availability of vendors, mobile units, storage and disposal services, etc.
  - Administrative feasibility.
  - Special long-term considerations (e.g., maintenance and operation requirements).

- Cost (Qualitative)

  - Capital cost.
  - Operation and maintenance (O&M) costs.

3.1 GENERAL RESPONSE ACTIONS

GRAs are the broad frameworks under which remedial technologies are identified to attain RAOs. An assembly of GRAs sets the framework for the development of remedial alternatives for a site. The GRAs for OU4 were assembled with consideration of current and potential future land uses at OU4. The following GRAs were used for OU4 and are described in the remainder of this subsection:

- No Action
- Limited Action
- Containment
- Removal
- Treatment
- Disposal
- Re-use

3.1.1 No Action

The no action response is retained throughout the FS process as required by the NCP. The no action response provides a comparative baseline against which other alternatives can be evaluated. Under this response, no remedial action is taken. The contaminated media are left “as is” without the implementation of any monitoring, land use controls (LUCs), containment, removal, treatment, or other mitigating actions.

3.1.2 Limited Action

Limited action includes technologies such as monitoring, access controls, natural recovery, and various LUCs to restrict land use and reduce or eliminate direct contact pathways of exposure. The toxicity, mobility, and volume of the contaminants are not reduced through treatment with the implementation of limited action technologies. Limited action technologies are typically implemented to monitor the progress and performance of a technology and to prevent the disturbance of a technology that is treating contaminated media or restricting access to contaminated media.

3.1.3 Containment

Another method of reducing risk is through containment, which involves the use of physical measures to reduce the potential for exposure or the potential for contaminant migration. For example, surface or subsurface barriers can be used to isolate contaminated media from ecological contact, and to prevent contaminant migration. Containment is often combined with LUCs to develop remedial alternatives.

3.1.4 Removal

Technologies in this category are used to remove a contaminated medium from its current location for treatment and return to the site, for treatment and disposal elsewhere, or for disposal elsewhere without treatment. Removal actions are combined with other GRAs, such as treatment or disposal actions, to develop remedial alternatives.

3.1.5 Treatment

Technologies in this category include ex-situ methods to remove a contaminant from, modify, or bind a contaminant in an impacted medium and could include physical, chemical, biological, or thermal treatment techniques. The options typically reduce the overall toxicity, mobility, and volume of the impacted medium. Ex-situ treatment processes are combined with other GRAs, such as removal and disposal actions, to develop alternatives.

3.1.6 Disposal

Disposal actions include placement of removed and/or treated materials within a permanent, approved, and permitted disposal facility. Disposal actions are combined with removal actions and could be combined with treatment actions to develop alternatives. Although the location of the contaminant may change, the toxicity, mobility, and volume of the contaminants are not reduced through the implementation of disposal without a treatment process.

3.1.7 Re-Use

Re-use actions include innovative ways to use the contaminated material in industrial processes (e.g., asphalt plants and concrete plants) that treat and immobilize the contaminants. Other re-use actions include using treated soil/sediment as backfill or for land development projects. To re-use treated soil/sediment, treatment must be able to reduce contamination in the material to acceptable non-regulated concentrations.

3.2 PRELIMINARY SCREENING OF SEDIMENT TECHNOLOGIES AND PROCESS OPTIONS

A variety of technologies and process options were identified under each GRA, and screened to focus on relevant technologies and process options based on the conditions, medium of concern, and COCs at each OU4 MS. Table 3-1 summarizes the preliminary screening of technologies and process options for sediment remediation. Table 3-1 lists the GRAs, identifies the associated technologies and process options, and provides brief descriptions of the process options and screening comments. Technologies and process options retained as possibilities for OU4 remediation after the preliminary screenings are provided below.

General Response Action	Remedial Technology	Process Options (Primary/Secondary)
No Action	None	Not Applicable
Limited Action	LUCs	Institutional Controls
		Engineered Controls
	Monitoring	Sampling and Analysis
	Natural Recovery	Naturally Occurring Processes
Containment	Surface Protection	Covering
	Source Containment	Barrier
Removal	Bulk Excavation	Mechanical Removal
		Mechanical Dredging
		Hydraulic Dredging
Ex-Situ Treatment	Pretreatment	Dewatering
	Thermal	Incineration
	Physical/Chemical	Sediment Washing/Solvent Extraction
		Chemical Stabilization/Solidification
Disposal	Landfill	Off-yard Landfilling
Re-Use	Re-Use Untreated Sediment	Use in Asphalt Batch Plant
		Use in Concrete Manufacturing
	Re-Use Treated Sediment	Fill After Treatment

Due to space limitations at PNS, “off-site” technologies are described here as “off-yard” technologies.

3.3 DESCRIPTION AND EVALUATION OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

The technologies and process options retained after preliminary screening are retained based on three broad evaluation criteria. Screening evaluations generally focus on effectiveness and implementability, with less emphasis on cost. Process options that would be precluded by waste or chemical characteristics and inapplicability to site conditions are screened and eliminated from further consideration. At this stage, no process options are eliminated based on cost. However, a process option within a technology category may not be carried through to the alternative development stage if an equally effective process option is available at a lower cost.

3.3.1 No Action

No action includes no controls, remediation, or other actions to mitigate risks at the site.

Effectiveness

The no action alternative would not be effective in meeting the RAO because there would be no action to prevent unacceptable risks from direct receptor exposure to contaminated sediment at OU4.

Implementability

There would be no technical implementability concerns because no actions would be implemented.

Cost

There would be no costs associated with the no action alternative.

Conclusion

Although the no action alternative is not effective in meeting the RAO, it is retained as required under CERCLA and the NCP for all monitoring stations. The no action alternative is carried through the FS to provide a baseline for comparison with other alternatives and their effectiveness in mitigating risks posed by site contaminants.

3.3.2 Limited Action

The technologies considered under this GRA include LUCs, monitoring, and natural recovery.

3.3.2.1 Land Use Controls

LUCs consist of administrative or legal mechanisms (e.g., deed or zoning restrictions, permits, etc.) designated as institutional controls or physical controls (e.g., fencing, security guards, etc.) designated as engineering controls. Site-specific LUCs are typically formulated through a LUC Remedial Design (RD) that is prepared in accordance with the Navy LUCs Principles (DoD, 2003) following approval of the ROD. LUCs typically also include the performance of regular site inspections to verify their continued implementation. Although LUCs are not effective in preventing access to ecological receptors, LUCs were retained for the development into OU4 MS remedial alternatives because of their effectiveness in preventing the disturbance of implemented remedies.

Effectiveness

Access restrictions (LUCs) would be effective in protecting an area from being disturbed by human activities such as dredging. However, LUCs would not be effective for protecting ecological receptors, the primary receptors of concern, from potential exposure to contaminated sediment. In addition, LUCs do not effectively reduce unacceptable risks from the spreading of contaminated sediment to previously uncontaminated areas unless coupled with other remedial technologies.

Implementability

LUCs would be easy to implement on a military facility where access is already restricted. A LUC RD could be readily prepared.

Cost

Both capital and O&M costs associated with LUCs would be low.

Conclusion

Although their stand-alone effectiveness for the protection of the environment would be somewhat limited, LUCs are retained for the development of remedial alternatives because they could add a useful protective element to other remedial technologies.

3.3.2.2 Monitoring

Monitoring consists of sampling and analyzing sediment throughout the areas of contamination to evaluate trends in concentrations of COCs. Monitoring can also be conducted both upgradient and

downgradient of the contamination zone to assess the potential for off-site migration of contaminants and to evaluate the effectiveness of other implemented technologies.

Effectiveness

Monitoring alone would not reduce the toxicity, mobility, or volume of COCs in the sediment. However, monitoring would allow for a determination of the effectiveness of natural recovery or active remedial actions, and could also detect potential off-site migration of contaminated sediment.

Implementability

Sediment monitoring would be easy to implement. Such monitoring has already been performed on several occasions at OU4. The resources and material required for monitoring are readily available.

Cost

The capital and O&M costs of monitoring would be low.

Conclusion

Monitoring is retained for the development of remedial alternatives.

3.3.2.3 Natural Recovery

Natural recovery involves naturally occurring processes that could reduce the risks posed by sediment COCs. For contaminated sediment these naturally occurring processes can reduce concentrations of COCs, isolate contaminated sediment by increasing the amount of cleaner sediments deposited over the contaminated sediment, or dispersing the contaminated sediment following the elimination of on-shore sources. To evaluate natural recovery, samples would be regularly collected and analyzed to establish trends in concentrations of COCs.

Effectiveness

Sufficient analytical data are currently available to establish COC trends at some of the OU4 monitoring stations. Typically, organic compounds such as PAHs are amenable to long-term natural recovery primarily through aerobic biodegradation. Naturally occurring processes, such as decomposing vegetation and upgradient sediment migration to the contaminated areas, are effective in providing a natural cover for the contaminated sediment. A technical memorandum was prepared as part of the responses to regulator comments on the draft FS report, which presented an evaluation of the OU4 data

to determine the potential for monitored natural recovery (MNR) to occur at the monitoring stations. That evaluation is presented at the end of the response to comment document in Appendix D.

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 receptors, a cover thickness of 1 foot is typically considered sufficient because the biotic zone is generally limited to the top few inches of sediment. However, in high water flow areas 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.

Implementability

Natural recovery would be very easy to implement because it requires no action. However, monitoring would be implemented as part of a natural recovery alternative to monitor progress. As noted earlier, the resources and materials required for monitoring are readily available.

Cost

The capital and O&M costs for natural recovery would be low.

Conclusion

Natural recovery is retained for the development of remedial alternatives.

3.3.2.4 Enhanced Natural Recovery

Enhanced natural recovery involves installation of structures to enhance naturally occurring processes that could reduce the risks posed by sediment COCs. These structures could be constructed in the river to reduce flow velocities and promote sediment deposition at each MS.

Effectiveness

As described in the Natural Recovery option, processes such as decomposing vegetation and upgradient sediment migration to the contaminated areas are effective in providing a natural cover for the

contaminated sediment and these processes could be enhanced with the installation of engineered structures.

Implementability

The resources, materials, and services required to implement engineered structures to encourage deposition rates are readily available. However, adding engineered structures to the navigable waterway could restrict boat traffic and dredging operations critical to the facilities mission.

Cost

The capital costs would be moderate and the O&M costs would be low for enhanced natural recovery.

Conclusion

Enhanced natural recovery is not retained for the development of remedial alternatives because engineered structures could alter or obstruct navigable waters and/or restrict dredging operations around PNS.

3.3.3 Containment

3.3.3.1 Covering

Covering would consist of installing a semi-permeable or impermeable barrier over the contaminated sediment to prevent direct exposure of ecological receptors to sediment, and to minimize potential off-site migration of sediment COCs. A cover would typically consist of a layer, at least 2 feet thick, of clean material with geotechnical characteristics (particle size, density, texture), such that it would be likely to remain above the native contaminated sediment.

Effectiveness

Covering would not remove sediment COCs or reduce their toxicity. Covering is a well-established and proven technology that could be effective in preventing direct exposure of ecological receptors to the contaminated sediment. A cover could also be effective in minimizing the potential for off-site migration of sediment COCs principally as a result of erosion and sedimentation. However, covering can result in restricted waterway access. In areas with high velocity, water flow erosion of the cover may reduce the effectiveness of the cover. These areas would also provide an additional obstacle to the installation of the cover especially if the cover is made of granular material, which can be carried away by the tidal current before settling occurs. The continued effectiveness of any cover depends on its integrity and the

long-term maintenance program established for the cover. The effectiveness of a cover could be significantly enhanced by the previously evaluated LUCs, which would prevent uncontrolled disturbance of contaminated sediment.

Implementability

The resources, materials, and services required to implement a cover are readily available. Long-term inspection and maintenance of surface protection are also readily implementable.

During placement of any new cover, site-specific health and safety procedures and Occupational Safety and Health Act (OSHA) regulations would have to be complied with to ensure that the workers are not put into dangerous situations and to ensure that dust suppression measures are in place, if needed.

Cost

The capital costs for covering would be moderate to high. Because of the need for frequent and long-term monitoring and maintenance, O&M costs would be relatively high.

Conclusion

Covering is not retained for development of remedial alternatives because of effectiveness concerns. Covering could alter or obstruct navigable waters, restrict dredging operations in and around ship berths, and would be difficult to implement in areas with high velocity water flow.

3.3.3.2 Concrete Barrier

A concrete barrier would consist of installing an impermeable barrier to prevent potential off-site migration of sediment COCs. A concrete barrier would typically be installed higher than the maximum height of water at high tide so that the incoming water would not be able to breach the barrier. A concrete barrier would also typically be equipped with a pump, filter, and piping so that if any water were to breach the barrier as a result of an excessively high tide, storm, etc., it would be easily removed from the area containing contaminated sediments.

Effectiveness

A concrete barrier would be effective in isolating contaminated sediments from migrating off-site as long as any water that would breach the barrier would be treated prior to re-entering the Piscataqua River. If appropriate treatment measures are not implemented, there is a chance that COC laden water or sediment could migrate to the Piscataqua River, adversely impacting the environment. Combined with

appropriate treatment and disposal technologies, a concrete barrier would provide more protection of the environment than LUCs or surface protection because contaminated material would be contained within the site.

Implementability

The resources, materials, and services required to implement a concrete barrier are readily available. Long-term inspection and maintenance of a concrete barrier are also readily implementable.

During construction of a concrete barrier, site-specific health and safety procedures and OSHA regulations would have to be complied with to ensure that the workers are not put into dangerous situations. Also, best management practices (BMPs) would have to be followed in the construction of a barrier so that contaminated sediment does not migrate off site while construction is under way.

Cost

The capital costs for a concrete barrier would be moderate to high. Because of the need for frequent and long-term monitoring and maintenance, O&M costs would be relatively high.

Conclusion

A concrete barrier is retained in combination with other remedial options, which would require the need to prevent off-site migration of contaminated sediment.

3.3.4 Removal

The technologies considered under the removal GRA include mechanical removal, mechanical dredging, and hydraulic dredging.

3.3.4.1 Mechanical Removal

Mechanical removal can be performed by a variety of equipment such as tractor shovels (front-end loaders), backhoes, and grade-alls. The type of equipment selected must take into consideration several factors, such as the type of material to be removed, load-bearing capacity of the ground surrounding the removal area, depth and aerial extent of removal, required rate of removal, and elevation of the groundwater table over the tidal cycle. Mechanical removal is a primary technology that requires a secondary technology to provide a location and means of placement of the removed sediments (e.g., on-site consolidation or off-site disposal).

The logistics of mechanical removal must take into account the available space for operating equipment, loading and unloading to transport the removed material, location of the site, etc.

Effectiveness

Mechanical removal is a well-proven and effective method of removing contaminated sediment from a site. Properly designed mechanical removal would remove contaminated sediment such that the site meets the RAOs and has no restrictions. Partial mechanical removal designs could remove the bulk of contamination and reduce the severity and amount of restrictions on a site. Mechanical removal could expose workers to contaminants during the implementation phase, although exposure would be minimized through the use of proper health and safety procedures. If appropriate control measures are not implemented, there is a chance that sediment could migrate in the removal process, particularly along the shoreline of the site, adversely impacting the environment. Combined with appropriate treatment and disposal technologies, mechanical removal would provide greater protection of the environment than LUCs or surface protection because contaminated material would be removed from the site.

Implementability

Depending on the MS and volume of sediment, mechanical removal would be moderately to very difficult to implement because it would have to be carefully managed with respect to existing structures, tidal level fluctuations, high currents in the Piscataqua River, and ongoing operations at PNS. Mechanical removal equipment and services are readily available from multiple vendors or contractors. This technology is well proven and established in the construction/remediation industry. During mechanical removal, site-specific health and safety procedures and OSHA regulations would have to be complied with to ensure that the exposure of workers to COCs is minimized. This would include the wearing of appropriate personal protective equipment (PPE) and the implementation of dust suppression measures.

Under this GRA, consideration is given to complete removal. Complete removal of all sediment contamination would be extremely difficult to implement using only one form of removal due to the tidal changes on the shore. Mechanical removal could not extend into the river to the full extent of contamination and workers could only work at certain times due to tidal changes. Appropriate measures would be needed for mechanical removal around above-ground utilities, adjacent to buildings, and along existing shoreline stabilization structures.

Cost

The cost of partial mechanical removal activities would be moderately higher than typical remedial actions located on native land because the expected removal areas are located around and inside existing

structures, and tidal changes would require a specific removal schedule. The cost of complete mechanical removal would be extremely high due to the location of the site with respect to the Piscataqua River.

Conclusion

Partial mechanical removal is retained in combination with other processes (e.g. off-yard disposal) for the development of remedial alternatives for contaminants above and within the tidal fluctuation zone. Complete mechanical removal of all contaminants (contaminants below the low tidal limits) is not considered for alternative development due to implementation difficulties and high costs.

3.3.4.2 Mechanical Dredging

Mechanical dredging uses conventional excavation equipment including excavators, clam shells, drag lines, etc. Mechanical dredging is a primary technology that requires a secondary technology to provide a location and means of placement of the removed sediments (e.g., on-site consolidation or off-site disposal). In addition, mechanical dredging often requires supporting technologies that include suspended sediment containment and dewatering. Mechanical dredging is considered feasible without the construction of access channels or constructed access points/roads from adjacent land into the Piscataqua River or on the site. However, in some areas mechanical dredging can only be performed off-shore when the tidal level is high, which would require laborers and equipment to be limited in the number of hours a day that could be spent on the dredging operation.

The advantages to mechanical dredging are that it limits the amount of water that needs to be removed before disposal, it can be performed in constricted areas, it interferes less with infrastructure and boat traffic than hydraulic dredging when equipment can be operated from the shoreline, it is more effective at removing debris and dense sediments, and it is able to operate to great depths. There are also disadvantages associated with mechanical dredging, including: it creates more turbidity than hydraulic dredging, it can leave a patchy sediment floor surface, and it generally has a much lower production rate than hydraulic dredging.

Effectiveness

Mechanical dredging is an effective method for removing contaminated sediments from waterways (below the low tide elevations). Engineering controls (including turbidity curtains and dewatering systems) are required to control re-suspended sediments and process the dredged sediment for transportation and disposal.

Implementability

Mechanical dredging is implementable using locally available labor, equipment, and materials. Associated engineering controls are also implementable using locally available labor, equipment, and materials. However, the feasibility of mechanical dredging is dependent on the distance of contaminated sediment from the shore and depth of water. Due to site conditions at some monitoring stations, mechanical dredging would be very difficult to implement because the area could only be dredged at high tide. At each location, the dewatering step would require additional containment barriers to be built to prevent the water lost from the sediment to mix with residual sediment onsite. Also, space would need to be available on land for dewatering processes.

Cost

Capital costs associated with mechanical dredging are expected to be high, but O&M costs would not be required.

Conclusion

Mechanical dredging is not retained for the development of remedial action alternatives for the removal of contaminated sediments from OU4 due to implementability concerns.

3.3.4.3 Hydraulic Dredging

Hydraulic dredging uses submersible cutter heads and piping systems to transport removed sediments to dewatering or consolidation areas. Hydraulic dredging is a primary technology that requires a secondary technology to provide a final location and means of placement of removed sediments (e.g., on-site consolidation or off-site disposal). In addition, hydraulic dredging requires supporting technologies that include suspended sediment containment and dewatering. Dewatering can be eliminated if sediment is pumped directly to its disposition location. Hydraulic dredging could be performed from on shore of PNS or from a barge in the Piscataqua River.

As compared to mechanical dredging, hydraulic dredging is less invasive, can be performed in shallower water, is more cost effective, is more precise, and is more efficient in transporting dredged material to its desired location through the use of pipelines. Hydraulic dredging is preferred for sensitive environments, can be used for most types of sediment, and leaves less residual contamination behind. However, hydraulic dredging is ineffective in dealing with debris and larger rocks, and uses more water for removal.

Effectiveness

Hydraulic dredging is an effective method for removing fine and coarse grained sediments, including stone and gravel up to 2 inches in diameter, from waterways (below the low tide elevation). Depending on the size of the system, hydraulic dredging can remove material up to 4 to 6 inches in diameter. However, the effectiveness of hydraulic dredging decreases as the diameter of the material requiring removal increases. Engineering controls (including turbidity curtains and dewatering systems) are required to control re-suspended sediments and process the dredged sediment for transportation and disposal.

Implementability

Hydraulic dredging is implementable using available equipment, and locally available labor and materials. Associated engineering controls are also implementable using locally available labor, equipment, and materials. In addition, if sediment bags are used for dewatering of dredged sediments, the footprint area needed for a dewatering pad is greatly reduced. Hydraulic dredging is less likely to harm vegetation than mechanical dredging, so it would be useful in areas around eelgrass beds and other sensitive areas.

Cost

Capital costs for hydraulic dredging are expected to be high, but O&M costs would not be required.

Conclusion

Hydraulic dredging is retained for the development of remedial action.

3.3.5 Ex-Situ Treatment

The technologies and process options considered under this GRA include dewatering, which would be required as an on-site pretreatment prior to off-site transportation. Also considered under this GRA are technologies and process options that might be required as part of land disposal at an off-site Treatment, Storage, and Disposal (TSD) facility, including sediment washing/solvent extraction, chemical stabilization/solidification, and incineration.

3.3.5.1 Dewatering

Dewatering is a process for reducing the free water content of a solid material. Dewatering is most commonly achieved by either passive (gravity-aided) drainage of water from stockpiled material or by mechanical expression of that material. Dewatering can also be achieved through the addition of

chemical agents that adsorb free water and/or improve the physical texture of the material to be dewatered.

Stockpiling of wet material on a drainage pad can cause most of the free water to drain as a result of gravity and the mechanical expression of the lower strata of stockpiled sediment by the weight of the upper strata. The free water drains through a pad designed to filter out solid particles. If required, this filtered water can then be treated to meet the appropriate criteria for discharge to local surface water, sanitary sewers, or off-site disposal.

Mechanical expression of free water from the material to be dewatered can be achieved through the use of pressure or centrifugal forces developed by specialized equipment, such as belt filter presses, plate-and-frame filter presses, vacuum filters, or centrifuges. As required, the released water can also be treated on-site as with the stockpiling option.

Addition of chemical agents such as Portland cement, lime, or fly-ash can adsorb free water, reduce the proportional moisture content, and improve the physical texture of the treated material. This type of dewatering is referred to as physical stabilization and is somewhat similar to chemical stabilization/solidification with the difference being that the primary aim in the case of physical stabilization is to improve the handling characteristics of the treated material rather than immobilize certain contaminants within the matrix of the treated material. As with chemical stabilization/solidification, the chemical agents used for physical stabilization are typically blended with the material to be dewatered.

Effectiveness

Mechanical expression is generally more effective than stockpiling because the rate and extent of dewatering are usually higher when forces greater than gravity alone are applied to separate liquids from solids. However, stockpiling could provide a simple and effective means of releasing most of the free water from the sediment. Physical stabilization is also an effective method of adsorbing free water, but it does not reduce the overall water content of the dewatered material and can significantly increase the waste volume.

Implementability

Both stockpiling and mechanical expression are readily implementable. Resources, equipment, and material to implement either of these options are readily available. Stockpiling would be simpler to implement but would require far more space than mechanical expression. Mechanical expression would require more equipment and maintenance than stockpiling. Depending on the types and concentrations

of contaminants present in the material being treated, an on-site dewatering system might have to meet the substantive requirements of a hazardous or non-hazardous waste TSD facility. Also, the substantive requirements of Maine's Waste Discharge Permitting Program might have to be met for surface discharge of the treated drainage water.

Physical stabilization would also be readily implementable. This kind of technology would typically be available as a service from a number of off-site contractors. This technology would require more space and less equipment than mechanical expression, but less space and more equipment than stockpiling. This technology also normally results in the release of less water that might have to be treated.

Cost

The cost of stockpiling is relatively low. The cost of mechanical expression would be moderate to high, depending on the volume to be dewatered. The cost of physical stabilization would be low to moderate, depending on the type and quantity of agent required.

Conclusion

Dewatering is retained for the development of sediment remedial alternatives. Dewatering by gravity will be the preferred method discussed within the alternatives; however, developed alternatives that include dewatering should not restrict the use of alternative dewatering methods.

3.3.5.2 Sediment Washing/Solvent Extraction

Sediment washing uses physical processes such as high-pressure water, screening, attrition scrubbing, froth flotation, electromagnetic separation, mechanical separation, hydrogravimetric separation (including hydrocyclones, mineral jigs, and spiral classifiers), and multigravity separation. Such physical separation processes achieve waste minimization through a volume reduction process by separating out a size fraction of sediment containing little or no contamination (such as coarse-grained sediment and large-sized material) from more highly contaminated, finer-grained material such as clays and silts.

Solvent extraction uses water or other solvents to extract or desorb COCs from sediment and to dissolve them into the liquid phase. Solvent extraction often requires preliminary treatment using physical separation to reduce the volume of material to be treated.

Effectiveness

The effectiveness of sediment washing is highly waste-specific, and this technology can be successfully adapted to the removal of a wide range of inorganic and organic contaminants. A thorough physical and

chemical characterization of the waste and treatability testing are essential to determine the most suitable and efficient means of separating COCs from clean sediment. When different classes of COCs are present, a series of extraction operations using different solvents, pH adjustment, etc., would be required. Such a combination of physical separation and various chemical extraction techniques would probably be required to successfully remove OU4 sediment COCs. The extraction process would yield clean sediment that would require water rinsing to remove the residual extractant. By-products from the process would consist of spent solvent streams containing wastes requiring further treatment/disposal and recovery/recycle of the extractants.

Implementability

Sediment washing/chemical extraction would be implementable. Specialized contractors or selected TSD facilities could perform this treatment. However, a sediment washing/chemical extraction system would be complex, consisting of physical separation operations and chemical extraction processes. Physical separation would consist of several operations depending on the type of debris, sizes, densities of materials, etc. A sieve analysis of the sediment would be required for design of the treatment system. Chemical extraction would require treatability studies to determine the specific type and composition of solvent. Typically, waste streams produced from chemical extraction are more contaminated and greater in volume than waste streams from other processes. To treat the extracted liquid, an extensive wastewater treatment facility would be required to separate reagents from treated sediment and then to treat the residuals. The wastewater facility would be required to have organic treatment and neutralization processes in addition to dewatering processes. Unless efficient recovery/recycle of the extractant is achievable, there would be significant implementability concerns for further treatment/disposal of the waste streams. Because of the lack of available land at PNS, this technology could not be practically implemented on site and would have to be implemented off-site as part of disposal activities.

Cost

The capital costs for sediment washing/chemical extraction would be moderate to high. Additional costs for disposal of residues could also be moderate to high. There would be no O&M costs.

Conclusion

Because of the fine-grained nature of the sediment and the different classes of COCs, ex-situ sediment washing/chemical extraction is eliminated from further consideration.

3.3.5.3 Chemical Stabilization/Solidification

Chemical stabilization consists of mixing contaminated sediment with chemical reagents that modify the COCs to render them less soluble and less mobile. Chemical solidification consists of mixing contaminated sediment with chemical reagents that bind COCs within the matrix of the material being treated. The most common stabilization reagents are phosphates, carbonates, hydroxides, and sulfates. The most common solidification reagents are pozzolanic-based materials such as Portland cement, and fly ash. Other reagents such as thermoplastic binders (i.e., asphalt); sorbents such as granular activated carbon (GAC), clays, zeolites, and anhydrous sodium silicate; and MAECTITE® have also been successfully used for chemical stabilization/solidification.

For ex-situ chemical stabilization/solidification, mixing of the material to be treated with the chemical reagents is normally accomplished in the presence of a controlled amount of water and with specialized mechanical blending equipment such as a pug mill. After the material is mixed with the chemical reagents, it is typically allowed to cure in order to allow the stabilization or solidification process to take full effect. In the case of chemical solidification, the treated material may either be allowed to cure as a monolithic block, or it can be made into a granular material with the consistency of a sediment-cement.

Effectiveness

Chemical stabilization/solidification is a well-established and proven technology, but its effectiveness is highly dependent on the type of material being treated and types of COCs being immobilized. A thorough physical and chemical characterization of the material to be treated and COCs to be immobilized is needed, and treatability testing is typically required to determine the most suitable stabilization/solidification reagents, mixing ratios, and special pretreatment or material-handling methods that may be required.

At some monitoring stations, a specialized reagent may be required because the sediment is contaminated with high concentrations of PAHs. Because chemical stabilization/solidification would not eliminate the toxicity of COCs immobilized in the treated sediment, this material would still require proper disposal or reuse to minimize unacceptable risks that could result from direct exposure. Chemical stabilization/solidification would effectively minimize the potential for migration of COCs from sediment to other environmental media such as groundwater. Long-term stability and leachability of the treated sediment would remain as potential concerns because COCs would remain within the treated sediment. Most chemical stabilization/solidification processes result in an increase in the volume of the treated material typically ranging from 5 to 15 percent.

Implementability

Ex-situ chemical stabilization/solidification would be relatively easy to implement. The necessary equipment and resources to perform this work are available at most permitted TSD facilities. Treatability tests would be required to determine the appropriate mix ratios prior to implementation. Depending on the chemical stabilization/solidification process selected, pretreatment (e.g. dewatering) may be required.

Cost

The capital costs of off-site stabilization/solidification would be moderate. Because application of this technology would be contracted as a service, there would be no O&M costs.

Conclusion

Because of the variety of COCs in the sediment, chemical stabilization/solidification is not retained for consideration in alternative development of remedial alternatives. Chemical stabilization/solidification is not effective in treating all types of COCs.

3.3.5.4 Incineration

Incineration is a thermal oxidation process that converts organic solids, liquids, and gases to inorganic substances at high temperatures in the presence of oxygen. The technology uses controlled flame combustion in an enclosed reactor to decompose organics. Carbon and hydrogen waste components are converted to carbon dioxide (CO_2) and water, respectively. Other combustion products are also present in smaller quantities. These may include carbon monoxide, nitrogen oxides, chlorine, fluorene, and trace metals. If a wet scrubber air pollution control system is used, a liquid waste stream could also be generated. Screening of the contaminated material would be required to remove noncombustible waste/debris from the sediments. The noncombustible waste/debris must be treated or disposed of by other means, depending on the level of contamination.

Rotary kilns are one of the most widely used incinerators for wastes in the form of solids, sludges, liquids, and gases. An integrated system for incineration by rotary kiln includes a solid feed system, a rotary kiln and secondary combustion chamber, air pollution control units for particulate and acid gas removal, and an exhaust stack. Such a system employs a refractory-lined rotary kiln operating at high temperatures (1,470 to 2,910 °F or 800 to 1,600 degrees Celsius [°C]) to combust wastes in the presence of oxygen. A typical throughput for a transportable rotary kiln is 75 to 200 tons per day. For wastes that have high heat content, the throughput may be limited by the capacity of the unit to control the heat generation rate. Fixed-based units, such as cement kilns that may be permitted to accept contaminated sediment, are also available.

Effectiveness

Incineration is a well-established and proven technology that would be very effective for destroying sediment organic COCs such as PAHs. Incineration would typically achieve in excess of 99.99 percent destruction of organic COCs with the resulting formation of inert CO_2 and water. In addition, when operating at the higher temperature ranges, incineration could achieve a certain degree of removal of a few of the metallic COCs. Because the organic COCs contain no significant chlorine or nitrogen, off-gas treatment requirements would probably be minimal and limited to control of solid particulates.

Implementability

Incineration could be implemented. However, on a practical level, this technology could only be implemented off-site, and only a few qualified TSD facilities are available to provide this service. As noted earlier, off-gas treatment requirements would probably be minimal. However, pre-approval of the material to be incinerated by the TSD facilities would be required, and a trial burn might be necessary. Adverse impact on the surrounding community and the environment as a result of off-site transportation of contaminated sediment would be adequately mitigated by adherence to spill prevention procedures and by compliance with Department of Transportation (DOT) regulations.

Cost

The cost of off-site incineration would be high. Because application of this technology would be contracted as a service, there would be no O&M costs.

Conclusion

Because of the low volumes of sediment being considered for removal and the limited number of these facilities in operation, incineration is not retained for consideration in alternative development of remedial alternatives. However, if during implementation of a disposal alternative, high concentrations of COCs are detected that prevent land disposal, incineration could be used to reduce concentrations to allow materials to be landfilled.

3.3.6 Disposal

The only technology considered under this GRA is off-yard landfilling. Off-yard landfilling consists of transporting dredged and dewatered sediment for burial in a permitted off-yard TSD facility. RCRA non-hazardous waste may be disposed of in a RCRA Subtitle D, or solid waste, landfill. RCRA-hazardous waste must be disposed of in an RCRA Subtitle C, or hazardous waste, landfill.

Effectiveness

Off-yard landfilling does not permanently or irreversibly reduce contaminant concentrations in the sediment, but it does permanently remove the contamination from the site in question. Although the CERCLA preference for treatment relegates direct landfilling as a less preferable option, this technology would be an effective disposal option for contaminated sediments at OU4. Off-yard landfills are only permitted to operate if they meet certain requirements of design and operation governing foundation, liner, leak detection, leachate collection and treatment, daily cover, post-closure inspections, and monitoring, etc., which ensure the effectiveness of these facilities. The requirements of a RCRA Subtitle C hazardous waste landfill are typically significantly more stringent than those of a RCRA Subtitle D solid waste landfill.

Implementability

Off-yard landfilling with or without treatment would be easily implementable. Permitted RCRA Subtitle C TSD facilities and Subtitle D landfill facilities are available for this purpose.

Cost

The cost of off-yard landfilling would be moderate for disposal at a RCRA Subtitle D solid waste landfill, and moderate to high for treatment/disposal at a RCRA Subtitle C hazardous waste landfill. The cost of disposal is also inflated with removal and transportation costs. There would be no O&M costs associated with disposal.

Conclusion

Off-yard landfilling is retained in combination with other process options for the development of remedial alternatives.

3.3.7 Re-use

After sediment has been removed and treated it may be acceptable to reuse the sediment off site as fill material. Additionally, untreated material could be used in industrial processes such as concrete manufacturing and asphalt plants. These re-use options are discussed below.

3.3.7.1 Fill After Treatment

Fill after treatment consists of using treated sediment as fill materials for construction activities or general cover material at landfills. Typically, material that is laid as construction fill would be in an area where it would not be in contact with biological receptors. However, material would need to meet chemical criteria to establish the material as clean fill.

Effectiveness

Re-use of treated sediment would require significant analysis to establish the material as suitable for un-restricted use. However, if establishing material as suitable for un-restricted use can be completed, re-use of material as fill is an effective way to reduce landfill usage.

Implementability

To establish the sediment as suitable for re-use as fill material would require treatment to establish clean fill certification. This may not be achievable, but establishing the material as usable for daily cover at a landfill is relatively easier to achieve.

Cost

The costs associated with re-using fill material are moderate to high based on the treatment needed and transportation required.

Conclusion

Because re-use of contaminated sediment as clean fill is difficult to implement, this alternative is not retained for consideration in alternative development. However, if disposal alternatives are evaluated and TSD facilities have the means to treat the material for beneficial re-use applications, the landfill will not be restricted from performing this treatment.

3.3.7.2 Use in Cement Manufacturing and Asphalt Batch Plants

Dredged sediment can be incorporated in cement and asphalt manufacturing operations. This technology is fairly innovative and is beginning to become a prevalent method of beneficial re-use.

Effectiveness

Cement manufacturing and asphalt plants using dredged contaminated sediments have been found to be effective so long as the classification of the sediment meets American Society for Testing and Materials

(ASTM) standards. If the sediment types meet the ASTM classification standards (sand or silty sand), this is an effective re-use of contaminated sediments.

Implementability

Using contaminated sediment to manufacture cement and asphalt is implementable, but would present challenges in the processing and transportation of dredged material to the manufacturing plants. The soil classification of the sediment must also match the ASTM standards.

Cost

Production of cement or asphalt from contaminated sediment is cost-effective. While there is a cost associated with sending dredged materials to a manufacturing plant, the profits earned through the sale of the product offset the transportation cost.

Conclusion

Re-use in Portland cement concrete and asphalt mixtures is eliminated from consideration because the site sediments to be removed contain significant fine grained particles (i.e., silt and clay sized particles) that are generally detrimental to concrete mixture performance. In addition, the unit cost to remove the fine grained particles by washing and screening would be significant due to the relatively small quantity and cost for mobilization, set-up, and processing of the material.

3.4 SELECTION OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

The following GRAs, remediation technologies, and process options are retained to develop sediment remedial alternatives:

- No Action: No Action
- Limited Action: LUCs, Monitoring, and Natural Recovery
- Removal: Mechanical Removal, Hydraulic Dredging
- Ex-Situ Treatment: Dewatering
- Disposal: Off-site Landfilling

Table 3-2 presents the applicable usage of the retained technologies for each individual monitoring station. Because of the different conditions and contaminant concentrations at each MS, the retained technologies may not be applicable for alternative development at each MS.

3.5 NATIONAL CONTINGENCY PLAN EVALUATION CRITERIA AND RELATIVE IMPORTANCE OF CRITERIA

The evaluation criteria as required by the NCP and the relative importance of these criteria in the CERCLA process are described in the following sections and are applicable to all monitoring stations at OU4.

3.5.1 Evaluation Criteria

In accordance with the NCP (40 CFR 300.430), the following nine criteria are used for the evaluation of remedial alternatives:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

Overall Protection of Human Health and the Environment

Remedial alternatives must be assessed for adequate protection of human health and the environment in both the short and long term. The remedial alternatives must be able to diminish the unacceptable risks posed by hazardous substances or contaminants present at the site by eliminating, reducing, or controlling exposure to levels exceeding remediation goals.

Compliance with ARARs and TBCs

Remedial alternatives must be assessed to determine whether they attain ARARs and TBCs under federal environmental laws and state environmental or facility siting laws. If one or more regulations that are applicable cannot be complied with, a waiver must be invoked.

Long-Term Effectiveness and Permanence

Remedial alternatives must be assessed for the long-term effectiveness and permanence they offer, along with the degree of certainty that the alternative would prove successful. Factors that are considered, as appropriate, include the following:

- Magnitude of Residual Risk - Risk posed by untreated waste or treatment residuals at the conclusion of remedial activities. The characteristics of residuals are considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.

- Adequacy and reliability of controls - Controls, such as containment systems and LUCs, that are necessary to manage treatment residuals and untreated waste must be shown to be reliable. In particular, this evaluation considers the uncertainties associated with land disposal for providing long-term protection from residual contamination, assessment of the potential need to replace technical components of the alternative (such as a surface cover, sign, or treatment system), and the potential exposure pathways and risks posed if technical components or the entire remedial action needs to be replaced.

Reduction of Toxicity, Mobility, or Volume through Treatment

The degree to which the remedial alternative employs recycling or treatment that reduces the toxicity, mobility, or volume is assessed. This assessment includes how treatment is used to address threats posed by the site. Factors to be considered, as appropriate, include the following:

- Treatment or recycling processes that the remedial alternative employs and the materials that they will treat.

- Amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled.

- Degree of expected reduction in toxicity, mobility, or volume of waste caused by treatment or recycling, and the specification of which reduction(s) is occurring.

- Degree to which the treatment is irreversible.

- Type and quantity of residual contamination that will remain following treatment considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents.

- Degree to which treatment reduces the inherent hazards posed by principal threats at the site.

Short-Term Effectiveness

The short-term impacts of the remedial alternative are assessed considering the following:

- Short-term risks that might be posed to the community during implementation.

- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures taken to minimize these impacts.

- Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation.

- Time until protection is achieved.

Implementability

The ease or difficulty of implementing the alternative is assessed considering the following types of factors, as appropriate:

- Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, reliability of the technology, ease of undertaking additional remedial actions, and ability to monitor the effectiveness of the remedy.

- Administrative feasibility, including activities needed to coordinate with other offices and agencies and the time required to obtain approvals and permits (if needed) from other agencies.

- Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; availability of necessary equipment, specialists, and additional resources; availability of services and materials; and availability of prospective technologies.

- Sustainability of an alternative is discussed and includes consideration of the relative size of the associated carbon footprint, material usage, and environmental benefit.

Cost

Costs for remedial alternatives include both capital costs and annual O&M costs. Capital costs include both direct and indirect costs expected at the time of alternative implementation. Annual O&M costs include periodic costs that occur following alternative implementation. Typical O&M costs include periodic long-term monitoring and inspections. A net present worth (NPW) of the capital and O&M costs is also provided. The NPW of a remedial alternative is the total of all capital and O&M costs expressed in today's dollars. Typically, the cost estimate accuracy range during the FS stage is plus 50 percent to minus 30 percent of the actual remedial action cost.

State Acceptance

This criterion reflects the statutory requirements to provide for substantial and meaningful regulatory involvement. Formal assessment of regulatory acceptance is completed during the ROD phase, occurring after the PRAP public comment period. In addition, regulatory concerns are continually considered through resolution of regulatory comments received on the FS Report and PRAP.

Community Acceptance

This criterion refers to comments from community members on the remedial alternatives under consideration, where "community" is broadly defined to include all interested parties. These comments are considered throughout the CERCLA process. The community acceptance criterion is evaluated as part of the responsiveness summary presented in the ROD after the public comment period on the PRAP is held.

3.5.2 Relative Importance of Criteria

Among the nine criteria, the threshold criteria are considered to be:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs and TBCs

The threshold criteria must be satisfied for an alternative to be eligible for selection.

Among the remaining criteria, the following five criteria are considered to be the primary balancing criteria:

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

The balancing criteria are used to weigh the relative merits of alternatives.

The remaining two criteria, State Acceptance and Community Acceptance, are considered to be modifying criteria that must be considered during remedy selection. These last two criteria are evaluated after the end of the public comment period on the PRAP. Therefore, this FS addresses seven of the nine criteria.

TABLE 3-1

PRELIMINARY SCREENING OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

General Response Actions	Remedial Technology	Process Option	Description	Screening Comment
No Action	None	Not applicable	No activities conducted at the site to address contamination.	**Retain for baseline comparison to other technologies as required by the National Contingency Plan (NCP).**
Limited Action	Land Use Controls	Active Controls: Physical Barriers/Security Guards	Fencing, markers, warning signs, and monitoring to restrict site access.	**Retain to regulate future development and activity in the area.**
		Passive Controls: Deed or Land Use Restrictions	Administrative action using property deeds or other land use prohibitions to restrict future site activities.	**Retain to regulate future development and activity in the area.**
	Monitoring	Sampling and Analysis	Sampling and analysis of sediment to evaluate migration of chemical constituents in the environment.	**Retain to assess future migration of chemical constituents from Operable Unit (OU)4.**
	Monitored Natural Recovery	Sampling to Access Degradation of Contaminants	Long term sampling and analysis of sediment to monitor the degradation of contaminants through natural processes.	**Retain to assess the future reduction of contaminants through natural processes.**
	Enhanced Natural Recovery	Installation of structures to enhance naturally occurring processes	Involves installation of structures to enhance naturally occurring processes that could reduce the risks posed by sediment chemicals of concern (COCs).	Eliminate because engineered structures could alter or obstruct navigable waters and/or restrict dredging operations around Portsmouth Naval Shipyard (PNS).

TABLE 3-1

PRELIMINARY SCREENING OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

General Response Actions	Remedial Technology	Process Option	Description	Screening Comment
Containment	Surface Protection	Granular Cover	Installation of a granular cover to prevent direct exposure to contaminated sediment and off-site migration of sediment by tidal currents.	Eliminate because of effectiveness concerns.
		Impermeable and Reactive Caps	Placement of an impermeable cap or reactive capping media on top of contaminated sediment to treat contaminants that move from sediment to surface water through advection and dispersion.	Eliminate because migration of contaminants from sediment to surface water is not a pathway of concern.
	Source Containment	Barrier Installation	A barrier would consist of installing an impermeable barrier to prevent potential off-site migration of sediment COCs.	**Retain to be coupled with sediment removal and off-yard disposal alternatives.**
Removal	Bulk Excavation	Mechanical Removal	Excavation involves the physical removal of sediment from a designated area. It uses construction equipment such as backhoe, front-end loader, grade-all, hand shovels, etc. to directly remove contaminated sediment from the site. Excavated sediment is collected for treatment/placement/disposal.	**Retain. Excavation is retained as a viable technology to be coupled with consolidation and covering or off-yard disposal. Excavation would effectively remove contaminated sediment from the site; however, it could only be performed onshore, and at certain times due to tidal changes.**

TABLE 3-1

PRELIMINARY SCREENING OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

General Response Actions	Remedial Technology	Process Option	Description	Screening Comment
Removal (continued)	Bulk Excavation (continued)	Mechanical Dredging	Dredging with the use of excavation equipment such as clam shells or excavators mounted on a barge or overhead cable system to directly remove contaminated sediment from the site. Excavated sediment is collected for treatment, placement, and/or disposal.	**Retain as a viable technology to be coupled with consolidation or off-yard disposal. Mechanical Dredging would effectively remove contaminated sediment from the site; however, it could not be performed completely at offshore areas or at certain times due to tidal changes.**
		Hydraulic Dredging	Dredging with hydraulic pumps requires vacuum equipment and the introduction of fluids based on the distance sediments are going to be transferred. Like dredging with excavation equipment, the use of hydraulic pumps will resuspend the sediments; however, the use of hydraulic pumps will dramatically reduce resuspension.	**Retain as a viable technology to be coupled with consolidation or off-yard disposal. Dredging could be executed offshore and would allow remedial activities to take place regardless of tidal fluctuations.**
In-Situ Treatment	Physical/Biological/ Chemical/Thermal	Chemical Fixation/ Aerobic/Anaerobic Treatment/ Sediment Flushing/Vitrification	Treatment of sediment without excavation or dredging.	Eliminate because under the dynamic conditions at each monitoring station (MS), mixing of treatment material into the sediment or implementing treatment processes would result in the spread and movement of the contaminated sediment.

TABLE 3-1

PRELIMINARY SCREENING OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

General Response Actions	Remedial Technology	Process Option	Description	Screening Comment
Ex-Situ Treatment	Physical/Chemical	Sediment Washing/Solvent Extraction	Use of water or other solvents to remove contaminants by solubilizing and/or gravity-based separation of contaminated soil particles.	Eliminate because of the fine-grained nature of the sediment, different classes of COCs present, and effectiveness concerns.
		Chemical Stabilization/Solidification	Mixing of pozzolanic agents to chemically fix contaminants and solidify the matrix.	Eliminate because of different classes of COCs present and effectiveness concerns.
	Physical/Chemical (continued)	Dewatering	Removal of water from a solid material through passive (gravity-aided) drainage of water.	**Retain as a viable secondary technology to be coupled with a primary technology such as bulk excavation.**
	Thermal	Incineration	Use of high temperatures to destroy contaminants.	Eliminate because of the low volume of sediment being considered for removal and the limited number of these facilities in operation,
Disposal	Landfill/Recycling	On-yard Landfilling	Disposal of excavated soil and treatment residues in an on-yard landfill.	Eliminate because of lack of space on the yard.
		Off-yard Landfilling	Disposal of excavated soil and treatment residues in an off-yard permitted treatment, storage, and disposal (TSD) facility.	**Retain landfilling as a secondary technology for disposal of sediment from removal activities.**

TABLE 3-1

PRELIMINARY SCREENING OF SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

General Response Actions	Remedial Technology	Process Option	Description	Screening Comment
Re-use	Recycling	Fill material	Use of treated sediment as fill materials for construction activities or general cover material at landfills.	Eliminate because the costs associated with re-using fill material are moderate to high based on the treatment needed and transportation required
		Manufacturing Additive	Use of sediment in cement and asphalt manufacturing.	Eliminate based on the site sediments not meeting the required American Society for Testing and Materials (ASTM) classification.

TABLE 3-2

SEDIMENT REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS RETAINED FOR INDIVIDUAL MONITORING STATIONS
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Process Options (Primary/Secondary)	MS-01	MS-03 & MS-04	MS-11	MS-12A	MS-12B
No Action	**Retain for baseline comparison to other technologies as required by National Oil and Hazardous Substances Pollution Contingency Plan (NCP).**	**Retain for baseline comparison to other technologies as required by NCP.**	**Retain for baseline comparison to other technologies as required by NCP.**	**Retain for baseline comparison to other technologies as required by NCP.**	**Retain for baseline comparison to other technologies as required by NCP.**
Land Use Controls (LUCs)	**Retain to prevent unauthorized disturbance of sediment until concentrations of COCs are less than PRGs.**	**Retain to prevent unauthorized disturbance of sediment until concentrations of COCs are less than PRGs.**	Eliminate because contaminants are only accessible by ecological receptors, and a covering alternative is not being considered for this MS.	**Retain to prevent unauthorized disturbance of sediment until concentrations of COCs are less than PRGs and to prevent disturbance of any containment barrier.**	**Retain to prevent unauthorized disturbance of sediment until concentrations of COCs are less than PRGs.**
Containment Barrier	Eliminate because this is not applicable at this monitoring station (not proposing a partial removal of contaminated sediment).	Eliminate because this is not applicable at this monitoring station (not proposing a partial removal of contaminated sediment).	Eliminate because this is not applicable at this monitoring station (not proposing a partial removal of contaminated sediment).	**Retain to isolate contaminated sediment above the low tide elevation.**	Eliminate because this is not applicable at this monitoring station (not proposing a partial removal of contaminated sediment).
Monitoring	**Retain to assess future Operable Unit (OU) 4 contaminant concentrations.**	**Retain to assess future OU4 contaminant concentrations.**	**Retain to assess future OU4 contaminant concentrations.**	**Retain to assess future OU4 contaminant concentrations.**	**Retain to assess future OU4 contaminant concentrations.**
Natural Recovery	**Retain to assess if contaminants are being reduced by naturally occurring processes.**	**Retain to assess if contaminants are being reduced by naturally occurring processes.**	**Retain to assess if contaminants are being reduced by naturally occurring processes.**	**Retain to assess if contaminants are being reduced by naturally occurring processes.**	**Retain to assess if contaminants are being reduced by naturally occurring processes.**
Mechanical Removal	Eliminate because contaminants are located below the low tide elevation.	Eliminate because contaminants are located below the low tide elevation.	Eliminate because contaminants are located below the low tide elevation.	**Retain for contaminated sediment above the low tide elevation.**	Eliminate because contaminants are located below the low tide elevation.
Hydraulic Dredging	**Retain for removal of contaminants to be combined with a disposal alternative.**	**Retain for removal of contaminants to be combined with a disposal alternative.**	Eliminate because contamination is limited and chemicals of concern (COCs) are not currently above preliminary remediation goals (PRGs).	**Retain for removal of contaminants to be combined with a disposal alternative.**	**Retain for removal of contaminants to be combined with a disposal alternative.**
Dewatering	**Retain as a secondary treatment option to be combined with sediment removal.**	**Retain as a secondary treatment option to be combined with sediment removal.**	Eliminate, because removal of sediment from this MS is not being considered.	**Retain as a secondary treatment option to be combined with sediment removal.**	**Retain as a secondary treatment option to be combined with sediment removal.**
Off-yard Landfilling	**Retain for disposal of excavated sediment.**	**Retain for disposal of excavated sediment.**	Eliminate, because removal of sediment from this MS is not being considered.	**Retain for disposal of excavated sediment.**	**Retain for disposal of excavated sediment.**

4.0 DESCRIPTION AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES FOR MS-01

This section presents descriptions of the remedial alternatives developed for MS-01 and evaluations of each remedial alternative with respect to the criteria of the NCP of 40 CFR 300, as revised in 1990 and presented in Section 3.5.

4.1 COMPARISON OF REMEDIAL ALTERNATIVES BY CRITERIA FOR MS-01

The following remedial alternatives have been developed from the retained technologies presented in Table 3-2 to address the unacceptable COC (PAHs) concentrations within the MS-01 sediment:

- Alternative MS01-01 – No Action
- Alternative MS01-02 – Monitored Natural Recovery
- Alternative MS01-03 – Hydraulic Dredging with Off-yard Disposal

Descriptions and detailed analyses of these alternatives are provided in the following sections.

4.1.1 Alternative MS01-01: No Action

4.1.1.1 Description

This alternative is required under CERCLA to establish a basis for comparison with other alternatives. No action includes no controls, remediation, or other actions to mitigate risks. Five-year reviews are also not included under the no action alternative. Because there is no action associated with Alternative MS01-01, this alternative has no location- or action-specific ARARs or TBCs. Chemical-specific ARARs and TBCs are presented in Table 4-1.

4.1.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS01-01 would not be protective of the environment.

Compliance with ARARs and TBCs

The no action alternative would not comply with chemical-specific ARARs and TBCs (see Table 4-1). There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS01-01 would provide no long-term effectiveness and permanence, because no action would occur.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative MS01-01 would not reduce the toxicity, mobility, or volume of contaminants through treatment.

Short-Term Effectiveness

Because no action would occur, implementation of Alternative MS01-01 would not pose a short-term risk to site workers or result in adverse impacts to the local community or the environment. However, Alternative MS01-01 would not meet the RAO within the short term because it would not provide adequate protection to ecological receptors.

Implementability

Alternative MS01-01 would be readily implementable because there would be nothing to implement. The technical feasibility criteria including constructability, operability, and reliability are not applicable. The implementability of administrative measures is not applicable because no such measures would be taken.

Alternative MS01-01 is considered a sustainable remediation because no energy would be used to implement the activity, and the remediation of MS-01 would be left to naturally occurring processes.

Cost

There would be no costs associated with Alternative MS01-01 because there are no remedial components.

4.1.2 Alternative MS01-02: Monitored Natural Recovery

4.1.2.1 Description

Alternative MS01-02 would consist of allowing naturally occurring processes to reduce the ecological risks posed by the sediment COCs over time. Based on the location of MS-01, the naturally occurring processes are limited to reduction in contamination concentrations due to biodegradation and dispersion. As discussed in Section 3.3.2.3 in this FS, Appendix D contains a technical memorandum that presents an evaluation of the OU4 data to determine the potential for MNR to occur at MS-01. It was determined that MNR is a viable alternative at MS-01 because there was a significant decrease in PAH

concentrations in sediment after the Site 34 removal action was completed. Based on the evaluation, it was estimated that PAH concentrations would decrease to less than the PRGs within 2 to 4 years now that the onshore source of PAH contamination has been removed. The primary mechanisms for the decrease in concentrations are: 1) the removal of the onshore source of contamination (i.e., ash), and 2) the contaminated sediment is being dispersed then replaced with cleaner sediment. With the onshore removal of the ash, contaminants will no longer be deposited in the MS-01 offshore area as a result of erosion. In addition, due to the nature of the currents within the limits of MS-01, it is not expected that contaminated sediment from other locations would settle out in this area because the MS-01 offshore area is a sediment dispersion area, not a deposition area.

To evaluate natural recovery, sediment samples would be collected and analyzed regularly to evaluate trends in concentrations of COCs. Sediment samples would be collected from within the boundary of MS-01 (three locations shown on Figure 4-1) and analyzed for PAHs to identify COC concentration trends. Sediment samples beyond the limits of MS-01 contaminated sediment would also be collected (two locations shown on Figure 4-1) to identify potential off-site contaminant contribution, and to identify the potential spread of MS-01 contamination. 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 number and location of samples identified on Figure 4-1 are presented in the FS for the purposes of describing the alternative and developing an associated cost estimate. Actual sample numbers, locations, and analytical lists would be established in the long-term monitoring plan that would be developed for this alternative. LUCs to prevent unauthorized disturbance of sediment would be implemented until concentrations of COCs are less than PRGs, Chemical- location- and action-specific ARARs and TBCs associated with Alternative MS01-02 are presented in Table 4-2.

Because contamination would remain in excess of levels that allow for unlimited use and unrestricted exposure, Five-Year Reviews would be required under this alternative until naturally occurring processes reduce the contaminant concentrations to acceptable ecological risk levels (PRGs). During the Five-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.

4.1.2.2 Detailed Analysis

<u>Overall Protection of Human Health and the Environment</u>

Alternative MS01-02 is expected to be protective of the environment within 2 to 4 years of implementation. Contaminant concentrations have already begun to decrease in the MS-01 offshore sediments after the onshore removal. The sampling associated with Alternative MS01-02 would identify

when protection of ecological receptors would occur. Five-Year Reviews would be conducted to evaluate the continued adequacy of the remedy. If contaminant trends do not identify a continual decrease in COC concentrations, a determination of the adequacy of the alternative would be made, in accordance with the decision making process that would be identified in the long-term monitoring plan associated with this alternative.

Compliance with ARARs and TBCs

Although Alternative MS01-02 does not remove or reduce COC concentrations to the identified PRGs upon implementation, the alternative should achieve the identified PRGs if natural processes are given the time to reduce COC concentrations. Therefore, Alternative MS01-02 would comply with chemical-specific ARARs and TBCs once natural processes reduce the COC concentrations. There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS01-02 would not provide long-term effectiveness and permanence until COC concentrations are reduced to the cleanup goals through naturally occurring processes. Once cleanup goals are achieved, it would be expected that these concentrations would remain below cleanup goals. Five-Year Reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS01-02 would not provide reduction in toxicity, mobility, or contaminant volume within the MS-01 area through treatment. However, reduction of contamination toxicity, mobility, and volume would occur as a result of naturally occurring processes.

Short-Term Effectiveness

Alternative MS01-02 would be effective in the short term. Implementation of this alternative would not adversely impact the surrounding community or the environment any more than it currently does. However, site workers could be exposed to the contaminated sediment during periodic sampling events. These exposures could be controlled/eliminated using PPE.

Alternative MS01-02 could be implemented with the signing of a ROD. Existing sample information could be used as the baseline for COC concentrations, and within 1 year a long-term monitoring plan could be prepared for the collection of periodic progress samples.

Implementability

Alternative MS01-02 would be readily implementable. Resources for developing and initiating a sediment monitoring program are readily available.

Alternative MS01-02 is considered a sustainable remediation alternative because minimal energy would be used to implement the activity and the remediation of the MS-01 area would be left to naturally occurring processes. Energy usage would be limited to sampling personnel mobilizing and de-mobilizing from the site. Lastly, landfill space would not be taken up by removed material.

Cost

Cost estimates for Alternative MS01-02 are included in Appendix C. The estimated costs for Alternative MS01-02 are as follows:

- Capital cost: $17,094
- Annual costs: $19,333 per year and $25,300 every 5 years
- 30-year NPW: $311,538

4.1.3 Alternative MS01-03: Hydraulic Dredging with Off-Yard Disposal

4.1.3.1 Description

Alternative MS01-03 would consist of complete removal and off-yard disposal of contaminated sediment from the offshore area of MS-01. Due to the high flow rates within the Piscataqua River, prior to removal, sampling would be conducted to verify the extent of contamination. The general limits of the proposed dredging and physical/hydraulic removal are shown on Figure 4-2. Calculations supporting the reported volumes and quantities are provided in Appendix C. Because Alternative MS01-03 removes the contaminated sediment, LUCs, O&M, inspections, and Five-Year Reviews would not be required with this alternative. Chemical-, location-, and action-specific ARARs and TBCs for this alternative are presented in Table 4-3.

The following describes the individual components of Alternative MS01-03.

- Hydraulic Dredging – Contaminated sediment located offshore of PNS within the boundary of MS-01 would be completely dredged. Hydraulic dredging would be performed using cutterheads and plain suction, and using both onshore and offshore equipment. A major water main is located onshore adjacent to site MS-01. This utility would need to be protected during construction activities.

Onshore equipment would include sediment bags to contain dredged sediments, and pumps to move contaminated sediment from the river to the containment bags. Offshore equipment would include the hydraulic dredge pipeline, and a boat to direct the dredging to the appropriate locations. The hydraulic dredging would include the removal of contaminated sediment and transportation of that material via pipeline to onshore staging areas where the removed sediment would be dewatered. BMPs would be implemented to prevent the migration of re-suspended sediment to downstream watercourses. Based on the limits identified on Figure 4-2, it is estimated that 1,800 cubic yards (cy) of in-place sediment would be dredged from the MS-01 area. Upon dewatering and adding of fly ash to stabilize the material for transportation, an estimated 1,500 cy of stabilized sediment would be transported to an off-yard disposal facility

- Sampling – Sampling would be conducted during dredging activities to monitor the effectiveness of the sediment migration controls (BMPs). Continuous construction monitoring devices capable of measuring turbidity would be located downstream of the dredged area. Samples would also be collected from the exposed river bed to ensure that all contaminated sediment was removed.

- Dewatering - A temporary material handling area would be constructed near the MS-01 onshore area. The material handling area would contain sediment bags into which the hydraulic dredging equipment would direct the flow of contaminated sediment and water. These bags would contain the sediment and allow the water to pass through. The water that passes through the sediment bags would be directed to a filter for cleaning prior to discharging back to the river. For the purposes of this evaluation, it is assumed that the collected water would be sampled for characterization purposes, and that direct discharge back to the river would be acceptable. The material handling area would be lined with an impermeable membrane and contain appropriate storage to prevent the infiltration or release of water removed from the sediment prior to obtaining results of the water characterization samples. If the characterization samples indicate that the water is not of an appropriate quality, the water would be pumped out for treatment or disposal. When the sediment is dry, a loader and trucks would be needed to transport the sediment off-yard for disposal.

- Off-yard Disposal - All dredged sediment would be dewatered, stockpiled, and characterized within the material handling area. After dewatering and characterization are complete, loaders and trucks would transport the sediment to an approved off-yard TSD facility.

The volumes of dredging sediment identified in the text are presented for purposes of this FS. Actual volumes, along with actual number and frequency of characterization sampling would need to be established in the design/work plan documents that would be created as part of this remedial alternative.

4.1.3.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS01-03 would be protective of the environment upon implementation. The complete removal of contaminated sediment and debris would prevent ecological receptors from being exposed to unacceptable levels of contamination in the MS-01 offshore area. BMPs would be used to ensure protection of human health and the environment during removal of contaminated sediment.

Compliance with ARARs

The implementation of Alternative MS01-03 would comply with all chemical-, location-, and action-specific ARARs and TBCs.

Long-Term Effectiveness and Permanence

Alternative MS01-03 would provide long-term effectiveness and permanence. Contaminated sediment associated with MS-01 would be removed from the site, protecting ecological receptors. Following implementation of Alternative MS01-03, the site would be suitable for continued use with no need for LUCs because there would be no residual contamination at the site. Verification samples would be required to confirm that the contaminated sediment has been removed. Following verification of contaminant removal, reviews of the site would not be necessary.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS01-03 would not provide any active treatment technologies that would achieve reduction in toxicity, mobility, or volume of the contaminants within the MS-01 area sediments. Reduction of contamination toxicity, mobility, and volume within the sediment removed from MS-01 would be left to natural processes occurring at the off-yard disposal facility.

Short-Term Effectiveness

Alternative MS01-03 would be effective in the short term. Controls would be implemented during dredging and off-yard transportation and disposal activities to protect remediation construction workers, the community, and the environment until the dredging and disposal activities are completed. These controls would include providing adequate PPE for remediation workers and the use of construction BMPs to prevent the spread of contamination during construction and dredging activities. The RD and work plan would specify the necessary activities to ensure protection of human health and the environment during remedial activities.

Alternative MS01-03 could be implemented within 1 year and would attain the RAOs upon completion. RD and work plan preparation could be completed within 1 year. Construction activities (temporary containment, removal, off-yard transportation and disposal) would be expected to take 3 months, depending on weather, sediment dewatering time, and access restrictions.

Implementability

Alternative MS01-03 would be implementable, but could pose some difficulties. The rocky river bottom, and the limited onshore area could make it difficult to use dredging equipment. In addition, because dredging activities mobilize sediment, two or three passes with the dredging equipment are often required to remove all contaminated sediment. Resources and equipment for the proposed dredging and dewatering would be found locally. Controls would need to be in place for resuspended contaminants and residual contamination while dredging; because of the high velocity water flows in this area, the implementation of turbidity curtains would be difficult. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add additional challenges to dredging activities. Local permitted landfill facilities are available for sediment and debris disposal.

Dredging would require a significant amount of energy to remove, dewater, load and transport the contaminated sediment to an off-yard disposal facility. In addition, the alternative would utilize valuable landfill space.

Cost

Cost estimates for Alternative MS01-03 are included in Appendix C. The estimated costs for Alternative MS01-03 are as follows:

- Capital cost: $917,661

4.2 COMPARATIVE ANALYSIS OF MS-01 REMEDIAL ALTERNATIVES

This section compares the MS-01 remedial action alternatives discussed in Section 4.1 using the seven CERCLA evaluation criteria used in the evaluation of each individual alternative.

4.2.1 Overall Protection of Human Health and Environment

Alternative MS01-03 would be protective of the environment upon implementation. Alternative MS01-01 would not be protective of the environment. Alternative MS01-02 would be protective of the environment but would depend on naturally occurring processes over time to achieve protection of the ecological

receptors. Alternative MS01-03 would use active remedial processes to eliminate the potential for unacceptable contaminant exposure to ecological receptors upon implementation. Alternative MS01-03 would be protective of all receptors within 3 months of implementation and would be the most protective of all receptors because it would permanently remove all of the contaminated sediment.

4.2.2 Compliance with ARARs and TBCs

Alternatives MS01-01 does not comply with chemical-specific ARARs and TBCs, and has no location- or action-specific ARARs or TBCs. Alternative MS01-02 would comply with all chemical-specific ARARs and TBCs once natural occurring processes reduce the contaminant concentrations to acceptable concentrations. There are no location- or action-specific ARARs or TBCs associated with this alternative. Alternative MS01-03 would comply with chemical-, location, and action-specific ARARs and TBCs upon implementation.

4.2.3 Long-Term Effectiveness and Permanence

Alternative MS01-01 provides no long-term effectiveness because no action is taken under this alternative. Alternatives MS01-02 and MS01-03 provide long-term effectiveness and permanence. However, Alternative MS01-02 depends on naturally occurring processes to reduce COC concentrations to cleanup levels prior to realizing long-term effectiveness and permanence. Alternative MS01-02 includes monitoring to determine when cleanup levels are achieved. Alternative MS01-03 would provide long-term effectiveness and permanence upon implementation. Alternative MS01-03 would be most effective because this alternative would remove the contaminated sediment. Removal would prevent ecological receptors from coming into contact with the contaminated sediment.

4.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives being considered would involve an active process that would reduce the toxicity, mobility, or volume of COCs. However, under all alternatives, natural processes would reduce the toxicity, mobility, and volume of the COCs regardless of the location of the contaminated sediment. Alternative MS01-02 is the only alternative that would include the development of a monitoring program to monitor the rate at which natural processes degrade COC concentrations.

4.2.5 Short-Term Effectiveness

Because no action would occur, Alternative MS01-01 is the only alternative that would have no short-term risks to site workers or no adverse impacts on the local community or the environment. The remaining alternatives, MS01-02 and MS01-03, would present some risks to site workers during sampling events or remedial activities. However, these risks and impacts can be controlled using PPE and BMPs. Potential

risks associated with Alternative MS01-02 would need to be protected against every time the area is inspected or monitored, and potential risks associated with Alternative MS01-03 would need to be protected against during remedial activities.

4.2.6 Implementability

Alternative MS01-01 would be easiest because there would be no activities to implement. Alternative MS01-02 would be the second easiest because this alternative only relies on the implementation of a monitoring program. Alternative MS01-03 would be considered the most difficult because this alternative involves the excavation, processing, and off-yard transportation and disposal of contaminated sediment.

Excluding the no action alternative, Alternative MS01-02 provides the least amount of energy usage, and does not utilize landfill space. Alternative MS01-03 utilizes a significant amount of fuel energy and fills landfill space. As a result, Alternative MS01-01 has the smallest remedial carbon foot-print, followed by Alternative MS01-02, then Alternative MS01-03.

4.2.7 Cost

The capital, O&M costs, and NPW for the MS-01 remedial alternatives are as follows.

Alternatives	Capital	Annual Costs	NPW (30 years)
MS01-01 No Action	$0	$0	$0
MS01-02 Monitored Natural Recovery	$17,094	$19,333/yr $25,300/5 yr	$311,538
MS01-03 Hydraulic Dredging, and Off-yard Disposal	$917,661	$0	$917,661

Detailed cost estimates are provided in Appendix C.

4.3 SUMMARY OF COMPARATIVE ANALYSIS FOR MS-01

Table 4-4 summarizes the comparative analysis of MS-01 remedial alternatives.

TABLE 4-1

ALTERNATIVE MS01-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To be considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC for the protection of freshwater and saltwater aquatic life were used to develop Preliminary Remediation Goals (PRGs), as appropriate. Because there is no action, PRGs would not be met.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs as appropriate. Because there is no action, PRGs would not be met.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. Because there is no action, PRGs would not be met.

TABLE 4-1

ALTERNATIVE MS01-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

TABLE 4-2

ALTERNATIVE MS01-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 USC 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through monitored natural recovery.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.

TABLE 4-2

ALTERNATIVE MS01-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33United States Code (USC) 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through dredging and off-yard disposal.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act (16 USC 1451 et seq.)	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for offshore remedial actions that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Navigable Waters	Rivers and Harbors Act Section 10 [33 USC 403; 33 Code of Federal Regulations (CFR) 322 and 323]	Applicable	These regulations control unauthorized obstruction or alteration of navigable waters. Activities involving structures or work in or affecting navigable waters, excavation or deposition of materials in navigable waters are regulated under these requirements.	Remedial activities, such as dredging would be designed such that navigable waters would not be obstructed or altered.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Wetlands and US Waters	Clean Water Act (CWA) Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters including wetlands. No activity that adversely affects a wetland is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	A wetlands functions and values assessment would be conducted to guide mitigative efforts if wetlands could be adversely impacted during remedial activities.
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 107 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities including dredging, dewatering, and monitoring would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon.
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions, such as dredging, that may impact the coastal floodplain or adjacent river. Remedial activities, such as dredging, would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	These regulations set forth the policy, procedure, and responsibilities to implement and enforce Executive Order 11990, Protection of Wetlands.	Remedial activities, such as dredging and access for equipment conducted within federal jurisdictional wetlands would be implemented in compliance with these standards.
STATE LOCATION-SPECIFIC ARARs and TBCs				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards (38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 CMR 305 1, 2, and 8)	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Dredging and construction near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river or adjacent wetlands during construction.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities such as dredging and dewatering that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.
Wetlands	Maine Wetland Protection Rules (06 096 CMR Part 310)	Applicable	Standards are provided for protection of wetlands, as defined in MEDEP Chapter 1000 Guidelines for Municipal Shoreline Zoning Ordinances. Jurisdiction under the rules includes the area adjacent to the wetlands, which is the area within 75 feet of the normal high-water line. Activities that have an unreasonable impact on wetlands are prohibited.	A wetlands functions and values assessment would be conducted that would be used to guide restorative efforts for adjacent wetlands that may be adversely impacted by remedial activities. Remedial activities would be conducted to avoid impacts to wetlands and coastal wetlands which include tidal and subtidal lands.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Surface Water	CWA (33 USC 1251 et seq.) NRWQC	TBC	These criteria are used to establish water quality standards for the protection of aquatic life.	These standards would be used for activities that may impact the water quality of the Piscataqua River. Remedial activities, such as dredging and dewatering, would be conducted to reduce adverse impacts to the offshore. Stormwater management, erosion controls, and management of water discharges would be included in remedial activities, as appropriate.
Water Management	CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	These regulations would be applicable to water management during dredging and where discharges 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.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to publically owned treatment works (POTW).	These regulations would be applicable to water management during dredging and where discharges to the sanitary sewer system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.
Water Management	NPDES (Storm water Permitting) 40 CFR 122.26	Applicable	Describes storm water discharge requirements from construction activities that disturb more than 1 acre.	Storm water management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit. Less than 1 acre to be disturbed, but overall Operable Unit (OU) 4 activities may be greater than 1 acre.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes CMR 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements. Wastes from activities at this site are unlikely to be hazardous.
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site, according to the regulation, until disposed of off-yard.
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to excavations and stockpiling dredged material. Applicable plans would be coordinated with MEDEP before implementation.

TABLE 4-3

ALTERNATIVE MS01-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	Although the individual disturbed areas and areas needed for dewatering are each less than 1 acre, the combined area for the OU4 remedial action may be greater than 1 acre. Applicable plans would be coordinated with MEDEP before implementation.
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for sediment handling. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq.*) and Waste Discharge Permitting Program [06-096 CMR 523 (Waste Discharge License Conditions) Sections 2, 5, and 6; and 06-096 CMR 528 (Pretreatment Program) Section 6]	Applicable	These standards regulate the discharge of pollutants from point sources to surface POTW.	Water discharged from sediment dewatering would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water or a POTW.

TABLE 4-4

SUMMARY OF COMPARATIVE ANALYSIS OF MS-01 REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS01-01: No Action	Alternative MS01-02: Monitored Natural Recovery	Alternative MS01-03: Hydraulic Dredging with Off-yard Disposal
Overall Protection of Human Health and Environment	Would not be protective of the environment because no action would occur but would be protective of human health. Unacceptable ecological risks would remain.	Would be protective of human health and the environment. At the time of implementation contaminants would be left in place and ecological receptor contact pathways would still exist. As natural processes reduce contaminant concentrations, protection of the environment would be achieved.	Would be protective of human health and the environment by removing all contaminated sediment from the area.
Compliance with applicable or relevant and appropriate requirements (ARARs) and to be considered (TBCs)	Would not comply with chemical-specific ARARs and TBCs. Location- and action-specific ARARs do not apply.	Would comply with all chemical-specific ARARs and TBCs once chemical of concern (COC) concentrations are reduced to less than preliminary remediation goals (PRGs). Location- and action-specific ARARs do not apply.	Would comply with all chemical-, location-, and action-specific ARARs and TBCs.
Long-Term Effectiveness and Permanence	Would not provide long-term effectiveness and permanence because no action would occur.	Would provide long-term effectiveness and permanence once contaminant concentrations are reduced to less than PRGs. Although COC concentrations would not be actively reduced, risks to ecological receptors would decrease with the natural reduction of COC concentrations.	Would provide long-term effectiveness and permanence by removing all contaminated sediment.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not provide reduction in toxicity, mobility, or volume through active treatment. However, natural processes would reduce toxicity, mobility, and volume over the long term.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no construction actions would occur.	Would not result in any short-term risk to the surrounding community or environment. Alternative implementation would result in periodic exposure to remedial workers during sampling events. These risks would be mitigated using appropriate personal protective equipment.	Would result in the possibility of exposing remediation workers, the surrounding community, and the environment to contaminated materials as a result of removal efforts. These risks are expected to be highest for this alternative because of the exposure of contaminated sediment. However, these risks would be reduced through compliance with appropriate use of personal protection equipment and implementation and maintenance of best management practices during construction. These risks would need to be mitigated over a 3 month construction schedule.

TABLE 4-4

SUMMARY OF COMPARATIVE ANALYSIS OF MS-01 REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS01-01: No Action	Alternative MS01-02: Monitored Natural Recovery	Alternative MS01-03: Hydraulic Dredging with Off-yard Disposal
Implementability	Technical and administrative implementation would be simple because there would be no action to implement	Technical and administrative implementation would be simple because resources for developing and initiating a sediment monitoring program are readily available.	Would be implementable, but could pose some difficulties. Resources for the proposed dredging and excavation activities are locally available and could be completed using conventional construction equipment. There is a limited amount of sediment located at MS-01, and the rocky bottom could make it difficult to use dredging equipment. Controls would need to be in place for resuspension of contaminants and residual contamination while dredging; because of the high velocity water flows in this area, the implementation of turbidity curtains could be difficult. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add an additional challenge to dredging activities. Permitted landfill facilities are available for sediment and debris disposal.
Costs:			
Capital:	$0	$17,094	$917,661
Annual:	$0	$19,333/yr, 25,300/5 years	$0
Net Present Worth:	$0	$311,538	$917,661

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932 / CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 04/26/12	ALTERNATIVE MS-01-02 - MONITORED NATURAL RECOVERY FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
REVISED BY —	DATE —		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 4-1 / REV 0

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932 / CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 04/26/12	ALTERNATIVE MS-01-03 - HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
REVISED BY —	DATE —		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 4-2 / REV 0

5.0 DESCRIPTION AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES FOR MS-03 AND MS-04

This section presents descriptions of the remedial alternatives developed for MS-03 and MS-04, and evaluations of each remedial alternative with respect to the criteria of the NCP of 40 CFR 300, as revised in 1990 and presented in Section 3.5.

5.1 COMPARISON OF REMEDIAL ALTERNATIVES BY CRITERIA FOR MS-03 AND MS-04

The following remedial alternatives have been developed from the retained technologies presented in Table 3-2 to address the unacceptable COC (PAHs and copper) concentrations within MS-03 and MS-04 sediment:

- Alternative MS0304-01 – No Action
- Alternative MS0304-02 – Monitored Natural Recovery
- Alternative MS0304-03 - Hydraulic Dredging with Off-yard Disposal

Descriptions and detailed analyses of these alternatives are provided in the following sections.

5.1.1 Alternative MS0304-01: No Action

5.1.1.1 Description

This alternative is required under CERCLA to establish a basis for comparison with other alternatives. No action includes no controls, remediation, or other actions to mitigate risks. Five-Year Reviews are also not included under the no action alternative. Because there is no action associated with Alternative MS0304-01, this alternative has no location- or action-specific ARARs or TBCs. Chemical-specific ARARs and TBCs are presented in Table 5-1.

5.1.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS0304-01 would not be protective of the environment.

Compliance with ARARs and TBCs

The no action alternative would not comply with chemical-specific ARARs and TBCs (see Table 5-1). There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS0304-01 would provide no long-term effectiveness and permanence, because no action would occur.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative MS0304-01 would not reduce the toxicity, mobility, or volume of contaminants through treatment.

Short-Term Effectiveness

Because no action would occur, implementation of Alternative MS0304-01 would not pose a short-term risk to site workers or result in adverse impacts to the local community or the environment. However, Alternative MS0304-01 would not meet the RAO within the short term because it would not provide adequate protection to ecological receptors.

Implementability

Alternative MS0304-01 would be readily implementable because there would be nothing to implement. The technical feasibility criteria including constructability, operability, and reliability are not applicable. The implementability of administrative measures is not applicable because no such measures would be taken.

Alternative MS0304-01 is considered a sustainable remediation because no energy would be used to implement the activity and the remediation of MS-03 and MS-04 would be left to naturally occurring processes.

Cost

There would be no costs associated with Alternative MS0304-01 because there are no remedial components.

5.1.2 Alternative MS0304-02: Monitored Natural Recovery

5.1.2.1 Description

Alternative MS0304-02 would consist of allowing naturally occurring processes to reduce the ecological risks posed by the sediment COCs over time. Although sedimentation modeling has not been completed for MS-03 and MS-04 areas, it is expected that contaminant concentration would begin to decrease as a result of shoreline stabilization activities and containment of onsite contaminant sources. As discussed in Section 3.3.2.3 in this FS, Appendix D contains a technical memorandum that presents an evaluation of the OU4 data to determine the potential for MNR to occur at MS-03 and MS-04. It was determined that MNR is a viable alternative at MS-03 and MS-04 because 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. 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. 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. With this containment of sources, contaminants will no longer be deposited in the MS-03 and MS-04 offshore areas as a result of erosion. In addition, due to the nature of the currents within the limits of MS-03 and MS-04, it is not expected that contaminated sediment from other locations would settle out in this area, because the MS-03 and MS-04 offshore areas are sediment dispersion areas, not deposition areas.

To evaluate natural recovery, sediment samples would be collected and analyzed regularly to evaluate trends in concentrations of COCs. Sediment samples would be collected from three locations within the boundaries of MS-03 and MS-04, two locations outside the limits of MS-03 and MS-04 to identify potential off-site contaminant contribution, and to identify the potential spread of MS-03 and MS-04 contamination (sampling locations identified on Figure 5-1). These samples would be analyzed for COCs to identify COC concentration trends (PAHs and copper). 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 number and location of samples identified on Figure 5-1 are presented in the FS for the purposes of describing and developing an associated cost estimate for the alternative. Actual sample numbers, locations, and analytical lists would be established in the long-term monitoring plan that would be developed for this alternative. LUCs to prevent unauthorized disturbance of sediment would be implemented until concentrations of COCs are less than PRGs. Chemical-, location-, and action-specific ARARs and TBCs associated with Alternative MS0304-02 are presented in Table 5-2.

Because contamination would remain in excess of levels that allow for unlimited use and unrestricted exposure, Five-Year Reviews would be required under this alternative until natural occurring processes

reduce the contaminant concentrations to acceptable ecological risk levels (PRGs). During the Five-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.

5.1.2.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS0304-02 would not initially be protective of the environment because no protection would be provided to ecological receptors at the time of implementation. However, protection of ecological receptors would occur over time. The sampling associated with Alternative MS0304-02 would identify when protection of ecological receptors would occur. Five-Year Reviews would be conducted to evaluate the continued adequacy of the remedy. If contaminant trends do not identify a continual decrease in COC concentrations, or if sampling does not identify continued accumulation of cleaner sediment over the contaminated areas, a determination on the adequacy of the alternative would be made in accordance with the decision making process that would be identified in the long-term monitoring plan associated with this alternative.

Compliance with ARARs and TBCs

Although Alternative MS0304-02 does not remove or reduce COC concentrations to the identified PRGs upon implementation, the alternative should achieve the identified PRGs if natural processes are given the time to reduce the COC concentrations. Therefore, Alternative MS0304-02 would comply with chemical-specific ARARs and TBCs once natural processes reduce the COC concentrations. There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS0304-02 would not provide long-term effectiveness and permanence until COC concentrations are reduced to the cleanup goals through naturally occurring processes. Once cleanup goals are achieved, it would be expected that these concentrations would remain below cleanup goals. Five-year reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS0304-02 would not provide reduction in toxicity, contaminant mobility, or contaminant volume within the MS-03 and MS-04 areas through treatment. However,

reduction of contamination toxicity, mobility, and volume would occur as a result of naturally occurring processes.

Short-Term Effectiveness

Alternative MS0304-02 would be effective in the short term. Implementation of this alternative would not adversely impact the surrounding community or the environment any more than it currently does. However, site workers could be exposed to the contaminated sediment during periodic sampling events. These exposures could be controlled/eliminated using PPE.

Alternative MS0304-02 could be implemented with the signing of a ROD. Existing sample information could be used as the baseline for COC concentrations and, within 1 year, a long-term monitoring plan could be prepared for the collection of periodic progress samples.

Implementability

Alternative MS0304-02 would be readily implementable. Resources for developing and initiating a sediment monitoring program are readily available.

Alternative MS0304-02 is considered a sustainable remediation because minimal energy would be used to implement the activity, and the remediation of the MS-03 and MS-04 areas would be left to naturally occurring processes. Energy usage would be limited to sampling personnel mobilizing and de-mobilizing from the site. Lastly, landfill space would not be taken up by removed material.

Cost

Cost estimates for Alternative MS0304-02 are included in Appendix C. The estimated costs for Alternative MS0304-02 are as follows:

- Capital cost: $17,094
- Annual costs: $20,295 per year and $25,300 every 5 years
- 30-year NPW: $323,481

5.1.3 Alternative MS0304-03: Hydraulic Dredging with Off-yard Disposal

5.1.3.1 Description

Alternative MS0304-03 would consist of complete removal and off-yard disposal of contaminated sediment from the offshore areas of MS-03 and MS-04. Prior to removal, sampling would be conducted

to verify the extent of contamination. The general limits of the proposed dredging and physical/hydraulic removal are shown on Figure 5-2. Calculations supporting the reported volumes and quantities are provided in Appendix C. Because Alternative MS0304-03 removes the contaminated sediment, LUCs, O&M, inspections, and Five-Year Reviews would not be required with this alternative. Chemical-, location-, and action-specific ARARs and TBCs for this alternative are presented in Table 5-3.

The following describes the individual components of Alternative MS0304-03.

- Hydraulic Dredging – The pockets of contaminated sediment located offshore of PNS within the boundary of MS-03 and MS-04 would be dredged in their entirety. Hydraulic dredging would be performed using cutterheads and plain suction, using both onshore and offshore equipment. Onshore equipment would include sediment bags to contain dredged sediments, and pumps to move contaminated sediment from the river to the containment bags. Offshore equipment would include the hydraulic dredge pipeline and a boat to direct the dredging to the appropriate locations. The hydraulic dredging would include the removal of contaminated sediment and transportation of that material via pipeline to onshore staging areas where the removed sediment would be dewatered. BMPs would also be implemented to prevent the migration of re-suspended sediment to downstream watercourses. Based on the limits identified on Figure 5-2 it is estimated that 1,030 cy of in-place sediment would be dredged from the MS-03 and MS-04 areas. Upon dewatering and adding of fly ash to stabilize the material for transportation, an estimated 865 cy of stabilized sediment would be transported to an off-yard disposal facility

- Sampling – Sampling would be conducted during dredging activities to monitor the effectiveness of the sediment migration controls (BMPs). Continuous construction monitoring devices capable of measuring turbidity would be located downstream of the dredged area. Samples would also be collected from the exposed river bed to ensure that all contaminated sediment was removed.

- Dewatering - A temporary material handling area would be constructed near the MS-03 and MS-04 onshore areas. The material handling area would contain sediment bags into which the hydraulic dredging equipment would direct the flow of contaminated sediment and water. These bags would contain the sediment and allow the water to pass through. The water that passes through the sediment bags would be directed to a filter for cleaning prior to discharging back to the river. For the purposes of this evaluation, it is assumed that the collected water would be sampled for characterization purposes, and that direct discharge back to the river would be acceptable. The material handling area would be lined with an impermeable membrane and contain appropriate storage to prevent the infiltration or release of water removed from the sediment prior to obtaining results of the water characterization samples. If the characterization samples indicate that the water

is not of an appropriate quality, the water would be pumped out for treatment or disposal. When the sediment is dry, a loader and trucks would be needed to transport the sediment off-yard for disposal.

- Off-Yard Disposal - All dredged sediment would be dewatered, stockpiled, and characterized within the material handling area. After dewatering and characterization are complete, loaders and trucks would be used to transport the sediment to an approved off-yard TSD facility.

The volumes of dredging sediment identified in the text are presented for purposes of this FS. Actual volumes, along with actual number and frequency of characterization sampling would need to be established in the design/work plan documents that would be created as part of this remedial alternative.

5.1.3.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS0304-03 would be protective of the environment upon implementation. The complete removal of contaminated sediment and debris would prevent ecological receptors from being exposed to unacceptable levels of contamination in the MS-03 and MS-04 offshore areas. BMPs would be used to ensure protection of human health and the environment during removal of contaminated sediment.

Compliance with ARARs and TBCs

The implementation of Alternative MS0304-03 would comply with all chemical-, location-, and action-specific ARARs and TBCs.

Long-Term Effectiveness and Permanence

Alternative MS0304-03 would provide long-term effectiveness and permanence. Contaminated sediment associated with OU4 MS-03 and MS-04 would be removed from the site, protecting ecological receptors. Following implementation of Alternative MS0304-03, the site would be suitable for continued use with no need for LUCs because there would be no residual contamination remaining onsite. Verification samples would be required to confirm that the contaminated sediment has been removed. Following verification of contaminant removal, reviews of the site would not be necessary.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS0304-03 would not provide any active treatment technologies that would achieve reduction in toxicity, mobility, or volume of the contaminants within the MS-03 and MS-04

area sediments. Reduction of contamination toxicity, mobility, and volume within the sediment removed from MS-03 and MS-04 would be left to natural processes occurring at the off-yard disposal facility.

Short-Term Effectiveness

Alternative MS0304-03 would be effective in the short term, controls would be implemented during dredging and off-yard transportation and disposal activities to protect remediation construction workers, the community, and the environment until the dredging and disposal activities are completed. These controls would include providing adequate PPE for remediation workers and the use of construction BMPs to prevent the spread of contamination during construction and dredging activities. The RD and work plan would specify the necessary activities to ensure protection of human health and the environment during remedial activities.

Alternative MS0304-03 could be implemented within 1 year and would attain the RAOs upon completion. RD and work plan preparation could be completed within 1 year. Construction activities (temporary containment, removal, off-yard transportation and disposal) would be expected to take 3 months depending on weather, sediment dewatering time, and employee access restrictions.

Implementability

Alternative MS0304-03 would be implementable, but could pose some difficulties. Because dredging activities mobilize sediment, two or three passes with the dredging equipment are often required to remove all contaminated sediment. Resources and equipment for the proposed dredging and dewatering would be found locally. Controls would need to be in place for resuspended contaminants and residual contamination while dredging. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add an additional challenge to dredging activities. Local permitted landfill facilities are available for sediment and debris disposal.

Dredging would require a significant amount of energy to remove, dewater, load and transport the contaminated sediment to an off-yard disposal facility. In addition, the alternative would utilize valuable landfill space.

Cost

Cost estimates for Alternative MS0304-03 are included in Appendix C. The estimated costs for Alternative MS0304-03 are as follows:

- Capital cost: $745,410

5.2 COMPARATIVE ANALYSIS OF MS-03 AND MS-04 REMEDIAL ALTERNATIVES

This section compares the MS-03 and MS-04 remedial action alternatives discussed in Section 5.1 using the seven CERCLA criteria used in the evaluation of each individual alternative.

5.2.1 Overall Protection of Human Health and Environment

Alternatives MS0304-01 would not be protective of the environment. Alternative MS0304-02 would be protective of the environment but would depend on naturally occurring processes over time to achieve protection of the ecological receptors. Alternative MS0304-03 would use active remedial processes to eliminate the potential for unacceptable contaminant exposure to ecological receptors upon implementation. Alternative MS0304-03 would be protective of all receptors within 3 months of implementation and would be the most protective of all receptors because it would permanently remove all of the contaminated sediment.

5.2.2 Compliance with ARARs and TBCs

Alternative MS0304-01 does not comply with chemical-specific ARARs and TBCs, and has no location- or action-specific ARARs or TBCs. Alternative MS0304-02 would comply with all chemical-specific ARARs and TBCs once natural occurring processes reduce the contaminant concentrations to acceptable concentrations. There are no location- or action-specific ARARs or TBCs associated with this alternative. Alternative MS0304-03 would comply with chemical- location, and action-specific ARARs and TBCs upon implementation.

5.2.3 Long-Term Effectiveness and Permanence

Alternative MS0304-01 provides no long-term effectiveness because no action is taken under this alternative. Alternatives MS0304-02 and MS0304-03 provide long-term effectiveness and permanence. However, Alternatives MS0304-02 depends on naturally occurring processes to reduce COC concentrations to cleanup levels prior to realizing the long-term effectiveness and permanence. Alternative MS0304-02 includes monitoring to determine when the cleanup levels are achieved. Alternative MS0304-03 would provide long-term effectiveness and permanence upon implementation. Alternative MS0304-03 would be most effective because this alternative would remove the contaminated sediment. Removal would prevent ecological receptors from coming into contact with the contaminated sediment.

5.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives being considered would involve an active process that would reduce the toxicity, mobility, or volume of COCs. However, under all alternatives, natural processes would reduce the toxicity, mobility, and volume of the COCs regardless of the location of the contaminated sediment. Alternative MS0304-02 is the only alternative that would include the development of a monitoring program to monitor the rate at which natural processes degrade COC concentrations.

5.2.5 Short-Term Effectiveness

Because no action would occur, Alternative MS0304-01 is the only alternative that would have no short-term risks to site workers or no adverse impacts on the local community or the environment. The remaining alternatives, MS0304-02 and MS0304-03, would present some risks to site workers during sampling events or remedial activities. However, these risks and impacts can be controlled using PPE and BMPs. Potential risks associated with Alternative MS0304-02 would need to be protected against every time the area is inspected or monitored, and potential risks associated with Alternative MS0304-03 would need to be protected against during remedial activities.

5.2.6 Implementability

Alternative MS0304-01 would be easiest because there would be no activities to implement. Alternative MS0304-02 would be the second easiest because this alternative only relies on the implementation of a monitoring program. Alternative MS0304-03 would be considered the most difficult because this alternative involves the removal, processing, and off-yard transportation and disposal of contaminated sediment.

Excluding the no action alternative, Alternative MS0304-02 requires the least amount of energy usage, and does not utilize landfill space. Alternative MS0304-03 utilizes a significant amount of fuel energy and fills landfill space. As a result, Alternative MS0304-01 has the smallest remedial carbon foot-print, followed by Alternative MS0304-02, then Alternative MS0304-03.

5.2.7 Cost

The capital, O&M costs, and NPW for the MS-03 and MS-04 remedial alternatives are as follows.

Alternatives	Capital	Annual Costs	NPW (30 years)
MS0304-01 No Action	$0	$0	$0
MS0304-02 Monitored Natural Recovery	$17,094	$20,295/yr $25,300/5 yrs	$323,481
MS0304-03 Hydraulic Dredging and Off-yard Disposal	$745,410	$0	$745,410

Detailed cost estimates are provided in Appendix C.

5.3 SUMMARY OF COMPARATIVE ANALYSIS FOR MS-03 AND MS-04

Table 5-4 summarizes the comparative analysis of the OU4 MS-03 and MS-04 remedial alternatives.

TABLE 5-1

ALTERNATIVE MS0304-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To be considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC for the protection of freshwater and saltwater aquatic life were used to develop Preliminary Remediation Goals (PRGs), as appropriate. Because there is no action, PRGs would not be met.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs as appropriate. Because there is no action, PRGs would not be met.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	The regulations implementing this program set state-wide NRWQC for toxic pollutants in surface water are identified. State-wide criteria are set at federal NRWCQ levels.	The criteria were used to develop PRGs, as appropriate. Because there is no action, PRGs would not be met.

TABLE 5-1

ALTERNATIVE MS0304-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

TABLE 5-2

ALTERNATIVE MS0304-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 USC 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through monitored natural recovery.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.

TABLE 5-2

ALTERNATIVE MS0304-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through dredging and off-yard disposal.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act (16 USC 1451 et seq.)	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for offshore remedial actions that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Navigable Waters	Rivers and Harbors Act Section 10 [33 USC 403; 33 Code of Federal Regulations (CFR) 322 and 323]	Applicable	These regulations control unauthorized obstruction or alteration of navigable waters. Activities involving structures or work in or affecting navigable waters, excavation or deposition of materials in navigable waters are regulated under these requirements.	Remedial activities, such as dredging would be designed such that navigable waters would not be obstructed or altered.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Wetlands and US Waters	CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters including wetlands. No activity that adversely affects a wetland is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	A wetlands functions and values assessment would be conducted to guide mitigative efforts if wetlands could be adversely impacted during remedial activities.
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 107 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities including dredging, dewatering, and monitoring would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions, such as dredging that may impact the coastal floodplain or adjacent river. Remedial activities, such as dredging, would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design.
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	Federal Emergency Management Agency (FEMA) regulations that set forth the policy, procedure, and responsibilities to implement and enforce Executive Order 11990, Protection of Wetlands.	Remedial activities, such as dredging and access for equipment conducted within federal jurisdictional wetlands would be implemented in compliance with these standards.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE LOCATION-SPECIFIC ARARs and TBCs				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards (38 Maine Revised Statutes Annotated [MRSA] 480 et seq.; 06-096 CMR 305 1, 2, and 8)	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Dredging and construction near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river or adjacent wetlands during construction.
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities such as dredging and dewatering that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Wetlands	Maine Wetland Protection Rules (06 096 CMR Part 310)	Applicable	Standards are provided for protection of wetlands, as defined in MEDEP Chapter 1000 Guidelines for Municipal Shoreline Zoning Ordinances. Jurisdiction under the rules includes the area adjacent to the wetlands, which is the area within 75 feet of the normal high-water line. Activities that have an unreasonable impact on wetlands are prohibited.	A wetlands functions and values assessment would be conducted that would be used to guide restorative efforts for adjacent wetlands that may be adversely impacted by remedial activities. Remedial activities would be conducted to avoid impacts to wetlands and coastal wetlands which include tidal and subtidal lands.
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Surface Water	Clean Water Act [33 USC 1251 et seq.]; NRWQC	To be considered	These criteria are used to establish water quality standards for the protection of aquatic life.	These standards would be used for activities that may impact the water quality of the Piscataqua River. Remedial activities, such as dredging and dewatering would be conducted to reduce adverse impacts to the offshore. Stormwater management, erosion controls, and management of water discharges would be included in remedial activities, as appropriate.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	These regulations would be applicable to water management during dredging and where discharges 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.
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to publicly owned treatment works (POTW).	These regulations would be applicable to water management during dredging and where discharges to the sanitary sewer system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	NPDES (Storm water Permitting) 40 CFR 122.26	Applicable	Describes storm water discharge requirements from construction activities that disturb more than 1 acre.	Storm water management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit. Less than 1 acre to be disturbed, but overall Operable Unit (OU) 4 activities may be greater than 1 acre.
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes CMR 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements. Wastes from activities at this site are unlikely to be hazardous.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site according to the regulation until disposed of off-yard.
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to excavations and stockpiling dredged material. Applicable plans would be coordinated with MEDEP before implementation.
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	Although the individual disturbed areas and areas needed for dewatering are each less than 1 acre, the combined area for the OU #4 remedial action may be greater than 1 acre. Applicable plans would be coordinated with MEDEP before implementation.

TABLE 5-3

ALTERNATIVE MS0304-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for sediment handling. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq*.) and Waste Discharge Permitting Program [06-096 CMR 523 (Waste Discharge License Conditions) Sections 2, 5, and 6; and 06-096 CMR 528 (Pretreatment Program) Section 6]	Applicable	These standards regulate the discharge of pollutants from point sources to surface water or POTW.	Water discharged from sediment dewatering would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water or a POTW

TABLE 5-4

SUMMARY OF COMPARATIVE ANALYSIS OF MS-03 AND MS-04 REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS0304-01: No Action	Alternative MS0304-02: Monitored Natural Recovery	Alternative MS0304-03: Hydraulic Dredging with Off-yard Disposal
Overall Protection of Human Health and Environment	Would not be protective of the environment because no action would occur but would be protective of human health. Unacceptable ecological risks would remain.	Would be protective of human health and the environment. At the time of implementation contaminants would be left in place and ecological receptor contact pathways would still exist. As natural processes reduce contaminant concentrations, protection of the environment would be achieved.	Would be protective of human health and the environment by removing all contaminated sediment from the area.
Compliance with applicable or relevant and appropriate requirements (ARARs) and To be considered (TBCs)	Would not comply with chemical-specific ARARs and TBCs. Location- and action-specific ARARs do not apply.	Would comply with all chemical-specific ARARs and TBCs once chemical of concern (COC) concentrations are reduced to less than preliminary remediation goals (PRGs). Location- and action-specific ARARs do not apply.	Would comply with all chemical-, location-, and action-specific ARARs and TBCs upon implementation.
Long-Term Effectiveness and Permanence	Would not provide long-term effectiveness and permanence because no action would occur.	Would provide long-term effectiveness and permanence once contaminant concentrations are reduced to less than PRGs. Although COC concentrations would not be actively reduced, risks to ecological receptors would decrease with the natural reduction of COC concentrations.	Would provide long-term effectiveness and permanence by removing all contaminated sediment.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not provide reduction in toxicity, mobility, or volume through active treatment. However, natural processes would reduce toxicity, mobility, and volume over the long term.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no construction actions would occur.	Would not result in any short-term risk to the surrounding community or environment. Alternative implementation would result in periodic exposure to remedial workers during sampling events. These risks would be mitigated using appropriate personal protective equipment.	Would result in the possibility of exposing remediation workers, the surrounding community, and the environment to contaminated materials as a result of removal efforts. These risks are expected to be highest for this alternative because of the exposure of contaminated sediment. However, these risks would be reduced through compliance with appropriate use of personal protection equipment and implementation and maintenance of best management practices during construction. These risks would need to be mitigated over a 3 month construction schedule.
Implementability	Technical and administrative implementation would be simple because there would be no action to implement	Technical and administrative implementation would be simple because resources for developing and initiating a sediment monitoring program are readily available.	Because dredging activities mobilize contaminated sediment, two or three passes with the dredging equipment are often required to remove all contaminated sediment. Resources and equipment for the proposed dredging and dewatering would be found locally. Controls would need to be in place for resuspension of contaminants and residual contamination while dredging. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add an additional challenge to dredging activities. Local permitted landfill facilities are available for sediment and debris disposal.

TABLE 5-4

SUMMARY OF COMPARATIVE ANALYSIS OF MS-03 AND MS-04 REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS0304-01: No Action	Alternative MS0304-02: Monitored Natural Recovery	Alternative MS0304-03: Hydraulic Dredging with Off-yard Disposal
Costs:			
Capital:	$0	$17,094	$745,410
Annual:	$0	$20,295/yr, $25,300/5 yrs	$0
NPW:	$0	$323,481	$745,410

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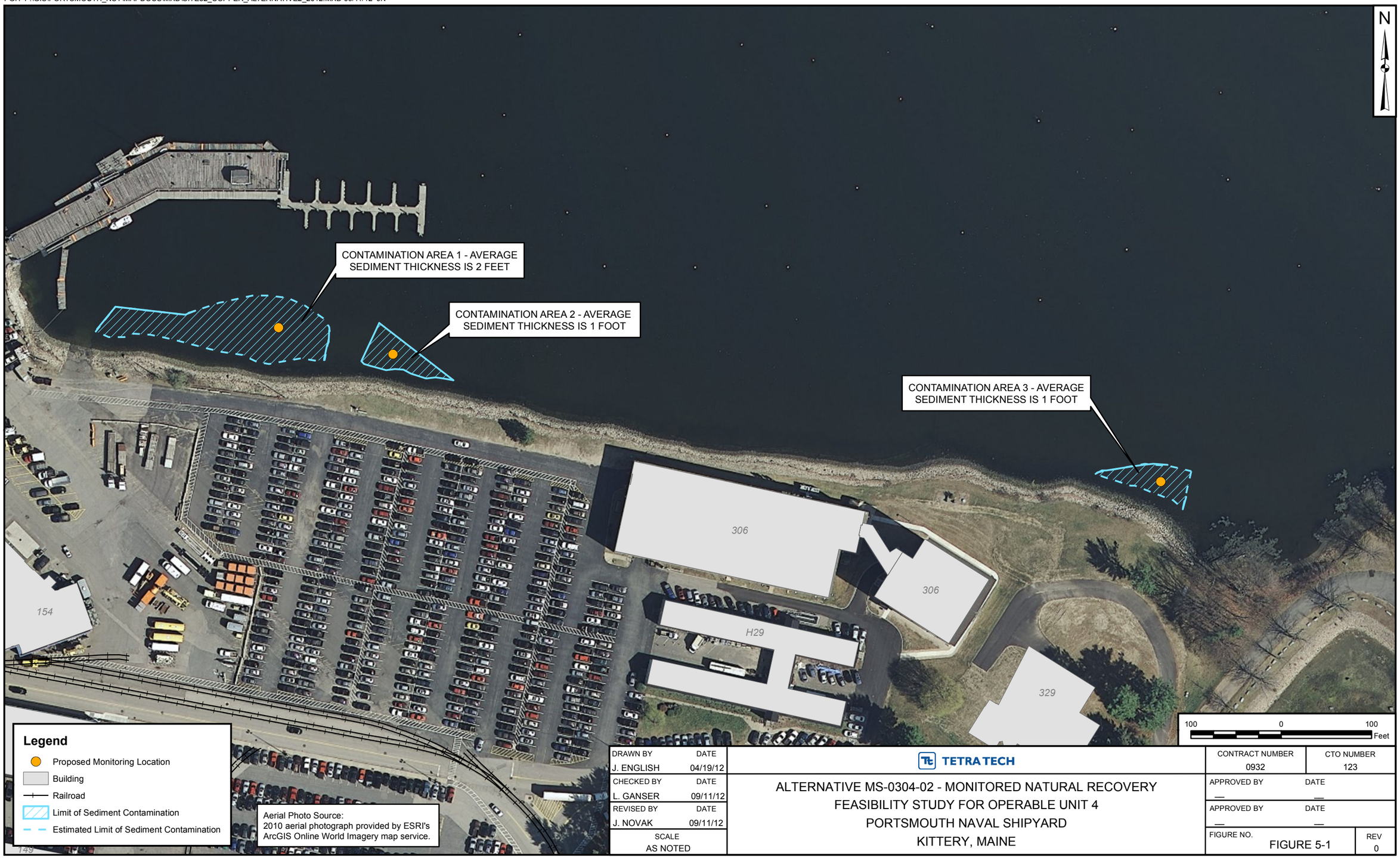

DRAWN BY	DATE
J. ENGLISH	04/19/12
CHECKED BY	DATE
L. GANSER	09/11/12
REVISED BY	DATE
J. NOVAK	09/11/12
SCALE	
AS NOTED	

TETRA TECH

ALTERNATIVE MS-0304-02 - MONITORED NATURAL RECOVERY
FEASIBILITY STUDY FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
0932	123
APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO.	REV
FIGURE 5-1	0

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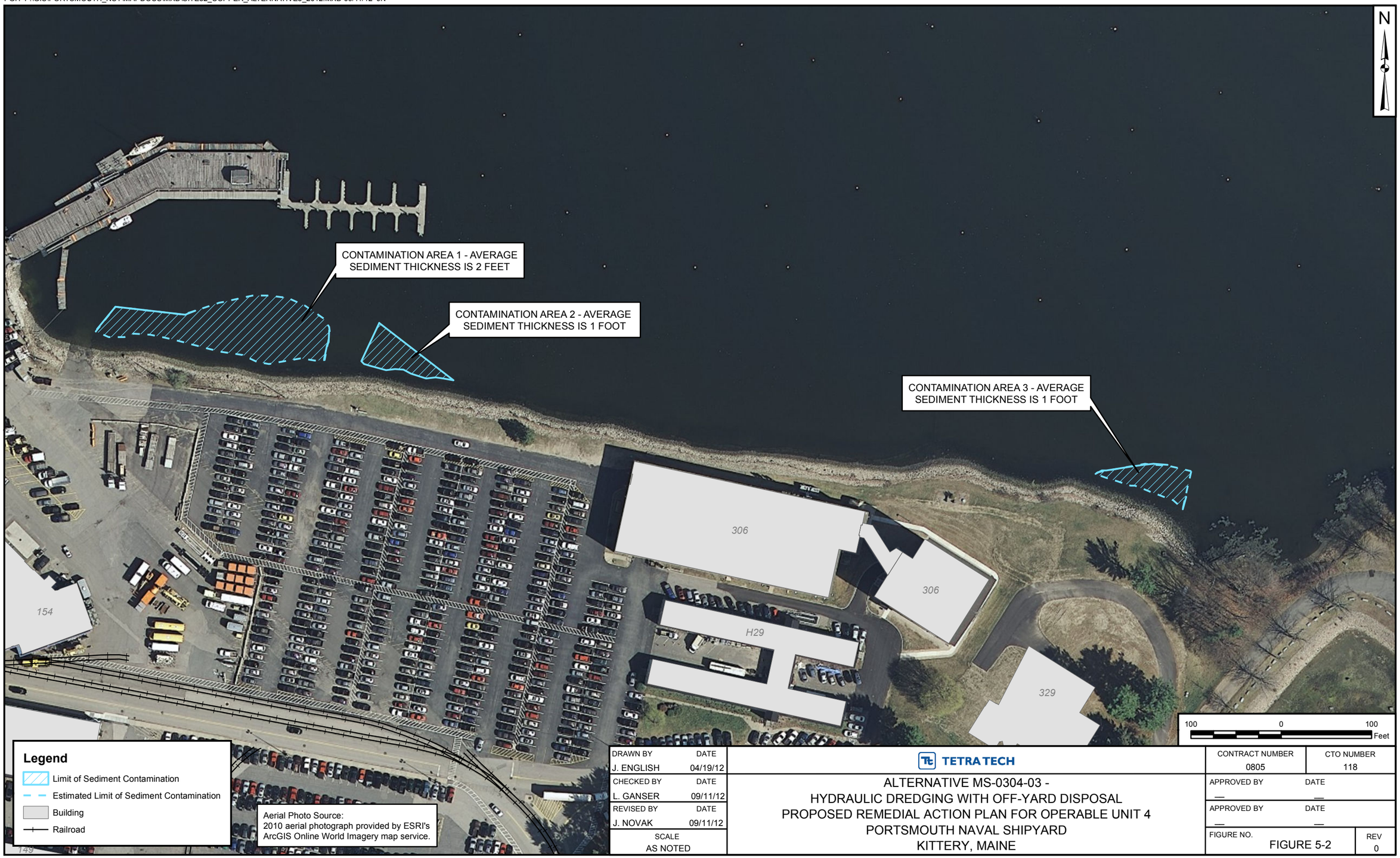

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J. ENGLISH	04/19/12
CHECKED BY	DATE
L. GANSER	09/11/12
REVISED BY	DATE
J. NOVAK	09/11/12
SCALE	
AS NOTED	

TETRA TECH

ALTERNATIVE MS-0304-03 -
HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
PROPOSED REMEDIAL ACTION PLAN FOR OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
0805	118
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO.	REV
FIGURE 5-2	0

6.0 DESCRIPTION AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES FOR MS-11

This section presents descriptions of the remedial alternatives developed for MS-11 and evaluations of each remedial alternative with respect to the criteria of the NCP of 40 CFR 300, as revised in 1990 and presented in Section 3.5.

6.1 COMPARISON OF REMEDIAL ALTERNATIVES BY CRITERIA FOR MS-11

The following remedial alternatives have been developed from the retained technologies presented in Table 3-2 to address the unacceptable COC (copper, lead, nickel) concentrations within MS-11 sediment:

- Alternative MS11-01 – No Action
- Alternative MS11-02 – Monitored Natural Recovery

The only sediment present in the MS-11 area was that which had settled between the large rocks along the shoreline, which is not a sufficient amount to cause unacceptable risk to ecological receptors. Therefore, monitored natural recovery is the only alternative, other than no action, being considered for MS-11. A description and detailed analysis of these alternatives are provided in the following sections.

6.1.1 Alternative MS11-01: No Action

6.1.1.1 Description

This alternative is required under CERCLA to establish a basis for comparison with other alternatives. No action includes no controls, remediation, or other actions to mitigate risks. Five-Year Reviews would not be included under the no action alternative. Because there is no action associated with Alternative MS11-01, this alternative has no location-specific or action-specific ARARs or TBCs. Chemical-specific ARARs and TBCs are presented in Table 6-1.

6.1.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS11-01 would be protective of the environment because currently there are no unacceptable risks to the environment associated with MS-11. However, this alternative would not include the development of a monitoring program or any other action to determine if there is a change in the MS-11 concentrations.

Compliance with ARARs and TBCs

The no action alternative would comply with chemical-specific ARARs and TBCs (see Table 6-1). There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS01-01 would provide long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative MS01-01 would not reduce the toxicity, mobility, or volume of contaminants through treatment.

Short-Term Effectiveness

Because no action would occur, implementation of Alternative MS11-01 would not pose a short-term risk to site workers or result in adverse impacts to the local community or the environment.

Implementability

Alternative MS11-01 would be readily implementable because there would be nothing to implement. The technical feasibility criteria including constructability, operability, and reliability are not applicable. The implementability of administrative measures is not applicable because no such measures would be taken.

Alternative MS11-01 is considered a sustainable remediation because no energy would be used to implement the activity, and the remediation of OU4 MS-11 would be left to naturally occurring processes.

Cost

There would be no costs associated with Alternative MS11-01 because there are no remedial components.

6.1.2 Alternative MS11-02: Monitored Natural Recovery

6.1.2.1 Description

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. When this alternative was first proposed, concentrations of copper, lead, and nickel in sediment were greater than PRGs. However, based on the

results of the Round 11 interim offshore monitoring program sampling for OU4, concentrations of copper, lead, and nickel were less than PRGs at MS-11 Loc. 3. Sediment is not present at MS-11 Locs. 1 and 2 because the shoreline activities conducted in this area, described below, eliminated soil erosion. Based on the location of MS-11 (and the contaminants), the naturally occurring processes by MS-11 Loc. 3 are limited to reduction in contamination concentrations due to dispersion and onshore source control.

Although sedimentation modeling has not been completed for MS-11 Loc. 3, it is expected that contaminant concentrations would decrease further as a result of recent shoreline stabilization activities and upon implementation of the remedy for the onshore area. The shoreline stabilization activities include: 1) a 1999 emergency removal action (shoreline erosion controls) at 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 at 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 onshore remedial actions complete, contaminants would 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 from other locations would settle out in this area. Observations have identified the MS-11 offshore area as a sediment dispersion area and not a deposition area. Further concentration reduction is not needed to meet the RAO for MS-11, because concentrations of metals in the recent (2011) interim offshore monitoring program sampling round were less than PRGs. Alternative MS11-02 would be used to ensure that there is not an accumulation of sediment with COC concentrations greater than PRGs and 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, and one sediment sample will be collected from MS-11, Locs. 1 and 2 (if sediment is present) 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.

Because sampling would continue with this alternative, the Five-Year Review process would be used to establish the continued sediment accumulation and COC concentration trends. In the event that sediment concentrations continue to decrease, or if there is no measurable sediment accumulation at MS-11, the Five-Year Review process would be used to make the determination to discontinue sampling for MS-11.

The number and location of samples are presented in the FS for the purposes of describing the alternative and developing an associated cost estimate for the alternative. Actual sample numbers, locations, and analytical lists would be established in the long-term monitoring plan that would be developed for this alternative.

6.1.2.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS11-02 would be protective of the environment for MS-11 because currently there are no unacceptable risks to the environment associated with MS-11. The sampling associated with Alternative MS11-02 would be used to confirm that a significant sediment accumulation with concentrations of COCs greater than PRGs is not occurring. If sediment with COC concentrations greater than PRGs is accumulating in the area, a determination of the adequacy of the alternative would be made in accordance with the decision identified in the long-term monitoring plan.

Compliance with ARARs and TBCs

Under current conditions, Alternative MS11-02 complies with chemical-specific ARARs and TBCs. There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Under current conditions, the limited area of sediment contamination at MS-11 indicates that Alternative MS11-02 would provide long-term effectiveness and permanence. Even though this alternative would not provide actions that would further reduce COC concentrations or provide reliable controls to protect against unacceptable exposure to contamination in the long term, current ecological risk indicate that active remediation would not be required to achieve long-term effectiveness and permanence. Five-Year Reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative MS11-02 would achieve no reduction in toxicity, mobility, or volume through treatment. There are no principle treatments or processes associated with this alternative. Reduction of contaminant toxicity, mobility, and volume may occur over the long term through naturally occurring processes.

Short-Term Effectiveness

Alternative MS11-02 would be effective in the short term. Implementation of this alternative would not adversely impact the surrounding community or the environment any more than it currently does. However, even though there is no human health risk at OU4, PPE would be used to protect site workers (samplers) during periodic monitoring.

Alternative MS11-02 could be implemented with the signing of a ROD. Existing sample information could be used as the baseline for COC concentrations, and within 1 year a long-term monitoring plan could be prepared for the collection of periodic progress samples.

Implementability

Alternative MS11-02 would be readily implementable. Resources for developing and initiating a sediment monitoring program are readily available.

Alternative MS11-02 is considered a sustainable remediation because minimal energy would be used to implement the activity and the remediation of the OU4 MS-11 area would be left to naturally occurring processes. Energy usage would be limited to sampling personnel mobilizing and de-mobilizing from the site.

Cost

Cost estimates for Alternative MS11-02 are included in Appendix C. The estimated costs for Alternative MS11-02 are as follows:

- Capital cost: $17,094
- Annual costs: $18,755 per year and $25,300 every 5 years
- 30-year NPW: $304,372

6.2 COMPARATIVE ANALYSIS OF MS-11 REMEDIAL ALTERNATIVES

This section compares the MS-11 remedial action alternatives discussed in Section 6.1 using the seven CERCLA evaluation criteria used in the evaluation of each individual alternative.

6.2.1 Overall Protection of Human Health and Environment

Under current conditions, the area of contaminated sediment at MS-11 does not cause a risk; therefore, both Alternative MS11-01 and Alternative MS11-02 would protect the environment. Both are protective of human health.

6.2.2 Compliance with ARARs and TBCs

Alternatives MS11-01 and MS11-02 would comply with ARARs. Alternatives MS11-01 and MS11-02 have no location- or action-specific ARARs and TBCs to comply with.

6.2.3 Long-Term Effectiveness and Permanence

Alternative MS11-01 provides long-term effectiveness. Alternative MS11-02 provides long-term effectiveness and permanence and would identify whether current conditions would change in a manner that would result in ecological risks.

6.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Neither of the alternatives being considered would involve an active process that would reduce the toxicity, mobility, or volume of COCs. However, under both alternatives, natural processes would reduce the toxicity, mobility, and volume of the COCs regardless of the location of the contaminated sediment. Alternative MS11-02 would include the development of a monitoring program to monitor the rate at which natural processes further degrade COC concentrations.

6.2.5 Short-Term Effectiveness

Because no action would occur, Alternative MS11-01 would have no short-term risks to site workers, and no adverse impacts on the local community or the environment. The remaining alternative, MS11-02, would present some risks to site workers during sampling events. However, these risks and impacts can be controlled using PPE and BMPs. Potential risks associated with Alternative MS01-02 would need to be protected against every time the area is inspected or monitored.

6.2.6 Implementability

Alternative MS11-01 would be easiest because there would be no activities to implement. Alternative MS11-02 would also be relatively easy because this alternative only relies on the implementation of a monitoring program.

Both alternatives require very little energy usage. Alternative MS11-01 has the smaller remedial carbon foot-print.

6.2.7 Cost

The capital, O&M costs, and NPW for the MS-11 remedial alternatives are as follows.

Alternatives	Capital	Annual Costs	NPW (30 years)
MS11-01 No Action	$0	$0	$0
MS11-02 Monitored Natural Recovery	$17,094	$18,755/yr $25,300/5 yrs	$304,372

Detailed cost estimates are provided in Appendix C.

6.3 SUMMARY OF COMPARATIVE ANALYSIS FOR MS-11

Table 6-3 summarizes the comparative analysis of the OU4 MS-11 remedial alternatives.

TABLE 6-1

ALTERNATIVE MS11-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq,	To be considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC for the protection of freshwater and saltwater aquatic life were used to develop Preliminary Remediation Goals (PRGs), as appropriate. Current concentrations of COCs are less than PRGs.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs as appropriate. Current concentrations of COCs are less than PRGs.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. Current concentrations of COCs are less than PRGs.

TABLE 6-1

ALTERNATIVE MS11-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

TABLE 6-2

ALTERNATIVE MS11-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 USC 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. Current concentrations of COCs are less than PRGs.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. Current concentrations of COCs are less than PRGs.

TABLE 6-2

ALTERNATIVE MS11-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the state.	The criteria were used to develop PRGs, as appropriate. Current concentrations of COCs are less than PRGs.

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

TABLE 6-3

SUMMARY OF COMPARATIVE ANALYSIS OF MS-11 REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS-11-01: No Action	Alternative MS-11-02: Monitored Natural Recovery
Overall Protection of Human Health and Environment	Would be protective of human health and the environment. Currently, chemicals of concern (COC) concentrations are less than the established preliminary remediation goals (PRGs).	Would be protective of human health and the environment. Currently COC concentrations are less than the established PRGs. Monitoring would be conducted to determine if concentrations remain less than PRGs.
Compliance with applicable or relevant and appropriate requirements (ARARs) and to be considered (TBCs)	Would comply with chemical-specific ARARs. Location- and action-specific ARARs do not apply.	Would comply with all chemical-specific ARARs. Location- and action-specific ARARs do not apply.
Long-Term Effectiveness and Permanence	Would provide long-term effectiveness and permanence.	Would provide long-term effectiveness and permanence because COC concentrations would be monitored and five-year reviews would be conducted to ensure the adequacy of the remedy.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no construction actions would occur.	Would not result in any short-term risk to the surrounding community or environment. Alternative implementation would result in periodic exposure to remedial workers during sampling events. These risks would be mitigated using appropriate personal protective equipment.
Implementability	Technical and administrative implementation would be simple because there would be no action to implement.	Technical and administrative implementation would be simple because resources for developing and initiating a sediment monitoring program are readily available.
Costs:		
Capital:	$0	$17,094
Annual:	$0	$18,755/yr, $25,300/5 years
NPW (Net Present Worth):	$0	$304,372

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932 / CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 04/26/12	ALTERNATIVE MS-11-02 - MONITORED NATURAL RECOVERY FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
REVISED BY —	DATE —		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 6-1 / REV 0

7.0 DESCRIPTION AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES FOR MS-12

MS-12 includes two areas that require the implementation of a remedial alternative. Because of the difference in COCs and physical setting between the two areas, they are considered separately. 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 2-3 for the locations of MS-12A and MS-12B. This section presents descriptions of the remedial alternatives developed for MS-12A and MS-12B, and an evaluation of each remedial alternative with respect to the criteria of the NCP of 40 CFR 300, as revised in 1990 and presented in Section 3.5.

7.1 COMPARISON OF REMEDIAL ALTERNATIVES BY CRITERIA FOR MS-12A

The following remedial alternatives have been developed from the retained technologies presented in Table 3-2 to address the unacceptable COC (lead and PAHs) concentrations within MS-12A sediment:

- Alternative MS12A-01 – No Action
- Alternative MS12A-02 – Containment, LUCs, and Monitoring
- Alternative MS12A-03 – Partial Removal, Off-yard Disposal, Containment and LUCs
- Alternative MS12A-04 – Complete Removal with Off-yard Disposal

A description and detailed analysis of these alternatives are provided in the following sections.

7.1.1 Alternative MS12A-01: No Action

7.1.1.1 Description

This alternative is required under CERCLA to establish a basis for comparison with other alternatives. No action would include no controls, no remediation, and no other actions to mitigate risks. Five-Year Reviews would not be included under the no action alternative. Because there is no action associated with Alternative MS12A-01, this alternative has no location- or action-specific ARARs and TBCs. Chemical-specific ARARs and TBCs are presented in Table 7-1.

7.1.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12A-01 would not be protective of the environment.

Compliance with ARARs and TBCs

The no action alternative would not comply with chemical-specific ARARs and TBCs (see Table 7-1). There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

The no action alternative (Alternative MS12A-01) would provide no long-term effectiveness and permanence, because no action would occur.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative MS12A-01 would not reduce the toxicity, mobility, or volume of contaminants through treatment.

Short-Term Effectiveness

Because no action would occur, implementation of Alternative MS12A-01 would not pose a short-term risk to onsite workers or result in adverse impacts to the local community or the environment. However, Alternative MS12A-01 would not meet the RAO within the short-term because it would not provide adequate protection to ecological receptors.

Implementability

Alternative MS12A-01 would be readily implementable because there would be nothing to implement. The technical feasibility criteria including constructability, operability, and reliability are not applicable. The implementability of administrative measures is not applicable because no such measures would be taken.

Alternative MS12A-01 is considered a sustainable remediation because no energy would be used to implement the activity, and the remediation of the MS-12A would be left to naturally occurring processes.

Cost

There would be no costs associated with Alternative MS12A-01 because there are no remedial components.

7.1.2 Alternative MS12A-02: Containment, LUCs and Monitoring

7.1.2.1 Description

Alternative MS12A-02 would consist of constructing a containment barrier to prevent sediment within Building 178 from migrating into the Piscataqua River, thus removing the ongoing source of contamination to the offshore habitats. LUCs would be implemented to ensure the containment barrier continues to function as designed. Chemical-, location-, and action-specific ARARs and TBCs for this alternative are presented in Table 7-2.

The following text describes the components of this alternative.

- Construction of a Containment Barrier - The containment barrier would be constructed as a concrete wall outside of Building 178 (see Figure 7-1 for the proposed containment barrier location). Before construction could begin, the area would be cleared of sediment using a skid-steer or other mechanical removal device. The barrier would extend 1 foot higher than the maximum height of water at high tide at the door to Building 178 (estimated height would be 6 feet), so that the incoming water would not be able to breach the barrier and enter the building. The barrier wall and any cracks in the concrete floor would be sealed to prevent water from bypassing the barrier. The concrete containment wall would also be equipped with a pump, filter, and outlet piping so that if any water were to breach the barrier due to an excessively high tide, storm, etc., it would be easily removed from the inside of Building 178. The filtration device would be needed on this outlet to prevent the migration of contaminated sediment that would remain in Building 178.

- LUCs, Monitoring and Inspections - The Navy would prepare a LUC RD that would document the LUCs, containment O&M requirements, containment inspection requirements, and organizations responsible for implementing and maintaining LUCs. As part of the evaluation of Alternative MS12A-02, it was assumed that annual inspections would be conducted to verify the integrity of the containment barrier. The results of the annual site inspections would identify minor and major containment system repair requirements and the status of LUCs. A monitoring program would be initiated to ensure the containment system performs as intended over the long-term and to evaluate offshore contaminant contribution. Sediment sampling locations would be established to evaluate the continued performance of the containment barrier and to ensure that contaminants do not migrate

from the onshore to the offshore area. Overtime, naturally occurring processes such as sediment deposition and COC concentration degradation due to source removals would reduce the COC concentrations found in the sediment on the boat ramp outside of Building 178.

- Monitored Natural Recovery - Sediment sampling locations would be established to evaluate the COC concentrations found in the sediment on the boat ramp outside of Building 178. After the containment barrier is constructed, naturally occurring processes, such as sediment dispersion and COC concentration degradation due to source removal, is expected to reduce the COC concentrations found in the sediment.

- Five-Year Reviews - Because contamination would remain in excess of levels that allow for unlimited use and unrestricted exposure inside Building 178, Five-Year Reviews would be required under this alternative to evaluate the continued adequacy of the remedy.

The type of containment barrier materials, and the locations and numbers of the proposed long-term sediment sampling are presented for purposes of this FS. Actual materials, sampling locations, and sample number and frequency would be established in the design/work plan documents and long-term monitoring plan documents that would be created as part of this remedial alternative.

7.1.2.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12A-02 would be somewhat protective of the environment. The LUCs would ensure that activities at Building 178 are regulated to reduce the spread of contaminants that are left in place and would also provide a mechanism to ensure that periodic inspections are performed to check the integrity of the concrete barrier. The containment barrier would prevent further migration of contamination to offshore habitats. Sediment sampling would be used to evaluate the COC concentrations found in the sediment on the boat ramp outside of Building 178

Compliance with ARARs and TBCs

The implementation of this alternative would result in the compliance with location-, and action-specific ARARs and TBCs. However, Alternative MS12A-02 would not fully comply with chemical-specific ARAR and TBCs until naturally occurring processes reduce the concentrations of COCs in the sediment to the established cleanup goals.

Long-Term Effectiveness and Permanence

Alternative MS12A-02 would provide little long-term effectiveness and permanence because the contaminated sediment would remain in place. The containment barrier would be effective in preventing the migration of Building 178 contaminants to the Piscataqua River. Alternative MS12A-02 would also provide long-term effectiveness and permanence for the ecological receptors once naturally occurring processes reduce the COC concentrations to the established cleanup goals, or naturally occurring sediment deposition provides a cover over impacted sediments preventing ecological exposure. Although no modeling has been completed for COC degradation rates or sediment deposition rates, it is expected that the PAH concentration would be reduced to the cleanup goal before the lead concentration.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS12A-02 does not provide any active treatment technologies that would achieve reduction in toxicity, mobility, or volume of the contaminants onshore or offshore at OU4 MS-12A. Reduction of contaminant toxicity, mobility, and volume would be left to natural processes.

Short-Term Effectiveness

Alternative MS12A-02 would be effective in the short term because actions would not expose the environment and surrounding community to any additional risks. PPE would be used to protect site workers (samplers) during periodic monitoring. Industry standard controls would be implemented to protect remediation construction workers and the surrounding environment until remedial activities are completed. Construction BMPs would be utilized to prevent the spread of contamination during construction. Upon construction completion and LUC implementation, this alternative would not adversely impact the surrounding community or the environment.

Alternative MS12A-02 could be implemented within 1 year, but would not meet the RAOs for the site upon implementation. Alternative MS12A-02 would prevent further migration of Building 178 contamination to the Piscataqua River, but would not protect the environment in any other way. RD, work plan, and LUC RD preparation could be completed within 1 year. Construction activities (containment barrier construction) would be expected to take 1 month depending on weather and employee access requirements.

Implementability

Alternative MS12A-02 would be easily implementable. Resources for the construction of the proposed concrete barrier are locally available. The RD and design work plan would provide the specifications for processes required for the construction of the proposed containment barrier wall. The necessary health

and safety requirements for construction activities associated with implementation of this alternative would be identified in the design work plan. Administratively, implementation and enforcement of LUCs and performance of Five-Year Reviews would be relatively simple to implement. Sediment sampling and a monitoring plan would also be relatively simple to implement. Uncertainty associated with implementing this alternative is with the condition of Building 178. Currently, access to the building is limited on days with high winds. Based on the building conditions and tidal action, it is likely that implementation of this alternative would have a larger number of restricted work days as compared to similar projects.

Alternative MS12A-02 would require the utilization of equipment and trucks that would use a substantial amount of fuel/energy to move materials from off-yard sources to the MS-12A area. Additional fuel/energy would be used to place the concrete barrier when needed. However, the alternative would not require the use of landfill space.

Cost

Cost estimates for Alternative MS12A-02 are included in Appendix C. The estimated costs for Alternative MS12A-02 are as follows:

- Capital cost: $369,626
- Annual costs: $20,174 per year and $25,900 every 5 years
- 30-Year NPW: $675,807

7.1.3 Alternative MS12A-03: Partial Removal, Off-yard Disposal, Containment, and LUCs

7.1.3.1 Description

Alternative MS12A-03 would consist of removing contaminated sediment from the offshore portion of MS-12A and the tidal zone located outside Building 178 by constructing a containment barrier and hydraulic dredging. The barrier would be constructed to prevent sediment remaining inside Building 178 from migrating to the Piscataqua River. Lastly, this alternative includes LUCs for areas where contamination remains in place (within Building 178). Although this alternative would allow contaminated sediment to remain inside Building 178, it was considered because of the difficulty in implementing the removal of sediment inside the building under current conditions. The barrier wall would prevent contaminated sediment inside of the building from migrating to the offshore area, and would prevent benthic invertebrates from contacting the sediment inside the building. This would allow the sediment outside of the building, where risks to benthic invertebrates are greatest, to be removed without a concern that the area would be recontaminated by sediment inside the building. The proposed dredging would remove approximately 1,585 cy of contaminated sediment from the MS-12A area outside of Building 178 (see

Figure 7-2). Chemical-, location-, and action-specific ARARs and TBCs for this alternative are presented in Table 7-3.

The following text describes the components of this alternative.

- Hydraulic Dredging – Contaminated sediment associated with MS-12A, located in the offshore and tidal zone outside of Building 178, would be dredged outside the limits of the eelgrass (limits of dredging presented on Figure 7-2). Hydraulic dredging would be performed using cutterheads and suction, and using both onshore and offshore equipment. Onshore equipment would include sediment bags to contain dredged sediments, and pumping equipment to move contaminated sediment from the river to the containment bags. Offshore equipment would include the hydraulic dredge pipeline and a boat to direct the dredging to the appropriate locations. The hydraulic dredging would include the removal of contaminated sediment and transportation of that material via pipeline to onshore staging areas where the removed sediment would be dewatered. BMPs would also be implemented to prevent the migration of re-suspended sediment to downstream watercourses, and to contain sediment during the dewatering process. Based on the limits identified on Figure 7-2 it is estimated that 1,585 cy of in place sediment would be dredged from the MS-12A area. Upon dewatering and adding of fly ash to stabilize the material for transportation, an estimated 1,331 cy of stabilized sediment would be transported to an off-yard disposal facility

- Dewatering – Dewatering would be conducted on the sediment dredged from the limits identified on Figure 7-2. Water removed from the sediment would be contained and sampled prior to discharge. It is assumed for the purposes of this FS that the retained water will be discharged to the Piscataqua River following characterization. If the water is not of an appropriate quality, it would need to be pumped out for treatment or disposal. When the sediment is dry, a loader and truck would be needed to transport the sediment off-yard. Sediment would then be disposed of off-yard at an appropriate TSD facility.

- Containment Barrier - The containment barrier would be constructed as a concrete wall outside of Building 178. Before construction could begin, the area would be cleared of sediment using a skid-steer or other mechanical removal device. The barrier would extend 1 foot higher than the maximum height of water at high tide at the door to Building 178 (estimated height of 6 feet), so that the incoming water would not be able to breach the barrier and enter the building. The barrier wall would be sealed to prevent water from entering/leaving the building through cracks, and any cracks/openings in the floor would be sealed to prevent water from entering/leaving the building prior to treatment. The concrete wall would also be equipped with a pump, filter and piping so that if any water were to breach the barrier as a result of an excessively high tide, storm, etc., it would be easily

removed from the area containing sediments. The filtration device would be needed on this outlet to prevent the migration of contaminated sediment that would remain in Building 178.

- LUCs and Inspections - The Navy would prepare a LUC plan that would document the LUCs, inspection requirements for the containment system, and organizations responsible for implementation of LUCs. As part of the evaluation of Alternative MS12A-03, it is assumed that annual inspections of the site would be conducted to verify continued effectiveness of the LUCs, and to provide periodic minor repair to the containment system based on the results of annual site inspections.

- Five-Year Reviews - Because contamination would remain in excess of levels that allow for unlimited use and unrestricted exposure inside Building 178, Five-Year Reviews would be required under this alternative to evaluate the continued adequacy of the remedy.

The type of containment barrier materials and amount of dredged sediment are presented for purposes of this FS. Actual materials, volumes, and inspection frequency would be established in the design/work plan documents and long-term monitoring plan documents that would be created as part of this remedial alternative.

7.1.3.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12A-03 would be protective of the environment. The removal of contaminated sediment offshore and within the tidal zone outside of Building 178 would prevent ecological receptors from being exposed to unacceptable levels of contamination in the offshore areas of MS-12A. The containment barrier would prevent further migration of contamination to offshore habitats.

Compliance with ARARs and TBCs

The implementation of Alternative MS12A-03 would comply with all chemical-, location-, and action-specific ARARs and TBCs.

Long-Term Effectiveness and Permanence

Alternative MS12A-03 would provide long-term effectiveness and permanence. The removal of contaminated sediment from the offshore and tidal zone outside of Building 178 would protect ecological receptors, and the containment barrier would prevent further contamination from entering the river from the tidal zone within Building 178. Because of sediment re-suspension, sites do not always meet

remediation goals under dredging, particularly on the first pass; however, any removal of contaminated sediment would be effective in reducing risks to receptors. In some instances two or three passes with the dredging equipment may be needed to attain cleanup goals.

Under Alternative MS12A-03, the site would be suitable for continued occupational use, and LUCs would provide a process to inspect the containment barrier and maintain access controls for Building 178. Five-year reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS12A-03 does not provide any active treatment technologies that would achieve reduction in toxicity, mobility, or volume of the contaminants onshore or offshore at MS-12A. Reduction of contamination toxicity, mobility, and volume would be left to naturally occurring processes.

Short-Term Effectiveness

Alternative MS12A-03 would be effective in the short term, but could allow workers and the community to be exposed to adverse conditions during remediation. Because dredging, off-site disposal, and containment activities are a component of the alternative, controls would be implemented to protect remediation construction workers, Building 178 employees, public property along haul routes, and the environment until the sediment from offshore is removed and LUCs are implemented. These controls would include providing adequate PPE for remediation construction workers, designated access routes for the employees of Building 178, limiting the number of trucks that can travel though the community in a day, and construction of BMPs to prevent the spread of contamination during construction. Upon construction completion, the containment system and implementation of LUCs would not adversely impact the surrounding community or the environment. The RD and work plan would specify the necessary activities to ensure protection of human health and the environment during remedial activities.

Alternative MS12A-03 could be implemented within 1 year and would attain the RAOs upon implementation. RD, work plan, and LUC plan preparation could be completed within 1 year. Construction activities (containment concrete wall construction and dredging of the offshore area) would be expected to take 3 months, depending on weather and employee access requirements.

Implementability

Alternative MS12A-03 would be implementable, but could pose some difficulties. Resources for the construction of the proposed soil containment system are locally available. Dredging and disposal could

be completed using conventional equipment and facilities that are also readily available in the surrounding area. Because this is an active area of PNS, there are various utilities in and around the proposed removal area. Therefore, utilities would need to be located and protected during the implementation of this alternative. Controls would need to be in place for resuspended contaminants and residual contamination, and it could be difficult to maneuver dredging equipment around infrastructure or boat traffic at the site. The RD and design work plan would provide the specifications for processes required for the construction of the proposed containment system. The necessary health and safety requirements for construction activities associated with implementation of this alternative would be identified in the design work plan. Administratively, implementation and enforcement of LUCs and performance of Five-Year Reviews would be relatively simple to implement. Uncertainty associated with implementing this alternative is with the condition of Building 178. Currently, access to the building is limited on days with high winds. Based on the building conditions and tidal action, it is likely that implementation of this alternative would have a larger number of restricted work days, as compared to similar projects.

Dredging would require a significant amount of energy to remove, dewater, load, and transport the contaminated sediment to an off-yard disposal facility. In addition the alternative would utilize valuable landfill space.

Cost

Cost estimates for Alternative MS12A-03 are included in Appendix C. The estimated costs for Alternative MS12A-03 are as follows:

- Capital cost: $1,305,682
- Annual costs: $19,327 per year and $25,900 every 5 years
- 30-year NPW: $1,601,353

7.1.4 Alternative MS12A-04: Complete Removal with Off-yard Disposal

7.1.4.1 Description

Alternative MS12A-04 would consist of complete removal with off-yard disposal of contaminated sediment from the onshore and tidal areas of MS-12A. The limits of the proposed dredging and removal are shown on Figure 7-3. Based on the limits presented on Figure 7-3, 900 cy of contaminated sediment would be removed from MS-12A. Because the removal process would remove all sediment above the concrete ramp (outside the limits of the eelgrass) and expose the underlying concrete, no verification sample would be collected. Because Alternative MS12A-04 removes the contaminated sediment, LUCs, O&M,

inspections, and Five-Year Reviews would not be required with this alternative. Chemical-, location-, and action-specific ARARs and TBCs for this alternative are presented in Table 7-4.

The following describes the individual components of Alternative MS12A-04.

- Hydraulic Dredging – 1,585 cy of contaminated sediment and debris located in the offshore and tidal zone outside Building 178 on the concrete ramp would be dredged outside the limits of the delineated eelgrass. 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 would not be dredged. Once the remaining sediment on the ramp is removed, risks to ecological receptors in this area would be acceptable. Hydraulic dredging would be performed using cutterheads and suction, and using both onshore and offshore equipment. Onshore equipment would include sediment bags to contain dredged sediments and pumping equipment to move contaminated sediment from the river to the containment bags. Offshore equipment would include the hydraulic dredge pipeline and a boat to direct the dredging to the appropriate locations. The hydraulic dredging would include the removal of contaminated sediment and transportation of that material via pipeline to onshore staging areas where the removed sediment would be dewatered. BMPs would also be implemented to prevent the migration of re-suspended sediment to downstream watercourses, and to contain sediment during the dewatering process.

- Dewatering – Dewatering would be conducted on the sediment dredged from the limits identified on Figure 7-3. Water removed from the sediment would be contained and sampled prior to discharge. It is assumed for the purposes of this FS that the retained water would be discharged to the Piscataqua River following characterization. If the water is not of an appropriate quality, it would need to be pumped out for treatment or disposal. When the sediment is dry, a loader and truck would be needed to transport the sediment off-yard. Sediment would then be disposed of off-yard at an appropriate TSD facility

- Physical Removal – 150 cy of sediment within Building 178 (limits identified on Figure 7-3) would be removed via power washing and/or physical removal (shovels, push-brooms, etc.) as needed until all sediment is removed from the onshore portion of MS-12A. During removal of sediment within Building 178, a temporary dam structure would be erected to prevent the tide from entering. All excavated material from the onshore area would be stockpiled and characterized along with the sediment removed via dredging. After characterization, the excavated material would be properly transported and disposed of off-yard.

- Off-yard Disposal – Once the onshore and offshore sediments are dried, characterized, and combined, loaders would load the trucks used to transport the sediment off-yard to an appropriate TSD facility.

The amount of removed sediment is presented for purposes of this FS. Actual materials, volumes, and inspection frequency would be established in the design/work plan documents that would be created as part of this remedial alternative.

7.1.4.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12A-04 would be protective of the environment. As indicated, once the sediment is removed from the ramp and Building 178, the sediment remaining within the limits of the eelgrass would not present an unacceptable risk to ecological receptors.

Compliance with ARARs and TBCs

The implementation of Alternative MS12A-04 would comply with all chemical-, location-, and action-specific ARARs and TBCs.

Long-Term Effectiveness and Permanence

Alternative MS12A-04 would provide long-term effectiveness and permanence. Because of sediment re-suspension, sites do not always meet remediation goals after dredging, particularly on the first pass; however, any removal of contaminated sediment would be effective in reducing risks to receptors. In some instances, two or three passes with the dredging equipment may be needed to attain cleanup goals. Onshore contamination would be removed fairly easily.

Following implementation of Alternative MS12A-04, the site would be suitable for continued use with no need for LUCs because there would be no ecological risks remaining. Verification samples would not be required to guarantee that the site was free of contamination, since removal is verified by the concrete ramp. Lastly, Five-Year Reviews of MS-12A would not be necessary.

Reduction of Toxicity, Mobility, or Volume through Treatment

Although Alternative MS12A-04 would remove contaminated sediment and debris from the OU4 MS-12A, implementation of Alternative MS12A-04 would not provide any active treatment technologies that would achieve reductions in the toxicity, mobility, or volume of contaminants in OU4 MS-12A sediment.

Reduction of contamination toxicity, mobility, and volume would occur as a result of naturally occurring processes.

Short-Term Effectiveness

Alternative MS12A-04 would be effective in the short term. However, because sediment removal (dredging and excavation), off-yard transportation, and disposal activities are a part of the alternative, controls would have to be implemented to protect remediation construction workers, Building 178 employees, the community, and the environment until the removal is completed. These controls would include providing adequate PPE for remediation workers, designated access routes for the employees of Building 178, restrictions on truck traffic within the surrounding community, and construction BMPs to prevent the spread of contamination during sediment removal and transportation. The RD and work plan would specify the necessary activities to ensure protection of human health and the environment during remedial activities.

Alternative MS12A-04 could be implemented within 1 year and would attain the RAOs and PRGs upon completion. RD and work plan preparation could be completed within 1 year. Construction activities (temporary containment, removal, off-site transportation and disposal) would be expected to take 3 months depending on weather and employee access requirements.

Implementability

Alternative MS12A-04 would be implementable, but could pose some difficulties. Resources for the proposed dredging and excavation activities are locally available and could be completed using conventional construction equipment. Permitted landfill facilities are also available for sediment and debris disposal. Because this is an active area of PNS, there are various utilities in and around the proposed sediment removal area. Therefore, utilities would need to be located and protected during the implementation of this alternative. Controls would need to be in place to control re-suspension of contaminants and residual contamination while dredging, and it could be difficult to maneuver dredging equipment around infrastructure or boat traffic at the site; however, hydraulic dredging can deal with these challenges relatively easily. The RD and design work plan would provide the specifications for processes required for the dredging and excavation proposed for the site. The necessary health and safety requirements for construction activities associated with implementation of this alternative would be identified in the design work plan. Administratively, there are no implementation concerns beyond the documentation needed for transporting and landfilling the removed sediment, because the site would be not contain unacceptable levels of contamination upon completion. Uncertainty associated with implementing this alternative is with the condition of Building 178. Currently, access to the building is limited on days with high winds. Based on the building conditions and tidal action, it is likely that

implementation of this alternative would have a larger number of restricted work days, as compared to similar projects.

Dredging and physical removal of sediment associated with MS-12A would require a significant amount of energy to remove, dewater, load, and transport the contaminated sediment to an off-yard disposal facility. In addition, the alternative would utilize landfill space.

Cost

Cost estimates for Alternative MS12A-04 are included in Appendix C. The estimated costs for Alternative MS12A-04 are as follows:

- Capital cost: $1,134,478

7.2 COMPARATIVE ANALYSIS OF MS-12A REMEDIAL ALTERNATIVES

This section compares the MS-12A remedial action alternatives discussed in Section 7.1 using the seven CERCLA evaluation criteria that were used in the evaluation of each individual alternative.

7.2.1 Overall Protection of Human Health and Environment

Alternative MS12A-01 would not provide protection of the environment because no actions would be taken under this alternative. All remaining alternatives considered are protective of the environment.

The implementation of Alternatives MS12A-02 would control the source of contamination to the offshore area and over time, concentrations of COCs would reduce through naturally occurring processes. Alternatives MS12A-03 and MS12A-04 would eliminate the exposure pathways between identified receptors and contaminated material. Alternative MS12A-04 would provide the most protection of ecological receptors because this alternative would completely remove contaminated MS-12A sediment causing unacceptable risk, preventing contact with this material, and preventing migration of this material to the Piscataqua River. Alternative MS12A-03 would remove contaminated sediment in the river and prevent sediment onshore from returning to the river, but if the containment barrier is compromised contaminants could migrate into the river.

7.2.2 Compliance with ARARs and TBCs

Alternative MS12A-01 would not comply with chemical-specific ARARs and TBCs, because there is no action under Alternative MS12A-01. Location- and action-specific ARARs and TBCs would not apply for Alternative MS12A-01. Alternative MS12A-02, would comply with ARARs and TBCs once naturally

occurring processes reduce COC concentrations to PRGs. MS12A-03 and MS12A-04 would comply with all chemical-, location-, and action-specific ARARs and TBCs.

7.2.3 Long-Term Effectiveness and Permanence

Alternative MS12A-01 would have no long-term effectiveness and permanence because no action would be taken under this alternative. Alternative MS12A-02 would provide long-term effectiveness and permanence once COC concentrations are reduced to PRGs. The containment barrier associated with MS12A-02 would be effective in preventing the migration of Building 178 contaminants to the Piscataqua River. Alternatives MS12A-03 and MS12A-04 would provide more long-term effectiveness and permanence than Alternatives MS12A-01 and MS12A-02 by removing contamination from the site. Alternative MS12A-04 has the greatest long-term effectiveness and permanence because all sediment contamination causing unacceptable risk would be removed from the site. MS12A-03 would also be effective and would permanently discontinue the source of contamination and the existing contamination offshore, but contamination would remain in place inside Building 178.

7.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives being considered would involve an active process that would reduce the toxicity, mobility, or volume of COCs. Under all alternatives, naturally occurring processes could reduce the toxicity, mobility, and volume of the COCs.

7.2.5 Short-Term Effectiveness

Alternative MS12A-01 would have no short-term effectiveness because no action would be conducted to reduce risk to ecological receptors. However, implementation of MS12A-01 would not result in risks to onsite workers, Shipyard workers, the community, or the environment as a result of alternative implementation. Alternative MS12A-02 would be effective in the short term at reducing the continued source of contamination to the offshore area. Alternatives MS12A-03 and MS12A-04 would be effective in the short term. However, since sediment removal (dredging and excavation), off-yard transportation, and disposal activities are a part of the alternative, controls would have to be implemented to protect remediation construction workers, Building 178 employees, the community, and the environment until the removal is completed. Alternatives MS12A-03 and MS12A-04 would achieve the RAO upon implementation.

7.2.6 Implementability

Alternative MS12A-01 would be easiest to implement because there would be no activities to implement. Alternatives, MS12A-02 would also be relatively easy to implement because it does not involve the

removal of a large amount of sediment, and construction activities would be kept to a minimum with the construction of a concrete block wall. The work plans and documents necessary to implement Alternative MS12A-02 would be easily prepared and implemented. However, the monitoring in Alternative MS12A-02 adds an administrative implementation concern that is not present in MS12A-03 or MS12A-04. MS12A-04 is more difficult to implement than MS12A-03, because Alternative MS12A-04 also requires the physical or hydraulic removal of sediment inside Building 178. Alternatives MS12A-03 and MS12A-04 would require some controls to decrease re-suspension of sediment particles in the river and the release of residual contamination. Considering the impact of these concerns, MS12A-02 would be easier to implement than Alternatives MS12A-03 or MS12A-04 because the administrative concern of long-term monitoring should be simpler to complete at the site than the complete dredging of the offshore area.

Excluding the no action alternative, Alternative MS12A-02 provides the least amount of energy usage. Alternatives MS12A-03 and MS12A-04 would require the usage of a significant amount of fuel energy, and utilize valuable landfill space. Of the two, Alternative MS12A-03 would not utilize as much energy or landfill space as Alternative MS12A-04. However, with not having to backfill the sediment removal areas, Alternatives MS12A-03 and MS12A-04 would not use the energy and natural resources that typical excavation projects use. Alternative MS12A-01 has the smallest remedial carbon foot-print, followed by Alternative MS12A-02, Alternative MS12A-03, and then Alternative MS12A-04.

7.2.7 Cost

The capital and O&M costs and NPW of the MS-12A remedial alternatives are as follows.

Alternatives	Capital	Annual Costs	NPW (30 years)
MS12A-01 No Action	$0	$0	$0
MS12A-02 Containment LUCs and Monitoring	$369,626	$20,174/yr $25,900/5 yrs	$675,807
MS12A-03 Partial Removal, Off-yard Disposal, Containment, and LUCs	$1,305,682	$19,327/yr $25,900/5 yrs	$1,601,353
MS12A-04 Complete Removal and Off-yard Disposal	$1,134,478	$0	$1,134,478

Detailed cost estimates are provided in Appendix C.

7.3 SUMMARY OF COMPARATIVE ANALYSIS FOR OU4 MS-12A

Table 7-5 summarizes the comparative analysis of the MS-12A remedial alternatives.

7.4 COMPARISON OF REMEDIAL ALTERNATIVES FOR MS-12B

The following remedial alternatives have been developed from the retained technologies presented in Table 3-2 to address the unacceptable COC (lead) concentrations within the MS-12B sediment:

- Alternative MS12B-01 – No Action
- Alternative MS12B-02 – Monitored Natural Recovery
- Alternative MS12B-03 – Hydraulic Dredging with Off-yard Disposal

A description and detailed analysis of these alternatives are provided in the following sections.

7.4.1 Alternative MS12B-01: No Action

7.4.1.1 Description

This alternative is required under CERCLA to establish a basis for comparison with other alternatives. No action would include no controls, no remediation, or other actions to mitigate risks. Five-Year Reviews would not be included under the no action alternative. Because there is no action associated with Alternative MS12B-01, this alternative has no location- or action-specific ARARs and TBCs. Chemical-specific ARARs and TBCs are presented in Table 7-6.

7.4.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12B-01 would not be protective of the environment.

Compliance with ARARs and TBCs

Alternative MS12B-01 would not comply with chemical-specific ARARs and TBCs (see Table 7-6). There would be no location- or action-specific ARARs and TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS12B-01 would provide no long-term effectiveness and permanence, because no action would occur.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative MS12B-01 would not reduce the toxicity, mobility, or volume of contaminants through treatment.

Short-Term Effectiveness

Because no action would occur, implementation of Alternative MS12B-01 would not pose a short-term risk to onsite workers or result in adverse impacts to the local community or the environment. However, Alternative MS12B-01 would not meet the RAO within the short-term because it would not provide adequate protection to ecological receptors.

Implementability

Alternative MS12B-01 would be readily implementable because there would be nothing to implement. The technical feasibility criteria, including constructability, operability, and reliability, are not applicable. The implementability of administrative measures is not applicable because no such measures would be taken.

Alternative MS12B-01 is considered a sustainable remediation because no energy would be used to implement the activity and the remediation of MS-12B would be left to naturally occurring processes.

Cost

There would be no costs associated with Alternative MS12B-01 because there are no remedial components.

7.4.2 Alternative MS12B-02: Monitored Natural Recovery

7.4.2.1 Description

Alternative MS12B-02 would consist of allowing naturally occurring processes to reduce the ecological risks posed by the sediment COC over time. Based on the location of MS-12B, the naturally occurring processes are limited to reduction in contamination concentrations due to dispersion. Although sedimentation modeling has not been completed for MS-12B, it is expected that contaminant concentration would begin to decrease if sediment is removed from MS-12A. As discussed in Section 3.3.2.3 in this FS, Appendix D contains a technical memorandum which presents an evaluation of the OU4 data to determine the potential for MNR to occur at MS-12B. 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 and the fact that the bottom is rocky and there is little fine-grained sediment. No current IRP sources of contamination to the sediment in this area are known, but the lead in the sediment from MS-12A is a potential source of lead to this area. 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 that is replaced with cleaner sediment and a remedial action at MS-12A, which would remove a potential source of lead contaminated sediment.

To evaluate natural recovery, five sediment samples would be collected and analyzed regularly to evaluate trends in concentrations of the COC. Three of the five sediment samples would be collected from within the boundary of MS-12B and analyzed for lead to identify COC trends. Sediment samples beyond the limits of MS-12B contaminated sediment would also be collected at two locations to identify potential off-site contaminant contribution, and to identify the potential spread of MS-12B contamination (proposed sampling locations are identified on Figure 7-4. 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 sample number and locations identified on Figure 7-4 are presented for the purpose of developing this FS, the final number of samples and their locations would be determined in the long-term monitoring plan. LUCs to prevent unauthorized disturbance of sediment would be implemented until concentrations of COCs are less than PRGs. Chemical-, location-, and action-specific ARARs and TBCs associated with Alternative MS12B-02 are presented in Table 7-7.

Because contamination would remain in excess of levels that do not allow for unlimited use and unrestricted exposure, Five-Year Reviews would be required under this alternative until naturally occurring processes reduce the contaminant concentrations to acceptable ecological risk levels (PRGs).

7.4.2.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12B-02 would be protective of the environment once naturally occurring processes reduce COC concentrations to PRGs and cleaner sediment deposits over the contaminated sediment. The sampling associated with Alternative MS12B-02 would identify when protection of ecological receptors would occur. Five-Year Reviews would be conducted to evaluate the continued adequacy of the remedy. If contaminant trends do not identify a continual decrease in COC concentrations, or if sampling does not identify continued accumulation of cleaner sediment over the contaminated areas, a determination of the adequacy of the alternative would be made in accordance with the decision making process that would be identified in the long-term monitoring plan associated with this alternative.

Compliance with ARARs and TBCs

Alternative MS12B-02 would comply with chemical-specific ARARs and TBCs once natural occurring processes reduce COC concentrations to PRGs. There are no location- or action-specific ARARs or TBCs associated with this alternative.

Long-Term Effectiveness and Permanence

Alternative MS12B-02 would provide long-term effectiveness and permanence once COC concentrations are reduced to the cleanup goals through naturally occurring processes or ecological exposure pathways are eliminated through the process of clean sediments accumulating on the contaminated sediment. Once cleanup goals are achieved, it would be expected that these concentrations would remain below cleanup goals. Five-Year Reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS12B-02 would not provide reduction in toxicity, contaminant mobility, or contaminant volume within the MS-12B area through treatment. However, reduction of contamination toxicity, mobility, and volume would occur as a result of naturally occurring processes.

Short-Term Effectiveness

Alternative MS12B-02 would be effective in the short term. Implementation of this alternative would not adversely impact the surrounding community or the environment any more than it currently does. However, site workers could be exposed to the contaminated sediment during periodic sampling events. These exposures could be controlled/eliminated using PPE.

Alternative MS12B-02 could be implemented with the signing of a ROD. Existing sample information could be used as the baseline for COC concentrations, and within 1 year a long-term monitoring plan could be prepared for the collection of periodic progress samples.

Implementability

Alternative MS12B-02 would be readily implementable. Resources for developing and initiating a sediment monitoring program are readily available.

Alternative MS12B-02 is considered a sustainable remediation because minimal energy would be used to implement the activity, and the remediation of the MS-12B area would be left to naturally occurring processes. Energy usage would be limited to sampling personnel mobilizing and de-mobilizing from the site. Lastly, landfill space would not be taken up by removed material.

Cost

Cost estimates for Alternative MS12B-02 are included in Appendix C. The estimated costs for Alternative MS12B-02 are as follows:

- Capital cost: $17,094
- Annual costs: $19,140 per year and $25,300 every 5 years
- 30-Year NPW: $309,149

7.4.3 Alternative MS12B-03: Dredging with Off-Yard Disposal

7.4.3.1 Description

Alternative MS12B-03 would consist of complete removal and off-yard disposal of contaminated sediment from the offshore area of MS-12B. Prior to removal, sampling would be conducted to verify the extent of contamination. The general limits of the proposed dredging and physical/hydraulic removal are shown on Figure 7-5. Because Alternative MS12B-03 removes the contaminated sediment, LUCs, O&M, inspections, and Five-Year Reviews would not be required with this alternative. Chemical-, location-, and action-specific ARARs and TBCs for this alternative are presented in Table 7-8.

The following describes the individual components of Alternative MS12B-03.

- Hydraulic Dredging – Contaminated sediment located offshore of PNS within the boundary of MS-12B would be completely dredged. Hydraulic dredging would be performed using cutterheads and plain suction, and using both onshore and offshore equipment. Onshore equipment would include sediment bags to contain dredged sediments, and pumping to move contaminated sediment from the river to the containment bags. Offshore equipment would include the hydraulic dredge pipeline and a boat to direct the dredging to the appropriate locations. The hydraulic dredging would include the removal of contaminated sediment and transportation of that material via pipeline to onshore staging areas where the removed sediment would be dewatered. BMPs would also be implemented to prevent the migration of re-suspended sediment to downstream watercourses. Based on the limits identified on Figure 7-5 it is estimated that 310 cy of in place sediment would be dredged from the

MS-12B area. Upon dewatering and adding of fly ash to stabilize the material for transportation, an estimated 160 cy of stabilized sediment would be transported to an off-yard disposal facility

- Sampling – Sampling would be conducted during dredging activities to monitor the effectiveness of the sediment migration controls (BMPs). Continuous construction monitoring devices capable of measuring turbidity would be located downstream of the dredged area. Samples would also be collected from the exposed riverbed to ensure that all contaminated sediment was removed.

- Dewatering - A temporary material handling area would be constructed near the MS-12B onshore area. The material handling area would contain sediment bags into which the hydraulic dredging equipment would direct the flow of contaminated sediment and water. These bags would contain the sediment and allow the water to pass through. The water that passes through the sediment bags would be directed to a filter for cleaning prior to discharging back to the river. For the purposes of this evaluation, it is assumed that the collected water would be sampled for characterization purposes, and that direct discharge back to the river would be acceptable. The material handling area would be lined with an impermeable membrane and contain appropriate storage to prevent the infiltration or release of water removed from the sediment prior to obtaining results of the water characterization samples. If the characterization samples indicate that the water is not of an appropriate quality, the water would be pumped out for treatment or disposal. When the sediment is dry, a loader and trucks would load and transport the sediment off-yard for disposal.

- Off-yard Disposal - All dredged sediment would be dewatered, stockpiled, and characterized within the material handling area. After dewatering and characterization are complete, loaders and trucks would transport the sediment to an approved off-yard TSD facility.

The volumes of dredged sediment identified in the text are presented for purposes of this FS. Actual volumes, along with actual number and frequency of characterization sampling, would need to be established in the design/work plan documents that would be created as part of this remedial alternative.

7.4.3.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative MS12B-03 would be protective of the environment upon implementation. The complete removal of contaminated sediment and debris would prevent ecological receptors from being exposed to unacceptable levels of contamination in the MS-12B offshore area. BMPs would be used to ensure protection of human health and the environment during removal of contaminated sediment.

Compliance with ARARs and TBCs

The implementation of Alternative MS12B-03 would comply with all chemical-, location-, and action-specific ARARs and TBCs.

Long-Term Effectiveness and Permanence

Alternative MS12B-03 would provide long-term effectiveness and permanence. Contaminated sediment associated with MS-12B would be removed from the site, protecting ecological receptors. Following implementation of Alternative MS12B-03, the site would be suitable for continued use with no need for LUCs because there would be no residual contamination on the site. Verification samples would be required to confirm that the contaminated sediment has been removed. Following verification of contaminant removal, reviews of the site would not be necessary.

Reduction of Toxicity, Mobility, or Volume through Treatment

The implementation of Alternative MS12B-03 would not provide any active treatment technologies that would achieve reduction in toxicity, mobility, or volume of the contaminants within the MS-12B area sediments. Reduction of contamination toxicity, mobility, and volume within the sediment removed from MS-12B would be left to natural processes occurring at the off-yard disposal facility.

Short-Term Effectiveness

Alternative MS12B-03 would be effective in the short term. Controls would be implemented during dredging and off-yard transportation and disposal activities to protect remediation construction workers, the community, and the environment until the dredging and disposal activities are completed. These controls would include providing adequate PPE for remediation workers, and the use of construction BMPs to prevent the spread of contamination during construction, dredging, and transportation activities. The RD and work plan would specify the necessary activities to ensure protection of human health and the environment during remedial activities.

Alternative MS12B-03 could be implemented within 1 year and would attain the RAOs and PRGs upon completion. RD and work plan preparation could be completed within 1 year. Construction activities (removal, off-yard transportation and disposal) would be expected to take 3 months, depending on weather, sediment dewatering time, and access restrictions.

Implementability

Alternative MS12B-03 would be implementable, but could pose some difficulties. Because dredging activities mobilize contaminated sediment, two or three passes with the dredging equipment are often

required to remove all contaminated sediment. In addition, the depth of the dredging could make hydraulic dredging more difficult than in shallower applications. Controls would need to be in place for re-suspension of contaminants and residual contamination while dredging. Maneuvering dredging equipment around boat traffic without disrupting Shipyard activities would add additional challenges to the dredging activities. However, resources and equipment for the proposed dredging and dewatering would be found locally and local permitted landfill facilities are available for sediment and debris disposal.

Dredging would require a significant amount of energy to remove, dewater, load, and transport the contaminated sediment to an off-yard disposal facility. In addition, the alternative would utilize valuable landfill space.

Cost

Cost estimates for Alternative MS12B-03 are included in Appendix C. The estimated costs for Alternative MS12B-03 are as follows:

- Capital cost: $428,824

7.5 COMPARATIVE ANALYSIS OF MS-12B REMEDIAL ALTERNATIVES

This section compares the MS-12B remedial action alternatives discussed in Section 7.4 using the seven CERCLA evaluation criteria used in the evaluation of each individual alternative.

7.5.1 Overall Protection of Human Health and Environment

Alternative MS12B-02 and Alternative MS12B-03 would be protective of the environment. Alternative MS12B-01 would not be protective of the environment. Alternative MS12B-02 would depend on naturally occurring processes to protect the ecological receptors, and Alternative MS12B-03 would use active remedial processes to eliminate the potential of unacceptable contaminant exposure to ecological receptors upon implementation. Alternative MS12B-03 would be protective of all receptors within 3 months of implementation. It is estimated that Alternative MS12B-03 would be the most protective of the ecological receptors because it would permanently remove all of the contaminated sediment from the MS-12B area.

7.5.2 Compliance with ARARs and TBCs

Alternative MS12B-01 would not comply with chemical-specific ARARs and TBCs. Alternative MS12B-02 would comply with chemical specific ARARs and TBCs once naturally occurring processes reduce the COC concentrations to PRGs. Alternatives MS12B-01 and MS12B-02 have no location- or action-specific

ARARs and TBCs. Alternatives MS12B-03 would comply with chemical- location, and action-specific ARARs and TBCs upon implementation.

7.5.3 Long-Term Effectiveness and Permanence

Alternative MS12B-01 has no long-term effectiveness and permanence because no action is taken under this alternative. Alternative MS12B-02 provides long-term effectiveness and permanence once COC concentrations are reduced to PRGs. Alternative MS12B-03 would provide long-term effectiveness and permanence upon implementation. Alternative MS12B-03 would be most effective because this alternative would remove the contaminated sediment from MS12B.

7.5.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives being considered would involve an active process that would reduce the toxicity, mobility, or volume of COCs. However, under Alternatives MS12B-02, natural processes would reduce the toxicity, mobility, and volume of the COCs in place.

7.5.5 Short-Term Effectiveness

Because no action would occur, Alternative MS12B-01 is the only alternative that would have no short-term risks to on-site workers and would not adversely impact the local community or the environment. The remaining alternatives present some risks to site workers, and Alternative MS12B-03 would include activities that could impact construction workers, Building 178 workers, the local community, and the environment. However, these risks and impacts would be controlled/eliminated using PPE and BMPs. Potential risks associated with Alternative MS12B-02 would need to be protected against every time the area is inspected or monitored.

7.5.6 Implementability

Alternative MS12B-01 would be easiest to implement because there would be no activities to implement. Alternative MS12B-02 would be the second easiest to implement because this alternative only relies on the development of a monitoring plan. Alternative MS12B-03 would be considered the most difficult to implement because this alternative involves the dredging, material processing, and off-yard transportation and disposal of contaminated sediment.

Excluding the no action alternative, Alternative MS12B-02 requires the least amount of energy usage and Alternative MS12B-03 requires the most amount of energy usage. Although Alternative MS12B-03 would require the usage of a significant amount of fuel energy, not requiring the backfilling of the dredged areas, saves some energy and material that is normally associated with removal alternatives. As a result,

Alternative MS12B-01 has the smallest remedial carbon foot-print, followed by Alternative MS12B-02, and Alternative MS12B-03.

7.5.7 Cost

The capital and O&M costs and NPW of the MS-12B remedial alternatives are as follows.

Alternatives	Capital	Annual Costs	NPW (30 years)
MS12B-01 No Action	$0	$0	$0
MS12B-02 Monitored Natural Recovery	$17,094	$19,140/year $25,300/5 years	$309,149
MS12B-03 Dredging with Off-yard Disposal	$428,824	$0	$428,824

Detailed cost estimates are provided in Appendix C.

7.6 SUMMARY OF COMPARATIVE ANALYSIS FOR OU4 MS-12B

Table 7-9 summarizes the comparative analysis of the OU4 MS-12B remedial alternatives.

TABLE 7-1

ALTERNATIVE MS12A-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To be considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC for the protection of freshwater and saltwater aquatic life were used to develop Preliminary Remediation Goals (PRGs), as appropriate. Because there is no action, PRGs would not be met.
	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs as appropriate. Because there is no action, PRGs would not be met.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. Because there is no action, PRGs would not be met.

TABLE 7-1

ALTERNATIVE MS12A-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through monitored natural recovery.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act (16 USC 1451 et seq.)	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for onshore and offshore remedial actions that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Historic Preservation	National Historic Preservation Act [16 USC 470 et seq., 36 Code of Federal Regulations (CFR) 800]	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historic, or archaeological data due to remedial actions at a site.	Construction of containment wall and sump system is within Building 178, a historic structure. The Navy would contact the State Historic Preservation Officer (SHPO) to determine the necessary actions, if any, to meet the substantive requirements of this act.

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 170 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities including containment construction, long-term sump discharge, and monitoring would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon. The requirements of the act would continue to apply during the operation and maintenance of the remedy.
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions that may impact the coastal floodplain or adjacent river. Remedial activities would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design. The requirements of the act would continue to apply during the operation and maintenance of the sump pump.

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE LOCATION-SPECIFIC ARARs and TBCs				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards [38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 CMR 305 1, 2, and 8]	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Construction near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river during construction.
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities such as containment construction that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Water Management	National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	Water discharged from sump would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water.
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to a publically owned treatment works (POTW).	If the sump water is discharged to the sanitary sewer, the substantive requirements of this regulation would be met.
Surface Water	CWA (33 USC 1251 et seq.) NRWQC	TBC.	These criteria are used to establish water quality standards for the protection of aquatic life.	Sump water discharged to surface water would be treated to meet these requirements.

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes CMR 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements. Wastes from activities at this site are unlikely to be hazardous.
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site according to the regulation until disposed of off-yard.
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to stockpiling sediment during containment construction. Applicable plans would be coordinated with MEDEP before implementation.

TABLE 7-2

ALTERNATIVE MS12A-02: CONTAINMENT, LUCs, AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for activities that have the potential to impact air quality. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq.*) and Waste Discharge Permitting Program [06-096 CMR 523 (Waste Discharge License Conditions) Sections 2, 5, and 6; and 06-096 CMR 528 (Pretreatment Program) Section 6]	Applicable	These standards regulate the discharge of pollutants from point sources to surface water or POTW.	Water discharged from sump would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water or a POTW

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33United States Code (USC) 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through removal, containment, and land use controls.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through removal, containment, and land use controls.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through removal, containment, and land use controls.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act [16 USC 1451 et seq.]	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for offshore remedial actions that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Navigable Waters	Rivers and Harbors Act Section 10 [33 USC 403; 33 Code of Federal Regulations (CFR) 322 and 323]	Applicable	These regulations control unauthorized obstruction or alteration of navigable waters. Activities involving structures or work in or affecting navigable waters, excavation or deposition of materials in navigable waters are regulated under these requirements.	Remedial activities, such as dredging would be designed such that navigable waters would not be obstructed or altered.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Wetlands and US Waters	CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters including wetlands and vegetated shallows, such as eelgrass. No activity that adversely affects a wetland or vegetated shallow is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	A wetlands functions and values assessment would be conducted to guide mitigative efforts if wetlands could be adversely impacted during remedial activities. Similarly, mitigative efforts would be required if eelgrass beds are adversely impacted.
Historic Preservation	National Historic Preservation Act (16 USC 470 et seq., 36 CFR 800)	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historic, or archaeological data due to remedial actions at a site.	Construction of containment wall and sump system is within Building 178, a historic structure. The Navy would contact the State Historic Preservation Officer (SHPO) to determine the necessary actions, if any, to meet the substantive requirements of this act.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 170 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities including dredging, dewatering, long-term sump discharge, and monitoring would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon. The requirements of the act would continue to apply during the operation and maintenance of the remedy.
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions that may impact the coastal floodplain or adjacent river. Remedial activities, such as dewatering and sump discharge, would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design. The requirements of the act would continue to apply during the operation and maintenance of the remedy.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE LOCATION-SPECIFIC ARARs and TBCs				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards [38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 CMR 305 1, 2, and 8]	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Dredging and construction near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river during construction.
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities such as dredging and containment construction that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Surface Water	CWA [33 USC 1251 et seq.] NRWQC	TBC	These criteria are used to establish water quality standards for the protection of aquatic life.	These standards would be used for activities that may impact the water quality of the Piscataqua River. Remedial activities, such as dredging would be conducted to reduce adverse impacts to the offshore. Stormwater management, erosion controls, and management of water discharges would be included in remedial activities, as appropriate. Sump water discharged to surface water would be treated to meet these requirements.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	These regulations would be applicable to water management during dredging and where discharges 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. Water discharged from sumps would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water.
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to publicly owned treatment works (POTW).	These regulations would be applicable to water management such as during sediment dewatering and sump discharge and where discharges to the sanitary sewer system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	NPDES (Storm water Permitting) 40 CFR 122.26	Applicable	Describes storm water discharge requirements from construction activities that disturb more than 1 acre.	Storm water management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit. Less than 1 acre to be disturbed, but overall Operable Unit (OU) 4 activities may be greater than 1 acre.
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes CMR 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements. Wastes from activities at this site are unlikely to be hazardous.
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site according to the regulation until disposed of off-yard.

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior Maine Department of Environmental Protection (MEDEP) approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to stockpiling dredged material. Applicable plans would be coordinated with MEDEP before implementation.
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	Although the individual disturbed areas and areas needed for dewatering are each less than 1 acre, the combined area for the OU4 remedial action may be greater than 1 acre. Applicable plans would be coordinated with MEDEP before implementation.
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for sediment handling. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).

TABLE 7-3

ALTERNATIVE MS12A-03: PARTIAL REMOVAL, OFF-YARD DISPOSAL, AND LUCs
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq*.) and Waste Discharge Permitting Program (06-096 CMR 523 [Waste Discharge License Conditions] Sections 2, 5, and 6; and 06-096 CMR 528 [Pretreatment Program] Section 6)	Applicable	These standards regulate the discharge of pollutants from point sources to surface water or POTW.	Water discharged from sediment dewatering and the sumps would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water or a POTW.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through dredging and off-yard disposal.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act (16 USC 1451 et seq.)	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for offshore remedial actions that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Navigable Waters	Rivers and Harbor Act Section 10, 33 Code of Federal Regulations (CFR) 322 and 323	Applicable	These regulations control unauthorized obstruction or alteration of navigable waters. Activities involving structures or work in or affecting navigable waters, excavation or deposition of materials in navigable waters are regulated under these requirements.	Remedial activities, such as dredging would be designed such that navigable waters would not be obstructed or altered.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Wetlands and US Waters	CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters including wetlands and vegetated shallows, such as eelgrass. No activity that adversely affects a wetland or vegetated shallow is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	A wetlands functions and values assessment would be conducted to guide mitigative efforts if wetlands could be adversely impacted during remedial activities. Similarly, mitigative efforts would be required if eelgrass beds are adversely impacted.
Historic Preservation	National Historic Preservation Act (16 USC 470 et seq., 36 CFR 800)	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historic, or archaeological data due to remedial actions at a site.	Some remediation activities are within Building 178, a historic structure. The Navy would contact the State Historic Preservation Officer (SHPO) to determine the necessary actions, if any, to meet the substantive requirements of this act.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
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PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 170 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities including dredging, dewatering, and monitoring would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon. The requirements of the act would continue to apply during the operation and maintenance of the remedy.
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions that may impact the coastal floodplain or adjacent river. Remedial activities, such as dredging would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE LOCATION-SPECIFIC ARARs and TBCs				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards (38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 CMR 305 1, 2, and 8)	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Dredging and construction near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river during construction.
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities, such as dredging and dewatering that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Surface Water	CWA (33 USC 1251 et seq.) NRWQC	TBC	These criteria are used to establish water quality standards for the protection of aquatic life.	These standards would be used for activities that may impact the water quality of the Piscataqua River. Remedial activities, such as dredging would be conducted to reduce adverse impacts to the offshore. Stormwater management, erosion controls, and management of water discharges would be included in remedial activities, as appropriate.
Water Management	National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	These regulations would be applicable to water management during dredging and where discharges 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.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to a publicly owned treatment works (POTW).	These regulations would be applicable for water management during dredging and where discharges to the sanitary sewer system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.
Water Management	NPDES (Storm water Permitting) 40 CFR 122.26	Applicable	Describes storm water discharge requirements from construction activities that disturb more than 1 acre.	Storm water management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit. Less than 1 acre to be disturbed, but overall Operable Unit (OU) 4 activities may be greater than 1 acre.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes CMR 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements. Wastes from activities at this site are unlikely to be hazardous.
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site according to the regulation until disposed of off-yard.

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to stockpiling dredged material. Applicable plans would be coordinated with MEDEP before implementation.
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	Although the individual disturbed areas and areas needed for dewatering are each less than 1 acre, the combined area for the OU4 remedial action may be greater than 1 acre. Applicable plans would be coordinated with MEDEP before implementation.
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for sediment handling. These standards would be met if any of the alternatives result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).

TABLE 7-4

ALTERNATIVE MS12A-04: COMPLETE REMOVAL WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq*.) and Waste Discharge Permitting Program [06-096 CMR 523 (Waste Discharge License Conditions) Sections 2, 5, and 6; and 06-096 CMR 528 (Pretreatment Program) Section 6]	Applicable	These standards regulate the discharge of pollutants from point sources to surface water or POTW.	Water discharged from sediment dewatering would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water or a POTW.

TABLE 7-5

SUMMARY OF COMPARATIVE ANALYSIS OF MS-12A REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS12A-01: No Action	Alternative MS12A-02: Containment, LUCs, and Monitoring	Alternative MS12A-03: Partial Removal, Off-yard Disposal, Containment, and LUCs	Alternative MS12A-04: Complete Removal with Off-yard Disposal
Overall Protection of Human Health and Environment	Would not be protective of the environment because no action would occur but would be protective of human health. Unacceptable ecological risks would remain.	Would be protective of human health and the environment. Natural occurring processes would reduce chemical of concern (COC) concentrations to preliminary remediation goals (PRGs) once source sediment contamination is contained. Land use controls (LUCs) to ensure the containment wall continues to function as designed.	Would be protective of human health and the environment. Partial removal and contaminant would remove ecological receptor contact pathways. Land use controls (LUCs) to ensure the containment wall continues to function as designed.	Would be protective of human health and the environment. All contaminated sediment would be removed from the area.
Compliance with applicable or relevant and appropriate requirements (ARARs) and to be considered (TBCs)	Would not comply with chemical-specific ARARs. Location- and action-specific ARARs do not apply.	Would comply with all chemical-, location-, and action-specific ARARs once natural occurring processes reduce COC concentrations to PRG.	Would comply with all chemical-, location-, and action-specific ARARs and TBCs.	Would comply with all chemical-, location-, and action-specific ARARs.
Long-Term Effectiveness and Permanence	Would not provide long-term effectiveness and permanence because no action would occur.	Would provide long-term effectiveness and permanence once COC concentrations are reduced to PRGs. The LUCs would ensure the long-term integrity of the containment wall.	Would provide long-term effectiveness and permanence by providing a containment barrier to prevent the further migration of contaminated sediment to the offshore area. The LUCs would ensure the long-term integrity of the containment wall.	Would provide long-term effectiveness and permanence by removing all contaminated sediment.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no construction actions would occur.	Would not result in any short-term risk to the surrounding community or environment. Alternative implementation would result in periodic exposure to remedial workers during sampling events. These risks would be mitigated using appropriate personal protective equipment.	Would result in the possibility of exposing remediation workers, the surrounding community, and the environment to contaminated materials as a result of consolidation and regrading efforts. However, these risks would be reduced through compliance with appropriate use of personal protection equipment and implementation and maintenance of best management practices during construction. These risks would need to be mitigated over a 3 month construction schedule.	Would result in the possibility of exposing remediation workers, the surrounding community, and the environment to contaminated materials as a result of excavation efforts. These risks are expected to be highest for this alternative because of the exposure of contaminated sediment. However, these risks would be reduced through compliance with appropriate use of personal protection equipment and implementation and maintenance of best management practices during construction. These risks would need to be mitigated over a 3 month construction schedule.

TABLE 7-5

SUMMARY OF COMPARATIVE ANALYSIS OF MS-12A REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS12A-01: No Action	Alternative MS12A-02: Containment, LUCs, and Monitoring	Alternative MS12A-03: Partial Removal, Off-yard Disposal, Containment, and LUCs	Alternative MS12A-04: Complete Removal with Off-yard Disposal
Implementability	Technical and administrative implementation would be simple because there would be no action to implement. Implementation of this alternative requires no energy usage.	Technical and administrative implementation would be simple because resources for developing and initiating a sediment monitoring program and LUC Remedial Design are readily available. The implementation of the containment wall uses conventional approaches and available labor, material, and equipment. Implementation of this alternative requires energy usage to transport construction materials to the site and to install the containment wall.	Because dredging activities mobilize contaminated sediment, two or three passes with the dredging equipment are often required to remove all contaminated sediment. Resources and equipment for the proposed dredging and dewatering would be found locally. Controls would need to be in place for resuspension of contaminants and residual contamination while dredging. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add an additional challenge to dredging activities. Local permitted landfill facilities are available for sediment and debris disposal. The administrative implementation is expected to be a simple process. Administrative implementation would require the development of a Land Use Controls Remedial Design, inspection plan, and Operation & Maintenance plan. This alternative uses a significant amount of energy to transport materials and equipment to and from the site and to perform the dredging activities. The alternative also uses landfill space.	Because dredging activities mobilize contaminated sediment, two or three passes with the dredging equipment are often required to remove all contaminated sediment. Resources and equipment for the proposed dredging and dewatering would be found locally. Controls would need to be in place for resuspension of contaminants and residual contamination while dredging. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add an additional challenge to dredging activities. Local permitted landfill facilities are available for sediment and debris disposal. This alternative uses a significant amount of energy to transport materials and equipment to and from the site and to perform the dredging activities. The alternative also uses landfill space.
Costs:				
Capital:	$0	$369,626	$1,305,682	$1,134,478
Annual:	$0	$20,174/yr, $25,900/5 yrs	$19,327/yr, $25,900/5 yrs	$0
NPW (Net Present Worth):	$0	$675,807	$1,601,353	$1,134,478

TABLE 7-6

ALTERNATIVE MS12B-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC)1251 et seq,	To be considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC for the protection of freshwater and saltwater aquatic life were used to develop Preliminary Remediation Goals (PRGs), as appropriate. Because there is no action, PRGs would not be met.
	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs as appropriate. Because there is no action, PRGs would not be met.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. Because there is no action, PRGs would not be met.

TABLE 7-6

ALTERNATIVE MS12B-01: NO ACTION
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No applicable ARARs or TBCs

TABLE 7-7

ALTERNATIVE MS12B-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC)[33 United States Code (USC) 1251 et seq.]	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through monitored natural recovery.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range=median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through monitored natural recovery.

TABLE 7-7

ALTERNATIVE MS12B-02: MONITORED NATURAL RECOVERY
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken

FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE LOCATION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

FEDERAL ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

STATE ACTION-SPECIFIC ARARs and TBCs: No Applicable ARARs or TBCs

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Clean Water Act (CWA); National Recommended Water Quality Criteria (NRWQC); 33 United States Code (USC) 1251 et seq.	To Be Considered (TBC)	CWA NRWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. NRWQC are set at levels that are guidelines for pollutants in surface water. NRWQC are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life.	NRWQC are for the protection of saltwater aquatic life and were used to develop Preliminary Remediation Goals (PRGs), as appropriate. PRGs would be met through dredging and off-yard disposal.
Sediment	National Oceanographic Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments (Long, et al. 1995)	TBC	This document provides chemical concentration effects distributions that describe the observed or predicted chemical concentrations associated with biological effects. Effects range-low (ER-L) and effects range-median (ER-M) represent the tenth and fiftieth percentile of reported effects.	ER-L and ER-M concentrations were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.
STATE CHEMICAL-SPECIFIC ARARs and TBCs				
Water	Maine Surface Water Quality Criteria for Toxic Pollutants [06-096 Code of Maine Rules (CMR) 584]	TBC	This rule establishes ambient water quality criteria for toxic pollutants in the surface waters of the State.	The criteria were used to develop PRGs, as appropriate. PRGs would be met through dredging and off-yard disposal.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act (16 USC 1451 et seq.)	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Applicable for offshore remedial actions that would impact the coastal zone. Activities that would reduce adverse impacts would be considered and implemented, as appropriate. Maine Department of Environmental Protection (MEDEP) would be included in the review of remedial designs and work plans to meet the substantive requirements of this act.
Navigable Waters	33 Code of Federal Regulations (CFR) 322 and 323	Applicable	These regulations control unauthorized obstruction or alteration of navigable waters. Activities involving structures or work in or affecting navigable waters, excavation or deposition of materials in navigable waters are regulated under these requirements.	Remedial activities, such as dredging would be designed such that navigable waters would not be obstructed or altered.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Wetlands and US Waters	CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters including wetlands. No activity that adversely affects a wetland is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	A wetlands functions and values assessment would be conducted to guide mitigative efforts if wetlands could be adversely impacted during remedial activities.
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR Part 170 and 402)	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire State of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon.	Remedial activities, such as dredging and dewatering would be conducted so as to avoid any adverse effect under the act to the short-nosed sturgeon.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	Applicable	This act requires any federal agency proposing to modify a body of water to consult with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for onsite actions.	This act would be applicable to remedial actions that may impact the coastal floodplain or adjacent river. Remedial activities such as dredging and dewatering would be conducted to prevent discharge to the Piscataqua River. The Navy would coordinate with USFWS during the design.
STATE LOCATION-SPECIFIC ARARs and TBCs				
Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards [38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 CMR 305 1, 2, and 8]	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Dredging near to shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River. Stormwater management and erosion control practices would be used to prevent sediment from entering the river during construction.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 et seq.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities such as dredging that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Surface Water	CWA (33 USC 1251 et seq.) NRWQC	TBC	These criteria are used to establish water quality standards for the protection of aquatic life.	These standards would be used for activities that may impact the water quality of the Piscataqua River. Remedial activities, such as dredging would be conducted to reduce adverse impacts to the offshore. Stormwater management, erosion controls, and management of water discharges would be included in remedial activities, as appropriate.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.41, 122.44, and 122.45)	Applicable	Discharges to surface water must meet the substantive requirements of the NPDES program. These sections describe conditions applicable to all permits, establishing limitations, standards, and other permit conditions, and calculating permit conditions.	These regulations would be applicable to water management during sediment dredging and where discharges 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.
Water Management	CWA General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403.5 – National Pretreatment Standards)	Applicable	The regulations provide general pretreatment requirements for discharge to publicly owned treatment works (POTW).	These regulations would be applicable to water management during dredging and where discharges to the sanitary sewer system may occur. The substantive requirements would be met if any discharges to the sanitary sewer are required.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	NPDES (Storm water Permitting) 40 CFR 122.26	Applicable	Describes storm water discharge requirements from construction activities that disturb more than 1 acre.	Storm water management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of a general permit. Less than 1 acre to be disturbed, but overall Operable Unit (OU) 4 activities may be greater than 1 acre.
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes Code of Maine Rules (CMR) 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are Resource Conservation and Recovery Act (RCRA) characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements. Wastes from activities at this site are unlikely to be hazardous.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
	Standards for Generators of Hazardous Waste CMR 06-096 Part 851	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste determined to be hazardous would be managed on site according to the regulation until disposed of off-yard.
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to stockpiling dredged material. Applicable plans would be coordinated with MEDEP before implementation.
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	Although the individual disturbed areas and areas needed for dewatering are each less than 1 acre, the combined area for the OU4 remedial action may be greater than 1 acre. Applicable plans would be coordinated with MEDEP before implementation.

TABLE 7-8

ALTERNATIVE MS12B-03: HYDRAULIC DREDGING WITH OFF-YARD DISPOSAL
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 4 FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/Citation	Status	Synopsis	Evaluation/Action To Be Taken
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for sediment handling. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq*.) and Waste Discharge Permitting Program (06-096 CMR 523 [Waste Discharge License Conditions] Sections 2, 5, and 6; and 06-096 CMR 528 [Pretreatment Program] Section 6)	Applicable	These standards regulate the discharge of pollutants from point sources to surface water or POTW.	Water discharged from sediment dewatering would be treated to meet these requirements. The substantive requirements would be met for any discharges of treated water to surface water or a POTW

TABLE 7-9

SUMMARY OF COMPARATIVE ANALYSIS OF MS-12B REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS12B-01: No Action	Alternative MS12B-02: Monitored Natural Recovery	Alternative MS12B-03: Hydraulic Dredging with Off-yard Disposal
Overall Protection of Human Health and Environment	Would not be protective of the environment because no action would occur but would be protective of human health. Unacceptable ecological risks would remain.	Would be protective of human health and the environment. At the time of implementation contaminants would be left in place and ecological receptor contact pathways would still exist. As natural processes reduce contaminant concentrations, protection of the environment would be achieved.	Would be protective of human health and the environment by removing all contaminated sediment from the area.
Compliance with applicable or relevant and appropriate requirements (ARARs) and to be considered (TBCs)	Would not comply with chemical-specific ARARs. Location- and action-specific ARARs do not apply.	Would comply with all chemical-specific ARARs once chemical of concern (COC) concentrations are reduced to less than preliminary remediation goals (PRGs). Location- and action-specific ARARs do not apply.	Would comply with all chemical-, location-, and action-specific ARARs.
Long-Term Effectiveness and Permanence	Would not provide long-term effectiveness and permanence because no action would occur.	Would provide long-term effectiveness and permanence once COC concentrations are reduced to less than PRGs. Although COC concentrations would not be actively reduced, risks to ecological receptors would decrease with the natural reduction of COC concentrations.	Would provide long-term effectiveness and permanence by removing all contaminated sediment.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no construction actions would occur.	Would not result in any short-term risk to the surrounding community or environment. Alternative implementation would result in periodic exposure to remedial workers during sampling events. These risks would be mitigated using appropriate personal protective equipment.	Would result in the possibility of exposing remediation workers, the surrounding community, and the environment to contaminated materials as a result of excavation efforts. These risks are expected to be highest for this alternative because of the exposure of contaminated sediment. However, these risks would be reduced through compliance with appropriate use of personal protection equipment and implementation and maintenance of best management practices during construction. These risks would need to be mitigated over a 3 month construction schedule.

TABLE 7-9

SUMMARY OF COMPARATIVE ANALYSIS OF MS-12B REMEDIAL ALTERNATIVES
OPERABLE UNIT 4, FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Evaluation Criteria	Alternative MS12B-01: No Action	Alternative MS12B-02: Monitored Natural Recovery	Alternative MS12B-03: Hydraulic Dredging with Off-yard Disposal
Implementability	Technical and administrative implementation would be simple because there would be no action to implement. Implementation of this alternative requires no energy usage.	Technical and administrative implementation would be simple because resources for developing and initiating a sediment monitoring program are readily available. Energy usage for this alternative would be limited to periodic mobilization of teams for sampling and inspection events.	Because dredging activities mobilize contaminated sediment, two or three passes with the dredging equipment are often required to remove all contaminated sediment. Resources and equipment for the proposed dredging and dewatering would be found locally. Controls would need to be in place for resuspension of contaminants and residual contamination while dredging. Maneuvering dredging equipment around infrastructure or boat traffic at the site would add an additional challenge to dredging activities. Local permitted landfill facilities are available for sediment and debris disposal. Implementing this alternative utilizes a significant amount of energy upon implementation but following removal there would be no further energy usage.
Costs:			
Capital:	$0	$17,094	$428,824
Annual:	$0	$19,140/year, $25,300/ 5 years	$0
NPW:	$0	$309,149	$428,824

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DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	04/19/12		0932	123
CHECKED BY	DATE	ALTERNATIVE MS-12A-02 - CONTAINMENT, LUCs AND MONITORING FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
A. BERNHARDT	06/26/12		___	___
REVISED BY	DATE		APPROVED BY	DATE
___	___		___	___
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 7-1	0

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY C. MILLER	DATE 6/5/12	ALTERNATIVE MS-12A-03 - PARTIAL REMOVAL, OFF-YARD DISPOSAL AND LUCS FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___	DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___	DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 7-2	REV 0

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY C. MILLER	DATE 6/5/12	ALTERNATIVE MS-12A-04 - COMPLETE REMOVAL AND OFF-YARD DISPOSAL FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___	DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___	DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 7-3	REV 0

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 04/26/12	ALTERNATIVE MS-12B-02 - MONITORED NATURAL RECOVERY FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___	DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___	DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 7-4	REV 0

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DRAWN BY J. ENGLISH	DATE 04/19/12	TETRA TECH	CONTRACT NUMBER 0932	CTO NUMBER 123
CHECKED BY A. BERNHARDT	DATE 04/26/12	ALTERNATIVE MS-12B-03 - DREDGING WITH OFF-YARD DISPOSAL FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___	DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___	DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 7-5	REV 0

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APPENDIX A

ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT

Rounds 1 Through 10 Interim Offshore Monitoring Program Report for Operable Unit 4 (OU4)

Portsmouth Naval Shipyard

Kittery, Maine

Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62472-03-D-0057

Contract Task Order 123

February 2010

070901/P

ROUNDS 1 THROUGH 10
INTERIM OFFSHORE MONITORING PROGRAM REPORT

FOR

OPERABLE UNIT 4 (OU4)

PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Mid-Atlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

Submitted by:
Tetra Tech NUS, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406

CONTRACT NO. N62472-03-D-0057
CONTRACT TASK ORDER 123

FEBRUARY 2010

PREPARED UNDER THE DIRECTION OF:

AARON BERNHARDT
PROJECT MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH NUS, INC.
KING OF PRUSSIA, PENNSYLVANIA

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4-10 High Molecular Weight PAH Concentrations in MS-12, AS Phase I & AS Phase 2 OU4 Additional Scrutiny FS Report
4-11 Lead Concentrations in MS-12, AS Phase I & AS Phase 2 OU4 Additional Scrutiny FS Report
4-12 Eelgrass Survey Locations at MS-12

ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
AVS	Acid Volatile Sulfide
BAF	Biota Accumulation Factor
BSAF	Biota Sediment Accumulation Factor
CAS	Columbia Analytical Services
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIA	Controlled Industrial Area
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of Concern
CTO	Contract Task Order
DMR	Department of Marine Resources
DRMO	Defense Reutilization and Marketing Office
DQA	Data quality assessment
DQO	Data quality objectives
DQR	Data quality reports
EERA	Estuarine Ecological Risk Assessment
ER-M	Effects Range-Median
FS	Feasibility Study
GPS	Global Positioning System
HMW	High Molecular Weight
IRG	Interim remediation goal
IRP	Installation Restoration Program
LMW	Low Molecular Weight
MDL	Minimum detection limit
NAVFAC	Naval Facilities Engineering Command
NHDES	New Hampshire Department of Environmental Services
NOAA	National Oceanic and Atmospheric Administration
OM&M	Operation, Maintenance, and Monitoring
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PNS	Portsmouth Naval Shipyard
PRG	Preliminary Remediation Goal
QA	Quality assurance
QAPP	Quality Assurance Project Plan

QC	Quality control
RAB	Restoration Advisory Board
RAO	Remedial action objective
RI	Remedial Investigation
ROD	Record of Decision
RPD	Relative percent difference
RSL	Regional Screening Level
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SEM	Simultaneously extracted metal
SQL	Sample quantitation limit
STL	Severn Trent Laboratories
TCDD	Tetrachlorodibenzo-p-dioxin
TEF	Toxicity Equivalent Factor
TEQ	Toxicity Equivalent Quotient
TOC	Total Organic Carbon
TtEC	Tetra Tech EC
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper confidence limit
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
WW	World War

EXECUTIVE SUMMARY

This Rounds 1 through 10 Interim Offshore Monitoring Report for Operable Unit (OU) 4 at Portsmouth Naval Shipyard (PNS), Kittery, Maine was prepared by Tetra Tech NUS, Inc. (TtNUS) for the United States Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract Number N62472-03-D-0057, Contract Task Order (CTO) 123. This report was prepared in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October 1999). The monitoring program for OU4 is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In May 1999, an Interim Record of Decision (ROD) for OU4 (Navy, May 1999) was signed requiring the Navy to conduct monitoring in the offshore area of PNS in the interim period before a final remedy is selected and implemented for OU4. The Navy determined that interim monitoring was warranted for OU4 to provide current data on the offshore areas to determine whether onshore remedial actions, natural process, and/or other sources have affected the chemical concentrations in OU4. The Interim Offshore Monitoring Plan (TtNUS, October 1999) was prepared as required by the Interim ROD to present the monitoring program that would be conducted as the interim action. The first seven rounds of sampling conducted between September 1999 and August 2003 were evaluated in the Rounds 1 through 7 Report (TtNUS, November 2004). Additional rounds of interim offshore monitoring were conducted between August 2005 and December 2008 as follows:

- Round 8 - August 20 through 23, 2005
- Round 9 - November 5 through 9, 2007
- Round 10 - December 17, 2008

In addition, two Additional Scrutiny investigations were conducted as follows:

- Phase I - August 20 to 24, 2005 and May 26, 2005
- Phase II – November 5 through 9, 2007, April 14 through 16, 2008, and December 17, 2008

Data packages for each sampling round and Additional Scrutiny investigations were prepared and include summaries of sampling activities, the analytical data, and field notes for the investigations (TtNUS, February 2000, October 2000, January 2001, September 2001, February 2002, March 2003, February 2004, January 2006, September 2008, and June 2009).

This report provides the results from the first 10 monitoring rounds of the Interim Offshore Monitoring Program and the results of the Phase II Additional Scrutiny Investigation at Monitoring Station (MS)-12. The objective of this Rounds 1 through 10 Report is to summarize the results of the offshore investigations that have been conducted at each monitoring and reference station to date and to present recommendations and the associated rationale for modifications to the monitoring program after Round 10. An updated Interim Offshore Monitoring Plan will be prepared to document the modifications that have occurred since the initial monitoring plan (TtNUS, October 1999) and to provide the Uniform Federal Policy (UFP) Sampling and Analysis Plan (SAP) Quality Assurance (QA) requirements for Round 11 and subsequent rounds.

The following is a summary of the conclusions from the report and recommendations based on the conclusions.

- **MS-01**: MS-01 is located in the western portion of the Back Channel Area of Concern (AOC), offshore of Site 34 (OU9). Additional sediment samples are needed to determine the (lateral and vertical) extent of PAHs in sediment at MS-01. A Uniform Federal Policy (UFP) Sampling and Analysis Plan (SAP) for the OU9 (Site 34) Remedial Investigation (RI), which will include the collection of offshore sediment samples at MS-01 to determine the extent of the PAH contamination, is currently being prepared. 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 PAHs because these were identified as the risk drivers at this monitoring station.

- **MS-02**: MS-02 is located in the central portion of the Back Channel AOC. No additional offshore monitoring or actions are needed for MS-02 because chemical concentrations in sediment are less than interim remediation goals (IRGs) and the data do not indicate any impacts from known Installation Restoration Program (IRP) sites. Therefore, it is recommended that interim offshore monitoring be discontinued at MS-02.

- **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). A Site 32 Phase II RI sampling event was conducted in December 2008 and included additional sediment sampling to determine the extent of copper and PAH IRG exceedances in the mid-to low tide area of the Site 32 shoreline. Concentrations of copper and PAHs exceeded IRGs in some samples. 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 PAHs and copper because these were identified as the risk drivers at these monitoring stations.

- **MS-05**: MS-05 is located in the Jamaica Cove AOC, offshore of OU3. Although several Additional Scrutiny samples and several samples from the Round 7 monitoring event had chemical concentrations greater than IRGs for PAHs, copper, and nickel or the ER-M for lead, chemical concentrations were less than IRGs and the ER-M during the most recent sampling event (Round 10). It is recommended that sampling be conducted bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented, which is consistent with the sampling frequency in the Interim Offshore Monitoring Plan for OU4 (TtNUS, October, 1999). It is recommended that the bi-annual sediment samples be analyzed for copper, lead, and nickel and the five-year sampling event samples be analyzed for PAHs and all metals.

- **MS-06**: MS-06 is located in the offshore area of OU3 in the Jamaica Cove AOC. No additional offshore monitoring or actions are needed for MS-06 because chemical concentrations in sediment are less than IRGs. In addition, PAH and metals concentrations detected at MS-06 were similar to or within the ranges of concentrations in reference samples (TtNUS, November 2004). Therefore, it is recommended that interim offshore monitoring be discontinued at MS-06.

- **MS-07**: MS-07 is located in a recreational area in the Clark Cove AOC. No additional offshore monitoring or actions are needed for MS-07 because chemical concentrations in sediment are less than IRGs. In addition, PAH and metals concentrations detected at MS-07 were also similar to or within the ranges of concentrations in reference samples (TtNUS, November 2004). Therefore, it is recommended that interim offshore monitoring be discontinued at MS-07. However, to provide 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.

- **MS-08**: MS-08 is located in the offshore area of OU3 in the Clark Cove AOC. Chemical concentrations were greater than IRGs, the PRG for 4,4'-DDT, or ER-M for lead at some locations during some rounds, but concentrations were less than the IRGs, PRG, or ER-M during the last two monitoring rounds (Rounds 9 and 10). It is recommended that sampling be conducted bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October, 1999). It is recommended that the bi-annual sediment samples be analyzed for PAHs, 4,4'-DDT, copper, lead, nickel, and dioxins/furans and the five-year sampling event samples be analyzed for PAHs, 4,4'-DDT, metals, PCBs, and dioxins/furans.

- **MS-09**: MS-09 is located in the offshore area of OU3 in Clark Cove AOC. Nickel concentrations were greater than its IRG during the most recent sampling event at all three locations. The lead

concentration at one location was greater than its ER-M during the most recent sampling event, but the concentration was less than twice the ER-M. It is recommended that sampling be conducted bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October, 1999). It is recommended that the bi-annual sediment samples be analyzed for PAHs, 4,4'-DDT, copper, lead, nickel, and dioxins/furans and the five-year sampling event samples be analyzed for PAHs, 4,4'-DDT, metals, PCBs, and dioxins/furans.

- **MS-10**: MS-10 is located in the Sullivan Point AOC, in the southeastern corner of PNS. PAH concentrations in most of sediment samples at MS-10 were less than their respective IRGs, with a few exceptions. No additional offshore monitoring or actions are needed for MS-10 because of the infrequent number of IRG exceedances over the eight rounds of sampling and the relatively low concentrations of PAHs, copper, nickel, and 4,4'-DDT in most samples. Also, the data do not indicate any impacts from IRP sites. Therefore, it is recommended that interim offshore monitoring be discontinued at MS-10.

- **MS-11**: MS-11 is located in the main channel of the Piscataqua River, offshore of OU2. The elevated concentrations of metals (copper, lead, and nickel) in MS-11 sediment are likely from erosion from OU2. Several interim removal actions have been conducted at OU2 that placed erosion controls along the shoreline on the western and eastern portions of the seawall. 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.

- **MS-12**: MS-12 is located adjacent to Building 178 and offshore of Sites 5 and 10. The following additional conclusions were based on the Additional Scrutiny investigations conducted at MS-12:

  - PAH concentrations in the sediment samples collected within 15 feet of the ramp drop-off were less than their respective IRG, and lead concentrations were less than twice the ER-M. Therefore, it is concluded that sediment does not have elevated concentrations of PAHs or lead, so no further action is needed in this area.

  - Sediment samples AS12-SD107 through AS12-SD109 had elevated lead detections; therefore, samples should be collected during the next Interim Offshore Monitoring Program event (Round 11) to determine whether concentrations are changing over time.

- In sediment samples collected inside and immediately outside Building 178, many PAH concentrations were greater than their IRGs, and concentrations of lead were greater than twice its ER-M; therefore, the sediment inside and immediately outside Building 178 should be considered in the FS for OU4.

- Average PAH concentrations were all less than IRGs, and the average lead concentration was less than its ER-M in sediment samples collected from within the eelgrass bed; therefore, the eelgrass bed should not be included in any removal action for this area.

It is recommended that sampling be conducted at MS-12 locations at the five-year sampling events until a final remedy for OU4 is implemented and that sediment samples be analyzed for PAHs and lead. It is recommended that additional sediment samples be collected near AS12-SD12 bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented. These samples should be analyzed for lead.

- **MS-13**: MS-13 is located outside of a dry dock, in the Dry Docks AOC offshore of Sites 5 and 31. Most PAH concentrations were less than IRGs or just slightly exceeded IRGs. Because of the infrequent number of exceedances of the IRGs over the eight rounds of sampling and because the data do not indicate any impacts from IRP sites, it is recommended that interim offshore monitoring be discontinued at MS-13.

- **MS-14**: MS-14 is located in the western most part of the back channel in the Dry Docks AOC offshore of Sites 5 and 31. PAH concentrations in most samples were less than IRGs during Round 1 through 6, and no concentrations of PAHs were greater than IRGs during Rounds 7 and 8. Because of the infrequent number of exceedances of the IRGs over the eight rounds of sampling and because the data do not indicate any impacts from IRP sites, it is recommended that interim offshore monitoring be discontinued at MS-14.

1.0 INTRODUCTION

This Rounds 1 through 10 Interim Offshore Monitoring Report for Operable Unit (OU) 4 at Portsmouth Naval Shipyard (PNS) in Kittery, Maine, was prepared for the United States Department of Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, by Tetra Tech NUS, Inc. (TtNUS) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62472-03-D-0057, Contract Task Order (CTO) 123. The monitoring program for OU4 is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The Navy determined that interim monitoring was warranted at OU4 to provide current data on offshore areas to determine whether onshore remedial actions, natural processes, and/or other sources have affected chemical concentrations in sediment at OU4. Therefore, an Interim Record of Decision (ROD) for OU4 was signed in May 1999 that requires the Navy to conduct interim offshore monitoring at OU4. Interim offshore monitoring is currently being conducted offshore at PNS (OU4) in accordance with the Interim Offshore Monitoring Plan for Operable Unit 4 (TtNUS, October 1999), with updates as described in Section 1.3.3.

The remainder of this section provides the objectives, scope, and organization of this report and background information on PNS, OU4, and the OU4 Interim Offshore Monitoring Program. This section also presents a summary of the Baseline Interim Offshore Monitoring Report (TtNUS, July 2002), the Rounds 1 through 7 Report (TtNUS, November 2004), Additional Scrutiny Investigation Report (TtNUS, August 2007), and Phase II Additional Scrutiny Investigation.

1.1 OBJECTIVES AND SCOPE

This report presents the results from the first 10 monitoring rounds of the Interim Offshore Monitoring Program and results of the Phase II Additional Scrutiny Investigation at Monitoring Station (MS)-12. The first seven rounds of sampling conducted between September 1999 and August 2003 were evaluated in the Rounds 1 through 7 Report (TtNUS, November 2004). Additional rounds of interim offshore monitoring were conducted on August 20 through 23, 2005 for Round 8, November 5 through 9, 2007 for Round 9, and December 17, 2008 for Round 10. In addition, two Additional Scrutiny investigations were conducted on August 20 to 24, 2005 and May 26, 3005 for Phase I and November 5 through 9, 2007, April 14 through 16, 2008, and December 17, 2008 for Phase II. A description of OU4 is presented in Section 1.3.4. The objective of this Rounds 1 through 10 Report is to summarize the results of the offshore investigations that have been conducted at each monitoring and reference station to date and to present recommendations and the associated rationale for modifications to the monitoring program after Round 10, which was conducted in December 2008. Modifications to the monitoring program are

recommended to comply with the Navy Sediment Policy (February 2002) requiring an exit strategy for monitoring and limiting investigations to areas linked to a Navy source. An updated Interim Offshore Monitoring Plan will be prepared to document the modifications that have occurred since the initial monitoring plan (TtNUS, October 1999) and to provide the Uniform Federal Policy (UFP) Sampling and Analysis Plan (SAP) Quality Assurance (QA) requirements for Round 11 and subsequent rounds.

1.2 REPORT ORGANIZATION

This report is composed of six sections. This section provides an introduction and background information including a summary of previous investigations conducted in the offshore area. Section 2.0 presents a summary of the sampling investigation and includes a summary of the data quality assessment (DQA) for the Rounds 1 through 10 data. Section 3.0 presents the data preparation methods (e.g., averaging). Section 4.0 presents the evaluations conducted at each monitoring station. Section 5.0 provides the results of the evaluations of other monitoring activities including mussel sampling, a dioxin/furan risk evaluation, and a comparison of analytical methods. Section 6.0 provides a summary of the conclusions and recommendations for modifications to the monitoring program. Appendix A presents the draft Technical Memorandum-Phase II Additional Scrutiny at Monitoring Station 01, which was submitted to regulators on June 16, 2008. No comments have been received on this memorandum.

1.3 BACKGROUND INFORMATION

The facility description and history, OU4 description and history, and summary of the Interim Offshore Monitoring Program are provided in this section.

1.3.1 Facility Description and History

PNS is a military facility with restricted access on an island located in the Piscataqua River, as shown on Figure 1-1. PNS is referred to on National Oceanic and Atmospheric Administration (NOAA) nautical charts as Seavey Island, with the eastern tip given the name Jamaica Island. Clark's Island is to the east, attached by a rock causeway to Seavey Island. The Piscataqua River is a tidal estuary that forms the southern boundary between Maine and New Hampshire. PNS is located in Kittery, Maine, north of Portsmouth, New Hampshire, at the mouth of the Great Bay Estuary (commonly referred to as Portsmouth Harbor).

PNS is engaged in the conversion, overhaul, and repair of submarines for the Navy. The long history of shipbuilding in Portsmouth Harbor dates back to 1690, when the first warship launched in North America, the Falkland, was built. PNS was established as a government facility in 1800, and it served as a repair and building facility for ships during the Civil War. The first government-built submarine was designed

and constructed at PNS during World War (WW) I. A large number of submarines have been designed, constructed, and repaired at this facility since 1917. PNS continues to service submarines as its primary military focus.

Military activities are concentrated in the western portion of the facility in the Controlled Industrial Area (CIA) (southern and southwestern portions of Dennett's Island). This area includes all of the dry docks and submarine berths and numerous buildings that house trade shops related to maintenance activities. Access to the area is tightly controlled and limited to individuals having appropriate clearances. The CIA is covered with buildings and asphalt to support military operations at PNS. Uses of other portions of PNS include administration offices, officers' residences, equipment storage, parking, and recreational facilities. Outside the CIA, areas are covered with asphalt, grass, and/or buildings depending on the use of the area. As part of the remedy for OU3, wetlands were constructed north of OU3, adjacent to Jamaica Cove, and a parking lot and a recreational area were constructed at OU3.

Water for operations and drinking at the Shipyard are supplied by the Kittery Water District from surface reservoirs located in the vicinity of York, Maine. Groundwater at PNS is not used for drinking, irrigation, industrial processes, fire fighting, or any other purposes.

A portion of PNS is on the National Register of Historic Places. The area between the two bridges connecting PNS to Kittery, Maine, was placed on the Register by the National Park Service in 1977. Based on a Cultural Resources Survey of PNS (Louis Berger Group, Inc., April 2003), the boundary of the PNS Historic District was expanded and includes the majority of the CIA. Two other historic districts within PNS were also identified (Portsmouth Naval Hospital and Portsmouth Naval Prison Historic Districts).

1.3.2 OU4 Description and History

OU4 is divided into six Areas of Concern (AOCs), identified in the Estuarine Ecological Risk Assessment (EERA) Report (NCCOSC, May 2000) as nearshore habitats adjacent to PNS that may have been affected by onshore Installation Restoration Program (IRP) sites. A conceptual model developed as part of the EERA was used to identify AOCs including Clark Cove, Sullivan Point, Defense Reutilization and Marketing Office (DRMO) Storage Yard, Dry Docks, Back Channel, and Jamaica Cove. The AOC and IRP site locations are shown on Figure 1-2. The monitoring stations in each of the AOCs are described in more detail in Section 4.0 of this report.

Two IRP sites, Site 5, Industrial Waste Outfalls, and Site 26, Portable Oil/Water Tanks, were considered sites that had offshore impacts but no onshore impacts. Therefore, these two sites were included only as part of OU4. Both sites are located within the Dry Docks AOC, and any impacts that Sites 5 and 26 may

have had on the offshore will be addressed as part of the Dry Dock AOC. Site 5 consisted of numerous discharge points along the Piscataqua River at the western end of PNS in the dry dock area. The outfalls were used to discharge liquid industrial wastes before the Industrial Waste Treatment Plant was constructed and are believed to have operated from 1945 to 1975. The wastewaters may have contained heavy metals (mercury, lead, cadmium, chromium, copper, and zinc), oils and grease, and polychlorinated biphenyls (PCBs). In 1978, dredging was conducted offshore in the vicinity of the outfalls (in the berth areas by the dry docks), and maintenance dredging is conducted periodically in the berth areas.

Site 26 consists of portable oil/water tanks used where necessary along the berths and dry docks of PNS. Currently, the tanks are used for petroleum waste storage before the petroleum waste is disposed at a facility off the shipyard (in accordance with the appropriate waste management and disposal regulations). Before 1980, acidic and alkaline cleaning solutions may have been included in the tanks. Before 1991, wastes from numerous spills during filling of the tanks reportedly discharged into the adjacent Piscataqua River near the dry docks. However, because of modifications in tank-filling operations and equipment improvement, only two spills have occurred at site 26 since 1991, neither of which reportedly included discharge of waste into the adjacent surface water. In August 2001, a Decision Document was signed indicating that no further action under CERCLA is necessary for Site 26; therefore, Site 26 is no longer included in OU4 (Navy, August 2001). However, previous releases from Site 26 to the offshore area are being addressed as part of OU4 (Navy, August 2001).

The offshore AOCs at PNS include pelagic, channel bottom/subtidal, eelgrass, intertidal mudflat, rocky intertidal, and salt marsh habitats. The pelagic habitat around PNS is the open water of the Piscataqua River, which includes the back channel of the river, Jamaica Cove, and Clark Cove. The channel bottom/subtidal habitat is the bottom of the pelagic area and includes hard-bottom areas and fine-grained depositional areas. The hard-bottom areas occur in areas within the river experiencing tidal scouring and active erosion such as by the areas offshore of PNS in the main flow of the Piscataqua River. The fine-grained depositional areas occur outside the main flow of the Piscataqua River, along the Back Channel, Jamaica Cove, and Clark Cove. Eelgrass areas, characterized by the presence of the rooted marine angiosperm *Zostera marina*, occur in subtidal areas by Jamaica Cove, Clark Cove, Sullivan Point, the Dry Docks, and in the Back Channel. Intertidal mudflats are generally muddy-sand or sandy-mud areas fringing the shoreline along the Back Channel, off Jamaica Island (in Jamaica Cove), and around Clark's Island. The rocky intertidal habitat occurs in many locations along Seavey and Jamaica Islands where the shoreline is exposed to river currents and where there are no appreciable fine-grained sediment accumulations (such as offshore of the DRMO, Site 6). Salt marsh habitats have been identified in Clark Cove, by Clark's Island, and in the Back Channel (including Jamaica Cove).

1.3.3 Summary of Interim Offshore Monitoring Program

The Interim Offshore Monitoring Program provides information on the condition of the offshore AOCs in the interim period before completion of the offshore Feasibility Study (FS) and implementation of a final remedy for OU4. Data collected as part of the monitoring program provides the information necessary to determine whether the remedial action objectives (RAOs) for this interim period, as presented in the Interim ROD, are being met. These interim RAOs were developed so that the protection of ecological offshore communities can be ensured by identification of exposure to chemicals of concern (COCs) at concentrations greater than acceptable levels. The Interim Offshore Monitoring Program was developed to provide a basis for any monitoring program that may be required as part of the remedial action for OU4. Upon implementation of the remedy for OU4, the current Interim Offshore Monitoring Program will be discontinued.

Interim offshore monitoring is being conducted in accordance with the Interim Offshore Monitoring Plan for Operable Unit 4 (TtNUS, October 1999), with several modifications throughout the first 10 rounds of monitoring. These modifications, when they were implemented, and where they were documented are listed in Table 1-1 and Table 1-2. Initially, monitoring was conducted at 14 Monitoring Stations adjacent to PNS and at four reference stations (representing non-PNS impacted areas) in the Piscataqua River. Several of these monitoring stations have not been samples since Round 7, based on the modifications discussed above. Figures 1-3 and 1-4 show the locations of all the Monitoring Stations and reference stations, respectively.

As part of the monitoring program, Science Applications International Corporation (SAIC) developed the PRGs using the process outlined in the PRG proposal that was presented in the Interim Offshore Monitoring Plan (TtNUS, October 1999; Appendix A), and the results are presented in the document Preliminary Remediation Goals for Operable Unit 4 (TtNUS, November 2001). PRGs were developed for chemicals that were identified as limiting COCs (i.e., chemicals that are responsible for much of the baseline risk). The PRGs developed for OU4 were used as the IRGs for the following chemicals for evaluation of the data:

Parameter	IRG (dry-weight)
Copper	486 mg/kg
Nickel	124 mg/kg
Acenaphthylene	210 µg/kg
Anthracene	1,236 µg/kg
Fluorene	500 µg/kg
HMW PAHs	13,057 µg/kg

Although pesticides were not identified as COCs for OU4, the PRG development process included pesticide data for OU4; PRGs were developed for endosulfan II (3.95 µg/kg), trans-nonachlor (3.99 µg/kg), and 4,4'-DDT (66.4 µg/kg). The PRGs developed for pesticides were not used as IRGs because they were not identified as COCs for OU4. Because a PRG was not developed for lead, twice the Effects Range-Median (ER-M) for lead (218 mg/kg) from Long et al., (1995) was used to evaluate the data. Two times the value of its ER-M is used, because the IRGs for copper and nickel were approximately twice the ER-M value.

The monitoring program was designed to include sampling and analysis of surficial sediment (0 to 10 centimeters) as the primary measure of exposure to determine whether the interim RAOs are being met. Sampling and analysis of mussel and juvenile lobster tissue to confirm the comparability between sediment and biota concentrations were also implemented as a secondary measure in satisfying the interim RAOs; the juvenile lobster sampling was discontinued after Round 5.

The following data were presented and evaluated in previous reports and are therefore not presented or discussed in this report:

- Sediment and sediment pore water analytical data collected during Round 2 for toxicity testing.
- Acid volatile sulfides (AVS) and simultaneously extracted metals (SEM) sediment data from Rounds 1 through 5.
- Juvenile lobster analytical data from Rounds 1 through 5.
- Mussel analytical data from Rounds 1 through 7.

1.4 SUMMARY OF BASELINE RESULTS

The Baseline Interim Offshore Monitoring Program Report (TtNUS, July 2002) was prepared in accordance with the Interim Offshore Monitoring Plan (TtNUS, October 1999) to provide the results of the evaluation of the four baseline monitoring rounds (Rounds 1 through 4). Round 1 was conducted in early September 1999 (TtNUS, February 2000), Round 2 was conducted in early May 2000 (TtNUS, October 2000), Round 3 was conducted in late August 2000 (TtNUS, January 2001), and Round 4 was conducted in early May 2001 (TtNUS, September 2001).

The main objective of the Baseline Report was to provide the Navy's recommendation for the appropriate sampling season for future monitoring rounds. In addition, the Baseline Report provided a comparison of chemical concentrations to IRGs, evaluation of the need for continued juvenile lobster sampling, risk evaluation of dioxin data, and results of other evaluations conducted with the Rounds 1 through 4 data. Based on the evaluation of the Rounds 1 through 4 data, the major decisions agreed to by the Navy, regulators, and Restoration Advisory Board (RAB) for future monitoring rounds were as follows:

- Sediment samples did not need to be analyzed for AVS or SEM.
- Juvenile lobster sampling could be discontinued.
- Sampling would be conducted in late summer.

The discontinuation of AVS and SEM analysis and juvenile lobster sampling was not implemented until Round 6 because the Baseline Report was not finalized at the time of the Round 5 sampling. The Round 5 lobster and AVS and SEM data are provided in the Round 5 Data Package (TtNUS, February 2002).

Additional results of the baseline evaluation were as follows:

- A risk evaluation of offshore dioxin data was conducted that included comparison of the dioxin concentrations in sediment, mussels, and lobsters to human health and ecological risk-based screening levels. Dioxin concentrations in sediment, mussel, and juvenile lobster collected from the monitoring stations did not appear to be at levels that would result in unacceptable risks to human or ecological receptors. It was recommended that an evaluation for discontinuing dioxin analysis, as part of the Interim Offshore Monitoring Program, be completed as part of the Rounds 1 through 7 Report.

- Biota sediment accumulation factors (BSAFs) for organic chemicals and biota accumulation factors (BAFs) for inorganic chemicals were calculated for mussels using the first four rounds of data. These values were similar to those found in the literature for mussels and other bottom-dwelling aquatic organisms.

1.5 SUMMARY OF ROUNDS 1 THROUGH 7 RESULTS

Analytical data from the first seven sampling rounds were evaluated in the Rounds 1 through 7 Interim Offshore Monitoring Program Report (TtNUS, November 2004). The main objectives of the report were to determine the appropriate frequency of monitoring for each monitoring station for the next 5 years and to determine whether additional scrutiny was needed at any monitoring station. In addition, the Rounds 1 through 7 Report provided an evaluation of the Rounds 1 through 7 data to determine whether modifications to the program should be made. In particular, a risk evaluation was provided to determine whether to discontinue dioxin/furan analyses, and mussel tissue data were evaluated to determine whether to discontinue mussel sampling and analysis for selected monitoring and/or reference stations. The following summarizes the recommendations of the Rounds 1 through 7 Report:

- Continued collection of sediment samples at MS-05, MS-08, MS-09, MS-10, MS-13, and MS-14 during Rounds 8 and 9.

- Conduct additional scrutiny at MS-01, MS-03, MS-04, MS-05, MS-08, MS-09, MS-11, and MS-12. Additional scrutiny at monitoring stations MS-03 and MS-04 was not needed as part of the OU4 monitoring program for copper and nickel because additional scrutiny had occurred in the area represented by those stations as part of the Phase I Remedial Investigation (RI) for Site 32 (TtNUS, January 2004). PAHs were evaluated in planning for the Phase II RI for Site 32 to determine the additional scrutiny that is recommended for these chemicals.

- Discontinue collection of mussels until the next 5-year sampling event.

- Discontinue analysis of sediment and mussel samples for alkylated PAHs.

- Perform dioxin/furan analysis only at monitoring stations MS-08, MS-09, and the reference stations for Rounds 8 and 9, but perform dioxin/furan analysis for monitoring stations MS-07 through MS-12 and the reference stations during Round 10.

- Conduct further evaluation of 4,4'-DDT as part of the additional scrutiny for MS-01 and MS-08. (Note: Additional scrutiny for 4,4'-DDT was not conducted at MS-08 because the sediment with the elevated 4,4'-DDT detection was excavated as part of OU3 remedial activities conducted in 2004.)

1.6 SUMMARY OF ADDITIONAL SCRUTINY RESULTS

An Additional Scrutiny investigation was conducted based on the recommendations in the Rounds 1 through 7 Report, and the results were presented in the Additional Scrutiny Report (TtNUS, August 2007). The results of the additional scrutiny are briefly summarized below and detailed in Section 4.0. A technical meeting between the Navy, regulators, and Tetra Tech was held on April 26, 2007, to discuss the additional scrutiny investigation. The minutes from that meeting are included as Appendix D of the Additional Scrutiny Report. Based on the results of that investigation, the Navy agreed to conduct Phase II Additional Scrutiny investigations at MS-01 and MS-12.

The conclusions and recommendations in the Additional Scrutiny Report (TtNUS, August 2007) are presented below.

MS-01

- A limited area of contamination near AS01-SD03 may be related to past sources of PAHs from Site 34.

- Based on the available data, it could not be determined whether past pesticide-rinsing operations associated with Site 34 were clearly a primary source of 4,4'-DDT in sediment at MS-01. However, the more likely source of 4,4'-DDT is erosion of soil containing 4,4'-DDT as a result of past pesticide spraying activities at the site. A removal action for sediment based on pesticides was not recommended.

- Continuation of the investigation in a phased approach was recommended to determine whether sufficient sediment is present in MS-01 to warrant consideration of a removal action. If it is determined that there is a significant amount of sediment, sediment samples for PAH analysis could be collected as part of the RI for Site 34 or as part of an OU4 investigation. (Note: sediment sampling for PAH analysis will be conducted as part of the RI for Site 34.)

- It was recommended than an evaluation be conducted to determine which method, or combination of methods, should be used to better understand the river bottom substrate. (Note: An underwater video was used to view the sediment as described in Section 1.7.1.)

MS-05 and MS-09

- At MS-05, the area with copper concentrations greater than the IRG and lead concentrations greater than twice the ER-M is less than 25 feet by 50 feet (0.03 acre). The area with lead concentrations greater than the ER-M is less than 50 feet by 300 feet (0.3 acre). No samples had nickel concentrations that exceeded its IRG.

- At MS-09, the area with copper, nickel, and flourene concentrations greater than their respective IRGs is likely less than 50 feet by 200 feet (0.2 acre). The concentrations of HMW PAHs slightly exceeded its IRG at three locations along the shoreline. The approximate size of the area with elevated HMW PAH concentrations cannot be easily determined, but it is not likely that sediment with concentrations greater than the IRG extend very far from the shoreline. No samples had acenaphthylene or anthracene concentrations that exceeded their IRGs.

- It was recommended that several sampling locations be moved to better cover the area at and near IRG or ER-M exceedances. (Note: These changes are described in Section 2.3.)

- It was recommended that after the OU3 Operation, Maintenance and Monitoring (OM&M) data for the first rounds of monitoring are evaluated, MS-05, MS-08, and MS-09 be removed from the Interim Offshore Monitoring Program and included in the OU3 monitoring program.

- A removal action for sediment was not recommended for MS-05 or MS-09.

MS-11

- It was concluded that metals in soil from OU2 appear to be the likely source of the elevated levels of metals observed in the sediment at MS-11, Loc. 3. (Note: Subsequently, the Navy placed shoreline controls along the eroding areas in 2005 and 2006.)

- Additional sediment sampling was not recommended because there is only a small amount of sediment at this monitoring station and because erosion controls were placed along the shoreline.

- A removal action for sediment was not recommended because there is only a small amount of sediment.

MS-12

- The location and PAH composition of one sediment sample inside Building 178 suggest that PAHs are possibly related to historical shipbuilding operations or materials used to construct the building (e.g., roof shingles and tar paper).

- The source of PAHs in the offshore area appears to be a mixture of PAHs from historical shipbuilding operations in Building 178, materials used to construct the building, and ambient background. These are not IRP sources.

- Sites 5 and 10 are historical sources of lead to the offshore area, and impacts are apparent at one sediment location.

- Sites 5 and 10 are not current sources of lead to the offshore. Industrial waste discharges associated with Site 5 were discontinued by 1974. Investigation of groundwater at Site 10 shows that it is not a current source of lead to the offshore area.

- It was recommended that additional data be collected to determine the extent of PAH and lead contamination in sediment at MS-12 as follows:

  - The approximate location of the ramp drop-off should be determined.

  - Additional sediment sampling to determine whether sediment is present in the area within 15 feet of the end of the ramp by Building 178 in the main channel of the Piscataqua River.

  - Additional surficial and subsurface sediment sampling inside and outside Building 178 to better define the vertical and horizontal extent of contamination and to estimate the volume of contaminated sediment in this area. The accessibility of sediment inside Building 178 also will be determined for potential removal.

  - The size and extent of the eelgrass bed should be mapped and the PAH concentrations in the sediment within the eelgrass bed should be determined to better evaluate whether a removal action is warranted for sediment in the eelgrass bed.

Additional recommendations for modifications to the monitoring program were presented in two technical memoranda included in Appendix A of the Phase II Additional Scrutiny Quality Assurance Project Plan (QAPP) (TtNUS, September 2007). The first memorandum recommended some modifications to sampling locations at MS-05 and MS-09 as well as eliminating the reference locations from the Round 9 sampling event. The second memorandum recommended not sampling MS-10, MS-13, and MS-14 during Round 9. The regulators agreed with the recommendations in both memoranda with one exception. They requested that sediment samples be collected from one of the four reference stations. The Navy selected reference station RS-02 for sampling.

At MS-05, an additional scrutiny sample was collected for analysis of copper and lead as part of the Round 9 sampling event. The sample was collected north of a location with concentrations of copper and nickel greater than IRGs and concentrations of lead greater than its ER-M. The sample was collected to ensure that the size of the area with elevated concentrations of metals was not increasing. Sample analysis determined that the concentration of copper was less than its IRG and the concentration of lead was less than its ER-M; therefore, defining the extent of contamination.

1.7 SUMMARY OF PHASE II ADDITIONAL SCRUTINY RESULTS

Phase II Additional Scrutiny activities were conducted in accordance with the Phase II Additional Scrutiny QAPP (TtNUS, September 2007). The objective of the Phase II Additional Scrutiny Investigation was to collect and evaluate data from MS-01 and MS-12 recommended in the Additional Scrutiny Report

(TtNUS, August 2007). A Phase II Additional Scrutiny Report has not yet been prepared; therefore, the Phase II additional scrutiny data are evaluated in this Rounds 1 through 10 Report.

1.7.1 MS-01

The Phase II Additional Scrutiny Investigation at MS-01 was conducted to determine the nature of the river bed substrate. Difficulties had been noted at this location in the collection of sediment during previous sampling investigations; however, it was not known whether the problems collecting sediment were due to a lack of sediment in the area or due to a rocky river bed. A sediment profile survey was conducted using an underwater video camera to record the penetration of a pipe into the sediment. The methodology is presented in detail in the Phase II Additional Scrutiny at Monitoring Station 01 Technical Memorandum (see Appendix A).

In summary, an underwater video camera was attached to a probe that was lowered into the sediment, and the approximate depth of sediment penetration of the probe was recorded, as were the horizontal coordinates of each survey location. Also, videos of the sediment were recorded along three transects by attaching the camera to a weighed rope and suspending it just above the bottom as the boat moved along each transect. Appendix A includes a figure showing the locations of the sediment probes and transects. The figure contains hyperlinks to the video.

Based on the results of the survey, it was determined that the substrate consists of small rocks and shells interspersed within sediment, with the density of rocks and shells appearing to increase further away from the shore. Most rocks are 2 to 3 inches or smaller in diameter. The sediment depth was greater than 1 inch at most locations; therefore, there appears to be a sufficient amount of sediment throughout MS-01 to support a significant benthic population. The following recommendations were presented in the Phase II Additional Scrutiny Investigation at MS-01 Technical Memorandum:

- Collect additional data to delineate the extent of PAH contamination in sediment at MS-01.
- Consider alternative methods to collect sediment for future sampling events, such as a core sampler, smaller grab sampler, or divers to collect the sediment directly.

1.7.2 MS-12

The Phase II Additional Scrutiny Investigation at MS-12 was conducted to determine the extent of contamination in and around Building 178, to define boundaries of the eelgrass bed, to determine the extent of contamination in the eelgrass bed, and to determine PAH and lead concentrations in sediment within 15 feet of the ramp drop-off near Building 178. Results from the investigation are presented in the Round 9 and Phase II Additional Scrutiny Data Package for Operable Unit 4 (OU4) at Portsmouth Naval

Shipyard (TtNUS, September 2008). Results for three additional sediment samples collected during the Round 10 sampling event and analyzed for lead are presented in the Round 10 Data Package (TtNUS, June 2009). A discussion of these results is presented in Section 4.5.1 of this report.

TABLE 1-1

SUMMARY OF INVESTIGATIONS CONDUCTED AT MONITORING AND REFERENCE STATIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station	Samples Collected as Part of the Interim Offshore Monitoring Program					Additional Scrutiny Investigation	
	Rounds 1 through 5[1]	Rounds 6 and 7[2]	Round 8[3]	Round 9[3]	Round 10[3]	Phase I	Phase II
Monitoring Stations							
MS-1	SD, MU, LJ	SD, MU	NS	NS	NS	Yes	Yes
MS-2	SD, MU, LJ	SD, MU	NS	NS	NS	NS	NS
MS-3	SD, MU, LJ	SD, MU	NS	NS	NS	NS	NS
MS-4	SD, MU, LJ	SD, MU	NS	NS	NS	NS	NS
MS-5	SD, MU, LJ	SD, MU	Full Suite	Full Suite	Full Suite	Yes	NS
MS-6	SD, MU, LJ	SD, MU	NS	NS	NS	NS	NS
MS-7	SD, MU, LJ	SD, MU	NS	NS	NS	NS	NS
MS-8	SD, MU, LJ	SD, MU	Full Suite + Dioxins/Furans	Full Suite + Dioxins/Furans	Full Suite + Dioxins/Furans	NS	NS
MS-9	SD, MU, LJ	SD, MU	Full Suite + Dioxins/Furans	Full Suite + Dioxins/Furans	Full Suite + Dioxins/Furans	Yes	NS
MS-10	SD, MU, LJ	SD, MU	PAHs	NS	NS	NS	NS
MS-11	SD, MU, LJ	SD, MU	NS	NS	NS	Yes	NS
MS-12	SD, MU, LJ	SD, MU	NS	NS	NS	Yes	Yes
MS-13	SD, MU, LJ	SD, MU	PAHs	NS	NS	NS	NS
MS-14	SD, MU, LJ	SD, MU	PAHs	NS	NS	NS	NS
Reference Stations							
RS-01	SD, MU, LJ	SD, MU	PAHs, PCBs, Dioxins/Furans, TOC	NS	NS	NS	NS
RS-02	SD, MU, LJ	SD, MU		PAHs, PCBs, Dioxins/Furans, TOC	NS	NS	NS
RS-03	SD, MU, LJ	SD, MU		NS	NS	NS	NS
RS-04	SD, MU, LJ	SD, MU		NS	NS	NS	NS

SD - Sediment samples
MU - Mussel samples
LJ - Juvenile lobster samples
NS - Not sampled or investigated.

1 - All samples were analyzed for polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), and metals.
Samples from MS-7 through MS-12 and all four reference stations were also analyzed for dioxins/furans.
- Sediment samples were additionally analyzed for grain size, total organic carbon (TOC), and acid volatile sulfide/simulataneously extracted metals (AVS/SEM).
- Mussel samples were additionally analyzed for percent lipids.

2 - Samples were analyzed for the same parameters as in Rounds 1 through 5 with the following expections:
- Sediment samples were not analyzed for AVS/SEM.

3 - Only sediment samples were collected during this sampling round, and the samples were analyzed for the parameters listed in the table.
- Full suite includes: PAHs, pesticides, PCBs, metals, grain size, and TOC (sediment samples were not analyzed for alkylated PAHs).
- Samples were not analyzed for chloropyrifos, pentachloroanisole, pentachlorobenzene, 1,2,3,4-tetrachlorobenzene, or 1,2,4,5-tetrachlorobenzene as they were for the first seven rounds.

TABLE 1-2

MODIFICATIONS TO THE INTERIM OFFSHORE
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Report	Round	Modification	Rationale/Comments	Modification Implemented
Baseline Interim Offshore Monitoring Report For Operable Unit 4 (TtNUS, July 2002)	Round 1-4	Discontinue analysis of sediment samples for AVS/SEM.	AVS/SEM data were not needed for future evaluations.	Round 6
		Discontinue juvenile lobster sampling.	Chemical concentrations in juvenile lobsters were similar between monitoring and reference stations. Mussels are a better indicator of contaminant concentrations.	
		Conduct future sampling rounds in late summer.	No significant differences in data collected during spring or summer. Round 5 samples were collected in summer before report was approved.	
Rounds 1 through 7 Interim Offshore Monitoring Program Report (TtNUS, November 2004)	Round 1-7	Collect sediment samples only at MS-05, MS-08, MS-09, MS-10, MS-13, and MS-14 during Rounds 8 and 9.	These locations had increasing concentrations that exceed IRGs or are predicted to exceed the IRGs within the next 5 years.	Round 8
		Conduct additional scrutiny only at MS-01, MS-03, MS-04, MS-05, MS-08, MS-09, MS-11, and MS-12. PAHs and metals were identified as target analytes.	Locations exceed IRGs and are predicted to continue to exceed the IRGs within the next 5 years.	
		Discontinued mussels collection until the next 5-year sampling event.	BSAFs/BAFs are not expected to change. Area is closed to shellfishing, so human health risks do not need to be re-evaluated.	
		Discontinue analysis of sediment and mussel samples for alkylated PAHs.	Alkylated PAHs have not been identified as COCs and are not used to make recommendations for additional sampling.	
		Perform dioxin/furan analysis only at MS-08, MS-09, and the reference stations for Rounds 8 and 9, but perform dioxin/furan analysis for MS-07 through MS-12 and the reference stations during Round 10.	Risks from dioxins/furans to human and ecological receptors are low. Samples will be collected in future rounds due to increase in dioxin/furans concentrations during Round 7.	
		Conduct further evaluation of 4,4'-DDT as part of the additional scrutiny for MS-01 and MS-08. (Additional scrutiny for 4,4'-DDT was not conducted at MS-08 because the sediment with the elevated 4,4'-DDT detection was excavated as part of the OU3 remedial activities in 2004.)	Elevated 4,4'-DDT level at MS-01.	

TABLE 1-2

MODIFICATIONS TO THE INTERIM OFFSHORE
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

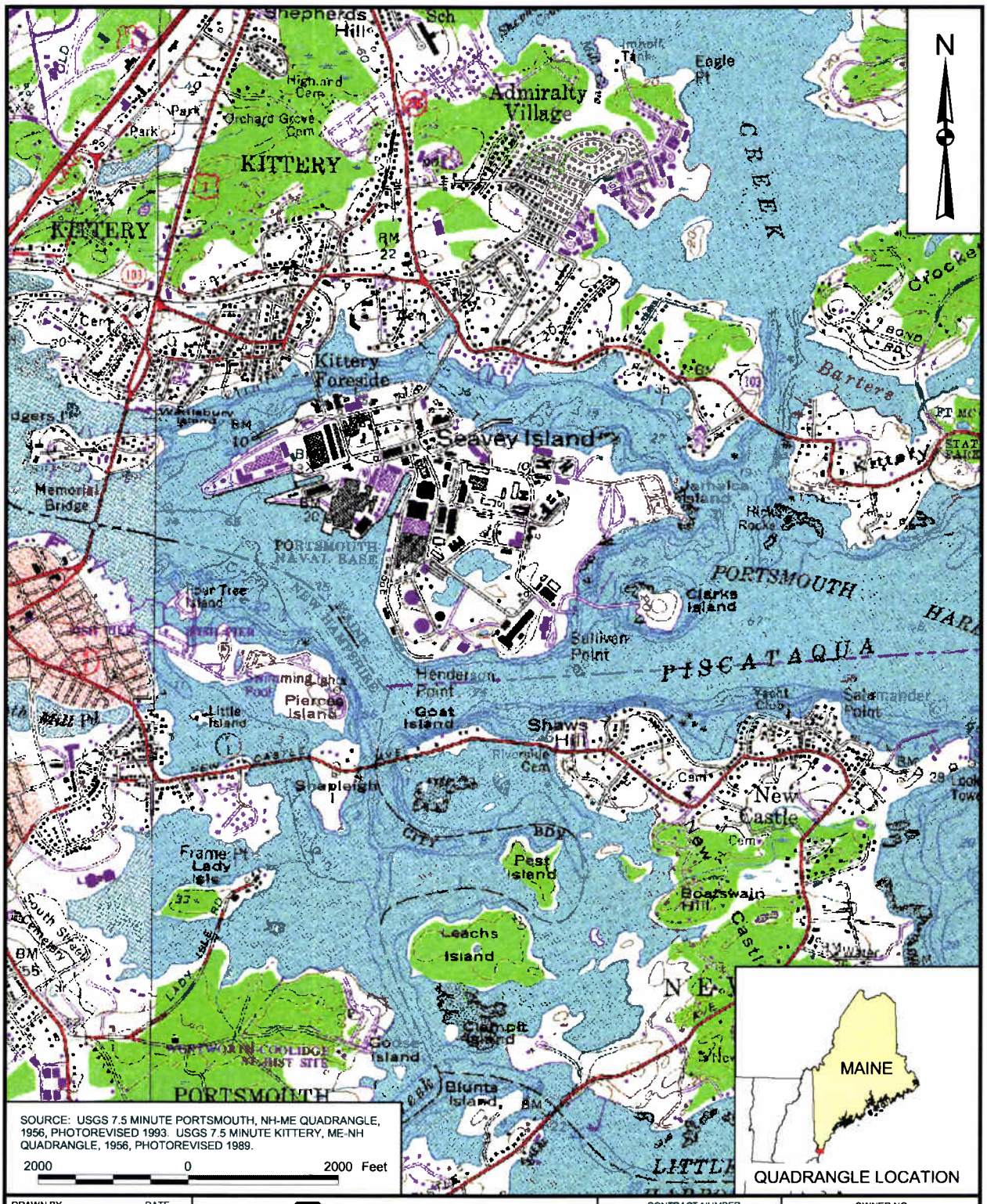
Report	Round	Modification	Rationale/Comments	Modification Implemented
Additional Scrutiny Quality Assurance Project Plan for Operable Unit 4, Appendix B: Technical Memorandum Comparison of Analytical Methods (TtNUS, August 2005)	Round 1-7	Use USEPA analytical methods for organic chemical analysis of sediment as opposed to NOAA methods.	Similar results by both methods. Greater number of laboratories capable of analyzing using USEPA methods, which results in cost saving.	Round 8 / Additional Scrutiny
		Use USEPA analytical methods for organic chemical and metal analyses of mussel samples as opposed to NOAA methods.	Similar results expected by both methods. Greater number of laboratory capable of analyzing using USEPA methods results in cost saving.	
		Remove select pesticides (chloropyrifos, pentachloroanisole, pentachlorobenzene, 1,2,3,4-tetrachlorobenzene, and 1,2,4,5-tetrachlorobenzene) from analytical parameter list.	At least two different analytical methods needed using USEPA methods for all parameters. The eliminated pesticides were not identified as COCs, do not have IRGs, and are not used in decision-making.	
Phase II Additional Scrutiny Quality Assurance Project Plan, Appendix A (TtNUS, September 2007)	Round 8 / Additional Scrutiny	Move sample locations at MS-05 and MS-09.	Obtain better spatial coverage of chemical concentrations in sediment.	Round 9 / Phase II Additional Scrutiny
		Collect sediment at two additional locations at MS-05 for analysis of copper and lead for Round 9.	Ensure that size of area near MS-05, Loc. 1 with elevated concentrations of metals is not increasing.	
		Eliminate sampling at reference stations (Navy agreed to collect sediment samples at one reference station for Round 9 after receiving comments from the regulators).	No increasing or decreasing trends in concentrations noted.	
		Discontinue monitoring at MS-10, MS-13, and MS-14.	Data do not indicate any impacts from IRP sites, and concentrations of PAHs are generally low and do not appear to be increasing.	

TABLE 1-2

MODIFICATIONS TO THE INTERIM OFFSHORE
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Report	Round	Modification	Rationale/Comments	Modification Implemented
Technical Memorandum for Round 10 (TtNUS, September 2008)	Prior to Round 10	Eliminate sampling at reference stations.	Overall, chemical concentrations at reference stations were consistent across all rounds at a particular station, with no increasing or decreasing trends in concentrations.	Round 10[(1)]
			The reference data are not currently being used for decision making because chemical concentrations are less than IRGs.	
			The data set is adequate for making decisions after Round 10.	
		Only collect sediment samples from MS-05, MS-08, and MS-09 during Round 10.	Sediment samples not needed at other monitoring stations for various reasons as discussed in the Technical Memorandum.	
		Discontinue use of NOAA methods for analysis of metals in sediment. Use USEPA Method 6020B for analysis of metals in future offshore sampling events. During an October 8, 2008, conference call, it was suggested that the Navy collect additional sediment samples from MS-05, MS-08, and MS-09 during Round 10 for analysis of metals by NOAA and USEPA methods to strengthen the data set.	Greater number of laboratories capable of analyzing using USEPA methods, which results in cost saving.	
		Discontinue mussel sampling at all monitoring and reference stations.	Bioaccumulation factors do not need to be recalculated.	

1 - Some of these modifications were recommended for future rounds, but based on regulator comments, it was agreed that the modifications would be applied to Round 10 only.
AVS - Acid volatile sulfides
BAF - Biota accumulation factor
BSAF - Biota sediment accumulation factor
COCs - Chemicals of concern
IRGs - Interim remediation goals
IRP - Installation Restoration Program
NOAA - National Oceanic and Atmospheric Administration
PAHs - Polycyclic aromatic hydrocarbons
SEM - Simimultaneously extracted metals
USEPA - United States Environmental Protection Agency

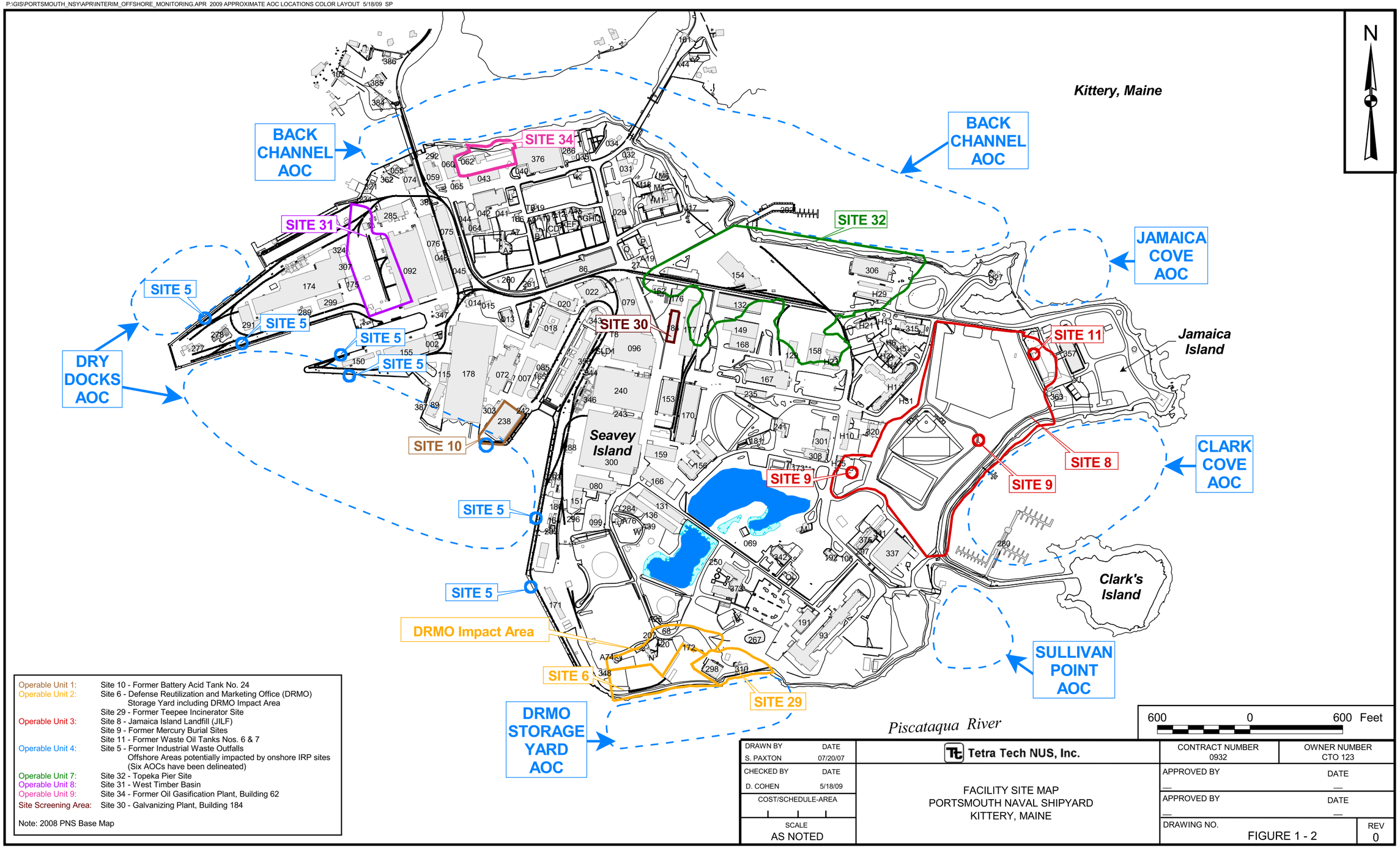


SOURCE: USGS 7.5 MINUTE PORTSMOUTH, NH-ME QUADRANGLE, 1956, PHOTOREVISED 1993. USGS 7.5 MINUTE KITTERY, ME-NH QUADRANGLE, 1956, PHOTOREVISED 1989.

DRAWN BY J. LAMEY	DATE 12/29/03	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0057 / OWNER NO. CTO 123
CHECKED BY L. GANSER	DATE 5/21/09	PORTSMOUTH NAVAL SHIPYARD VICINITY MAP PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 1 / REV 0

P:/GIS/PORTSMOUTH_NSY/APR/INTERIM_OFFSHORE_MONITORING.APR VICINITY LAYOUT 5/21/09 SP

P:\GIS\PORTSMOUTH_NSY\APR\INTERIM_OFFSHORE_MONITORING.APR 2009 APPROXIMATE AOC LOCATIONS COLOR LAYOUT 5/18/09 SP

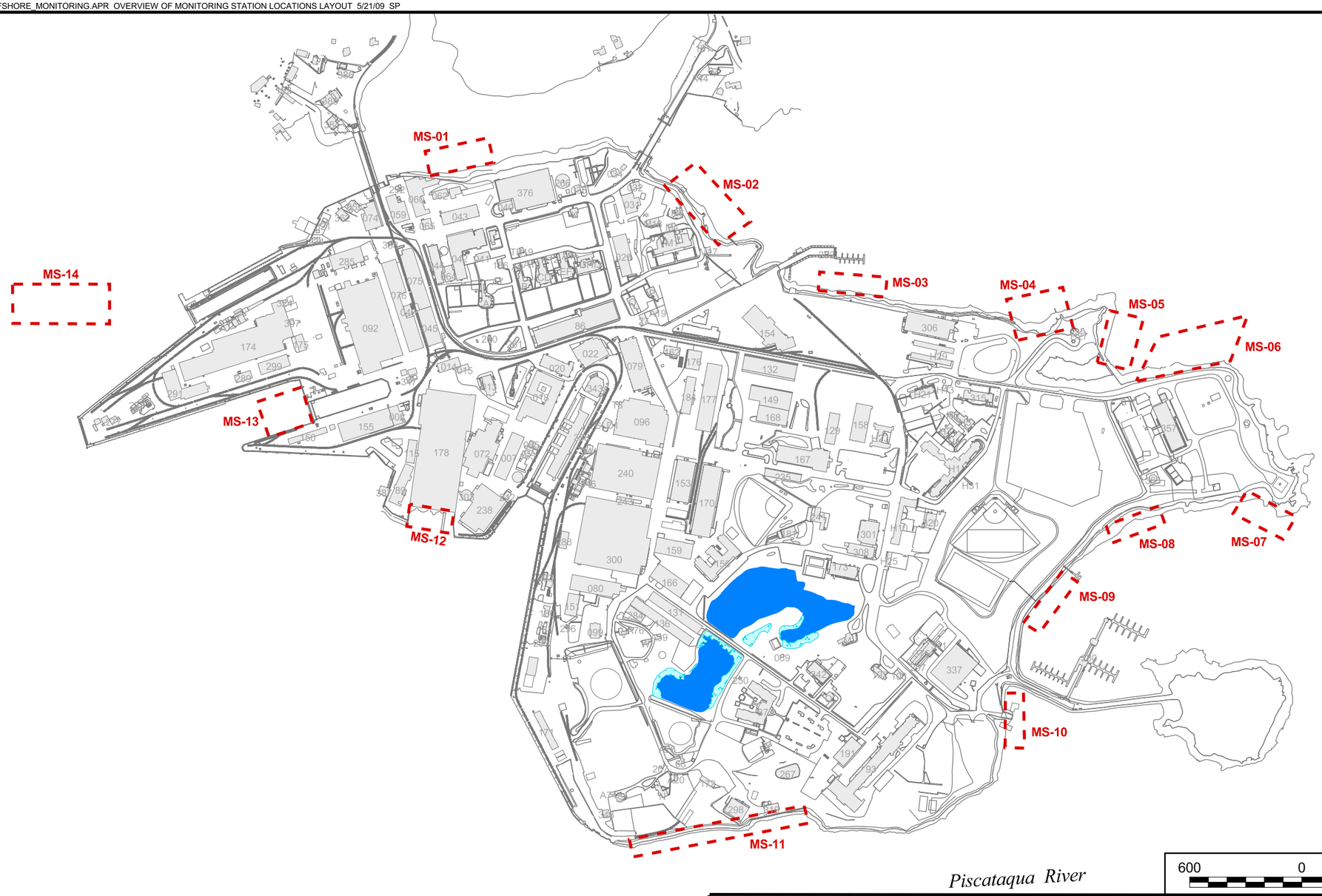


Operable Unit 1:	Site 10 - Former Battery Acid Tank No. 24
Operable Unit 2:	Site 6 - Defense Reutilization and Marketing Office (DRMO) Storage Yard including DRMO Impact Area
	Site 29 - Former Teepee Incinerator Site
Operable Unit 3:	Site 8 - Jamaica Island Landfill (JILF)
	Site 9 - Former Mercury Burial Sites
	Site 11 - Former Waste Oil Tanks Nos. 6 & 7
Operable Unit 4:	Site 5 - Former Industrial Waste Outfalls Offshore Areas potentially impacted by onshore IRP sites (Six AOCs have been delineated)
Operable Unit 7:	Site 32 - Topeka Pier Site
Operable Unit 8:	Site 31 - West Timber Basin
Operable Unit 9:	Site 34 - Former Oil Gasification Plant, Building 62
Site Screening Area:	Site 30 - Galvanizing Plant, Building 184

Note: 2008 PNS Base Map

DRAWN BY S. PAXTON	DATE 07/20/07	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932 / OWNER NUMBER CTO 123
CHECKED BY D. COHEN	DATE 5/18/09	FACILITY SITE MAP PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 2 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\INTERIM_OFFSHORE_MONITORING.APR OVERVIEW OF MONITORING STATION LOCATIONS LAYOUT 5/21/09 SP

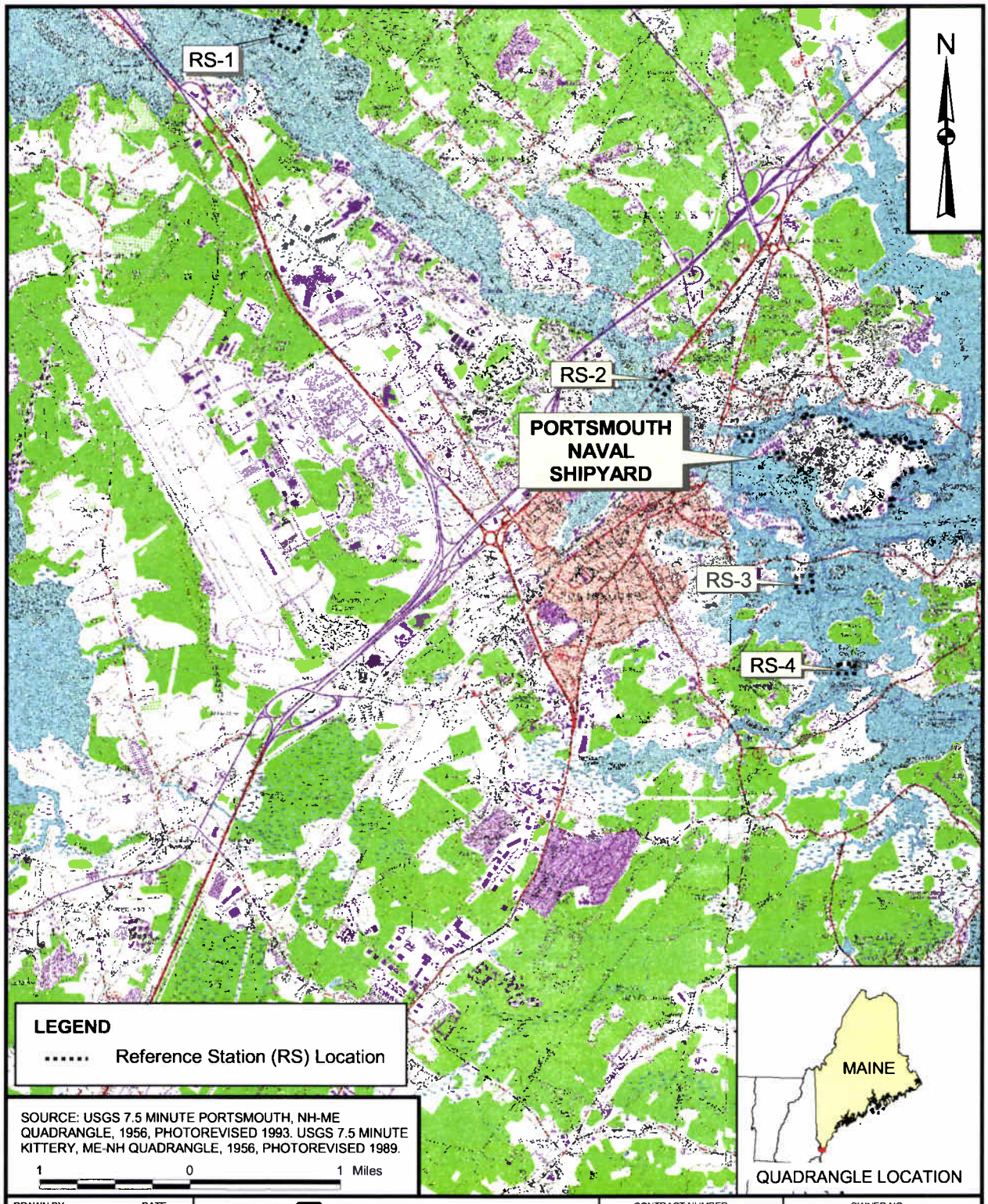


LEGEND

Monitoring Station Location

Note: 2008 PNS Base Map

DRAWN BY J. LAMEY	DATE 04/20/04	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932 / OWNER NUMBER CTO 123
CHECKED BY M. BOERIO	DATE 5/21/09	OVERVIEW ON MONITORING STATION LOCATIONS ROUND 10 INTERIM OFFSHORE MONITORING PROGRAM PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 3 / REV 0



DRAWN BY J. LAMEY — DATE 04/27/04	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932	OWNER NO. CTO 123
CHECKED BY L. GANSER — DATE 5/21/09	OVERVIEW OF REFERENCE STATION LOCATIONS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 1 - 4	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\INTERIM_OFFSHORE_MONITORING.APR OVERVIEW OF REFERENCE STATION LOCATIONS 5/21/09 SP

2.0 SAMPLING INVESTIGATION

The offshore monitoring sampling was described in the Interim Offshore Monitoring Plan (TtNUS, October 1999), but modifications have been made throughout the program, as presented in Tables 1-1 and 1-2. Samples were collected twice a year during the baseline rounds (Rounds 1 through 4) and once a year during Rounds 5 through 10. Tables 2-1 to 2-3 present the analytical program for each of the sampling rounds [Table 2-1 (Rounds 1 through 7) and Table 2-2 (Rounds 8 through 10)] and the additional scrutiny investigations (Table 2-3). The sampling conducted at the monitoring and reference stations has been as follows:

- Seven rounds of sediment data were collected at MS-01 through MS-04, MS-06, MS-07, MS-11, and MS-12.
- Eight rounds of sediment data were collected at MS-10, MS-13, MS-14 and RS-01, RS-03, and RS-04.
- Nine rounds of sediment data were collected at reference station RS-02.
- Ten rounds of sediment data were collected at MS-05, MS-08, and MS-09.

Sample collection and analysis for the first seven rounds are described in the Rounds 1 through 7 Report (TtNUS, November 2004). Samples were collected by Eyak Environmental Sciences, LLC for Round 8, by Ecotones for Round 9, and TG&B Marine Services, Inc., for Round 10. Sampling during all rounds was conducted under the direction and supervision of Tetra Tech NUS, Inc. (TtNUS). Chemical analyses of sediment samples were conducted by Severn Trent Laboratories (STL) for Round 8, Mitkem Corporation, Brooks-Rand Labs, LLC, and Pace Analytical Services for Round 9, and Mitkem Corporation and Brooks-Rand Labs, LLC, for Round 10. The analytical results and summary of sampling investigations from Rounds 8, 9, and 10 were presented in data packages (TtNUS, January 2006, September 2008, and June 2009).

2.1 STATION DESCRIPTIONS

As presented in Section 1.0 of this report, 14 monitoring stations (MS-01 through MS-14) are adjacent to PNS, and four reference stations (RS-01 through RS-04) are in the Piscataqua River. Figures 1-3 and 1-4 present the locations of the monitoring and reference stations, respectively. Table 3-3 in the Interim Offshore Monitoring Plan (TtNUS, October 1999) presents the rationale for the location of each station. Descriptions of the stations and samples collected during Rounds 1 through 10 and as part of the

additional scrutiny investigations are presented in Appendix B.1. The first table in Appendix B.1 is from the Rounds 1 through 7 Report (TtNUS, November 2004), and the next four tables are from the Round 8, Additional Scrutiny, Round 9, and Round 10 data packages (TtNUS, January 2006; February 2006; September 2008, and June 2009), respectively.

For this report, the number after the monitoring station designates the sample location for that station. For example, MS-01, Loc. 3, is location 3 at MS-01. Complete nomenclature is described in Section 5.2 of the Interim Offshore Monitoring Plan (TtNUS, October 1999).

Sampling procedures including the sample identification system, decontamination procedures, and other sample collection methods are presented in the Interim Offshore Monitoring Plan for Operable Unit 4 (TtNUS, October 1999). Sections 2.2.1 and 2.2.2 of the Baseline Report (TtNUS, July 2002) describe the sediment collection procedures used for the Rounds 1 through 10 Interim Offshore Monitoring Program Sampling. The Additional Scrutiny QAPPs (TtNUS, August 2005 and September 2007) describe the sediment collection procedures used for the additional scrutiny investigations. One modification to the sample methodology during Rounds 6, 7, and 8 was in the recording of the reduction-oxidation (redox) discontinuity of sediment samples. Instead of using a clear tube to determine the depth at which the color changes, usually from brown to black, sediment was scraped away from the sample hole and the depth visually observed for sediment color changes. The redox discontinuity was used to evaluate AVS/SEM data, but because AVS/SEM samples were not collected after Round 5, the change in method does not adversely impact the monitoring program. During Rounds 9 and 10, redox discontinuity was not recorded because the data were not being used to make decisions associated with the monitoring program.

2.2 ANALYTICAL METHODS

Section 6.0 of the Interim Offshore Monitoring Plan (TtNUS, October 1999) details the quality assurance/quality control (QA/QC) protocols and requirements based on standard practices, methodology, and QA/QC guidance for Interim Offshore Monitoring Program Samples. The Additional Scrutiny QAPPs (TtNUS, August 2005 and September 2007) describe the QA/QC protocols and requirements for the additional scrutiny investigations.

The analytical procedures for organic chemicals during Rounds 8, 9, and 10 were different than they were for the first seven rounds, as described in Appendix C of the Additional Scrutiny QAPP (TtNUS, August 2005). It was recommended by the Navy and agreed to by the regulators that the analytical method for organic chemicals be modified based on a comparison of NOAA and United States Environmental Protection Agency (USEPA) analytical methods presented in the Technical Memorandum Comparison of Analytical Methods for the Interim Offshore Monitoring Program [see Appendix B of the Additional Scrutiny QAPP for Operable Unit 4 (TtNUS, August 2005)].

As part of the Round 10 sampling event, samples for metals analysis from MS-05, MS-08, and MS-09 were analyzed using both NOAA and USEPA analytical methods, except for the sample from MS-05, Loc. 4, which was only analyzed using USEPA analytical methods in accordance with the methods used for additional scrutiny samples. The rationale for analyzing the metals by these two methods and an evaluation of the differences in the results between the two methods are discussed in more detail in Section 5.3.

Tables 2-1 to 2-3 summarize the sediment analytical parameters for each round. The analyte list was presented in the Interim Offshore Monitoring Plan (TtNUS, October 1999); however, modifications to the sampling program were made as noted in Tables 2-1 (Rounds 1 through 7) and 2-2 (Rounds 8 through 10).

2.3 DEVIATIONS/MODIFICATIONS AND SIGNIFICANT ISSUES FROM INTERIM OFFSHORE MONITORING PROGRAM

Details regarding deviations/modifications to the monitoring program during the first seven rounds were presented in the Rounds 1 through 7 Report (TtNUS, November 2004). There were no significant concerns with the data from the first seven rounds that would affect any decisions made in this report using that data. This section presents the deviations/modifications from the interim offshore monitoring program and other significant observations during Rounds 8 through 9 that may be useful in evaluating the sampling results in this report. In addition, this section presents the changes to locations made at MS-05 and MS-09. The figures showing the monitoring station locations at MS-05 and MS-09 are presented in Section 4.0 of this report.

2.3.1 Round 8

During Round 8, the sample from MS-08, Loc. 3 was collected approximately 10 to 15 feet toward the water because the previously sampled location was covered with rip-rap from the OU3 removal action that occurred in that area in 2004. This slight modification to the sampling location is not expected to impact the sample results. This change was also made for Rounds 9 and 10.

Water quality measurements were inadvertently not collected at some of the monitoring and reference stations. Because water quality data were collected for informational purposes, and were not used to make any decisions, not having these data is not considered a significant concern.

Global Positioning System (GPS) measurements were not made at some of the intertidal reference locations where permanent markers were no longer present. Detailed field notes from previous sampling events were used to estimate the locations.

2.3.2 Round 9

During the Phase II Additional Scrutiny Investigation, the location of one sample (AS05-SD15) from MS-05 was moved approximately 5 feet toward the water because the proposed location was rocky.

2.3.3 Round 10

No deviations were noted.

2.3.4 MS-05

The following is a summary of sampling conducted at MS-05, including changes to the monitoring station locations:

- MS-05, Loc. 1: Ten rounds of sampling have been conducted at this location. This location was moved slightly (approximately 5 to 10 feet) after the Round 5 sampling event because the previously sampled location was under the new rip-rap placed in the area as part of OU3 construction activities. Therefore, Rounds 1 through 5 of sampling were conducted at the initial location of MS-05, Loc. 1, and Rounds 6 through 10 were conducted at the new location designated as MS-05, Loc.1A, on figures to differentiate it from the original location.

- MS-05, Loc. 2: Ten rounds of sampling have been conducted at this location. As presented in more detail in a Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (TtNUS, September, 2007), this location was moved 200 feet to the southeast toward OU3 to better monitor the sediment in this area after Round 8. The primary reason for moving the location was that sediment samples from MS-05, Loc. 2, had consistently low chemical concentrations in the first eight rounds and so continued monitoring in that area was not warranted. Therefore, Rounds 1 through 8 of sampling were conducted at the initial location of MS-05, Loc. 2, and Rounds 9 and 10 were conducted at the new location designated as MS-05, Loc 2A, on figures to differentiate it from the original location.

- MS-05, Loc. 3: Ten rounds of sampling have been conducted at this location.

- MS-05, Loc. 4: Two rounds of sampling have been conducted at this location, beginning with the Round 9 sampling event. As presented in more detail in a Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (TtNUS, September, 2007), this location (approximately 50 feet toward the water from MS-05, Loc. 1) was added to verify that the size of the area with elevated concentrations of metals is not increasing. Concentrations of copper and nickel at MS-05, Loc. 1, were greater than IRGs, and concentrations of lead were greater than its ER-M (Long et al., 1995). The samples from this location were only analyzed for copper and lead during Round 9 but were analyzed for all metals during Round 10.

2.3.5 MS-09

The following is a summary of the sampling conducted at MS-09, including changes to the monitoring station locations:

- MS-09, Loc. 1: Ten rounds of sampling have been conducted at this location. As described above, the intertidal area at MS-09 no longer exists, and MS-09, Loc. 1, was moved slightly offshore (approximately 10 to 15 feet) to the subtidal area. As a result, Rounds 1 through 6 of sampling were conducted at the initial location of MS-09, Loc 1, and Rounds 7 through 10 were conducted at the new location designated as MS-09, Loc 1A, on figures to differentiate it from the original location.

- MS-09, Loc. 2: Ten rounds of sampling have been conducted at this location. As described above, the intertidal area at MS-09 no longer exists, and MS-09, Loc. 2, was moved offshore of the intertidal location to the subtidal area for Rounds 7 and 8. However, this placed MS-09, Loc. 2, very close to MS-09, Loc. 3, which is also subtidal. Therefore, as presented in more detail in a Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (TtNUS, September, 2007), MS-09 Loc. 2, was moved south along the shoreline near AS09-SD03 and near monitoring well JW-20 to obtain better spatial coverage at this station for Rounds 9 and 10. The location for Rounds 7 and 8 is designated as MS-09, Loc 2A, and the location for Rounds 9 and 10 is designated as MS-09, Loc 2B, on figures to differentiate it from the original location.

- MS-09, Loc. 3: Ten rounds of sampling have been conducted at this location.

2.4 DATA QUALITY REVIEW

This section presents a summary of the analytical data quality reports (DQRs) for data collected from OU4 for Rounds 8 through 10 and the Phase I and Phase II Additional Scrutiny Investigations. The DQRs provide an evaluation of the analytical methods used by the laboratories and discuss the data validation results for each sampling round. The DQRs for Rounds 1 through 4 were presented in

Appendix A of the Baseline Report (TtNUS, July 2002) and the DQRs for Rounds 5 through 7 were presented in Appendix A of the Rounds 1 through 7 Report (TtNUS, November 2004). DQA reports for Rounds 8, 9, and 10, and the Additional Scrutiny Investigations are provided in Appendix C of this report.

The Interim Offshore Monitoring Plan for Operable Unit 4 (TtNUS, October 1999) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. After completion of the DQRs, it was determined that data for the Interim Offshore Monitoring Program for OU4 is representative of site conditions. However, several data quality issues were noted in the DQRs, including rejection of pesticide/PCB data, absence of data for hexachlorobenzene and mercury, low percent solids for select sediment samples, analysis of some PAHs beyond the holding time limit, and absence of sediment at proposed sample locations. The following sections present summaries of the DQRs provided in Appendix C.

2.4.1 Round 8 Data Quality

For Round 8, laboratory completeness was 61percent for pesticides, 93 percent for PCBs, 92 percent for metals, and 100 percent for all other fractions. Pesticide and PCB data were rejected due to a severe noncompliance of the percent difference between columns/detectors for results determined via gas chromatography/high performance liquid chromatography (GC/HPLC) or due to other problems that can encompass a number of issues. The rejection of these results represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides and PCBs and because data for these compounds are available for the other monitoring rounds. Pesticides and PCBs have not been identified as COCs for OU4 and are not used in decision making. Mercury was inadvertently not analyzed for by the laboratory in any Round 8 sediment samples. The absence of mercury results represents a data gap that has little negative effect on the project because an IRG was not developed for mercury and because mercury data are available for the other monitoring rounds.

An additional data quality issue identified in Round 8 was a percent solid value of less than 30 percent for solids in one sample (OU4-SD-M09-305A) for metal analysis. The metals in this sediment sample were qualified as estimated due to the low percent solids and therefore, this sample may not be representative of sediment at the site as a high portion of the sample is aqueous.

2.4.2 Round 9 Data Quality

For Round 9, laboratory completeness was 95 percent for pesticides, 99 percent for PCBs, and 100 percent for all other fractions. Results for three pesticides in sample OU4-SD-M05-207A were qualified as rejected, and hexachlorobenzene was not analyzed for in any of the 10 samples.

Hexachlorobenzene was included in the scope of work but was not analyzed by the laboratory. The rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. The rejection of these results and the absent of hexachlorobenzene results represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides.

An additional data quality issue identified in Round 9 was analysis of PAH compounds in one sample (OU4-SD-M08-207A) beyond the holding time limit. The initial analysis resulted in surrogate recoveries less than the quality control limits; therefore, the samples were re-extracted outside of the extraction hold time. The re-extracted samples were used for validation because the PAH concentrations were greater in the re-extractions. Upon consideration of the matrix, affected analytes, and applicable storage conditions, loss of analyte due to delayed analysis was considered not to be a significant concern. The PAH data qualified due to holding time exceedance are considered acceptable for use in this document.

2.4.3 Round 10 Data Quality

For Round 10, laboratory completeness was 93 percent for pesticides, 99 percent for PCBs, and 100 percent for all other fractions. Six pesticide results were qualified as rejected, and hexachlorobenzene was not analyzed in any of the 10 samples. Hexachlorobenzene was included in the scope of work but was not analyzed by the laboratory. All positive rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. The rejection of these results and the absence of hexachlorbenzene analysis represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides.

An additional data quality issue identified in Round 10 was a percent solid value of less than 30 percent solids in two samples (OU4-SD-M09-108A and OU4-SD-M09-108A-D). All parameters analyzed for in these sediment samples were qualified as estimated due to the low percent solids. Due to the low percent solids, this sample may not be representative of sediment at the site as a high portion of the sample is aqueous.

2.4.4 Additional Scrutiny Phase I Investigation Data Quality

For the Additional Scrutiny Phase I Investigation, sample completeness was low for PAHs with a sample completeness of 86 percent, because one sample was not collected due to the absence of sediment at the proposed sampling location. Laboratory completeness was 64 percent for pesticides and was 100 percent for all other fractions. Several pesticide results were qualified as rejected due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC

or other problems that can encompass a number of issues. The rejection of these results represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides.

An additional data quality issue identified in the Additional Scrutiny Phase I Investigation was a percent solid value of less than 30 percent solids in one sample (AS09-SD-SD01). PAHs analyzed for in this sediment sample were qualified as estimated due to the low percent solids. Due to low percent solids, this sample may not be representative of sediment at the site as a high portion of the sample is aqueous.

2.4.5 Additional Scrutiny Phase II Investigation Data Quality

For the Additional Scrutiny Phase II Investigation, sample completeness percentage for all fractions was greater than or equal to 100 percent. Although only one sediment sample was to be collected if the sediment was less than 18 inches thick, two sediment samples were collected at several locations to provide additional extent information. In addition, sediment samples were collected from seven discretionary locations (SD-100 through SD-106) to provide additional data at those locations. Sediment samples could not be collected from several proposed locations in the offshore area at MS-12.

TABLE 2-1

SUMMARY OF DATA COLLECTED DURING ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium	Parameter[1]	Round 1 Sep-99	Round 2 May-00	Round 3 Aug-00	Round 4 May-01	Round 5 Aug-01	Round 6 Aug-02	Round 7 Aug-03
Sediment	Metals	X	X	X	X	X	X	X[3]
	Organics[2]	X	X	X	X	X	X	X
	AVS/SEM (0-10 cm)	X	X	X	X	X		
	AVS (0-2 cm)	X	X	X	X	X		
	Grain Size	X	X	X	X	X	X	X
	Total Organic Carbon	X	X	X	X	X	X	X
	Amphipod Toxicity Test		X					
	Pore Water Metals		X					
	Pore Water Dissolved Organic Carbon		X					
	Pore Water Sea Urchin Embryological Development Toxicity Test		X					
Mussel	Metals	X	X	X	X	X	X	X
	Organics	X	X	X	X	X	X	X
	Lipids	X	X	X	X	X	X	X
Lobster	Metals	X	X	X	X	X		
	Organics	X	X	X	X	X		
	Lipids	X	X	X	X	X		

Sampling Dates:
Sep-99 = September 7 through 11, 1999
May-00 = May 2 through 7 and May 23, 2000
Aug-00 = August 27 through 30, 2000
May-01 = May 5 through 9, 2001
Aug-01 = August 18 through 22, 2001
Aug-02 = August 10 through 15, 2002
Aug-03 = August 9 through 13, 2003

Organics = Dioxins/furans, PAHs, alkylated PAHs, pesticides, and PCBs
AVS = Acid volatile sulfide
SEM = Simultaneously extracted metals
PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls

Sources of data are the round data packages (TtNUS, February 2000, October 2000, January 2001, September 2001, February 2002, March 2003, and February 2004).
Organic and inorganic analyses were performed using NOAA analytical methods unless otherwise stated.
1 Collected at all monitoring stations, unless otherwise stated.
2 Dioxin/furans collected at MS-07 through MS-12 and all reference stations.
3 Analyses performed using both NOAA and USEPA analytical methods.

TABLE 2-2

SUMMARY OF DATA COLLECTED DURING ROUNDS 8 TRHOUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Monitoring Station	Metals	PAHs[1]	Pesticides[2]	PCBs	TOC	Grain Size	Dioxins
Round 8 (Aug-05)							
MS-05	X	X	X	X	X	X	
MS-08	X	X	X	X	X	X	X
MS-09	X	X	X	X	X	X	X
MS-10		X			X		
MS-13		X			X		
MS-14		X			X		
RS-01		X		X	X		X
RS-02		X		X	X		X
RS-03		X		X	X		X
RS-04		X		X	X		X
Round 9 (Nov-07)							
MS-05	X[3, 4]	X	X	X	X	X	
MS-08	X[3]	X	X	X	X	X	X
MS-09	X[3]	X	X	X	X	X	X
RS-02		X		X	X		X
Round 10 (Dec-08)							
MS-05	X[3, 5]	X	X	X	X	X	
MS-08	X[3]	X	X	X	X	X	X
MS-09	X[3]	X	X	X	X	X	X

Metal analyses were performed using NOAA analytical methods, unless otherwise stated.
Organic (PAHs, pesticides, PCBs, and dioxins) analyses performed using USEPA analytical methods.

Sampling Dates:
Aug-05 = August 20 through 23, 2005
Nov-07 = November 5 through 9, 2007
Dec-08 = December 17, 2008

PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
TOC = Total organic carbon

1 Alkylated PAHs not included in analysis.
2 Pesticides chloropyrifos, pentachloroanisole, pentachlorobenzene, 1,2,3,4-tetrachlorobenzene, and 1,2,4,5-tetrachlorobenzene were eliminated from the parameter list due to the change in analytical method from Rounds 1 through 7.
3 Analyses performed using both NOAA and USEPA analytical methods.
4 MS-05, Loc 4, analyzed only for copper and lead by USEPA analytical methods.
5 MS-05, Loc 4, analyzed only for metals by USEPA analytical methods.

Sources of data are the round data packages (TtNUS, January 2006, TtNUS, September 2008, TtNUS, June 2009)

TABLE 2-3

SUMMARY OF ANALYTICAL DATA COLLECTED DURING PHASE I AND PHASE II ADDITIONAL SCRUTINY SAMPLING ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station/ Sample Type	Sample Number[1]	Forensics Analysis[2]				Microscopic Analysis	Pesticides	Lead	Copper, Nickel	PAHs
		TPH	PAHs	Biomarkers	TOC					
Phase I Additional Scrutiny Investigation										
MS-01										
Catch Basin Sediment	AS01-CP-CB01	X	X	X	X		X			
	AS01-CP-CB02						X			
Offshore Sediment	AS01-SD-SD01	X	X	X	X		X			
	AS01-SD-SD02	X					X			
	AS01-SD-SD03	X	X	X	X	X	X			
	AS01-SD-SD04	X					X			
	AS01-SD-SD05	X	X	X	X	X	X			
	AS01-SD-SD06	X					X			
	AS01-SD-SD07	X	X	X	X		X			
Onshore Soil	AS01-CP-SS01	X	X	X	X	X				
	AS01-CP-SS02	X	X	X	X					
MS-05										
Offshore Sediment	AS05-SD-SD01							X	X	
	AS05-SD-SD02							X	X	
	AS05-SD-SD03							X	X	
	AS05-SD-SD04							X	X	
	AS05-SD-SD05							X	X	
	AS05-SD-SD06							X	X	
	AS05-SD-SD07							X	X	
	AS05-SD-SD08							X	X	
	AS05-SD-SD09							X	X	
	AS05-SD-SD10							X	X	
	AS05-SD-SD11							(3)	(3)	
	AS05-SD-SD12							(3)	(3)	
	AS05-SD-SD13							X	X	
	AS05-SD-SD14							(3)	(3)	
MS-09										
Offshore Sediment	AS09-SD-SD01								X	X
	AS09-SD-SD02								X	X
	AS09-SD-SD03								X	X
	AS09-SD-SD04								X	X
	AS09-SD-SD05								X	X
	AS09-SD-SD06								X	X
MS-11										
Catch Basin Sediment	AS11-CP-CB01							X	X	
Onshore Soil	AS11-CP-SS01							X	X	
	AS11-CP-SS02							X	X	
MS-12										
Offshore Sediment	AS12-SD-SD01	X	X	X	X			X		
	AS12-SD-SD02	X	X	X	X			X		
	AS12-SD-SD03							X		
	AS12-SD-SD04	X						X		
	AS12-SD-SD05	X						X		
	AS12-SD-SD06							X		
	AS12-SD-SD06-0004		X					X		
4-12 inches	AS12-SD-SD06-0412		X					X		
12-20 inches	AS12-SD-SD06-1220		X					X		
20-31 inches	AS12-SD-SD06-2031		X					X		
	AS12-SD-SD07-0004	X	X	X	X			X		
4-12 inches	AS12-SD-SD07-0412		X					X		
12-20 inches	AS12-SD-SD07-1220		X					X		
20-28 inches	AS12-SD-SD07-2028		X					X		
	AS12-SD-SD08							X		
	AS12-SD-SD09	X	X	X	X	X		X		
	AS12-SD-SD10	X						X		
	AS12-SD-SD11							X		
	AS12-SD-SD12							X		
	AS12-SD-SD13							X		
	AS12-SD-SD14	X						X		
	AS12-SD-SD15	X	X	X	X			X		
	AS12-SD-SD16	X	X	X	X			X		
Catch Basin Sediment	AS12-CP-CB02	X	X	X	X			X		

TABLE 2-3

SUMMARY OF ANALYTICAL DATA COLLECTED DURING PHASE I AND PHASE II ADDITIONAL SCRUTINY SAMPLING ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station/ Sample Type	Sample Number[1]	Forensics Analysis[2]				Microscopic Analysis	Pesticides	Lead	Copper, Nickel	PAHs
		TPH	PAHs	Biomarkers	TOC					
Background/Reference Samples										
Background Outfall	AS00-SD-SD01	X	X	X	X					
Sediment	AS00-SD-SD02	X								
Reference Sediment	AS00-SD-SD03	X	X	X	X					
	AS00-SD-SD04	X	X	X	X					
	AS00-SD-SD05	X								
Phase II Additional Scrutiny Investigation										
MS-12										
0-2 inches	AS12-SD-SD20-00				X			X		X
	AS12-SD-SD21-00							X		X
4-8 inches	AS12-SD-SD21-01				X			X		X
	AS12-SD-SD22-00							X		X
	AS12-SD-SD23-00							X		X
4-10 inches	AS12-SD-SD23-01				X			X		X
	AS12-SD-SD24-00							X		X
4-12 inches	AS12-SD-SD24-01							X		X
	AS12-SD-SD25-00							X		X
4-12 inches	AS12-SD-SD25-01				X			X		X
	AS12-SD-SD26-00							X		X
0-3 inches	AS12-SD-SD27-00				X			X		X
0-3 inches	AS12-SD-SD28-00				X			X		X
	AS12-SD-SD29-00				X			X		X
	AS12-SD-SD30-00				X			X		X
	AS12-SD-SD31-00				X			X		X
	AS12-SD-SD32-00							X		X
8-12 inches	AS12-SD-SD32-01				X			X		X
	AS12-SD-SD33-00				X			X		X
12-15 inches	AS12-SD-SD33-01							X		X
	AS12-SD-SD34-00							X		X
7-17 inches	AS12-SD-SD34-01				X			X		X
	AS12-SD-SD35-00				X			X		X
4-12 inches	AS12-SD-SD35-01							X		X
	AS12-SD-SD36-00				X			X		X
	AS12-SD-SD37-00				X			X		X
0-3 inches	AS12-SD-SD38-00				X			X		X
	AS12-SD-SD39-00				X			X		X
0-3 inches	AS12-SD-SD40-00				X			X		X
	AS12-SD-SD41-00				X			X		X
0-3 inches	AS12-SD-SD42-00				X			X		X
	AS12-SD-SD43-00				X			X		X
	AS12-SD-SD44-00							X		X
	AS12-SD-SD45-00				X			X		X
	AS12-SD-SD46-00							X		X
	AS12-SD-SD49-00				X			X		X
	AS12-SD-SD50-00				X			X		X
	AS12-SD-SD100-00				X			X		X
8-10 inches	AS12-SD-SD100-01							X		X
	AS12-SD-SD101-00				X			X		X
0-3 inches	AS12-SD-SD102-00				X			X		X
	AS12-SD-SD103-00							X		X
8-15 inches	AS12-SD-SD103-01				X			X		X
	AS12-SD-SD104-00				X			X		X
	AS12-SD-SD105-00				X			X		X
	AS12-SD-SD106-00				X			X		X

1 All sediment samples were collected from the surface (0 to 4 inches), unless otherwise noted in the first column.
2 All samples for forensics analysis were analyzed for TPH, and based on the results of the TPH analysis, samples were selected for: PAH, biomarker, and TOC analyses.
3 These samples were collected but not analyzed in accordance with the decisions presented in the Additional Scrutiny Quality Assurance Project Plan (TtNUS, August 2005).

TPH - Total petroleum hydrocarbon
PAHs - Polycyclic aromatic hydrocarbons
TOC - Total organic carbon

3.0 DATA PREPARATION

This section describes the procedures used in preparing the data for the various tables and figures presented in this report.

3.1 AVERAGING

When averages were calculated, one-half of the minimum detection limit (MDL) was used for non-detected values. At locations where duplicate samples were collected, sample and duplicate chemical concentrations were averaged and counted as a single sample, except for Toxicity Equivalent (TEQ) values for dioxins/furans and dioxin-like PCBs. If a sample and duplicate pair included a detected and non-detected result, one-half of the MDL was substituted for the non-detected value to calculate the average unless the detected value was less than the non-detected value. In this case, the detected concentration was used in the calculation of the sample average. The average TEQ values were not calculated by averaging TEQ values from the original sample and duplicate; the average TEQ values were calculated as described in Section 3.3 using the average dioxin/furan or dioxin-like PCB concentration.

3.2 CALCULATION OF TOTAL VALUES

Many individual chemicals have potentially additive toxicological effects, so total values are often used to evaluate those chemicals. Various total values were calculated, presented on tables and figures, and evaluated in this report. Total values were calculated as follows; example calculations are presented in Appendix C of the Rounds 1 through 7 Report (TtNUS, November 2004):

- Total DDT values were calculated by summing the 2,4'- and 4,4'-DDD, DDE, and DDT values using detected concentrations only and detected concentrations plus one-half of the detection limits for non-detected values.

- Low molecular weight (LMW) PAH values were calculated by summing the following seven PAHs, substituting one-half of the detection limits for non-detects: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene.

- HMW PAH values were calculated by summing the following six PAHs, substituting one-half of the detection limits for non-detects: benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and pyrene.

- Total PAH values were calculated by summing the LMW and HMW values.

- Total PCB congener values were calculated by summing the following 18 PCB congeners, substituting one-half of the detection limits for non-detects potentially: PCB-101/90, -105, -118, -128, -138/160, -153/132, -170/190, -18/17, -180, -187, -195/208, -206, -209, -28, -44, -52, -66, and -8/5, and multiplying the value by 2.0 because previous studies indicate that the 18 NOAA PCBs typically account for about one-half of the PCB concentration in a sample (NOAA, 1989).

In addition to the other parameters, sediment samples were analyzed for dioxins/furans and the 12 chlorobiphenyl congeners on the World Health Organization (WHO) PCB list. The 12 WHO PCBs are termed dioxin-like PCBs because they exhibit dioxin-like properties regarding their mechanism of toxicity. Six different TEQ values were calculated as part of this report for each receptor (humans, birds, and fish). The following text describes the methodology used to calculate these TEQ values.

Calculation of Dioxin/Furan TEQs

Dioxins and furans were evaluated using Toxicity Equivalent Factors (TEFs) that relate the toxicity of various congeners to the toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), as specified in the USEPA's Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDD and CDFs) 1989 Update (March 1989). The WHO TEF values published in Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife (Van den Berg, et al., 2006) were used to calculate TEQ values for each congener. The concentration of each dioxin/furan was multiplied by the associated TEF to produce a TEQ value for each dioxin/furan congener. The individual TEQ values for all dioxins/furan were summed for each sample for an overall TEQ value for that sample. If any congeners were reported as non-detected in a sample, two total TEQ values were developed for that sample. In one case, the TEQ value was the sum of the toxic equivalent values of dioxin/furan congeners using zero for non-detects [i.e., TEQ (using human TEFs), TEQ BIRD (using bird TEFs), and TEQ FISH (using fish TEFs)]. In the other case, the TEQ value was the sum of the toxic equivalent values using one-half the detection limit for non-detects [i.e., TEQ HALFND (using human TEFs), TEQ BIRD HALFND (using bird TEFs), and TEQ FISH HALFND (using fish TEFs)].

Calculation of Dioxin-Like PCB TEQs

Dioxin-like PCBs were treated in a manner similar to dioxins/furans. TEFs recommended by the WHO and specific to each dioxin-like PCB congener were applied to the individual dioxin-like PCB congener concentrations. Specifically, each individual dioxin-like PCB congener concentration was multiplied by its TEF to produce a 2,3,7,8-TCDD TEQ value. The individual congener TEQ values were summed for each sample for an overall TEQ value for that sample. If any congeners were reported as non-detected in a

sample, two total TEQ values were developed for that sample. In one case, the TEQ value was the sum of the toxic equivalents of dioxin-like PCBs using zero for non-detects [i.e., TEQ PCB (using human TEFs), TEQ PCB BIRD (using bird TEFs), and TEQ PCB FISH (using fish TEFs)]. In the other case, the TEQ value was the sum of the toxic equivalents using one-half the detection limit for non-detects [i.e., TEQ PCB HALFND (using human TEFs), TEQ PCB BIRD HALFND (using bird TEFs), and TEQ PCB FISH HALFND (using fish TEFs)].

Calculation of Total TEQs

Total TEQ values were calculated by summing the total dioxin/furan TEQ values and total dioxin-like PCB TEQ values for each sample. Similar to the dioxin/furan TEQ values and dioxin-like PCB TEQ values, two total TEQ values were developed for each sample if there were non-detects. In one case, the TEQ value was the sum of the toxic equivalent values using zero for non-detects [i.e., TEQ (using human TEFs), TEQ BIRD (using bird TEFs), TEQ FISH (using fish TEFs)]. In the other case, the TEQ value was the sum of the toxic equivalent values using one-half the detection limit for non-detects [i.e., TEQ HALFND (using human TEFs), TEQ BIRD HALFND (using bird TEFs), and TEQ FISH HALFND (using fish TEFs)].

3.3 CONCENTRATION TREND PLOTS

This section describes the methodology used to prepare concentration trend plots. Concentration trend plots of sediment data were prepared for all stations for each chemical with an IRG, and for lead and 4,4'-DDT at select stations. Concentration trend plots for selected monitoring and reference stations are presented in Appendix D. The concentration trend plots were prepared using data collected from each monitoring station during all rounds. Only sediment data collected as part of the Interim Offshore Monitoring Program were used to generate concentration trend plots.

The monitoring plan (TtNUS, October 1999) indicated that during each round trend lines would be generated using average chemical concentrations at each station during each round, thereby plotting a total of 10 points. This method, however, does not account for the variability in data at each station. For example, if one location at a particular station has greater chemical concentrations than the other two locations, those differences would not be observed in the plots. For those reasons, concentration trend plots were prepared for this report using results from all samples from each station, and trend lines were not included on the plots. In addition, each location within a station was given a different symbol, and the legend indicated whether the sample was intertidal or subtidal and whether the sample was collected in eelgrass or saltmarsh. Non-detected data were assigned a value of one-half of the detection limit, and duplicate samples were first averaged with the original sample, and the average value was included in the plots.

During a technical meeting between the Navy and regulators on April 26, 2007, it was agreed that because of the large amount of variability in the data, there is significant uncertainty in the trend lines. Therefore, less emphasis was placed on the trend lines when evaluating the data, and trend lines that were used to evaluate the date in the Rounds 1 through 7 report were to be removed from the data plots for future evaluations. Therefore, concentration trend plots in Appendix D do not contain trend lines.

4.0 EVALUATION OF MONITORING STATION DATA

The following sections present the results of evaluations conducted and recommendations based on these results for the 14 monitoring stations currently monitored under the OU4 Interim Offshore Monitoring Program.

As indicated in Section 3.4, concentration trend plots were generated for the first 10 rounds of data for chemicals for which IRGs were developed including acenaphthylene, anthracene, fluorene, HMW PAHs, copper, and nickel. In addition, trend plots were generated for lead and 4,4'-DDT at selected monitoring stations because these chemicals were identified as COCs for some onshore sites. The plots were initially presented in the Rounds 1 through 7 Report (TtNUS, November 2004) to determine whether the concentration trend lines may exceed the IRGs (i.e., change from an exceedance to a non-exceedance or from a non-exceedance to an exceedance) before the next 5-year trending report. However, during a technical meeting on April 26, 2007, it was agreed that because of the variability in the data, trend lines would be removed from future data plots. At MS-05, MS-08, and MS-09, metals were analyzed using two different analytical methods (NOAA and USEPA) in Rounds 7 and 10 (see Section 2.2). For those rounds, the NOAA data were used for the plots to be consistent with analytical methods used during the other rounds. The plots are used to visually determine whether concentrations exceeded IRGs (or the ER-M for lead) and appeared to be increasing or decreasing over time.

Figure 1-2 shows the locations of each AOC, Figure 1-3 shows the locations of each monitoring station, and Figure 1-4 shows the location of each reference station.

4.1 BACK CHANNEL AREA OF CONCERN

The Back Channel AOC is located in the back channel of the Piscataqua River. Monitoring stations located within this AOC include MS-01 through MS-04. Known IRP sites located immediately onshore of the Back Channel AOC include Sites 32 and 34. The following sections present the results of the evaluations conducted for the monitoring stations located within the Back Channel AOC.

4.1.1 MS-01

MS-01 is located in the western portion of the Back Channel AOC, offshore of Site 34 (OU9) and adjacent to the bridge leading to Gate No. 1. The primary environmental concern for this monitoring station is PAHs in sediment that may be a result of disposal of ash from Site 34 operations around Building 62. The ash was characterized as having concentrations of PAHs greater than acceptable risk levels. A removal action was conducted at Site 34 in 2007 and included removal of all ash around Building 62 and

62 annex and stabilization of a portion of the shoreline. As part of the removal action, ash and soil mixed with ash were removed by excavating from the ground surface until native material with no ash was observed. Native and non-native materials were identified based on their color. The excavated area was backfilled and covered with asphalt or vegetation. One area of Site 34, a grassy area with large trees, was not included in the 2007 removal action. Based on the ash extent investigation conducted in April 2004, ash was generally found in the top 0.5 to 2 feet of soil and was found in relatively thin layers in the grassy area. Also, the adjacent shoreline (bedrock ledge) is stable, so erosion of ash along the shoreline is not likely. Therefore, the Navy determined that excavation of the ash in the grassy area was not warranted as part of the removal action.

Seven rounds of interim offshore monitoring and two Additional Scrutiny Investigations were conducted at MS-01. Additional scrutiny was recommended at this monitoring station because concentrations of PAHs exceeded IRGs during the first seven rounds and because the data indicated that concentrations were increasing (TtNUS, November 2004). Also, PAH concentrations in site sediment samples were greater than concentrations in reference samples. In accordance with the Additional Scrutiny QAPP (TtNUS, August 2005), additional sediment samples were collected at MS-01 to determine whether Site 34 was a primary source of PAHs at MS-01. The data from the additional sediment samples were evaluated in the Additional Scrutiny Report (TtNUS, August 2007), which concluded that Site 34 was not likely a current primary source but was likely a historical source of PAHs to the offshore area. This conclusion was based in part on a PAH forensics investigation conducted on sediment samples collected from the offshore area at MS-01 and in catch basins along storm water pipes that discharge to the offshore area and on soil samples collected from Site 34. In particular, a limited area of contamination near one sediment sample location may be related to past sources of PAHs from Site 34.

A technical meeting with the Navy, regulators, and TtNUS was held on April 26, 2007 to discuss the Draft Additional Scrutiny Report. The minutes from this meeting are included in Appendix D of the Additional Scrutiny Report (TtNUS, August 2007). During the technical meeting, it was agreed that additional data were needed to understand the substrate and possibly determine the extent of PAH contamination in sediment at MS-01. It was recommended that the Navy continue the investigation in a phased approach and determine whether sufficient sediment is present in MS-01 to warrant consideration of a sediment removal action. It was noted during the meeting that if there was a significant amount of sediment at MS-01, sediment samples for PAH analysis could be collected as part of the RI for Site 34 or as part of a subsequent OU4 investigation.

The Phase II Additional Scrutiny QAPP was prepared to present the methodologies to determine whether sufficient sediment is present at MS-01 to warrant consideration of a removal action (TtNUS, September 2007). The studies in the Phase II Additional Scrutiny QAPP were implemented in November 2007, and

a Technical Memorandum was prepared to summarize the investigation results (see Appendix A). It was concluded that there is a sufficient amount of sediment at MS-01 to warrant proceeding further with additional sampling. Therefore, sediment samples for PAH analysis are needed to determine the extent of PAHs in sediment at MS-01.

A Sampling and Analysis Plan (SAP) for the OU9 (Site 34) RI, which includes collection of offshore sediment samples to determine the extent of the PAH contamination in the MS-01 area, was prepared in July 2009 (TtNUS). Samples were collected in August 2009 and the RI data package was completed in January 2010 (TtNUS)

4.1.2 MS-02

MS-02 is located in the central portion of the Back Channel AOC, between Topeka Pier and the bridge leading to Gate No. 2. There are no known IRP sites immediately onshore of MS-02.

Seven rounds of interim offshore monitoring were conducted at this station. Concentration trend plots presenting the first seven rounds of PAH and metals data compared to their respective IRGs are presented in Appendix D. As presented in the Rounds 1 through 7 Report (TtNUS, November 2004), concentrations of PAHs and metals were less than IRGs in the first seven rounds and were predicted to remain less than IRGs for the next 5 years. Also, the ranges of PAH and metals concentrations detected at MS-02 were similar to or within the ranges of concentrations in reference samples (TtNUS, November 2004). Additional scrutiny was not recommended for this monitoring station in the Rounds 1 through 7 Report because chemical concentrations were much less than their respective IRGs.

No additional offshore monitoring or actions is needed for MS-02 because chemical concentrations in sediment are less than IRGs and data do not indicate any impacts from IRP sites.

4.1.3 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 Site 32 has been identified in the intertidal areas of MS-03 and MS-04 and is likely the source of elevated metals concentrations at those stations. Concentrations of PAHs were greater than IRGs in a few samples at MS-04.

Seven rounds of interim offshore monitoring were conducted at these stations, along with Phase I Site 32 RI sampling as described below. Several chemicals were detected in sediment at MS-03 and MS-04 at concentrations exceeding IRGs and concentrations in reference samples. Additional scrutiny at these monitoring stations was not needed as part of the OU4 monitoring program for copper and nickel because

the offshore area was investigated as part of the Phase I RI for Site 32 (TtNUS, January 2004 and June 2004). The Rounds 1 through 7 Report (TtNUS, November 2004) indicated that PAHs would be evaluated during planning for the Phase II RI for Site 32 to determine the additional scrutiny recommended for these chemicals.

During Site 32 Phase I RI sampling, the presence of foundry slag and copper and nickel concentrations in sediment in the intertidal area of Site 32 were further investigated. Slag mapping 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. Concentrations of copper and nickel in sediment samples located further away from the shoreline were less than IRGs. Samples with exceedances of IRGs were located in the mid-tide area and were bounded by samples to the east, west, and north.

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).

Based on the results of the Interim Offshore Monitoring Program and Phase I RI, the Navy conducted a Phase II RI that included additional sediment sampling in December 2008 to determine the extent of copper and PAH IRG exceedances in the mid-to low tide area of the Site 32 shoreline. Copper and PAH concentrations exceeded IRGs in some samples (TtNUS, June 2009a).

4.2 JAMAICA COVE AND CLARK COVE AOCS

Monitoring stations MS-05 and MS-06 are located offshore of OU3 in the Jamaica Cove AOC, and MS-07, MS-08, and MS-09 are located in the Clark Cove AOC. As part of the remedy for OU3, the Navy completed excavation and consolidation of contaminated soil/waste in the area adjacent to Jamaica Cove in September 2002 and completed construction of wetlands in June 2003. Other activities for the OU3 remedy began in spring 2003, including construction of shoreline erosion controls in Clark Cove, site compaction and grading, construction of drainage systems, followed by placement of geosynthetic materials on the northern portion of OU3. In accordance with the Post-Remedial Operation, Maintenance, and Monitoring (OM&M) Plan for OU3 (TtNUS, June 2006) groundwater samples are being collected from several locations around the landfill as part of a long-term monitoring program. As of June 2009, seven rounds of groundwater samples have been collected. Currently, groundwater samples are being analyzed for PAHs and metals.

During the 2004 construction season, geosynthetic materials were placed on the southern portion of OU3, a concrete wearing surface was placed on the boat storage area, an upper revetment was constructed along Clark Cove, landscaping plantings were installed, and topsoil was placed for construction of ballfields. In 2004, an area of waste was identified in Clark Cove outside the revetment, near MS-08. The area was excavated and the waste was placed under the geosynthetic material. The excavated area was backfilled with stone and silty sand. During OU3 construction activities, turbidity curtains were used in Jamaica Cove and Clark Cove to minimize the size of the area in each cove potentially impacted by eroding soil via overland runoff.

The following sections describe the sampling activities and investigations that have occurred at each of the monitoring stations in the Jamaica Cove and Clark Cove AOCs.

4.2.1 MS-05

MS-05 is located in the offshore area of OU3 in the Jamaica Cove AOC and is adjacent to the wetland constructed as part of the remedy for OU3. Ten rounds of interim offshore monitoring and Phase I Additional Scrutiny were conducted at this station.

Based on the first seven rounds of data (metals were detected at concentrations that exceeded IRGs and reference concentrations) and because of the offshore impacts from OU3 construction activities, it was recommended in the Rounds 1 through 7 Report (TtNUS, November 2004) that interim offshore monitoring at this station be continued on an annual basis until at least Round 10 (when the monitoring program was to be re-evaluated). It was also recommended in the Rounds 1 through 7 Report that additional scrutiny be conducted at this monitoring station.

4.2.1.1 Interim Offshore Monitoring Program Sampling Results

Ten round of sampling have been conducted at MS-05, although some sample locations were moved during the rounds (see Section 2.3.4). Appendix B presents the analytical results for each of the samples collected at MS-05. The locations in the more recent rounds are shown as Loc. 1A and Loc. 2A on Figures 4-1, 4-2, and 4-3 but are referred to as Loc. 1 and Loc. 2 in the text below for consistency. See Section 2.3.4 for more details.

Appendix D presents the concentrations plots for the four PAHs with IRGs, copper, nickel, and lead. The following summarizes samples with concentrations that exceed IRGs (and the ER-M for lead):

- Concentrations of PAHs and nickel did not exceed their respective IRGs at any location during any round.

- Copper was detected at concentrations that exceeded its IRG at one location during Rounds 7 and 9.

  - In Round 7, the exceedance occurred at Loc. 1. Copper concentrations at Loc. 1 increased in Rounds 6 and 7 as a result of the OU3 construction activities. Copper concentrations decreased to less than its IRG in Rounds 8, 9, and 10.

  - In Round 9, the exceedance occurred at Loc. 2. This location was moved closer to OU3 after Round 8 because greater copper concentrations were identified in the sediment closer to OU3 during the Additional Scrutiny Investigation. In Round 10, the copper concentration at Loc. 2 decreased to less than its IRG and was similar to concentrations in Rounds 1 through 5.

- Lead was detected at concentrations that exceeded its ER-M at one location during Rounds 6 through 9.

  - In Rounds 6 through 8, the exceedances occurred at Loc. 1. Lead concentrations at Loc. 1 increased in Rounds 6 through 8 as a result of OU3 construction activities but then decreased to less than its ER-M in Round 10, and was similar to concentrations in Rounds 1 through 5.

  - In Round 9, the exceedance occurred at Loc. 2. This location was moved closer to OU3 after Round 8 because greater lead concentrations were identified in the sediment closer to OU3 during the Additional Scrutiny Investigation. In Round 10, the lead concentration at Loc. 2 decreased to less than its ER-M and was similar to concentrations in Rounds 1 through 8.

Sediment samples were collected from Loc. 4 in Rounds 9 and 10. Copper and lead concentrations during both of these rounds were much lower than the IRG for copper and ER-M for lead.

4.2.1.2 Additional Scrutiny Sampling Results

Additional scrutiny was conducted at MS-05 to determine the extent of copper and nickel concentrations in sediment that exceed IRGs and the extent of lead concentrations in sediment that exceed the ER-M. Most of the Additional Scrutiny samples were collected in August 2005, concurrently with sampling for Round 8 of the Interim Offshore Monitoring Program. One Additional Scrutiny sediment sample (at location AS05-SD15) was collected in November 2007 during the Round 9 sampling event from the area northwest of MS-05, Loc. 1, to better refine the extent of contamination in this area.

Because sediment from location AS05-SD15 was collected during the Round 9 sampling event, MS-05, Loc. 4, was added for Rounds 9 and 10, and MS-05, Loc. 2, was moved to a new location after Round 8, new figures showing copper, nickel, and lead concentrations at MS-05 were prepared for this report. Figures 4-1, 4-2, and 4-3 show copper, nickel, and lead concentrations, respectively, for the Additional Scrutiny samples and samples collected for Round 10 of the Interim Offshore Monitoring Program at MS-05. Figures showing copper, nickel, and lead concentrations at MS-05 for the samples collected during the Additional Scrutiny Investigation and samples collected during Round 8 of the Interim Offshore Monitoring Program were presented in the Additional Scrutiny Report (TtNUS, August 2007) are included in Appendix B of this report.

Figures 4-1, 4-2, and 4-3 show the original locations of MS-05, Loc. 1 and MS-05, Loc. 2, but do not present the data from those locations because they were not sampled in Round 10. The following is a summary of the results of the Additional Scrutiny Investigation and an evaluation of Round 10 data for MS-05:

- The concentrations of copper (27 mg/kg) and lead (40 mg/kg) in the sample from AS05-SD15 were less than IRGs. Therefore, the extent of contamination is defined in the area Northwest of MS-05, Loc. 1.

- Concentrations of copper and nickel in the Round 10 and Additional Scrutiny samples were less than IRGs at all sampling locations (see Figures 4-1 and 4-2).

- Concentrations of lead in Round 10 samples were less than the ER-M; however, concentrations in several Additional Scrutiny samples collected in 2005 exceeded the ER-M (see Figure 4-3).

  - Exceedances were noted at locations AS05-SD01, AS05-SD02, AS05-SD03, AS05-SD04, and AS05-SD08. At two of these locations (AS05-SD01 and AS05-SD02), concentrations of lead were slightly greater than the ER-M but lead concentrations in duplicate samples at these locations were less than the ER-M. Because the Additional Scrutiny samples were collected in 2005, it is possible that the concentrations have decreased to less than the ER-M at those locations, similar to decreased at MS-05, Loc. 1.

  - As described in the Additional Scrutiny Report (TtNUS, August 2007), 436 mg/kg (two times the ER-M) was used to further evaluate lead because IRGs for copper and nickel are approximately twice their respective ER-M values. None of the lead concentrations in the Additional Scrutiny samples or Round 10 samples were greater than twice the ER-M.

4.2.1.3 Summary of Station Results

In summary, chemical concentrations were less than IRGs (for PAHs, copper, and nickel) or the ER-M (for lead) in sediment samples at MS-05 collected during the most recent sampling event (Round 10). Also, concentrations of copper and nickel in Additional Scrutiny samples were less than their respective IRGs at all sampling locations. Concentrations of lead in Round 10 samples were less than the ER-M. Concentrations in several Additional Scrutiny samples (collected in 2005) exceeded the ER-M, but none of those lead concentrations were greater than twice the ER-M. Also, because the Additional Scrutiny samples were collected in 2005, it is likely that they would show the same decreasing trend observed at MS-05, Loc.1 (see Appendix D).

4.2.2 MS-06

MS-06 is located in the offshore area of OU3 in the Jamaica Cove AOC. Seven rounds of interim offshore monitoring were conducted at this station. Chemical concentration plots presenting the first seven rounds of PAH and metals data compared to their respective IRGs are presented in Appendix D. As presented in the Rounds 1 through 7 Report (TtNUS, November 2004), concentrations of PAHs and metals were less than IRGs in the first seven rounds and were predicted to remain less than their IRGs for the next 5 years. Also, the range of PAH and metals concentrations detected at MS-06 were similar to or within the range of concentrations in reference samples (TtNUS, November 2004). Additional scrutiny was not recommended for this monitoring station in the Rounds 1 through 7 Report (TtNUS, November 2004) because chemical concentrations were much less than IRGs.

No additional offshore monitoring or actions are needed for MS-06 because chemical concentrations in sediment are less than IRGs.

4.2.3 MS-07

MS-07 is located in a recreational area in the Clark Cove AOC, but it is not immediately offshore of OU3. There are no known IRP sites immediately onshore of MS-07. MS-07 acted as a nearby reference station for MS-08 and MS-09, which are also located in Clark Cove.

Seven rounds of interim offshore monitoring were conducted at this station. Chemical concentration plots presenting the first seven rounds of PAH and metals data compared to their respective IRGs are presented in Appendix D. As presented in the Rounds 1 through 7 Report (TtNUS, November 2004), concentrations of PAHs and metals were less than IRGs in the first seven rounds and were predicted to remain less than their IRGs for the next 5 years. Additional scrutiny was not recommended for this

monitoring station in the Rounds 1 through 7 Report (TtNUS, November 2004) because chemical concentrations were significantly less than IRGs.

No additional offshore monitoring or actions are needed for MS-07 because chemical concentrations in sediment are less than IRGs, and data do not indicate any impacts from IRP sites. In addition, the ranges of PAH and metals concentrations detected at MS-07 were also similar to or within the ranges of concentrations in reference samples (TtNUS, November 2004).

4.2.4 MS-08

MS-08 is located in the offshore area of OU3 in the Clark Cove AOC. The intertidal area near MS-08 was excavated as part of the OU3 remedial activities in 2004, and the excavated area was backfilled with clean material.

Ten rounds of interim offshore monitoring were conducted at this monitoring station. Based on evaluation of the first seven rounds of data (metals were detected at concentrations that exceeded IRGs and reference concentrations, and PAH concentrations were projected to exceed IRGs within 5 years) and because of offshore impacts from OU3 construction activities, it was recommended in the Rounds 1 through 7 Report (TtNUS, November 2004) that interim offshore monitoring be continued on an annual basis until at least Round 10 (when the monitoring program was to be re-evaluated). During Rounds 8 through 10, the sample at MS-08, Loc. 3 was collected about 14 feet toward the water because the previously sampled location was covered with rip-rap from the removal action that occurred in that area. This location was not renamed Loc 3A because the new location was still intertidal and was in the same general area as the previous location.

Appendix B presents analytical data for the 10 rounds of samples collected at MS-08. Concentration plots for the four PAHs and two metals with IRGs are presented in Appendix D. In addition, concentration plots for 4,4'-DDT and lead are presented in Appendix D because of potential onshore sources of pesticides and lead and because of elevated 4,4'-DDT and lead concentrations in sediment during previous sampling events. The following summary lists the samples with concentrations that exceed IRGs, the PRG for 4,4'-DDT, and ER-M for lead:

- None of the PAHs were detected at concentrations that exceeded their respective IRGs at any locations during any rounds.

- Copper was detected at concentrations that exceeded its IRG at one location during each of Rounds 2 and 5, and at two locations during Round 7. Copper concentrations in Rounds 8 through 10 decreased to less than its IRG.

- Concentrations of nickel generally followed a similar pattern, with concentrations that exceeded its IRG at one location during Rounds 1, 2, 3, and 5 and at two locations during Round 7. Nickel concentrations in Rounds 8 through 10 decreased to less than its IRG.

- During Round 7, lead concentrations in samples collected from all three MS-08 locations were greater than its ER-M, and the concentration at one location was much greater than twice the ER-M. Lead concentrations in all of the other rounds were less than its ER-M.

- Concentrations of 4,4'-DDT were greater than its PRG at one or two locations during Rounds 1, 2, 3, 4, and 7. 4,4'-DDT concentrations in Rounds 8 through 10 decreased to less than its PRG.

In summary, although chemical concentrations were greater than IRGs, the PRG (for 4,4'-DDT), or ER-M (for lead) at some MS-08 locations during some rounds, chemicals concentrations decreased to less than the IRGs, PRG, or ER-M during the last two to three monitoring rounds.

4.2.5 MS-09

MS-09 is located in the offshore area of OU3 in Clark Cove AOC. As part of OU3 remedial activities, the small intertidal areas that existed at MS-09 were covered with riprap, so there is no longer an intertidal area associated with MS-09. Ten rounds of interim offshore monitoring and Phase I Additional Scrutiny were conducted at this station.

Based on evaluation of the first seven rounds of data (metals and PAHs were detected at concentrations that exceeded IRGs and reference concentrations) and because of the offshore impacts from the OU3 construction activities, it was recommended in the Rounds 1 through 7 Report (TtNUS, November 2004) that interim offshore monitoring be continued on an annual basis until at least Round 10 (when the monitoring program was to be re-evaluated). It was also recommended in the Rounds 1 through 7 Report that additional scrutiny be conducted at this monitoring station.

4.2.5.1 Offshore Monitoring Sampling

Ten rounds of sampling have been conducted at this monitoring station, although some sample locations were moved during the rounds (see Section 2.3.5). Appendix B presents the analytical results for each of the samples collected at MS-09. The locations in the more recent rounds are shown as Loc. 1A, Loc. 2A, and Loc. 2B on Figure 4-4 but are referred to as Loc. 1 and Loc. 2 in the text below for consistency with samples from previous rounds. See Section 2.3.5 for more details.

Appendix D presents concentrations plots for the four PAHs with IRGs, copper, nickel, lead, and 4,4'-DDT. The following summary lists the samples with concentrations that exceed the IRGs, ER-M (for lead), and PRG (for 4,4'-DDT):

- Fluorene and HMW PAHs were detected at concentrations that exceeded their respective IRGs at one or more locations during Rounds 7 and 8. Concentrations decreased to less than IRGs in Rounds 9 and 10 but were slightly greater than concentrations in Rounds 1 through 5.

- Copper was detected at a concentration that exceeded its IRG at one location during Round 2. Copper concentrations decreased to less than its IRG in Rounds 9 and 10 and were similar to concentrations in Rounds 1 through 6.

- Nickel was detected at a concentration that exceeded its IRG at one location during Round 2 and at all three locations during Round 10. Concentrations of nickel were variable across the rounds. Round 7 generally had the greatest concentrations of nickel at all locations and Rounds 2 and 8 had elevated concentrations of nickel at Loc. 1.

- Concentrations of 4,4'-DDT were greater than its PRG at one or two locations during Rounds 6 and 7, but concentrations decreased in Rounds 9 and 10 to levels similar to Rounds 1 through 5. (The 4,4'-DDT data from Round 8 were rejected, so the data do not appear on the plot.)

- Concentrations of lead were greater than its ER-M at one or more locations during Rounds 7 through 10, although there was a decreasing trend in concentrations between Rounds 7 to 10 and no lead concentrations in Rounds 9 or 10 were greater than twice its ER-M.

4.2.5.2 Additional Scrutiny Sampling

Additional scrutiny was conducted at MS-09 to determine the extent of PAH, copper, and nickel concentrations in sediment that exceed IRGs. All of the Additional Scrutiny samples were collected in August 2005, concurrently with sampling for Round 8 of the Interim Offshore Monitoring Program.

Figures showing PAH, copper, and nickel concentrations at MS-09 for the samples collected during the Additional Scrutiny Investigation and samples collected as part of Round 8 of the Interim Offshore Monitoring Program were presented in the Additional Scrutiny Report (TtNUS, August 2007). Because no additional locations were added since the Round 8 sampling event, new figures were not prepared for this report. Figures 5-5 through 5-10 from the Additional Scrutiny Report (TtNUS, August 2007) are presented in Appendix B. The following is a summary of conclusions from the Rounds 1 through 7 Report (TtNUS, November 2004) and an evaluation of the Round 10 data.

- No samples had acenaphthylene or anthracene concentrations that exceeded their IRGs.

- At MS-09, the area with copper, nickel, and fluorene concentrations (around one sampling location) greater than their respective IRGs is likely less than 50 feet by 200 feet (0.2 acre) (see Figures 5-5, 5-6, and 5-9 in Appendix B).

  - Round 10 concentrations of copper and fluorene at all three monitoring station locations were less than IRGs.

  - Although concentrations of nickel slightly decreased at Loc. 1 from Round 8 to Round 10, concentrations of nickel at the other two locations increased and exceeded the IRG.

- Concentrations of HMW PAHs slightly exceeded its IRGs at three locations along the shoreline (see Figure 5-10 in Appendix B). The approximate size of the area with elevated HMW PAH concentrations could not be easily determined because there were relatively few sediment samples collected at this monitoring station. However, because the magnitude of exceedances of the IRGs were low so, it is unlikely that the concentrations greater than the IRG extend very far from the shoreline. Also, two samples adjacent to one of the samples with an elevated HMW PAH concentration had low HMW PAH concentrations, providing further support that the elevated levels may not be widespread.

  - HMW PAHs were detected at concentrations that exceeded its IRG at two Round 8 monitoring station locations (Loc. 1 and Loc. 3) and one Additional Scrutiny location (AS09-SD03).

  - In Round 10, HMW PAH concentrations at Loc. 1 and Loc. 3 were less than its IRG. Also, Loc. 2 is at the location of AS09-SD03, and the HMW PAH concentration at this location was less than its IRG.

4.2.5.3 Summary of Station

In summary, chemical concentrations were less than IRGs (for PAHs, copper, and nickel) and the PRG for 4,4'-DDT in sediment samples collected at MS-09 during the most recent sampling event (Round 10). The lead concentration at one location was greater than its ER-M during the most recent sampling event, but the concentration was less than twice the ER-M and overall has a decreasing concentration trend.

4.3 SULLIVAN POINT AOC

MS-10 is the only monitoring station within the Sullivan Point AOC, which is located in the southeastern corner of PNS. In the Rounds 1 through 7 Report (TtNUS, November 2004), sampling during Rounds 8 and 9 was recommended for MS-10 because, based on concentration trend line plots the 90th percentile upper confidence limits (UCLs) were projected to increase to greater than IRGs within the next 5 years for anthracene and HMW PAHs. The UCLs were projected to exceed IRGs within the next 5 years because the confidence interval was wide based on variability in the data. It was anticipated that having additional data before the next 5-year sampling event would provide a higher level of confidence in predicting exceedances of IRGs (TtNUS, November 2004).

Eight rounds of interim offshore monitoring were conducted at MS-10. Analytical data from the first eight rounds of sediment sampling at MS-10 were evaluated in a technical memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (TtNUS, September 2007). It was recommended in that memorandum that interim offshore monitoring at MS-10 be discontinued after the Round 8 sampling event. Therefore, no sediment samples were collected at this station during Round 9. In addition, no sediment samples were collected at this station during Round 10 in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (TtNUS, September 2008a).

Concentration plots presenting the first eight rounds of PAH data compared to their respective IRGs are presented in Appendix D. The concentration plots presenting the first seven rounds of copper, nickel, and 4,4'-DDT data are also presented in Appendix D (Round 8 samples were not analyzed for copper, nickel, or 4,4'-DDT). The following summary lists the samples with concentrations that exceed the IRGs and PRG (for 4,4'-DDT):

- PAH concentrations in most of sediment samples at MS-10 were less than their respective IRGs.
    - Concentrations of acenaphthylene were greater than its IRG at two locations during Rounds 1 and 2.
    - Concentration of anthracene were greater than its IRGs at one location during Rounds 2 and 4.
    - Concentrations of fluorene were less than its IRG during all eight rounds, and concentrations of HMW PAHs were only greater than the IRG at one location during one round.

- Most IRG exceedances occurred at subtidal station MS-10, Loc. 2.

- The intertidal location, MS-10, Loc. 1, consistently had the lowest concentrations of PAHs, which were significantly less than IRGs and similar to concentrations at reference station 04.

- All 4,4'-DDT concentrations in MS-10 sediment samples were less than the sediment PRG of 66.4 µg/kg.

- Concentrations of copper and nickel were much less than their respective IRGs.

No additional offshore monitoring or actions are needed for MS-10 because of the infrequent number of IRG exceedances over the eight rounds of sampling and the relatively low concentrations of PAHs, copper, nickel, and 4,4'-DDT in most samples. Also, the data do not indicate any impacts from IRP sites.

4.4 DRMO STORAGE YARD AOC

MS-11 is the only monitoring station within the DRMO Storage Yard AOC, which is located in the main channel of the Piscataqua River, just offshore of OU2 (Sites 6 and 29).

Seven rounds of interim offshore monitoring and Phase I Additional Scrutiny were conducted at this station. During the Interim Offshore Monitoring Program, sediment has been consistently available at one location (MS-11, Loc. 3) within a small depositional intertidal area east of the OU2 shoreline. During the first round of monitoring, a small amount of sediment (eroded soil) was found at another location (MS-11, Loc. 2). This location is within the area addressed by a 1999 emergency removal action (shoreline erosion controls), and subsequently, there has been no sediment or eroded soil at this location.

Additional scrutiny was recommended at this station because concentrations of copper and nickel in sediment exceeded their IRGs (and reference concentrations) and because contaminant concentration trend lines for offshore sediment indicated that concentrations are increasing. Also, concentrations of lead exceeded the ER-M at this station, and trend lines indicated that concentrations were increasing.

Additional scrutiny was conducted at MS-11 to determine whether an IRP site was the source of metals in sediment (TtNUS, August 2005). It was concluded in the Additional Scrutiny Report that OU2 was likely the primary source of metals in sediment at MS-11 (TtNUS, August 2007). Erosion of contaminated soil from metal debris was observed along the shoreline east and west of the seawall at MS-11 during the Additional Scrutiny Investigation, and elevated levels of metals were detected in soil samples collected onshore at OU2 (TtNUS, August 2007).

Based on the presence of metal debris along the shoreline and elevated levels of metals in soil, the Navy conducted removal actions along the shoreline at the western and eastern ends of the seawall. 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. Because of the steep slope, the shoreline controls in the 100-foot section of shoreline west of the seawall were upgraded in 2008. In June 2006, surficial debris on the eastern portion of the seawall was removed, the area was covered, and erosion controls were placed along the shore at this time. As concluded in the Additional Scrutiny Report (TtNUS, August 2007), additional sediment sampling is not planned at MS-11 because there is only a small amount of sediment at this monitoring station and because erosion controls were placed along the shoreline. Also, a removal action for sediment as part of OU4 is not planned at MS-11 because there is only a small amount of sediment present. The OU2 FS being prepared provides an evaluation of remedial options for OU2 and the area offshore of OU2.

4.5 DRY DOCKS AOC

The Dry Docks AOC is located in the Piscataqua River on the western side of PNS. Monitoring stations located within this AOC include MS-12 through MS-14. Known IRP sites located immediately onshore of the Dry Docks AOC include Sites 5 (Former Industrial Waste Outfalls), 10 (Former Battery Acid Tank No. 24), and 31(West Timber Basin Landfill). The following sections present the results of evaluations conducted for monitoring stations located within the Dry Docks AOC.

4.5.1 MS-12

MS-12 is located adjacent to Building 178 and offshore of Sites 5 and 10. Seven rounds of interim offshore monitoring and two Additional Scrutiny investigations were conducted at this station. Additional scrutiny was conducted at this monitoring station because concentrations of PAHs exceeded their respective IRGs and reference concentrations during the first seven monitoring rounds, and trend lines indicated that concentrations were increasing (TtNUS, November 2004). Also, concentrations of lead in sediment exceeded its ER-M and were predicted to remain greater than the ER-M for the next 5 years.

Table 4-1 presents the PAH and lead results for each of the Phase II Additional Scrutiny samples collected at MS-12. Appendix B presents detected concentration tables for the Phase I Additional Scrutiny samples and for the Rounds 1 through 7 Interim Offshore Monitoring Program samples from MS-12. Table 4-2 presents the results for lead and for PAHs with IRGs for the Phase I and Phase II Additional Scrutiny samples and the Interim Offshore Monitoring Program samples collected at MS-12.

Figure 4-5 shows the locations where sediment samples were collected, and Figure 4-6 shows proposed locations where sample could not be collected.

Figures 4-7 through 4-10 present PAH results compared to IRGs, and Figure 4-11 present lead results compared to its ER-M. At locations where the IRGs or ER-M were exceeded, the chemical concentrations were added to the figures. At locations where multiple depths were collected, all of the results from the samples are shown including locations with no exceedances. For interim offshore monitoring locations, at which seven rounds of data have been collected, only the maximum detected concentration is shown. Non-detected values exceeding IRGs were also shown on the figures (no non-detected values exceeded the ER-M for lead).

MS-12 is located adjacent to Building 178, a one-story 178,000-square-foot building. The floor in the southern portion of the building (closest to the water) is concrete, and slopes down into the water. As a result, sediment is present on the floor of the building in areas that are inundated with water at high tide.

4.5.1.1 Phase I Additional Scrutiny Investigation

In accordance with the Additional Scrutiny QAPP (TtNUS, August 2005), sediment samples were collected at MS-12 to determine whether either elevated lead and PAH concentrations in MS-12 sediments could be linked a current or historical IRP source or to a non-IRP source. The results of this determination are presented in the Additional Scrutiny Report (TtNUS, August 2007), which had the following conclusions:

- The location and PAH composition of one sediment sample inside Building 178 suggest that the PAHs were possibly related to historical shipbuilding operations or the materials used to construct the building (e.g., roof shingles and tar paper).

- The source of PAHs in the offshore area appears to be a mixture of PAHs from historical shipbuilding operations in Building 178, materials used to construct the building, and ambient background. These are not IRP sources.

- Sites 5 and 10 are historical sources of lead to the offshore area, and impacts are apparent at one sediment location.

- Sites 5 and 10 are not current sources of lead to the offshore. Industrial waste discharges as part of Site 5 were discontinued by 1974. Investigation of groundwater at Site 10 shows that it is not a current source of lead to the offshore area.

A technical meeting with the Navy, regulators, and TtNUS was held on April 26, 2007, to discuss the Draft Additional Scrutiny Report. The minutes from this meeting are included in Appendix D of the Additional

Scrutiny Report (TtNUS, August 2007). Based on the recommendations from the meeting, additional sediment samples were collected to address data gaps (i.e., delineation of the spatial extent of contamination and approximate depth of sediment), and an eelgrass survey was conducted to determine the approximate size and location of the eelgrass bed as part of the Phase II Additional Scrutiny Investigation as summarized below.

4.5.1.2 Phase II Additional Scrutiny Investigation

The Phase II Additional Scrutiny QAPP presented the sampling program and data quality objectives (DQOs) for the Phase II Additional Scrutiny Investigation conducted in November 2007 and April 2008 (TtNUS, September 2007). The analytical data from the Phase II Additional Scrutiny Investigation were presented in the Round 9 and Phase II Additional Scrutiny Data Package for OU4 (TtNUS, September 2008). A Phase II Additional Scrutiny Report is not being prepared; this Rounds 1 through 10 Report documents the results of that investigation and provides recommendations for further actions.

DQOs prepared as part of the Phase II Additional Scrutiny QAPP listed the following study questions to be answered by the Phase II Additional Scrutiny Investigation:

1) Does sediment (if present), in the “drop-off” area in the main channel of Piscataqua River within 15 feet of the end of the Building 178 ramp have elevated levels of PAHs and/or lead?

2) What is the horizontal and vertical extent of contaminated sediment inside Building 178 and on the ramp outside of Building 178?

3) How large is the eelgrass bed at monitoring station MS-12?

4) Are the average concentrations of PAHs and lead in the eelgrass bed greater than IRGs for PAHs or twice the ER-M for lead?

The following sections present an evaluation of the data collected to answer those questions.

<u>Study Question No. 1</u>

To determine whether sediment within 15 feet of the end of the Building 178 ramp has elevated levels of PAHs and/or lead, sediment samples were collected (or attempted to be collected) with a grab sampler in the “drop-off” area within 15 feet of end of the ramp. The collected sediment samples were analyzed for PAHs and lead. Up to five grab attempts were made at four locations in the main channel of the Piscataqua River within 15 feet of the ramp drop-off. If sufficient amounts of sediment were not retrieved

from any of the five grabs, it was assumed that the amount of sediment at that location was insignificant. After enough sediment was collected at a location, additional grabs were not attempted. Sufficient sediment was collected at two of the proposed locations (AS12-SD49 and AS12-SD50) but was not available at two other proposed locations (AS12-SD47 and AS12-SD48). Figure 4-5 shows the locations where sediment samples were collected, and Figure 4-6 shows the locations of the proposed samples that could not be collected.

The decision rule in the Phase II Additional Scrutiny QAPP (TtNUS, September 2007) for Study Question No. 1 was as follows:

- Determine whether there is sediment in the main channel of the Piscataqua River within 15 feet of the ramp drop-off, and if so, determine whether the sediment has elevated concentrations of PAHs and/or lead.

  - If sediment is not collected after five attempts at a sample location, assume that the amount of sediment at that location is insignificant. Otherwise, collect the sediment sample and analyze the sample for PAHs and lead.

  - If the concentration of any PAH in any single sample is greater than its IRG, or if the concentration of lead in any single sample is greater than twice the ER-M, then the area will be further evaluated in another phase as part of a FS or removal action. Otherwise, conclude that the sediment does not have elevated concentrations of PAHs and lead and take no further action.

Because sediment was collected from two of the four proposed locations, it was determined that sediment was present within 15 feet of the ramp drop-off and so the sediment samples were analyzed for PAHs and lead. The next step was to determine whether the concentration of any PAH in any single sample is greater than its IRG, or whether the concentration of lead in any single sample is greater than twice the ER-M. As can be seen in Table 4-1 and on Figures 4-7 through 4-12, PAH concentrations in the sediment samples from AS12-SD49 and AS12-SD50 were less than their respective IRGs, and lead concentrations were less than twice the ER-M (436 mg/kg). The analytical data compared to the IRGs and ER-M (for lead) are also presented on Figures 4-7 through 4-11. Therefore, it is concluded that the sediment does not have elevated concentrations of PAHs or lead and so no further action is needed at the edge of the ramp-drop off.

As part of the Phase II Additional Scrutiny, three surface (0 to 4 inches) sediment samples (AS12-SD107 through AS12-SD109) were collected near AS12-SD12 (a Phase I Additional Scrutiny sample) because the lead concentration in sediment from the AS12-SD12 location was elevated (3,120 mg/kg) (see

Figure 4-11). The lead results in these three samples were 417 mg/kg, 647 mg/kg, and 598 mg/kg, so the lead concentrations in two of the three samples were greater than twice the ER-M. The location closest to the ramp drop-off, AS12-SD107, had the lowest concentration.

Study Question No. 2

To determine the horizontal and vertical extent of contamination inside Building 178 and on the ramp outside of Building 178, surface and subsurface sediment samples were collected inside Building 178 and on the ramp outside of Building 178 and analyzed for PAHs and lead (See Figure 4-5).

Inside Building 178, it was initially proposed that samples be collected approximately 40 feet apart in two east-west transects that were also approximately 40 feet apart. However, this was modified in the field based on the availability of sediment and obstructions inside Building 178. The sediment samples were collected at locations that could be accessed and where sediment was available in an attempt to obtain good spatial coverage within the intertidal portion of the building.

On the ramp outside of Building 178, each location was initially proposed to be approximately 50 feet apart in two east-west transects approximately 50 feet apart. At each location, surface and subsurface sediment samples were to be collected, and each sample was to be a composite of three grabs collected within 10 to 15 feet of each other. At least two samples were to be collected within the eelgrass bed. In addition, surface sediment samples only were to be collected from four locations in the eelgrass bed.

The sampling protocol was modified slightly in the field based on the availability of sediment at depth. It was proposed in the Additional Scrutiny QAPP (TtNUS, September 2007) that a maximum of three samples be collected at each core location; one at the surface and up to two from the subsurface. The target depths for chemical analysis of subsurface sediment were: (1) at the bottom of the core (marked by either refusal or a maximum depth of 8 feet and (2) at the midpoint of the core hole unless the maximum depth was less than 4 feet. If refusal was encountered at 4 feet or less, only one subsurface sediment sample would be collected for laboratory analysis from the bottom 1-foot of the core hole. However, if the total depth of the core hole was less than 1.5 feet, only the surface sample would be collected.

The depths of samples were limited by concrete flooring and refusal due to blast rock fragments inside and outside the building. Although sediment was less than 1.5 feet thick at all of the locations, the decision was made to collect sediment from between 4 inches and the bottom of the core hole for chemical analysis to provide additional information regarding contaminant concentrations at those locations. Surface samples were generally collected from the surface to 3 or 4 inches, and subsurface samples were collected to a maximum depth of approximately 17 inches. Table 2-3 lists the depths from which sediment samples were collected. The sample log sheets in the Round 9 and Phase II Additional

Scrutiny Data Package (TtNUS, September 2008) present the depths of sediment at each of the three cores at each location.

As discussed in the Phase II Additional Scrutiny QAPP (TtNUS, September 2007), a decision rule was not needed for Study Question No. 2 because the data are being used to better characterize the site. Any decisions made with the data will be done as part of a FS or removal action.

The greatest PAH concentrations were detected in samples inside and immediately outside Building 178 (see Figures 4-7 through 4-10). Many of the concentrations of PAHs were greater than their IRGs, and concentrations of lead were greater than twice its ER-M. The concentrations were lower in the samples further from the building. Also, concentrations were lower in the deeper samples inside Building 178 but increased with depth in samples outside Building 178. Many PAH concentrations, especially in sediment samples inside and immediately outside Building 178, were several times greater than their respective IRGs.

Concentrations of lead generally followed the same pattern as PAHs, with the greatest concentrations in samples inside and immediately outside Building 178 (see Figure 4-11). Most concentrations were less than 1,000 mg/kg, but several concentrations inside the building and one concentration in a depth sample outside the building were greater than 1,000 mg/kg.

Study Question No. 3

Because eelgrass beds are unique habitats for aquatic receptors, the size and extent of the eelgrass bed at MS-12 needs to be considered in addition to chemical concentrations in the habitat before a remedial decision is made that may disturb or destroy the eelgrass bed. As discussed in the Phase II Additional Scrutiny QAPP (TtNUS, September 2007), a decision rule was not needed for this study question because no decisions will be made based solely on the physical boundary of the eelgrass bed.

To determine the approximate size of the eelgrass bed at MS-12, the boundaries of the eelgrass were mapped by lowering a pole with an underwater camera below the water surface and moving along transects from Building 178 toward the main channel of the Piscataqua River until the eelgrass was no longer visible with the camera. A Trimble DSM-232 GPS was used to record the coordinates of each transect. The coordinates of the locations where the eelgrass began and ended for each transect was also recorded. As an additional task, and to help answer Study Question No. 1, the location where the concrete ramp ended (i.e., ramp drop-off) was observed in the underwater video, and the coordinates along the edge of the ramp were recorded.

Figure 4-12 presents the approximate boundary of the eelgrass bed at MS-12 and the approximate location of the ramp drop-off, along with the locations of the underwater video survey transects. The CD in Appendix A contains an electronic copy of Figure 4-12 with hyperlinks to the underwater video transects; the underwater video can be viewed by clicking on the transects.

Study Question No. 4

To determine whether average concentrations of PAHs and lead in the eelgrass bed are greater than the IRGs for PAHs or twice the ER-M for lead, surface sediment samples were collected in the eelgrass bed and analyzed for PAHs and lead.

The decision rule in the Phase II Additional Scrutiny QAPP (TtNUS, September 2007) for this study question was as follows:

- Determine whether average concentrations of PAHs and lead in the eelgrass bed are greater than the IRGs for PAHs or twice the ER-M for lead.

  - If average concentrations of PAHs and lead in the eelgrass bed are greater than the IRGs for PAHs or twice the ER-M for lead, conduct a benefits analysis considering the size and potential benefit of the eelgrass bed along with the chemical concentrations in surficial sediment to determine whether a removal action for the area is warranted.

  - If average concentrations of PAHs and lead in the eelgrass bed are less than the IRGs for PAHs or twice the ER-M for lead, do not consider a removal action for the area.

In the eelgrass bed, despite penetration of the core to depths of 1 to 3 feet only 4 to 12 inches of sediment were retained in the cores. Table 4-3 presents average concentrations of lead and the PAHs with IRGs for sediment samples collected within the eelgrass bed. One Interim Offshore Monitoring Program location is within the eelgrass bed at MS-12, Loc. 2. To be conservative, the maximum chemical concentration from all rounds was used to calculate the average chemical concentration for each parameter. The Interim Offshore Monitoring program samples were the only samples collected from within the eelgrass bed that had PAH concentrations greater than IRGs, or lead concentrations greater than its ER-M. The average PAH concentrations were all less than their respective IRGs, and the average lead concentration was less than its ER-M. Therefore, the eelgrass bed should not be considered for a removal action.

Summary of MS-12 Results

The following presents a summary of the Additional Scrutiny Investigation conducted at MS-12. It was determined that sediment was present within 15 feet of the ramp drop-off, but the PAH concentrations in sediment samples from this area were less than IRGs, and the lead concentrations were less than twice the ER-M. Therefore, it is concluded that the sediment does not have elevated concentrations of PAHs or lead.

As part Phase II Additional Scrutiny, three surface (0 to 4 inches) sediment samples (AS12-SD107, through AS12-SD109) were collected near AS12-SD12 (a Phase I Additional Scrutiny sample) because the lead concentration in the sediment from AS12-SD12 was elevated (3,120 mg/kg) (see Figure 4-11). The lead results in these three samples were 417 mg/kg, 647 mg/kg, and 598 mg/kg, so the lead concentrations in two of the three samples were greater than twice the ER-M. The location closest to the ramp drop-off was AS12-SD107, which had the concentration of 417 mg/kg.

Maximum PAH concentrations were detected in sediment samples inside and immediately outside Building 178. Also, concentrations inside Building 178 decreased with increasing depth, but increased with depth in samples outside Building 178. Concentrations of lead generally followed the same pattern as PAHs, with maximum concentrations in samples inside and immediately outside Building 178. Many of the concentrations of PAHs were greater than their IRGs, and concentrations of lead were greater than twice its ER-M.

Average PAH concentrations were all less than IRGs, and the average lead concentration was less than its ER-M in sediment samples collected from within the eelgrass bed.

4.5.2 MS-13

MS-13 is located outside of a dry dock in the Dry Docks AOC offshore of Sites 5 and 31. Seven rounds of interim offshore monitoring were conducted at this station for parameters listed in the Interim Offshore Monitoring Plan for OU4 (TtNUS, October 1999), and Round 8 of offshore monitoring was conducted at MS-13 with analysis of PAHs in sediment.

Offshore monitoring of sediment during Rounds 8 and 9 was recommended for MS-13 in the Rounds 1 through 7 Report because the UCL for fluorene exceeded the IRG, partially based on the wide confidence interval caused by variability in the data. It was anticipated that having additional data before the next 5-year sampling event would provide a higher level of confidence regarding exceedance of the IRG. Analytical data from the first eight rounds of sediment sampling at MS-13 were evaluated in the Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (TtNUS, September 2007), which

recommended that interim offshore monitoring at MS-13 be discontinued after the Round 8 sampling event. Therefore, no sediment samples were collected at this station during Round 9. In addition, no sediment samples were collected at this station during Round 10 in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (TtNUS, September 2008a).

Chemical concentration plots presenting the first eight rounds of PAH data compared to IRGs are presented in Appendix D. The following summarizes IRG exceedances during Rounds 1 through 8:

- PAH concentrations in most samples were less than IRGs.
    - Concentrations of acenaphthylene and anthracene were greater than IRGs during three and four rounds, respectively, at one location during round.
    - Concentrations of fluorene and HMW PAHs were greater than IRGs at one location during each of the Rounds 2 and 3. The duplicate sample collected during Round 8 at Loc. 1 exceeded IRGs for HMW PAHs, but the original sample and average of the two samples did not exceed IRGs.
    - Concentrations of all four PAHs were less than their respective IRGs during Rounds 7 and 8, except for the duplicate sample collected at Loc. 1 during Round 8 that exceeded the IRG for HMW PAHs.
- Concentrations of copper and nickel were less than IRGs in all samples, but there was an increase in concentrations during Round 6. In addition, the only exceedance of the lead ER-M occurred during Round 6 at one sampling location. Copper concentrations decreased during Round 7.

Maintenance dredging, which occurs periodically in the dry dock where MS-13 is located, is a likely cause for at least a portion of the variability in the data. In fact, maintenance dredging was performed in the berth areas by the dry docks between Rounds 5 and 6, which may account for the spike in copper and nickel concentrations during Round 6.

4.5.3 MS-14

MS-14 is located in the westernmost part of the back channel in the Dry Docks AOC to monitor sediment potentially impacted by Sites 5 and 31. Seven rounds of interim offshore monitoring were conducted at this station for parameters listed in the Interim Offshore Monitoring Plan for OU4 (TtNUS, October 1999), and Round 8 offshore monitoring was conducted at MS-14 for analysis of PAHs in sediment. Offshore monitoring of sediment during Rounds 8 and 9 was recommended for this station because UCLs for

acenaphthylene and anthracene were predicted to increase to greater than IRGs within the next 5 years, partially based on the wide confidence interval caused by variability in the data. It was anticipated that having additional data before the next 5-year sampling event will provide a higher level of confidence regarding IRG exceedances.

Analytical data from the first eight rounds of sediment sampling at MS-14 were evaluated in the Technical Memorandum in Appendix A of the Phase II Additional Scrutiny QAPP (TtNUS, September 2007), which recommended that interim offshore monitoring at MS-14 be discontinued after the Round 8 sampling event. Therefore, no sediment samples were collected at this station during Round 9. In addition, no sediment samples were collected at this station during Round 10 in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (TtNUS, September 2008a).

Chemical concentration plots presenting the first eight rounds of PAH data compared to IRGs are presented in Appendix D. The following summarizes IRG exceedances during Rounds 1 through 8:

- PAH concentrations in most samples are less than IRGs.
    - Concentrations of acenaphthylene were only greater than its IRGs at location 1 during Round 5, whereas concentrations of both acenaphthylene and anthracene were only greater than their IRG at location 2 during Round 6.
    - Concentrations of fluorene and HMW PAHs were less than IRGs during all eight rounds.
    - No concentrations of acenaphthylene have been greater than the IRG since Round 6.
    - Concentrations of acenaphthylene were slightly greater than the IRG for Rounds 5 and 6, but concentrations were less than the IRG during Rounds 7 and 8.
- Concentrations of copper and nickel were less than IRGs in all samples.

4.6 REFERENCE STATIONS

Sediment samples have been collected from four reference stations located in the Great Bay Estuary as part of the Interim Offshore Monitoring Program. It was recommended in the Rounds 1 through 7 Report (TtNUS, November 2004) that sediment samples be collected at reference stations during Rounds 8 and 9 for analysis of PAHs, PCBs, dioxins/furans and TOC. Analysis for metals and pesticides at reference stations was not recommended because concentrations of metals and pesticides at the reference stations

were much lower than concentrations at the monitoring stations where continued sampling during Rounds 8 and 9 was recommended. During Round 9, sediment samples were only collected from reference station RS-02 in accordance with the Technical Memorandum in the Phase II Additional Scrutiny QAPP (TtNUS, September 2007). The memorandum recommended discontinuation sampling at all reference stations, but the regulators responded that they would like at least one reference station sampled during Round 9. No reference station samples were collected during Round 10 in accordance with the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (TtNUS, September 2008a).

Appendix D contains concentration plots for the four reference stations. The concentration plots contain the first nine rounds of data for PAHs and the first seven rounds of data for copper, lead, nickel, and 4,4'-DDT (Round 8 and 9 sediment samples from reference stations were not analyzed for metals or pesticides).

With the exception of an elevated lead detection at one RS-02 location during Round 7, overall chemical concentrations were consistent across all rounds at a particular station. No increasing or decreasing trends in concentrations were observed in the data plots. Also, with one exception during Round 1, all detected concentrations in reference samples were less than IRGs. The reference data were used to help develop the PRGs and IRGs and to evaluate the monitoring station data in the Rounds 1 through 7 Report (TtNUS, November 2004). However, because chemical concentrations in reference samples are consistently less than concentrations in monitoring stations with exceedances of IRGs, reference concentrations will not affect remedial decisions for those monitoring stations.

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	**AS12-SD-SD21-00**	**AS12-SD-SD21-01**	**AS12-SD-SD22-00**	**AS12-SD-SD22-00-D**	**AS12-SD-SD23-00**
SAMPLE DATE	**20071108**	**20071108**	**20071108**	**20071108**	**20071107**
ROUND	**ASP2**	**ASP2**	**ASP2**	**ASP2**	**ASP2**
TOP DEPTH (FT)	**0**	**0.33**	**0**	**0**	**0**
BOTTOM DEPTH (FT)	**0.33**	**0.67**	**0.33**	**0.33**	**0.33**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	13	5.4 U	12 J	7.3 J	18 J
1-METHYLNAPHTHALENE	29	9.4	25 J	13 J	41 J
1-METHYLPHENANTHRENE	86	32	90 J	94 J	150 J
2,3,5-TRIMETHYLNAPHTHALENE	11 U	5.4 U	14 J	8.8 J	15 J
2,6-DIMETHYLNAPHTHALENE	19	6.6	100 J	94 J	84 J
2-METHYLNAPHTHALENE	44	14	29 J	15 J	58 J
ACENAPHTHENE	180	70	150 J	68 J	250 J
ACENAPHTHYLENE	24	17	84 J	76 J	100 J
ANTHRACENE	280	110	270 J	170 J	420 J
BENZO(A)ANTHRACENE	580	240	600 J	450 J	1200 J
BENZO(A)PYRENE	470	220	510 J	400 J	970 J
BENZO(B)FLUORANTHENE	540	250	620 J	460 J	1100 J
BENZO(E)PYRENE	260	120	290 J	230 J	510 J
BENZO(G,H,I)PERYLENE	250	120	310 J	250 J	540 J
BENZO(K)FLUORANTHENE	270	120	280 J	230 J	500 J
CHRYSENE	510	230	590 J	390 J	1100 J
DIBENZO(A,H)ANTHRACENE	75	34	98 J	72 J	170 J
DIBENZOTHIOPHENE	66	25	68 J	34 J	110 J
FLUORANTHENE	1000	420	1600 J	900 J	2200 J
FLUORENE	160	63	150 J	66 J	220 J
HIGH MOLECULAR WEIGHT PAHS	3485	1504	4698	3002	7440
INDENO(1,2,3-CD)PYRENE	240	110	300 J	230 J	520 J
LOW MOLECULAR WEIGHT PAHS	1748	666	1829	883	2858
NAPHTHALENE	100	32	46 J	28 J	110 J
PERYLENE	120	53	160 J	130 J	220 J
PHENANTHRENE	960	360	1100 J	460 J	1700 J
PYRENE	850	360	1300 J	790 J	1800 J
INORGANICS (MG/KG)					
LEAD	57.7 J	68 J	70.4 J	74.9 J	100 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	--	1.2	--	--	--

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD23-01	AS12-SD-SD24-00	AS12-SD-SD24-01	AS12-SD-SD25-00	AS12-SD-SD25-01
SAMPLE DATE	20071107	20071105	20071105	20071108	20071108
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0.33	0	0.33	0	0.33
BOTTOM DEPTH (FT)	0.83	0.33	1	0.33	1
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	6.7 U	18	56	51 J	34 U
1-METHYLNAPHTHALENE	10	41	95	100 J	39
1-METHYLPHENANTHRENE	42	110	340	240 J	180
2,3,5-TRIMETHYLNAPHTHALENE	6.7 U	14	49	20 J	34 U
2,6-DIMETHYLNAPHTHALENE	11	40	110	94 J	53
2-METHYLNAPHTHALENE	14	58	140	180 J	55
ACENAPHTHENE	88	330	1300	750 J	340
ACENAPHTHYLENE	23	43	74	77 J	65
ANTHRACENE	130	460	1900	850 J	510
BENZO(A)ANTHRACENE	420	860	2900	1600 J	1400
BENZO(A)PYRENE	340	620	2100	1400 J	1100
BENZO(B)FLUORANTHENE	370	800	2600	1600 J	1500
BENZO(E)PYRENE	200	400	1200	770 J	650
BENZO(G,H,I)PERYLENE	190	400	920	780 J	610
BENZO(K)FLUORANTHENE	240	350	1300	860 J	530
CHRYSENE	350	760	2700	1500 J	1300
DIBENZO(A,H)ANTHRACENE	52	130	270	320 J	180
DIBENZOTHIOPHENE	34	110	320	240 J	130
FLUORANTHENE	960	1800	7900	3000 J	2600
FLUORENE	73	290	1300	620 J	260
HIGH MOLECULAR WEIGHT PAHS	2782	5570	21770	10420	8680
INDENO(1,2,3-CD)PYRENE	180	400	890	760 J	580
LOW MOLECULAR WEIGHT PAHS	854	2891	12794	5677	3220
NAPHTHALENE	26	110	280	400 J	90
PERYLENE	92	180	400	440 J	350
PHENANTHRENE	500	1600	7800	2800 J	1900
PYRENE	660	1400	5900	2600 J	2100
INORGANICS (MG/KG)					
LEAD	124 J	240	340	236 J	327 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	2.2	--	--	--	3.1

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD26-00	AS12-SD-SD43-00	AS12-SD-SD44-00	AS12-SD-SD45-00	AS12-SD-SD46-00
SAMPLE DATE	20071108	20071105	20071109	20071105	20071105
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0	0	0	0
BOTTOM DEPTH (FT)	0.33	0.33	0.33	0.33	0.33
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	8 J	12	25	6	10
1-METHYLNAPHTHALENE	16 J	25	54	16	27
1-METHYLPHENANTHRENE	40 J	72	200	61	69
2,3,5-TRIMETHYLNAPHTHALENE	6 UJ	7	14	5	10
2,6-DIMETHYLNAPHTHALENE	11 J	24	39	12	46
2-METHYLNAPHTHALENE	29 J	34	78	20	32
ACENAPHTHENE	140 J	180	450	130	130
ACENAPHTHYLENE	14 J	35	51	27	46
ANTHRACENE	170 J	250	640	190	260
BENZO(A)ANTHRACENE	380 J	600	1900	520	510
BENZO(A)PYRENE	300 J	390	1600	440	430
BENZO(B)FLUORANTHENE	370 J	490	1700	490	480
BENZO(E)PYRENE	170 J	300	690	250	240
BENZO(G,H,I)PERYLENE	140 J	300	670	250	250
BENZO(K)FLUORANTHENE	180 J	250	680	200	240
CHRYSENE	390 J	500	1900	420	420
DIBENZO(A,H)ANTHRACENE	44 J	98	210	77	77
DIBENZOTHIOPHENE	45 J	65	170	46	55
FLUORANTHENE	540 J	1300	4000	920	1000
FLUORENE	98 J	160	360	100	140
HIGH MOLECULAR WEIGHT PAHS	2114	3808	12710	3117	3287
INDENO(1,2,3-CD)PYRENE	150 J	300	660	240	240
LOW MOLECULAR WEIGHT PAHS	905	1447	4829	1217	1499
NAPHTHALENE	74 J	68	150	40	51
PERYLENE	67 J	130	300	110	110
PHENANTHRENE	380 J	720	3100	710	840
PYRENE	460 J	920	3100	740	850
INORGANICS (MG/KG)					
LEAD	104 J	58	53.8 J	45	55
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	--	0.99 UJ	--	1 UJ	--

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD49-00	AS12-SD-SD50-00	AS12-SD-SD20-00	AS12-SD-SD27-00	AS12-SD-SD28-00
SAMPLE DATE	20071106	20071106	20080414	20080414	20080414
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0	0	0	0
BOTTOM DEPTH (FT)	0.33	0.33	0.17	0.25	0.33
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	5	16	850 UJ	850 UJ	87 UJ
1-METHYLNAPHTHALENE	8	24	850 UJ	1800 J	87 UJ
1-METHYLPHENANTHRENE	56	140	1800 J	2900 J	150 J
2,3,5-TRIMETHYLNAPHTHALENE	13	22	850 UJ	850 UJ	87 UJ
2,6-DIMETHYLNAPHTHALENE	50	83	850 UJ	850 UJ	87 UJ
2-METHYLNAPHTHALENE	11	40	1200 J	2700 J	87 UJ
ACENAPHTHENE	61	130	4000 J	9900 J	400 J
ACENAPHTHYLENE	59	75	850 UJ	850 UJ	87 UJ
ANTHRACENE	220	520	7700 J	15000 J	650 J
BENZO(A)ANTHRACENE	400	760	13000 J	20000 J	1400 J
BENZO(A)PYRENE	370	580	11000 J	18000 J	1300 J
BENZO(B)FLUORANTHENE	410	770	19000 J	28000 J	2200 J
BENZO(E)PYRENE	200	310	7300 J	11000 J	900 J
BENZO(G,H,I)PERYLENE	220	300	6300 J	10000 J	740 J
BENZO(K)FLUORANTHENE	170	290	5500 J	8500 J	870 J
CHRYSENE	350	710	13000 J	18000 J	1500 J
DIBENZO(A,H)ANTHRACENE	62	95	2200 J	2700 J	260 J
DIBENZOTHIOPHENE	45	68	2100 J	3200 J	140 J
FLUORANTHENE	800	1500	47000 J	64000 J	3800 J
FLUORENE	74	200	4500 J	8200 J	340 J
HIGH MOLECULAR WEIGHT PAHS	2632	4845	119200	172700	11060
INDENO(1,2,3-CD)PYRENE	210	290	5400 J	8800 J	760 J
LOW MOLECULAR WEIGHT PAHS	893	2265	61225	102325	4217
NAPHTHALENE	18	100	2400 J	8100 J	140 J
PERYLENE	97	150	2800 J	4400 J	290 J
PHENANTHRENE	450	1200	41000 J	58000 J	2600 J
PYRENE	650	1200	33000 J	50000 J	2800 J
INORGANICS (MG/KG)					
LEAD	280	86	422 J	369 J	608 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	1 J	1 J	1	1.6	1.1

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD29-00	AS12-SD-SD30-00	AS12-SD-SD31-00	AS12-SD-SD32-00	AS12-SD-SD32-01
SAMPLE DATE	20080414	20080414	20080415	20080415	20080415
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0	0	0	0.67
BOTTOM DEPTH (FT)	0.33	0.33	0.33	0.33	1
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	44 UJ	100 UJ	39 U	320 U	180 U
1-METHYLNAPHTHALENE	44 UJ	150 J	60	350	320
1-METHYLPHENANTHRENE	110 J	330 J	130	700	470
2,3,5-TRIMETHYLNAPHTHALENE	44 UJ	100 UJ	39 U	320 U	180 U
2,6-DIMETHYLNAPHTHALENE	44 UJ	100 UJ	39 U	320 U	220
2-METHYLNAPHTHALENE	69 J	230 J	97	610	480
ACENAPHTHENE	400 J	1600 J	340	3400	1800
ACENAPHTHYLENE	44 UJ	100 UJ	39 U	320 U	180 U
ANTHRACENE	500 J	1300 J	560	3700	2100
BENZO(A)ANTHRACENE	900 J	3100 J	1100	6700	4800
BENZO(A)PYRENE	780 J	2600 J	700	5400	4100
BENZO(B)FLUORANTHENE	1300 J	4800 J	1100 J	9100 J	6500 J
BENZO(E)PYRENE	530 J	1700 J	450	3400	2700
BENZO(G,H,I)PERYLENE	410 J	1400 J	360	3000	2200
BENZO(K)FLUORANTHENE	550 J	1300 J	540	3000	2700
CHRYSENE	950 J	3200 J	860	6400	5000
DIBENZO(A,H)ANTHRACENE	160 J	440 J	140	980	760
DIBENZOTHIOPHENE	110 J	460 J	130	870	520
FLUORANTHENE	2500 J	10000 J	2700	17000	13000
FLUORENE	340 J	970 J	400	2500	1600
HIGH MOLECULAR WEIGHT PAHS	7190	26940	7400	48480	36760
INDENO(1,2,3-CD)PYRENE	420 J	1400 J	380	3000	2300
LOW MOLECULAR WEIGHT PAHS	3581	13110	3976	27670	17070
NAPHTHALENE	150 J	560 J	160	1300	1000
PERYLENE	160 J	610 J	160	1300	1000
PHENANTHRENE	2100 J	8400 J	2400	16000	10000
PYRENE	1900 J	7600 J	1900	12000	9100
INORGANICS (MG/KG)					
LEAD	761 J	278 J	41600 J	324 J	305 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	0.98 U	1.4	2.2	--	2.9

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD33-00	AS12-SD-SD33-00-D	AS12-SD-SD33-01	AS12-SD-SD34-00	AS12-SD-SD34-01
SAMPLE DATE	20080415	20080415	20080415	20080415	20080415
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0	0.75	0	0.83
BOTTOM DEPTH (FT)	0.33	0.33	1.25	0.33	1.42
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	47 U	89 U	21 U	16	33
1-METHYLNAPHTHALENE	140 J	300 J	38	29	40
1-METHYLPHENANTHRENE	150 J	370 J	93	39	23
2,3,5-TRIMETHYLNAPHTHALENE	88	110	25	16	31
2,6-DIMETHYLNAPHTHALENE	210	320	39	36	63
2-METHYLNAPHTHALENE	140 J	390 J	76	66	87
ACENAPHTHENE	270 J	1300 J	130	67	4.2 U
ACENAPHTHYLENE	93	94	49	40	33
ANTHRACENE	420 J	1700 J	230	92	65
BENZO(A)ANTHRACENE	1600 J	3600 J	540	250	120
BENZO(A)PYRENE	1500 J	3100 J	460	240	150
BENZO(B)FLUORANTHENE	2500 J	5000 J	910 J	420 J	230
BENZO(E)PYRENE	1000 J	2000 J	360	180	110
BENZO(G,H,I)PERYLENE	870	1500	330	170	110
BENZO(K)FLUORANTHENE	1100 J	2000 J	220	140	93
CHRYSENE	1700 J	3500 J	470	250	140
DIBENZO(A,H)ANTHRACENE	300 J	590 J	120	55	38
DIBENZOTHIOPHENE	93 J	370 J	50	37	160
FLUORANTHENE	3800 J	8800 J	1200	600	250
FLUORENE	210 J	950 J	130	51	25
HIGH MOLECULAR WEIGHT PAHS	11700	26090	3710	1875	1008
INDENO(1,2,3-CD)PYRENE	880 J	1600 J	310	160	100
LOW MOLECULAR WEIGHT PAHS	3113	11484	1528	727	375
NAPHTHALENE	80 J	350 J	53	51	53
PERYLENE	340 J	690 J	110	52	34
PHENANTHRENE	1900 J	6700 J	860	360	110
PYRENE	2800 J	6500 J	920	480	310
INORGANICS (MG/KG)					
LEAD	823 J	786 J	719 J	1820 J	1270 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	1.8	1.5	--	--	2.4

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD35-00	AS12-SD-SD35-01	AS12-SD-SD36-00	AS12-SD-SD37-00	AS12-SD-SD38-00
SAMPLE DATE	20080415	20080415	20080415	20080416	20080416
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0.33	0	0	0
BOTTOM DEPTH (FT)	0.33	1	0.33	0.33	0.25
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	1500 U	24 U	96 U	430 U	460 U
1-METHYLNAPHTHALENE	1500 U	41	130	840	1200
1-METHYLPHENANTHRENE	4000	91	270	1400	1200 J
2,3,5-TRIMETHYLNAPHTHALENE	1500 U	24 U	96 U	430 U	460 U
2,6-DIMETHYLNAPHTHALENE	1500 U	25	96 U	430 U	1000
2-METHYLNAPHTHALENE	2400	72	170	1300	1600 J
ACENAPHTHENE	13000	450	1200	4200	5700 J
ACENAPHTHYLENE	1500 U	34	150	430 U	460 U
ANTHRACENE	16000	370	1100	5900	5500
BENZO(A)ANTHRACENE	31000	960	2600	12000	13000
BENZO(A)PYRENE	26000	720	2200	9700	11000
BENZO(B)FLUORANTHENE	44000 J	1100 J	3900 J	16000 J	17000
BENZO(E)PYRENE	17000	470	1400	6300	6800
BENZO(G,H,I)PERYLENE	14000	330	1200	5400	5700
BENZO(K)FLUORANTHENE	15000	550	1000	5400	7300 J
CHRYSENE	32000	840	2400	11000	14000
DIBENZO(A,H)ANTHRACENE	4100	140	450	1700	1700
DIBENZOTHIOPHENE	4200	100	300	1400	1400 J
FLUORANTHENE	90000	2300	7100	30000	35000
FLUORENE	12000	280	840	4200	3900 J
HIGH MOLECULAR WEIGHT PAHS	249100	6660	20150	86400	99700
INDENO(1,2,3-CD)PYRENE	14000	370	1300	5300	5500
LOW MOLECULAR WEIGHT PAHS	130950	3196	8910	46515	47130
NAPHTHALENE	4800	190	350	2700	2200 J
PERYLENE	5600	160	490	2400	3000
PHENANTHRENE	82000	1800	5100	28000	28000 J
PYRENE	66000	1700	5400	22000	25000
INORGANICS (MG/KG)					
LEAD	230 J	261 J	345 J	3160 J	2530 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	1.5	--	1.6	1.5	2.5

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD38-00-D	AS12-SD-SD39-00	AS12-SD-SD40-00	AS12-SD-SD41-00	AS12-SD-SD42-00
SAMPLE DATE	20080416	20080416	20080416	20080416	20080416
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0	0	0	0
BOTTOM DEPTH (FT)	0.25	0.33	0.25	0.33	0.25
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	210 U	24 U	42 U	24 UJ	79 U
1-METHYLNAPHTHALENE	880	43	48	24 UJ	79 U
1-METHYLPHENANTHRENE	680 J	74	110	69 J	160
2,3,5-TRIMETHYLNAPHTHALENE	260 J	24 U	42 U	24 UJ	79 U
2,6-DIMETHYLNAPHTHALENE	790	48	42 U	24 UJ	79 U
2-METHYLNAPHTHALENE	1100 J	63	70	34 J	80
ACENAPHTHENE	2400 J	170	340	160 J	680
ACENAPHTHYLENE	210 U	25	42 U	67 J	79 U
ANTHRACENE	2600	190	490	200 J	760
BENZO(A)ANTHRACENE	8700	610	950	710 J	1900
BENZO(A)PYRENE	7400	510	700	620 J	1500
BENZO(B)FLUORANTHENE	13000	950	1300	1100 J	2800
BENZO(E)PYRENE	4500	360	470	410 J	1000
BENZO(G,H,I)PERYLENE	4200	340	400	380 J	860
BENZO(K)FLUORANTHENE	3800 J	270	330	270 J	770
CHRYSENE	8300	600	860	690 J	1800
DIBENZO(A,H)ANTHRACENE	1400	120	140	110 J	300
DIBENZOTHIOPHENE	650 J	48	130	48 J	190
FLUORANTHENE	20000	1400	3000	1500 J	4600
FLUORENE	1700 J	130	260	100 J	480
HIGH MOLECULAR WEIGHT PAHS	60800	4340	7850	4930	13500
INDENO(1,2,3-CD)PYRENE	4100	340	400	360 J	880
LOW MOLECULAR WEIGHT PAHS	21905	1599	3591	1481	5830
NAPHTHALENE	1000 J	61	110	70 J	190
PERYLENE	1800	110	170	140 J	340
PHENANTHRENE	13000 J	960	2300	850 J	3600
PYRENE	15000	1100	2200	1300 J	3400
INORGANICS (MG/KG)					
LEAD	1730 J	690 J	1090 J	231 J	777 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	2.7	3.3	1.4	1.7	1

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD100-00	AS12-SD-SD100-01	AS12-SD-SD101-00	AS12-SD-SD102-00	AS12-SD-SD103-00
SAMPLE DATE	20080416	20080416	20080416	20080416	20080416
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0.67	0	0	0
BOTTOM DEPTH (FT)	0.33	0.83	0.33	0.25	0.33
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	910	1100	36 U	490 U	7.6 U
1-METHYLNAPHTHALENE	2000	2500	91	1400	7.6 U
1-METHYLPHENANTHRENE	2600	3700	110	970	21 J
2,3,5-TRIMETHYLNAPHTHALENE	900 U	930 U	36 U	490 U	7.6 U
2,6-DIMETHYLNAPHTHALENE	900 U	1000	65	780	7.6 U
2-METHYLNAPHTHALENE	3400	4300	140	2000	8.1 J
ACENAPHTHENE	9200	11000	310	5500	49 J
ACENAPHTHYLENE	900 U	930 U	110	490 U	12
ANTHRACENE	13000	18000	370	5200	42 J
BENZO(A)ANTHRACENE	21000	29000	1100	11000	240 J
BENZO(A)PYRENE	17000	24000	880	8800	250 J
BENZO(B)FLUORANTHENE	25000	36000	1600	14000	490 J
BENZO(E)PYRENE	10000	15000	600	5400	200 J
BENZO(G,H,I)PERYLENE	8900	13000	520	4500	170 J
BENZO(K)FLUORANTHENE	11000	15000	510	4900	170 J
CHRYSENE	22000	29000	1000	11000	330 J
DIBENZO(A,H)ANTHRACENE	3200	4800	180	1700	61 J
DIBENZOTHIOPHENE	3100	4100	100	1300	20 J
FLUORANTHENE	64000	84000	2600	31000	730 J
FLUORENE	11000	14000	260	4100	39 J
HIGH MOLECULAR WEIGHT PAHS	172200	231800	7660	85500	2171
INDENO(1,2,3-CD)PYRENE	7800	11000	520	4100	160 J
LOW MOLECULAR WEIGHT PAHS	111950	143465	3330	48045	597
NAPHTHALENE	8900	9700	140	2000	17 J
PERYLENE	4700	6400	200	2300	64 J
PHENANTHRENE	66000	86000	2000	29000	430 J
PYRENE	45000	61000	1900	22000	560 J
INORGANICS (MG/KG)					
LEAD	7810 J	6970 J	736 J	1110 J	202 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	2.3	--	0.98 U	3.1	--

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	AS12-SD-SD103-00-D	AS12-SD-SD103-01	AS12-SD-SD104-00	AS12-SD-SD105-00	AS12-SD-SD106-00
SAMPLE DATE	20080416	20080416	20080416	20080416	20080416
ROUND	ASP2	ASP2	ASP2	ASP2	ASP2
TOP DEPTH (FT)	0	0.67	0	0	0
BOTTOM DEPTH (FT)	0.33	1.25	0.33	0.33	0.33
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
1,1-BIPHENYL	77 U	44 U	190 U	170 U	44 U
1-METHYLNAPHTHALENE	77 U	82	210	210	44 U
1-METHYLPHENANTHRENE	250 J	170	520	440	120
2,3,5-TRIMETHYLNAPHTHALENE	77 U	44 U	190 U	170 U	44 U
2,6-DIMETHYLNAPHTHALENE	77 U	44 U	190 U	170 U	44 U
2-METHYLNAPHTHALENE	110 J	140	340	320	71
ACENAPHTHENE	760 J	460	2100	1800	440
ACENAPHTHYLENE	77 U	44 U	190 U	170 U	44 U
ANTHRACENE	1300 J	670	2100	1900	390
BENZO(A)ANTHRACENE	2300 J	1200	5300	4300	1100
BENZO(A)PYRENE	1600 J	830	4700	3800	1100
BENZO(B)FLUORANTHENE	3100 J	1600	8000	6500	1900
BENZO(E)PYRENE	1100 J	580	3000	2400	760
BENZO(G,H,I)PERYLENE	950 J	460	2700	2100	610
BENZO(K)FLUORANTHENE	820 J	450	2500	2100	700
CHRYSENE	2100 J	1100	5400	4500	1400
DIBENZO(A,H)ANTHRACENE	310 J	170	820	640	220
DIBENZOTHIOPHENE	240 J	170	590	520	140
FLUORANTHENE	5700 J	3500	14000	12000	4100
FLUORENE	700 J	570	1600	1500	330
HIGH MOLECULAR WEIGHT PAHS	16110	9300	41220	34340	10920
INDENO(1,2,3-CD)PYRENE	910 J	460	2500	2000	560
LOW MOLECULAR WEIGHT PAHS	8098	5602	19035	16505	4343
NAPHTHALENE	190 J	240	800	900	190
PERYLENE	390 J	190	1200	940	270
PHENANTHRENE	5000 J	3500	12000	10000	2900
PYRENE	4100 J	2500	11000	9100	3000
INORGANICS (MG/KG)					
LEAD	140 J	114 J	874 J	608 J	288 J
MISCELLANEOUS PARAMETERS (%)					
TOTAL ORGANIC CARBON	--	2.7	1.3	1.8	1.5

TABLE 4-1

ANALYTICAL DATA FOR PHASE II ADDITIONAL SCRUTINY SEDIMENT SAMPLES AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

SAMPLE ID	**AS12-SD-SD10700**	**AS12-SD-SD10800**	**AS12-SD-SD10900**
SAMPLE DATE	**20081217**	**20081217**	**20081217**
ROUND			
TOP DEPTH (FT)	**0**	**0**	**0**
BOTTOM DEPTH (FT)	**0.33**	**0.33**	**0.33**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)			
1,1-BIPHENYL	--	--	--
1-METHYLNAPHTHALENE	--	--	--
1-METHYLPHENANTHRENE	--	--	--
2,3,5-TRIMETHYLNAPHTHALENE	--	--	--
2,6-DIMETHYLNAPHTHALENE	--	--	--
2-METHYLNAPHTHALENE	--	--	--
ACENAPHTHENE	--	--	--
ACENAPHTHYLENE	--	--	--
ANTHRACENE	--	--	--
BENZO(A)ANTHRACENE	--	--	--
BENZO(A)PYRENE	--	--	--
BENZO(B)FLUORANTHENE	--	--	--
BENZO(E)PYRENE	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--
BENZO(K)FLUORANTHENE	--	--	--
CHRYSENE	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--
DIBENZOTHIOPHENE	--	--	--
FLUORANTHENE	--	--	--
FLUORENE	--	--	--
HIGH MOLECULAR WEIGHT PAHS	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--
LOW MOLECULAR WEIGHT PAHS	--	--	--
NAPHTHALENE	--	--	--
PERYLENE	--	--	--
PHENANTHRENE	--	--	--
PYRENE	--	--	--
INORGANICS (MG/KG)			
LEAD	417	647	598
MISCELLANEOUS PARAMETERS (%)			
TOTAL ORGANIC CARBON	--	--	--

ASP2 - Phase II Additional Scrutiny Samples
U = Nondetected value
J = Estimated concentration
-- = Not analyzed

TABLE 4-2

CONCENTRATIONS OF ACENAPHTHYLENE, ANTHRACENE, FLUORENE, HMW PAHs, AND LEAD AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station Location	Sample Number	Round	TOC (%)	ACENAPHTHYLENE (ug/kg)(1)	ANTHRACENE (ug/kg)(1)	FLUORENE (ug/kg)(1)	HMW PAHs (ug/kg)(1)	LEAD (mg/kg)(2)
AS12-CB02	AS12-CP-CB02	ASP1	1.1	110	170	32	2661	**401 J**
AS12-SD01	AS12-SD-SD01	ASP1	0.39	99	840	380	12100	**409**
AS12-SD02	AS12-SD-SD02	ASP1	0.52	**270**	**3200**	**1900**	**52030**	128 J
AS12-SD03	AS12-SD-SD03	ASP1	--	---	---	---	---	50.8 J
AS12-SD04	AS12-SD-SD04	ASP1	--	---	---	---	---	116 J
AS12-SD05	AS12-SD-SD05	ASP1	--	---	---	---	---	63.1 J
AS12-SD06	AS12-SD-SD06-0004	ASP1	--	29 J	1200 J	**640 J**	**15870**	118 J
	AS12-SD-SD06-0412		--	44 J	**1500 J**	**750 J**	**17940**	**610 J**
	AS12-SD-SD06-1220		--	61 J	**1300 J**	500 J	**22270**	**544 J**
	AS12-SD-SD06-2031		--	110 J	**3600 J**	**3000 J**	**54600**	**681 J**
AS12-SD07	AS12-SD-SD07-0004	ASP1	0.32	88	990	500	**16330**	**297 J**
	AS12-SD-SD07-0412		--	47 J	**1700 J**	**950 J**	**24190**	**534 J**
	AS12-SD-SD07-1220		--	39 J	1100 J	**640 J**	**13190**	**1350 J**
	AS12-SD-SD07-2028		--	37 J	**1500 J**	**2100 J**	**21660**	**651 J**
	AS12-SD-SD07-D		--	---	---	---	---	**768 J**
AS12-SD08	AS12-SD-SD08	ASP1	--	---	---	---	---	**757 J**
AS12-SD09	AS12-SD-SD09	ASP1	0.33	200	**2500**	**1500**	**47540**	144
	AS12-SD-SD09-D		--	---	---	---	---	163
AS12-SD10	AS12-SD-SD10	ASP1	--	---	---	---	---	**290 J**
AS12-SD11	AS12-SD-SD11	ASP1	--	---	---	---	---	155 J
AS12-SD12	AS12-SD-SD12	ASP1	--	---	---	---	---	**3120**
AS12-SD13	AS12-SD-SD13	ASP1	--	---	---	---	---	148
AS12-SD14	AS12-SD-SD14	ASP1	--	---	---	---	---	42
AS12-SD15	AS12-SD-SD15	ASP1	0.88	**670**	**11000**	**6400**	**157600**	**643 J**
AS12-SD16	AS12-SD-SD16	ASP1	0.79	120	**1500**	**880**	**24410**	**423 J**
	AS12-SD-SD16-D		0.58	100	1200	**690**	**19330**	---
AS12-SD020	AS12-SD-SD20-00	ASP2	1.0	**850 UJ**	**7700 J**	**4500 J**	**119200**	**422 J**
AS12-SD21	AS12-SD-SD21-00	ASP2	--	24	280	160	3485	57.7 J
	AS12-SD-SD21-01		1.2	17	110	63	1504	68.0 J
AS12-SD22	AS12-SD-SD22-00	ASP2	--	84 J	270 J	150 J	4698	70.4 J
	OU4-FD-003-007A		--	76 J	170 J	66 J	3002	74.9 J
AS12-SD23	AS12-SD-SD23-00	ASP2	--	100 J	420 J	220 J	7440	100 J
	AS12-SD-SD23-01		2.2	23	130	73	2782	124 J
AS12-SD24	AS12-SD-SD24-00	ASP2	--	43	460	290	5570	**240**
	AS12-SD-SD24-01		--	74	**1900**	**1300**	**21770**	**340**

TABLE 4-2

CONCENTRATIONS OF ACENAPHTHYLENE, ANTHRACENE, FLUORENE, HMW PAHs, AND LEAD AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station Location	Sample Number	Round	TOC (%)	ACENAPHTHYLENE (ug/kg)(1)	ANTHRACENE (ug/kg)(1)	FLUORENE (ug/kg)(1)	HMW PAHs (ug/kg)(1)	LEAD (mg/kg)(2)
AS12-SD25	AS12-SD-SD25-00	ASP2	--	77 J	850 J	620 J	10420	236 J
	AS12-SD-SD25-01		3.1	65	510	260	8680	327 J
AS12-SD26	AS12-SD-SD26-00	ASP2	--	14 J	170 J	98 J	2114	104 J
AS12-SD027	AS12-SD-SD27-00	ASP2	1.6	850 UJ	15000 J	8200 J	172700	369 J
AS12-SD028	AS12-SD-SD28-00	ASP2	1.1	87 UJ	650 J	340 J	11060	608 J
AS12-SD029	AS12-SD-SD29-00	ASP2	0.98 U	44 UJ	500 J	340 J	7190	761 J
AS12-SD030	AS12-SD-SD30-00	ASP2	1.4	100 UJ	1300 J	970 J	26940	278 J
AS12-SD031	AS12-SD-SD31-00	ASP2	2.2	39 U	560	400	7400	41600 J
AS12-SD032	AS12-SD-SD32-00	ASP2	--	320 U	3700	2500	48480	324 J
	AS12-SD-SD32-01		2.9	180 U	2100	1600	36760	305 J
AS12-SD033	AS12-SD-SD33-00	ASP2	1.8	93	420 J	210 J	11700	823 J
	AS12-SD-DUP01-041508		1.5	94	1700 J	950 J	26090	786 J
	AS12-SD-SD33-01		--	49	230	130	3710	719 J
AS12-SD034	AS12-SD-SD34-00	ASP2	--	40	92	51	1875	1820 J
	AS12-SD-SD34-01		2.4	33	65	25	1008	1270 J
AS12-SD035	AS12-SD-SD35-00	ASP2	1.5	1500 U	16000	12000	249100	230 J
	AS12-SD-SD35-01		--	34	370	280	6660	261 J
AS12-SD036	AS12-SD-SD36-00	ASP2	1.6	150	1100	840	20150	345 J
AS12-SD037	AS12-SD-SD37-00	ASP2	1.5	430 U	5900	4200	86400	3160 J
AS12-SD038	AS12-SD-SD38-00	ASP2	2.5	460 U	5500	3900 J	99700	2530 J
	AS12-SD-DUP02-041608		2.7	210 U	2600	1700 J	60800	1730 J
AS12-SD039	AS12-SD-SD39-00	ASP2	3.3	25	190	130	4340	690 J
AS12-SD040	AS12-SD-SD40-00	ASP2	1.4	42 U	490	260	7850	1090 J
AS12-SD041	AS12-SD-SD41-00	ASP2	1.7	67 J	200 J	100 J	4930	231 J
AS12-SD042	AS12-SD-SD42-00	ASP2	1	79 U	760	480	13500	777 J
AS12-SD43	AS12-SD-SD43-00	ASP2	0.99 UJ	35	250	160	3808	58.0
AS12-SD44	AS12-SD-SD44-00	ASP2	--	51	640	360	12710	53.8 J
AS12-SD45	AS12-SD-SD45-00	ASP2	1.0 UJ	27	190	100	3117	45.0
AS12-SD46	AS12-SD-SD46-00	ASP2	--	46	260	140	3287	55.0
AS12-SD49	AS12-SD-SD49-00	ASP2	1.0 J	59	220	74	2632	280
AS12-SD50	AS12-SD-SD50-00	ASP2	1.0 J	75	520	200	4845	86.0
AS12-SD100	AS12-SD-SD100-00	ASP2	2.3	900 U	13000	11000	172200	7810 J
	AS12-SD-SD100-01		--	930 U	18000	14000	231800	6970 J
AS12-SD101	AS12-SD-SD101-00	ASP2	0.98 U	110	370	260	7660	736 J
AS12-SD102	AS12-SD-SD102-00	ASP2	3.1	490 U	5200	4100	85500	1110 J

TABLE 4-2

CONCENTRATIONS OF ACENAPHTHYLENE, ANTHRACENE, FLUORENE, HMW PAHs, AND LEAD AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station Location	Sample Number	Round	TOC (%)	ACENAPHTHYLENE (ug/kg)(1)	ANTHRACENE (ug/kg)(1)	FLUORENE (ug/kg)(1)	HMW PAHs (ug/kg)(1)	LEAD (mg/kg)(2)
AS12-SD103	AS12-SD-SD103-00	ASP2	--	12	42 J	39 J	2171	202 J
	AS12-SD-DUP03041608		--	77 U	1300 J	700 J	16110	140 J
	AS12-SD-SD103-01		2.7	44 U	670	570	9300	114 J
AS12-SD104	AS12-SD-SD104-00	ASP2	1.3	190 U	2100	1600	41220	874 J
AS12-SD105	AS12-SD-SD105-00	ASP2	1.8	170 U	1900	1500	34340	608 J
AS12-SD106	AS12-SD-SD106-00	ASP2	1.5	44 U	390	330	10920	288 J
AS12-SD107	AS12-SD-SD107-00	ASP2	--	---	---	---	---	417
AS12-SD108	AS12-SD-SD108-00	ASP2	--	---	---	---	---	647
AS12-SD109	AS12-SD-SD109-00	ASP2	--	---	---	---	---	598
MS-12, LOC. 1	OU4-SD-M12-199A	01	2.29	220 J	2900	1400	39579	190 J
	OU4-SD-M12-100B	02	1.4	120	1200	680 J	13329	118
	OU4-SD-M12-100A	03	1.38	300 J	2200	2400	46931	330 J
	OU4-SD-M12-101B	04	1.33	170 U	2400 J	1200 J	22195	379
	OU4-SD-M12-101A	05	1.92	160	4000	1400	38253	240
	OU4-SD-M12-102A	06	0.82	510 J	9300 J	4000 J	106039	307
	OU4-SD-M12-103A	07	1.84	300	7400	4100	87938	410
MS-12, LOC. 2	OU4-SD-M12-299A	01	1.4	69 J	360	150	5353	53.3 J
	OU4-SD-M12-200B	02	1.14	98	1100	670 J	13073	56.5
	OU4-FD-005-000B		1.14	88 J	1000 J	630 J	11431	54.4
	OU4-SD-M12-200A	03	1.17	190 J	1000	1100	26371	142 J
	OU4-FD-006-000A		1.22	240 J	1100	1100	25839	204 J
	OU4-SD-M12-201B	04	2.03	170	2300 J	1500 J	23074	103
	OU4-FD-006-001B		2.3	120	2700 J	1800 J	22827	94.0
	OU4-SD-M12-201A	05	1.08	120 J	1800 J	840 J	19866	306
	OU4-FD-006-001A		1.12	240 J	2600	1400 J	27779	203 J
	OU4-SD-M12-202A	06	0.92	80 J	1600 J	590 J	15578	152
	OU4-FD-006-002A		0.92	58	860 J	390	9999	100
	OU4-SD-M12-203A	07	1.09	140	2200	1100	25428	147
	OU4-FD-006-003A		1.56	140	1900	990	21452	122

TABLE 4-2

CONCENTRATIONS OF ACENAPHTHYLENE, ANTHRACENE, FLUORENE, HMW PAHs, AND LEAD AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station Location	Sample Number	Round	TOC (%)	ACENAPHTHYLENE (ug/kg)(1)	ANTHRACENE (ug/kg)(1)	FLUORENE (ug/kg)(1)	HMW PAHs (ug/kg)(1)	LEAD (mg/kg)(2)
MS-12, LOC. 3	OU4-SD-M12-399A	01	1.84	79 J	480	150	6475	87.7 J
	OU4-FD-002-099A		1.73	68 J	320	130	5795	83.1 J
	OU4-SD-M12-300B	02	1.8	64 J	260 J	70 J	3916	124
	OU4-FD-006-000B		1.68	96	580	120	6589	107
	OU4-SD-M12-300A	03	1.42	85	200	120	3372	201 J
	OU4-SD-M12-301B	04	1.57	100 J	500 J	250 J	5605	126
	OU4-SD-M12-301A	05	2.02	83	760 J	420	8985	175
	OU4-SD-M12-302A	06	1.01	63 J	370 J	83 J	6497	148
	OU4-SD-M12-303A	07	1.45	77	1000	**610**	**13206**	**555**

1 -Shaded concentrations exceed Interim Remediation Goals:
Acenaphthylene - 210 ug/kg
Anthracene - 1,236 ug/kg
Fluorene - 500 ug/kg
HMW PAHs - 13,057 ug/kg

2 - Shaded concentrations exceed the Effects-Range Median of 218 mg/kg.

J - Estimated concentration.
UJ - The detection limit is estimated.
--- = Not analyzed or not applicable
ASP1 - Additional Scrutiny Phase 1.
ASP2 - Additional Scrutiny Phase 2.
01 to 07 - Round from the Interim Offshore Monitoring Program

TABLE 4-3

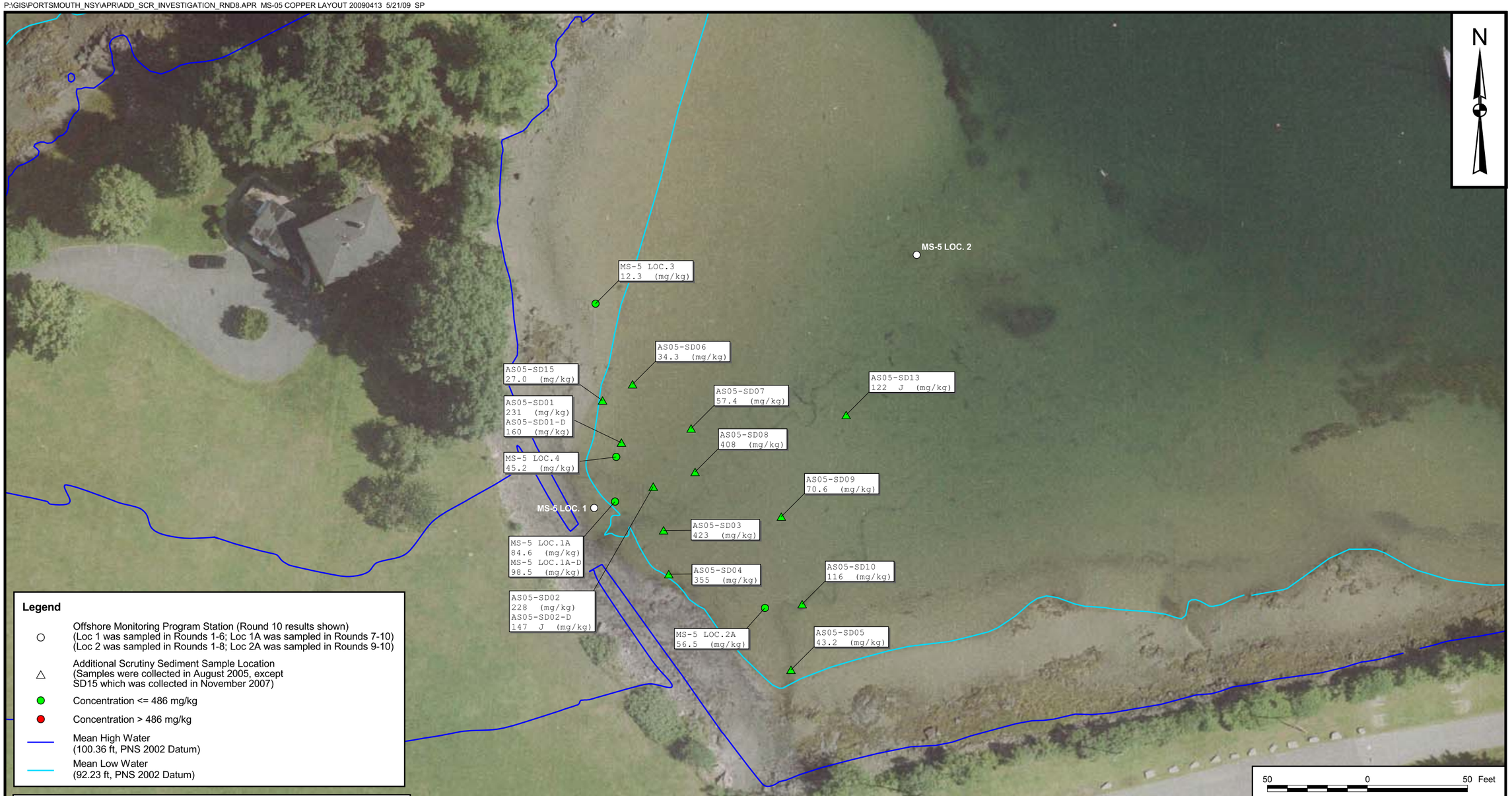
AVERAGE CONCENTRATIONS OF PAHs AND LEAD IN SEDIMENT WITHIN THE EELGRASS BED AT MS-12
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Station Location	Sample Number	Round	ACENAPHTHYLENE (ug/kg)(1)	ANTHRACENE (ug/kg)(1)	FLUORENE (ug/kg)(1)	HMW PAHs (ug/kg)(1)	LEAD (mg/kg)(2)
AS12-SD03	AS12-SD-SD03	ASP1	---	---	---	---	50.8 J
AS12-SD05	AS12-SD-SD05	ASP1	---	---	---	---	63.1 J
AS12-SD21	AS12-SD-SD21-00	ASP2	24	280	160	3485	57.7 J
AS12-SD22	AS12-SD-SD22-00	ASP2	84 J	270 J	150 J	4698	70.4 J
	OU4-FD-003-007A		76 J	170 J	66 J	3002	74.9 J
AS12-SD23	AS12-SD-SD23-00	ASP2	100 J	420 J	220 J	7440	100 J
AS12-SD26	AS12-SD-SD26-00	ASP2	14 J	170 J	98 J	2114	104 J
AS12-SD43	AS12-SD-SD43-00	ASP2	35	250	160	3808	58
AS12-SD44	AS12-SD-SD44-00	ASP2	51	640	360	12710	53.8 J
AS12-SD45	AS12-SD-SD45-00	ASP2	27	190	100	3117	45
AS12-SD46	AS12-SD-SD46-00	ASP2	46	260	140	3287	55
MS-12, LOC. 2	Max result	1 - 7	**242 J**	**2733 J**	**1769**	**27779**	**306**
Average for stations within the eelgrass bed:			70	538	322	7144	87

1 - The concentration is shaded when it exceeds its respective Interim Remediation Goal:
Acenaphthylene - 210 ug/kg
Anthracene - 1,236 ug/kg
Fluorene - 500 ug/kg
HMW PAHs - 13,057 ug/kg

2 - The concentration is shaded when it exceeds its Effects-Range Median:
Lead - 218 mg/kg
J - Estimated during laboratory analysis.
--- = Not analyzed or not applicable
ASP1 - Additional Scrutiny Phase 1.
ASP2 - Additional Scrutiny Phase 2.
1-7 - Rounds 1 through 7 of the Interim Offshore Monitoring Program

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-05 COPPER LAYOUT 20090413 5/21/09 SP

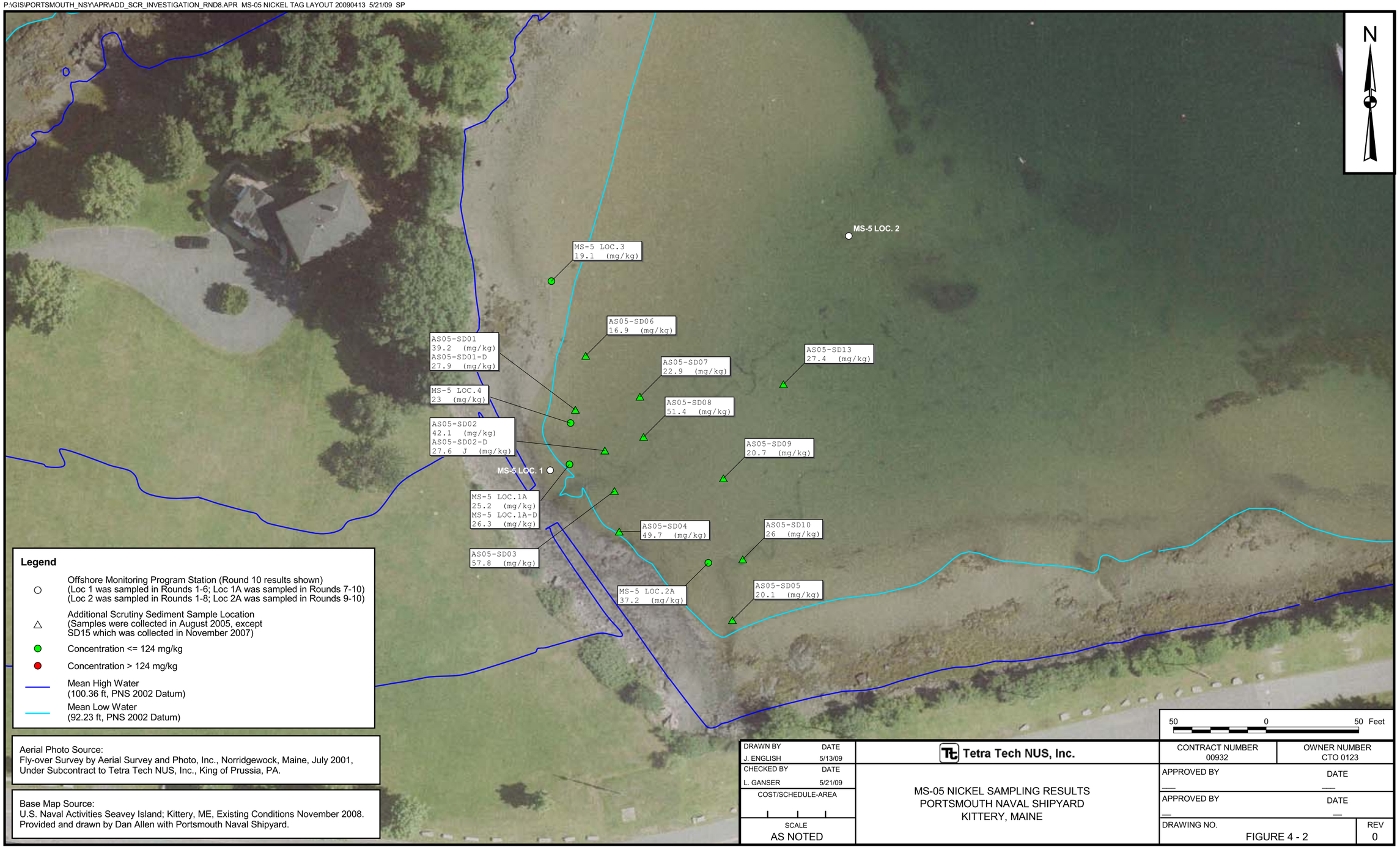


Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions November 2008.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

DRAWN BY J. ENGLISH	DATE 4/13/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 00932 / OWNER NUMBER CTO 0123
CHECKED BY L. GANSER	DATE 5/21/09	MS-05 COPPER SAMPLING RESULTS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ DATE ___
COST/SCHEDULE-AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 1 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-05 NICKEL TAG LAYOUT 20090413 5/21/09 SP

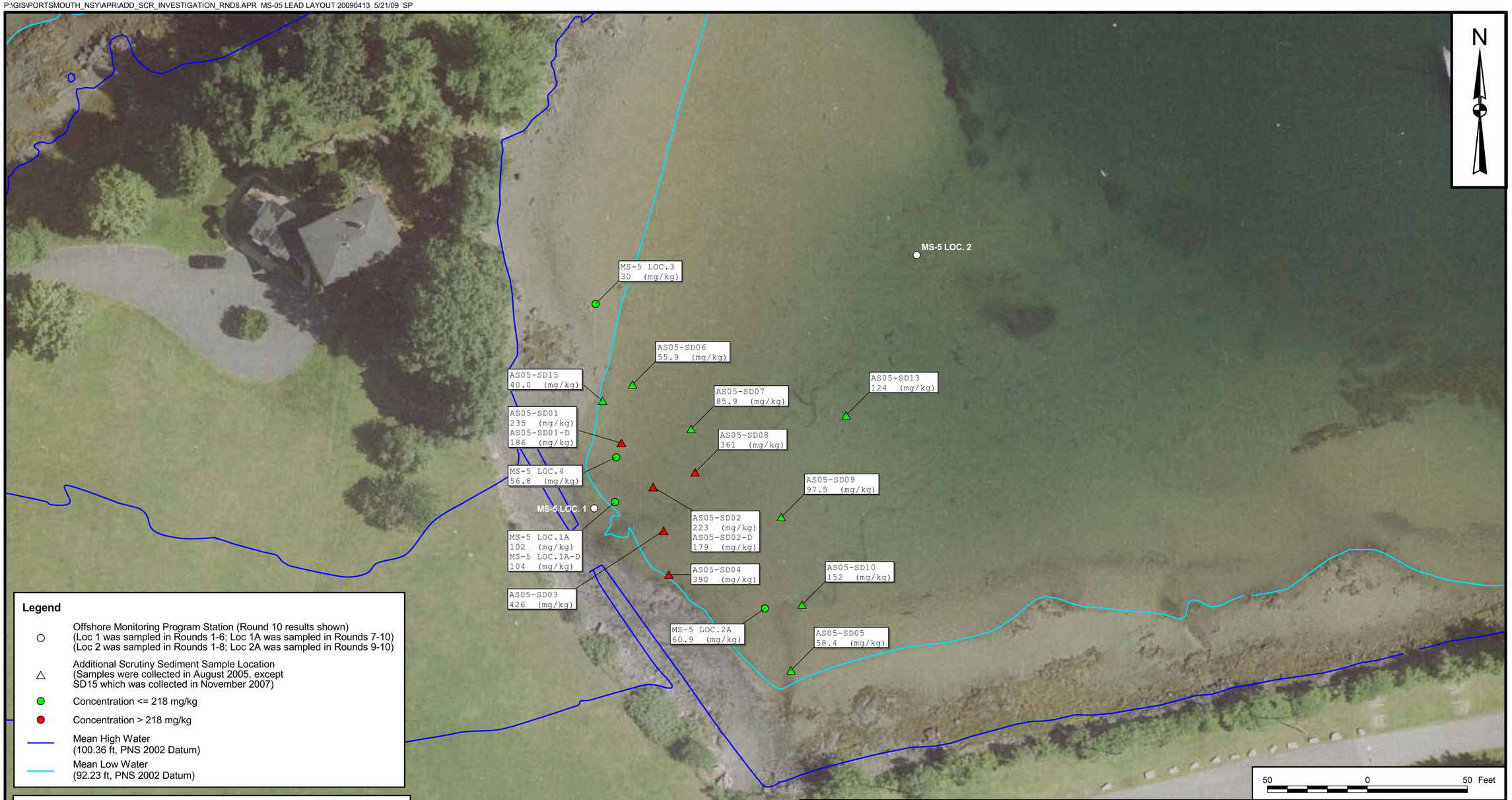


Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions November 2008.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

DRAWN BY J. ENGLISH	DATE 5/13/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 00932 / OWNER NUMBER CTO 0123
CHECKED BY L. GANSER	DATE 5/21/09	MS-05 NICKEL SAMPLING RESULTS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ DATE ___
COST/SCHEDULE-AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 2 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-05 LEAD LAYOUT 20090413 5/21/09 SP



Legend

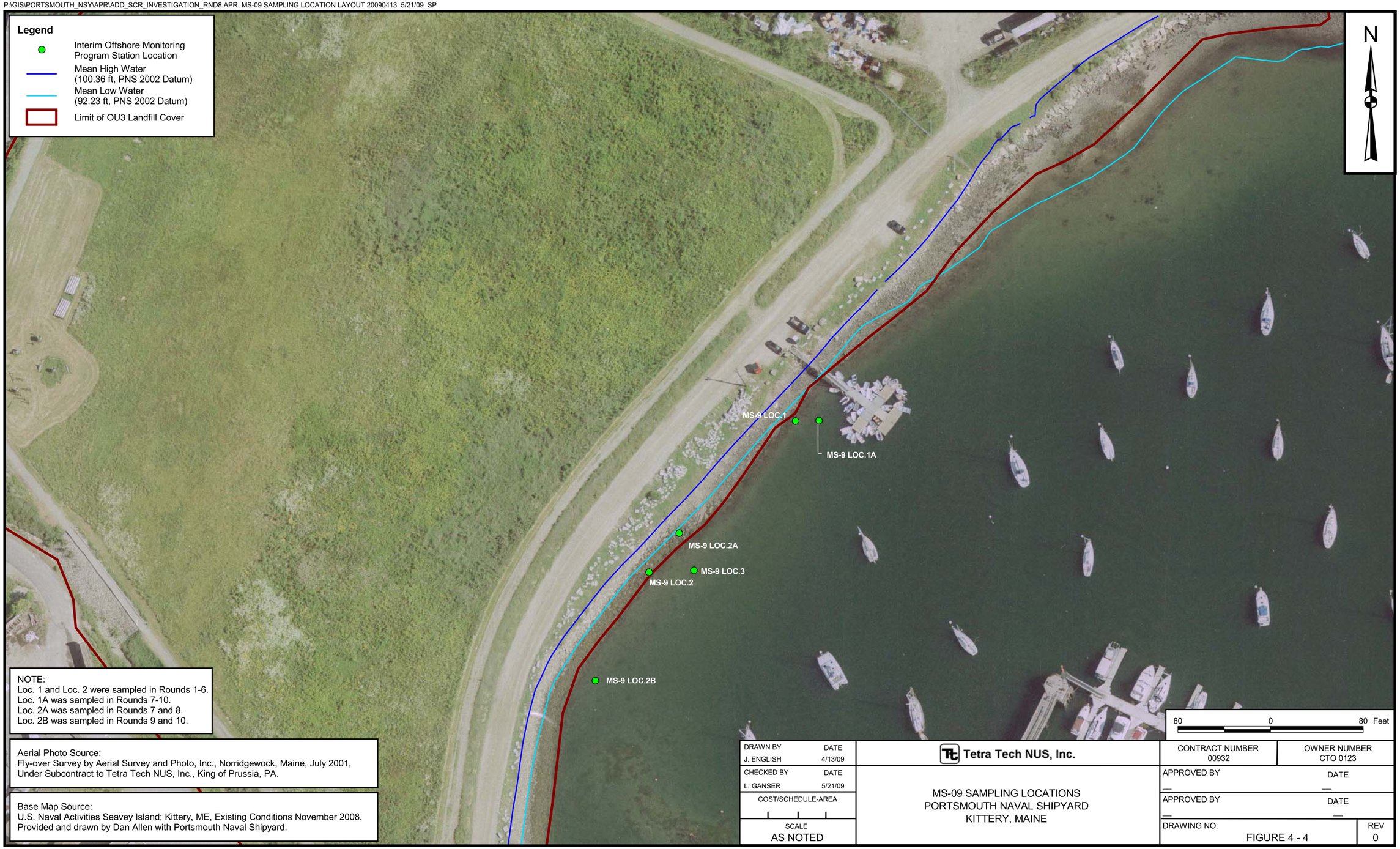
- ○ Offshore Monitoring Program Station (Round 10 results shown) (Loc 1 was sampled in Rounds 1-6; Loc 1A was sampled in Rounds 7-10) (Loc 2 was sampled in Rounds 1-8; Loc 2A was sampled in Rounds 9-10)
- △ Additional Scrutiny Sediment Sample Location (Samples were collected in August 2005, except SD15 which was collected in November 2007)
- ● Concentration <= 218 mg/kg
- ● Concentration > 218 mg/kg
- Mean High Water (100.36 ft, PNS 2002 Datum)
- Mean Low Water (92.23 ft, PNS 2002 Datum)

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001, Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions November 2008. Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

DRAWN BY J. ENGLISH	DATE 4/13/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 00932 / OWNER NUMBER CTO 0123
CHECKED BY L. GANSER	DATE 5/21/09	MS-05 LEAD SAMPLING RESULTS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ DATE ___
COST/SCHEDULE-AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 3 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 SAMPLING LOCATION LAYOUT 20090413 5/21/09 SP



NOTE:
Loc. 1 and Loc. 2 were sampled in Rounds 1-6.
Loc. 1A was sampled in Rounds 7-10.
Loc. 2A was sampled in Rounds 7 and 8.
Loc. 2B was sampled in Rounds 9 and 10.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001, Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions November 2008. Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

DRAWN BY J. ENGLISH	DATE 4/13/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 00932	OWNER NUMBER CTO 0123
CHECKED BY L. GANSER	DATE 5/21/09	MS-09 SAMPLING LOCATIONS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 4	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-12 SEDIMENT SAMPLE LAYOUT 5/20/09 SS

DRAWN BY J. ENGLISH DATE 7/31/08	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932	OWNER NUMBER CTO 123
CHECKED BY L. GANSER DATE 5/20/09	MS-12 SEDIMENT SAMPLE LOCATIONS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 4 - 5	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-12 UNSUCCESSFUL SD CORE AND GRAB LAYOUT 8/21/08 SP

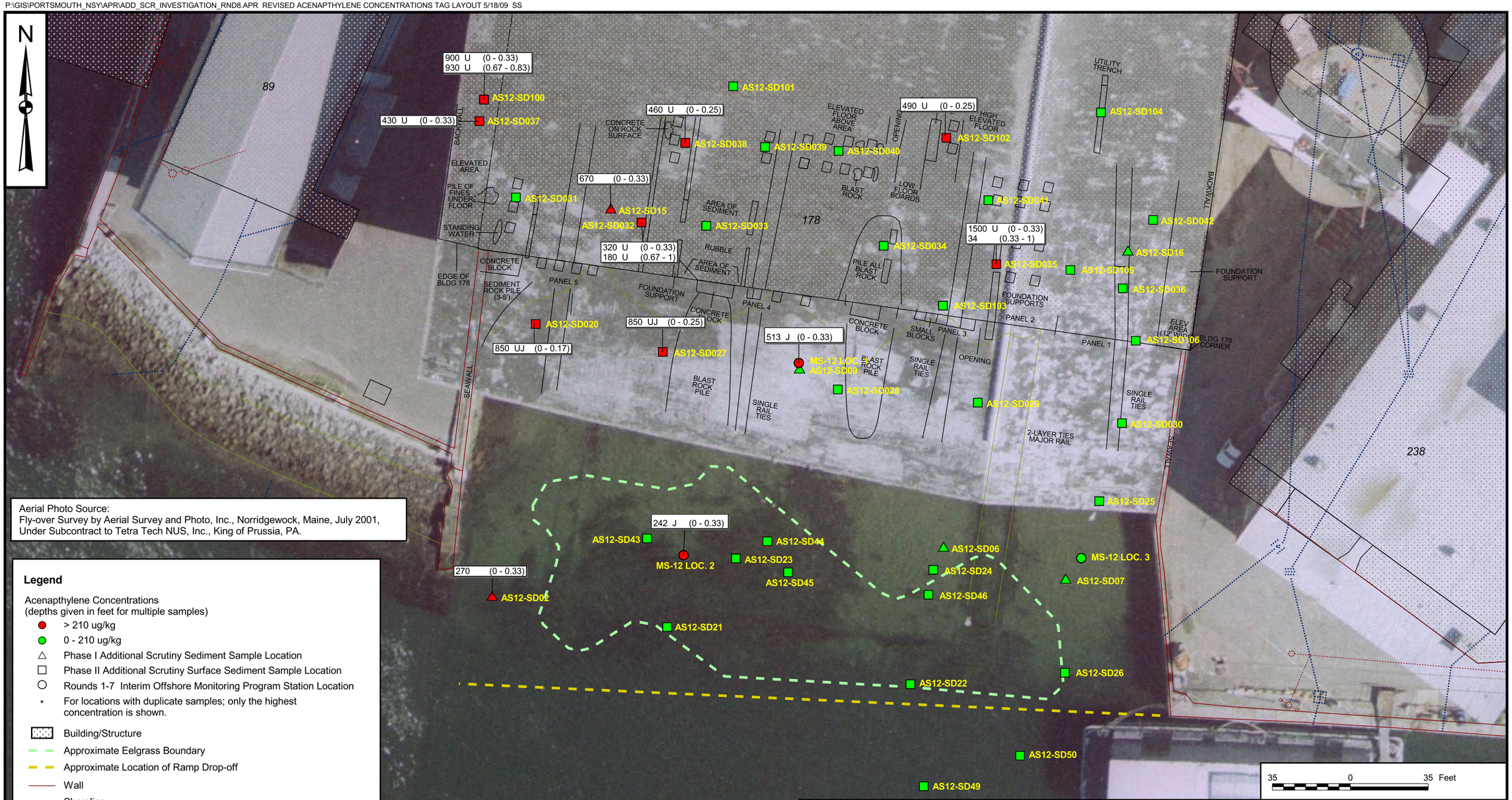
Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001, Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Legend

- Unsuccessful Core Attempt
- Unsuccessful Grab Attempt (approximate mid-point of grabs for this location)
- Building/Structure
- Approximate Eelgrass Boundary
- Approximate Location of Ramp Drop-off
- Wall
- Shoreline
- Road
- Railroad
- Storm Sewer Inlet
- Utility Drain
- Sewer Utility

DRAWN BY J. ENGLISH	DATE 7/31/08	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932 / OWNER NUMBER CTO 123
CHECKED BY A. BERNHARDT	DATE 8/21/08	LOCATIONS OF UNSUCCESSFUL SEDIMENT GRAB AND CORE ATTEMPTS DURING THE PHASE II ADDITIONAL SCRUTINY INVESTIGATION AT MS-12 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 6 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR REVISED ACENAPTHYLENE CONCENTRATIONS TAG LAYOUT 5/18/09 SS



Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

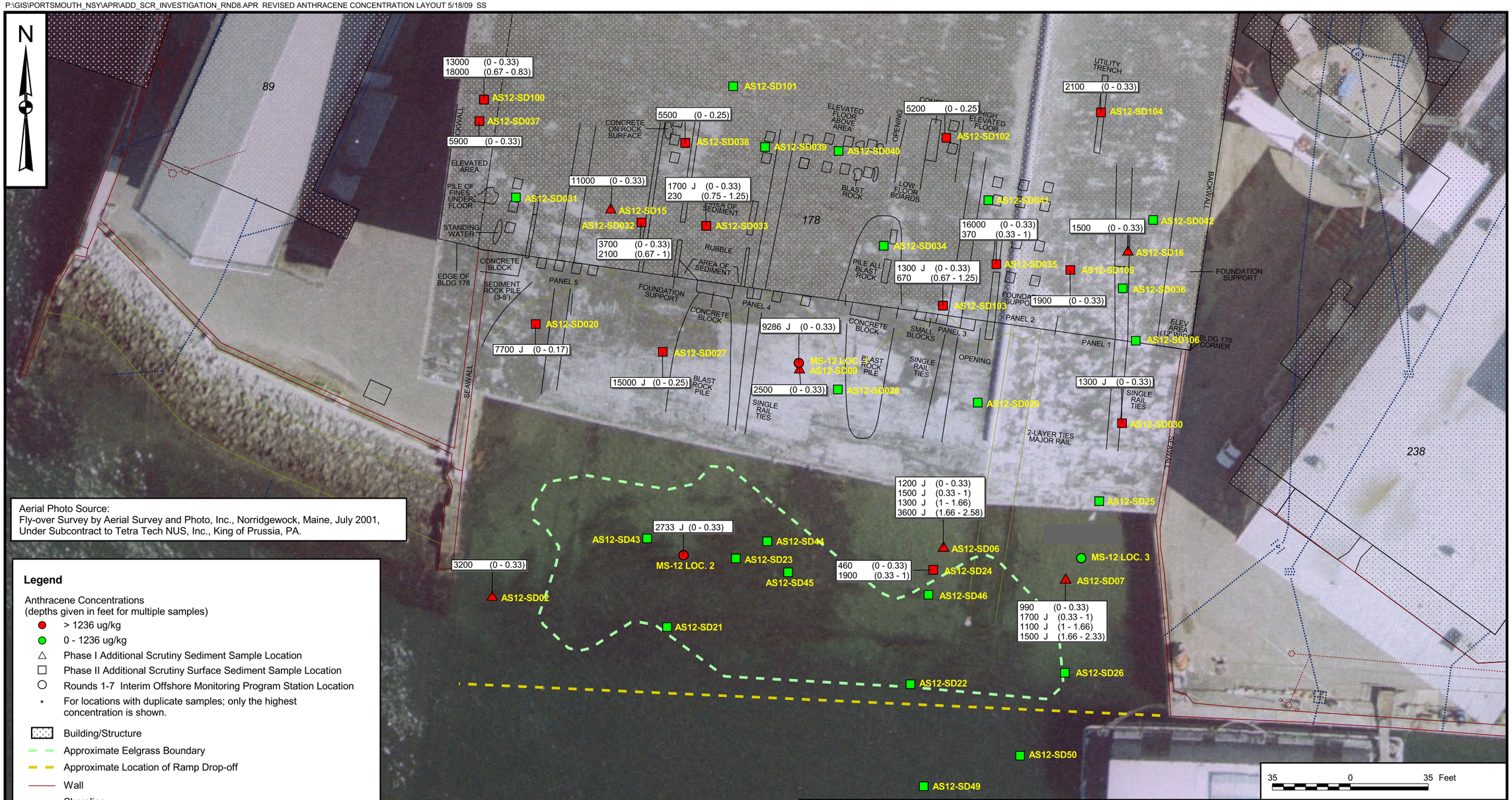
Legend

Acenapthylene Concentrations
(depths given in feet for multiple samples)

- > 210 ug/kg
- 0 - 210 ug/kg
- Phase I Additional Scrutiny Sediment Sample Location
- Phase II Additional Scrutiny Surface Sediment Sample Location
- Rounds 1-7 Interim Offshore Monitoring Program Station Location
- * For locations with duplicate samples; only the highest concentration is shown.
- Building/Structure
- Approximate Eelgrass Boundary
- Approximate Location of Ramp Drop-off
- Wall
- Shoreline
- Road
- Railroad
- Storm Sewer Inlet
- Utility Drain
- Sewer Utility

DRAWN BY S. STROZ	DATE 1/15/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932	OWNER NUMBER CTO 123
CHECKED BY L. GANSER	DATE 5/18/09	ACENAPTHYLENE CONCENTRATIONS IN MS-12, AS PHASE I & AS PHASE 2 OU4 ADDITIONAL SCRUTINY FS REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 7	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR REVISED ANTHRACENE CONCENTRATION LAYOUT 5/18/09 SS



Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

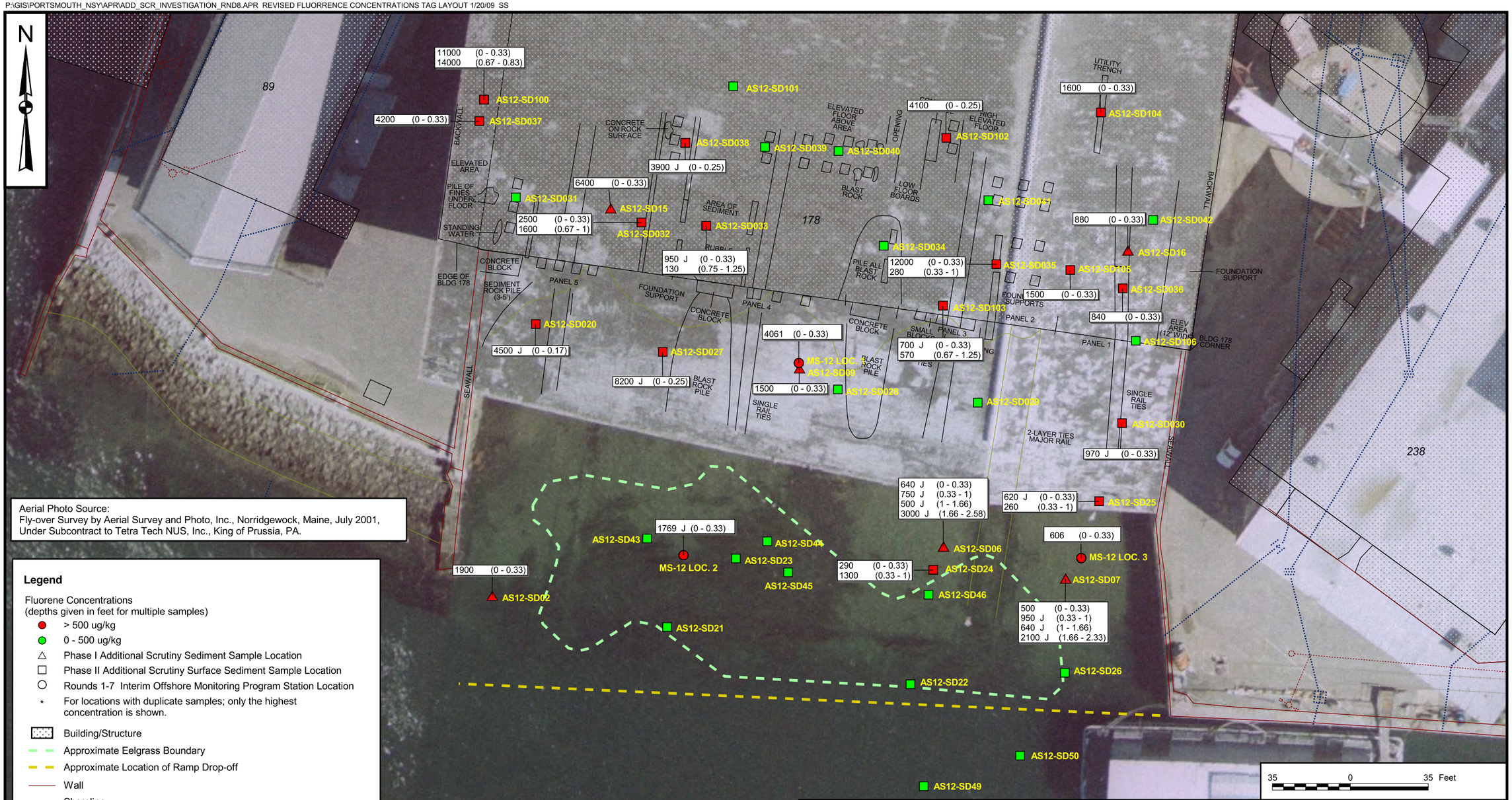
Legend

Anthracene Concentrations
(depths given in feet for multiple samples)

- > 1236 ug/kg
- 0 - 1236 ug/kg
- Phase I Additional Scrutiny Sediment Sample Location
- Phase II Additional Scrutiny Surface Sediment Sample Location
- Rounds 1-7 Interim Offshore Monitoring Program Station Location
- * For locations with duplicate samples; only the highest concentration is shown.
- Building/Structure
- Approximate Eelgrass Boundary
- Approximate Location of Ramp Drop-off
- Wall
- Shoreline
- Road
- Railroad
- Storm Sewer Inlet
- Utility Drain
- Sewer Utility

DRAWN BY S. STROZ	DATE 1/15/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932 / OWNER NUMBER CTO 123
CHECKED BY L. GANSER	DATE 5/18/09	ANTHRACENE CONCENTRATIONS IN MS-12, AS PHASE I & AS PHASE 2 OU4 ADDITIONAL SCRUTINY FS REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 8 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR REVISED FLUORRENCE CONCENTRATIONS TAG LAYOUT 1/20/09 SS



Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

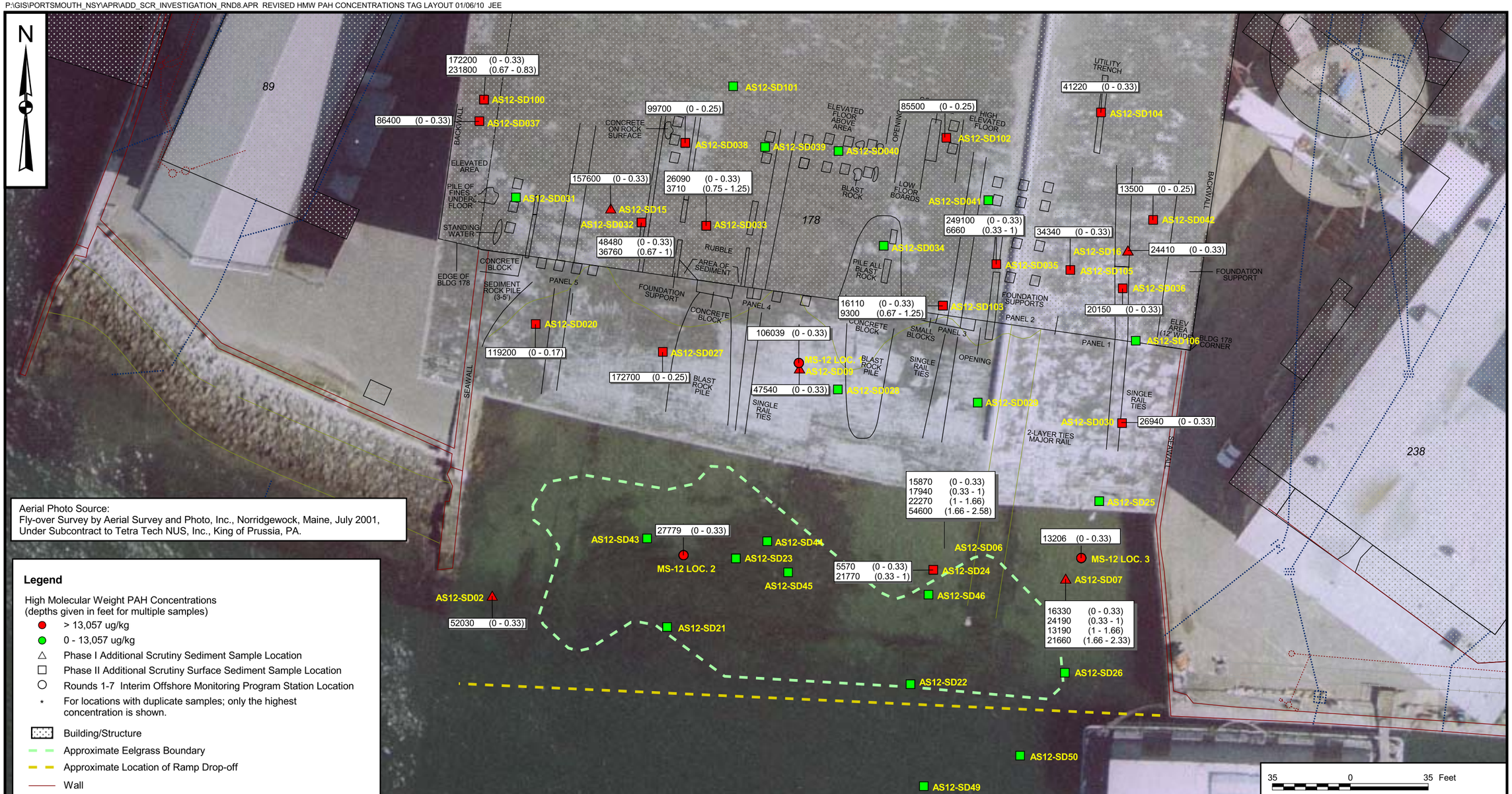
Legend

Fluorene Concentrations
(depths given in feet for multiple samples)

- > 500 ug/kg
- 0 - 500 ug/kg
- Phase I Additional Scrutiny Sediment Sample Location
- Phase II Additional Scrutiny Surface Sediment Sample Location
- Rounds 1-7 Interim Offshore Monitoring Program Station Location
- * For locations with duplicate samples; only the highest concentration is shown.
- Building/Structure
- Approximate Eelgrass Boundary
- Approximate Location of Ramp Drop-off
- Wall
- Shoreline
- Road
- Railroad
- Storm Sewer Inlet
- Utility Drain
- Sewer Utility

DRAWN BY S. STROZ	DATE 1/15/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932	OWNER NUMBER CTO 123
CHECKED BY L. GANSER	DATE 5/18/09	FLUORENE CONCENTRATIONS IN MS-12, AS PHASE I & AS PHASE 2 OU4 ADDITIONAL SCRUTINY FS REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 9	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR REVISED HMW PAH CONCENTRATIONS TAG LAYOUT 01/06/10 JEE



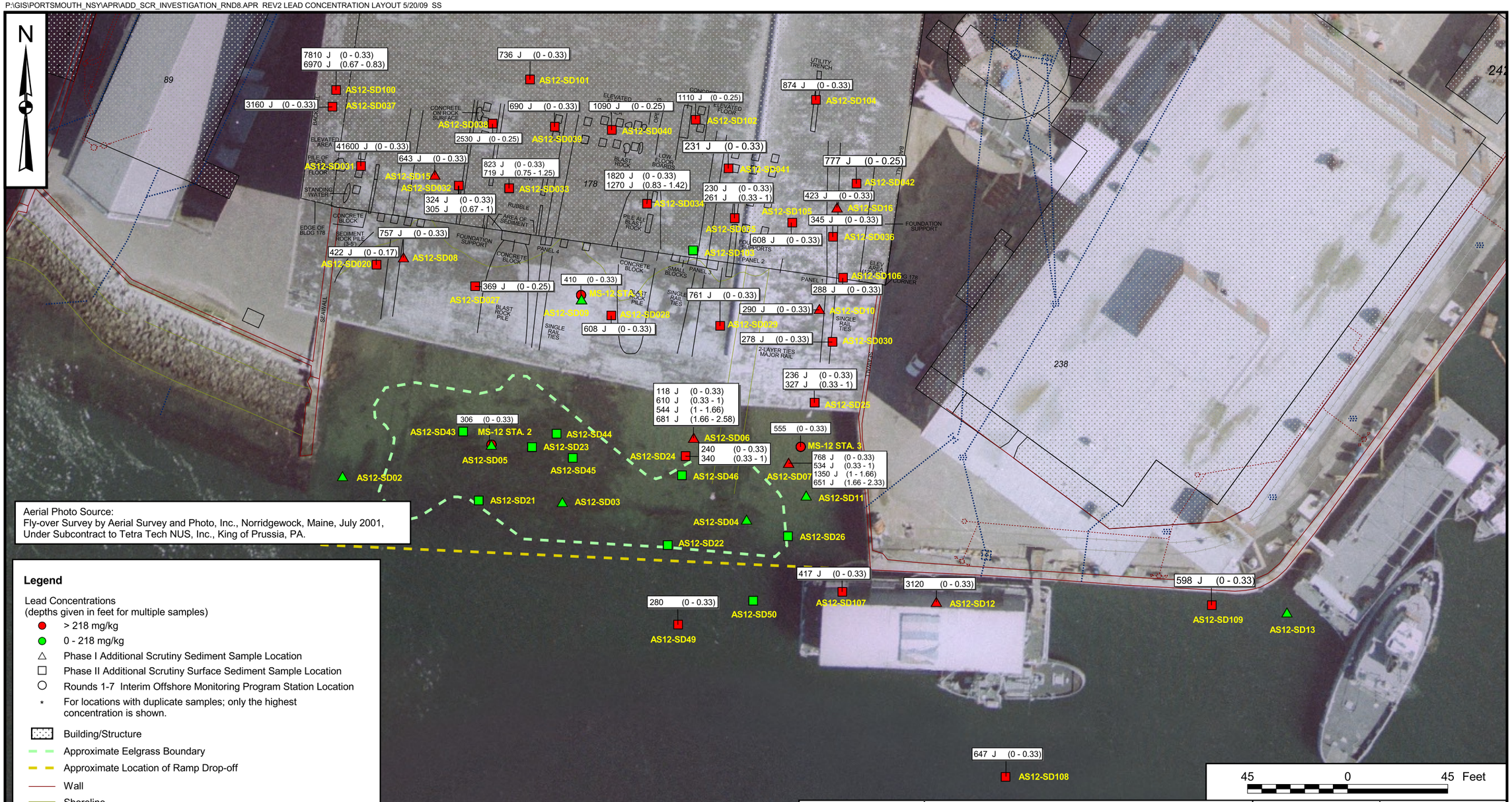
DRAWN BY	DATE
S. STROZ	01/15/09
CHECKED BY	DATE
M. GRAY	01/06/10
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

Tetra Tech NUS, Inc.

HIGH MOLECULAR WEIGHT PAH CONCENTRATIONS
IN MS-12, AS PHASE I & AS PHASE 2
OU4 ADDITIONAL SCRUTINY FS REPORT
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

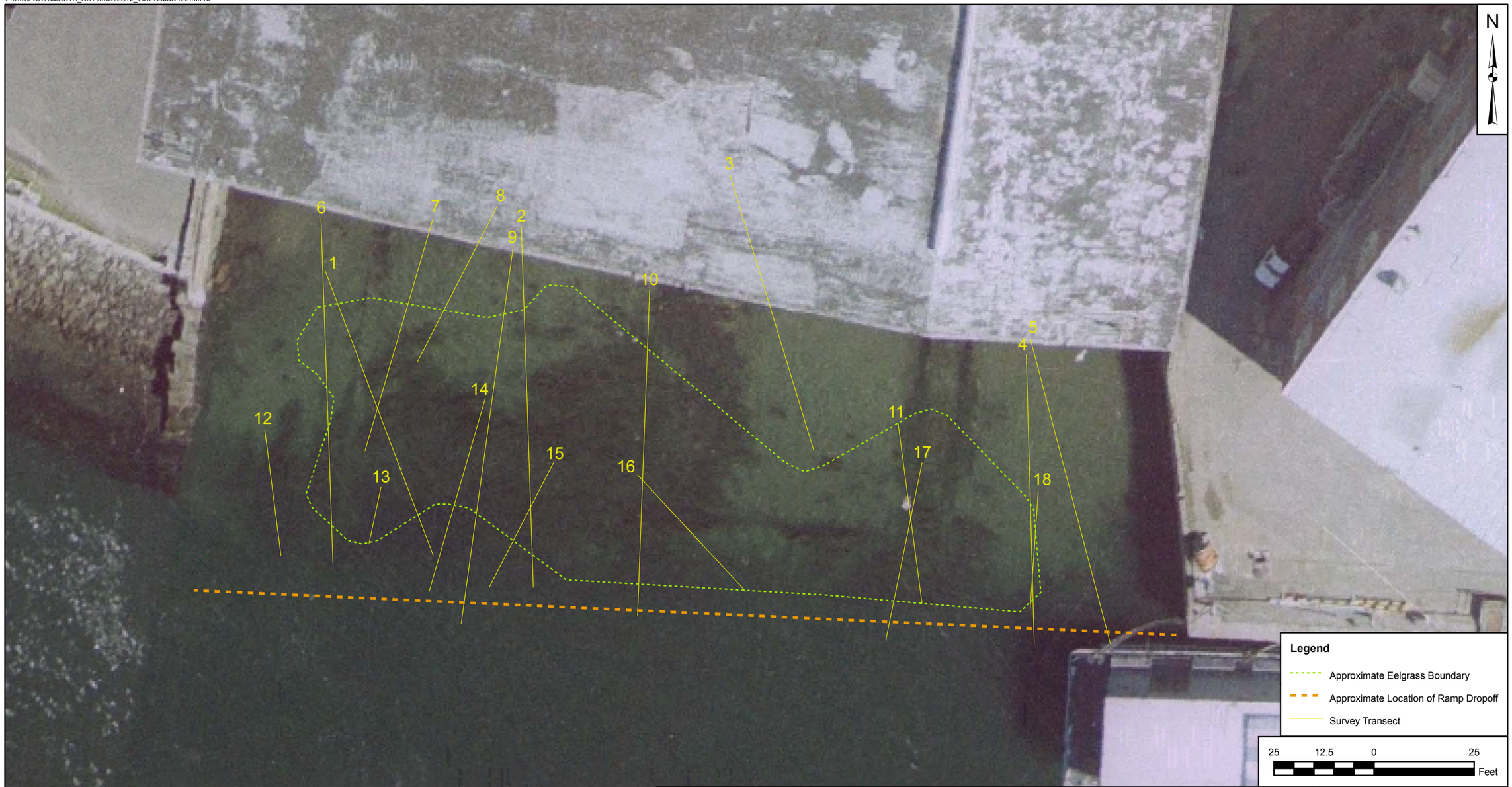
CONTRACT NUMBER	OWNER NUMBER
0932	CTO 123
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
DRAWING NO.	REV
FIGURE 4 - 10	0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR REV2 LEAD CONCENTRATION LAYOUT 5/20/09 SS



DRAWN BY S. STROZ DATE 5/20/09	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932	OWNER NUMBER CTO 123
CHECKED BY L. GANSER DATE 5/20/09	LEAD CONCENTRATIONS IN MS-12, AS PHASE I & AS PHASE 2 OU4 ADDITIONAL SCRUTINY FS REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 4 - 11	REV 0

P:\GIS\PORTSMOUTH_NSY\MXD\MS12_VIDEO.MXD 5/21/09 SP



DRAWN BY K. MOORE	DATE 6/6/08	Tetra Tech NUS, Inc.	CONTRACT NUMBER CTO 123
CHECKED BY L. GANSER	DATE 5/21/09	EELGRASS SURVEY LOCATIONS AT MS-12 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ DATE ___
COST/SCHED AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 4 - 12 / REV 0

5.0 EVALUATION OF OTHER ACTIVITIES

This section of the report presents an evaluation of other activities conducted as part of or that could affect the Interim Offshore Monitoring Program. These include collection of mussel samples, analysis of samples for dioxins/furans, and analytical methods for analysis of metals in sediment.

5.1 MUSSEL SAMPLING

As described in the Interim Offshore Monitoring Plan (TtNUS, October 1999), mussel samples were collected to evaluate contaminant concentrations in mussels as a secondary measure of exposure. The mussels were collected to determine the uptake and concentrations trends of chemicals in these filter feeders. Sediment contaminant monitoring is the primary measure in determining whether the interim RAOs for sediment exposure to the assessment communities are being met.

Mussels were collected to develop a site-specific BSAF/BAF, to have data available to evaluate risks to humans, and to monitor locations where sediment is not present. BSAFs and BAFs are transfer coefficients that relate chemical concentrations in biota to chemical concentrations in sediment (USEPA, September 1997). Typically, the transfer coefficients for organic chemicals are termed BSAFs, and the transfer coefficients for metals are termed BAFs. BSAFs and BAFs are ratios of chemical concentrations in tissue divided by chemical concentrations in co-located sediment. A detailed discussion of the calculation of BSAFs and BAFs is presented in the Rounds 1 through 7 Interim Monitoring Report (TtNUS, November 2004).

One to three mussel samples were collected at each monitoring station during Rounds 1 through 7. Sediment concentrations at two locations at MS-11 where sediment was absent were estimated using mussel data from those locations and calculated BSAFs/BAFs. In the Round 1 through 7 Report, the Navy recommended not collecting mussels during Rounds 8 and 9 for calculation of BAFs because the overall factors were not expected to change significantly. However, there was a recommendation in the report to collect mussel samples as part of the next 5-year sampling event (Round 10) to determine whether the BSAFs/BAFs calculated during that round are similar to those calculated for the first seven rounds. It has since been determined that sediment monitoring at MS-11 is no longer needed, in part because of erosion controls implemented in 2005 and 2006 along the shoreline at OU2 and because there is very little sediment present at this location. Therefore, there is no need to recalculate BAFs. This rationale was presented in the Technical Memorandum Recommendation for Modifications to the Interim Offshore Monitoring Program for OU4 (TtNUS, September 2008a), so mussel samples were not collected during the Round 10 monitoring event.

According to the Maine Department of Marine Resources (DMR) regulations, effective February 2004 and as updated in August 2008, because of pollution, it is unlawful to collect clams, quahogs, oysters, and mussels from the shores, flats, or waters of Kittery, Eliot, and South Berwick northwest of a line across the Piscataqua River at the Memorial Bridge and south of a line across the mouth of Spinney Creek at the Route 103 Causeway, which includes the PNS area. In addition, a special permit is required for a restricted area north of the line across the mouth of Spinney Creek at the Causeway (Maine DMR, August 2008).

The New Hampshire Department of Environmental Services (NHDES) is responsible for the classification of shellfish growing waters to determine whether water quality is acceptable for shellfish harvesting. The NHDES uses the National Shellfish Sanitation Program to establish criteria and methodology to classify the shellfish growing waters. The river waters around PNS are currently closed for shellfish harvesting. These closures are described in more detail in the NHDES Shellfish Program: 2005 Annual Report (NHDES, June 2006). As discussed in this report, the closures are caused by fecal coliform bacterial loading from wastewater treatment plants.

Because the area surrounding the shipyard is closed for shellfishing for human consumption, it is not necessary to evaluate risks to humans consuming mussels at this time. The seven rounds of mussel samples that were collected could be evaluated in the future should the ban on the human consumption of mussels be lifted.

5.2 DIOXIN/FURAN RISK EVALUATION

As presented in the Interim ROD for OU4, even though dioxins/furans were not identified as COCs, the Navy agreed to sample for dioxins in the vicinity of Clark Cove, the DRMO Storage Yard, Sullivan Point, Dry Docks 1 and 2, and at reference stations. The selected stations for dioxin analysis were MS-07, MS-08, MS-09 (near Site 8, where ash from Site 29 was reportedly disposed), MS-10, MS-11, and MS-12 (locations downgradient, near, and upgradient, respectively, of Site 29, where an incinerator was located). Samples from monitoring stations MS-08 and MS-09 were analyzed for dioxins during Rounds 8 through 10.

Data from previously collected sediment and mussel samples (during Rounds 1 through 7) at MS-07 through MS-12 were evaluated in the Rounds 1 through 7 Interim Monitoring Report (TtNUS, November 2004). The conclusions from that report were that risks from dioxins/furans to humans and ecological receptors are low and do not support the continued analysis of dioxins/furans in future sampling rounds. However, because there was an increase in dioxin/furan concentrations during Round 7, it was recommended that dioxin/furan analysis be continued at MS-08 and MS-09 as well as the reference

stations for Rounds 8 and 9 and that dioxin/furan analysis be continued at MS-07 through MS-12 and all reference stations for Round 10.

5.2.1 Objective

The primary objective of this section of the report is to evaluate risks to human and ecological receptors (humans, birds, and fish) from dioxin/furans in sediment to determine whether these risks warrant retention of these analytes in the Interim Offshore Monitoring Program. The focus of the section is on sediment data collected from MS-08 and MS-09 because these were the only monitoring stations where sediment samples were analyzed for dioxins since Round 7 (previously collected sediment and mussel samples were evaluated in the Rounds 1 through 7 Report as discussed above).

5.2.2 Background

This dioxin/furan risk evaluation follows the methodology presented in the Round 1 through 7 Interim Monitoring Report (TtNUS, November 2004). Dioxin/furan concentrations detected in sediment were converted to TEQ values of 2,3,7,8-TCDD (as described in Section 3.0) because the toxicities of the individual dioxin/furan compounds are different. The 2,3,7,8-TCDD TEQ values were calculated using TEFs presented in Van den Berg et al. (1998) for birds and fish. Updated TEFs presented in Van den Berg et al. (2006) were used to calculate the TEQ values for mammals (including humans). The TEFs relate the toxicity of each dioxin/furan congener to that of 2,3,7,8-TCDD and are used to convert each dioxin/furan congener concentration to a TEQ value of 2,3,7,8-TCDD. TEQ values for the individual congeners were summed to represent the total TEQ value for each sample. TEQ values also were calculated for the dioxin/furan-like PCBs using TEFs from the documents referenced above. Dioxin/furan-like PCBs are PCBs that exhibit dioxin/furan toxicity characteristics.

Example calculations are presented in the Round 1 through 7 Report Interim Monitoring Report (TtNUS, November 2004), but some of the mammal TEFs have been updated since that report was prepared. The 2,3,7,8-TCDD TEQ values were calculated in two ways: (1) using positive detections only and (2) using positive detections and one-half the sample quantitation limit (SQL) for non-detected results. Both sets of calculations are presented in the Round 1 through 7 Report. The results presented in Tables 5-1 through 5-3 are those results calculated using the detected concentrations only. Results in Tables 5-4 through 5-6 are those calculated using the detected concentrations and one-half of the detection limits for non-detects. The tables also have total TEQ values, which are the sums of the dioxin/furan and PCB TEQ values.

5.2.3 Establishment of Risk-Based Screening Levels

Human health and ecological risk-based screening levels for exposure to sediment (risk to humans, birds, and fish) were developed or obtained from literature values. The following sections summarize the methods used to develop the risk levels and present the risk screening levels used in the risk evaluation.

5.2.3.1 Human Health Screening Levels

Recreational screening levels for dioxins/furans expressed as 2,3,7,8-TCDD TEQ values were developed for humans as part of the Technical Memorandum for the Development of Facility-Specific Human Health Risk Screening Levels for Intertidal Surface Water and Sediment at Portsmouth Naval Shipyard, Kittery, Maine (TtNUS, December 2002). These screening levels were based on the assumption that while people are recreating they may be exposed to sediment in the intertidal zone. Human health screening levels were not developed for sediment in the subtidal zone because human exposure to subtidal sediment is minimal.

The cancer slope factor originally used to develop the human health screening level was presented in the USEPA Region 9 PRGs Table (October 2002). Since the development of the site-specific human health screening levels presented in the Technical Memorandum (TtNUS, December 2002), USEPA Region 1 indicated that toxicity data from the USEPA Regional Screening Levels (RSLs) Table (September 2008) should be used instead of the Region 9 PRGs. Therefore, the evaluation of dioxins/furans presented in this section reflects the updated screening level developed using the cancer slope factor for 2,3,7,8-TCDD of 1.3×10^5. This changed the human health screening level from 59 ng/kg in the Round 1 through 7 Report (TtNUS, November 2004) to 68 ng/kg in this report.

5.2.3.2 Ecological Screening Levels

Ecological screening levels were located in the literature for sediment. Table 5-1 in the Interim Report on Data and Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin/Furan Risks to Aquatic Life and Associated Wildlife (USEPA, March 1993) lists 2,3,7,8-TCDD concentrations in sediment that are associated with risks to aquatic life and associated wildlife. These sediment concentrations were developed to protect birds exposed to sediment (via fish consumption) (21 ng/kg) and to protect fish from the accumulation of toxic levels in their tissues (60 ng/kg). Sediment concentrations established to protect mammals were not selected as screening levels for evaluation in this report because the EERA (NCCOSC, May 2000) did not include mammals as potential ecological receptors.

5.2.4 Comparisons to Screening Levels

This section presents a summary of the calculated TEQ values that were compared to human health and ecological screening levels.

5.2.4.1 Comparison to Human Health Screening Levels

As presented in Section 5.2.3.1, the human health screening level was based on the assumption that people may be exposed to sediment while they are recreating in the intertidal zone. A human health screening level was not developed for sediment in the subtidal zone because humans are not significantly exposed to subtidal sediment. As the initial step in the dioxin/furan risk evaluation, the dioxin/furan TEQ values and PCB TEQ values from each intertidal sample location (Locs. 1 and 3) at MS-08 were compared to the 2,3,7,8-TCDD screening level.

The data from monitoring station MS-09 were not compared to human health screening levels because, although intertidal sediments existed during the first six rounds, the intertidal area has since been covered with rip-rap from construction activities associated with OU3. Therefore, no intertidal sediment is present at this monitoring station.

Table 5-1 presents a comparison of dioxin/furan TEQ values and PCB TEQ values for each intertidal sample at MS-08 (Loc. 1 and Loc. 3) to the updated human health screening level of 68 ng/kg. No intertidal sediment sample had a dioxin/furan TEQ value greater than the human health screening level at MS-08. PCB TEQ values exceeded the human health screening level at MS-08 at one of two intertidal locations during Round 7. As presented in Section 4.2, a portion of the intertidal area at MS-08 was excavated after Round 7, and the sediment was consolidated within the landfill at OU3. The TEQ values in Rounds 8 through 10 reflect this because they were much lower in those rounds.

In summary, risks to humans from dioxin/furans are considered to be low because TEQ values are less than the screening level in all samples. Risks to human from PCBs are also low because the TEQ values were less than the screening level in the most recent rounds of sampling.

5.2.4.2 Comparisons to Ecological Screening Levels

Unlike humans, ecological receptors can be exposed to intertidal and subtidal sediment. Therefore, data from both the intertidal and subtidal sediment are compared to ecological screening levels, although birds will be primarily exposed to intertidal sediment.

Table 5-2 presents a comparison of dioxin/furan TEQ values and PCB TEQ values for sediment samples at MS-08 and MS-09 to the ecological screening level of 21 ng/kg for the protection of birds (USEPA, March 1993). Dioxin/furan and PCB TEQ values exceeded the sediment screening level for protection of birds at both monitoring station during several rounds. The evaluation in the Rounds 1 through 7 Report (TtNUS, November 2004) noted that PCB TEQ values also exceeded the screening level in several of the reference stations during every round of sampling. At MS-08, the dioxin/furan TEQ values were greatest in Rounds 8 through 10, and total TEQ values were greatest in Rounds 7 through 10. The PCB TEQ values comprise the majority of the total TEQ value for most samples. At MS-09, the dioxin/furan TEQ values were greatest in Rounds 7 through 9. In Rounds 8 and 9, the dioxin/furan TEQ values comprise the majority of the total TEQ value for most samples; in other rounds, the PCB TEQ values comprise a majority of the total TEQ value for most samples or the TEQ values are similar.

Table 5-3 presents a comparison of dioxin/furan TEQ values and PCB TEQ values for sediment samples at MS-08 and MS-09 to the ecological screening level of 60 ng/kg for protection of fish. Dioxin/furan and PCB TEQ values exceeded the screening level at MS-08 and MS-09 very infrequently, with most of the exceedances in Rounds 7 and 8, and one exceedance each in Round 9 and Round 10.

The dioxin/furan and PCB TEQ values exceeded the bird and fish ecological screening level in some samples; therefore, a comparison to the screening levels using average TEQ values was conducted. For MS-08 and MS-09, the average TEQ value across each station was compared to bird and fish screening levels because it is assumed that fish and birds will live and feed throughout the area (see Tables 5-2 and 5-3).

The greatest total TEQ values for birds at MS-08 occurred in Rounds 7, 9, and 10 (see Table 5-2). The average total TEQ values at MS-08 during Rounds 7, 9, and 10 were 533 ng/kg, 673 ng/kg, and 1,511 ng/kg, respectively, all of which greatly exceeded the screening level for birds of 21 ng/kg. At MS-09, the greatest total TEQ values for birds occurred in Rounds 7, 8, and 9 with average total TEQ values of 544 ng/kg, 219 ng/kg, and 74 ng/kg, respectively (see Table 5-2)..

The bird screening level for sediment is based on birds consuming fish exposed to sediment and accumulating the associated dioxin/furans in their tissue. Mussels have a greater exposure to sediment at MS-08 and MS-09 because they are sessile and in close contact with the sediment as opposed to fish that can swim throughout the area. For that reason, evaluating risks to birds consuming mussels is more relevant than evaluating risks to birds from chemicals in sediment at OU4. Mussel samples were not collected during Rounds 8, 9, or 10, but mussel samples collected at MS-08 and MS-09 during Rounds 1 through 7 had dioxin/furan concentrations less than the screening level for protection of birds consuming tissue, so risks to birds from dioxin/furans were considered negligible (see Table 6-4 in TtNUS, November

2004). Some mussel samples did have total TEQs concentrations greater than the screening level for protection of birds consuming tissue, but most of the values were similar to reference concentrations. As presented above, average total TEQ concentrations in sediment samples have increased at MS-08 locations since Round 7 but have decreased at MS-09. Therefore, total TEQ concentrations in mussels may have increased slightly at MS-08 since Round 7 but have likely decreased at MS-09. Even if concentrations have increased slightly, they would likely be just slightly greater than reference levels because dioxin/furan-like PCB TEQ values were similar to reference station TEQ values, as presented in the Rounds 1 through 7 Report (TtNUS, November 2004).

The greatest total TEQ values for fish at MS-08 occurred in Rounds 7 and 10 (see Table 5-3). The average total TEQ concentrations at MS-08 during these rounds were less than the screening level for fish of 60 ng/kg. At MS-09, the greatest total TEQ values for birds were in Rounds 7, 8, and 9 (see Table-5-3). The average total TEQ concentrations at MS-09 during Rounds 7, 8, and 9 were 82 ng/kg, 107 ng/kg, and 44 ng/kg, respectively. In Rounds 9 and 10, average total TEQ concentrations at MS-09 were less than the screening level for fish, and the concentrations in Rounds 7 and 8 were less than two times the screening level. Therefore, it is not likely that fish will be significantly impacted by dioxins/furans or dioxin-like PCBs from at these stations.

5.2.5 Uncertainty Analysis

There are several sources of uncertainty in the risk evaluation, including the calculation and evaluation of TEQ values using a value of zero for non-detected values, the impact of rejected data on the evaluation, and uncertainties in actual exposure of human and ecological receptors to the evaluated media. Also, as part of this uncertainty analysis, total TEQ values (dioxin/furan TEQ plus PCB TEQ) were evaluated to determine whether potential risks to human and ecological receptors would change based on summing the dioxin/furan and PCB TEQ values. These uncertainties are discussed below.

5.2.5.1 Uncertainty Associated With Using Zero for Non-Detected Values

The TEQ values used in the evaluation presented in Section 5.2.4 were calculated using only detected results. Table 5-4 presents a comparison of TEQ values calculated using one-half the detection limits for non-detected values to the human health screening level. There are few differences in the TEQ values calculated using a value of zero for non-detects (Table 5-1) compared to TEQ values calculated using a value of one-half of the detection limits for non-detects (Table 5-4). Rounds 9 and 10 were analyzed by Mitkem Laboratories, whereas, the earlier rounds of samples were analyzed by Severn Trent Laboratories or Texas A&M University. The detection limits reported by Mitkem Laboratories were notably higher for PCBs, leading to greater PCB TEQ values in Rounds 9 and 10 using one-half the detection limits for non-detected values. This resulted in PCB TEQ values being greater than the

screening level using one-half the detection limits for non-detected values, whereas the sediment samples at these locations were less than the TEQ value using only detected concentrations.

Tables 5-5 and 5-6 present a comparison of TEQ values calculated using one-half the detection limits for non-detected values to the ecological screening level for protection of birds and protection of fish, respectively. In most instances, PCB TEQ values calculated using one-half the detection limits for non-detected values are greater than PCB TEQ values calculated using a value of zero for non-detects. This resulted in more samples having PCB TEQ values that exceeded the screening level for protection of birds (Table 5-5), but the same was not true for the screening level for protection of fish. The number of dioxin/furan TEQ values for birds that were greater than the screening level is similar to the number calculated using one-half the detection limits for non-detected values. The greater differences are for PCB TEQ values for birds exposed to sediment, which is due in part to the higher MDLs reported by Mitkem Laboratories for Round 9 and 10 data.

5.2.5.2 Uncertainty Associated with Total TEQs

A comparison of total TEQ values (dioxin/furan TEQ plus PCB TEQ) to human health and ecological screening levels was not conducted in Section 5.2.4. As can be seen in Table 5-1, the total TEQ value is essentially equal to the PCB TEQ at all locations where there was an exceedance of the human health screening level. No sediment samples had dioxin/furan TEQ and PCB TEQ concentrations less than the human health screening level and total TEQ concentrations greater than the human health screening level. Similarly, as can be seen in Tables 5-2 to 5-3, the total TEQ value is essentially equal to the PCB TEQ value at almost all locations where there was an exceedance of the ecological screening level. Total TEQ values for a bird exposed to sediment exceeded the screening level in a few samples, but individual dioxin/furan and PCB TEQ values at these stations were less than the screening level. Although total TEQ values exceeded the bird screening level at these locations, total TEQ values were only slightly greater than the bird screening level. In addition, the dioxin/furan and PCB TEQ values exceeded the screening level at most of the stations during other sampling rounds. Consequently, the results of the evaluation would not change if total TEQ values were used in the analysis.

The screening levels presented in USEPA (1993) are based on 2,3,7,8-TCDD; therefore, there is uncertainty in comparing the dioxin-like PCB results to the screening levels because that likely overestimates exposure.

5.2.5.3 Uncertainties Associated with Rejected Data

Some dioxin/furan results were rejected in sediment samples from five monitoring stations during Round 5 and one station during Rounds 1 and 4. No dioxin/furans were rejected from MS-08 and MS-09

after Round 5. PCB results were rejected in sediment samples from two monitoring stations and two reference stations during Round 4. Some PCB results were rejected during Rounds 8 and 10 from MS-08 and MS-09. Tables 6-11 and 6-12 in the Rounds 1 through 7 Report (TtNUS, November 2004) show samples with rejected analytical results for sediments. Because the majority of the rejected analytical results for sediment occurred in one sampling round (Round 5 for dioxins/furans and Round 4 for PCBs), the rejection of analytical results is not considered to be problematic because there are nine additional rounds of usable analytical data and because the rejections were only for a few parameters.

5.2.5.4 Uncertainties Associated with Human and Ecological Exposures to Sediment

Dioxin/furan TEQ values at MS-08 and MS-09 exceeded the bird screening level for sediment, which is based on birds consuming fish exposed to sediment and accumulating dioxin/furans in their tissue.

Based on the high chemical concentrations at MS-08 during Round 7 compared to previous rounds, the Navy excavated waste material in this area in 2004 as part of the OU3 remedial activities. Material was excavated down to the original mudflat material and replaced with sandy silty clean fill material. Consequently, the sediment included in this evaluation for MS-08 are no longer present at the site. The dioxin/furan TEQ value at one location for MS-08 exceeded the screening level during Round 8 but was less than the screening level during Rounds 9 and 10.

It is not known whether mussels are actually present at MS-09. They were not present during the Round 7 sampling event because they had not yet recolonized the rip-rap placed along the shoreline as part of OU3 construction activities. Also, because the intertidal area (with exposed sediment) by MS-09 no longer exists, any intertidal mussels will not be in close contact sediment. Therefore, dioxin/furan and PCB concentrations in the mussels should be less than in previous rounds when they were in close contact with the sediment.

5.2.6 Summary and Conclusions

The following summarizes the results of the risk evaluation for dioxins/furans:

- No intertidal sediment samples had dioxin/furan TEQ values greater than the human health screening level at MS-08. PCB TEQ values exceeded the human health screening level at monitoring station MS-08, Loc. 1, during Round 7. PCB TEQ values during Rounds 8 to 10 were less than the human health screening level.

- Dioxin/furan TEQ values exceeded the sediment screening level for protection of birds at MS-08 during Rounds 7 and 8 and at MS-09 during Rounds 3 and 7 to 10. As evaluated in the Rounds 1

through 7 Report (TtNUS, November 2004), PCB TEQ values exceeded the screening level for protection of birds in sediment samples from several reference stations. Based on actual mussel data from Rounds 1 through 7, impacts to birds consuming mussels are unlikely to occur from dioxins/furans and are likely to be similar to reference stations from dioxin-like PCBs.

- Dioxin/furan TEQ values exceeded the screening level for protection of fish at MS-09 during Rounds 7 through 9, but average total TEQ concentrations at MS-09 were less than the screening level during Rounds 9 and 10. None of the average total TEQ concentrations at MS-08 exceeded the screening level for protection of fish. Therefore, it is not likely that fish will be impacted from dioxins/furans or dioxin-like PCBs at the site.

5.3 METALS ANALYTICAL METHODS EVALUATION

5.3.1 Introduction

For the first seven rounds of the interim offshore monitoring program, sediment and tissue samples were analyzed for metals and organic chemicals (i.e., dioxins, PAHs, pesticides, and PCBs) using analytical methods developed for the NOAA Status and Trends Program. Also, during Round 7, several sediment samples from different monitoring stations were analyzed for metals using standard USEPA analytical methods. The Navy evaluated the impacts of using different analytical methods for future rounds of interim offshore monitoring in a Technical Memorandum entitled Comparison of Analytical Methods for the Interim Offshore Monitoring Program for Operable Unit 4, presented in Appendix B of the Additional Scrutiny QAPP for Operable Unit 4 (TtNUS, August 2005). Based on the findings presented in the memorandum, the following recommendations were made:

- Continue to use NOAA analytical methods for metals analysis of sediment for data that will be used for chemical trend plots; consider using USEPA analytical methods for sediment samples that are not included in the trend plots.
- Use USEPA analytical methods for organic chemical analysis of sediment.
- Use USEPA analytical methods for organic chemical and metal analyses of mussel samples.
- Remove select pesticides from the analytical parameter list.

The objective of this section of the report is to re-evaluate whether to continue to use NOAA analytical methods for metals analysis of sediment or change to USEPA analytical methods. The primary reason for this evaluation is that NOAA methods are typically three to four times more expensive than standard USEPA methods, can be conducted by only a few laboratories in the United States, and typically the time to receive results is almost twice as long. To obtain a more robust data set, sediment samples collected

during Round 10 at MS-05, MS-08, and MS-09 were analyzed using both NOAA methods and USEPA methods and evaluated in conjunction with the Round 7 data.

5.3.2 Background

Differences in concentrations of some metals are expected when using different analytical methods. The NOAA analytical method utilizes a complete digestion of the sediment particle using hydrofluoric acid so metals that are incorporated into the sediment matrix are included in the sample results. These typically include metals such as aluminum, iron, and other metals that may be specific to the geologic material in the area where samples were collected. The USEPA analytical method, on the other hand, utilizes a total recoverable digestion, which digests the material bound to the outer portion of the sediment particle to determine the concentration of chemicals that will be more bioavailable to human and ecological receptors. Therefore, the methods will yield different results for metals that are incorporated into the sediment matrix, which are not likely related to site activities.

The more critical issue, however, is whether concentrations of the primary COCs in the offshore area (i.e., chemicals for which IRGs were developed such as copper and nickel) or other metals that may be important at some sites (such as lead) change significantly by using USEPA methods. This is an important issue because if much lower or higher concentrations were obtained for these metals using the USEPA methods, it would appear as if there was a decrease or increase in chemical concentrations over time, when the changes may be solely because of differences in analytical methods. Also, site-specific IRGs for copper and nickel were developed using NOAA metals data.

5.3.3 Approach

The approach used to analyze the 17 samples (including two duplicates) collected during Round 7 is described in the Technical Memorandum presented in the Additional Scrutiny QAPP for Operable Unit 4 (TtNUS, August 2005). The 10 sediment samples (including a duplicate) collected during Round 10 of the Interim Offshore Monitoring Program were analyzed for metals and mercury by Columbia Analytical Services (CAS) using USEPA Method 6010B/6020 and USEPA Method 7471A, respectively. A portion of the same samples were analyzed for metals and mercury by Brooks Rand Labs using NOAA methods, USEPA Method 1638 modified, and USEPA Method 1631, respectively.

Samples collected during Round 7 were not analyzed for mercury using the USEPA method because the NOAA method does not utilize a complete digestion of sediment and so the mercury results obtained using the USEPA 7471A method are expected to be similar to results obtained using the NOAA method. The data obtained from Round 10 were evaluated to determine whether the results supported this expectation.

5.3.4 Results

Figures 1 through 15 in Appendix E graphically present results for samples analyzed by both NOAA and USEPA methods; non-detected data were not included on the figures. USEPA concentrations are plotted on the x-axis and the corresponding NOAA concentration for each sample analyzed is plotted on the y-axis. The best fit line and equation of the best fit line (including the correlation coefficient, R^2) are also shown. Correlation coefficients range from 0 to 1.0, with an R^2 value of 1.0 indicating the best correlation and a value of 0 indicating no correlation.

IRGs have been developed for two metals, copper and nickel. Also, lead has been identified as a metal of concern at several onshore sites. Therefore, these three metals are the primary focus of this evaluation, although the results for other metals are also discussed. Figures 1, 3, and 5 present the correlation plots for copper, lead, and nickel, respectively, showing all detected data points for Rounds 7 and 10. Round 7 and 10 data from the different methods for the three metals have very good correlations, with R^2 values of 0.96, 0.93, and 0.80, for copper, lead, and nickel, respectively. The slightly lower correlation of nickel data is caused by more variability in the sample results, which may be more indicative of the heterogeneous nature of the samples. Overall, most samples for these three metals fall close to the best fit line, especially for the concentrations close to the IRGs (for copper and nickel) or E-RM (for lead), which are footnoted on the figures. Figures 2 and 4 present correlation plots for copper and lead, respectively, showing only sample concentrations less than 700 mg/kg (based on USEPA analytical results) because the IRG for copper (486 mg/kg) and twice the ER-M for lead (436 mg/kg) are both less than this value. The correlation coefficients are slightly greater in this limited range, which contains more than half of the samples. The R^2 values were 0.97 for both copper and lead.

The ratios of NOAA to USEPA analytical results were calculated to determine whether the results using the NOAA method were greater than the results using the USEPA method, and if so, determine the numerical differences between the results (see Table 1 in Appendix E). The ratios ranged from 0.5 to 2.6 for copper, 0.4 to 2.9 for lead, and 0.5 to 3.1 for nickel. The mean ratios across all of the samples from both rounds were 1.2 (copper), 1.4 (lead), and 1.2 (nickel). These average ratios are similar to the ratios calculated using only Round 7 data, which were 1.4, 1.4, and 1.3 for copper, lead, and nickel, respectively. The ratios are summarized in Table 5-7. A review of the ratios in Table 1 (in Appendix E) for individual samples shows that most of the ratios for copper and nickel were close to 1.0, which indicates that only a small portion of these metals are incorporated into the sediment matrix. For lead, the ratios were slightly higher, with most ranging from 1.2 to 1.4, so slightly more lead may be incorporated into the sediment matrix. In the samples with greater chemical concentrations, some of the variability may be caused by the heterogeneous nature of the sediment, as evident when evaluating duplicate samples. For example, as seen in Table 1 (in Appendix E), the copper results at MS-04-1 using the

NOAA methods ranged from 6,421 mg/kg in the original sample and 7,725 mg/kg in the duplicate sample. Using USEPA methods, the concentrations ranged from 6,070 mg/kg in the original sample and 6,490 mg/kg in the duplicate sample, similar to the results in the original sample.

Figures 6 through 15 present correlation plots for aluminum, arsenic, cadmium, chromium, iron, manganese, mercury, silver, and zinc. These plots were evaluated to understand differences in results using the two analytical methods.

The correlation coefficients for aluminum (Figure 6), cadmium, (Figure 8), and manganese (Figure 12) are low (especially aluminum) compared to the R^2 values for other metals. The NOAA/USEPA ratios are also greatest for these metals, with average ratios of 4.5 for aluminum, 6.1 for cadmium, and 2.4 for manganese. As discussed above, higher NOAA/USEPA ratios correspond to larger percentages of metals incorporated into the sediment matrix because the NOAA method extracts that portion of the metal from the sediment particle.

For chromium, two correlation plots were generated; one with all the data and one with data from MS-03, Loc. 2 removed (Figures 9 and 10). The chromium concentration for MS-03, Loc. 2 using NOAA methods was 925 mg/kg, which was much higher than chromium concentrations at that location during previous rounds. During previous rounds, chromium concentrations ranged from 94 mg/kg (Round 4) to 137 mg/kg (Round 2). Therefore, there may have been a small piece of metal in the sample aliquot analyzed using the NOAA methods but was not present in the aliquot analyzed using the USEPA methods, which resulted in a chromium concentration of 58.1 mg/kg. A value of 94 to 137 mg/kg for this sample, giving a NOAA/USEPA ratio of 1.6 to 2.4, would be in line with the NOAA/USEPA ratios for the other samples. After removing the outlying data point, the R^2 value increased to 0.73, which shows relatively good correlation. The average NOAA/USEPA ratio for chromium after removing the sample from MS-03, Loc. 2 was 1.7, indicating that a larger amount of chromium is incorporated into the sediment matrix compared to some of the other metals such as copper, lead, and nickel.

Arsenic, iron, silver, and zinc had relatively high R^2 values of 0.87, 0.70, 0.77, and 0.94, respectively. The average NOAA/USEPA ratios for these metals were 1.2, 1.2, 1.3, and 1.1. These correlations were similar to the correlations and ratios developed using only average concentrations from Round 7. The correlations developed for these metals from Round 7 data were 0.88, 0.70, 0.80, and 0.92, respectively. The average NOAA/USEPA ratios for these metals from Round 7 data were 1.3, 1.3, 1.4, and 1.2.

Mercury also had a relatively high R^2 value of 0.78 based on Round 10 data (Figure 15). The data were anticipated to be similar because the NOAA method for mercury analysis does not include a complete

digestion process. The average NOAA/USEPA ratio was 1.1. The data from the two methods were similar, with ratios ranging from 0.7 to 1.2, with the exception of one ratio of 1.6.

5.3.5 Summary/Conclusions

The primary metals of concern for OU4 are copper, nickel, and to a lesser extent lead. The results of this evaluation show good correlation of sample results between NOAA and USEPA analytical methods for these metals. NOAA results were consistently greater than USEPA results, suggesting that some percentage of these metals is bound to the sediment matrix, which is extracted in the complete digestion using NOAA method that is not extracted in the recoverable digestion used in the USEPA method.

A concern from the evaluation of data from Round 7 was uncertainty using the ratios to convert the analytical results measured from one method to equivalent results from the other method because the ratios were only based on a limited number of samples. This evaluation of the Round 7 and Round 10 data provides confirmation of the correlations and ratios developed using only Round 7 data. The additional data was useful in providing information needed to develop the regression equation to compare results obtained using USEPA methods and NOAA methods. These regression equations can be used to account for the portion of chemical bound to the sediment matrix and not digested using the USEPA method.

TABLE 5-1

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE HUMAN HEALTH SCREENING LEVEL USING DETECTED CONCENTRATIONS ONLY
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS08			
			LOC. 1	LOC. 1D	LOC. 3	LOC. 3D
Dioxin/Furan TEQ Value	68	1	1.5	--	0.43	--
		2	5.8	--	1.0	0.37
		3	5.1	2.4	0.23	--
		4	0.23	0.36	0.049	--
		5	5.0	4.4	0.73	--
		6	3.2	3.0	0.98	--
		7	25	48	0.64	--
		8	0.0036	0.0036	0.25	--
		9	0.038	--	0.84	--
		10	0.89	--	8.0	--
PCB TEQ Value		1	8.0	--	4.9	--
		2	11	--	7.5	10
		3	1.6	0.69	0.30	--
		4	1.6	0.96	14	--
		5	15	6.6	2.4	--
		6	8.8	8.3	5.5	--
		7	**654**	**728**	23	--
		8	0 U	0 U	0.025	--
		9	1.4	--	0 U	--
		10	0 U	--	6.0	--
Total TEQ Value		1	9.6	--	5.3	--
		2	17	--	8.6	11
		3	6.7	3.1	0.53	--
		4	1.8	1.3	14	--
		5	20	11	3.1	--
		6	12	11	6.5	--
		7	**679**	**776**	23	--
		8	0.0036	0.0036	0.27	--
		9	1.4	--	0.84	--
		10	0.89	--	14	--

Units are ng/kg
Shaded values exceed the human health screening level.
U = Nondetected result
-- = Not analyzed

TABLE 5-2

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE BIRD SCREENING LEVEL
USING DETECTED CONCENTRATIONS ONLY
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS08						
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D	Average
Dioxin/Furan TEQ Value	21	1	0.28	--	0.77	--	0.17	--	0.41
		2	3.5	--	0.90	--	0.81	0.24	1.6
		3	7.3	4.9	0.68	--	0.43	--	2.4
		4	0.072	0.10	0.052	--	0.049	--	0.06
		5	5.7	3.8	6.3	--	0.92	--	4.0
		6	2.4	0.74	1.9	--	2.5	--	2.0
		7	**43**	**83**	2.7	--	1.8	--	**23**
		8	0.0012	0.0012	**26**	**27**	0.096	--	9
		9	0.11	--	16	--	2.0	--	6
		10	1.6	--	11	--	18	--	10
PCB TEQ Value		1	**25**	--	**29**	--	18	--	**24**
		2	**25**	--	**38**	--	**22**	**64**	**35**
		3	14	14	2.9	--	0.35	--	6
		4	20	15	0.52	--	13	--	10
		5	**34**	**25**	15	--	9.3	--	18
		6	18	**23**	9.7	--	13	--	15
		7	**1196**	**1287**	**236**	--	**53**	--	**510**
		8	0 U	0 U	**53**	--	0.034	--	**27**
		9	**700**	--	**1300**	--	0 U	--	**1000**
		10	0 U	--	**2501**	--	**2000**	--	**2251**
Total TEQ Value		1	**25**	--	**30**	--	18	--	**25**
		2	**28**	--	**39**	--	**23**	**64**	**37**
		3	21	19	3.5	--	0.78	--	8
		4	20	15	0.57	--	13	--	10
		5	**39**	**29**	**21**	--	10	--	**22**
		6	21	**24**	12	--	16	--	17
		7	**1239**	**1370**	**239**	--	**55**	--	**533**
		8	0.0012	0.0012	**79**	**27**	0.13	--	18
		9	**700**	--	**1316**	--	2.0	--	**673**
		10	1.6	--	**2512**	--	**2018**	--	**1511**

TABLE 5-2

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE BIRD SCREENING LEVEL
USING DETECTED CONCENTRATIONS ONLY
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS09						
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D	Average
Dioxin/Furan TEQ Value	21	1	0.62	--	0.24	--	0.042	--	0.30
		2	15	--	1.1	--	16	--	10.5
		3	11	--	11	--	17	**31**	15.4
		4	0.17	--	0.020	--	2.5	3.5	1.06
		5	9.0	--	5.1	--	16	20	10.7
		6	0.78	--	1.4	--	5.7	6.4	2.8
		7	**30**	--	**30**	--	**272**	**221**	**102**
		8	**369**	**401**	**74**	--	**120**	--	**193**
		9	**108**	--	**38**	**38**	**76**	--	**74**
		10	8.3	10	11	--	**25**	--	15
PCB TEQ Value		1	10	--	12	--	**26**	--	16
		2	**48**	--	**61**	--	16	--	**42**
		3	2.1	--	11	--	12	14	9
		4	**22**	--	9.5	--	**36**	17	19
		5	3.7	--	16	--	10	9.0	10
		6	11	--	7.2	--	**30**	**24**	15
		7	**493**	--	**379**	--	**469**	**436**	**441**
		8	2.4	--	0.83	--	**76**	--	**26**
		9	0.16	--	0 U	0 U	0 U	--	0.16
		10	0 U	--	0 U	--	0 U	--	0U
Total TEQ Value		1	11	--	12	--	**26**	--	16
		2	**63**	--	**62**	--	**32**	--	**52**
		3	13	--	**23**	--	**30**	**45**	**24**
		4	**22**	--	9.5	--	**39**	21	20
		5	13	--	**21**	--	**26**	**29**	21
		6	12	--	8.7	--	**36**	**31**	18
		7	**524**	--	**409**	--	**741**	**657**	**544**
		8	**372**	**403**	**75**	--	**196**	--	**219**
		9	**108**	--	**38**	**38**	**76**	--	**74**
		10	8.3	10	11	--	**25**	--	15

Units are ng/kg
Shaded values exceed the bird screening level.
U = Nondetected result
-- = Not analyzed

TABLE 5-3

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE FISH SCREENING LEVEL
USING DETECTED CONCENTRATIONS ONLY
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS08						
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D	Average
Dioxin/Furan TEQ Value	60	1	0.79	--	2.3	--	0.25	--	1.1
		2	3.8	--	0.37	--	0.85	0.32	1.6
		3	4.1	2.2	0.29	--	0.20	--	1.2
		4	0.072	0.10	0.052	--	0.049	--	0.06
		5	3.9	3.1	3.3	--	0.54	--	2.5
		6	1.6	0.74	1.8	--	1.3	--	1.4
		7	31	59	0.61	--	0.79	--	15
		8	0.0012	0.0012	12	13	0.096	--	4.3
		9	0.057	--	9.1	--	0.87	--	3.4
		10	0.31	--	4.4	--	8.1	--	4.2
PCB TEQ Value		1	0.50	--	0.51	--	0.31	--	0.44
		2	0.56	--	0.82	--	0.43	0.64	0.64
		3	0.32	0.17	0.054	--	0.050	--	0.12
		4	0.21	0.21	0.077	--	0.17	--	0.15
		5	0.92	0.47	0.13	--	0.18	--	0.33
		6	0.53	0.54	0.23	--	0.37	--	0.38
		7	35	39	6.9	--	1.4	--	15
		8	0 U	0 U	0.30	--	0.0030	--	0.15
		9	1.4	--	2.6	--	0 U	--	2.0
		10	0 U	--	**67**	--	10	--	38
Total TEQ Value		1	1.3	--	2.8	--	0.56	--	1.6
		2	4.4	--	1.2	--	1.3	0.96	2.2
		3	4.4	2.3	0.34	--	0.25	--	1.3
		4	0.29	0.31	0.13	--	0.22	--	0.21
		5	4.9	3.6	3.4	--	0.72	--	2.8
		6	2.1	1.3	2.0	--	1.6	--	1.8
		7	**66**	**98**	7.5	--	2.2	--	31
		8	0.0012	0.0012	13	13	0.099	--	4.4
		9	1.5	--	12	--	0.87	--	4.7
		10	0.31	--	**71**	--	18	--	30

TABLE 5-3

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE FISH SCREENING LEVEL
USING DETECTED CONCENTRATIONS ONLY
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS09						
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D	Average
Dioxin/Furan TEQ Value	60	1	1.7	--	0.68	--	0.15	--	0.84
		2	11	--	1.3	--	9.7	--	7.4
		3	6.1	--	5.6	--	12	20	9.1
		4	0.17	--	0.020	--	2.5	3.5	1.1
		5	5.6	--	3.8	--	10	10	6.6
		6	1.1	--	1.4	--	4.1	4.2	2.2
		7	20	--	20	--	**179**	**160**	**70**
		8	**202**	**222**	42	--	**67**	--	**107**
		9	**65**	--	22	20	45	--	44
		10	3.4	4.5	4.3	--	11	--	6.5
PCB TEQ Value		1	0.25	--	0.28	--	0.52	--	0.35
		2	0.84	--	0.60	--	0.52	--	0.65
		3	0.027	--	0.11	--	0.12	0.14	0.09
		4	0.068	--	0.083	--	1.2	0.13	0.27
		5	0.17	--	0.097	--	0.096	0.11	0.12
		6	0.42	--	0.16	--	0.51	0.55	0.37
		7	13	--	11	--	13	12	12
		8		--	0.13	--	0.56	--	0.35
		9	0.080	--	0 U	0 U	0 U	--	0.08
		10	0 U	--	0 U	--	0 U	--	0 U
Total TEQ Value		1	1.9	--	0.96	--	0.67	--	1.2
		2	12	--	1.9	--	10	--	8.0
		3	6.2	--	5.7	--	12	20	9.2
		4	0.24	--	0.10	--	3.7	3.7	1.3
		5	5.8	--	3.9	--	11	10	6.7
		6	1.5	--	1.6	--	4.6	4.8	2.6
		7	34	--	31	--	**192**	**172**	**82**
		8	**202**	**222**	42	--	**68**	--	**107**
		9	**65**	--	22	20	45	--	44
		10	3.4	4.5	4.3	--	11	--	6.5

Units are ng/kg
Shaded values exceed the fish screening level.
U = Nondetected result
-- = Not analyzed

TABLE 5-4

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE HUMAN HEALTH SCREENING LEVEL INCLUDING NON-DETECTED VALUES
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS08			
			LOC. 1	LOC. 1D	LOC. 3	LOC. 3D
Dioxin/Furan TEQ Value	68	1	3.5	--	1.3	--
		2	6.5	--	1.5	1.5
		3	5.2	4.0	1.2	--
		4	1.8	1.9	1.3	--
		5	5.1	4.9	1.2	--
		6	4.7	4.9	2.4	--
		7	26	50	1.6	--
		8	0.87	0.87	1.6	--
		9	0.39	--	1.2	--
		10	6.5	--	12	--
PCB TEQ Value		1	11	--	4.9	--
		2	11	--	7.5	10
		3	11	10.0	7.1	--
		4	13	18	18	--
		5	15	14	7.6	--
		6	8.8	8.3	10	--
		7	**654**	**728**	23	--
		8	3.2 U	3.2 U	3.3	--
		9	**445**	--	**451 U**	--
		10	**457 U**	--	**475**	--
Total TEQ Value		1	14	--	6.2	--
		2	17	--	9.0	12
		3	16	14	8.4	--
		4	14	20	19	--
		5	20	19	8.8	--
		6	13	13	13	--
		7	**680**	**777**	24	--
		8	4.0	4.1	4.9	--
		9	**446**	--	**452**	--
		10	**464**	--	**487**	--

Units are ng/kg
Shaded values exceed the human health screening level.
One-half of the detection limit is used for non-detected values
U = Nondetected result
-- = Not analyzed

TABLE 5-5

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE BIRD SCREENING LEVEL
INCLUDING NON-DETECTED VALUES
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS08					
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D
Dioxin/Furan TEQ Value	21	1	4.2	--	8.3	--	2.0	--
		2	6.5	--	2.2	--	2.2	2.0
		3	7.3	6.3	2.1	--	1.8	--
		4	2.1	1.9	2.7	--	1.9	--
		5	5.9	4.8	9.6	--	1.5	--
		6	4.0	3.5	5.8	--	4.0	--
		7	**44**	**84**	5.1	--	2.7	--
		8	1.2	1.2	**28**	**29**	2.0	--
		9	0.58	--	16	--	2.3	--
		10	8.8	--	16	--	**22**	--
PCB TEQ Value		1	**25**	--	**30**	--	18	--
		2	**36**	--	**78**	--	**31**	**64**
		3	**26**	**25**	**27**	--	14	--
		4	**31**	**28**	19	--	17	--
		5	**34**	**25**	**49**	--	9.5	--
		6	18	**23**	9.7	--	14	--
		7	**1196**	**1287**	**236**	--	**53**	--
		8	5.2 U	5.3 U	**58**	--	5.5	--
		9	**1385**	--	**2166**	--	**867 U**	--
		10	**880 U**	--	**2750**	--	**2365**	--
Total TEQ Value		1	**29**	--	**38**	--	20	--
		2	**43**	--	**80**	--	**34**	**66**
		3	**33**	**31**	**29**	--	16	--
		4	**33**	**30**	**22**	--	19	--
		5	**40**	**30**	**58**	--	11	--
		6	**22**	**27**	16	--	18	--
		7	**1239**	**1371**	**241**	--	**56**	--
		8	6.4	6.4	**85**	**29**	7.5	--
		9	**1385**	--	**2182**	--	**870**	--
		10	**889**	--	**2766**	--	**2387**	--

TABLE 5-5

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE BIRD SCREENING LEVEL
INCLUDING NON-DETECTED VALUES
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS09					
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D
Dioxin/Furan TEQ Value	21	1	16	--	7.1	--	3.7	--
		2	17	--	3.8	--	18	--
		3	11	--	11	--	17	31
		4	2.2	--	2.5	--	5.8	7.5
		5	10	--	6.8	--	16	21
		6	3.3	--	3.9	--	7.8	8.6
		7	32	--	31	--	272	221
		8	369	401	77	--	121	--
		9	108	--	38	38	76	--
		10	12	15	15	--	28	--
PCB TEQ Value		1	10	--	12	--	26	--
		2	48	--	61	--	17	--
		3	8.9	--	23	--	28	34
		4	44	--	11	--	36	41
		5	24	--	59	--	57	56
		6	11	--	7.2	--	30	24
		7	493	--	379	--	469	436
		8	444	602	99	--	131	--
		9	1634	--	1823 U	1760 U	1509 U	--
		10	2012 U	--	1886 U	--	1635 U	--
Total TEQ Value		1	26	--	19	--	30	--
		2	66	--	65	--	34	--
		3	20	--	34	--	46	65
		4	46	--	14	--	42	48
		5	34	--	66	--	73	76
		6	14	--	11	--	38	33
		7	525	--	410	--	741	657
		8	814	1004	176	--	252	--
		9	1742	--	1861	1798	1585	--
		10	2024	15	1901	--	1663	--

Units are ng/kg
Shaded values exceed the bird screening level.
One-half of the detection limit is used for non-detected values
U = Nondetected result
-- = Not analyzed

TABLE 5-6

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE FISH SCREENING LEVEL
INCLUDING NON-DETECTED VALUES
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS08					
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D
Dioxin/Furan TEQ Value	60	1	2.7	--	6.1	--	1.1	--
		2	4.7	--	1.6	--	1.4	1.4
		3	4.2	3.2	1.6	--	1.3	--
		4	2.0	1.9	2.0	--	1.5	--
		5	4.1	3.6	6.4	--	1.2	--
		6	3.4	3.1	5.2	--	2.9	--
		7	31	59	2.8	--	1.8	--
		8	1.00	1.0	15	16	1.7	--
		9	0.45	--	9.1	--	1.2	--
		10	7.0	--	9.5	--	13	--
PCB TEQ Value		1	0.51	--	0.51	--	0.31	--
		2	0.58	--	0.90	--	0.45	0.64
		3	0.77	0.63	0.72	--	0.41	--
		4	0.77	0.86	0.20	--	0.34	--
		5	0.92	0.48	1.8	--	0.19	--
		6	0.53	0.54	0.23	--	0.37	--
		7	35	39	6.9	--	1.4	--
		8	0.14 U	0.14 U	0.52	--	0.15	--
		9	20	--	27	--	20 U	--
		10	20 U	--	**67**	--	28	--
Total TEQ Value		1	3.2	--	6.6	--	1.4	--
		2	5.3	--	2.5	--	1.8	2.1
		3	4.9	3.9	2.4	--	1.7	--
		4	2.7	2.7	2.2	--	1.8	--
		5	5.0	4.1	8.2	--	1.4	--
		6	3.9	3.6	5.4	--	3.3	--
		7	**66**	**98**	9.7	--	3.2	--
		8	1.1	1.1	16	16	1.8	--
		9	21	--	36	--	21	--
		10	27	--	**77**	--	41	--

TABLE 5-6

COMPARISON OF TEQ RESULTS IN SEDIMENT TO THE FISH SCREENING LEVEL
INCLUDING NON-DETECTED VALUES
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Screening Level	Round	MS09					
			LOC. 1	LOC. 1D	LOC. 2	LOC. 2D	LOC. 3	LOC. 3D
Dioxin/Furan TEQ Value	60	1	9.9	--	4.3	--	2.6	--
		2	12	--	2.8	--	12	--
		3	6.7	--	5.9	--	12	20
		4	1.7	--	2.5	--	4.7	5.8
		5	6.9	--	5.4	--	11	12
		6	3.0	--	3.6	--	6.5	6.6
		7	22	--	21	--	**179**	**160**
		8	**202**	**222**	44	--	**68**	--
		9	**65**	--	22	20	45	--
		10	8.4	9.4	9.5	--	16	--
PCB TEQ Value		1	0.25	--	0.29	--	0.52	--
		2	0.84	--	0.60	--	0.53	--
		3	0.35	--	0.59	--	0.94	0.96
		4	0.67	--	0.16	--	1.2	1.3
		5	0.28	--	2.2	--	2.4	2.4
		6	0.42	--	0.16	--	0.51	0.56
		7	13	--	11	--	13	12
		8		--	2.8	--	2.6	--
		9	37	--	41 U	40 U	34 U	--
		10	46 U	--	43 U	--	37 U	--
Total TEQ Value		1	10	--	4.6	--	3.1	--
		2	12	--	3.4	--	12	--
		3	7.0	--	6.5	--	12	21
		4	2.4	--	2.7	--	5.9	7.1
		5	7.2	--	7.6	--	13	14
		6	3.4	--	3.7	--	7.0	7.2
		7	35	--	33	--	**192**	**172**
		8	**213**	**238**	47	--	**71**	--
		9	**102**	--	**64**	60	**79**	--
		10	54	9.4	52	--	53	--

Units are ng/kg
Shaded values exceed the fish screening level.
One-half of the detection limit is used for non-detected values
U = Nondetected result
-- = Not analyzed

TABLE 5-7

SUMMARY OF RATIOS OF NOAA AND USEPA ANALYTICAL METHOD RESULTS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Round 7 Data

Metal	Minimum Ratio	Maximum Ratio	Average Ratio	Median Ratio
ALUMINUM	1.7	9.6	4.5	4.0
ARSENIC	0.7	1.7	1.3	1.2
CADMIUM	0.5	15.7	5.1	4.3
CHROMIUM(1)	1.1	3.2	1.8	1.7
COPPER	0.5	2.6	1.4	1.2
IRON	0.5	2.0	1.3	1.4
LEAD	0.4	2.6	1.4	1.3
MANGANESE	1.3	7.2	2.6	1.9
NICKEL	0.5	3.1	1.3	1.1
SILVER	0.3	2.2	1.4	1.3
ZINC	0.8	2.0	1.2	1.1

Round 7 and Round 10 Data

Metal	Minimum Ratio	Maximum Ratio	Average Ratio	Median Ratio
ALUMINUM	1.7	9.6	4.5	3.9
ARSENIC	0.7	1.7	1.2	1.2
CADMIUM	0.4	24.9	6.1	4.3
CHROMIUM(1)	1.1	3.7	1.7	1.5
COPPER	0.5	2.6	1.2	1.0
IRON	0.5	2.0	1.2	1.2
LEAD	0.4	2.9	1.4	1.2
MANGANESE	1.3	7.2	2.4	1.9
MERCURY(2)	0.4	2.9	1.4	1.2
NICKEL	0.5	3.1	1.2	1.0
SILVER	0.3	2.2	1.3	1.2
ZINC	0.6	2.0	1.1	1.1

1 - The average and median ratios for chromium do not include the ratio of 15.9 for MS-03, Loc. 2.
2 - Mercury was analyzed by the two methods during Round 10 only.

Ratio = [NOAA]/[USEPA]
NOAA - National Oceanic and Atmospheric Administration (Method referenced in NOS ORCA 130)
USEPA - United States Environmental Protection Agency (Analytical Method SW-846, Method 6010B/6020)

6.0 CONCLUSIONS/RECOMMENDATIONS

This section presents a summary of the conclusions from the report and lists the recommendations for the monitoring program based on these conclusions. A summary of the recommendations are presented in Table 6-1.

6.1 MONITORING AND REFERENCE STATIONS

The following sections present conclusions and recommendations for the 14 interim offshore monitoring program monitoring stations and four reference stations for OU4.

6.1.1 Back Channel Area of Concern

This section presents conclusions and recommendations for the four interim offshore monitoring program monitoring stations located in the Back Channel AOC (MS-01 through MS-04).

MS-01

MS-01 is located in the western portion of the Back Channel AOC, offshore of Site 34 (OU9) and adjacent to the bridge leading to Gate No. 1. Seven rounds of interim offshore monitoring and two Additional Scrutiny investigations were conducted at MS-01. Based on the Phase I Additional Scrutiny Investigation (TtNUS, August 2007), it was concluded that Site 34 was not likely a current source but a historical source of PAHs to the offshore area.

Additional sediment samples are needed to determine the (lateral and vertical) extent of PAHs in sediment at MS-01. An UFP-SAP for the OU9 (Site 34) RI, which will include the collection of offshore sediment samples at MS-01 to determine the extent of the PAH contamination, has been prepared (TtNUS, July 2009). The sampling was conducted in August 2009. The results of these sediment samples, along with historical sample results will be evaluated in the FS for OU4.

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 PAHs because these were identified as the risk drivers at this monitoring station.

MS-02

MS-02 is located in the central portion of the Back Channel AOC, between Topeka Pier and the bridge leading to Gate No. 2. Seven rounds of interim offshore monitoring were conducted at MS-02. No

additional offshore monitoring or actions are needed for MS-02 because chemical concentrations in sediment are less than IRGs and data do not indicate any impacts from IRP sites. In addition, PAH and metals concentrations detected at MS-02 were similar to or within the ranges of concentrations in reference samples. Therefore, it is recommended that interim offshore monitoring be discontinued at MS-02.

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). Seven rounds of interim offshore monitoring were conducted at these stations, along with Phase I Site 32 RI sampling. Based on the results of the Rounds 1 through 7 report (TtNUS, November 2004) and Phase I RI for Site 32 (TtNUS, January 2004 and June 2004), the Navy conducted the Phase II RI sampling event in December 2008 that included additional sediment sampling to determine the extent of copper and PAH IRG exceedances in the mid-to low tide area of the Site 32 shoreline. Copper and PAHs exceeded IRGs in some samples.

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 PAHs and copper because these were identified as the risk drivers at this monitoring station.

6.1.2 Jamaica Cove and Clark Cove AOCs

This section presents conclusions and recommendations for the five interim offshore monitoring program monitoring stations located in the Jamaica Cove and Clark Cove AOCs (MS-05 through MS-09).

MS-05

MS-05 is located in the offshore area of OU3 in the Jamaica Cove AOC and is adjacent to the wetland constructed as part of the remedy for OU3. Ten rounds of interim offshore monitoring and one Additional Scrutiny investigation were conducted at MS-05. Although several 2005 Additional Scrutiny samples and several samples from the Round 7 monitoring event had chemical concentrations greater than IRGs for PAHs, copper, and nickel or the ER-M for lead, chemical concentrations were less than IRGs and the ER-M during the most recent sampling event (Round 10) (see Section 4.2.1).

It is recommended that sampling be conducted bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October, 1999). It is recommended that the bi-annual sediment samples be

analyzed for copper, lead, and nickel and the five-year sampling event samples be analyzed for PAHs and all metals. Sampling is recommended because no concentrations currently exceed their respective IRGs (only the 2005 Additional Scrutiny samples had lead concentrations that exceeded its ER-M) and concentrations of copper, nickel, and lead appeared to decrease in Round 10. Having additional samples before the next five-year sampling event will allow the Navy to determine whether concentrations are decreasing over time.

MS-06

MS-06 is located in the offshore area of OU3 in the Jamaica Cove AOC. Seven rounds of interim offshore monitoring were conducted at MS-06. No additional offshore monitoring or actions are needed for MS-06 because chemical concentrations in sediment are less than IRGs. In addition, PAH and metals concentrations detected at MS-06 were similar to or within the ranges of concentrations in reference samples (TtNUS, November 2004). Therefore, it is recommended that interim offshore monitoring be discontinued at MS-06.

MS-07

MS-07 is located in a recreational area in the Clark Cove AOC. Seven rounds of interim offshore monitoring were conducted at MS-07. No additional offshore monitoring or actions are needed for MS-07 because chemical concentrations in sediment are less than IRGs. In addition, PAH and metals concentrations detected at MS-07 were also similar to or within the ranges of concentrations in reference samples (TtNUS, November 2004). Therefore, it is recommended that interim offshore monitoring be discontinued at MS-07. However, 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.

MS-08

MS-08 is located in the offshore area of OU3 in the Clark Cove AOC. Ten rounds of interim offshore monitoring were conducted at MS-08. Chemical concentrations were greater than IRGs, the PRG for 4,4'-DDT, or ER-M for lead at some locations during some rounds, but concentrations were less than the IRGs, PRG, or ER-M during the last two monitoring rounds (Rounds 9 and 10).

It is recommended that sampling be conducted bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October, 1999). It is recommended that the bi-annual sediment samples be analyzed for PAHs, 4,4'-DDT, copper, lead, nickel, and dioxins/furans and the five-year sampling event

samples be analyzed for PAHs, 4,4'-DDT, metals, PCBs, and dioxins/furans. 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.

MS-09

MS-09 is located in the offshore area of OU3 in Clark Cove AOC. Ten rounds of interim offshore monitoring and one Additional Scrutiny investigation were conducted at MS-09. Chemical concentrations were less than IRGs for PAHs and copper and the PRG for 4,4'-DDT in sediment samples collected during the most recent sampling event (Round 10). The lead concentration at one location was greater than its ER-M during the most recent sampling event, but the concentration was less than twice the ER-M.

It is recommended that sampling be conducted bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October, 1999). It is recommended that the bi-annual sediment samples be analyzed for PAHs, 4,4'-DDT, copper, lead, nickel, and dioxins/furans and the five-year sampling event samples be analyzed for PAHs, 4,4'-DDT, metals, PCBs, and dioxins/furans. 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.

6.1.3 Sullivan Point AOC

This section presents conclusions and recommendations for MS-10, the interim offshore monitoring program monitoring station located in the Sullivan Point AOC, which is located in the southeastern corner of PNS.

Eight rounds of interim offshore monitoring were conducted at MS-10 with the last round of sediment samples analyzed for PAHs only. PAH concentrations in most of sediment samples at MS-10 were less than their respective IRGs, with a few exceptions. All 4,4'-DDT concentrations less than the sediment PRG of 66.4 µg/kg, and concentrations of copper and nickel were much less than their respective IRGs.

No additional offshore monitoring or actions are needed for MS-10 because of the infrequent number of IRG exceedences over the eight rounds of sampling and the relatively low concentrations of PAHs,

copper, nickel, and 4,4'-DDT in most samples. Also, the data do not indicate any impacts from IRP sites. Therefore, it is recommended that interim offshore monitoring be discontinued at MS-10.

6.1.4 DRMO Storage Yard AOC

This section presents conclusions and recommendations for MS-11, the interim offshore monitoring program monitoring station located in the DRMO Storage Yard AOC, which is located in the main channel of the Piscataqua River, just offshore of OU2 (Sites 6 and 29). Seven rounds of interim offshore monitoring and Phase I Additional Scrutiny were conducted at this station. Based on the Additional Scrutiny investigation, it was concluded that OU2 was likely the primary source of metals in sediment at MS-11. Several interim removal actions have been conducted at OU2 that placed erosion controls along the shoreline on the western and eastern portions of the seawall.

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).

6.1.5 Dry Docks AOC

This section presents conclusions and recommendations for the three interim offshore monitoring program monitoring stations located in the Dry Docks AOC (MS-12 through MS-14).

MS-12

MS-12 is located adjacent to Building 178 and offshore of Sites 5 and 10. Seven rounds of interim offshore monitoring and two Additional Scrutiny investigations were conducted at this station. The following is a brief summary of the conclusions from the Additional Scrutiny investigations (see Section 4.5.1):

- PAH concentrations in the sediment samples collected within 15 feet of the ramp drop-off were less than their respective IRG, and lead concentrations were less than twice the ER-M. Therefore, it is concluded that sediment does not have elevated concentrations of PAHs or lead, so no further action is needed in this area.

- Two of three additional sediment samples collected near AS12-SD12 had lead concentrations greater than twice the ER-M.

- The greatest PAH concentrations were found in sediment samples inside and immediately outside Building 178. Also, concentrations were lower in the deeper samples inside Building 178, but increased with depth in the samples outside Building 178. The concentrations of lead generally followed the same pattern as PAHs, with the greatest concentrations in samples inside and immediately outside Building 178. Many PAH concentrations were greater than their IRGs, and concentrations of lead were greater than twice its ER-M.

- Average PAH concentrations were all less than IRGs, and the average lead concentration was less than its ER-M in sediment samples collected from within the eelgrass bed at MS-12.

Based on the conclusions stated above, the following recommendations are made for MS-12:

- No further action for sediment within 15 feet of the ramp drop-off.
- Collection of additional sediment samples in the area of elevated lead detections at sediment samples AS12-SD107 through AS12-SD109 during the next Interim Offshore Monitoring Program event (Round 11) to determine whether concentrations are changing over time.
- The sediment inside and immediately outside Building 178 should be considered in the FS for OU4.
- The eelgrass bed should not be included in any removal action for this area.

It is recommended that sampling be conducted at MS-12 locations at the five-year sampling events until a final remedy for OU4 is implemented and that sediment samples be analyzed for PAHs and lead. It is recommended that additional sediment samples be collected near AS12-SD12 bi-annually (every 2 years) and at the five-year sampling events until a final remedy for OU4 is implemented. These samples should be analyzed for lead.

MS-13

MS-13 is located outside of a dry dock, in the Dry Docks AOC offshore of Sites 5 and 31. Eight rounds of interim offshore monitoring were conducted at MS-13 with the last round of sediment samples analyzed for PAHs only. Most PAH concentrations were less than IRGs or just slightly exceeded IRGs. The concentrations of all four PAHs with IRGs were less than IRGs during Round 8. Because of the infrequent number of exceedences of the IRGs over the eight rounds of sampling and because the data do not indicate any impacts from IRP sites, it is recommended that interim offshore monitoring be discontinued at MS-13.

MS-14

This station is located in the western most part of the back channel in the Dry Docks AOC offshore of Sites 5 and 31. Eight rounds of interim offshore monitoring were conducted at MS-14 with the last round of sediment samples analyzed for PAHs only. PAH concentrations in most samples were less than IRGs during Round 1 through 6, and no concentrations of PAHs were greater than IRGs during Rounds 7 and 8. Because of the infrequent number of exceedences of the IRGs over the eight rounds of sampling and because the data do not indicate any impacts from IRP sites, it is recommended that interim offshore monitoring be discontinued at MS-14.

6.1.6 Reference Stations

The Navy believes that the reference sample data set is adequate for making decisions, so additional reference samples do not need to be collected as part of the OU4 Interim Offshore Monitoring Program.

6.2 OTHER MONITORING ACTIVITIES

The following sections present conclusions and recommendations for the other monitoring activities conducted as part of the OU4 monitoring program.

6.2.1 Mussel Sampling

Mussel samples were collected at each monitoring station and each reference station for the first seven rounds of interim offshore monitoring. Mussels were collected to develop site-specific BSAFs/BAFs, to have data available to evaluate risks to humans, and to monitor locations where sediment is not present. There is no need to recalculate BSAFs at this time because mussels are not being used to predict sediment concentrations at locations (MS-11) where sediment is not present. The results of the seven rounds of mussel samples collected to date could be evaluated in the future should the current ban on harvesting mussels in the Pisquataqua River be lifted. Therefore, the Navy recommends discontinuing mussel sampling at all monitoring and reference stations as part of the Interim Offshore Monitoring Program.

6.2.2 Dioxin/Furan Risk Evaluation

The dioxin/furan risk evaluation was conducted to evaluate risk to human and ecological receptors from dioxins/furans in sediment (risks to humans, birds, and fish) to determine if the risks posed by dioxins/furans warrant their retention as analytes in the Interim Offshore Monitoring Program. The following bullets summarize the results of the risk evaluation for dioxins/furans:

- No intertidal sediment sample had a dioxin/furan TEQ values greater than the human health screening level at MS-08. No intertidal sediment was available at MS-09 so the human health screening was not conducted at this monitoring station. PCB TEQ values exceeded the human health screening level at monitoring station MS-08, Loc. 1 during Round 7, but were less than the human health screening level during Round 8, 9, and 10.

- Based on actual mussel data from Rounds 1 through 7, impact to birds consuming mussels are unlikely to occur from dioxins/furans and are likely to be similar impacts at reference stations from dioxin-like PCBs.

- In Rounds 9 and 10, the average total TEQ concentrations at MS-09 was less than the screening level for fish, and the concentrations in Rounds 7 and 8 were less than two time the screening level. Therefore, it is not likely that fish will be significantly impacted from dioxins/furans or dioxin-like PCBs from the site.

In summary, risks from dioxins/furans to humans and ecological receptors are low and do not support the continued analysis of dioxins/furans in future sampling rounds. However, as discussed in the OM&M Plan for OU3 (TtNUS, June 2006) dioxins/furans were not included in the analyte list for groundwater because dioxins/furans are hydrophobic and unlikely to be present in the groundwater at detectable levels. Because dioxins/furans bound to soil particles may migrate from the landfill to the offshore area and adsorb to the sediment, the sediment offshore of OU3 in Clark Cove is being analyzed for dioxins/furans as part of the interim offshore monitoring program. Therefore, the Navy is not recommending deleting dioxins/furans from the monitoring program at MS-07, MS-08 or MS-09.

6.2.3 Metals Analytical Methods Evaluation

An evaluation was conducted to determine whether to continue to use NOAA analytical methods for metals analysis of sediment for data to use USEPA analytical methods. The following bullets summarize the results of this evaluation:

- Good correlation of sample results between NOAA and USEPA analytical methods were observed for copper, lead, and nickel.

- NOAA results were consistently greater than USEPA results, suggesting that some percentage of these metals are bound in the sediment matrix, which is extracted in the complete digestion using NOAA method but is not extracted in the recoverable digestion used in the USEPA method.

It is recommended that future sediment samples be analyzed for metals using standard USEPA analytical methods (USEPA Method 6010B/6020 for all metals except mercury and USEPA Method 7471A for mercury). It is also recommended that the regression equations be used to convert the IRGs for copper and nickel developed using the NOAA method to IRGs based on results from the USEPA analytical method. For lead, it is recommended that the regression equation be used to convert lead concentrations when using standard USEPA analytical methods for comparing future results to previous results analyzed using NOAA methods.

TABLE 6-1

SUMMARY OF RECOMMENDATIONS FOR INTERIM OFFSHORE MONITORING
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

AOC/Monitoring Activity	Monitoring/Reference Station	IRP Site/OU	Recommendation
Back Channel	MS-01	Site 34 (OU9)	• Conduct interim offshore monitoring during five-year sampling events (next scheduled for 2013) until a final remedy for OU4 is implemented. • Analyze samples for PAHs.
	MS-02	None	• Discontinue interim offshore monitoring.
	MS-03 and MS-04	Site 32 (OU7)	• Conduct interim offshore monitoring during five-year sampling events (next scheduled for 2013) until a final remedy for OU4 is implemented. • Analyze samples for PAHs and copper.
Jamaica Cove	MS-05	OU3	• Conduct interim offshore monitoring bi-annually (every 2 years) and at five-year sampling events until a final remedy for OU4 is implemented. • Analyze bi-annual samples for copper, lead, and nickel. • Analyze five-year samples for PAHs and metals.
	MS-06		• Discontinue interim offshore monitoring.
Clark Cove	MS-07	OU3	• Conduct interim offshore monitoring during five-year sampling events (next scheduled for 2013) until a final remedy for OU4 is implemented. • Analyze samples for PAHs, 4,4'-DDT, dioxins/furans, PCBs, and metals.
	MS-08 and MS-09		• Conduct interim offshore monitoring bi-annually (every 2 years) and at five-year sampling events until a final remedy for OU4 is implemented. • Analyze bi-annual samples for PAHs, 4,4'-DDT, copper, lead, nickel, and dioxins/furans. • Analyze five-year samples for PAHs, 4,4'-DDT, metals, PCBs, and dioxins/furans.
Sullivan Point	MS-10	None	• Discontinue interim offshore monitoring.
DRMO Storage Yard	MS-11	Sites 6 and 29 (OU2)	• Conduct interim offshore monitoring during five-year sampling events (next scheduled for 2013) until a final remedy for OU4 is implemented. • Analyze samples for copper, lead, and nickel.

TABLE 6-1

SUMMARY OF RECOMMENDATIONS FOR INTERIM OFFSHORE MONITORING
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

AOC/Monitoring Activity	Monitoring/Reference Station	IRP Site/OU	Recommendation
Dry Docks	MS-12	Sites 5 and 10	• Conduct interim offshore monitoring during five-year sampling events (next scheduled for 2013) until a final remedy for OU4 is implemented. o Analyze samples for PAHs and lead. • Collect additional sediment samples near AS12-SD12 bi-annually (every 2 years) and at five-year sampling events until a final remedy for OU4 is implemented. o Analyze samples for lead.
	MS-13 and MS-14	Sites 5 and 31	• Discontinue interim offshore monitoring.
None	All reference stations	None	• Do not collect sediment samples as part of the OU4 interim offshore monitoring program.
Analytical Methods for Metals	None	None	• Analyze future sediment samples using standard USEPA analytical methods (USEPA Method 6010B/6020 for all metals except mercury (and USEPA Method 7471A for mercury). • Use regression equations to compare results from USEPA and NOAA analytical methods and to convert IRGs for copper and nickel, when necessary.

AOC – Area of Concern
IRG – Interim Remediation Goal
IRP – Installation Restoration Program
NOAA – National Oceanic and Atmospheric Administration
OU – Operable Unit
PAHs – Polycyclic aromatic hydrocarbons
USEPA – United States Environmental Protection Agency

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APPENDIX A

PHASE II ADDITIONAL SCRUTINY AT MONITORING STATION 01

TECHNICAL MEMORANDUM
PHASE II ADDITIONAL SCRUTINY AT MONITORING STATION 01
OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1.0 INTRODUCTION

This Technical Memorandum for Phase II Additional Scrutiny at Monitoring Station 01 (MS-01) at Operable Unit (OU) 4, Portsmouth Naval Shipyard (PNS), Kittery, Maine, was prepared by Tetra Tech NUS, Inc. (TtNUS) for the United States Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract Number N62472-03-D-0057, Contract Task Order (CTO) 123. These Phase II additional scrutiny activities were conducted in accordance with the Interim Offshore Monitoring Plan for OU4 (TtNUS, October 1999) and the Phase II Additional Scrutiny Quality Assurance Project Plan (QAPP) (TtNUS, September 2007). The environmental activities at OU4 are being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

1.1 OBJECTIVE AND SCOPE

This technical memorandum presents the Phase II additional scrutiny activities conducted at MS-01, including the investigation procedures and the results.

The Phase II additional scrutiny investigation for MS-01 was conducted from November 5 to November 9, 2008, in accordance with the Phase II Additional Scrutiny QAPP (TtNUS, September 2007). The Phase II investigation at MS-01 was conducted concurrently with a portion of the Phase II additional scrutiny investigation for MS-12 and Round 9 sediment sampling for the Interim Offshore Monitoring Program. The results of the investigation for MS-12 and Round 9 sampling are not discussed in this technical memorandum. Results of Phase II additional scrutiny at MS-12 and an evaluation of the Round 9 data will be discussed in separate documents.

1.2 BACKGROUND INFORMATION

This section presents background information on MS-01 and associated offshore monitoring activities.

1.2.1 MS-01 Location and Description

MS-01 is located in the Back Channel of the Piscataqua River, offshore of Site 34 (Former Oil Gasification Plant, Building 62) as shown on Figure 1. The intertidal area is relatively narrow, with generally 20 to 40 feet between mean high and mean low tide elevations. MS-01 is located in an area where the width of the channel decreases, and the water velocity is very fast during incoming and outgoing tides. As a result, grain size analysis for previous sediment samples collected at MS-01 indicates that the average silt content in the sediment at this station is less than 9 percent, and the average sand content is greater than 80 percent (TtNUS, November 2004). Section 1.4 of the Additional Scrutiny QAPP (TtNUS, August 2005) and Section 4.0 of the Additional Scrutiny Report (TtNUS, August 2007) present more information regarding MS-01.

The Piscataqua River is part of the tidal Great Bay Estuary, and in the vicinity of PNS, the water is predominantly saline (salinities greater than 20 parts per thousand). The mean tidal range in the vicinity of PNS is approximately 8 feet, and average tidal currents (ebb and flood) are generally strong (around 3 to 4 knots). The water from the river is not used for human consumption. The river is used for commercial recreational boating, industrial wastewater discharge to the river, and storm sewer drainage to the river. The Back Channel is approximately 20 feet deep (mean low water) and is generally used for recreational boating (TtNUS, October 1999). Some commercial fishing (lobstering) also occurs in portions of the Back Channel.

1.2.2 Summary of Interim Offshore Monitoring Program for MS-01

Interim offshore monitoring is being conducted at OU4, including MS-01, as required by the Interim Record of Decision for OU4 (Navy, May 1999), in accordance with the Interim Offshore Monitoring Plan (TtNUS, October 1999) with revisions based on the Baseline Interim Offshore Monitoring Report (TtNUS, July 2002) and the Rounds 1 through 7 Interim Offshore Monitoring Program Report (TtNUS, November 2004). Based on the Rounds 1 through 7 Report, additional scrutiny was required at several monitoring stations, including MS-01. The Additional Scrutiny QAPP and Report (TtNUS, August 2005 and August 2007) describe the investigation and results for MS-01. A second phase of additional scrutiny investigation was recommended for MS-01, which was described in the Phase II Additional Scrutiny QAPP (TtNUS, September 2007).

Based on the Rounds 1 through 7 interim offshore monitoring data, the primary environmental concern for this monitoring station is polycyclic aromatic hydrocarbons (PAHs) in sediment that may be from past activities at Site 34. Several sediment PAH concentrations in samples at MS-01 exceeded the OU4 Interim Remediation Goals (IRGs) (TtNUS, November 2004). 4,4'-DDT

was identified as a secondary concern because two detections of 4,4-DDT in sediment at MS-01 exceeded the OU4 Preliminary Remediation Goal (PRG).

The Navy prepared the Additional Scrutiny QAPP (TtNUS, August 2005) to collect additional data at several monitoring stations, including MS-01. The investigations detailed in that QAPP were implemented in August 2005. The primary objectives of the additional scrutiny as they relate to MS-01 were to:

- Determine whether Site 34 is a primary source of PAHs in the offshore sediment at MS-01.

- Determine whether past pesticide rinsing operations associated with Site 34 were a primary source of 4,4'-DDT in offshore sediment at MS-01.

The results of the additional scrutiny activities were presented in the Additional Scrutiny Report (TtNUS, August 2007). Based on several lines of evidence evaluated in the report, the following conclusions were made for MS-01:

- A limited area of contamination near AS01-SD03 may be related to past sources of PAHs from Site 34.

- Based on the available data, it cannot be determined whether past pesticide rinsing operations associated with Site 34 were clearly a primary source of 4,4'-DDT in sediment at MS-01. However, the more likely source of 4,4'-DDT is erosion of soil containing 4,4'-DDT as a result of past pesticide spraying activities at the site.

It was determined that pesticides did not need to be further evaluated at this monitoring station because the source of the pesticides was likely typical spraying activities and not disposal activities.

It has been difficult to collect sediment at MS-01 subtidal locations during the Interim Offshore Monitoring Program and Additional Scrutiny sampling events. The sediment grab sampler was often empty upon retrieval. In some cases, rocks or shell were stuck in the jaws of the sampler, which prevented closure of the sampler causing sediment to drain out of the sampler. Other times, the reason for little or no sediment in the sampler was not known. Multiple attempts were usually needed to successfully collect sufficient sediment volume. Therefore, it was not known whether the difficulty collecting the sediment samples resulted from a lack of sediment in the area or because the area is very rocky.

Several of the sediment samples had PAH concentrations that exceeded their respective IRGs, so sediment invertebrates living in those sediments may be impacted by the PAH contamination. Because the amount of sediment with concentrations of PAHs greater than the IRGs has not been determined, the significance of the impacts to sediment invertebrates from PAHs is not known. For example, small shallow patches of sediment typically would maintain fewer sediment invertebrates than large areas of deeper sediments. For these reasons, it was determined that the next step for evaluating the offshore area at MS-01 was to conduct a Phase II additional scrutiny investigation to determine whether sufficient sediment is present in MS-01 to warrant the consideration of a removal action.

2.0 INVESTIGATION METHODOLGIES

This section describes the investigation methodologies conducted as part of the Phase II additional scrutiny at MS-01 in accordance with the Phase II QAPP (TtNUS, September 2007). From November 5 to 9, 2007, a sediment profile survey was conducted to determine the nature of the river bed substrate over an area of approximately 150 feet by 300 feet. The survey was conducted by Ecotones, Inc., with assistance and oversight by TtNUS personnel.

The main objective of this investigation was to determine whether sufficient sediment is present at MS-01 to warrant the consideration of a removal action. The underwater video from the sediment profile survey was also used to determine the presence of any valued habitat in the area such as eelgrass beds that would need to be considered as part of a removal action. In the Phase II Additional Scrutiny QAPP (TtNUS, September 2007), the spatial extent and depths of sediment at various locations within the investigation area were to be estimated by visual observations with a video camera or still photographs, visual observations using an aqua scope, and "probing" the sediment with a pole and listening to the noise generated and feeling the amount of penetration. Once in the field, however, the methodology was modified slightly to obtain better information regarding the spatial extent and depth of sediment. The aqua scope was not used because the underwater video provided better resolution of the bottom substrate.

The survey was completed using two methods. In shallower areas, an underwater video camera was attached to a long pipe. A 2-foot-long metal probe was attached to the end of the pipe and marked off in 6-inch increments using white and black electrical tape to help determine the depth of penetration into the sediment. The pole was lowered slowly until the sediment could be seen on the video screen and then the probe was pushed into the sediment. The approximate depth of sediment penetration was recorded, as were the horizontal coordinates of each survey location. This methodology provided better sediment depth information than listening to the noise

generated and feeling the amount of penetration. At locations where the water depth was greater than the length of the pole, a second method was used to conduct the survey. The underwater camera and 2-foot metal probe were attached to a weighted line. The camera and probe were slowly lowered until they were approximately 2 to 3 feet from the bottom. When the boat reached the desired location, the line was released, the camera and probe were allowed to fall, and the approximate depth of sediment penetration was recorded. This method was not as effective as the pole method because there was less force to push the probe into the sediment and the probe would sometimes tilt on the way down and was not perpendicular to the sediment. A recording of the underwater video was made for each location for later review. Figure 2 shows the locations of each of the sediment probes. Attachment A, of this memorandum, provided on CD, contains an electronic copy of Figure 2 with hyperlinks to the video.

Initially, sediment depth surveying was to be conducted along transects in the east-to-west direction (i.e., downstream to upstream), and the probes were to be attempted approximately 15 feet apart, in accordance with the Phase II QAPP (TtNUS, September 2007). However, because of strong currents in this area, it was difficult to stay in straight transects and exactly 15 feet apart. Therefore, after approximately 80 probes were completed, locations where probing was conducted were viewed on a global positioning system (GPS) unit, and 18 additional probings were completed to fill in gaps in the spacing. After all the probings were completed, videos of the sediment were recorded along three transects by attaching the camera to the weighed rope and suspending it just above the bottom surface as the boat moved along each transect. The three transects are also shown on Figure 2. Attachment A of this memorandum, provided on CD, contains an electronic copy of Figure 2 with hyperlinks to the video

3.0 PHASE II ADDITIONAL SCRUTINY RESULTS

This section provides the results of the Phase II additional scrutiny evaluation for MS-01.

After returning from the field, the underwater video was reviewed to better refine the penetration depth of the probe at each location. Table 1 presents a summary of the approximate depths of sediment at the survey locations.

The underwater video was also reviewed to provide a physical description of the bottom substrate at each location. The video for a few of the locations was unclear because the boat was moving too fast, the probe was lowered too fast, or the probe landed sideways. However, enough information was obtained to characterize the bottom substrate.

In general, the substrate consists of small rocks and shells interspersed within the sediment. Most rocks are 2 to 3 inches or smaller in diameter, but some larger rocks are present. No valuable habitats such as eelgrass beds were observed. There appears to be a sufficient amount of sediment throughout MS-01 to support a significant benthic population. The density of the rocks appear to increase further from the shore, somewhere between transects 1 and 2 on Figure 2.

The depth of sediment was greater than 18 inches at some locations, while the sediment probe hit rocks on the surface at other locations. There was no apparent pattern to sediment depth, and, although numerous probing attempts hit rock, the accompanying videos for those probing points show rocks embedded in the sediment. Measured depths decreased substantially when the weighted probe was used instead of the pole. However, this was almost certainly a result of the change in methodology, which did not allow the probe to be pushed into the sediment, and not because the sediment was not as deep in those areas.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the probing survey, the substrate at MS-01 consists of sediment interspersed with numerous small rocks and shells. The density of rocks and shells appears to increase further away from shore. The sediment depth was greater than 1 inch at most locations Most of rocks at MS-01 are 2 to 3 inches or smaller in diameter, but some larger rocks are present. Based on the results of this investigation, the difficulty in collecting sediment at MS-01 using a grab sampler is attributed to the presence of rocks and/or shells in the sediment as opposed to the lack of available sediment on the river bottom. The rocks and shells would get caught in the jaws of the grab sampler preventing it from closing completely and may have prevented the sampler from laying flat on the river bottom. The sediment present may provide suitable habitat for benthic invertebrates and other aquatic biota.

Because there is sufficient sediment to provide suitable habitat for aquatic life, additional data are needed to delineate the extent of PAH contamination in sediment at MS-01. The extent of PAH contamination would be used to determine whether a removal action or other remedial action is necessary for MS-01. It is recommended that the extent of PAH contamination in sediment at MS-01 be conducted as part of the RI for OU9.

Because of the rocks present in sediment at MS-01, alternative methods to collect sediment should be considered for future sampling events. One method may include using a core sampler to collect sediment from areas between the rocks. A camera could be mounted to the sampler to aid in this effort. A second method could involve using divers to collect the sediment, but the fast

currents in this area may make that difficult. Finally, a smaller grab sampler, such as a petite ponar, might have better success obtaining sediment from small areas between rocks.

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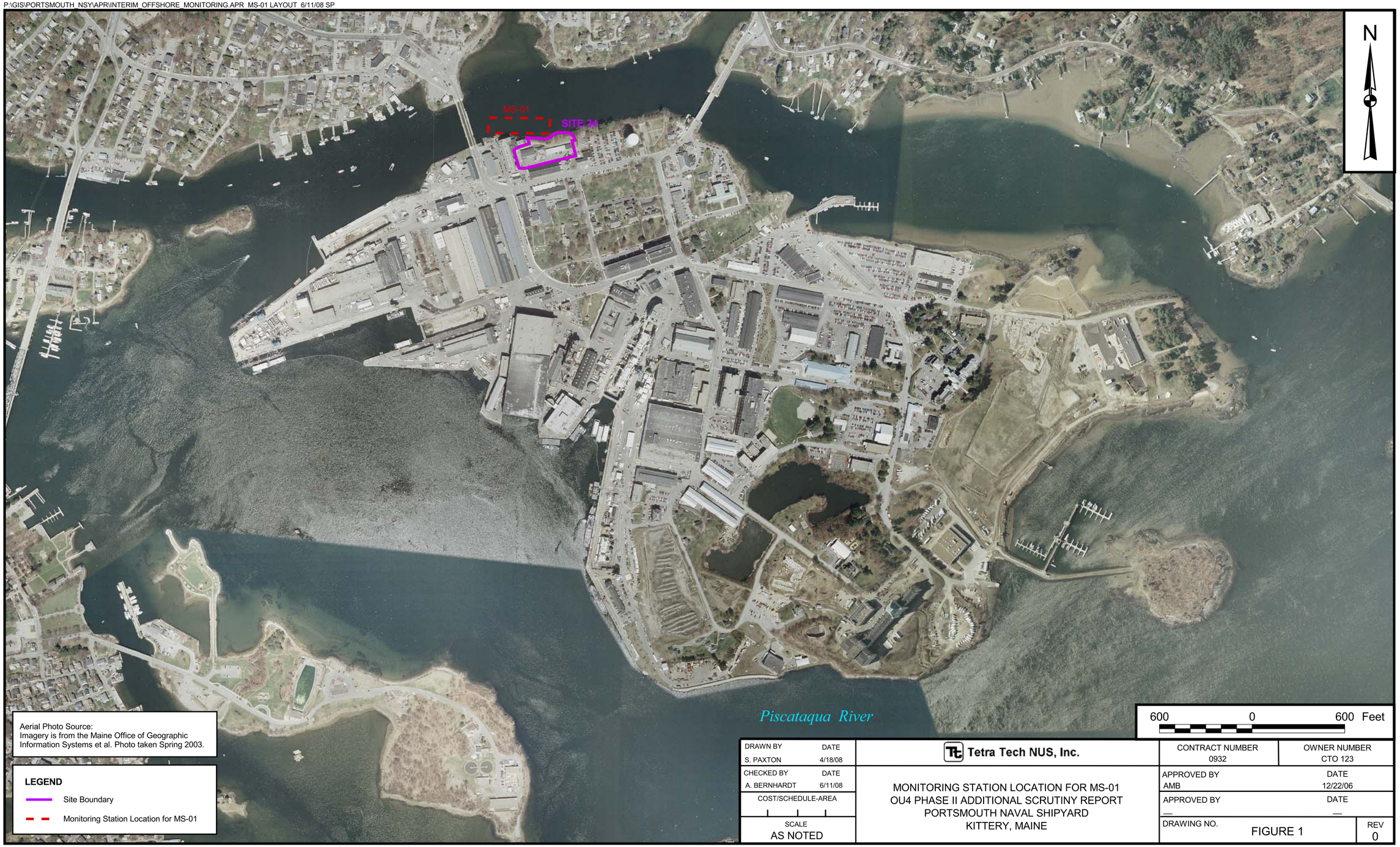
TABLE 1

SEDIMENT PROBING DEPTHS AT MS-01
PHASE II ADDITIONAL SCRUTINY AT MONITORING STATION 01
OPERABLE UNIT 4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Probe Location	Approximate Penetration Depth (inches)	Probe Location	Approximate Penetration Depth (inches)	Probe Location	Approximate Penetration Depth (inches)
Underwater Camera Attached to Pole					
001	8	**022**	12	**043**	12
002	2	**023**	6	**044**	4
003	2	**024**	16	**045**	14
004	5	**025**	0	**046**	10
005	5	**026**	6	**047**	6
006	0	**027**	14	**048**	>18
007	0	**028**	12	**049**	6
008	5	**029**	6	**050**	10
009	0	**030**	15	**051**	10
010	6	**031**	10	**052**	8
011	0	**032**	2	**053**	10
012	2	**033**	0	**054**	3
013	3	**034**	1	**055**	10
014	3	**035**	6	**056**	12
015	2	**036**	6	**057**	10
016	>18	**037**	12	**058**	6[(1)]
017	>18	**038**	>18	**059**	12
018	0	**039**	12	**060**	8
019	8	**040**	12	**061**	6
020	9	**041**	8	**062**	>18
021	6	**042**	12	**063**	10[(1)]
Underwater Camera Attached to Weighted Probe					
064	6	**076**	4	**088**	2
065	0	**077**	0	**089**	4
066	4	**078**	0	**090**	4
067	6	**079**	2	**091**	2
068	0	**080**	2	**092**	4
069	4	**081**	6	**093**	6
070	0	**082**	2	**094**	4
071	0	**083**	6	**095**	4
072	3	**084**	3	**096**	4
073	0	**085**	3	**097**	2
074	0	**086**	2	**098**	2
075	0	**087**	4		

1 - Depth estimated from visual observation in field because no video was available.

P:\GIS\PORTSMOUTH_NSY\APR\INTERIM_OFFSHORE_MONITORING.APR MS-01 LAYOUT 6/11/08 SP



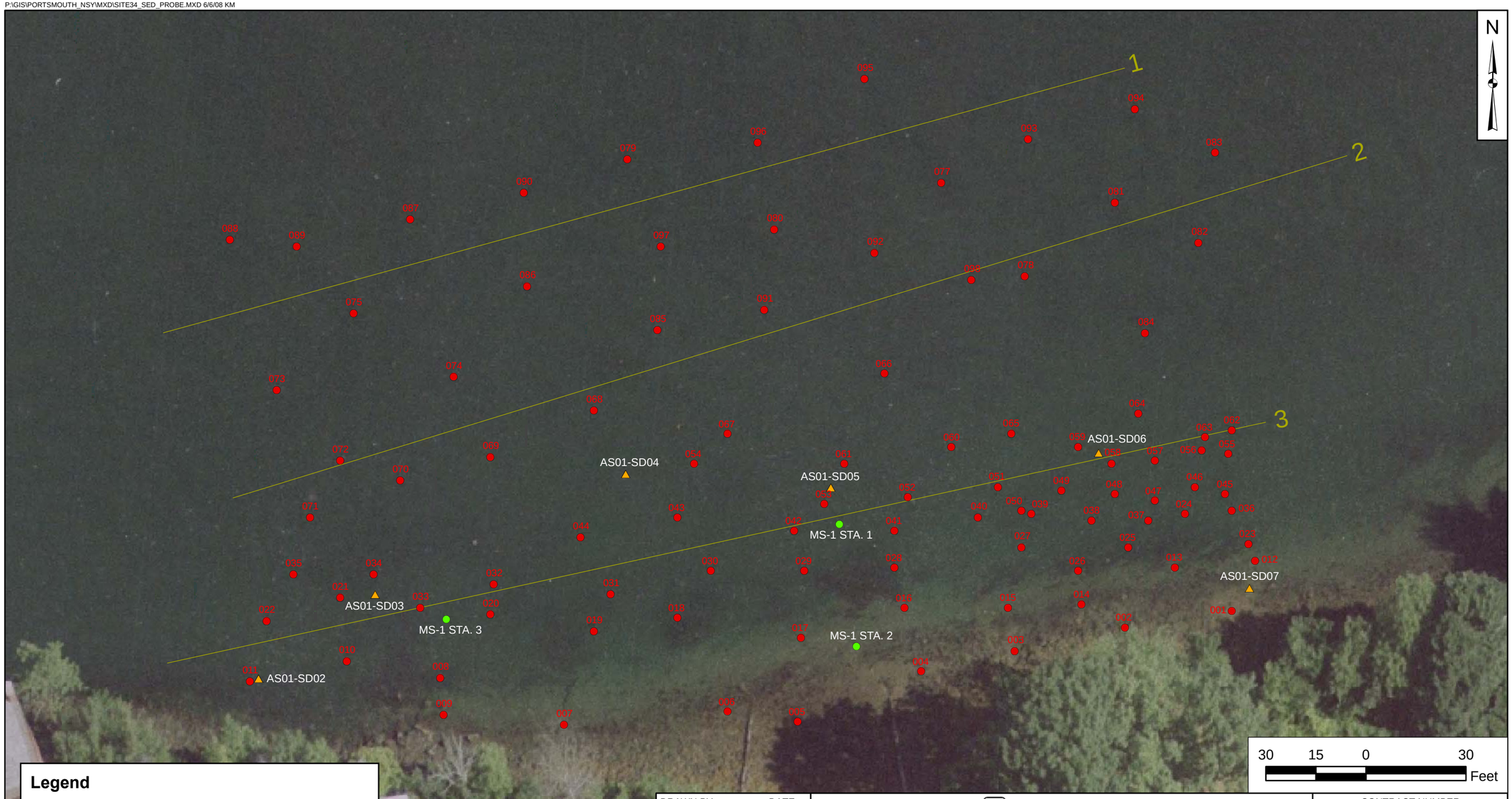
Aerial Photo Source:
Imagery is from the Maine Office of Geographic Information Systems et al. Photo taken Spring 2003.

LEGEND

- Site Boundary
- Monitoring Station Location for MS-01

DRAWN BY S. PAXTON	DATE 4/18/08	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0932	OWNER NUMBER CTO 123
CHECKED BY A. BERNHARDT	DATE 6/11/08	MONITORING STATION LOCATION FOR MS-01 OU4 PHASE II ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB	DATE 12/22/06
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1	REV 0

P:\GIS\PORTSMOUTH_NSY\MXD\SITE34_SED_PROBE.MXD 6/6/08 KM



Legend

- Interim Offshore Monitoring Program Station Location
- Additional Scrutiny Sediment Sample Location
- Sediment Probe Location
- Underwater Video Transect

DRAWN BY K. MOORE	DATE 4/9/08	Tetra Tech NUS, Inc.	CONTRACT NUMBER CTO 123
CHECKED BY P. SMITH	DATE 6/6/08	SEDIMENT PROBING SURVEY LOCATIONS AT MS-01 OU4 PHASE II ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ DATE ___
COST/SCHED AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 2 / REV 0

ATTACHMENT A

UNDERWATER VIDEO

To start the video for each sample location or transect:

1) **Open up Figure 2.**
2) **Place the cursor on the sample point.**
3) **Click the left button on the mouse (for a right-handed mouse).**

APPENDIX B

SUPPORTING INFORMATION

B.1 SAMPLE AND STATION DESCRIPTIONS

B.2 POSITIVE DETECTION TABLES FOR MS-05, MS-08, MS-09 AND MS-12

B.3 CONCENTRATION FIGURES FOR MS-05 AND MS-09

B.1 SAMPLE AND STATION DESCRIPTIONS

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M01-1	1	0.5-1	sandy, somewhat mottled		
	2	1	0-1 cm (coarse yellow sand and gravel); 1-10 cm (mottled transition zone; grades to black silty sand); 7-8 cm (worm burrows)	many clam worms	
	3	1-2	0-2 cm (light brown coarse sand with gravel); 2-9 cm (black sandy silt with shell pieces); many rocks and shells, including mussel shells	hermit crab, snail, many worms; young starfish, sea stars, sea urchins, and brittle star	
	4	0.5-2	0.5-2 cm, reddish brown, mottled 3-5, black 5-10 cm, silty coarse sand; cobbles on surface, shelly sediment	Crab in grab, lots of redworms, and crepidula shell; Eelgrass on anchor (none visible from boat, too deep)	
	5	3.0	0 to 3 cm light brown/medium yellow sandy gravel; 3 to 8.5 cm dark gray silty sand; at depth sediment changes from coarse to silty sand	Large mussel, hermit crab, snails, worms, shell fragments on surface	
	6	3	black sand to a sand mix	Snails, worms	
	7	2.5	brown coarse sand, little silt	worms	difficult to collect grabs (rocks, shells prevented good grabs)

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M01-2	1	0.3	0-0.3 cm(thin layer of mud); 0.3 - 10 cm (sandy area with smaller rocks); primarily 0-6 cm was collected, but collected some 0-10 cm because of hard substrate.	abundant ascophyllum, fucus, and many mussels	very rocky (sharp rocks), intertidal, gentle slope
	2	12	surface (armor of cobbles); 0-12 cm (light to medium brown); >12 cm (reddish dark brown); sediment was gravelly coarse sand	abundant mussels and worms	cobbled intertidal zone
	3	>7	light to medium brown coarse sand and gravel		
	4	9	coarse sand and gravel medium to light brown, beneath redox red to reddish brown		
	5	none observed	coarse sand and gravel; below 6 cm sand was rusty red color	mussels	Collected mussels within 5 feet of sediment
	6	no redox	light brown sand and gravel	mussels, snails, brown algae	sediment collected by marker; ledge drops steeply to gravel; sand slope down to water
	7	no redox	brown coarse sand	mussels, periwinkles, brown algae, ascophyllum, fucus, mastocarpus	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M01-3	1	0.5-1	surface (black sand lag); below (dense sandy/clay silt); several worm burrows	many large clam worms, pipe fish, mostly large mussels (6-7 cm).	gravel, shells, seaweed made it difficult to collect grabs, added weights to grab
	2	4-6	surface (many mussel shells); 0-4 cm (dark brown coarse sand); 4-10 cm (grades to dark gray silty sand)	some large mussels; one sea anemone	very strong current; due to the lack of sediment present, >3 grabs were required
	3	2	surface (cobbles and mussel shells); 0-2 cm (medium to light brown sand with cobbles); 2-11 cm (mottled dark brown and black sandy silt with worm tubes)	many worms, mussel (dead), some green algae, other plant material	
	4	5-10	0-3.5 cm brown; 5-10 cm mottled black and gray gravelly silty sand, shelly; rocks/gravel on surface	Big clam worm, lots of red worms, kelp, lots of small snails (alive).	Very strong current. It is >4m deep but CTD won't go down and is moving up and down in the current.
	5	3.0	0 to 3 cm dark/medium yellow gravelly sand; 3 to 8 cm black silty sand	numerous shells, worms; mussels	Only able to sample to 8 cm
	6	3	sand, pebbles on top; sandy silt mix underneath	small crabs and worms	slight oil sheen from grab; difficult to collect grabs (rocky); 10 attempts
	7	0.3	brown surface then black; sand silt, some clay, and shells	mussels	difficult to collect grabs; had to relocate several times

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M02-1	1	3-4	surface (brown); below (black gray); sediment was sandy/clay silt, mottled, with many worm burrows	many large clam worms; abundant green, brown, and red algae on surface	
	2	1	0-1 cm (light brown); 1-10 cm (black); sediment was silty sand with gravel	many mussels	difficult to collect sediment because of the large quantity of mussels
	3	2.5	0-2.5 cm (gravel with coarse brown sand); 2.5-6 cm (light gray clayey silt); many rocks		bullets present in the sediment; very strong currents made it difficult to maintain the same position
	4	0-3	0 to 1-3cm light brown silty sand 1-3 to 6-10 cm mottled brown/black; very shelly	Tube worms	Area contained high currents and eddies
	5	none observed	0 to 7 cm mottled medium yellow/light gray/medium gray sandy/silty gravel with cobbles	mussels, crab shells	difficult to anchor, grabs consisted of gravel and rocks with some shell material; mussels collected ~20 feet from station
	6	2.8	light sand and gravel top; then firm, clayey black silt	worms and ribbon worms	grabs consisted of rocks; 10 to 11 attempts; had to move around to get grab; mussels collected underwater from rocky shoal at low tide
	7	0.7-2.3	brown sand and some black silt	shells, mussels, clams, hermit crabs	grabs consisted of rocks; 10 to 12 attempts; had to move around to get grab-collected sample about 20 feet from dock

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M02-2	1	1.2	0-1.2 (brown); 1.2-4 cm (gray silty sand); 4-10 cm (gray sandy gravel)	good mussel bed; abundant seaweed	15-20 feet east of old boat ramp in mud flat
	2	0.5	0-0.5 cm (gray silt and sand); 0.5-3.5 cm (black silt and sand); 3.5-10 cm (orange/brown coarse sand)	abundant mussels	sampling location is 2 feet seaward of the station marker
	3	0.2	surface (covered with mussel shells); 0-0.2 (medium brown silt); 0.2-3 cm (black silty mud with sand); 3-10 cm (brown sand); sediment contains gravel		
	4	0-5	coarse sands/rocks	Mussel shells	
	5	1.5	0 to 1.5 cm dark gray and black coarse sand with gravel;1.5 to 8 cm light brown coarse sand with gravel	mussels	Only able to sample to 8 cm; mussels collected within 5 feet of sediment
	6	0.1	0 to 1 mm light brown silt with gravel; dark brown silt to 7 cm; 7 to 10 cm brown sand	mussels, snails, brown algae, barnacles	rocky steep drop to gravel sediment slope
	7	1.5-2	rock, sand, light mud with organic layer		collected one foot east of marker

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M02-3	1	9	black/dark brown silt with rhizome roots	salt marsh	50-75 foot intertidal zone; mostly rocky with mussels and mudflat closer to water
	2	none recorded	saltmarsh mud with *Spartina alterniflora* roots	mussels, *Spartina alterniflora*	rocky intertidal zone; sampling location is 3.5 feet seaward of the station marker
	3	>10	0-10 cm (silt with marsh grass roots)	marsh grass	
	4	none observed	0-2 cm light brown silt with roots (salt marsh); 2-10 cm dark brown silt with roots.	Mussels 20-30 from sample location	No metal debris noted
	5	none observed	clay	mussels; marsh grass roots throughout	Collected mussels within 25-30 feet of sediment
	6	no redox	brown mud	mussels; salt marsh vegetation	collected mussels 50 feet from marker
	7	no redox	mud with organic matter, roots	salt marsh	collected sediment about 2 feet west of marker; collected mussels about 25 feet from sediment

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M03-1	1	0.7	0-0.7 cm (brown); 0.7-10 cm (black); sediment was muddy clay with trace gravel; high water content	mussels; algae on rocks	near seep BC 1018; large flow of water from seep; creating a "cove" at low tide with 1' of water; sediment/mussels collected at top of "cove"
	2	0.1	0-0.1 cm (brown silt with clay); 0.1-10 cm (black clayey silt)	abundant mussels toward shore	sampling location is on the bank of seep BC 1018, 5 feet seaward of the station marker in a straight line from the short piling
	3	0.2	none recorded		sampling location is approximately 10 feet east of seep BC 1018
	4	0.5-10	0-0.5 cm, light brown sandy silt; 0.5-10 cm dark gray sandy silt; sporadic shells 0-10 cm, some plant strands, approx 10 cm shell hash layer	Hundreds of mussels	Some metal debris present
	5	0.5	0 to 0.5 cm light brown clayey silt with gravel; 0.5 to 10 cm dark gray/black clayey silt with gravel	mussels	collected mussels within 8 feet of sediment
	6	<0.1	black mud	mussels, barnacles, worms, brown algae	high flow seep starts @25 feet from edge of grass at top of hill; no pipe visible; lots of copper/slag material in sediment; sediment collected 2-3 feet from large seep
	7	0.1	thin layer of light brown silt then black silt with gravel	mussels, periwinkles	sediment collected 3-4 feet from large seep and about 1 foot from marker; approximately 1 foot up from mudflat in rocky area but sample was "mud"

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M03-2	1	1	0-1 cm (brown); 1-10 cm (gray/black); sediment was a silty clay	abundant mussels within 3-10 feet of sample; harder substrate, seaweed present	near seep BC 1020; much anthropogenic debris (i.e., metal, plastic); 100 feet intertidal zone (50' rock, 50' mudflat); collected sediment 2-3" from main rivulet because silt present (sand/gravel in rivulet)
	2	1.5	0-1.5 cm (brown silty clay); 1.5-10 cm (black silty clay with small pebbles)	mussels	upper layer of sediment has more pore water; sampling location is 3 feet seaward of the station marker in a straight line from the tallest birch tree
	3	0.1	0-0.1 cm (black silt); many rocks	snails	sampling location is 15 feet west of the seep
	4	0-2	0 - 2 cm, light gray silt black below, silty-sand, small pebbles	Lots of shells and mussels	Much metal debris, copper
	5	0.5	0 to 0.5 cm light brown silt; 0.5 to 10 cm very fine black sandy silt with gravel	mussels; snails abundant	in seep - a lot of sediment has been carried away; sediment taken 1.5 feet west of seep
	6	0.2	light brown to dark brown, silty sand mixed with gravel	mussels, snails, brown algae	gravel, silt slopes to mud flat; seeps present (sheet flow); sediment collected in seep
	7	0.1	light brown fine silt to gravel surface; black fine silt to gravel below ; sand near 10cm	mussels, periwinkles, fucus, ascophyllum	sediment collected in mudflat in seep; mussles collected 10-15 feet from marker

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M03-3	1	0.5-1	black sandy silt; many worm burrows		
	2	1-2	0-2 cm (medium brown); 2-10 cm (mottled brown and black); sediment was sandy, clayey silt, more fine-grained at the bottom; 0-6 cm (many worm burrows); some shells	many worms	
	3	2-3	0-2 cm (brown); 2-10 cm (mottled gray and black); 8-10 cm (black fades to gray); sediment was sandy silt; many worm tubes	large clam worm	
	4	1.5-2	0 - 2 cm, sandy silt top light brown/green; bottom gray dark	Big sand worm	
	5	2.0	0 to 2 cm reddish medium brown sandy silt; 2 to 7 cm dark gray mottled with medium brown; 7 to 12 cm medium brown clayey silt	clam worms abundant, many burrows with red linings (to 11 cm), green crab, amphipods, mussel shells, snails	dinker rock - high temp combustion product
	6	0.4	light brown to black fine silt	worms, amphipods	sample collected on edge of mudflat prior to a steep dropoff
	7	1	brown silt on surface; black silt to sand below	worms	sediment collected approximately 4 boats down from end of dock

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M04-1	1	0.3	0-6 cm (brown muddy clay); 6-10 cm (shells)	sparsely covered with seaweed and fucus; mussels present; mudflat	near seep BC-1016
	2	4	surface (cobbles); 0-4 cm (brown); 4-10 cm (black); sediment was mostly sand with some gravel, silt, and snail shells	very abundant mussels	seep BC 1016 flows across the site; mussel sampling location is 5 feet seaward of the station marker
	3	>10	coarse gravel with sand		seep BC 1016 flows across the sampling location
	4	none observed	0-10 cm brown sand with silt and some reddish pockets		No apparent redox zone; Lots of metal debris (copper & iron) around seep and upgradiant of seep
	5	none observed	gravelly sediment with coarse sand matrix	snail shells; mussels	collected mussels within 5 feet of sediment
	6	1	gravel, sand to mud sand mix	barnacles, shells, brown algae	gravel beach leading to mud flat; sampled edge of gravel
	7	no redox	brown coarse sand, gravel	mussels, periwinkles, fucus, ascophyllum, crabs, shells	sample collected within seep; approximately 8 feet from mudflat

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M04-2	1	3	0-3 cm (light brown); 3-10 cm (black)	little seaweed; mudflat; abundant clam worms	
	2	2-3.5	0-3.5 cm (medium brown); 3-6 cm (transition zone); 4-14 cm (mottled medium gray and black); sediment was clayey silt with amphipod tubes; 3-6 cm (worm burrows)		
	3	2.5-3	0 to 2.5-3 cm (medium brown); 3-8 cm (mottled medium gray and black); 8-12 cm (medium gray); sediment was sandy silt with some shells	some worms, and isopods (or decapods)	
	4	2-5	0-2 cm light brown, 2-3 cm mottled dark brown gray, 3-12 dark gray sandy silt	Gastropod shells, living snails, lots of worms, thin 5-10 cm long	
	5	2.0	0 to 2 cm light brown silt; 2 to 10 cm light gray/black mottled; 10 to 12 medium gray sandy silt	numerous worms and worm tubes, small shell pieces, amphipods, isopods	Water quality meter problems
	6	1.6	light brown to black fine silt	amphipods, worms, crabs	
	7	1.7	light brown fine silt surface, black fine silt below	worms	had to add wings to ponar to decrease penetration

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M04-3	1	none observed	brown sand and gravel; very rocky; sediment under a layer of gravel	no mussels present, saltmarsh	collected at fringe of saltmarsh
	2	none recorded	surface (cobbles); 0-10 cm (brown gravelly sand with some silt); cobble beach	small salt marsh; rock snails	sample collected from beneath cobbles; sampling location is approximately 2 feet seaward of the station marker
	3	>6	gravel and sand with many marsh grass roots		
	4	none observed	0-10 cm brown silt, sand, and gravel		
	5	none observed	0 to 2 cm very large gravel; 2 to 8 cm gravelly with sandy matrix and salt marsh grass roots		only able to sample to 8 cm
	6	no redox	brown sand, mud, gravel	brown algae, salt marsh vegetation, periwinkles	
	7	no redox	brown sand, gravel	brown algae, salt marsh vegetation	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M05-1	1	0.2	0-0.2 cm (brown); 0.2 - 10 cm (black); sediment was a silty clay	mussels and snail shells present	near seep BC-1005
	2	0.2-0.5	0 to 0.2-0.5 cm (brown); 0.2-0.5 to 10 cm (black); sediment was silty sand	mussels	sampling location is 8 inches west of the station marker
	3	1	0-1 cm (light brown); 1-10 cm (dark black); sediment was fine silt	abundant mussels and snails	sampling location is approximately 1 foot from the station marker in the mud flat
	4	1-10	Redox 1 cm; 0-1 cm light brown silt; 1-10 cm dark gray sandy silt	Hundreds of mussels	2 metal bars (look like very old rebar), copper chunk.
	5	1	0 to 1 cm greenish clayey silt; 1 to 10 cm light brown clayey silt with scattered pebbles	mussels	collected mussels within 10 to 15 feet of sediment
	6	0.6	light brown to black mud	snails, worms, many worm burrows	
	7	0.1	light brown silt surface, black thick silt below	periwinkles and fucus	No mussels on rip rap; could not locate marker, collected sediment about 5 feet from edge of rip rap; GPS located sample under rip rap

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M05-2	1	0.8	0-0.8 cm (light brown); 0.8 to 10 cm (black); floc layer on top of sediment	none observed	
	2	4	0-4 cm (medium brown); 4-8 cm (grades to gray); 8-16 cm (black); sediment was clayey silt; 0-5 cm (worm burrows)		
	3	0.8-1.4	0-1.4 cm (medium brown); 1.4-5 cm (black); 5-11 cm (mottled dark gray and black); sediment was sandy silt	algae, eelgrass bed, soft-shelled clam	
	4	3-11	0-3 cm, sandy-silt (fine sand) light brown, 3-11 cm dark gray sandy silt	Lots of red worms, worm burrows.	Sulfur odor
	5	3.0	0 to 2 cm medium brown sandy silt; 2 to 3 cm medium/dark gray silt; 3 to 10 cm mottled dark to light gray	eelgrass in grab; clam worms; snails and isopods on surface, many worm burrows	Sulfide smell
	6	0.3	light brown to black fine silt	amphipods, worms, and eelgrass	silt curtain stretched across cove; sample @150 feet from curtain
	7	0.1	brown to black silt	eelgrass	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M05-3	1	0.3	0-0.3 cm (brown sandy mud); 0.3-4 cm (mottled, dark gray/black sandy mud); 4-10 cm (brown sand, gravel, shells)	mudflat; abundant mussels	near seep BC-1012 but could not locate stakes
	2	1	0-1 cm (brown); 1-10 cm (black); sediment was gravelly silty sand	mussels	sediment sampling location is 1 foot east of the station marker
	3	1	0-1 cm (light brown silty sand); 1-10 cm (black medium sand with silt)		sampling location is adjacent to the station marker
	4	1	0-1 cm light brown silt; 1-10 cm dark brown/black sand with silt	Hundreds of mussels, but patchy; snails and seaweed present	
	5	1.5	0 to 1.5 cm light brown sandy silt; 1.5 to 10 cm gray sandy silt	mussels, many snails	collected mussels within 10 feet of sediment
	6	0.3	light brown to black; sand over black silt; sand at 10 cm	mussels, barnacles, snails, worms	sediment collected 1 foot northeast of marker; gravel beach slopes to mud flat; no seeps present
	7	<0.1	black to lighter color sand with gravel; silty sand coarse to medium grain below	shells	near house

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M06-1	1	0.5	0-0.5 cm (brown); 0.5-10 cm (black) sediment was a sandy silt	mussels present	near seep BC-1006, culvert; 71 feet intertidal zone when sampled
	2	1.5	0-1.5 cm (brown); 1.5-10 cm (black); sediment was silty	abundant mussels	sample located in seep BC 1008 (note that this sample was mis-identified as BC 1006 in the Round 1 Data Package); sediment sampling location is 7 inches southeast of the station marker
	3	0.1	0-0.1 cm (light brown); 0.1-10 cm (black); sediment was silt with some fine sand	mussels	sampling location was in seep BC 1008, approximately 1 foot seaward of the station marker
	4	4	0-4 cm light brown silty sand 4-10 cm black; some shells	Worms	
	5	1.5	0 to 1.5 cm light brown coarse sand with gravel; 1.5 to 10 cm dark gray/black coarse sand gravel in silty matrix	mussels	collected mussels within 10 feet of sediment
	6	5	0 to 1 mm fine mud; sandy mix below, small pebbles; brown to dark brown	abundant mussels, worm burrows, gastropods, barnacles, sparse brown algae	sediment collected within the seep
	7	1	light brown silt, coarse sand, with black silt and some gravel below	mussels and periwinkles	sample collected 0.5 foot from culvert

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M06-2	1	1.5	black, silty sand	mussels present	rock outcrop prevented sample from being collected in eel grass bed
	2	1-3	0-3 cm (light brown); 3-8 cm (light gray mottled with black); 8-16 cm (mottled darker black); sediment was silt; 0-8 cm (many worm burrows)	eelgrass bed, mussels	
	3	0.1	0-10 cm (dark brown sandy silt)	eelgrass (including rhizomes), algae, snails, small sea star, fish (in grab), large clam worms	used maps to find this sampling location - no GPS
	4	2-3	0-2 cm light brown sandy silt, 3-8 cm black-dark gray, 8-11 cm light brown half sand half silt (coarser)	Tube worms - looks like fecal pellets 1/2 cm. Large eelgrass bed around sed sampling station pretty big; mussels on rocks	
	5	0.5-1	0 to 1 cm light brown silty sand; 1 to 3 cm medium gray; 3 to 10 cm dark gray silty sand	grabs had kelp and eelgrass; worm burrows; one worm; mussels	several bad grabs; eelgrass bed ~100-150 yards long and 5 yards wide
	6	no redox	black fine silt	eelgrass and amphipods	eelgrass in grabs
	7	0.1	brown silt at surface, black silt below	eelgrass, worms and amphipods	eelgrass in grabs; sulfide odor

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M06-3	1	0.2	0-0.2 cm (brown); 0.2-10 cm (black) sediment was silty with abundant roots	collected at saltmarsh	
	2	none recorded	0-5 cm (thick mat of roots); 5-10 cm (gray, gravelly, fine sand and silt)	salt marsh; mussels	sampling location is 6 feet seaward of the station marker; mussels collected within 5-8 feet of sediment
	3	>10	0-10 cm (light brown silty sand with many roots)	salt marsh	sampling location is approximately 1 feet east of the previous location on the edge of the salt marsh (near the station marker)
	4	1-6	0-1 cm peaty gravel with sand well oxidized 1-6 cm darker		Salt marsh station
	5	2.5	0 to 2.5 cm light brown coarse sand with grass roots; 2.5 to 10 cm dark gray very coarse sand/gravel	mussels, grass roots	collected mussels within 15 feet of sediment
	6	no redox	sandy surface with clayey sand underneath	snails, barnacles, salt marsh grass, brown algae	salt marsh leads down to gravel beach then to mud flat
	7	no redox	brown coarse sand, little gravel	mussels, salt marsh vegetation, fucus, ascophyllum	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M07-1	1	0.1	black sand/thick mud layer	abundant mussels; ascophyllum and fucus on boulders; large mud flat surrounded by rocks and boulders	near seep CC-1011; 111 foot intertidal zone when sampled
	2	0.2	0-0.2 cm (brown); 0.2-10 cm (black); sediment was silt and fine sand with clay; 10 cm (black, more sand)	many worms and mussels	sampling location is 4 feet southeast of the station marker
	3	1	0-1 cm (light brown); 1-10 cm (dark gray); sediment was sandy silt		
	4	1	1 cm redox 0-1 cm light brown silty sand. 1-10 cm dark gray sandy silt	hundreds of mussels	
	5	0.3	0 to 0.3 cm light brown silty sandy clay with pebbles in matrix; 0.3 to 10 cm dark gray silty sand clay	shells; mussels	collected mussels within 5 feet of sediment
	6	0.3	brown and black mud with some gravel	abundant mussels, barnacles, worms, brown algae, periwinkles	mud flat surrounded by mussel beds and rocks; seeps present
	7	0.1	light brown silt over dark sandy silt	abundant mussels	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M07-2	1	0.1-0.4	brown silt	none observed	
	2	2-3	0 to 2-3 cm (light brown); 2-3 to 10 cm (dark brown); sediment was silt; 0-12 cm (many burrows, not many worm tubes)	many clam worms	
	3	0.6-1	0 to 1 cm (medium brown); 1 to 6 cm (mottled light brown and black); 6-10 (medium brown, less black); sediment was silty sand	clam worms, eelgrass (dead)	sampling location was near hazardous rock
	4	1	0 -1 cm light brown, 1-11 cm black silt with a bit of sand (5%)	Lots of worms, clam worm, stinky	
	5	2	0 to 2 cm medium brown sandy silt; 2 to 3 cm black sandy silt; 3 to 8.5 cm mottled medium gray and black sandy silt	sticky brown bacteria/algae, sparse red worms	sulfide odor
	6	0.6	0 to 6 mm light brown, darker below; fine silt	few worms	
	7	0.1	light brown silt surface, black silt below	many worms, amphipod tubes	sulfide odor

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M07-3	1	0.5	black/dark gray sandy silt	mussels	
	2	4-5	0-1 cm (green); 1-5 cm (light brown); 5-10 cm (mottled gray and black); sediment was sandy silt	abundant eelgrass (shoots, rhizomes, and blades), many small red worms, mussels	
	3	3	0-3 cm (medium brown sandy silt); 3-10 cm (mottled light gray/brown and black sandy silt); 10-13 cm (mottled brown and black silty sand); shells present	eelgrass	
	4	3	0-3 cm light brown silt, 3-6 cm mottled light brown/gray (worm burrows), 6-10 cm mottled dark gray black silt	Eelgrass on anchor, eelgrass piece in grab- eelgrass bed around; Clam worms, small worms, snails	
	5	1.5	0 to 1.5 cm light brown/medium yellow sandy silt; 1.5 to 3 cm black; 3 to 10 cm dark gray and black silt	brown filamentous mat-like material, worm burrows	no eelgrass observed but was on the anchor, sulfide odor
	6	0.5	light brown to black fine silt	eelgrass and worms	sulfide odor; eelgrass in grabs collected mussels from subtidal area by raking from boat; mussels between eelgrass and shore
	7	0.1	brown silt surface, black silt below	eelgrass and few worms	eelgrass in grabs; had to put wings on ponar to decrease penetration

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M08-1	1	redox discontinuity at surface	black sand	abundant mussels; mudflat	near seep CC-1004.5; 54 foot intertidal zone when sampled
	2	none recorded	silt with clay, gravel patches	mussel beds all around	sample location is 6 inches east of the station marker
	3	1	0-1 (light brown); 1-10 (black); sediment was sandy-clayey silt with a few pebbles	some small worms	used maps to find this sampling location - no GPS; station marker was just above the mud
	4	0.5-2	0 to 1/2 cm light brown, 1/2 to 2 cm med gray with light brown burrow tubes, 2-10 cm dark gray all sandy silt		Metal plate, rusting approx. 1' by 2' 5-10 feet from marker; station is at edge of mucky tidal flat; hard station to locate- marker gets buried. Marked location with a rebar hook
	5	1.5	0 to 1.5 cm light brown silty very fine sand; 1.5 to 10 cm dark gray silty very fine sand	mussels	
	6	<0.1	light brown to black silt	mussels, barnacles, worms, brown algae, and periwinkles	sample collected 2 feet toward water from marker in mudflat; seep flowing over sample; metal pipe (rebar) on shoreline
	7	<0.1	thin layer of light brown silt on surface, black fine silt below	mussels nearby	oil sheen present on sediment possibly from diesel fuel spill; could not find marker only rebar hook present that marked location in the past

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M08-2	1	0.2-0.3	black/dark gray sandy silt	none observed	
	2	1.5	0-7 cm (silty mud); 7-10 cm (dense silty-clay or clayey silt)	mussels, many red worms and worm tubes	collected mussels at low tide by walking out and raking
	3	0.3-0.7	0-0.7 cm (medium brown); 0.7-4 cm (mottled dark gray/black); 4-9 (medium to light gray); sediment is silty sand	worm, green crab	low tide, lobster pots, and a hazardous rock made exact positioning difficult
	4	2.0	0 to 1-2 cm light brown sandy silt (medium sand) 4 cm worm burrow depth 2-11 cm mottled gray-black clayey silt (pebbles in matrix-probably from rock wall next to station)	Worm tubes on surface, amphipods "tons of them", 2 big clam worms, many red worms	
	5	0.2	0 to 0.2 cm light brown sandy silt; 0.2 to 3 cm dark gray sandy silt; 3 to 12 cm black and dark gray mottled with light brown burrows	2 large clam worms, burrows, floating mats of brown algae and grass, little red worms, duck foot clam, mussels	
	6	1.1	light brown to dark brown, fine silt		
	7	0.5-0.8	brown silt surface, black silt below	amphipod tubes on surface	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M08-3	1	none observed	light tan isolated patches of coarse sand with gravel	small mussels under rock weed	
	2	none recorded	cobble gravel and sand beach; boulders adjacent to the site	abundant rockweed; abundant mussels (especially 20 ft seaward of the site)	sample was collected adjacent to the station marker
	3	none observed	0-10 cm brown sand with some cobbles and gravel		sampling location was 1 foot east of the station marker
	4	none observed	brown-gray sand with pebbles, cobbles on surface		
	5	none observed	0 to 7 cm very coarse sand with gravel	mussels	only able to sample to 7 cm
	6	no redox	brown sand, gravel, and rock	barnacles, smaller mussels, brown algae, periwinkles	mussels under rockweed
	7	no redox	brown coarse sand	mussels	collected subtidal mussels by rock
M08-4	2	2	0-2 cm (brown); 2-10 cm (dark brown/black); sediment was silt with some fine sand; mud flat	many worms	approximately 34 feet seaward of sample OU4-SD-M08-300B

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M09-1	1	0.1	0-0.1 cm (brown); 0.1-10 cm (black); sediment was a sand with gravel	only 3 mussels present within 30 feet	
	2	none recorded	surface (boulders); 0-10 cm (coarse gravel and sand)	mussels	station is on a 60 degree slope
	3	>5	gray and brown gravelly, coarse sand with a little mud; many rocks		
	4	0.5	gray gravel	few mussels	
	5	none observed	very coarse sand with gravel and cobbles	mussels	difficult to dig below 6 cm
	6	0.5	sand, mud, and gravel	mussels, barnacles, snails, brown algae, periwinkles	steep, rocky slope
	7	<0.1	light brown to dark brown sandy silt, more silt than sand		could not locate, previously intertidal now subtidal; no mussels present; station is approximately 30 feet west of dock in line with second piling from shore

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M09-2	1	0.1-0.3	sediment collected under water (still intertidal)	seaweed on lower rocks	very rocky area near seep CC-1004.3
	2	5	0-9 cm (gravel and silt)	many mussels	sample was collected close to the station marker; rocks prevented collection of the sample deeper than 9 cm
	3	0.4	0-0.4 cm (brown silt); 0.4-10 cm (dark gray/black sandy silt with gravel)	mussels, snails	sampling location was 10 feet downslope from pipe
	4	0.5	redox 1/2 cm; 0 to 1/2 cm brown sandy silt, 1/2 to 10 cm dark gray coarse sandy silt with gravel and shells		
	5	0.5	0 to 0.5 cm light brown/greenish on surface clayey silt; 0.5 to 10 cm black clayey silt	abundant mussel and snail shells; mussels	
	6	<0.1	brown and black; sand, mud, slight gravel mix	mussels, barnacles, brown algae, periwinkles	sample collected in mudflat; seeps present
	7	no redox	sand with dark brown silt below		difficult to locate station (well point no longer present); approximately 40 feet from previous location; oily sheen present on sediment possibly from diesel fuel spill; rip rap slope, sediment at base of rocks between large boulders under water, moved sample to subtidal; no mussels present

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M09-3	1	0.2-0.3	black silty sand		
	2	1	surface (filamentous organic matter - bacteria/algae); 0-1 cm (brown); 1-10 cm (black with a sulfur odor); sediment was silty mud with many worm tubes	clam worms	
	3	0.6	0-8 cm (mottled black and medium gray); 8-16 cm (medium gray); sediment was very soft silt to clayey silt with a strong odor		
	4	3-6	0-3 cm light brown clayey silt; 3-6 cm mottled brown/dark gray with burrows; 6-11 cm black	brown filamentous algae on surface	A lot of organic material, couple of sticks (leaf on grab) pipes on shore- old and rusty
	5	0.2	0 to 0.2 cm medium brown sandy silt; 0.2 to 8 cm dark brown mottled with black	many worm tubes	rusty valve on shore; difficult to collect full grabs
	6	0.6	light brown silt, darker underneath	few worms	difficult to collect grabs; 8-9 attempts; kept wings on sampler
	7	1	brown silt on surface, black silt below	few worms	oil droplets
M09-4	2	4-5	0-5 cm (brown); 5-10 (dark brown/black); sediment was silt with some fine sand and gravel		approximately 10 feet from sample OU4-SD-M09-100B; seeps are flowing upgradient of the sampling location

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M10-1	1	none observed	brown coarse gravel with some sand	abundant mussels	near seep SP-1001
	2	none recorded	surface (cobbles); 0-2 cm (fine gravel and shell hash with some light brown fine sand and silt); 2-10 cm (more sand and grayer in color)	abundant mussels (especially near adjacent seep)	
	3	4	0-4 cm (dark brown); 4-10 cm (black); sediment was medium-grained sand with silt, a few pebbles, and some larger cobbles		
	4	2	redox at 2 cm 0-2 cm brown silty sand, 2-10 cm dark gray silty sand; old holes found, silty sand patch with eel grass just below mussel patch		Seep flowed through vicinity of station
	5	3	0 to 3 cm light brown with very fine to coarse sand; 3 to 4 cm light gray cobbles; 4 to 10 cm light to medium gray	abundant shell fragments, eelgrass roots, mussels	
	6	no redox	sand and gravel mix	mussels, barnacles, snails, ulva, brown algae, eelgrass (21 feet toward water from sample), periwinkles	rocky beach; collected sediment just down from mussel patch within seep @ 72 feet from wooden stake on shore
	7	0.3	light brown sand on surface, black silty sand below	abundant mussels, fucus, eelgrass just subtidal	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M10-2	1	1	black sandy mud	collected mussels in eel grass bed; mussels were larger than 5-6 cm; abundant eel grass	offshore of seep SP-1002
	2	1-2	0-2 cm (light brown); 2-10 cm (grades to black); sediment was silty sand with gravel	abundant eelgrass (fresh blades), mussels	raked for subtidal mussels
	3	1-2	0-2 cm (dark brown); 2-9 cm (mottled dark brown and black); sediment was silty sand	eelgrass, slipper shells (dead), clam worm, red crab	strong current
	4	2.0	0 to 1-2 cm oxygenated brown silty medium and coarse sand; 2-4 cm burrows, partially oxygenated; 4-10 cm mottled brown/black silty sand	amphipods, live eelgrass in grab; looks like extensive bed in area; shells in grab, lots of red worms, algae (kelp, ulva) in grab, gastropods, 1 huge blue clam worm	
	5	3.5-4.0	0 to 3.5 cm medium brown sand; 3.5 to 6.5 cm dark gray sand	eelgrass and kelp present, gastropod shells and mussel shell fragments, worms	cannot see the extent of eelgrass bed
	6	0.2	light brown surface layer, black silt underneath	eelgrass	foul odor; difficult to collect grabs; strong current; total of 11 grabs
	7	no redox	light brown sandy silt	eelgrass, worms, small shells	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M10-3	1	0.1	black, abundant shells	mussels and shells	near seep SP-1003
	2	1	0-1 cm (light brown); 1-10 cm (black with a sulfur odor); sediment was sandy silt, which contained a mat of filamentous organic matter; worm tubes	mussels, red worms, clam worms	mussels collected in 3-5 feet of water at the base of a rock face over-hang; no mussels were present in the sediment
	3	2	0-2 cm (medium brown); 2-12 cm (black); sediment was sandy silt with shell pieces, small rocks, and algae pieces; strong odor	many worms, including clam worms	
	4	2-6	0-1 cm reddish brown clayey silt, 2-6 cm med gray, 6-11 cm black; very smelly	amphipods, very soft bottom-could take weights off; couple of small worms	Boom surrounding dock adjacent to the site
	5	0 to 1.5 cm medium brown sandy silt; 1.5 to 11 cm black sandy silt	some burrows, many worms, amphipods, mussels	sulfide odor; Wire/cable and pieces of fire hose were picked up in grabs	
	6	0.4	tan to black silt		had to take weights off sampler and add plexaglass wings
	7	0.6-0.8	light brown soft silt on surface with some fine gravel below	light film of brown algae on surface	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M11-1	1		no sediment present	mussels	
	2	not applicable	no sediment present	mud snails; small mussels (approximately 100-150 total) in one localized area	
	3	not applicable	no sediment present	mussels	
	4		no sediment		
	5		no sediment		No mussels found
	6		no sediment		
	7		no sediment	mussels	
M11-2	1	Not deep enough to observe	light brown sand and cobbles; a small patch of sediment was present behind mussels at the erosional area; not deep enough to collect 0-10 cm	mussels present	much metal debris present
	2	not applicable	no sediment present	small patch of mussels (less than 50)	
	3	not applicable	no sediment present	mussels	
	4		no sediment		
	5		no sediment	only 2 large mussels found	
	6		no sediment		
	7		no sediment	small mussels	on rip rap by 2 pipes

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M11-3	1	none observed	coarse at surface; cobbles and sand with some silt	mussels were collected 30 feet to the west of the sediment sample; no sediment at this location	very difficult to access by water, would be easier by land
	2	5-8	surface (cobbles); below the surface (cobbles, sand, and some silt)	mussels, knotweed	rust at a depth in the dark part of the redox
	3	4	surface (cobbles); 0-4 cm (yellowish-brown); 4-10 (dark gray); sediment was sandy gravel	mussels	
	4	2	0-2 cm light brown sandy silt with gravel, 2-10 cm black sandy silt gravel		Sandy silt found in conjunction with mussels
	5	2.0-4.0	cobbles and gravel/sand with some pockets of silt under large cobbles	lots of mussels	Redox discontinuity irregular due to cobbles
	6	no redox	mud with gravel	green crabs and periwinkles	site is steep with small sandy patch near low water mark
	7	5	coarse sand, gravel, mud, silt	periwinkles, small crabs, urchins	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M12-1	1	not recorded	not recorded	mussels	could not access site with GPS unit.
	2	2	clayey silt; fibrous; many worm tubes	abundant eelgrass; thousands of mussels	mussel sampling location is 5 feet from the station marker directly between the wooden rails located in front of the second bay door from the left
	3	5	0-5 cm (light brown with fibrous material); 5-10 cm (dark gray to black); sediment was silt		sampling location was 2 feet seaward of the station marker between the wooden rail ways
	4	2	0-1(~2) cm light brown, 2-10 cm med-dark gray -, sandy silt; 0-1(~2) cm - many roots	2-10 cm - many worms	
	5	2	0 to 2 cm medium brown sandy silt; 2 to 8 cm medium gray sandy silt; 8 to 10 cm black sandy silt	mussels, worm tubes present, many bamboo worm tubes	Approximately 4 feet seaward from station marker
	6	1	sand and rock to mud	mussels, worms, periwinkles	sand surface near rail system; scattered rocks
	7	0.8	coarse sand mixed with silt and small pebbles	mussels, periwinkles, clam shells	paced 40 feet from 2nd door towards water line

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M12-2	1	0.3-1.5	brown and black mottled; worm burrows	eelgrass, mussels, tube worms	
	2	none observed	sandy silt; mottled	abundant eelgrass; many mussels	mussels collected using a clam rake
	3	0.3	0-0.3 cm (medium brown); 0.3-10 cm (mottled dark brown to black); sediment was sandy-silt with some shells and wood pieces	abundant eelgrass (including rhizomes, blades, and roots), brown algae, small snails, worms	collect sample during low wind conditions, and at low boat traffic times (morning) to avoid getting waves in the boat
	4	2	0-1/2 to 2 cm, light brown sandy silt, 2-6 cm dark gray, 6-10 cm light gray silty sand with gravel	worm tubes, worms, some big clam worms; mussel shells, plant debris; algae piles and mussel shells around boat; do not see eelgrass	
	5	1.6-2	0 to 2 cm medium yellow/brown fine sand; 2 to 10.5 cm mottled medium dark gray silty sand	small red worms on surface, eelgrass in grab, mussel shells, mussels	
	6	<0.1	thin layer of brown sand over a black sand/silt mix	starfish, snails, mussel shells, eelgrass	difficult to collect grabs; 20 drops with nothing but eelgrass, algae; best to sample at low tide to see sediment patches; mussels were collected from rock wall while tide was out; difficult collection
	7	0.1	sand, silt, detritus	worms	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M12-3	1	2.5	black	none observed	could not access proposed location; collected near discharge on wall
	2	4-5	0 to 4-5 cm (light brown); 5-10 cm (black); sediment was sandy silt	abundant eelgrass	
	3	0.5-1	0-1 (medium brown); 1-4.5 (dark gray); 4.5-6 (light brown); 6-11.5 (black); sediment was clayey silt	eelgrass bed, blood worms	sampling location was 16 m from the warning sign; position 2 (from May 2000) was used because position 1 is currently under a barge
	4	0.1	0-1 mm light brown sandy silt, 1 mm -12 cm black, > 12 cm shell hash sandy layer; broken up shells a couple of whole shells; in third grab the sandy layer is at ~ 10 cm so some got sampled; smelly	plant debris, eelgrass patches around boat	Water very turbid, though, can't see extent of eelgrass
	5	0.6-1.2	0 to 1.2 cm light brown silty sand; 1.2 to 11 cm black sandy silt	fine shell fragments on surface, twigs, few red worms	sulfide odor; eelgrass patches all around station
	6	0.1	brown and black silt	snails, worms, eelgrass	concrete
	7	<0.1	black mud and sand, some coarse sand	snails, worms	slight oily sheen, sulfur odor

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M13-1	1	0.1	dark gray to black clayey silt; no bioturbation, strong sulfur odor	mussels collected from floating raft	
	2	1.5-2	0 to 1.5-2 cm (medium brown); 2-10 cm (black); sediment was clayey, sandy silt (fine sand)	mussels, one living worm	oil sheen on waste water[3]
	3	1.5-3	0 to 1.5-3 cm (medium brown); 3-9 cm (black); sediment was sandy silt with worm tubes, a small mussel shell, and wood pieces	brown algae (kelp), sea lettuce	
	4	3	0 to 1.5-3 cm light brown clayey silt; 3-10 cm jet black; stinky	plant debris- a couple of leaves, a couple of shells (mussel, snail)	
	5	0.5-1.0	0 to 1 cm medium brown sandy silt; 1 to 7 cm black sandy silt	abundant plant debris (oak leaves), one worm	sulfide odor, oily sheen in sediment buckets
	6	0.5	light brown to black soft silt	large mussels, amphipods	mussels collected from granite blocks at low tide; had to add wings to sampler
	7	1.2	light brown fine silt on surface, black fine silt below	mussels, worms, small crabs, vegetation, rotting detritus	oil sheen from grab; slight sheen in sample

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M13-2	1	3	black clayey silt; strong sulfur odor	none observed	
	2	0-3	0-3 cm (light to medium brown); 5-10 cm (black); sediment was sandy silt with some worm tubes; 0-5 cm (worm burrows)		oil sheen on waste water[3]
	3	1-2	surface (small amphipod tubes); 0-2 cm (light brown); 2-4 cm (black); 4-9 cm (mottled medium to dark gray and black); sediment was sandy silt with many worm tubes	eelgrass, worms	
	4	2.5	0 to 2.5 cm medium brown clayey silt, 2.5 - 5 cm gray; 5-10 cm black	plant debris (a lot)	CTD cable was not long enough to reach the bottom
	5	2.0	0 to 2 cm medium to light brown sandy silt; 2 to 4 cm mottled dark gray to light brown sandy silt; 4 to 10 cm dark gray sandy silt	0 to 4 cm burrows present, plant debris (eelgrass), worms	sulfide odor
	6	<0.1	light brown silt over black soft silt	amphipods	slight oil sheen from grab; had to add wings to sampler
	7	0.1	thin brown silt on surface, black silt below	detritus	strong sulfide odor

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M13-3	1	2	mud, strong sulfur odor	mussels collected from pylons	
	2	0-1.5	0-1.5 cm (medium brown); 1.5-10 cm (dark gray to black); sediment was clayey silt with a lesser sulfur odor than during Round 1	mussels, dead seaweed	oil sheen on waste water[3]
	3	1-2	0 to 1-2 cm (light brown); 2-9 cm (black); sediment was clayey, sandy silt with strong odor; some shells and wood pieces present	eelgrass, algae, leaves (dead)	
	4	1	0-1 light brown oxygenated, 1-4 cm gray, 4-6 light brown, 6-7 black clayey silt with some sand	plant debris, lots of ulva on grab, live snail; live eelgrass in 3rd grab	Distinct odor
	5	none observed	0 to 7 cm black sandy silt with some gravel	plant debris (red oak leaves)	Distinct odor from black sediment with consistancy of mayonaise, piece of concrete in grab 1
	6	0.6	brown and black; soft and fine silt	worm, amphipods, large mussels	slight odor of decomposition; had to add wings to sampler
	7	0	black fine silt; watery	rotting detritus	strong sulfide odor; oily sheen

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M14-1	1	1	brown/dark brown and gray sediment with roots, rocks, gravel, fine sand, and a little bit of silt	mussels collected within 30 feet of sediment, saltmarsh	
	2	none recorded	salt marsh sediment	salt marsh, mussels	sampling location was approximately 16 inches from the station marker
	3	none recorded	salt marsh sediment	salt marsh	sampling location was adjacent to the station marker
	4	none observed	salt marsh sed		
	5	3.5	0 to 3.5 cm medium brown clayey silt; 3.5 to 10 cm dark brown/gray mottled with dark gray clayey silt	marsh grass roots abundant, mussels	samples taken near old holes
	6	no redox			trouble finding marker; found in middle of salt marsh
	7	<0.1	brown fine sand on surface, black fine sand below		

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M14-2	1	1-2	mottled gray and black silty sand	mussels present	
	2	0-1.5	0-1.5 cm (light brown); 1.5-14 cm (mottled dark brown/black); sediment was sandy silt	mussels	better to sample at mid-high tide
	3	0.5-1	0-1 cm (light brown); 1-12 cm (mottled dark gray and black); sediment was sandy silt with a strong odor	many red worms, shrimp, large clam worm	
	4	1-6	0-1 light brown-green, 1-6 cm mottled brown/dark gray/black, 6-10 cm dark brown	worm, shells, plant debris, large clam worm, large scallop shell; green crab	
	5	1.0	0 to 1 cm medium brown sandy silt; 1 to 3 cm black sandy silt; 3 to 10 cm medium to light gray with black patches of sandy silt	worm tubes - red worms and many clam worms; mussels	
	6	0.6	light sandy silt on surface with hard clayey silt underneath	worms	few mussels at station; difficult to find enough for sample
	7	0.5	light brown fine sandy silt, dark brown fine sandy silt below	worms, amphipods, fine brown algae	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
M14-3	1	2-3	clayey silt, sandy	algae present	
	2	0-3	0-3 cm (light brown, many worm burrows); 3-7 cm (light gray); 7-13 cm (black); sandy silt with many worm tubes		
	3	0.7-1.5	0-1.5 cm (light brown); 1.5-6 cm (medium gray); 6-13 cm (mottled dark gray and black); sediment was sandy silt with a strong odor	worms, eelgrass (dead)	
	4	3.7	0-1 cm light brown, 1 to 3-7 medium brown, 3-7 to 13 cm black clayey silt	small white tube worms on surface; stinky; larger tube worm with pointy tip; shells (gastropods) in sed; plant debris	
	5	0.1	0 to 0.1 cm medium brown silt; 0.1 to 8 cm dark gray silt; 8 to 10 cm black silt	brown algae on surface	odor - black sediment with consistancy of mayonnaise
	6	<0.1	brown to dark black soft silt	amphipods, worms	had to add wings to sampler
	7	1	light brown silt on surface, black fine silt below	amphipods, worms, crabs	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R01-1	1	1.5	0-1.5 cm (brown); 1.5-10 cm (black); sediment was a sandy silt with roots	collected at salt marsh	residential along shoreline; residential with a wooded area and a large salt marsh
	2	none recorded	salt marsh sediment	salt marsh	sampling location is 3 feet seaward of the station marker
	3	1	0-1 cm (light brown); 1-10 cm (dark, almost black); sediment was silty mud		
	4	none observed	silt-clay sized sediment with lots of roots; this is near the edge of the salt marsh.	There are a few patches of young grass here, but the grass is not nearly as dense as it is 5 feet shoreward of the station marker	No bioturbation
	5	none observed	0 to 5.5 cm light brown silt; 5.5 to 10 cm dark gray to black clay	Many plant material and roots; many organisms living in the sediment	
	6	>15	grey fine mud	saltmarsh, fine mermaid hair algae	sediment collected 1-2 feet from marker; light organic odor in sediment
	7	no redox	silty mud	saltmarsh	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R01-2	1	2-7	brown to dark brown medium sand; small eel grass plants/roots present in grabs; worm burrows	eelgrass	near what appears to be a UNH float marking eelgrass locations
	2	0-2	0-2 cm (light brown); 2-10 cm (black); sediment was medium sand	many snails	
	3	none recorded	surface (medium brown); below surface (black)		
	4	0.5	1/2 cm redox; 0 to 1/2 cm reddish brown silty sand, 1/2 to 5 cm mottled dark gray-brown	a lot of plant material, many snail shells, worm tubes; eelgrass all around - thick bed adjacent to sampling, many smaller patches, bed is probably greater than 100 ft by 100 ft	
	5	1.0-1.5	0 to 1 cm medium brown silty sand; 1 to 8 cm medium gray sand silt	worm tubes, eelgrass and other plant material present	
	6	0.4	light brown to black; sand to sandy silt	worms and eelgrass	eelgrass in grabs
	7	0.3	brown fine sand with mud	worms, welk, and eelgrass	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R01-3	1	1-2.5	fine sand (medium brown to mottled black); some roots, sparse eel grass, and snail shells; many worm burrows	eelgrass; mussels on large rock (most were 6-7 cm)	rocky site; use caution when approaching; collected sediment about 20 feet from rock
	2	none recorded	surface (many pebbles); 0-10 cm (light brown medium sand)	mussels, abundant snails, old rhizomes	difficult to collect the sample due to abundant snails
	3	0.5	0-0.5 cm (medium brown); 0.5-6 cm (dark gray); sediment was silty sand with rocks and shells		
	4	0-3	0-3 cm medium brown, 3-10 cm grading to medium gray sand with gravel	some eelgrass, rockweed, lots of rocks, eelgrass all around	
	5	0.5	0 to 0.5 cm light to medium brown silty sand; 0.5 to 3 cm medium gray silty sand with some cobbles and patches of light gray clay	mussels on rock	difficult to collect sediment
	6	1.3	brown and black sand to sand/silt mix	amphipods, eelgrass, periwinkles	eelgrass in grabs; had to add weights to sampler; collected mussels by large rock
	7	1.1	brown and black sand to sand/silt mix	amphipods, eelgrass, clam shells, mussel shells, periwinkles	eelgrass in grabs; added weights to ponar to increase penetration

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R01-4	1	1	0-1 cm (brown); 1-10 cm (black); silty with clay and shells	mussels; mudflat; rockweed	
	2	<1	0-1 cm (brown); 1-10 cm (black); sediment was clayey silt; mud flat with an occasional boulder	many snails, many large mussels, clam worms, rockweed	sampling location is approximately 3 feet seaward of the station marker
	3	1.5-2	0-2 cm (brown); 1-10 cm (darker brown); sediment was silt with marsh grass roots	marsh grass, snails (10 within one square foot), worms	
	4	3	0-3 cm light brown, 3-5 cm light gray, 5-10 cm dark gray black sandy silt with some clay towards bottom of sample; sediment has slight anaerobic odor	lots of mussels, snails, many worms in sediment	Sulfur odor
	5	1.0-2.0	0 to 2 cm brown silt; 2 to 6 cm dark brown silt with many worms; 6 to 10 cm black silty material	lots of snails, mussels	
	6	0.1	light brown, fine sand with dark mud underneath	mussels, gastropods, barnacles, shells, brown algae	organic odor in sediment
	7	no redox	silty mud	mussels	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R02-1	1	none observed	brown silty sand	collected at saltmarsh; snails, bivalves, and crabs present; no mussels present	large mudflat in cove at low tide; only a small rivulet at low tide; residential area in cove, monitoring station adjacent to elevated railroad bridge; sample located about 40 feet toward the river across from boat dock
	2	none observed	0 to 3-4 cm (brown coarse sand with some gravel, shells, and fine sand); 3-4 to 10 cm (grayish-brown fine sand and silt with some medium sand and many roots)	sprouting marsh grass	sampling location is approximately 3 feet straight down from the eroded marsh bank and approximately 1 foot seaward of the station marker
	3	1	coarse sand with some pebbles and marsh grass roots	marsh grass	sampling location is approximately 2 meters from station marker toward drawbridge
	4	5	0-5 cm reddish brown coars sand, 5-10 cm brownish gray very fine sandy silt with marsh roots	a lot of worms present	
	5	none observed	0 to 2 cm light tan silty sand with pebbles; 2 to 10 cm medium gray sandy silt	many marsh grass roots	sampled 6 feet seaward of station marker - no other holes visible
	6	no redox	grey pebbly sand to 3 in; muddy with depth	sparse brown algae and marine vegetation, salt marsh	organic odor in sediment
	7	no redox	brown silt with medium sand	salt marsh roots	organic decomposition odor in sediment; could not find marker, collected sediment based on previous field notes and sampling experience; about 40 feet toward river from boat dock across cove, 3 feet down from eroding bank in saltmarsh

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R02-2	1	3-5	silty sand; eel grass and worm tubes in sediment	eelgrass	close to red nun #4 just outside of channel in mooring field
	2	2-4	0-3 cm (yellowish-brown); 3-5 cm (gray); 5-10 cm (black); sediment was medium sand with a small amount of silt and many worm tubes; 0-6 cm (worm burrows)	eelgrass	sponson point was touching red nun #4
	3	4	0-4 cm (medium brown); 4-11 cm (mottled brown and black); sediment was fine- to medium-grained sand (0-7 cm) and silty sand (>7 cm)	eelgrass, tube worms	sample was collected while the boat was tied to red nun #4
	4	2-3	0-2 cm reddish brown, 2-3 cm light gray, 3-11 cm dark gray silty sand	tube worms on surface, clam worm, plant debris, a lot of worms, small white flakes like tiny amphipods	
	5	2.0-4.0	0 to 2 cm yellow/brown silty medium sand; 2 to 11 cm mottled dark and medium gray silty medium sand	lots of worms - red and clam, small white shell material throughout, small duck foot clam	
	6	0.6	black; slight sandy top, sandy silt underneath	worms, clam shells, amphipods, snails, eelgrass	@ 30 feet from red nun based on GPS values
	7	0.2	light brown fine sand at surface, dark brown fine sand below	eelgrass, welks, worms	sediment collecteed approximately 30 feet from red nun based on GPS values

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R02-3	1	0.5-3	sand with clay	very large clam worm; mussels on 1st bridge pylon	had to add weights to grab sample
	2	1.5	surface (thin layer of leaves; shell fragments and worm tubes); 0-1.5 cm (light brown); 1.5-10 cm (black); sediment was a fine sandy silt	mussels	
	3	1-2	surface (rocks and shells); 0-2 cm (medium brown); 2-6 cm (mottled dark gray and black); 6-10.5 cm (dark gray); sediment was a fine sand (0-5 cm), and clayey silt with little, or no sand (5-10.5 cm)	mussels, snail, clam worm	
	4	0-5	0-5 cm light brown coarse sand with some gravel, cobbles; some light gray balls of clay	a mussel; many worms	Rock held jaws open a bit in first grab (still a good one though); 2nd grab- another rock but some sed fine
	5	1.0	0 to 1 cm medium brown/yellow sand with shells; 1 to 6.5 cm dark gray sand; 6.5 to 7.5 cm light gray sand; 7.5 to 10 cm dark gray sand	many big clam worms and red worms, mussels collected	nut and bolt in third grab
	6	0.2	gravel on top to sandy silt	amphipods and periwinkles	@ 30 feet from bridge pier
	7	0.7	fine sand	abundant mussels, worms, shells, green crabs	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R02-4	1	0.5	0-0.5 cm (brown); 0.5-10 cm (black); sediment was a sandy silt	mudflat; abundant mussels	
	2	2-4	surface (worm tubes); 0 to 2-4 cm (light brown); 2-4 to 10 cm (black); sediment was silt with some clay and fine sand	mussels, clam and crab remnants	sampling location is approximately 2 feet from the seep towards the river and adjacent to the station marker
	3	0.5	0 to 0.5 cm (light brown); 0.5 to 10 cm (black); sediment was silt with 3 or 4 worm burrows		sampling location is approximately 1 meter from the station marker
	4	1-10	redox ~ 1.5 cm; sed light brown silt with some very fine sand below redox (~1.5 to 10 cm) black very fine sandy silt	a lot of worms present	
	5	0.5	0 to 0.5 cm medium brown very fine sandy silt with some clay; 0.5 to 10 cm grading from medium to dark gray sandy silt with some clay	worms, mussels shells, mussels	sampled 6 inches landward of station marker - no cement in station marker; pieces of wood present
	6	0.1	grey to dark grey; silt to mud	abundant mussels, barnacles, brown algae	strings in mud, organic mud odor; seeps through area
	7	0.3	light brown silt at surface, black sandy silt with little gravel below	few mussels, periwinkles, fucus	could not locate marker, collected in small mudflat; based on previous field notes and sampling experience; collected mussels 10-15 feet from sediment

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R03-1	1	none observed	clayey silt with abundant roots in sediment	saltmarsh; some fucus mixed in with grass; abundant snails; no mussels present	patches of trees adjacent saltmarsh
	2	4-8	0 to 4-8 cm (light brown, gradational boundary); 4-8 to 10 cm (light gray); sediment was gravelly silt with many roots	salt marsh; rockweed, abundant snails	sampling location is at the top of the eroded surface of the salt marsh and 3 feet east of the station marker
	3	>10	brown silt with many marsh grass roots	marsh grass, many snails	sampling location is right next to Round 2 hole
	4	none observed	salt marsh, no redox layer, brown sand and silt throughout	marsh grass roots abundant	
	5	none observed	0 to 7 cm roots, fine silty sand; 7 to 10 cm no roots, softer medium brown	Salt Marsh	Previous holes visible, sample taken adjacent to previous holes
	6	no redox	sand	salt marsh, cancer crabs	sediment located in third (last) salt marsh from bridge; low, near edge in middle of salt marsh
	7	no redox	brown sand and silt		sample 3 feet east of marker

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R03-2	1	0.3-2	1-2 cm (light oxygenated); 2-7 cm (reduced-black), 7-16 cm (dark gray to brown); sediment was a silt with some fine sand; sediment mottled with burrows; abundant eelgrass and roots in one grab	eelgrass and clam worms	
	2	2-4	0 to 2-4 cm (reddish medium brown); 6-10 cm (black with a light odor); sediment was silty sand; 0-6 cm (worm burrows)	dense eelgrass (fresh green blades); many amphipods	
	3	1-2	0 to 1-2 cm (medium brown); 2-10 cm (mottled medium brown and black); sediment was silty sand with worm burrows	eelgrass	
	4	3	0 to 1-3 cm light brown clayey silt; 3-11 cm mottled brown/dark gray; very stiff, cohesive mud; worm burrows to 6 cm	many worms, huge clam worm; lobster burrows possibly; eelgrass patches all around, got some in grab 3, patches were medium size, about 2 coolers in size	
	5	1.5	0 to 1.5 cm medium brown sandy silt; 1.5 to 3 cm dark gray mottled with brown sandy silt; 3 to 7 cm light gray sandy silt; 7 to 10 cm medium gray sandy silt	clam worms, eelgrass abundant, worm burrows	all eelgrass approximately within 150x150 feet area; very shallow; old sample hole visible
	6	0.5	black	worms, eelgrass	eelgrass in grabs
	7	0.4-0.5	light brown mud at surface, black mud below	worm tubes, fine brown algae	sulfide odor

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R03-3	1	0.5	black sandy silt	eelgrass; only large mussels available	
	2	1-2	0-2 cm (brown); 2-7 cm (mottled brown /dark gray); 7-12 (black); sediment was sandy silt	mussels, amphipods, eelgrass (fresh blades and rhizomes)	
	3	0.5	0-0.5 cm (medium brown); 0.5-6 cm (mottled dark brown and black); sediment was sandy silt with gravel	eelgrass, many worms including clam worms, small brittle stars, sand shrimp, snails	strong current
	4	6	0 to 5-6 cm light brown, 6-10 cm medium gray light brown burrows; sandy clayey silt	eelgrass patches all around-only a dozen or so blades per patch so very small but a lot of them; dead eelgrass pieces and roots in grab sample; worms, big clam worms	
	5	1	0 to 1 cm yellow/brown sandy silt; 1 to 5.5 cm light to medium gray sandy silt; 5.5 to 9 cm dark gray sandy silt	many clam worms, possible razor clam burrows, many eelgrass patches, mussels collected	
	6	0.3	black silt with fine sand	sparse mussels, worms, eelgrass	mussels collected 15 to 20 meters from sediment because eelgrass area is all mud and closest mussels are in rocky/gravel area out from shore; need to do at low tide
	7	0.5	light brown fine silt at surface, dark brown fine silt below	worm tubes, fine brown algae, eelgrass	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R03-4	1	0.5-0.7	0-0.7 cm (brown); 0.7-10 cm (dark gray); sediment was a sandy silt; pebbles present	thick bed of scattered mussel shells	
	2	2	0-2 (pale brown); 0-10 cm (grades to pale gray); sediment was gravelly, silty coarse sand (beach)	mussels	sampling location is 4 feet northwest of the station marker
	3	0.5	0-0.5 (medium brown); 0.5-10 cm (dark gray); sediment was sandy silt		sampling location is 2 feet seaward of the station marker
	4	0.5	0.5 cm redox; sandy silt, light brown thru redox, blackish gray below redox	worms present	
	5	0.5	0 to 0.5 cm light brown silty very fine sand; 0.5 to 10 cm black/dark gray silt with very fine sand	worms present, mussels collected, worm burrows	bioturbation
	6	1.2	brown to black mud	periwinkles	mussels collected within 10 feet of sediment
	7	0.3	light grey/brown mud mixed with sand on surface, black below	worms	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R04-1	1	none observed	fine sand and silt with abundant roots	collected at saltmarsh; 1.5 feet from edge (in marsh)	
	2	none observed	surface (thin layer of light gray sand); below the surface (darker, grayish sand; very rooty; hydrogen sulfide odor)	salt marsh	sampling location is 6.5 feet seaward of the station marker; sampling location is 8 inches shoreward of the Round 1 sample hole because the marsh is being undercut and eroded
	3	>10	0-10 cm (brown silt)	abundant marsh grass	sampling location is 20 yards west of seep; sampling location is adjacent to the Round 2 sample hole
	4	none observed	salt marsh	a lot of marsh grass roots	No mussels
	5	none observed	medium brown fine sand with some silt	salt marsh; a lot of marsh grass roots	previous sample holes visible, sample taken next to previous holes
	6	no redox	brown sand with some mud	salt marsh, some brown algae, periwinkles	could not find marker, sample collected 12 feet from drainage pathway and 9 feet into salt marsh; location based on previous field notes
	7	no redox	sand silt with roots	salt marsh	could not find marker; location based on previous field notes

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R04-2	1	1-4	light to dark brown coarse sand with some gravel	abundant mud snails, eelgrass	
	2	2.5-3.0	0-3 cm (yellow), 3-8 cm (dark gray); sediment was coarse sand and pebbles		
	3	1-1.5	0-1.5 cm (medium brown), 1.5-6 cm (dark gray); sediment was coarse- to medium-grained sand with gravel and rocks	snails, young crab	very strong current
	4	1-5	0-1 cm, gravel layer, 1-5 cm coarse sand all light brown	worms, rocky and shelly, shrimp type organism in sediment	
	5	4.0	0 to 2 cm yellow/brown pebble/gravel; 2 to 4 cm yellow/brown coarse sand; 4 to 8 cm medium gray coarse sand	lots of shells, snails, worm, eelgrass patches	large pipes running parallel to shore in intertidal zone
	6	0.5	sand and gravel	worms, periwinkles	
	7	0.9	coarse sand and gravel	snail shells, sand lance fish, small shrimp	

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R04-3	1	2-3	light to dark brown medium to coarse sand with some gravel	mussels by rock causeway; some larger (6-8 cm), but enough 5-6 cm mussels	difficult to collect grab; collected subtidal mussles about 5-7 feet from causeway and about 20-25 feet from sediment (rocks in sediment near mussels)
	2	3-4.5	0-4 cm (medium brown); 4-10 cm (black); sediment was medium sand with mussel shells and a few pebbles	mussels	mussels collected with grab sampler
	3	4	0-4 cm (medium brown); 4-8 cm (dark gray); sediment was coarse- to medium-grained sand with gravel and many shells	snails, eelgrass	very strong current
	4	1-5	0-1 cm light brown, 1-5 cm medium gray some mottling with light brown, coarse sand with snail shells, gravelly sand; gravel to cobbles		
	5	4.0-6.0	0 to 1 cm brown/yellow pebble sized gravel; 1 to 4 cm brown/yellow medium coarse sand; 4 to 10 cm mottled dark to light gray medium coarse sand	shells, snails, mussels	previous sample holes visible
	6	2	brown and black sand	cancer crabs, mussels, periwinkles	raked mussels from boat and by wading; need to do at low tide
	7	0.1-1.0	grey silty sand tub, sand/gravel below	snail shells, periwinkles	sulfide odor

Station	Round	Redox Discontinuity[1] (cm)	Sediment Description	Biota Present	Other Comments/Notes[2]
R04-4	1	2	sandy sediment	abundant mussels	
	2	2-4	sediment was medium sand with shells and many worm tubes	mussels	sampling location is 2.5 feet seaward of the station marker
	3	>10	0-10 cm (dark gray to brown fine, silty sand)		
	4	none observed	no obvious redox, but some small, intermittent pockets of dark gray, blackish sand; fine sand light brown to gray		
	5	0.5	0 to 0.5 cm light brown sandy sediment; 0.5 to 10 cm dark gray with patches of light brown sandy sediment	mussels	sample taken ~8 paces seaward of marker
	6	no redox	brown sand	mussels, worms, periwinkles	sediment collected in mudflat; mussels collected 15 to 20 feet towards shore; marker starting to come out (pushed back down)
	7	no redox	black sand	mussels	sediment collected in mudflat based on previous notes; could not find marker

Notes:
1 - Redox discontinuity is based on a visual observation of where the sediment color changes from brown to black.
2 - Permanent station markers were installed at most of the intertidal locations.
3 - The waste water is the water and excess sediment that is drained from the sediment sampler during sample collection.

Source data located in Rounds 1 through 7 data packages (TtNUS, February 2000, October 2000, January 2001, September 2001, February 2002, March 2003, February 2004).

ROUND 8 INTERIM OFFSHORE MONITORING AND REFERENCE SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment Description	Biota Present	Other Comments/Notes
OU4-SD-M05-105A	<1	black color, silt/clay with some sand	worms, iron secretions	
OU4-SD-M05-205A	1	dark grey silt	kelp	
OU4-SD-M05-305A	1	coarse sand and silt with brown and black layering		Walked to sample location at low tide; collected sample 1 foot from permanent marker toward water.
OU4-SD-M08-105A	no redox	red-brownish color sand with some silt		
OU4-SD-M08-205A	3	dark grey silt	burrows	
OU4-SD-M08-305A	3	medium brown sand with medium grey silt below		Moved 14 feet toward water because riprap was present at previous sample location.
OU4-SD-M09-105A	<1	black silt	one mussel shell	Collected sample 30 feet south of 2nd wooden pier.
OU4-SD-M09-205A	<1	black silt on surface, dark grey silt below		
OU4-SD-M09-305A	<3	dark grey silt	few burrows	
OU4-SD-M10-105A	no redox	dark grey sand with shell fragments		Walked to sample location; removed gravel at surface to collect sediment.
OU4-SD-M10-205A	1 to 4	brown sand at surface, brown/dark grey to black silt below	kelp, eelgrass, some shells	
OU4-SD-M10-305A	<1	black silt with some sand on surface		
OU4-SD-M13-105A	<1	black silt		
OU4-SD-M13-205A	<1	brown sediment with black silt and sand below		
OU4-SD-M13-305A	<1	brown sediment with black silt and sand below		
OU4-SD-M14-105A	no redox	red to brown color	many roots; saltmarsh	Collected sample near permanent marker.
OU4-SD-M14-205A	<1 to 3	dark grey sand and silt		

ROUND 8 INTERIM OFFSHORE MONITORING AND REFERENCE SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment Description	Biota Present	Other Comments/Notes
OU4-SD-M14-305A	<1	mostly black silt with some sand		
OU4-SD-R01-105A	4	brown/ dark brown sand and silt	many roots; saltmarsh	Used the GPS to locate the permanent marker. Sample was collected 1 foot from marker away from the water.
OU4-SD-R01-205A	3	brown/ dark grey sand and silt	eelgrass bed; many roots	
OU4-SD-R01-305A	no redox	red to brown sand	eelgrass	
OU4-SD-R01-405A	3	brown sand and silt		Used the GPS to locate the permanent marker. Found stick-up reflector in water and collected samples 1 foot from permanent mnarker which was 2 feet from the reflector.
OU4-SD-R02-105A	no redox	brown		Collected sample at edge of saltmarsh. Could not find marker but collected in approximate location based on field notes and GPS reading from boat made at high tide earlier in the day.
OU4-SD-R02-205A	1	dark brown silt and some sand on surface with black silt below		The eelgrass previously ovserved at this location was not present but sample was collected near red nun.
OU4-SD-R02-305A	<1	silt with some sand	few rocks; blue mussel shell	
OU4-SD-R02-405A	<1	brown surface color with black color below		Collected sample from small pooled mudflat area as described in field notes from previous sampling events.

ROUND 8 INTERIM OFFSHORE MONITORING AND REFERENCE SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment Description	Biota Present	Other Comments/Notes
OU4-SD-R03-105A	no redox	medium grey color	salt marsh; roots	Found marker and old holes at third salt marsh from the bridge; markes was in the middle of salt marsh on side facing the water. Marker was buried pretty deep.
OU4-SD-R03-205A	2	dark brown silt and sand with black silt and sand below	eelgrass	
OU4-SD-R03-305A	1	dark brown with dark grey below	eelgrass	
OU4-SD-R03-405A	<2	dark grey to black color		Collected sampels near permanent marker in the mudflat which was located on the pennensula on the side facing the bridge.
OU4-SD-R04-105A	no redox	brown/dark brown color	salt marsh; many roots	Could not find permanent marker. Measured location using field notes from previous investigations.
OU4-SD-R04-205A	no redox	red/brown sand and brown gravel and sand	snail; worms	
OU4-SD-R04-305A	5	medium brown/ dark grey sand and gravel	few snails; eelgrass	Collected samples approximately 10-feet north of station because it was difficult obtaining sediment at the previous location.
OU4-SD-R04-405A	3	medium grey to brown color		Could not find permanent marker. Measured location using field notes from previous investigations.

PHASE I ADDITIONAL SCRUTINY SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment/Soil Description	Biota Present	Other Comments/Notes
AS00-SD01	<1	Black silt		Sediment could not be collected at the proposed location by downtown Portsmouth because it was very rocky. After attempting to collect sediment at several other nearby locations, the station was moved to Prescot Park Marina.
AS00-SD02	<1	Dark brown on surface, dark gray below; silt/some sand		Walked in along shore. Collected sample by parking lot discharge from Trape Academy.
AS00-SD03	<1	Black, surface was brown		Same location as Interim Offshore Monitoring Program station RS02 - Loc. 4.
AS00-SD04	2	Brown on surface, black below; silt/sand	Eelgrass	Same location as Interim Offshore Monitoring Program station RS03 - Loc. 2.
AS00-SD05	1	Dark brown on surface, dark gray below	Eelgrass	Same location as Interim Offshore Monitoring Program station RS03 - Loc. 3.
AS01-CB01	Not Applicable	Brown sand and black silt		The catch basin which drains a large paved area. The catch basin was dry when the sample was collected. Eight grabs were collected to obtain an adequate volume of sediment. Sediment had a petroleum odor.
AS01-CB02	Not Applicable	Black sand and silt with leaves		The bottom of the catch basin was covered with water. Ten grabs were collected to obtain an adequate volume of sediment. ~One-half of sediment was collected in each grab. Sediment had an anaerobic odor.

PHASE I ADDITIONAL SCRUTINY SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment/Soil Description	Biota Present	Other Comments/Notes
AS01-SS01	Not Applicable	Brown/black silty sand with pieces of ash and coal		Collected sample from two areas of exposed ash. 2 to 3 scoops were collected from each area and composited into one sample.
AS01-SS02	Not Applicable	Brown silty sand with some pieces of ash/coal. Large pieces of ash/coal were removed from sample.		Found old “Ash” stake and collected soil from five locations within 10 to 15 feet of the stake and composited into one sample.
AS01-SD01	2	Brown coarse sediment on surface; black coarse sediment below		It was difficult to collect sediment with the ponar because it was rocky so sediment was collected on a ledge by Outfall 46 using a spoon.
AS01-SD02	No redox	Black silt with some sand		Sediment deposited between rocks along the shore was collected.
AS01-SD03	>10	Brown color; sandy with small rocks		
AS01-SD04	2	Brown on surface, dark gray below		It took several attempts to obtain a successful grab.
AS01-SD05	4	Brown on surface, dark gray below; sandy with small shell fragments and some small gravel		Had to relocate slightly several times to obtain a successful grab.
AS01-SD06	3	Brown on surface, dark gray below; sand and silt with some shell fragments and some small gravel		
AS01-SD07	4	Brown on surface, black below		Sediment deposited between rocks along the shore was collected.

PHASE I ADDITIONAL SCRUTINY SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment/Soil Description	Biota Present	Other Comments/Notes
AS05-SD01	2	Dark brown on surface, dark gray below		
AS05-SD02	3	Dark gray silt	Few burrows	
AS05-SD03	<1	Black/dark gray silt/clay		
AS05-SD04	4	Gray/black silt/clay		
AS05-SD05	<1	Black		
AS05-SD06	<1	Dark gray silt		
AS05-SD07	<1	Dark gray silt		
AS05-SD08	<1	Dark gray silt	Several burrows	
AS05-SD09	<1	Dark gray silt	Few burrows	
AS05-SD10	<1	Dark gray silt	Few burrows	
AS05-SD11	<1	Brown on surface, black/gray below		
AS05-SD12	2	Dark gray silt		
AS05-SD13	3	Dark gray silt		
AS05-SD14	<1	Dark gray silt		
AS09-SD01	<1	Dark gray silt		Located 18 feet south of south corner of the dock
AS09-SD02	<1	Dark gray silt		
AS09-SD03	2	Dark gray silt		
AS09-SD04	2	Dark gray silt	Few burrows	
AS09-SD05	<1	Black silt	1 burrow observed	

PHASE I ADDITIONAL SCRUTINY SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment/Soil Description	Biota Present	Other Comments/Notes
AS09-SD06	<2	Dark gray silt		Location was moved slightly; proposed location was roped-off because of rocks.
AS11-SS01	Not Applicable	Mostly fine-to-coarse, well graded sand with trace silt and trace fine-to-coarse gravel. Metal debris noted. No large debris or rock fragments included in sample (only finer grained material).		Collected top 2 inches of soil/fill material from five locations along river side of berm south/southeast of Bldg 298 and west of the seawall; the grabs were taken from areas of ongoing erosion and composited into one sample.
AS11-SS02	Not Applicable	Metal debris including rust flakes, metal coils and shavings, nuts, bolts, wire. Silt and fine sand sized particles of debris noted. No large debris included in sample (only finer grained material including some fine-sized metal pieces).		Collected top 2 inches of soil/fill material from each of 5 locations within 10 foot radius on the river side slope beneath eastern end of the seawall; all grabs were taken from areas of ongoing visible erosion and composited into one sample.
AS11-CB01	Not Applicable	The upper material (0 to 1 inch) was gravelly, fine-to-coarse sand with trace silt and the bottom material (1 to 4 inches) was silt with trace fine to medium sand. Trace organic debris.		An approximate 4-inch layer of sediment was present under the 2 to 4 inches of flowing storm water (rainy weather) in the catch basin. A strong hydrogen sulfide odor, moderate petroleum odor, and sheen were noted. Multiple grabs were collected to obtain an adequate volume of sediment.

PHASE I ADDITIONAL SCRUTINY SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment/Soil Description	Biota Present	Other Comments/Notes
H1	Not Applicable	Did not collect a sample from this location.		Hole dug to 0.8 feet bgs, fill material including scrap metal debris with steel, iron, copper and stainless steel, man-made debris mixed with angular rock fragments and some fine-to-coarse sand, trace silt. Rust noted. Debris size up to about 2 inches in length. Refusal on steel plate.
H2	Not Applicable	Did not collect a sample from this location.		Hole dug to 1.5 feet bgs; fill mostly man-made debris and scrap metal, nuts, bolts, rust flakes, fire brick, stainless steel shavings, copper tubing, slag, trace glass and porcelain, few angular gravel and fine-to coarse sand. Heavy oxidation noted throughout (rust red color). Refusal on large metal debris.
AS12-CB02	Not Applicable	Brown silt on surface, black silt below		The catch basin manhole had a solid cover. Small oil droplets (a few mm in diameter) were present in the sediment. The sediment had an anaerobic odor. Water was flowing slowly through pipe.
AS12-SD01	2	Brown on surface, black below; sand with many shell fragments		Station located near Navy police boat dock.
AS12-SD02	<1	Black silt with some sand	Eelgrass beds	
AS12-SD03	<1	Dark brown on surface, dark gray below, some shells	Eelgrass beds, worms, and kelp	Had to relocate ~30 ft from proposed location because it was very rocky and there was a steep drop-off at the edge of the ramp.

PHASE I ADDITIONAL SCRUTINY SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Redox Discontinuity (cm)	Sediment/Soil Description	Biota Present	Other Comments/Notes
AS12-SD04	<1	Black silt/sand		
AS12-SD05	1	Dark brown on surface, black below; sand/silt	Eelgrass bed	
AS12-SD06	<1	Dark brown on surface, black below; sand/silt	Eelgrass bed	
AS12-SD07	<1	Dark gray sandy silt, some shells		
AS12-SD08	No redox	Coarse sand, iron deposits	Eelgrass beds	
AS12-SD09	<1	Black silt/sand, some small shells and a few small pebbles	Eelgrass near station	Sample collected 4 to 5 feet from permanent marker toward the water. Slight sheen on the water.
AS12-SD10	1	Dark brown on surface, black below; silt with sand		
AS12-SD11	<1	Dark gray sand/silt		
AS12-SD12	<1	Black sand with some silt; some shells		Moved location because a barge was docked at the proposed location.
AS12-SD13	<1	Black silt/sand, some shells		
AS12-SD14	<1	Black silt		Moved location ~80 ft because boat was docked at the proposed location; sulfide odor.
AS12-SD15	No redox	Brown coarse sand		Moved location to furthest west bay in Bldg. 178 because proposed location was very rocky with little sediment.
AS12-SD16	No redox	Brown sand on surface, black fine sand below		Sample collected in furthest bay in Bldg. 178. Possible petroleum odor.

PHASE II ADDITIONAL SCRUTINY AND ROUND 9 INTERIM OFFSHORE MONITORING AND REFERENCE SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Sampling Method	Sediment Description	Other Comments/Notes
Monitoring Station 05			
MS-5, Loc. 1	spoon/spatula	brown on top, black below, muddy	
MS-5, Loc. 2	Van Veen	brown on top, black below, fine sediment	
MS-5, Loc. 3	spoon/spatula	brown on top, black below, muddy	
MS-5, Loc. 4	Van Veen	brown on top, black below, muddy	
AS05-SD15	spoon/spatula	brown on top, black below, muddy	
Monitoring Station 08			
MS-8, Loc. 1	spoon/spatula	brown on top, black below, muddy	
MS-8, Loc. 2	Van Veen	brown on top, black below, muddy	
MS-8, Loc. 3	spoon/spatula	brown on top, black below, muddy	
Monitoring Station 09			
MS-9, Loc. 1	Van Veen	brown on top, black below	
MS-9, Loc. 2	Van Veen	brown on top, black below	
MS-9, Loc. 3	Van Veen	brown on top, black below, muddy	
Reference Station 02			
RS-02, Loc. 1	spoon/spatula	brown, sandy	
RS-02, Loc. 2	Van Veen	brown on top, black below, sandy	
RS-02, Loc. 3	Van Veen	brown on top, black below, sandy	
RS-02, Loc. 4	spoon/spatula	brown, sandy	strong organic odor
Monitoring Station 12			
AS12-SD20	spoon/spatula	brown/dark brown/reddish brown on top, black below, sandy silt	Could only sample 0-2 inches because blast rock fragments.
AS12-SD21	core	brown on top, black below, sandy silt	Core penetrated approximately 1.5-2 feet but only 8 inches of sediment were retained in core.
AS12-SD22	core	black, sandy silt	Core penetrated approximately 1 foot but only 4 inches of sediment were retained in core. Sample was collected in eelgrass bed and sediment had an organic odor.

PHASE II ADDITIONAL SCRUTINY AND ROUND 9 INTERIM OFFSHORE MONITORING AND REFERENCE SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Sampling Method	Sediment Description	Other Comments/Notes
AS12-SD23	core	black, muddy	
AS12-SD24	core	brown on top, black below	Core penetrated approximately 3 feet but only 12 inches of sediment were retained in core. Sediment had a petroleum odor.
AS12-SD25	core	black, muddy	Core penetrated approximately 1.5 feet but only 12 inches of sediment were retained in core. Sediment had a strong organic odor.
AS12-SD26	core	black, muddy	
AS12-SD27	spoon/spatula	reddish brown on top to black below, sandy with some silt	Could only sample 0-3 inches because blast rock fragments.
AS12-SD28	spoon/spatula	brown/dark brown/reddish brown on top, black below, sandy with trace silt.	Blast rock near sample location.
AS12-SD29	spoon/spatula	black on top to some reddish brown below, sandy.	Could only sample 0-4 inches because of rocks.
AS12-SD30	spoon/spatula	brown on top, black below, organic silt/muck.	Very soft material. Sediment up to 6 inches deep.
AS12-SD31	spoon/spatula	brown/black/ reddish brown, sandy silt.	Could only sample 0-4 inches because of rocks. Debris such as wood, wire, slag, steel, etc. on surface.
AS12-SD32	spoon/spatula	brown/black, sand and gravel.	Debris such as metal, slag, corrugated pipe, etc. on surface. Could not advance hole deeper than 12 inches because incoming tide collapsed hole.
AS12-SD33	spoon/spatula	brown/reddish brown, silt/sand/gravel.	Presence of rubble and limited areas of sediment necessitated spreading out sample locations. Blast rock 2-3 feet higher than sediment areas.
AS12-SD34	spoon/spatula	brown to reddish brown, silty sand.	Oil-like odor in 7 to 10 inch sample and some sediment was coated with an oil-like substance.
AS12-SD35	spoon/spatula	brown/reddish brown, silt/sand.	
AS12-SD36	spoon/spatula	brown to black, sandy silt.	Location in middle of rail line. Only 6 inch depth of sediment covering area.

PHASE II ADDITIONAL SCRUTINY AND ROUND 9 INTERIM OFFSHORE MONITORING AND REFERENCE SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Sampling Method	Sediment Description	Other Comments/Notes
AS12-SD37	spoon/spatula	brown/reddish brown, sand with gravel.	Sample collected under wooden platform with limited access.
AS12-SD38	spoon/spatula	brown/black, sandy silt.	Shallow sediment only because of concrete at 3 inches.
AS12-SD39	spoon/spatula	brown/black, sandy silt.	Shallow sediment only because of concrete at 4 inches. Mussel shells in area.
AS12-SD40	spoon/spatula	brown, silty sand.	Shallow sediment only because of concrete at 3 inches.
AS12-SD41	spoon/spatula	tan brown/gray brown/brown black, silty sand/organic silt.	Concrete floor at 6 inches.
AS12-SD42	spoon/spatula	brown, sandy.	Shallow sediment only because of concrete at 3 inches. Surface debris such as metal discs, pipes, anchor links, cables, etc.
AS12-SD43	Van Veen	brown on top, black below, sandy silt.	Eelgrass in grab.
AS12-SD44	Van Veen	brown on top, black below, muddy.	Eelgrass in grab.
AS12-SD45	Van Veen	brown on top, black below, silty.	Eelgrass in grab.
AS12-SD46	Van Veen	brown on top, black below, silty.	Eelgrass in grab.
AS12-SD47	Van Veen	no sediment.	no sediment after five attempts.
AS12-SD48	Van Veen	no sediment.	no sediment after five attempts.
AS12-SD49	Van Veen	brown on top, black below, sandy.	
AS12-SD50	Van Veen	brown on top, black below, sandy.	
AS12-SD100	spoon/spatula	brown/reddish brown, silty sand/	Single sample only. A composite was not collected difficult to access other locations. 1-2 feet depth sediment pile close to west wall. Soft material.
AS12-SD101	spoon/spatula	brown/reddish brown, sand with gravel/	Concrete floor at 6 inches.
AS12-SD102	spoon/spatula	brown/reddish brown, silty sand.	Area between elevated floors. Concrete floor at 3 inches.
AS12-SD103	spoon/spatula	brown to dark brown, sand some gravel.	15 inches of sediment next to large pile of mussels.
AS12-SD104	spoon/spatula	brown/reddish brown to black, sand some silt.	Location in utility trench.
AS12-SD105	spoon/spatula	brown/reddish brown/black, silty.	Concrete floor at 4 inches.
AS12-SD106	spoon/spatula	brown to black, sandy silt/silty sand	Sediment was soft.

ROUND 10 INTERIM OFFSHORE MONITORING SAMPLE/STATION DESCRIPTIONS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

Station	Sampling Method	Sediment Description	Other Comments/Notes
Monitoring Station 05			
MS-5, Loc. 1	spoon/spatula	dark brown, sandy silt, saturated, some organic material	Low tide, walked to location
MS-5, Loc. 2	spoon/spatula	dark brown, sandy silt, saturated, some organic material	Low tide, walked to location
MS-5, Loc. 3	spoon/spatula	dark brown, sandy silt, saturated, some organic material	Low tide, walked to location
MS-5, Loc. 4	Ponar Dredge	dark brown, silty clay, saturated	High tide, used boat to access location. 3 grabs
Monitoring Station 08			
MS-8, Loc. 1	Ponar Dredge	dark brown, sandy silt, saturated	High tide, used boat to access location. 3 grabs
MS-8, Loc. 2	Ponar Dredge	dark brown, sandy silt, saturated	High tide, used boat to access location. 3 grabs
MS-8, Loc. 3	Ponar Dredge	dark brown, silty clay, saturated	High tide, used boat to access location. 3 grabs
Monitoring Station 09			
MS-9, Loc. 1	Ponar Dredge	dark brown, silty clay, saturated	High tide, used boat to access location. 3 grabs
MS-9, Loc. 2	Ponar Dredge	dark brown, silty clay, saturated	High tide, used boat to access location. 3 grabs
MS-9, Loc. 3	Ponar Dredge	dark brown, silty clay, saturated	High tide, used boat to access location. 3 grabs
Monitoring Station 12			
AS12-SD107	Ponar Dredge	dark brown, silty sand, shells, small rock fragments, saturated	No fine-grained sediment at the location. Sampled at the edge of the barge.
AS12-SD108	Ponar Dredge	dark brown, silty sand, shells, small rock fragments, saturated	No fine sediment and debris (rope) was caught on the sampler. Sampled at the edge of the barge.
AS12-SD109	Ponar Dredge	dark brown, silty sand, shells, small rock fragments, saturated	No fine-grained sediment at the location. Sheen present on sediment. Sampled at the edge of the barge.

B.2 POSITIVE DETECTION TABLES FOR MS-05, MS-08, MS-09 AND MS-12

POSTIVE DETECTIONS FOR MONITORING STATION 5

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1		MS-5 LOC.1	
nsample	**OU4-SD-M05-199A**		**OU4-SD-M05-199A-2**		**OU4-SD-M05-299A**		**OU4-SD-M05-299A-2**		**OU4-SD-M05-399A**		**OU4-SD-M05-399A-2**		**OU4-SD-M05-100B**		OU4-SD-M05-100B-2	
sample_dat	19990908		19990908		19990909		19990909		19990908		19990908		20000504		20000504	
round	01		01		01		01		01		01		02		02	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	8.56	U			5.04	U			4.5	U			6.6	J		
1-METHYLNAPHTHALENE	21.2	U			13.8	U			7.95	U			13.9			
1-METHYLPHENANTHRENE	67.2				28.4				27.4				27.5	J		
2,3,5-TRIMETHYLNAPHTHALENE	16				9.45				7.14				10.6	J		
2,6-DIMETHYLNAPHTHALENE	19				8.89				7.58				13.5	J		
2-METHYLNAPHTHALENE	32.8	U			20.2	U			12.7	U			22.6			
ACENAPHTHENE	50.2				11.7				13				24.2	J		
ACENAPHTHYLENE	87.2	J			62.7	J			55.6	J			73.1	J		
ANTHRACENE	295				123				118				177	J		
BENZO(A)ANTHRACENE	727				259				231				300	J		
BENZO(A)PYRENE	981	J			422	J			379				435			
BENZO(B)FLUORANTHENE	1013				344				360				422	J		
BENZO(E)PYRENE	456				196				172				223	J		
BENZO(G,H,I)PERYLENE	566	J			221	J			193				212			
BENZO(K)FLUORANTHENE	229				118				94.4				120	J		
CHRYSENE	679				264				237				338	J		
DIBENZO(A,H)ANTHRACENE	185	J			59.4	J			52.4				60.4	J		
DIBENZOTHIOPHENE	36.2				12.7				12.3	J			13	J		
FLUORANTHENE	1251				393				351				532	J		
FLUORENE	63.3				22.4				23.1				45.4	J		
HIGH MOLECULAR WEIGHT PAHS	4928				1762.4				1583.4				2167.4			
INDENO(1,2,3-CD)PYRENE	661	J			230	J			208	J			230	J		
LOW MOLECULAR WEIGHT PAHS	1061.3				406.8				388.7				601.1			
NAPHTHALENE	58.4	U			43.8	U			21.3	U			40.8			
PERYLENE	252				58.5				56.9				84.7	J		
PHENANTHRENE	520				155				162				218	J		
PYRENE	1105	J			365	J			333	J			502	J		
TOTAL PAHS ECO	5989.3				2169.2				1972.1				2768.5			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	1558	J	1180	J	2053	J	2313	J	96.6	J	144	J	1810		1050	
CADMIUM	0.36				0.41				0.66				0.203			
COPPER	8.7	U			2.1	U			7.1	U			1.86	U		
LEAD	105	J			33.8	J			25.5	J			37			
NICKEL	4.4				3.8				5.8				1.98			
ZINC	91.2				50.4				37.1				41.2			
HF Digestion Inorganics (mg/kg)																
ALUMINUM	62489				64319				54211				66100			
ARSENIC	11.7				12.6				5.3				14.6			
CADMIUM	0.59				0.54				0.99				0.55			
CHROMIUM	94.9	J			102	J			66.4	J			121			
COPPER	105				32.2				24.4				63.9			
IRON	26883				27779				17877				29400			
LEAD	187	J			59.8	J			46.9	J			135			
MANGANESE	428				416				495				433			
MERCURY	1.1	J			0.26	J			0.21	J			0.62			
NICKEL	32.2	J			28.9	J			30.1	J			33.7			
SILVER	0.60				0.38				0.41				1	J		
ZINC	208				115				84.1				151			
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1		MS-5 LOC.1	
nsample	**OU4-SD-M05-199A**		**OU4-SD-M05-199A-2**		**OU4-SD-M05-299A**		**OU4-SD-M05-299A-2**		**OU4-SD-M05-399A**		**OU4-SD-M05-399A-2**		**OU4-SD-M05-100B**		**OU4-SD-M05-100B-2**	
sample_dat	19990908		19990908		19990909		19990909		19990908		19990908		20000504		20000504	
round	01		01		01		01		01		01		02		02	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.07	J			0.12	J			0.14	J			0.23	J		
1,2,4,5-TETRACHLOROBENZENE	0.41	J			0.53	J			0.56				1.7			
2,4'-DDD	2.7				1.1				1.7				2.8	U		
2,4'-DDE	0.82				0.23				0.17				0.62	J		
2,4'-DDT	1				0.04	U			0.55				0.73	J		
4,4'-DDD	2.7				1				2.1				5	U		
4,4'-DDE	4				0.87				1.6				4.5			
4,4'-DDT	3.5	J			0.52	J			1.2	J			5.7	U		
ALDRIN	6.9				2.7				2.6				0.08	J		
ALPHA-BHC	0.17	U			0.067	U			0.063	U			0.10			
ALPHA-CHLORDANE	0.69				0.27				0.13				0.78			
BETA-BHC	0.14	J			0.056	J			0.038	J			2.5			
CHLORPYRIFOS	1.1				0.18	J			0.06	J			1.1	J		
CIS-NONACHLOR	0.32				0.16				0.14				0.33			
DELTA-BHC	0.13				0.079	U			0.031	J			0.065	U		
DIELDRIN	0.42				0.14				0.10				0.40	J		
ENDOSULFAN II	0.13	U			0.63				0.092	U			1.2			
ENDRIN	0.20	U			0.24	U			0.14	U			0.20	U		
GAMMA-BHC (LINDANE)	1.1	U			0.50	U			0.51	U			0.13	J		
GAMMA-CHLORDANE	0.23				0.073	J			0.16				0.52	J		
HEPTACHLOR	0.65				0.23	J			0.15	J			0.25	U		
HEPTACHLOR EPOXIDE	0.15	U			0.14				0.12				0.044	U		
HEXACHLOROBENZENE	0.15				2.9				0.72				0.065	UJ		
MIREX	0.21				0.16				0.031	U			0.26	J		
OXYCHLORDANE	0.022	U			0.026	U			0.015	U			0.06	J		
PCB-101																
PCB-101/90	1.8				0.87				1.1				2	J		
PCB-105	0.14	J			0.52	J			0.36	J			1.3			
PCB-118	1.2				0.64				0.82				2.2			
PCB-123																
PCB-126	0.20	J			0.035	J			0.027	J			0.14	J		
PCB-128	1.1				0.31				0.54				0.55	J		
PCB-138																
PCB-138/160	2.7				1.3	U			2.2				2.6	J		
PCB-149/123	1.6				0.92				1.5				0.90	J		
PCB-153																
PCB-153/132	2.2				1.4				2.4				3.2			
PCB-156	1.91				0.74				0.93				1.7	J		
PCB-167	1.3				1				0.85				0.23	J		
PCB-169	0.27	U			0.32	U			0.19	U			0.19	J		
PCB-170																
PCB-170/190	0.32	J			0.36	J			0.34	J			0.83	J		
PCB-18																
PCB-18/17	0.13	U			0.16	U			0.43	J			0.13	UJ		
PCB-180	2.5	J			1.5	J			1.3	J			1.4	U		
PCB-187	4.1				1.2				1.3				1.2	J		
PCB-189	0.27	U			0.32	U			0.18	U			0.41	J		
PCB-195																
PCB-195/208	0.77				0.42				1.1				0.49			
PCB-201/157/173	0.40				0.09				0.15				0.11			
PCB-206	1				0.66				2.8				0.87	U		
PCB-209	0.78	J			0.47	J			3	J			1.2			
PCB-28	1.4				0.46				0.30				1.7	J		
PCB-44	0.074	J			0.16	J			0.13	J			2.5			
PCB-52	0.72				0.21	J			0.66				0.82	J		
PCB-66	0.95				0.54				0.27				0.48	J		
PCB-77	0.14	J			0.054	J			0.12	J			1.1	U		
PCB-8																
PCB-8/5	0.44	J			0.38	J			0.23	J			1.1	J		
PCB-81	0.026	J			0.014	J			0.086	J			0.40			
PENTACHLOROANISOLE	0.22	J			0.18	J			0.047	J			0.20	J		
PENTACHLOROBENZENE	0.12				0.11	J			0.19				0.32	J		
TEQ PCB	0.020218				0.003627				0.002877				0.020025			
TEQ PCB BIRD	0.029886				0.00776				0.017475				0.054538			
TEQ PCB BIRD HALFND	0.030036				0.007938				0.017585				0.082051			
TEQ PCB FISH	0.00106				0.000207				0.000214				0.000943			
TEQ PCB FISH HALFND	0.001069				0.000217				0.00022				0.000999			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1		MS-5 LOC.1	
nsample	**OU4-SD-M05-199A**		**OU4-SD-M05-199A-2**		**OU4-SD-M05-299A**		**OU4-SD-M05-299A-2**		**OU4-SD-M05-399A**		**OU4-SD-M05-399A-2**		**OU4-SD-M05-100B**		OU4-SD-M05-100B-2	
sample_dat	19990908		19990908		19990909		19990909		19990908		19990908		20000504		20000504	
round	01		01		01		01		01		01		02		02	
TEQ PCB HALFND	0.024276				0.008437				0.005734				0.020084			
TOTAL DDT HALFND	14.72				3.74				7.32				12.6			
TOTAL DDT POS	14.72				3.72				7.32				5.85			
TOTAL PCB CONGENERS	44.518				21.66				38.56				46.74			
TRANS-NONACHLOR	0.29				0.23				0.044				0.59	J		
Miscellaneous Parameters (%)																
PERCENT CLAY	22.94				30.07				10.25				22.14			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT SAND	41.37				27.1				74.19				23.64			
PERCENT SILT	35.69				42.83				15.56				54.22			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	2.34				2.51				0.96				1.36			
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	455				200				175				201	J		
C1-DIBENZOTHIOPHENES	44.1				19.1				18.9				15.4	J		
C1-FLUORANTHENES/PYRENES	731				349				293				298	J		
C1-FLUORENES	46.3				24.2	U			16.8	U			33.7	J		
C1-NAPHTHALENES	54	U			33.9	U			20.6	U			36.4			
C1-PHENANTHRENES/ANTHRACENES	375				153				138				155	J		
C2-CHRYSENES	211				88.5				72				89.4	J		
C2-DIBENZOTHIOPHENES	69.9				27.1				23				23.1	J		
C2-FLUORENES	64.8				37				37.2				31.3	J		
C2-NAPHTHALENES	84.6	J			55.9	J			31.8	J			41.5			
C2-PHENANTHRENES/ANTHRACENES	304				142				108				118	J		
C3-CHRYSENES	15.7				4.63				5.03				4.5	J		
C3-DIBENZOTHIOPHENES	58.3				21.2				17.3				17.2	J		
C3-FLUORENES	50.9				19.5				17.9				30.6	J		
C3-NAPHTHALENES	87.4				70				37.8				34.9	J		
C3-PHENANTHRENES/ANTHRACENES	182				82.4				54.2				58.3	J		
C4-CHRYSENES	52.1				16.7				16.5				2.7			
C4-NAPHTHALENES	42.3				30.2				15.7				10.7	J		
C4-PHENANTHRENES/ANTHRACENES	66.9				29.4				18.2				24.2	J		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3	
nsample	OU4-SD-M05-100B-2-AVG		OU4-SD-M05-100B-2-D		OU4-SD-M05-100B-AVG		OU4-SD-M05-100B-D		OU4-SD-M05-200B		OU4-SD-M05-200B-2		OU4-SD-M05-300B		OU4-SD-M05-300B-2	
sample_dat	20000504		20000504		20000504		20000504		20000504		20000504		20000504		20000504	
round	02		02		02		02		02		02		02		02	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL					8.8	J	11		7.62	J			4.1	J		
1-METHYLNAPHTHALENE					17.3		20.7		25.6				8.8			
1-METHYLPHENANTHRENE					59.2	J	90.9	J	56.2				19.8			
2,3,5-TRIMETHYLNAPHTHALENE					20	J	29.4	J	17.1				6.3			
2,6-DIMETHYLNAPHTHALENE					20.7	J	27.9	J	21.7				8.6			
2-METHYLNAPHTHALENE					25.7		28.8		38.2				14.3			
ACENAPHTHENE					41.55	J	58.9	J	32.7				22.9			
ACENAPHTHYLENE					99.55	J	126	J	80.8				56.7			
ANTHRACENE					344	J	511	J	271				142			
BENZO(A)ANTHRACENE					501	J	702	J	411				245			
BENZO(A)PYRENE					559.5		684		477	J			345			
BENZO(B)FLUORANTHENE					557	J	692	J	419				305	J		
BENZO(E)PYRENE					297.5	J	372		236				182	J		
BENZO(G,H,I)PERYLENE					267		322		219				169			
BENZO(K)FLUORANTHENE					185	J	250	J	166				107			
CHRYSENE					567.5	J	797	J	446				254			
DIBENZO(A,H)ANTHRACENE					81.7	J	103	J	68.7	J			48.9			
DIBENZOTHIOPHENE					23.55	J	34.1	J	18.4	J			10.5			
FLUORANTHENE					1096.5	J	1661	J	703				401			
FLUORENE					85.2	J	125	J	88	J			37.2			
HIGH MOLECULAR WEIGHT PAHS					3753.7		5340		2748.7				1668.9			
INDENO(1,2,3-CD)PYRENE					296.5	J	363	J	239				182	J		
LOW MOLECULAR WEIGHT PAHS					999.45		1397.8		884.6				477.7			
NAPHTHALENE					45.45		50.1		43.9				23.6			
PERYLENE					141.85	J	199	J	109				48	J		
PHENANTHRENE					358	J	498	J	330	J			181			
PYRENE					947.5	J	1393	J	643				375	J		
TOTAL PAHS ECO					4753.15		6737.8		3633.3				2146.6			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	774.75		999	U	1850		1890		1660		2070	J	49		99.7	U
CADMIUM					0.211		0.219		0.186				0.21			
COPPER					2.295	U	2.73	U	0.559	U			1.87	U		
LEAD					37.85		38.7		17	J			13.8			
NICKEL					1.98		2.2	U	1.55				1.65			
ZINC					45.5		49.8		34.2				15.6			
HF Digestion Inorganics (mg/kg)																
ALUMINUM					66550		67000		62700				53300			
ARSENIC					14.4		14.2		12.3				6.9			
CADMIUM					0.54		0.53		0.57				0.64			
CHROMIUM					119.5		118		101				72.7			
COPPER					62.85		61.8		38.5				22.7			
IRON					29350		29300		26400				17800			
LEAD					132.5		130		48.8				46.7			
MANGANESE					432		431		400				602			
MERCURY					0.595		0.57		0.35				0.28			
NICKEL					33.4		33.1		28.6				27.5			
SILVER					0.765	J	0.53		0.41				0.45	J		
ZINC					150.5		150		109				79			
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3	
nsample	**OU4-SD-M05-100B-2-AVG**		**OU4-SD-M05-100B-2-D**		**OU4-SD-M05-100B-AVG**		**OU4-SD-M05-100B-D**		**OU4-SD-M05-200B**		**OU4-SD-M05-200B-2**		**OU4-SD-M05-300B**		OU4-SD-M05-300B-2	
sample_dat	20000504		20000504		20000504		20000504		20000504		20000504		20000504		20000504	
round	02		02		02		02		02		02		02		02	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE					0.18	J	0.13	J	0.53				0.26			
1,2,4,5-TETRACHLOROBENZENE					1.6		1.5		0.17	J			0.66			
2,4'-DDD					2.65		3.9		3				1.6	U		
2,4'-DDE					0.405	J	0.19	J	0.68				0.09			
2,4'-DDT					0.37475	J	0.039	UJ	0.06				0.35	U		
4,4'-DDD					2.7		2.7		2.5				2.3	U		
4,4'-DDE					2.85		1.2	J	1.1				1.3	U		
4,4'-DDT					1.1		1.1		2.8				1.5	U		
ALDRIN					0.08	J	0.10	U	0.098	U			0.061	U		
ALPHA-BHC					0.20		0.30	J	0.27				0.10			
ALPHA-CHLORDANE					0.71		0.64		0.26				0.24			
BETA-BHC					2.55		2.6		3.1				1.2			
CHLORPYRIFOS					0.6725	J	0.49	UJ	0.47	U			0.29	U		
CIS-NONACHLOR					0.32		0.31		0.19				0.40			
DELTA-BHC					0.05	J	0.05	J	0.073	U			0.06			
DIELDRIN					0.225	J	0.05	J	0.001	J			0.24			
ENDOSULFAN II					1.6		2		1.2				0.87			
ENDRIN					0.215	U	0.23	U	0.22	U			0.14	U		
GAMMA-BHC (LINDANE)					0.255	J	0.38	J	0.61				0.29			
GAMMA-CHLORDANE					0.39	J	0.26	J	0.24				0.05	J		
HEPTACHLOR					0.03	J	0.03	J	0.28	U			0.14	J		
HEPTACHLOR EPOXIDE					0.048	U	0.052	U	0.049	U			0.031	U		
HEXACHLOROBENZENE					1.66625	J	3.3	J	0.073	U			0.046	U		
MIREX					0.18	J	0.10	J	0.28				0.11			
OXYCHLORDANE					0.225	J	0.39	J	0.04	J			0.08	J		
PCB-101																
PCB-101/90					2.75	J	3.5	J	2.2				0.78			
PCB-105					1.55		1.8		0.90	J			0.64	J		
PCB-118					2.8		3.4		1.9				0.90			
PCB-123																
PCB-126					0.22	J	0.30	J	0.25	J			0.15	J		
PCB-128					0.825	J	1.1	J	0.28				0.30			
PCB-138																
PCB-138/160					3.7	J	4.8	J	2.5				2	U		
PCB-149/123					1.7	J	2.5	J	0.96				1.4			
PCB-153																
PCB-153/132					3.75		4.3		2.2				2.2			
PCB-156					0.9275	J	0.31	UJ	0.56				0.95			
PCB-167					1.415	J	2.6	J	2.3				0.18	J		
PCB-169					0.195	J	0.20	J	0.17	J			0.17	J		
PCB-170																
PCB-170/190					14.915	J	29	J	12	U			0.54	J		
PCB-18																
PCB-18/17					0.3775	J	0.69	J	0.15	U			0.092	U		
PCB-180					2.15	J	3.6	J	1.5	J			1.2	U		
PCB-187					1.75	J	2.3	J	0.96				1			
PCB-189					0.29	J	0.17	J	0.57				0.16	J		
PCB-195																
PCB-195/208					0.64		0.79		0.38				0.32			
PCB-201/157/173					0.635		1.16	J	0.49				0.33			
PCB-206					1.1175		1.8		0.13	J			0.33	U		
PCB-209					1.25		1.3		1				0.64	U		
PCB-28					3.25	J	4.8	J	3				0.77			
PCB-44					2.2		1.9		0.56				1.1			
PCB-52					2.31	J	3.8	J	3.1				0.19			
PCB-66					0.645	J	0.81	J	0.54				0.12	J		
PCB-77					0.86	U	0.62		0.87				0.44	U		
PCB-8																
PCB-8/5					1.65	J	2.2	J	2.4				0.34	J		
PCB-81					0.48		0.56		0.39				0.13	J		
PENTACHLOROANISOLE					0.195	J	0.19	J	0.50	J			0.07	J		
PENTACHLOROBENZENE					0.255	J	0.19	J	0.19				0.33			
TEQ PCB					0.028273		0.036579		0.030535				0.020275			
TEQ PCB BIRD					0.070569		0.117583		0.107923				0.028389			
TEQ PCB BIRD HALFND					0.092083		0.117615		0.107937				0.039398			
TEQ PCB FISH					0.001396		0.00191		0.001579				0.000846			
TEQ PCB FISH HALFND					0.00144		0.001912		0.00158				0.000868			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3	
nsample	**OU4-SD-M05-100B-2-AVG**		**OU4-SD-M05-100B-2-D**		**OU4-SD-M05-100B-AVG**		**OU4-SD-M05-100B-D**		**OU4-SD-M05-200B**		**OU4-SD-M05-200B-2**		**OU4-SD-M05-300B**		OU4-SD-M05-300B-2	
sample_dat	20000504		20000504		20000504		20000504		20000504		20000504		20000504		20000504	
round	02		02		02		02		02		02		02		02	
TEQ PCB HALFND					0.02832		0.036589		0.030539				0.0203			
TOTAL DDT HALFND					10.07975		9.1095		10.14				3.615			
TOTAL DDT POS					10.07975		9.09		10.14				0.09			
TOTAL PCB CONGENERS					95.26		143.78		59.25				22.662			
TRANS-NONACHLOR					0.35	J	0.11	J	0.26				0.07			
Miscellaneous Parameters (%)																
PERCENT CLAY					22.65		23.16		22.64				6.96			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT SAND					25.055		26.47		33.92				78.13			
PERCENT SILT					52.295		50.37		43.44				14.91			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON					2.005		2.65		2.36				0.70			
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES					305	J	409	J	298				158			
C1-DIBENZOTHIOPHENES					32.4	J	49.4	J	21.4				11.5			
C1-FLUORANTHENES/PYRENES					492	J	686	J	507				223			
C1-FLUORENES					59.65	J	85.6	J	58.9				26.7			
C1-NAPHTHALENES					43		49.6		63.8				23.1			
C1-PHENANTHRENES/ANTHRACENES					223	J	291	J	261				114			
C2-CHRYSENES					161.7	J	234	J	117				65.8			
C2-DIBENZOTHIOPHENES					50.45	J	77.8	J	29.2				15.7			
C2-FLUORENES					83.15	J	135	J	51				25.8			
C2-NAPHTHALENES					53.15		64.8		67.1				22.6			
C2-PHENANTHRENES/ANTHRACENES					182	J	246	J	196				83.8			
C3-CHRYSENES					7.9	J	11.3	J	10.4				3			
C3-DIBENZOTHIOPHENES					39	J	60.8	J	27.8				11.7			
C3-FLUORENES					71.3	J	112	J	48				16.4			
C3-NAPHTHALENES					51.85	J	68.8	J	61.8				22.2			
C3-PHENANTHRENES/ANTHRACENES					116.15	J	174	J	115				46.8			
C4-CHRYSENES					2.69		2.68		2.39				1.1			
C4-NAPHTHALENES					38.15	J	65.6	J	20.2				5.2			
C4-PHENANTHRENES/ANTHRACENES					32.65	J	41.1	J	36				9.9			

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC 2		MS-5 LOC 2	
nsample	**OU4-SD-M05-100A**		**OU4-SD-M05-100A-2**		**OU4-SD-M05-100A-2-AVG**		**OU4-SD-M05-100A-2-D**		**OU4-SD-M05-100A-AVG**		**OU4-SD-M05-100A-D**		**OU4-SD-M05-200A**		**OU4-SD-M05-200A-2**	
sample_dat	20000827		20000827		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	5.01	J							6.6	J	8.19		7.33	J		
1-METHYLNAPHTHALENE	12.7	J							19.05	J	25.4	J	26.4	J		
1-METHYLPHENANTHRENE	22.5								29.4		36.3		48.8			
2,3,5-TRIMETHYLNAPHTHALENE	6.47	J							9.935	J	13.4	J	12.7			
2,6-DIMETHYLNAPHTHALENE	8.44	J							12.17	J	15.9	J	15.4			
2-METHYLNAPHTHALENE	19.7	J							28.95	J	38.2	J	37.7	J		
ACENAPHTHENE	13.9	J							20.2	J	26.5	J	17.1			
ACENAPHTHYLENE	46.2	J							76.6	J	107	J	103			
ANTHRACENE	62.9	J							118.95	J	175	J	173	J		
BENZO(A)ANTHRACENE	181	J							273	J	365	J	315			
BENZO(A)PYRENE	209	J							157.5	J	106	J	149	J		
BENZO(B)FLUORANTHENE	303	J							438.5	J	574	J	493			
BENZO(E)PYRENE	173	J							231.5	J	290	J	264			
BENZO(G,H,I)PERYLENE	156	J							220.5	J	285	J	267			
BENZO(K)FLUORANTHENE	113	J							161	J	209	J	162			
CHRYSENE	140	J							258.5	J	377	J	306			
DIBENZO(A,H)ANTHRACENE	33.7	J							53.7	J	73.7	J	64.9			
DIBENZOTHIOPHENE	8.37	J							12.935	J	17.5	J	14.1			
FLUORANTHENE	351	J							541	J	731	J	544			
FLUORENE	18.7	J							30.75	J	42.8	J	41	J		
HIGH MOLECULAR WEIGHT PAHS	1225.7								1772.7		2319.7		1890.9			
INDENO(1,2,3-CD)PYRENE	158	J							242	J	326	J	289			
LOW MOLECULAR WEIGHT PAHS	346.6								543.75		740.9		630.5			
NAPHTHALENE	40.2								48.8		57.4		55.7			
PERYLENE	54.4	J							95.7	J	137	J	114			
PHENANTHRENE	145	J							219.5	J	294	J	203			
PYRENE	311	J							489	J	667	J	512			
TOTAL PAHS ECO	1572.3								2316.45		3060.6		2521.4			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	272	J	388	J	327.5	J	267	J	258.5	J	245	J	287	J	385	J
CADMIUM	0.43	J							0.33	J	0.23	J	0.32	J		
COPPER	2.14	J							12.87	J	23.6	J	9.22	J		
LEAD	77.81	J							83.78	J	89.75	J	39.94	J		
NICKEL	5.71	J							6.01	J	6.31	J	5.3	J		
ZINC	101.63	J							95.7	J	89.77	J	59.23	J		
HF Digestion Inorganics (mg/kg)																
ALUMINUM	62766								60830		58894		60457			
ARSENIC	18.3								18.6		18.9		14			
CADMIUM	0.59								0.58		0.57		0.63			
CHROMIUM	97.7								95.1		92.5		88.8			
COPPER	65	J							61.15	J	57.3		33	J		
IRON	33256	J							31933.5	J	30611		30228	J		
LEAD	116								117		118		66.6			
MANGANESE	358								354		350		345			
MERCURY	0.37								0.38		0.39		0.19			
NICKEL	25.4	J							25.65	J	25.9	J	25.1	J		
SILVER	4.43	J							4.19	J	3.95		4.38	J		
ZINC	95.9	J							105.95	J	116		97.4	J		
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2	
nsample	**OU4-SD-M05-100A**		**OU4-SD-M05-100A-2**		**OU4-SD-M05-100A-2-AVG**		**OU4-SD-M05-100A-2-D**		**OU4-SD-M05-100A-AVG**		**OU4-SD-M05-100A-D**		**OU4-SD-M05-200A**		OU4-SD-M05-200A-2	
sample_dat	20000827		20000827		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.09	U							0.275	U	0.46	U	0.07	U		
1,2,4,5-TETRACHLOROBENZENE	1.2	U							1.1	U	1	U	1.5	U		
2,4'-DDD	1.3	J							1.95	J	2.6	J	1.5			
2,4'-DDE	0.14	J							0.30	J	0.46	J	0.31			
2,4'-DDT	0.08	J							0.13	J	0.18	J	0.04			
4,4'-DDD	1.3	J							1.75	J	2.2	J	1.6			
4,4'-DDE	1.2	J							1.75	J	2.3	J	1			
4,4'-DDT	1.3	J							1.005	J	0.71	J	0.88			
ALDRIN	0.02	J							0.035	J	0.05	J	0.05	J		
ALPHA-BHC	0.06	J							0.115	J	0.17	J	0.14			
ALPHA-CHLORDANE	0.19	J							0.30	J	0.41	J	0.33			
BETA-BHC	0.34	U							0.34	U	0.34	U	0.36	U		
CHLORPYRIFOS	1.4	U							0.94	U	0.48	U	1.5	U		
CIS-NONACHLOR	0.29								0.305		0.32		0.17			
DELTA-BHC	0.04	J							0.04	J	0.075	U	0.079	U		
DIELDRIN	0.06	J							0.08	J	0.10	J	0.04	J		
ENDOSULFAN II	0.62								0.635		0.65		0.95			
ENDRIN	0.23	U							0.23	U	0.23	U	0.24	U		
GAMMA-BHC (LINDANE)	0.14	J							0.14	J	0.40	U	0.42	U		
GAMMA-CHLORDANE	0.11	U							0.09	J	0.09	J	0.12	U		
HEPTACHLOR	0.29	UJ							0.3125	J	0.48	J	0.30	U		
HEPTACHLOR EPOXIDE	0.051	U							0.0505	U	0.05	U	0.053	U		
HEXACHLOROBENZENE	0.076	U							0.0755	U	0.075	U	0.24			
MIREX	0.051	U							0.0505	U	0.05	U	0.053	U		
OXYCHLORDANE	0.02	J							0.05	J	0.08	J	0.14			
PCB-101																
PCB-101/90	0.99	J							1.545	J	2.1	J	1.6			
PCB-105	0.38	J							0.545	J	0.71	J	0.67	J		
PCB-118	0.99	J							1.345	J	1.7		1.6			
PCB-123																
PCB-126	0.15	U							0.225	U	0.30	U	0.32	U		
PCB-128	0.37	J							0.53	J	0.69	J	0.58			
PCB-138																
PCB-138/160	1.5	J							2	J	2.5	J	2.5			
PCB-149/123	0.73	J							1.215	J	1.7	J	1.2			
PCB-153																
PCB-153/132	1.5	J							2.4	J	3.3	J	2.4			
PCB-156	0.41								0.375		0.34		0.57			
PCB-167	0.13	J							0.915	J	1.7	J	0.23	J		
PCB-169	0.40	J							0.275	J	0.30	U	0.32	U		
PCB-170																
PCB-170/190	0.68	J							0.68	J	1.7	UJ	1.1	J		
PCB-18																
PCB-18/17	0.15	UJ							0.5375	J	1	J	0.59			
PCB-180	0.78								0.94		1.1		1.9			
PCB-187	0.44	J							0.68	J	0.92	J	1.1			
PCB-189	0.26	J							0.335	J	0.41		0.37			
PCB-195																
PCB-195/208	0.28	J							0.385	J	0.49	J	0.47			
PCB-201/157/173	0.30								0.255		0.21		0.48			
PCB-206	0.28	J							0.43	J	0.58	J	0.39			
PCB-209	0.41	J							0.755	J	1.1	J	0.82			
PCB-28	0.51	U							0.5525	J	0.85	J	0.49	U		
PCB-44	0.27								0.235		0.20	J	0.66			
PCB-52	0.60	J							0.85	J	1.1	J	0.95			
PCB-66	0.19	J							0.315	J	0.44	J	0.36			
PCB-77	0.04	J							0.08	J	0.12	J	0.02	J		
PCB-8																
PCB-8/5	0.16	J							0.53	J	0.90	J	0.95			
PCB-81	0.30	U							0.165	U	0.03	U	0.32	U		
PENTACHLOROANISOLE	0.10	U							0.14	U	0.18	U	0.19	U		
PENTACHLOROBENZENE	0.22	U							0.23	U	0.24	U	0.22	U		
TEQ PCB	0.0121								0.008406		0.000214		0.000155			
TEQ PCB BIRD	0.00253								0.00443		0.006181		0.001206			
TEQ PCB BIRD HALFND	0.025045								0.023945		0.022846		0.033382			
TEQ PCB FISH	0.000041								0.000048		0.000045		0.000027			
TEQ PCB FISH HALFND	0.000492								0.000652		0.000812		0.000916			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2	
nsample	**OU4-SD-M05-100A**		**OU4-SD-M05-100A-2**		**OU4-SD-M05-100A-2-AVG**		**OU4-SD-M05-100A-2-D**		**OU4-SD-M05-100A-AVG**		**OU4-SD-M05-100A-D**		**OU4-SD-M05-200A**		**OU4-SD-M05-200A-2**	
sample_dat	20000827		20000827		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
TEQ PCB HALFND	0.019649								0.019685		0.019722		0.021008			
TOTAL DDT HALFND	5.32								6.885		8.45		5.33			
TOTAL DDT POS	5.32								6.885		8.45		5.33			
TOTAL PCB CONGENERS	20.3								30.51		41.06		37.77			
TRANS-NONACHLOR	0.13	J							0.335	J	0.54	J	0.14			
Miscellaneous Parameters (%)																
PERCENT CLAY	30.9								30.75		30.6		31			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT SAND	19.1								18.8		18.5		29.3			
PERCENT SILT	50								50.45		50.9		39.7			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	2.57	J							2.52	J	2.47	J	2.59	J		
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	150	J							217.5	J	285	J	246			
C1-DIBENZOTHIOPHENES	10	J							15.15	J	20.3	J	17.7			
C1-FLUORANTHENES/PYRENES	169	J							300	J	431	J	372			
C1-FLUORENES	18.1	J							27.5	J	36.9	J	34.5			
C1-NAPHTHALENES	32.4	J							48	J	63.6	J	64.2			
C1-PHENANTHRENES/ANTHRACENES	89.1	J							130.05	J	171	J	152			
C2-CHRYSENES	52.4								82.7		113	J	103			
C2-DIBENZOTHIOPHENES	14.5	J							23.15	J	31.8	J	25.1			
C2-FLUORENES	20.1	J							37.35	J	54.6	J	45.5			
C2-NAPHTHALENES	29.2	J							47.25	J	65.3	J	77.7			
C2-PHENANTHRENES/ANTHRACENES	65.2	J							101.1	J	137	J	118			
C3-CHRYSENES	5.22	J							6.38	J	7.54		7.86			
C3-DIBENZOTHIOPHENES	9.76	J							19.33	J	28.9	J	21			
C3-FLUORENES	10.8	J							23.15	J	35.5	J	24.7			
C3-NAPHTHALENES	23.8	J							47.5	J	71.2	J	73.7			
C3-PHENANTHRENES/ANTHRACENES	31.4	J							73.2	J	115	J	72.1			
C4-CHRYSENES	6.61								7.165		7.72		6.44			
C4-NAPHTHALENES	11.2	J							25	J	38.8	J	32.2			
C4-PHENANTHRENES/ANTHRACENES	14.8	J							43.15	J	71.5	J	66			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3	
nsample	***OU4-SD-M05-300A***		**OU4-SD-M05-300A-2**		**OU4-SD-M05-101B**		**OU4-SD-M05-101B-2**		**OU4-SD-M05-201B**		**OU4-SD-M05-201B-2**		**OU4-SD-M05-301B**		OU4-SD-M05-301B-2	
sample_dat	20000827		20000827		20010506		20010506		20010507		20010507		20010506		20010506	
round	03		03		04		04		04		04		04		04	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	4.35	J			8.6				3.1				4.2			
1-METHYLNAPHTHALENE	15.8	J			17.9				9				11.3			
1-METHYLPHENANTHRENE	29.1				31				30.3				38.4			
2,3,5-TRIMETHYLNAPHTHALENE	8.31				6.5				6.7				4.6			
2,6-DIMETHYLNAPHTHALENE	9.63				16.8				6.5				8.2			
2-METHYLNAPHTHALENE	21.2	J			26.4				12.6				17.8			
ACENAPHTHENE	16.1				14.9				13				45.8			
ACENAPHTHYLENE	70.9				53.3				67.1				55.7			
ANTHRACENE	99.3	J			129.5				168.9				203.2			
BENZO(A)ANTHRACENE	242				253.5				221.2				317.2			
BENZO(A)PYRENE	202	J			407.1	J			361.4	J			480.6	J		
BENZO(B)FLUORANTHENE	343				329.9				298.7				395.8			
BENZO(E)PYRENE	183				157.7				149.8				188.8			
BENZO(G,H,I)PERYLENE	194				152.9				134.4				178.5			
BENZO(K)FLUORANTHENE	129				100.4				86				103.3			
CHRYSENE	228				251.7	J			223	J			271.6	J		
DIBENZO(A,H)ANTHRACENE	51.1				38	J			35.1	J			44.5	J		
DIBENZOTHIOPHENE	11				9	J			8.2	J			16.2	J		
FLUORANTHENE	403				433.7				418.9				550.1			
FLUORENE	31	J			31.6	J			32.8	J			64.4	J		
HIGH MOLECULAR WEIGHT PAHS	1524.1				1771.3				1625.8				2145.2			
INDENO(1,2,3-CD)PYRENE	211				174.9	J			150.8	J			203.7	J		
LOW MOLECULAR WEIGHT PAHS	450.3				475.4				491.6				772.5			
NAPHTHALENE	32.8				30				22.4				30			
PERYLENE	75.7				57.2	J			52.7	J			56.4	J		
PHENANTHRENE	179				189.7				174.8				355.6			
PYRENE	398				387.3				366.2				481.2			
TOTAL PAHS ECO	1974.4				2246.7				2117.4				2917.7			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	147	J	13	U	643.127	J	1237.799	J	448.672	J	606.58	J	30.311	J	57.169	J
CADMIUM	0.20	J			0.59				0.43	J			0.26	J		
COPPER	5.6	J			29.2	J			16.8	J			7.05	J		
LEAD	20.13	J			84.4				42.5				22.6			
NICKEL	3.59	J			7.1				6.11				4.37			
ZINC	27.37	J			108				72.8				31.6			
HF Digestion Inorganics (mg/kg)																
ALUMINUM	57212				57340.52				54131.3				44042.89			
ARSENIC	14.1				13.314				12.163				5.652			
CADMIUM	0.56				0.25	J			0.21	J			0.19	J		
CHROMIUM	87.6				118.98				112.81				78.81			
COPPER	31.4	J			51.25				31.76				14.74			
IRON	28333	J			30075.6				28113.78				17250.76			
LEAD	65				107.62				63.51				42.95			
MANGANESE	356				388.67				367.5				394.08			
MERCURY	0.1878	U			0.39	J			0.22	J			0.18	J		
NICKEL	22.8	J			28.72				25.69				21.56			
SILVER	4.11	J			0.62	J			0.66	J			0.43	J		
ZINC	71.9	J			130.62				111.23				59.52			
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3	
nsample	**OU4-SD-M05-300A**		**OU4-SD-M05-300A-2**		**OU4-SD-M05-101B**		**OU4-SD-M05-101B-2**		**OU4-SD-M05-201B**		**OU4-SD-M05-201B-2**		**OU4-SD-M05-301B**		**OU4-SD-M05-301B-2**	
sample_dat	20000827		20000827		20010506		20010506		20010507		20010507		20010506		20010506	
round	03		03		04		04		04		04		04		04	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.07	U			0.17				0.03	J			0.07			
1,2,4,5-TETRACHLOROBENZENE	0.57	U			0.35				0.14	U			0.40			
2,4'-DDD	1.3				2.2				1.9				2.3			
2,4'-DDE	0.06	J			0.94				0.64				0.29			
2,4'-DDT	0.13				0.13				0.03	J			0.10			
4,4'-DDD	1.3				1				0.48				2.2			
4,4'-DDE	1.1				1.5				0.68				1.1			
4,4'-DDT	0.53				1.7				0.81				0.98			
ALDRIN	0.01	J			0.19				0.039	U			0.03			
ALPHA-BHC	0.05	J			0.04	J			0.14	U			0.077	U		
ALPHA-CHLORDANE	0.22				0.64				0.20				0.14			
BETA-BHC	0.19	U			0.22	U			0.10	U			0.08	U		
CHLORPYRIFOS	0.62	U			0.14	U			0.06	J			0.01	J		
CIS-NONACHLOR	0.10				0.36				0.04	J			0.07			
DELTA-BHC	0.02	J			0.05	J			0.097	U			0.03	J		
DIELDRIN	0.03	J			0.07	J			0.12	U			0.066	U		
ENDOSULFAN II	0.42				0.40				0.06	J			0.46			
ENDRIN	0.13	U			0.12	U			0.12	U			0.066	U		
GAMMA-BHC (LINDANE)	0.23	U			0.82	U			0.80	U			0.45	U		
GAMMA-CHLORDANE	0.064	U			0.21				0.058	U			0.04			
HEPTACHLOR	0.16	U			0.34				0.16	U			0.14			
HEPTACHLOR EPOXIDE	0.028	U			0.12	U			0.18				0.04	J		
HEXACHLOROBENZENE	0.042	U			0.01	J			0.03	J			0.055	U		
MIREX	0.028	U			0.06	U			0.058	U			0.01	J		
OXYCHLORDANE	0.03				0.04	U			0.039	U			0.02	J		
PCB-101																
PCB-101/90	0.49				2.2				1.1				0.59			
PCB-105	0.22	J			0.27				0.26				0.23			
PCB-118	0.48				0.47				0.36				0.53			
PCB-123																
PCB-126	0.17	U			0.02	U			0.47	U			0.26	U		
PCB-128	0.09				0.46				0.14				0.26			
PCB-138																
PCB-138/160	1.2				2				1.4				1.4	U		
PCB-149/123	0.78				0.95	U			0.63	U			1.1	U		
PCB-153																
PCB-153/132	1.2				1.7	U			1.4	U			0.44	U		
PCB-156	0.28				1.3				1.2				0.62			
PCB-167	0.02	J			0.99				0.82				0.81			
PCB-169	0.02	U			0.48	U			0.01	J			0.26	U		
PCB-170																
PCB-170/190	0.97	U			4.7				4.4				4.6			
PCB-18																
PCB-18/17	0.085	U			0.88				0.25	U			0.14	U		
PCB-180	0.60				1.4	U			0.99	U			0.97	U		
PCB-187	0.58				0.72				0.41				0.74	U		
PCB-189	0.05	J			0.14	U			0.07	J			0.06	J		
PCB-195																
PCB-195/208	0.23				0.24				0.07				0.24			
PCB-201/157/173	0.21				0.24				0.18				0.17			
PCB-206	0.24				0.48				0.18				0.29			
PCB-209	0.59				0.28	J			0.21	J			0.34	J		
PCB-28	0.45				0.09	J			0.07	J			0.05	J		
PCB-44	0.10	J			0.04	J			0.31	U			0.04	J		
PCB-52	0.32				0.39				0.36				0.17			
PCB-66	0.08	J			0.53				0.70				0.14			
PCB-77	0.03	J			0.01	U			0.04	U			0.26	U		
PCB-8																
PCB-8/5	0.07	J			0.13	J			0.36				0.20			
PCB-81	0.07	U			0.48	U			0.47	U			0.01	U		
PENTACHLOROANISOLE	0.03	U			0.36	J			0.09	U			0.04	U		
PENTACHLOROBENZENE	0.06	U			0.15				0.07	J			0.05	J		
TEQ PCB	0.000064				0.000098				0.000387				0.000073			
TEQ PCB BIRD	0.001584				0.000196				0.000187				0.000116			
TEQ PCB BIRD HALFND	0.013602				0.025699				0.048197				0.020256			
TEQ PCB FISH	0.000012				0.000015				0.000014				0.000012			
TEQ PCB FISH HALFND	0.000455				0.000199				0.001311				0.000686			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3	
nsample	**OU4-SD-M05-300A**		**OU4-SD-M05-300A-2**		**OU4-SD-M05-101B**		**OU4-SD-M05-101B-2**		**OU4-SD-M05-201B**		**OU4-SD-M05-201B-2**		**OU4-SD-M05-301B**		**OU4-SD-M05-301B-2**	
sample_dat	20000827		20000827		20010506		20010506		20010507		20010507		20010506		20010506	
round	03		03		04		04		04		04		04		04	
TEQ PCB HALFND	0.008877				0.008388				0.02397				0.017005			
TOTAL DDT HALFND	4.42				7.47				4.54				6.97			
TOTAL DDT POS	4.42				7.47				4.54				6.97			
TOTAL PCB CONGENERS	14.935				30.86				22.99				19.05			
TRANS-NONACHLOR	0.01	J			0.13	J			0.14	U			0.09			
Miscellaneous Parameters (%)																
PERCENT CLAY	15.7				21.1				20.5				4.7			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT SAND	76.2				31.9				43.3				88.3			
PERCENT SILT	8.1				47				36.3				7.1			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	0.57	J			2.63	J			2.85	J			0.60	J		
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	174				122.8				132.2				157.3			
C1-DIBENZOTHIOPHENES	12.6				10.4				9.7				12.7			
C1-FLUORANTHENES/PYRENES	293				204.8				245.4				278.8			
C1-FLUORENES	25.2				24				25				29			
C1-NAPHTHALENES	37				44.3				21.6				29.1			
C1-PHENANTHRENES/ANTHRACENES	117				108.1				111.5				142.2			
C2-CHRYSENES	66.5				61.6				71.1				69.9			
C2-DIBENZOTHIOPHENES	16.3				13.5				12.6				16.6			
C2-FLUORENES	33.1				21.4				20.4				22.9			
C2-NAPHTHALENES	50				41.4				21.7				22.9			
C2-PHENANTHRENES/ANTHRACENES	91.4				77.9				88.6				93.2			
C3-CHRYSENES	5.92				6.7	J			8.7				6.5			
C3-DIBENZOTHIOPHENES	12.1				8.8				11				10.3			
C3-FLUORENES	15.6				18.8				23.6				34.9			
C3-NAPHTHALENES	49.8				27.5				23				19.4			
C3-PHENANTHRENES/ANTHRACENES	49.9				41.3				52.8				44.8			
C4-CHRYSENES	6.08				25.5				19				28.4			
C4-NAPHTHALENES	21.1				16.5				18.2				12.3			
C4-PHENANTHRENES/ANTHRACENES	15.9				11.7				24.8				18.5			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2	
nsample	**OU4-SD-M05-101A**		**OU4-SD-M05-101A-2**		**OU4-SD-M05-201A**		**OU4-SD-M05-201A-2**		**OU4-SD-M05-301A**		**OU4-SD-M05-301A-2**		**OU4-SD-M05-102A**		**OU4-SD-M05-202A**	
sample_dat	20010819		20010819		20010819		20010819		20010819		20010819		20020811		20020810	
round	05		05		05		05		05		05		06		06	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	7.6				7				4.6				40.8		7.9	
1-METHYLNAPHTHALENE	12.7				13.6				9.3				104.6	J	16.2	J
1-METHYLPHENANTHRENE	44.8				45.7				29.1				91.1		46	
2,3,5-TRIMETHYLNAPHTHALENE	9.8				11.8				5.2				50.5		15.6	
2,6-DIMETHYLNAPHTHALENE	13				14.5				7.4				87.2		18.2	
2-METHYLNAPHTHALENE	21.3				20.9				15.4				198.2		27.3	
ACENAPHTHENE	23.2				18.5				14.9				69.5		20.2	
ACENAPHTHYLENE	71.2				92.5				75.7				118.8	J	75.7	J
ANTHRACENE	276	J			363.1	J			201.7	J			325.8		183.6	
BENZO(A)ANTHRACENE	387				414.6				234.2				701.5	J	413.4	J
BENZO(A)PYRENE	630.8				665.9				408.8				712	J	566.9	J
BENZO(B)FLUORANTHENE	548.4				511.1				328.5				741.3		390.4	
BENZO(E)PYRENE	260.5				267				168.9				420.5	J	259.7	J
BENZO(G,H,I)PERYLENE	294.8	J			332.1	J			209.5	J			318.2	J	192.1	J
BENZO(K)FLUORANTHENE	164.8				180.9				99.7				30.3	J	5.6	J
CHRYSENE	315.6				327.8				192.1				662.5		406.5	
DIBENZO(A,H)ANTHRACENE	81.7	J			89.1	J			58.3	J			39.2	J	21	J
DIBENZOTHIOPHENE	14.2				14.4				9.1				46.9		19.9	
FLUORANTHENE	627.5				558.1				318.9				1036		600.5	
FLUORENE	46	J			59.8	J			33.2	J			124.2		38.2	
HIGH MOLECULAR WEIGHT PAHS	2616.7				2563.6				1532				4055.7		2566.5	
INDENO(1,2,3-CD)PYRENE	372.1	J			377.7	J			241.4	J			204.8	J	78.9	J
LOW MOLECULAR WEIGHT PAHS	749				870.4				538.9				1664.7		649.2	
NAPHTHALENE	37.3				36.8				25				303.9		52.1	
PERYLENE	87.8				84.5				51.5				112.5		92.6	
PHENANTHRENE	274				278.8				173				524.3		252.1	
PYRENE	574.1				508.1				319.7				904.5		558.2	
TOTAL PAHS ECO	3365.7				3434				2070.9				5720.4		3215.7	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	406.377	J	456.173	J	316.919	J	424.215	J	147.64	J	96.995	J				
CADMIUM	0.54				0.53				0.62							
COPPER	24.21				11.36				8.96							
LEAD	92.63				39.14				34.51							
NICKEL	5.16				5.19				5.41							
ZINC	92.1				64.24				46.06							
HF Digestion Inorganics (mg/kg)																
ALUMINUM	55118.38				54220.63				44595.3				61004		54979	
ARSENIC	15.14				14.92				7.4				35.2		13.4	
CADMIUM	0.4615	U			0.4481	U			0.4608	U			1.6		1.1	
CHROMIUM	118.1				103.2				83.44				92.9		88.6	
COPPER	56.09				29.44				22.67				325		36.5	
IRON	30992.69				29244.38				19112.7				36693		27318	
LEAD	116.92				57.22				62.87				474		71.5	
MANGANESE	384.85				372.86				387.86				522		352	
MERCURY	0.3977	J			0.1854	J			0.2466	J			1.7	J	0.19	J
NICKEL	31.72				27.21				24.35				50	J	25.5	J
SILVER	0.62	J			0.47	J			0.65	J			0.87		0.42	U
ZINC	138.64	J			107.98	J			75	J			386		99.6	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2	
nsample	**OU4-SD-M05-101A**		**OU4-SD-M05-101A-2**		**OU4-SD-M05-201A**		**OU4-SD-M05-201A-2**		**OU4-SD-M05-301A**		**OU4-SD-M05-301A-2**		**OU4-SD-M05-102A**		**OU4-SD-M05-202A**	
sample_dat	20010819		20010819		20010819		20010819		20010819		20010819		20020811		20020810	
round	05		05		05		05		05		05		06		06	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.39				0.32	J			1.21				2.36		0.28	J
1,2,4,5-TETRACHLOROBENZENE	1.71	U			2.28	U			1.05	U			2.71		0.67	
2,4'-DDD	2.04				2.02				2.26				7.18		1.53	
2,4'-DDE	0.17				0.29				0.10				2.65		0.24	
2,4'-DDT	0.16				0.12				0.19				4.46		0.35	
4,4'-DDD	1.88				2.2				2.48				13.39		1.93	
4,4'-DDE	1.65				0.93				1.41				8.08		1.52	
4,4'-DDT	0.89				1.12				0.46				15.6		1.22	
ALDRIN	0.12	U			0.11	U			0.07	U			0.23		0.55	
ALPHA-BHC	0.07	J			0.06	J			0.06				0.09		0.06	J
ALPHA-CHLORDANE	0.38				0.90				0.10	J			0.16	U	0.19	U
BETA-BHC	0.26	J			0.31	J			0.28				0.93		0.17	J
CHLORPYRIFOS	0.20	U			0.20	U			0.12	U			0.16	U	0.20	U
CIS-NONACHLOR	0.32				0.22				0.20				2.2		0.38	
DELTA-BHC	0.27				0.04	J			0.02	J			0.09	U	0.07	J
DIELDRIN	0.20				0.20				0.05				2.61		0.22	
ENDOSULFAN II	0.90				0.99				0.61				0.72		0.04	J
ENDRIN	0.12	U			0.12	U			0.07	U			0.10	U	0.12	U
GAMMA-BHC (LINDANE)	0.24	U			0.24	U			0.24				0.31		0.14	J
GAMMA-CHLORDANE	0.05	U			0.10				0.03	U			0.07		0.10	
HEPTACHLOR	0.13	J			0.27	U			0.06	J			4.96		0.47	
HEPTACHLOR EPOXIDE	0.10	U			0.09	U			0.06	U			0.08	U	0.10	U
HEXACHLOROBENZENE	0.09	U			0.09	U			0.10				0.37		0.14	
MIREX	0.16	U			0.15	U			0.10	U			0.05	J	0.16	U
OXYCHLORDANE	0.02	J			0.02	J			0.03	J			0.49		0.12	
PCB-101																
PCB-101/90	1.41				1.24				1.75				34.79		5.24	
PCB-105	0.38	J			0.48	J			0.21	J			5.94		0.94	J
PCB-118	1.34				1.26				1.11				17.49		2.87	
PCB-123																
PCB-126	0.52	J			0.03	J			0.03	J			1.52	J	0.18	J
PCB-128	0.75				0.56				0.47				7.47		1	
PCB-138																
PCB-138/160	3.75				2.12	J			2.55				45.25		6.31	
PCB-149/123	1.53				1.06				2.08				38.63		4.05	
PCB-153																
PCB-153/132	2.72				2.21	J			3.52				52.8		8.11	
PCB-156	0.72	U			0.71	U			0.45	U			7.33		1.27	
PCB-167	0.33	J			0.14	J			0.18	J			2.28		0.35	J
PCB-169	0.82	U			0.80	U			0.50	U			0.01	J	0.03	J
PCB-170																
PCB-170/190	1.54	U			1.51	U			0.95	U			19.14	J	2.57	J
PCB-18																
PCB-18/17	0.15	U			0.15	U			0.09	U			0.45		0.35	
PCB-180	1.04	J			1.13	J			1.56	J			33.92		4.29	
PCB-187	1.22	J			1.03	J			1.5				23.46		2.94	
PCB-189	0.30	J			0.64	J			0.16	J			0.87		0.08	J
PCB-195																
PCB-195/208	0.61				0.45				0.46				9.35		0.91	
PCB-201/157/173	0.33	J			0.35	J			0.34	J			3.62		0.51	J
PCB-206	0.80				0.41				0.51				13.23		1.35	
PCB-209	1.78				0.58				0.86				14.63		1.63	
PCB-28	0.70				0.37	J			0.15	J			0.95		0.91	
PCB-44	0.33				0.39				0.14	J			6.73		1	
PCB-52	0.68				1.02				0.51				19.27		2.7	
PCB-66	0.41				0.46				0.17				3.6		0.92	
PCB-77	0.02	J			0.01	J			0.50	U			0.09	J	0.03	J
PCB-8																
PCB-8/5	0.25	J			0.58				0.16	J			1.02		0.32	
PCB-81	0.15	J			0.01	J			0.02	J			0.96	J	0.13	J
PENTACHLOROANISOLE	0.14	J			0.13	J			0.04	J			0.31		0.10	J
PENTACHLOROBENZENE	0.29	U			0.65	U			0.33	U			0.50		0.13	J
TEQ PCB	0.052173				0.003121				0.003127				0.154882		0.019243	
TEQ PCB BIRD	0.068105				0.004614				0.005091				0.254792		0.032876	
TEQ PCB BIRD HALFND	0.068587				0.005086				0.017885				0.254822		0.032912	
TEQ PCB FISH	0.0027				0.000175				0.000181				0.008469		0.00102	
TEQ PCB FISH HALFND	0.002724				0.000199				0.00022				0.00847		0.001022	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.1		MS-5 LOC.1		MS-5 LOC.2		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2	
nsample	**OU4-SD-M05-101A**		**OU4-SD-M05-101A-2**		**OU4-SD-M05-201A**		**OU4-SD-M05-201A-2**		**OU4-SD-M05-301A**		**OU4-SD-M05-301A-2**		**OU4-SD-M05-102A**		OU4-SD-M05-202A	
sample_dat	20010819		20010819		20010819		20010819		20010819		20010819		20020811		20020810	
round	05		05		05		05		05		05		06		06	
TEQ PCB HALFND	0.064495				0.015143				0.010666				0.154891		0.019254	
TOTAL DDT HALFND	6.79				6.68				6.9				51.36		6.79	
TOTAL DDT POS	6.79				6.68				6.9				51.36		6.79	
TOTAL PCB CONGENERS	38.03				30.24				32.3				618.98		88.72	
TRANS-NONACHLOR	0.26				0.08	J			0.06	J			0.24		0.09	J
Miscellaneous Parameters (%)																
PERCENT CLAY	27				26.1				7.1				21.7		22	
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL													0.00		0.00	
PERCENT MEDIUM SAND																
PERCENT SAND	19.1				31.3				79				29.4		38.8	
PERCENT SILT	53.9				42.6				13.9				48.9		39.2	
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	1.95				2.27				0.75				1.75	J	0.88	J
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	233.4				323				170.8				364.2		253.2	
C1-DIBENZOTHIOPHENES	16.3				16.7				12.2				53.9		23.3	
C1-FLUORANTHENES/PYRENES	343.3				401.4				257.1				461.6		282	
C1-FLUORENES	33.2				43				24.5				80.6		29.4	
C1-NAPHTHALENES	34				34.5				24.7				302.8		43.5	
C1-PHENANTHRENES/ANTHRACENES	167.9				193.3				119.9				266.4		140.2	
C2-CHRYSENES	24.8				122.8				54.9				200.9		120.5	
C2-DIBENZOTHIOPHENES	20.7				21.9				16.2				88.3		32.7	
C2-FLUORENES	41.1				51.8				32.9				84.7		24.9	
C2-NAPHTHALENES	27.8				34.6				20.5				216.6		36.5	
C2-PHENANTHRENES/ANTHRACENES	140.5				167.9				94.8				255.1		145.2	
C3-CHRYSENES	6.1	J			9.2				4.2	J			36.3		18.6	
C3-DIBENZOTHIOPHENES	17.4				21.9				14.6				61.2		37.7	
C3-FLUORENES	20.6				32.6				15.3				97.9		26.1	
C3-NAPHTHALENES	26.1				36.4				18				174.6		33.9	
C3-PHENANTHRENES/ANTHRACENES	54.1				94.3				41.2				151.1		80.3	
C4-CHRYSENES	0.50	J			1.5	J			0.30	J			16.7		9.3	
C4-NAPHTHALENES	18.7				22.7				11.4				106.8		18	
C4-PHENANTHRENES/ANTHRACENES	36.6				28.1				17.4				48.4		25.9	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.2	
nsample	**OU4-SD-M05-302A**		**OU4-SD-M05-103A**		**OU4-SD-M05-203A**		**OU4-SD-M05-303A**		**OU4-SD-M05-105A**		**OU4-SD-M05-105A-AVG**		**OU4-SD-M05-105A-D**		**OU4-SD-M05-205A**	
sample_dat	20020811		20030811		20030810		20030809		20050820		20050820		20050820		20050820	
round	06		07		07		07		08		08		08		08	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	4.4		30.6		10.4		3.1		44		48		52		4.7	
1-METHYLNAPHTHALENE	8.2	J	49.2		19		6.3		65		71		77		8.8	
1-METHYLPHENANTHRENE	23.7		52.9		39.7		21.3		100		105		110		43	
2,3,5-TRIMETHYLNAPHTHALENE	7.1		27.4		16		3.9		63		66		69		9.4	
2,6-DIMETHYLNAPHTHALENE	8.5		68.2		23.8		4.8		99		109.5		120		10	
2-METHYLNAPHTHALENE	13.6		97.1		30		9		110		115		120		11	
ACENAPHTHENE	13.1		47.7		21.8		27.7		77		85.5		94		21	
ACENAPHTHYLENE	55.1	J	52.4		82.7		18.7		24	J	25	J	26	J	22	
ANTHRACENE	109.7		215.4		243.5		87.9		210		225		240		89	
BENZO(A)ANTHRACENE	247.9	J	274.6		317.8		144.7		610		630		650		400	
BENZO(A)PYRENE	393.8	J	312.8		417.2		195.7		660		690		720		450	
BENZO(B)FLUORANTHENE	286.1		341.7		397.5		190.2		700		735		770		300	
BENZO(E)PYRENE	165.5	J	173.7		210.9		100.7		550		570		590		310	
BENZO(G,H,I)PERYLENE	123.1	J	158.2		182.1		104.7		480		505		530		280	
BENZO(K)FLUORANTHENE	11.4	J	345		126.7		66.7		700		720		740		470	
CHRYSENE	236.2		378.2		324		140.8		920		940		960		410	
DIBENZO(A,H)ANTHRACENE	15.3	J	35.9		46.7		21.5		74		97		120		57	
DIBENZOTHIOPHENE	10.9		37.3		19.5		12.7		65		68.5		72		18	J
FLUORANTHENE	327.6		612		666.2		324.6		1300		1400		1500		650	
FLUORENE	23.6		94.4		61.4		38.7		130		135		140		37	
HIGH MOLECULAR WEIGHT PAHS	1541.6		2146.2		2384.4		1095.5		4964		5207		5450		2507	
INDENO(1,2,3-CD)PYRENE	84.4	J	170.1		201		116.5		390		415		440		250	
LOW MOLECULAR WEIGHT PAHS	404.3		953.5		790.2		429.3		1331		1415.5		1500		450	
NAPHTHALENE	27.8		152.4		49.8		17.4		170		180		190		20	J
PERYLENE	57.1		78		97.4		35.5		200		210		220		140	
PHENANTHRENE	161.4		294.1		301		229.9		610		650		690		250	
PYRENE	320.8		532.7		612.5		268.2		1400		1450		1500		540	
TOTAL PAHS ECO	1945.9		3099.7		3174.6		1524.8		6295		6622.5		6950		2957	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE																
CADMIUM																
COPPER																
LEAD																
NICKEL																
ZINC																
HF Digestion Inorganics (mg/kg)																
ALUMINUM	44185		80241.62		62988.21		51427.49		57358		55648.5		53939		46199	
ARSENIC	6		59.62		15.82		8.29		34.58		34.945		35.31		9.68	
CADMIUM	0.93	U	1.49	J	0.46	U	0.47	U	2.54		2.62		2.7		0.47	
CHROMIUM	61.1		155.49	J	119.57		95.86		102.26	J	101.145	J	100.03	J	79.69	J
COPPER	16.9		684.72	J	82.54		51.24		988.2	J	982.82	J	977.44	J	30.8	J
IRON	18540		41757.6		22457.63		15825.3		43428	J	43862	J	44296	J	23784	J
LEAD	47		694	J	77.9		42.22		829.24	J	824.07	J	818.9	J	57.69	J
MANGANESE	368		588.66		376.75		490.45		542		557		572		376	
MERCURY	0.31	J	1.8192		0.2882		0.157									
NICKEL	21.5	J	76.46		13.87	U	12.61	U	107.18		110.31		113.44		22.76	
SILVER	0.30	U	1.531		0.32		0.28		2.62	J	2.75	J	2.88	J	0.78	J
ZINC	59.5		697.58		138.17		75.74		1052.11	J	1058.09	J	1064.07	J	111.46	J
Inorganics (mg/kg)																
ALUMINUM			20300	J												
ARSENIC			49	J												
CADMIUM			1.5	J												
CHROMIUM			68.4	J												
COPPER			553	J												
IRON			37900	J												
LEAD			541	J												
MANGANESE			385	J												
MERCURY																
NICKEL			75.3	J												
SILVER			1.4	J												
ZINC			638	J												

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.2	
nsample	**OU4-SD-M05-302A**		**OU4-SD-M05-103A**		**OU4-SD-M05-203A**		**OU4-SD-M05-303A**		**OU4-SD-M05-105A**		**OU4-SD-M05-105A-AVG**		**OU4-SD-M05-105A-D**		**OU4-SD-M05-205A**	
sample_dat	20020811		20030811		20030810		20030809		20050820		20050820		20050820		20050820	
round	06		07		07		07		08		08		08		08	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.05	J	2.36		0.42		0.188	U								
1,2,4,5-TETRACHLOROBENZENE	0.14	J	4.17		2.7		0.46									
2,4'-DDD	1.6		6.48		2.5		1.97		27	J	27	J	29	R	2.5	R
2,4'-DDE	0.16		1.62		0.40		0.23		110	R	102	R	94	R	4.6	R
2,4'-DDT	0.47		4.05		0.45		0.27		4.7	J	4.7	J	4.1	R	0.46	J
4,4'-DDD	2.79		13.08		2.23		2.95		65	J	58.5	J	52	J	1.5	J
4,4'-DDE	1.47		4.49		1.42		0.95		39	J	36.5	J	34	J	1.2	J
4,4'-DDT	1.37		9.81		1.09		0.92		160	R	145	R	130	R	2	J
ALDRIN	0.37		2.68		0.08		0.063	U	11	R	10.35	R	9.7	R	0.35	J
ALPHA-BHC	0.04	J	0.05		0.03	J	0.02	J	6	J	5.8	J	5.6	J	0.35	U
ALPHA-CHLORDANE	0.12	U	0.114	U	0.58		0.07	J	8	J	6.9	J	5.8		0.55	J
BETA-BHC	0.05	J	0.86		0.43		0.09	J	11		10.5	J	10	J	1.5	R
CHLORPYRIFOS	0.13	U	0.114	U	0.99		0.01	J								
CIS-NONACHLOR	0.17		2.34	J	0.43	J	0.13	J	3.3	U	3.35	U	3.4	U	0.47	J
DELTA-BHC	0.02	J	0.062	U	0.05	J	0.05	J	6.4	R	5.9	R	5.4	R	0.25	J
DIELDRIN	0.12		2.55		0.27		0.03		88	J	80	J	72		1	
ENDOSULFAN II	0.16	J	0.89		1.11		0.19		3.3	U	5.125	J	8.6	J	0.53	U
ENDRIN	0.08	U	0.07	U	0.14	U	0.063	U	35	R	31.5	R	28	R	0.53	U
GAMMA-BHC (LINDANE)	0.15	U	0.28		0.17	J	0.02	J	0.50	J	0.50	J	0.46	R	0.12	J
GAMMA-CHLORDANE	0.03	U	0.12	J	0.13	J	0.08		6.3	J	6.3	J	29	R	0.88	R
HEPTACHLOR	0.18		4.89		0.32	U	0.23		6.5		6.3		6.1		0.47	R
HEPTACHLOR EPOXIDE	0.06	U	0.03	J	0.11	U	0.052	U	29	J	26.5	J	24	J	0.55	J
HEXACHLOROBENZENE	0.02	J	0.51	U	0.67	U	0.05		0.94	J	0.775	J	0.61	J	1.4	R
MIREX	0.02	J	0.10		0.12	J	0.084	U	23	R	12.15	R	1.3	R	2.2	R
OXYCHLORDANE	0.04	J	0.26		0.04	J	0.07		14	R	12.5	R	11	R	0.55	R
PCB-101									210		240	J	270	J	0.99	J
PCB-101/90	2.38		69.89		7.3		1.03									
PCB-105	0.39	J	6		1.25		0.14	J	36	J	51.5	J	67	J	0.47	J
PCB-118	1.5		36.68		3.99		0.55		130		150		170		1.6	J
PCB-123									4.7	U	4.85	U	5	U	0.078	U
PCB-126	0.05	J	3.07		0.75	J	0.13	J	7.1	U	7.3	U	7.5	U	0.12	U
PCB-128	0.51		8.5		1.43		0.22		37	J	41	J	45	J	0.51	J
PCB-138									190		210		230		2.4	
PCB-138/160	3.28		85.17		8.86		1.5									
PCB-149/123	2.41		60.97		6.05		1.13									
PCB-153									250		270		290		2.7	
PCB-153/132	4.43		102.91		11.39		1.73									
PCB-156	0.60		6.58	J	1.54	J	0.10	J	5.5	U	17.875	J	33	J	0.33	J
PCB-167	0.29	J	6.14		2.21		0.07	J	12	J	13.5	J	15	J	0.17	J
PCB-169	0.46	U	0.01	J	0.06	J	0.02	J	5.3	U	5.45	U	5.6	U	0.088	U
PCB-170									98	J	104	J	110	J	1.2	
PCB-170/190	1.88	J	26.9	J	13.74	J	12.59	J								
PCB-18									5.7	J	7.85	J	10	J	0.75	R
PCB-18/17	0.08	J	0.47		0.21		0.07	J								
PCB-180	2.25		59.94		6.75		0.83	J	190		210		230		1.3	J
PCB-187	1.68		43.53		4.83		0.74	J	140		150		160		1.5	
PCB-189	0.04	J	1.03		0.37	J	0.06	J	5.7	U	5.9	U	6.1	U	0.095	U
PCB-195									24	J	26	J	28	J	0.12	J
PCB-195/208	0.40		9.11		1.7		0.24									
PCB-201/157/173	0.28	J	5.39		0.85		0.15	J								
PCB-206	0.61		12.06		1.87		0.31		63		66.5		70		0.66	J
PCB-209	0.87		29.4		2.34		0.66		80		100		120		0.64	
PCB-28	0.33		0.88		1.48		0.19	J	6.9	J	8.1	J	9.3	J	0.34	J
PCB-44	0.46		7.64		1.4	U	0.37	U	42	J	46.5	J	51		0.64	J
PCB-52	1.01		37.34		3.79		0.42		92		101		110		0.62	J
PCB-66	0.33		7.39		0.55		0.07		44	R	49	R	54	R	0.39	J
PCB-77	0.02	J	0.45	J	0.16	J	0.22	J	5.9	U	6.1	U	6.3	U	0.097	U
PCB-8									5.6	U	5.75	U	5.9	U	0.82	R
PCB-8/5	0.31		0.78		0.45		0.29									
PCB-81	0.07	J	1.95		0.74	J	0.14	J	4.6	J	5.65	J	6.7	J	0.071	U
PENTACHLOROANISOLE	0.04	J	0.33		0.17	J	0.10									
PENTACHLOROBENZENE	0.02	J	0.38	U	0.20	U	0.22	J								
TEQ PCB	0.005188		0.311613		0.077527		0.013729		0.00672		0.008681		0.01056		0.000077	
TEQ PCB BIRD	0.013169		0.527355		0.15755		0.038078		0.46502		0.573573		0.68185		0.000098	
TEQ PCB BIRD HALFND	0.013422		0.527375		0.157591		0.038098		0.971022		1.094397		1.21777		0.012126	
TEQ PCB FISH	0.000314		0.016984		0.00422		0.000754		0.00319		0.00399		0.004775		0.000013	
TEQ PCB FISH HALFND	0.000327		0.016985		0.004222		0.000755		0.021433		0.022735		0.024035		0.000338	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2		MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.2	
nsample	**OU4-SD-M05-302A**		**OU4-SD-M05-103A**		**OU4-SD-M05-203A**		**OU4-SD-M05-303A**		**OU4-SD-M05-105A**		**OU4-SD-M05-105A-AVG**		**OU4-SD-M05-105A-D**		**OU4-SD-M05-205A**	
sample_dat	20020811		20030811		20030810		20030809		20050820		20050820		20050820		20050820	
round	06		07		07		07		08		08		08		08	
TEQ PCB HALFND	0.012095		0.311619		0.077539		0.013735		0.441911		0.45606		0.470212		0.007417	
TOTAL DDT HALFND	7.86		39.53		8.09		7.29		135.7		126.7		86		5.16	
TOTAL DDT POS	7.86		39.53		8.09		7.29		135.7		126.7		86		5.16	
TOTAL PCB CONGENERS	45.4		1089.18		145.26		43.53		3195		3571		3947		32.2	
TRANS-NONACHLOR	0.05	J	0.03	J	0.24		0.08	J	19	R	17.5	R	16	R	0.65	R
Miscellaneous Parameters (%)																
PERCENT CLAY	4.1		22		17.6		2.4		22.3		22.5		22.7		15.8	
PERCENT COARSE SAND									0.30		0.15		0.00		0.00	
PERCENT FINE SAND									28.5		28.45		28.4		24.3	
PERCENT FINES																
PERCENT GRAVEL	0.00		0.00		0.00		25		0.80		0.65		0.50		0.00	
PERCENT MEDIUM SAND									1.4		1.5		1.6		0.70	
PERCENT SAND	85.7		15		28.8		63.6									
PERCENT SILT	10.2		63		53.6		9		46.7		46.75		46.8		59.2	
PERCENT SOLIDS									62.2		60.3		58.4		37.6	
SIEVE 1"									100		100		100		100	
SIEVE 1-1/2"									100		100		100		100	
SIEVE 2"									100		100		100		100	
SIEVE 3"									100		100		100		100	
SIEVE 3/4"									100		100		100		100	
SIEVE 3/8"									100		99.8		99.6		100	
SIEVE NO. 004									99.2		99.35		99.5		100	
SIEVE NO. 010									98.9		99.15		99.4		100	
SIEVE NO. 020									98.7		98.95		99.2		99.8	
SIEVE NO. 040									97.5		97.65		97.8		99.2	
SIEVE NO. 060									94.7		94.8		94.9		98.1	
SIEVE NO. 080									90.5		90.6		90.7		96.6	
SIEVE NO. 100									86.5		86.55		86.6		94.7	
SIEVE NO. 140																
SIEVE NO. 200									69		69.2		69.4		74.9	
TOTAL ORGANIC CARBON	0.73	J	1.29		0.92		1.02		1.96		1.94		1.92		2.77	
TOTAL SOLIDS			55													
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	143.4		203.4		230.2		80.4									
C1-DIBENZOTHIOPHENES	11.1		55.1		19.9		8.9									
C1-FLUORANTHENES/PYRENES	189.5		465.8		400.6		137.6									
C1-FLUORENES	16.7		111.4		54.1		15.2									
C1-NAPHTHALENES	21.8		146.3		49		15.2									
C1-PHENANTHRENES/ANTHRACENES	75.3		184.8		214		77.6									
C2-CHRYSENES	86.4		96.4		101.5		26.3									
C2-DIBENZOTHIOPHENES	16.6		51.2		31.1		9.6									
C2-FLUORENES	13.6		101.7		73		12.4									
C2-NAPHTHALENES	15.4		1.5	U	56.6		10.7									
C2-PHENANTHRENES/ANTHRACENES	72.5		189.7		190.7		48									
C3-CHRYSENES	11.7		31.3		15.2		4.6	J								
C3-DIBENZOTHIOPHENES	18.7		379.2		24.2		5.6									
C3-FLUORENES	13.4		171.7		89.6		14.8									
C3-NAPHTHALENES	13.5		3.1	U	32		11.3									
C3-PHENANTHRENES/ANTHRACENES	33		112.8		107.2		22.6									
C4-CHRYSENES	5.3		18.1		1.3	J	0.30	J								
C4-NAPHTHALENES	6.7		3.1	U	36.4		7.9									
C4-PHENANTHRENES/ANTHRACENES	10.7		316.1		133.1		13.9									

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2A		MS-5 LOC.3		MS-5 LOC.4		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.1A	
nsample	**OU4-SD-M05-305A**		**OU4-SD-M05-107A**		**OU4-SD-M05-207A**		**OU4-SD-M05-307A**		**OU4-SD-M05-407A**		**OU4-SD-M05-108A**		**OU4-SD-M05-108A-AVG**		**OU4-SD-M05-108A-D**	
sample_dat	20050821		20071107		20071106		20071107		20071106		20081217		20081217		20081217	
round	08		09		09		09		09		10		10		10	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	1.8	J	7	U	12		4	U			16		14.5		13	
1-METHYLNAPHTHALENE	4.4	J	7	U	16		4	U			7.6	UJ	14.9	J	26	J
1-METHYLPHENANTHRENE	27		7	U	35		12				31	J	48.5	J	66	J
2,3,5-TRIMETHYLNAPHTHALENE	5.1	J	7	U	12		4	U			7.6	UJ	17.9	J	32	J
2,6-DIMETHYLNAPHTHALENE	4.3	J	7	U	51		7				83		71		59	
2-METHYLNAPHTHALENE	5.4	J	7	U	27		4	U			7.6	UJ	11.4	J	19	J
ACENAPHTHENE	10		7	U	19		5				9.9	J	19.95	J	30	J
ACENAPHTHYLENE	13		7	U	51		9				53		67		81	
ANTHRACENE	29		7	U	110		23				59	J	99.5	J	140	J
BENZO(A)ANTHRACENE	200		12		240		64				180		240		300	
BENZO(A)PYRENE	220		15		260		68				220		290		360	
BENZO(B)FLUORANTHENE	230		21		310		82				250	J	375	J	500	J
BENZO(E)PYRENE	140		11		170		41				140		185		230	
BENZO(G,H,I)PERYLENE	140		12		190		43				140		150		160	
BENZO(K)FLUORANTHENE	150		8		140		32				110	J	150	J	190	J
CHRYSENE	180		26		300		64				200		260		320	
DIBENZO(A,H)ANTHRACENE	38		7	U	51		11				38		44		50	
DIBENZOTHIOPHENE	7.6	J	7	U	17		4	U			8.9	J	17.45	J	26	J
FLUORANTHENE	310		28	U	390		120				290	J	435	J	580	J
FLUORENE	18		7	U	31		7				17	J	34	J	51	J
HIGH MOLECULAR WEIGHT PAHS	1238		84		1641		427				1218		1704		2190	
INDENO(1,2,3-CD)PYRENE	120		10		160		37				130		145		160	
LOW MOLECULAR WEIGHT PAHS	214.9		31		471		112				290.7		501.85		713	
NAPHTHALENE	9.5		7	U	33		4	U			18	J	25	J	32	J
PERYLENE	46		7	U	66		15				52		65.5		79	
PHENANTHRENE	130		10		200		64				130	J	245	J	360	J
PYRENE	290		27	U	400		100				290	J	435	J	580	J
TOTAL PAHS ECO	1452.9		115		2112		539				1508.7		2205.85		2903	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE																
CADMIUM																
COPPER																
LEAD																
NICKEL																
ZINC																
HF Digestion Inorganics (mg/kg)																
ALUMINUM	36164		58300		55230		46890				56300		58000		59700	
ARSENIC	4.07		20.2		27.4		5.68				17.2		16.9		16.6	
CADMIUM	0.25		0.64	J	1.93	J	0.30	J			0.48		0.497		0.514	
CHROMIUM	67.9	J	99.0	J	118	J	77.2	J			75.2		77.7		80.2	
COPPER	13.81	J	174	J	501	J	17.0	J			84.6		91.55		98.5	
IRON	20011	J	32040	J	37720	J	20240	J			27600		28600		29600	
LEAD	29.87	J	175	J	509	J	33.1	J			102		103		104	
MANGANESE	470		523	J	583	J	650	J			427		438.5		450	
MERCURY			0.441		0.958		0.133				0.342		0.341		0.34	
NICKEL	21.73		37.6	J	61.4	J	21.1	J			25.2		25.75		26.3	
SILVER	0.64	J	0.95		1.81		0.42				0.683		0.675		0.667	
ZINC	61.75	J	267	J	713	J	83.7	J			166		171.5		177	
Inorganics (mg/kg)																
ALUMINUM											16800		16850		16900	
ARSENIC											17.4		17.3		17.2	
CADMIUM											1.4	U	1.45	U	1.5	U
CHROMIUM											62.1		61.9		61.7	
COPPER									64.0		108		108		108	
IRON											29800		29850		29900	
LEAD									68.0		108		107		106	
MANGANESE											308		307.5		307	
MERCURY											0.306		0.3165		0.327	
NICKEL											30.5		30.1		29.7	
SILVER											1.5	U	1.45	U	1.4	U
ZINC											188		190.5		193	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2A		MS-5 LOC.3		MS-5 LOC.4		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.1A	
nsample	**OU4-SD-M05-305A**		**OU4-SD-M05-107A**		**OU4-SD-M05-207A**		**OU4-SD-M05-307A**		**OU4-SD-M05-407A**		**OU4-SD-M05-108A**		***OU4-SD-M05-108A-AVG***		**OU4-SD-M05-108A-D**	
sample_dat	20050821		20071107		20071106		20071107		20071106		20081217		20081217		20081217	
round	08		09		09		09		09		10		10		10	
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE																
1,2,4,5-TETRACHLOROBENZENE																
2,4'-DDD	1.6	R	7	U	14	J	4	U			7.5	U	7.85	U	8.2	U
2,4'-DDE	2	R	7	U	7	U	4	U			7.5	U	7.85	U	8.2	U
2,4'-DDT	0.21	J	7	U	7	U	4	U			7.5	U	7.85	U	8.2	U
4,4'-DDD	1.5	J	7	U	7	U	4	U			7.5	U	7.85	U	8.2	U
4,4'-DDE	0.59	J	7	U	13		4	U			7.5	U	7.85	U	8.2	U
4,4'-DDT	0.80	J	13		87		4	U			9		9.3	J	9.6	J
ALDRIN	0.12	U	4	U	3	U	2	U			3.9	U	4.05	U	4.2	U
ALPHA-BHC	0.099	U	4	U	3	U	2	U			3.9	U	4.975	J	8	J
ALPHA-CHLORDANE	0.30	U	4	U	3	U	2	U			3.9	U	3.325	J	4.7	J
BETA-BHC	1.4	R	4	U	3	U	2	U			3.9	U	4.05	U	4.2	U
CHLORPYRIFOS																
CIS-NONACHLOR	0.14	R	4	U	3	U	2	U			8.1	J	7.7	J	7.3	J
DELTA-BHC	0.14	J	4	U	3	U	2	U			3.9	U	4.05	U	4.2	U
DIELDRIN	0.43	J	7	U	36	J	4	U			7.5	U	7.85	U	8.2	U
ENDOSULFAN II	0.23	U	7	U	7	U	4	U			7.5	U	7.85	U	8.2	U
ENDRIN	0.27	UJ	7	U	11	J	4	U			7.5	U	7.85	U	8.2	U
GAMMA-BHC (LINDANE)	0.12	U	4	U	3	U	2	U			3.9	U	4.05	U	4.2	U
GAMMA-CHLORDANE	0.16	R	4	U	13	J	2	U			3.9	U	4.05	U	4.2	U
HEPTACHLOR	0.27	UJ	4	U	3	U	2	U			3.9	U	4.05	U	4.2	U
HEPTACHLOR EPOXIDE	0.22	J	4	U	6	R	2	U			3.9	U	4.05	U	4.2	U
HEXACHLOROBENZENE	0.11	U														
MIREX	0.31	R	4	U	5	R	2	U			3.9	U	4.075	J	6.2	J
OXYCHLORDANE	0.14	U	4	U	4	R	2	U			7.5	J	4.8	J	4.2	UJ
PCB-101	0.32		11	U	100	J	6.5	U			11	U	11.5	U	12	U
PCB-101/90																
PCB-105	0.046	U	11	U	49	J	6.5	U			11	U	11.5	U	12	U
PCB-118	0.076	J	11	U	62		6.5	U			11	U	11.5	U	12	U
PCB-123	0.039	U	11	U	100		6.5	U			11	U	11.5	U	12	U
PCB-126	0.058	U	11	U	40	J	6.5	U			11	U	11.5	U	12	U
PCB-128	0.081	J	11	U	15	R	6.5	U			11	U	11.5	U	12	U
PCB-138	0.42		17		180		6.5	U			19		22		25	
PCB-138/160																
PCB-149/123																
PCB-153	0.51		14	J	150	J	6.5	U			17		19		21	
PCB-153/132																
PCB-156	0.045	U	11	U	10	U	6.5	U			11	U	11.5	U	12	U
PCB-167	0.035	U	11	U	16	R	6.5	U			11	U	11.5	U	12	U
PCB-169	0.043	U	11	U	10	U	6.5	U			11	U	11.5	U	12	U
PCB-170	0.24	J	11	U	73		6.5	U			11	U	11.5	U	12	U
PCB-170/190																
PCB-18	0.12	R	11	U	10	U	6.5	U			11	U	11.5	U	12	U
PCB-18/17																
PCB-180	0.46	J	11	U	110		6.5	U			11	U	8.75		12	
PCB-187	0.31		11	U	72		6.5	U			11	U	11.5	U	12	U
PCB-189	0.047	U	11	U	10	U	6.5	U			11	U	11.5	U	12	U
PCB-195	0.045	U	11	U	15		6.5	U			11	U	11.5	U	12	U
PCB-195/208																
PCB-201/157/173																
PCB-206	0.13	J	11	U	22		6.5	U			11	U	11.5	U	12	U
PCB-209	0.092	J	11	U	25		6.5	U			11	U	11.5	U	12	U
PCB-28	0.069	R	11	U	10	U	6.5	U			11	UJ	11.5	UJ	12	UJ
PCB-44	0.14	J	11	U	15	J	6.5	U			11	U	11.5	U	12	U
PCB-52	0.11	J	11	U	45	J	6.5	U			11	U	11.5	U	12	U
PCB-66	0.12	J	11	U	44	J	6.5	U			11	U	11.5	U	12	U
PCB-77	0.048	U	11	U	71		6.5	U			11	U	11.5	U	12	U
PCB-8	0.07	R	11	U	10	U	6.5	U			150	J	78	J	12	UJ
PCB-8/5																
PCB-81	0.035	U	11	U	22	J	6.5	U			11	U	11.5	U	12	U
PENTACHLOROANISOLE																
PENTACHLOROBENZENE																
TEQ PCB	0.000002		0	U	4.02003		0	U			0	U	0	U	0	U
TEQ PCB BIRD	0.000001		0	U	9.75652		0	U			0	U	0	U	0	U
TEQ PCB BIRD HALFND	0.005881		1.38292	U	9.76307		0.817178	U			1.38292	U	1.445782	U	1.50864	U
TEQ PCB FISH	0		0	U	0.219155		0	U			0	U	0	U	0	U
TEQ PCB FISH HALFND	0.000157		0.031299	U	0.219505		0.01849	U			0.031299	U	0.03272	U	0.03414	U

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
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PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.3		MS-5 LOC.1A		MS-5 LOC.2A		MS-5 LOC.3		MS-5 LOC.4		MS-5 LOC.1A		MS-5 LOC.1A		MS-5 LOC.1A	
nsample	**OU4-SD-M05-305A**		**OU4-SD-M05-107A**		**OU4-SD-M05-207A**		**OU4-SD-M05-307A**		**OU4-SD-M05-407A**		**OU4-SD-M05-108A**		**OU4-SD-M05-108A-AVG**		**OU4-SD-M05-108A-D**	
sample_dat	20050821		20071107		20071106		20071107		20071106		20081217		20081217		20081217	
round	08		09		09		09		09		10		10		10	
TEQ PCB HALFND	0.003561		0.71852	U	4.17063		0.424584	U			0.71852	U	0.751176	U	0.78384	U
TOTAL DDT HALFND	3.1		30.5		124.5		12				27.75		28.925		30.1	
TOTAL DDT POS	3.1		13		114		0	U			9		9.3		9.6	
TOTAL PCB CONGENERS	6.11		121		898		71.5				121		132.5		144	
TRANS-NONACHLOR	0.53	R	4	U	3	U	2	U			4.3	J	5.5	J	6.7	J
Miscellaneous Parameters (%)																
PERCENT CLAY	6		6				2									
PERCENT COARSE SAND	9.2															
PERCENT FINE SAND	35.2															
PERCENT FINES											78		79.1		80.2	
PERCENT GRAVEL	15										0		0.00		0	
PERCENT MEDIUM SAND	13.3															
PERCENT SAND											22		20.9		19.8	
PERCENT SILT	21.4		24				8									
PERCENT SOLIDS	75.7		44.9		48.5		71.6									
SIEVE 1"	100															
SIEVE 1-1/2"	100															
SIEVE 2"	100															
SIEVE 3"	100															
SIEVE 3/4"	100															
SIEVE 3/8"	90.9															
SIEVE NO. 004	85		0		4		10									
SIEVE NO. 010	75.8		11		21		8									
SIEVE NO. 020	67.8		18		16		9									
SIEVE NO. 040	62.5		10		8		11									
SIEVE NO. 060	54.7		6		5		8									
SIEVE NO. 080	50															
SIEVE NO. 100	47.6															
SIEVE NO. 140			12		9		23									
SIEVE NO. 200	27.3		9		7		14									
TOTAL ORGANIC CARBON	0.779		2.0	J	2.0	J	0.99	UJ			2.2		2.2		2.2	
TOTAL SOLIDS											43.5		43.29		43.08	
Alkylated PAHs (ug/kg)																
C1-CHRYSENES																
C1-DIBENZOTHIOPHENES																
C1-FLUORANTHENES/PYRENES																
C1-FLUORENES																
C1-NAPHTHALENES																
C1-PHENANTHRENES/ANTHRACENES																
C2-CHRYSENES																
C2-DIBENZOTHIOPHENES																
C2-FLUORENES																
C2-NAPHTHALENES																
C2-PHENANTHRENES/ANTHRACENES																
C3-CHRYSENES																
C3-DIBENZOTHIOPHENES																
C3-FLUORENES																
C3-NAPHTHALENES																
C3-PHENANTHRENES/ANTHRACENES																
C4-CHRYSENES																
C4-NAPHTHALENES																
C4-PHENANTHRENES/ANTHRACENES																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.2A		MS-5 LOC.3		MS-5 LOC.4	
nsample	**OU4-SD-M05-208A**		**OU4-SD-M05-308A**		**OU4-SD-M05-408A**	
sample_dat	20081217		20081217		20081217	
round	10		10		10	
Semivolatile Organics (ug/kg)						
1,1-BIPHENYL	6.7	U	7.3			
1-METHYLNAPHTHALENE	6.7	U	4.7	U		
1-METHYLPHENANTHRENE	6.7	U	18			
2,3,5-TRIMETHYLNAPHTHALENE	6.7	U	4.7	U		
2,6-DIMETHYLNAPHTHALENE	6.7	U	68			
2-METHYLNAPHTHALENE	6.7	U	4.7	U		
ACENAPHTHENE	6.7	U	7.4			
ACENAPHTHYLENE	6.7	U	19			
ANTHRACENE	8		31			
BENZO(A)ANTHRACENE	7.1		79			
BENZO(A)PYRENE	6.7	U	87			
BENZO(B)FLUORANTHENE	7.8		120			
BENZO(E)PYRENE	6.7	U	56			
BENZO(G,H,I)PERYLENE	6.7	U	52			
BENZO(K)FLUORANTHENE	6.7	U	36			
CHRYSENE	7.3		88			
DIBENZO(A,H)ANTHRACENE	6.7	U	12			
DIBENZOTHIOPHENE	6.7	U	5.1			
FLUORANTHENE	17		170			
FLUORENE	6.7	U	10			
HIGH MOLECULAR WEIGHT PAHS	54.1		596			
INDENO(1,2,3-CD)PYRENE	6.7	U	49			
LOW MOLECULAR WEIGHT PAHS	38.75		160.05			
NAPHTHALENE	6.7	U	8.3			
PERYLENE	6.7	U	20			
PHENANTHRENE	14		82			
PYRENE	16		160			
TOTAL PAHS ECO	92.85		756.05			
AVS/SEM Inorganics (mg/kg)						
ACID VOLATILE SULFIDE						
CADMIUM						
COPPER						
LEAD						
NICKEL						
ZINC						
HF Digestion Inorganics (mg/kg)						
ALUMINUM	47900		46800			
ARSENIC	12.9		6.75			
CADMIUM	0.333		0.264			
CHROMIUM	68.2		66.9			
COPPER	56.5		12.3			
IRON	24500		21500			
LEAD	60.9		30			
MANGANESE	459		532			
MERCURY	0.309		0.0717			
NICKEL	37.2		19.1			
SILVER	0.596		0.324			
ZINC	112		69.5			
Inorganics (mg/kg)						
ALUMINUM	14400		8970		14000	
ARSENIC	13.7		4.8		12.3	
CADMIUM	1.5	U	0.692	U	1.2	U
CHROMIUM	56.9		33.8		57.1	
COPPER	62.2		7		45.2	
IRON	24700		17900		23200	
LEAD	58.4		10.3		56.8	
MANGANESE	316		168		220	
MERCURY	0.254		0.067		0.239	
NICKEL	25.8		19.2		23	
SILVER	1.6	U	0.686	U	1.2	U
ZINC	118		43.4		117	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.2A		MS-5 LOC.3		MS-5 LOC.4	
nsample	**OU4-SD-M05-208A**		**OU4-SD-M05-308A**		**OU4-SD-M05-408A**	
sample_dat	20081217		20081217		20081217	
round	10		10		10	
Pesticides/PCBs (ug/kg)						
1,2,3,4-TETRACHLOROBENZENE						
1,2,4,5-TETRACHLOROBENZENE						
2,4'-DDD	6.7	U	4.7	U		
2,4'-DDE	6.7	U	4.7	U		
2,4'-DDT	6.7	U	4.7	U		
4,4'-DDD	6.7	U	4.7	U		
4,4'-DDE	6.7	U	4.7	U		
4,4'-DDT	6.7	U	4.7	U		
ALDRIN	3.5	U	2.4	U		
ALPHA-BHC	3.5	U	2.4	U		
ALPHA-CHLORDANE	3.5	U	2.4	U		
BETA-BHC	3.5	U	2.4	U		
CHLORPYRIFOS						
CIS-NONACHLOR	3.5	U	2.4	U		
DELTA-BHC	3.5	U	2.4	U		
DIELDRIN	6.7	U	4.7	U		
ENDOSULFAN II	6.7	U	4.7	U		
ENDRIN	6.7	U	4.7	U		
GAMMA-BHC (LINDANE)	3.5	U	2.4	U		
GAMMA-CHLORDANE	3.5	U	2.4	U		
HEPTACHLOR	3.5	U	2.4	U		
HEPTACHLOR EPOXIDE	3.5	U	2.4	U		
HEXACHLOROBENZENE						
MIREX	3.5	U	2.4	U		
OXYCHLORDANE	3.5	U	2.5			
PCB-101	10	U	7.2	U		
PCB-101/90						
PCB-105	10	U	7.2	U		
PCB-118	10	U	7.2	U		
PCB-123	10	U	7.2	U		
PCB-126	10	U	7.2	U		
PCB-128	10	U	7.2	U		
PCB-138	10	U	7.2	U		
PCB-138/160						
PCB-149/123						
PCB-153	10	U	7.2	U		
PCB-153/132						
PCB-156	10	U	7.2	U		
PCB-167	10	U	7.2	U		
PCB-169	10	U	7.2	U		
PCB-170	10	U	7.2	U		
PCB-170/190						
PCB-18	10	U	7.2	U		
PCB-18/17						
PCB-180	10	U	7.2	U		
PCB-187	10	U	7.2	U		
PCB-189	10	U	7.2	U		
PCB-195	10	U	7.2	U		
PCB-195/208						
PCB-201/157/173						
PCB-206	10	U	7.2	U		
PCB-209	10	U	7.2	U		
PCB-28	10	UJ	7.2	UJ		
PCB-44	10	U	7.2	U		
PCB-52	10	U	7.2	U		
PCB-66	10	U	7.2	U		
PCB-77	10	U	7.2	U		
PCB-8	10	U	7.2	U		
PCB-8/5						
PCB-81	10	U	7.2	U		
PENTACHLOROANISOLE						
PENTACHLOROBENZENE						
TEQ PCB	0	U	0	U		
TEQ PCB BIRD	0	U	0	U		
TEQ PCB BIRD HALFND	1.2572	U	0.905184	U		
TEQ PCB FISH	0	U	0	U		
TEQ PCB FISH HALFND	0.02845	U	0.020484	U		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 05 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-5 LOC.2A		MS-5 LOC.3		MS-5 LOC.4	
nsample	**OU4-SD-M05-208A**		**OU4-SD-M05-308A**		**OU4-SD-M05-408A**	
sample_dat	20081217		20081217		20081217	
round	10		10		10	
TEQ PCB HALFND	0.6532	U	0.470304	U		
TOTAL DDT HALFND	20.1		14.1			
TOTAL DDT POS	0	U	0	U		
TOTAL PCB CONGENERS	110		79.2			
TRANS-NONACHLOR	3.5	U	2.4	U		
Miscellaneous Parameters (%)						
PERCENT CLAY						
PERCENT COARSE SAND						
PERCENT FINE SAND						
PERCENT FINES	76.9		31.5			
PERCENT GRAVEL	1.3		9.1			
PERCENT MEDIUM SAND						
PERCENT SAND	21.8		59.4			
PERCENT SILT						
PERCENT SOLIDS						
SIEVE 1"						
SIEVE 1-1/2"						
SIEVE 2"						
SIEVE 3"						
SIEVE 3/4"						
SIEVE 3/8"						
SIEVE NO. 004						
SIEVE NO. 010						
SIEVE NO. 020						
SIEVE NO. 040						
SIEVE NO. 060						
SIEVE NO. 080						
SIEVE NO. 100						
SIEVE NO. 140						
SIEVE NO. 200						
TOTAL ORGANIC CARBON	1.9		0.87			
TOTAL SOLIDS	42.48		69			
Alkylated PAHs (ug/kg)						
C1-CHRYSENES						
C1-DIBENZOTHIOPHENES						
C1-FLUORANTHENES/PYRENES						
C1-FLUORENES						
C1-NAPHTHALENES						
C1-PHENANTHRENES/ANTHRACENES						
C2-CHRYSENES						
C2-DIBENZOTHIOPHENES						
C2-FLUORENES						
C2-NAPHTHALENES						
C2-PHENANTHRENES/ANTHRACENES						
C3-CHRYSENES						
C3-DIBENZOTHIOPHENES						
C3-FLUORENES						
C3-NAPHTHALENES						
C3-PHENANTHRENES/ANTHRACENES						
C4-CHRYSENES						
C4-NAPHTHALENES						
C4-PHENANTHRENES/ANTHRACENES						

POSTIVE DETECTIONS FOR MONITORING STATION 8

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-199A**		**OU4-SD-M08-199A-2**		**OU4-SD-M08-299A**		**OU4-SD-M08-299A-2**		**OU4-SD-M08-399A**		**OU4-SD-M08-399A-2**		**OU4-SD-M08-100B**	
sample_dat	19990908		19990908		19990908		19990908		19990909		19990909		20000503	
round	01		01		01		01		01		01		02	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL	9.16	U			12.3	U			4.64	U			7.3	J
1-METHYLNAPHTHALENE	30.5	U			30.9	U			12.6	U			16.1	
1-METHYLPHENANTHRENE	31.7				54.2				29				28.1	
2,3,5-TRIMETHYLNAPHTHALENE	9.43				16.3				9.99				14	
2,6-DIMETHYLNAPHTHALENE	14.8				22.9				11.1				14.8	
2-METHYLNAPHTHALENE	47.7	U			49.8	U			17.5	U			26.8	
ACENAPHTHENE	61.4				55.7				33.7				40.9	
ACENAPHTHYLENE	53.9	J			108	J			80.4	J			67	
ANTHRACENE	233				286				285				225	
BENZO(A)ANTHRACENE	426				689				558				342	
BENZO(A)PYRENE	552	J			937				630	J			375	
BENZO(B)FLUORANTHENE	607				905				636				452	J
BENZO(E)PYRENE	302				476				323				231	J
BENZO(G,H,I)PERYLENE	339	J			529	J			357	J			243	
BENZO(K)FLUORANTHENE	191				323				238				163	
CHRYSENE	443				718				570				410	
DIBENZO(A,H)ANTHRACENE	103	J			165	J			121	J			74.8	
DIBENZOTHIOPHENE	29.7				33.5	J			33				14.2	
FLUORANTHENE	878				1063				1052				617	
FLUORENE	72.4				75				61.7				55.7	
HIGH MOLECULAR WEIGHT PAHS	3181				4518				3811				2433.8	
INDENO(1,2,3-CD)PYRENE	378	J			607	J			413	J			255	J
LOW MOLECULAR WEIGHT PAHS	948.6				1072.15				1073.05				704	
NAPHTHALENE	80.1	U			79.1	U			45	U			33.6	
PERYLENE	102				151				117				64.4	J
PHENANTHRENE	464				483				581				255	
PYRENE	779	J			946	J			880	J			615	J
TOTAL PAHS ECO	4129.6				5590.15				4884.05				3137.8	
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	503	J	8	J	1178	J	154	UJ	2.2	U	3.9	UJ	601	
CADMIUM	0.14				0.19				0.16				0.0968	
COPPER	39.4				3.3	U			180				5.26	U
LEAD	62.1	J			24	J			58.9	J			20.7	
NICKEL	21				4.5				28.3				5.44	
ZINC	314				72.9				283				94.6	
HF Digestion Inorganics (mg/kg)														
ALUMINUM	57877				64359				47318				53800	
ARSENIC	12.2				12				10.8				11.6	
CADMIUM	0.23				0.44				0.20				0.38	
CHROMIUM	170	J			114	J			144	J			161	
COPPER	370				94.8				282				455	
IRON	56926				27898				68679				46100	
LEAD	428	J			178	J			141	J			245	
MANGANESE	508				430				678				557	
MERCURY	0.14	J			0.39	J			0.07	J			0.21	
NICKEL	83.4	J			35.7				174	J			92.8	
SILVER	0.48				0.62	J			0.19				0.69	
ZINC	1034				180				537				701	
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-199A**		**OU4-SD-M08-199A-2**		**OU4-SD-M08-299A**		**OU4-SD-M08-299A-2**		**OU4-SD-M08-399A**		**OU4-SD-M08-399A-2**		**OU4-SD-M08-100B**	
sample_dat	19990908		19990908		19990908		19990908		19990909		19990909		20000503	
round	01		01		01		01		01		01		02	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE	0.053	J			0.14	J			0.13	J			0.49	
1,2,4,5-TETRACHLOROBENZENE	0.21	J			1				0.24	J			1	
2,4'-DDD	27				8.3				48				36	
2,4'-DDE	0.86				0.71				1.6				1.3	
2,4'-DDT	12				2.9				37				6.5	
4,4'-DDD	81				19				135				120	
4,4'-DDE	14				5.7				21				22	
4,4'-DDT	42	J			17	J			132	J			285	
ALDRIN	6				6				4.2				0.056	U
ALPHA-BHC	0.045	U			0.095	U			0.047	U			0.15	
ALPHA-CHLORDANE	1.6				0.93				2				2.8	
BETA-BHC	0.16	J			0.11	J			0.13	J			0.67	
CHLORPYRIFOS	0.26	U			0.05	J			0.20	U			0.27	U
CIS-NONACHLOR	0.46				0.47				1.1				0.74	
DELTA-BHC	0.18				0.15				0.032	U			0.01	J
DIELDRIN	0.28				0.33				0.38				0.94	
ENDOSULFAN II	0.083	U			0.13	U			0.064	U			1.3	
ENDRIN	0.12	U			0.19	U			0.096	U			0.15	
GAMMA-BHC (LINDANE)	0.44	U			0.70	U			0.26	U			0.12	J
GAMMA-CHLORDANE	1.9				1.1				2.3				4.4	
HEPTACHLOR	0.39				0.27				0.32				0.12	J
HEPTACHLOR EPOXIDE	0.30				0.13				0.089				0.028	U
HEXACHLOROBENZENE	0.088	U			0.20	U			0.099	U			0.14	
MIREX	0.062				0.072				0.06				0.20	
OXYCHLORDANE	0.014	U			0.021	U			0.023				0.27	J
PCB-101														
PCB-101/90	4.7				5.4				3.3				14	
PCB-105	2.5				2				1.5				5.2	
PCB-118	2.4				3				1				8	
PCB-126	0.075	J			0.074	J			0.043	J			0.06	J
PCB-128	1.7				1.6				1.2				2.7	
PCB-138														
PCB-138/160	10				8.5				8.5				20	
PCB-149/123	7.4				6.1				6.3				11	
PCB-153														
PCB-153/132	11				11				9.4				22	
PCB-156	2.16				1.63				1.49				5.9	
PCB-167	0.83				1.2				0.52				1.3	
PCB-169	0.17	U			0.25	U			0.007	J			0.13	J
PCB-170														
PCB-170/190	2.7				1.6				2.2				2.6	J
PCB-18														
PCB-18/17	0.87	J			1.1	J			0.088	J			0.92	
PCB-180	11	J			7.3	J			8.1	J			14	
PCB-187	7.7				5.8				7.6				8.7	
PCB-189	0.35				0.11	J			0.35				0.39	
PCB-195														
PCB-195/208	2.5				4.9				1.5				3.8	
PCB-201/157/173	1.46				0.92				0.45				0.93	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-199A**		**OU4-SD-M08-199A-2**		**OU4-SD-M08-299A**		**OU4-SD-M08-299A-2**		**OU4-SD-M08-399A**		**OU4-SD-M08-399A-2**		**OU4-SD-M08-100B**	
sample_dat	19990908		19990908		19990908		19990908		19990909		19990909		20000503	
round	01		01		01		01		01		01		02	
PCB-206	4				12				1.8				7.6	
PCB-209	0.87	J			3.9				0.60	J			2.3	
PCB-28	0.99				1.2				0.30				3.2	
PCB-44	0.71				0.53				0.81				3.1	
PCB-52	1.8				2				1.5				6	
PCB-66	1				1.6				0.78				3.3	
PCB-77	0.28	J			0.32	J			0.19	J			0.47	U
PCB-8/5	0.20	J			0.35	J			0.21	J			0.75	
PCB-81	0.028	J			0.055	J			0.038	J			0.17	
PENTACHLOROANISOLE	0.12	J			0.28	J			0.22	J			0.25	J
PENTACHLOROBENZENE	0.044	J			0.39				0.084				0.21	
TEQ PCB	0.008049				0.007897				0.004889				0.010933	
TEQ PCB BIRD	0.025022				0.029459				0.018033				0.02454	
TEQ PCB BIRD HALFND	0.025115				0.029596				0.018039				0.036298	
TEQ PCB FISH	0.000502				0.000505				0.000312				0.000555	
TEQ PCB FISH HALFND	0.000506				0.000512				0.000312				0.000579	
TEQ PCB HALFND	0.010602				0.011651				0.004891				0.01096	
TOTAL DDT HALFND	176.86				53.61				374.6				470.8	
TOTAL DDT POS	176.86				53.61				374.6				470.8	
TOTAL PCB CONGENERS	133.28				147.56				100.776				256.34	
TRANS-NONACHLOR	1.4				0.84				1.2				2.1	
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	671	U			1946	U			133	U			1141	J
1,2,3,4,6,7,8,9-OCDF	43.4	U			128	U			6.19	U			58.4	J
1,2,3,4,6,7,8-HPCDD	90.4				275				18.1				139	J
1,2,3,4,6,7,8-HPCDF	26.4	U			78.8	U			5.01	U			40.2	J
1,2,3,4,7,8,9-HPCDF	1.56	U			3.93	U			1.3	U			2.4	U
1,2,3,4,7,8-HXCDD	1.13				3.41				0.19	J			1.5	J
1,2,3,4,7,8-HXCDF	3.03	U			6.19	U			1.3	U			3.7	J
1,2,3,6,7,8-HXCDD	4.33				13.6				0.98	J			7.7	J
1,2,3,6,7,8-HXCDF	1.98	U			4.27	U			1.3	U			2.9	U
1,2,3,7,8,9-HXCDD	2.92	U			8.66	U			1.3	U			4.3	J
1,2,3,7,8,9-HXCDF	0.90				1.9				1.3				0.90	J
1,2,3,7,8-PECDD	0.95	U			1.9	U			0.20	U			1.1	J
1,2,3,7,8-PECDF	1.35	U			2.37	U			1.3	U			2.4	U
2,3,4,6,7,8-HXCDF	3.02	U			6.42	U			1.3	U			4.1	J
2,3,4,7,8-PECDF	2.34	U			3.93	U			1.3	U			2.6	U
2,3,7,8-TCDD	0.36	U			0.57	U			0.30	U			0.30	J
2,3,7,8-TCDF	2.57	U			4.93	U			1.13	U			2.8	U
TEQ	1.54				4.641				0.428				5.77182	
TEQ BIRD	0.2802				0.7715				0.1674				3.51294	
TEQ BIRD HALFND	4.18072				8.34935				1.99591				6.48994	
TEQ FISH	0.7887				2.306				0.2529				3.80094	
TEQ FISH HALFND	2.71832				6.11065				1.12866				4.73794	
TEQ HALFND	3.48921				8.7493				1.261428				6.49482	
TOTAL DIOXINS													1607	J
TOTAL FURANS													179	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-199A**		**OU4-SD-M08-199A-2**		**OU4-SD-M08-299A**		**OU4-SD-M08-299A-2**		**OU4-SD-M08-399A**		**OU4-SD-M08-399A-2**		**OU4-SD-M08-100B**	
sample_dat	19990908		19990908		19990908		19990908		19990909		19990909		20000503	
round	01		01		01		01		01		01		02	
TOTAL HPCDD	252				662				54.3				373	J
TOTAL HPCDF	61.4	U			194	U			10.6	U			91.7	J
TOTAL HXCDD	53.2	U			85.4	U			12.4	U			84.9	J
TOTAL HXCDF	8.76	U			18.3	U			2.84	U			48.7	J
TOTAL PECDD	0.95	U			13.9	U			1.3	U			1.1	J
TOTAL PECDF	20.9	U			28	U			3.18	U			23.6	J
TOTAL TCDD	2.48				9.42				1.09	J			7.7	J
TOTAL TCDF	14	U			23.9	U			3.71	U			15.3	J
Miscellaneous Parameters (%)														
PERCENT CLAY	8.37				26.25				1.78				7.07	
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL														
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND	83.98				29.45				97.78				78.55	
PERCENT SILT	7.65				44.3				0.44				14.38	
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON	0.75				2.37				0.49				1.04	
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES	206				395				212				245	
C1-DIBENZOTHIOPHENES	21.1				34.7				17.5				14.3	
C1-FLUORANTHENES/PYRENES	414				655				380				277	
C1-FLUORENES	27.8				47				21.5				32.2	
C1-NAPHTHALENES	78.2	U			80.7	U			30.1	U			42.9	
C1-PHENANTHRENES/ANTHRACENES	174				299				185				133	
C2-CHRYSENES	79.2				143				76.3				82.8	
C2-DIBENZOTHIOPHENES	27.2				45.6				17.5				20.1	
C2-FLUORENES	34.7				61				19.8				39.8	
C2-NAPHTHALENES	77.6	J			96.5	J			42.1	U			39.7	
C2-PHENANTHRENES/ANTHRACENES	106				231				97				102	
C3-CHRYSENES	6.4				12.1				9.01				6.1	
C3-DIBENZOTHIOPHENES	27.3				32.5				13.2				12.7	
C3-FLUORENES	37.2				31.3				20.9				29.9	
C3-NAPHTHALENES	71.7	J			85.6	J			57.9	J			50.5	
C3-PHENANTHRENES/ANTHRACENES	62.4				149				48.4				55	
C4-CHRYSENES	30.9				51.6				44.6				3	
C4-NAPHTHALENES	37.4				38.4				16.4				24.3	
C4-PHENANTHRENES/ANTHRACENES	44.7				58.6				14				15.6	

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ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100B-2**		**OU4-SD-M08-200B**		**OU4-SD-M08-200B-2**		**OU4-SD-M08-300B**		**OU4-SD-M08-300B-2**		**OU4-SD-M08-300B-2-AVG**		OU4-SD-M08-300B-2-D	
sample_dat	20000503		20000503		20000503		20000503		20000503		20000503		20000503	
round	02		02		02		02		02		02		02	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL			8	J			2.6	J						
1-METHYLNAPHTHALENE			20.2				7.9							
1-METHYLPHENANTHRENE			84.2	J			12.6	J						
2,3,5-TRIMETHYLNAPHTHALENE			18.6				2.9	J						
2,6-DIMETHYLNAPHTHALENE			18.3				5.6							
2-METHYLNAPHTHALENE			31.7				15.5							
ACENAPHTHENE			43.8				6.3	J						
ACENAPHTHYLENE			88.6				21.8	J						
ANTHRACENE			276				74.9	J						
BENZO(A)ANTHRACENE			418				101	J						
BENZO(A)PYRENE			580				112	J						
BENZO(B)FLUORANTHENE			550				151	J						
BENZO(E)PYRENE			310				80.2	J						
BENZO(G,H,I)PERYLENE			276				75.9	J						
BENZO(K)FLUORANTHENE			189				37.5	J						
CHRYSENE			459				149	J						
DIBENZO(A,H)ANTHRACENE			88.2				22.7	J						
DIBENZOTHIOPHENE			20.9	J			4.5	J						
FLUORANTHENE			52.1	J			372	J						
FLUORENE			76.7				9.3	J						
HIGH MOLECULAR WEIGHT PAHS			2317.3				1049.7							
INDENO(1,2,3-CD)PYRENE			293	J			71.6	J						
LOW MOLECULAR WEIGHT PAHS			937				224.9							
NAPHTHALENE			57.2				14.3							
PERYLENE			95.1	J			30.8	J						
PHENANTHRENE			363				82.8	J						
PYRENE			720	J			293	J						
TOTAL PAHS ECO			3254.3				1274.6							
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	435		1200		506	J	0.205		9.46	U	5.245	U	0.103	U
CADMIUM			0.254	J			0.123							
COPPER			4.49	U			137							
LEAD			28	J			44.7							
NICKEL			2.44	J			19.7							
ZINC			47.5	J			142							
HF Digestion Inorganics (mg/kg)														
ALUMINUM			62500				45700							
ARSENIC			10.8				12.1							
CADMIUM			0.50				0.24							
CHROMIUM			105				120							
COPPER			77.5				441	J						
IRON			24000				50200							
LEAD			66.2				207							
MANGANESE			402				924							
MERCURY			0.38				0.09							
NICKEL			31.2				124							
SILVER			0.54	J			0.27							
ZINC			146				904							
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100B-2**		**OU4-SD-M08-200B**		**OU4-SD-M08-200B-2**		**OU4-SD-M08-300B**		**OU4-SD-M08-300B-2**		**OU4-SD-M08-300B-2-AVG**		OU4-SD-M08-300B-2-D	
sample_dat	20000503		20000503		20000503		20000503		20000503		20000503		20000503	
round	02		02		02		02		02		02		02	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE			0.12	J			0.16	UJ						
1,2,4,5-TETRACHLOROBENZENE			1.2				0.42							
2,4'-DDD			4.8				12							
2,4'-DDE			0.11	J			0.61							
2,4'-DDT			0.89				15	J						
4,4'-DDD			11	U			24	J						
4,4'-DDE			3.1				14	J						
4,4'-DDT			3.4	U			51	J						
ALDRIN			0.02	J			0.12	J						
ALPHA-BHC			0.10				0.04	J						
ALPHA-CHLORDANE			0.46				2.1							
BETA-BHC			1.9				0.15	UJ						
CHLORPYRIFOS			0.39	U			0.21	U						
CIS-NONACHLOR			0.34				0.41	J						
DELTA-BHC			0.20				0.034	U						
DIELDRIN			0.30				0.41	J						
ENDOSULFAN II			1.9				0.54	J						
ENDRIN			0.18	U			0.10	U						
GAMMA-BHC (LINDANE)			0.25	J			0.21							
GAMMA-CHLORDANE			0.24				2.4							
HEPTACHLOR			0.17	J			0.13	U						
HEPTACHLOR EPOXIDE			0.041	U			0.022	U						
HEXACHLOROBENZENE			0.062	U			0.12							
MIREX			0.19				0.11							
OXYCHLORDANE			0.10	J			0.011	UJ						
PCB-101														
PCB-101/90			6.3				5.1							
PCB-105			2.6				2.9							
PCB-118			6.2				2.1							
PCB-126			0.12	J			0.03	J						
PCB-128			1.7				1.3							
PCB-138														
PCB-138/160			8.9				14	J						
PCB-149/123			3.8				10	J						
PCB-153														
PCB-153/132			15				18	J						
PCB-156			3.1				3.1	J						
PCB-167			0.50				0.50	J						
PCB-169			0.14	J			0.04	J						
PCB-170														
PCB-170/190			1.1	J			15	J						
PCB-18														
PCB-18/17			0.12	U			0.55	J						
PCB-180			4.8				16	J						
PCB-187			3.2				7.9	J						
PCB-189			0.39				0.32	J						
PCB-195														
PCB-195/208			1.4				1.7	J						
PCB-201/157/173			0.58				0.73	J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100B-2**		**OU4-SD-M08-200B**		**OU4-SD-M08-200B-2**		**OU4-SD-M08-300B**		**OU4-SD-M08-300B-2**		**OU4-SD-M08-300B-2-AVG**		**OU4-SD-M08-300B-2-D**	
sample_dat	20000503		20000503		20000503		20000503		20000503		20000503		20000503	
round	02		02		02		02		02		02		02	
PCB-206			2.8				2							
PCB-209			1.3				0.59	U						
PCB-28			1.9				0.29							
PCB-44			2.3				0.85	J						
PCB-52			3.2				1.5							
PCB-66			0.90				0.63							
PCB-77			1.6	U			0.14	U						
PCB-8/5			0.53				0.09	J						
PCB-81			0.25				0.07	J						
PENTACHLOROANISOLE			0.14	J			0.11	J						
PENTACHLOROBENZENE			0.12				0.17							
TEQ PCB			0.01679				0.004811							
TEQ PCB BIRD			0.037877				0.010842							
TEQ PCB BIRD HALFND			0.077889				0.014348							
TEQ PCB FISH			0.000818				0.000285							
TEQ PCB FISH HALFND			0.000899				0.000292							
TEQ PCB HALFND			0.016874				0.00482							
TOTAL DDT HALFND			16.1				116.61							
TOTAL DDT POS			8.9				116.61							
TOTAL PCB CONGENERS			128.38				180.41							
TRANS-NONACHLOR			0.30				1.4							
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD			122				140	J						
1,2,3,4,6,7,8,9-OCDF			8.8				8.6	J						
1,2,3,4,6,7,8-HPCDD			16.9				17.3	J						
1,2,3,4,6,7,8-HPCDF			6.1				8.6	J						
1,2,3,4,7,8,9-HPCDF			1.5	U			0.80	U						
1,2,3,4,7,8-HXCDD			0.10	J			1.1	UJ						
1,2,3,4,7,8-HXCDF			1.5	U			1.5	J						
1,2,3,6,7,8-HXCDD			0.90	J			0.90	J						
1,2,3,6,7,8-HXCDF			1.5	U			1.3	U						
1,2,3,7,8,9-HXCDD			0.50	U			0.90	J						
1,2,3,7,8,9-HXCDF			1.5	U			1.1	UJ						
1,2,3,7,8-PECDD			1.5	U			0.40	J						
1,2,3,7,8-PECDF			0.30	U			1.3	U						
2,3,4,6,7,8-HXCDF			1.5	U			1.6	J						
2,3,4,7,8-PECDF			0.40	J			1.9	U						
2,3,7,8-TCDD			0.30	U			0.20	UJ						
2,3,7,8-TCDF			0.40				1.2	U						
TEQ			0.52924				1.19358							
TEQ BIRD			0.90498				0.92716							
TEQ BIRD HALFND			2.15248				2.79366							
TEQ FISH			0.36998				0.84616							
TEQ FISH HALFND			1.58748				1.88266							
TEQ HALFND			1.76624				1.83708							
TOTAL DIOXINS			165				185	J						
TOTAL FURANS			26.8				51.3	J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100B-2**		**OU4-SD-M08-200B**		**OU4-SD-M08-200B-2**		**OU4-SD-M08-300B**		**OU4-SD-M08-300B-2**		**OU4-SD-M08-300B-2-AVG**		**OU4-SD-M08-300B-2-D**	
sample_dat	20000503		20000503		20000503		20000503		20000503		20000503		20000503	
round	02		02		02		02		02		02		02	
TOTAL HPCDD			37.2				42.6	J						
TOTAL HPCDF			12.5				15.9	J						
TOTAL HXCDD			6.1				1.8	J						
TOTAL HXCDF			4.4				12.9	J						
TOTAL PECDD			1.5	U			0.40	J						
TOTAL PECDF			0.70	U			9.7	U						
TOTAL TCDD			0.30	U			0.40	J						
TOTAL TCDF			0.40				4.2	U						
Miscellaneous Parameters (%)														
PERCENT CLAY			14.73				0.17							
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL														
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND			43.71				98.99							
PERCENT SILT			41.56				0.84							
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON			1.63				0.28							
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES			339				58.1	J						
C1-DIBENZOTHIOPHENES			26.9				5.6	J						
C1-FLUORANTHENES/PYRENES			428				97.1	J						
C1-FLUORENES			62.6				8	J						
C1-NAPHTHALENES			51.9				23.4							
C1-PHENANTHRENES/ANTHRACENES			259				52.8	J						
C2-CHRYSENES			137				29.5	J						
C2-DIBENZOTHIOPHENES			29.5				9.2	J						
C2-FLUORENES			71.6				11.6	J						
C2-NAPHTHALENES			62.2				17.6							
C2-PHENANTHRENES/ANTHRACENES			164				38.1	J						
C3-CHRYSENES			6.5				5							
C3-DIBENZOTHIOPHENES			14.2				7.3	J						
C3-FLUORENES			35.3				9.4	J						
C3-NAPHTHALENES			68.8				11.4	J						
C3-PHENANTHRENES/ANTHRACENES			95.2				19.7	J						
C4-CHRYSENES			10.2				3.5							
C4-NAPHTHALENES			18.2				4.6	J						
C4-PHENANTHRENES/ANTHRACENES			16.7				5.6	J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.4		MS-8 LOC.4		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-300B-AVG**		**OU4-SD-M08-300B-D**		**OU4-SD-M08-400B**		**OU4-SD-M08-400B-2**		**OU4-SD-M08-100A**		**OU4-SD-M08-100A-2**		**OU4-SD-M08-100A-2-AVG**	
sample_dat	20000503		20000503		20000506		20000506		20000828		20000828		20000828	
round	02		02		02		02		03		03		03	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL	2.73	J	2.86	J	8.1	J			7.82	J				
1-METHYLNAPHTHALENE	8.42		8.94		20				29.2	J				
1-METHYLPHENANTHRENE	35.95	J	59.3	J	42.3				44.5	J				
2,3,5-TRIMETHYLNAPHTHALENE	5.22	J	7.54	J	10.7				12.6					
2,6-DIMETHYLNAPHTHALENE	6.585		7.57		16.3				18					
2-METHYLNAPHTHALENE	15.15		14.8		29.9				45.3	J				
ACENAPHTHENE	15.25	J	24.2	J	59.7	J			43.2	J				
ACENAPHTHYLENE	60.45	J	99.1	J	91.1	J			83.1					
ANTHRACENE	230.95	J	387	J	302	J			214					
BENZO(A)ANTHRACENE	310.5	J	520	J	478	J			427					
BENZO(A)PYRENE	274	J	436	J	567				370	J				
BENZO(B)FLUORANTHENE	376	J	601	J	596				690	J				
BENZO(E)PYRENE	173.6	J	267	J	326				367					
BENZO(G,H,I)PERYLENE	147.95	J	220	J	313				344	J				
BENZO(K)FLUORANTHENE	92.25	J	147	J	213				199					
CHRYSENE	370.5	J	592	J	530				476	J				
DIBENZO(A,H)ANTHRACENE	47.85	J	73	J	95.8				84.4	J				
DIBENZOTHIOPHENE	10.6	J	16.7	J	21.1				17.9	J				
FLUORANTHENE	873.5	J	1375	J	956	J			790	J				
FLUORENE	23.9	J	38.5	J	79.3	J			47.6	J				
HIGH MOLECULAR WEIGHT PAHS	2652.85		4256		3479.8				2864.4					
INDENO(1,2,3-CD)PYRENE	168.3	J	265	J	346				346	J				
LOW MOLECULAR WEIGHT PAHS	565.95		907		1003				767.8					
NAPHTHALENE	14.35		14.4		45				41.6	J				
PERYLENE	47.6	J	64.4	J	166	J			71.5	J				
PHENANTHRENE	205.9	J	329	J	396				293	J				
PYRENE	776.5	J	1260	J	853	J			717	J				
TOTAL PAHS ECO	3218.8		5163		4482.8				3632.2					
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	0.527		0.849		1110		595	U	200	J	186	J	187	J
CADMIUM	0.08385		0.0447		0.223				0.1219	U				
COPPER	151.5		166		8.25	J			145.31	J				
LEAD	43		41.3		33.7				126.42	J				
NICKEL	19.6		19.5		8.53				30.81	J				
ZINC	135		128		121				573.13	J				
HF Digestion Inorganics (mg/kg)														
ALUMINUM	45100		44500		59300				51430					
ARSENIC	11.45		10.8		10.4				12.5					
CADMIUM	0.22		0.20		0.43				0.32					
CHROMIUM	123.5		127		121				141					
COPPER	755.5	J	1070	J	157				280					
IRON	48500		46800		33600				55844					
LEAD	207		207		104				183					
MANGANESE	907		890		456				357					
MERCURY	0.105		0.12		0.24				0.19					
NICKEL	130.5		137		52.9				55.2	J				
SILVER	0.355		0.44		0.59				4.51					
ZINC	913.5		923		293				486					
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.4		MS-8 LOC.4		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-300B-AVG**		**OU4-SD-M08-300B-D**		**OU4-SD-M08-400B**		**OU4-SD-M08-400B-2**		**OU4-SD-M08-100A**		**OU4-SD-M08-100A-2**		OU4-SD-M08-100A-2-AVG	
sample_dat	20000503		20000503		20000506		20000506		20000828		20000828		20000828	
round	02		02		02		02		03		03		03	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE	0.14	J	0.20	J	0.23	J			0.21	U				
1,2,4,5-TETRACHLOROBENZENE	0.36		0.30	J	0.82				0.64					
2,4'-DDD	14.5		17		10				31	J				
2,4'-DDE	0.80		0.99		0.46				1	J				
2,4'-DDT	26	J	37	J	2.2				3.8					
4,4'-DDD	38	J	52	J	24				80	J				
4,4'-DDE	21	J	28	J	7.6				17	J				
4,4'-DDT	92.5	J	134	J	11				13	J				
ALDRIN	0.07125	J	0.045	UJ	6.1				0.056	U				
ALPHA-BHC	0.055	J	0.07		0.20				0.05	J				
ALPHA-CHLORDANE	2.25		2.4		0.68				1.5					
BETA-BHC	0.1475	J	0.22	J	1.2				0.21	J				
CHLORPYRIFOS	0.21	U	0.21	U	0.37	U			0.27	U				
CIS-NONACHLOR	0.565	J	0.72	J	0.53				0.46					
DELTA-BHC	0.0335	U	0.033	U	0.26				0.042	U				
DIELDRIN	0.28	J	0.15	J	0.34				0.063	UJ				
ENDOSULFAN II	1.47	J	2.4	J	0.97				0.47					
ENDRIN	0.10	U	0.10	U	0.18	U			0.13	U				
GAMMA-BHC (LINDANE)	0.185		0.16	J	0.23	J			0.22	U				
GAMMA-CHLORDANE	2.2		2		0.091	U			2.1					
HEPTACHLOR	0.12	J	0.12	J	0.22	U			0.05	J				
HEPTACHLOR EPOXIDE	0.022	U	0.022	U	0.04	U			0.028	U				
HEXACHLOROBENZENE	0.115		0.11		0.13				0.04	J				
MIREX	0.125		0.14		0.04	U			0.02	J				
OXYCHLORDANE	0.14275	J	0.28	J	0.16	U			0.37	J				
PCB-101														
PCB-101/90	6.05		7		6.5				41	J				
PCB-105	3.35		3.8		3.3				22	J				
PCB-118	2.15		2.2		4.3				32	J				
PCB-126	0.045	J	0.06	J	0.13	J			0.17	U				
PCB-128	1.7		2.1		2				9.2	J				
PCB-138														
PCB-138/160	23.5	J	33	J	12				39	J				
PCB-149/123	14	J	18	J	7.2				19	J				
PCB-153														
PCB-153/132	29	J	40	J	13				35	J				
PCB-156	1.5825	J	0.13	UJ	1.1				6.1	J				
PCB-167	1.2	J	1.9	J	1.9				2.9	J				
PCB-169	0.075	J	0.11	J	0.23	U			0.01	U				
PCB-170														
PCB-170/190	34.5	J	54	J	29	J			43	J				
PCB-18														
PCB-18/17	0.29175	J	0.067	UJ	0.65				1.3	J				
PCB-180	29.5	J	43	J	12				17	J				
PCB-187	12.95	J	18	J	7.4				9.2	J				
PCB-189	0.49	J	0.66	J	0.42				0.49					
PCB-195														
PCB-195/208	2.7	J	3.7	J	2.3				6	J				
PCB-201/157/173	1.135	J	1.54	J	1.06				1.21					

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.4		MS-8 LOC.4		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-300B-AVG**		**OU4-SD-M08-300B-D**		**OU4-SD-M08-400B**		**OU4-SD-M08-400B-2**		**OU4-SD-M08-100A**		**OU4-SD-M08-100A-2**		OU4-SD-M08-100A-2-AVG	
sample_dat	20000503		20000503		20000506		20000506		20000828		20000828		20000828	
round	02		02		02		02		03		03		03	
PCB-206	2.6		3.2		4.3				15	J				
PCB-209	0.5325		0.77		1.5				2.9	J				
PCB-28	0.32		0.35		1.8				1.5					
PCB-44	0.655	J	0.46	J	1.6				9.7	J				
PCB-52	1.4		1.3		2.2				27	J				
PCB-66	0.65		0.67		1.1				6.4	J				
PCB-77	0.38	U	0.62		0.08	J			0.18	U				
PCB-8/5	0.13	J	0.17	J	1.6				0.56	J				
PCB-81	0.165	J	0.26		0.23	U			0.10	J				
PENTACHLOROANISOLE	0.12	J	0.13	J	0.42	J			0.13	U				
PENTACHLOROBENZENE	0.14		0.11		0.46				0.10	U				
TEQ PCB	0.007516		0.010283		0.013587				0.002541					
TEQ PCB BIRD	0.021861		0.063872		0.017684				0.013475					
TEQ PCB BIRD HALFND	0.031367		0.063884		0.029311				0.026488					
TEQ PCB FISH	0.000431		0.000639		0.000755				0.000467					
TEQ PCB FISH HALFND	0.00045		0.000639		0.00082				0.000901					
TEQ PCB HALFND	0.007537		0.010287		0.017074				0.011203					
TOTAL DDT HALFND	192.8		268.99		55.26				145.8					
TOTAL DDT POS	192.8		268.99		55.26				145.8					
TOTAL PCB CONGENERS	303.9585		427.507		213.1				635.52					
TRANS-NONACHLOR	1.45		1.5		0.77				1					
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	113.1	J	86.2		102	J			957					
1,2,3,4,6,7,8,9-OCDF	7.15	J	5.7		7.2	J			44.3					
1,2,3,4,6,7,8-HPCDD	14	J	10.7		14.9	J			117	J				
1,2,3,4,6,7,8-HPCDF	5.25	J	3.8	U	4.6	U			32.8	J				
1,2,3,4,7,8,9-HPCDF	0.415	U	0.03	U	1.3	UJ			2.12					
1,2,3,4,7,8-HXCDD	0.20	J	0.20	J	0.50	J			1.2					
1,2,3,4,7,8-HXCDF	1.45	J	1.4	J	1.3	UJ			3.28					
1,2,3,6,7,8-HXCDD	0.80	J	1.4	U	1.3	UJ			5.17					
1,2,3,6,7,8-HXCDF	0.90	U	0.50	U	1.3	UJ			2.33					
1,2,3,7,8,9-HXCDD	0.55	J	0.20	J	1.3	UJ			3.64	J				
1,2,3,7,8,9-HXCDF	0.05	J	0.05	J	1.3	UJ			0.91	U				
1,2,3,7,8-PECDD	0.40	J	1.4	U	1.3	UJ			1.1	J				
1,2,3,7,8-PECDF	0.95	U	0.60	U	1.3	UJ			1.71	U				
2,3,4,6,7,8-HXCDF	1.05	J	0.50	J	1.3	UJ			3.2					
2,3,4,7,8-PECDF	1.3	U	0.70	U	0.40	J			2.24	J				
2,3,7,8-TCDD	0.25	UJ	0.30	U	0.27	UJ			0.50	J				
2,3,7,8-TCDF	1.1	U	1	U	0.27	UJ			2.53					
TEQ	1.038575		0.36957		0.35176				6.22659					
TEQ BIRD	0.806525		0.24489		0.45082				8.29303					
TEQ BIRD HALFND	2.2261		2.02604		1.79682				8.42403					
TEQ FISH	0.847025		0.31689		0.47582				4.98193					
TEQ FISH HALFND	1.39535		1.43304		1.60257				5.07018					
TEQ HALFND	1.4749		1.49772		1.58926				6.29774					
TOTAL DIOXINS	149.5	J	114		147	J			1378					
TOTAL FURANS	37.5	J	23.7	J	22.1	J			217					

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ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.4		MS-8 LOC.4		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-300B-AVG**		**OU4-SD-M08-300B-D**		**OU4-SD-M08-400B**		**OU4-SD-M08-400B-2**		**OU4-SD-M08-100A**		**OU4-SD-M08-100A-2**		**OU4-SD-M08-100A-2-AVG**	
sample_dat	20000503		20000503		20000506		20000506		20000828		20000828		20000828	
round	02		02		02		02		03		03		03	
TOTAL HPCDD	34.85	J	27.1		40.1	J			336	J				
TOTAL HPCDF	9.775	J	7.3	U	10.3	J			75.4					
TOTAL HXCDD	1.15	J	0.50	J	4.7	J			73					
TOTAL HXCDF	9.75	J	6.6	J	4.3	U			50.6					
TOTAL PECDD	0.40	J	1.4	U	1.3	UJ			1.1					
TOTAL PECDF	6.4	U	3.1	U	0.40	J			31.3					
TOTAL TCDD	0.275	J	0.30	UJ	0.27	UJ			11.5	J				
TOTAL TCDF	2.6	U	1	U	0.27	UJ			15.5					
Miscellaneous Parameters (%)														
PERCENT CLAY	0.085		0.00		13.43				5.4					
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL														
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND	99.345		99.7		56.94				81					
PERCENT SILT	0.57		0.30		29.63				13.6					
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON	0.545		0.81		1.88				0.88	J				
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES	155.05	J	252	J	275				294	J				
C1-DIBENZOTHIOPHENES	10.65	J	15.7	J	18.1				18.2					
C1-FLUORANTHENES/PYRENES	305.05	J	513	J	367				427	J				
C1-FLUORENES	18	J	28	J	40.3				32					
C1-NAPHTHALENES	23.55		23.7		49.9				74.5					
C1-PHENANTHRENES/ANTHRACENES	135.9	J	219	J	195				169					
C2-CHRYSENES	81.75	J	134	J	96.8				114					
C2-DIBENZOTHIOPHENES	19.9	J	30.6	J	22.4				23.6					
C2-FLUORENES	30.35	J	49.1	J	28.8				40.5					
C2-NAPHTHALENES	22.9		28.2		45.8				84.3					
C2-PHENANTHRENES/ANTHRACENES	105.05	J	172	J	112				150	J				
C3-CHRYSENES	6.365		7.73	J	8				8.91	J				
C3-DIBENZOTHIOPHENES	12.55	J	17.8	J	13				27.1	J				
C3-FLUORENES	25.3	J	41.2	J	26.9				45.7					
C3-NAPHTHALENES	20.45	J	29.5	J	36.7				71.7					
C3-PHENANTHRENES/ANTHRACENES	49.8	J	79.9	J	61.5				196	J				
C4-CHRYSENES	3.565		3.63		2.4				8.61	J				
C4-NAPHTHALENES	7.18	J	9.76	J	9.9				51.6					
C4-PHENANTHRENES/ANTHRACENES	11.75	J	17.9	J	23.2				110	J				

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100A-2-D**		**OU4-SD-M08-100A-AVG**		**OU4-SD-M08-100A-D**		**OU4-SD-M08-200A**		**OU4-SD-M08-200A-2**		**OU4-SD-M08-300A**		**OU4-SD-M08-300A-2**	
sample_dat	20000828		20000828		20000828		20000827		20000827		20000828		20000828	
round	03		03		03		03		03		03		03	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL			7.79	J	7.76	J	7.6	J			1.84	J		
1-METHYLNAPHTHALENE			25.65	J	22.1	J	21.4	J			3.71	J		
1-METHYLPHENANTHRENE			43.6	J	42.7		55.7				5.9			
2,3,5-TRIMETHYLNAPHTHALENE			11.5		10.4		12.1				1.89			
2,6-DIMETHYLNAPHTHALENE			17.45		16.9		16.9				3.1			
2-METHYLNAPHTHALENE			41.45	J	37.6		33.5	J			7.26	J		
ACENAPHTHENE			49.55	J	55.9		31.3				7.15	J		
ACENAPHTHYLENE			87		90.9	J	87.3				21.5			
ANTHRACENE			213		212		180	J			43.5			
BENZO(A)ANTHRACENE			403		379	J	327				73.8			
BENZO(A)PYRENE			472.5	J	575	J	157	J			32.5	J		
BENZO(B)FLUORANTHENE			701	J	712	J	507				136	J		
BENZO(E)PYRENE			357.5		348		258				79.7			
BENZO(G,H,I)PERYLENE			324	J	304	J	269				82.7	J		
BENZO(K)FLUORANTHENE			206.5		214		159				44			
CHRYSENE			464	J	452		344				118			
DIBENZO(A,H)ANTHRACENE			83.95	J	83.5	J	71.1				19.2	J		
DIBENZOTHIOPHENE			20	J	22.1		17.6				3.72			
FLUORANTHENE			800	J	810	J	663				172			
FLUORENE			61.8	J	76		50	J			8.14			
HIGH MOLECULAR WEIGHT PAHS			2923.45		2982.5		2173.1				562.5			
INDENO(1,2,3-CD)PYRENE			350	J	354		296				76			
LOW MOLECULAR WEIGHT PAHS			850.7		933.6		722.2				177.96			
NAPHTHALENE			41.4	J	41.2		48.1				8.71	J		
PERYLENE			88.75	J	106		135				21.6	J		
PHENANTHRENE			356.5	J	420		292				81.7			
PYRENE			700	J	683	J	611				147	J		
TOTAL PAHS ECO			3774.15		3916.1		2895.3				740.46			
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	188	J	205.5	J	211	J	257	J	275	J	4.86	U	5.79	U
CADMIUM			0.10245	U	0.083	U	0.27	J			0.0883	U		
COPPER			100.6	J	55.89	J	10.73	J			214.06	J		
LEAD			97.51	J	68.6	J	40.58	J			79.91	J		
NICKEL			24.465	J	18.12	J	4.35	J			40.32	J		
ZINC			448.305	J	323.48	J	86.54	J			445.8	J		
HF Digestion Inorganics (mg/kg)														
ALUMINUM			48884.5		46339		51595				56262			
ARSENIC			13.15		13.8		13.6				13.1			
CADMIUM			0.315		0.31	J	0.57				0.14			
CHROMIUM			136.5		132		85.8				155			
COPPER			310.5		341	J	118	J			407			
IRON			48970.5		42097	J	26387	J			80067			
LEAD			200.5		218	J	78.3				164			
MANGANESE			389.5		422		334				958			
MERCURY			0.46		0.73		0.26				0.0953	U		
NICKEL			76.6	J	98	J	25.2	J			130	J		
SILVER			4.35		4.19		4.18	J			4.46			
ZINC			491.5		497	J	90	J			738			
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100A-2-D**		**OU4-SD-M08-100A-AVG**		**OU4-SD-M08-100A-D**		**OU4-SD-M08-200A**		**OU4-SD-M08-200A-2**		**OU4-SD-M08-300A**		**OU4-SD-M08-300A-2**	
sample_dat	20000828		20000828		20000828		20000827		20000827		20000828		20000828	
round	03		03		03		03		03		03		03	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE			0.2625	J	0.42	J	0.28	U			0.06	U		
1,2,4,5-TETRACHLOROBENZENE			0.64		0.93	U	1.2	U			0.03	U		
2,4'-DDD			37	J	43		3.7				14			
2,4'-DDE			1.6	J	2.2	J	0.19				0.50	J		
2,4'-DDT			4.85		5.9		0.17				15			
4,4'-DDD			92.5	J	105		5.6				38			
4,4'-DDE			17	J	17		2.4				11			
4,4'-DDT			22.5	J	32	J	2				70			
ALDRIN			0.057	U	0.058	U	0.07	J			0.042	U		
ALPHA-BHC			0.075	J	0.10		0.07	J			0.02	J		
ALPHA-CHLORDANE			1.9		2.3		0.49				0.72			
BETA-BHC			0.155	J	0.20	UJ	0.27	U			0.14	U		
CHLORPYRIFOS			0.735	U	1.2	U	0.87	U			0.20	U		
CIS-NONACHLOR			0.57		0.68	J	0.35				0.20			
DELTA-BHC			0.043	U	0.044	U	0.05	J			0.032	U		
DIELDRIN			0.14075	J	0.25	J	0.13				0.048	U		
ENDOSULFAN II			0.435		0.40		1.1				0.16			
ENDRIN			0.13	U	0.13	U	0.18	U			0.096	U		
GAMMA-BHC (LINDANE)			0.225	U	0.23	U	0.33	U			0.17	U		
GAMMA-CHLORDANE			2.15		2.2		0.17				0.98			
HEPTACHLOR			0.05	J	0.17	U	0.23	U			0.12	U		
HEPTACHLOR EPOXIDE			0.0285	U	0.029	U	0.041	U			0.021	U		
HEXACHLOROBENZENE			0.04	J	0.04	J	0.11				0.02	J		
MIREX			0.02	J	0.029	U	0.041	U			0.021	U		
OXYCHLORDANE			0.195	J	0.02	J	0.08				0.011	U		
PCB-101														
PCB-101/90			26.5	J	12	J	2.1				2.4			
PCB-105			12.15	J	2.3	J	1.2				1.8	J		
PCB-118			19.05	J	6.1	J	2.3				0.88			
PCB-126			0.175	U	0.18	U	0.24	U			0.13	U		
PCB-128			5.6	J	2	J	0.85				0.59			
PCB-138														
PCB-138/160			26	J	13	J	4.3				6.1			
PCB-149/123			13.55	J	8.1	J	2.4				5.7			
PCB-153														
PCB-153/132			25	J	15	J	3.6				6.5			
PCB-156			4.15	J	2.2	J	0.98				0.70			
PCB-167			2.2	J	1.5	J	2				0.33			
PCB-169			0.015	U	0.02	U	0.06	U			0.02	U		
PCB-170														
PCB-170/190			22.15	J	1.3	J	1.4	U			6.9	J		
PCB-18														
PCB-18/17			2	J	2.7	J	1.4				0.12			
PCB-180			12.75	J	8.5	J	3.4				6.3			
PCB-187			7.3	J	5.4	J	2.4				3.6			
PCB-189			0.44		0.39		0.22	J			0.21			
PCB-195														
PCB-195/208			5.5	J	5		1.5				1			
PCB-201/157/173			1.095		0.98		0.69				0.30			

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100A-2-D**		**OU4-SD-M08-100A-AVG**		**OU4-SD-M08-100A-D**		**OU4-SD-M08-200A**		**OU4-SD-M08-200A-2**		**OU4-SD-M08-300A**		OU4-SD-M08-300A-2	
sample_dat	20000828		20000828		20000828		20000827		20000827		20000828		20000828	
round	03		03		03		03		03		03		03	
PCB-206			12.5	J	10		2.7				1.6			
PCB-209			3.5	J	4.1		1.7				0.51			
PCB-28			1.35		1.2		0.98				0.22			
PCB-44			5.75	J	1.8	J	0.48				0.32			
PCB-52			15.6	J	4.2	J	1.6				0.59			
PCB-66			3.85	J	1.3	J	0.42				0.25			
PCB-77			0.135	U	0.09	U	0.05	J			0.02	U		
PCB-8/5			0.365	J	0.34	U	0.45	U			0.17	J		
PCB-81			0.115	J	0.13	J	0.24	U			0.13	U		
PENTACHLOROANISOLE			0.1175	J	0.17	J	0.14	U			0.24	J		
PENTACHLOROBENZENE			0.215	U	0.33	U	0.15	U			0.05	U		
TEQ PCB			0.001612		0.000686		0.000299				0.000297			
TEQ PCB BIRD			0.013592		0.013709		0.002856				0.000351			
TEQ PCB BIRD HALFND			0.025734		0.024978		0.026898				0.013867			
TEQ PCB FISH			0.000321		0.000173		0.000054				0.00005			
TEQ PCB FISH HALFND			0.000766		0.000627		0.000717				0.000408			
TEQ PCB HALFND			0.010597		0.009993		0.013239				0.00712			
TOTAL DDT HALFND			175.45		205.1		14.06				148.5			
TOTAL DDT POS			175.45		205.1		14.06				148.5			
TOTAL PCB CONGENERS			413.83		192.14		63.71				79.7			
TRANS-NONACHLOR			1.25		1.5		0.22				0.48			
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD			958.5		960		125				64.3			
1,2,3,4,6,7,8,9-OCDF			44.3		50.4	U	7.8				4.06			
1,2,3,4,6,7,8-HPCDD			87	J	114	U	17.7				7.62			
1,2,3,4,6,7,8-HPCDF			24.575	J	32.7	U	4.42				4.47			
1,2,3,4,7,8,9-HPCDF			2.01		1.9		2.22	U			0.20	J		
1,2,3,4,7,8-HXCDD			1.3		1.4		2.22	U			0.23	J		
1,2,3,4,7,8-HXCDF			3.29		3.3		0.37	J			1	U		
1,2,3,6,7,8-HXCDD			5.585		6		0.49	J			0.28	J		
1,2,3,6,7,8-HXCDF			2.515		2.7		2.22	U			1	U		
1,2,3,7,8,9-HXCDD			2.0625	J	0.97	UJ	0.50	J			1	U		
1,2,3,7,8,9-HXCDF			0.94	U	0.97	U	2.22	U			1	U		
1,2,3,7,8-PECDD			0.7925	J	0.97	UJ	0.06	J			1	UJ		
1,2,3,7,8-PECDF			1.5775	J	2.3	J	0.25	U			0.40	U		
2,3,4,6,7,8-HXCDF			3.55		3.9		0.20	J			1	U		
2,3,4,7,8-PECDF			1.3625	J	0.97	UJ	2.22	U			1	UJ		
2,3,7,8-TCDD			0.2975	J	0.19	UJ	0.07	J			0.20	UJ		
2,3,7,8-TCDF			2.965		3.4	J	0.36	J			0.35	J		
TEQ			5.109515		2.446		0.58304				0.229408			
TEQ BIRD			7.29098		4.865		0.67708				0.425456			
TEQ BIRD HALFND			7.33798		6.25002		2.08818				1.795456			
TEQ FISH			4.11348		2.15		0.29008				0.196456			
TEQ FISH HALFND			4.16048		3.24887		1.63943				1.261456			
TEQ HALFND			5.156515		4.00956		1.26389				1.235408			
TOTAL DIOXINS			1366.5		1355		170				85.1			
TOTAL FURANS			217		232	U	22.3				22.3			

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3	
nsample	**OU4-SD-M08-100A-2-D**		**OU4-SD-M08-100A-AVG**		**OU4-SD-M08-100A-D**		**OU4-SD-M08-200A**		**OU4-SD-M08-200A-2**		**OU4-SD-M08-300A**		**OU4-SD-M08-300A-2**	
sample_dat	20000828		20000828		20000828		20000827		20000827		20000828		20000828	
round	03		03		03		03		03		03		03	
TOTAL HPCDD			248.25	J	321	U	40.3				19.2			
TOTAL HPCDF			75.4		79.1	U	11.3				4.67			
TOTAL HXCDD			70.2		67.4		4.81				0.51	J		
TOTAL HXCDF			49.45		48.3		0.57	J			4.59			
TOTAL PECDD			0.7925		0.97	UJ	0.06	J			1	UJ		
TOTAL PECDF			30.45		29.6	J	1.19	U			7.44	J		
TOTAL TCDD			9.15	J	6.8	J	0.07	U			1.08	U		
TOTAL TCDF			20.1		24.7	J	1.48				1.54	J		
Miscellaneous Parameters (%)														
PERCENT CLAY			7.1		8.8		11.5				0.00			
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL														
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND			80.2		79.4		49.7				99.7			
PERCENT SILT			12.7		11.8		38.8				0.30			
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON			0.875	J	0.87	J	2.01	J			0.20	J		
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES			229	J	164	J	243				47.9			
C1-DIBENZOTHIOPHENES			16.75		15.3		19.7				3.19			
C1-FLUORANTHENES/PYRENES			324	J	221	J	412				69.8			
C1-FLUORENES			31.3		30.6		34.2				4.42	U		
C1-NAPHTHALENES			67.1		59.7		54.9				11	J		
C1-PHENANTHRENES/ANTHRACENES			152.5		136		188				28.8			
C2-CHRYSENES			93.8		73.6		95.5				24.4			
C2-DIBENZOTHIOPHENES			20.4		17.2		25.2				4.78			
C2-FLUORENES			43.6		46.7		36.8				8.23			
C2-NAPHTHALENES			73.8		63.3		57.5				9.79			
C2-PHENANTHRENES/ANTHRACENES			110.95	J	71.9	J	137				15.6			
C3-CHRYSENES			7.03	J	5.15	J	6.45				4.31			
C3-DIBENZOTHIOPHENES			18.85	J	10.6	J	31.4				6.78			
C3-FLUORENES			45.5		45.3		21.1				5.94	U		
C3-NAPHTHALENES			64.8		57.9		65.5				12.4			
C3-PHENANTHRENES/ANTHRACENES			117.9	J	39.8	J	67.5				10.3			
C4-CHRYSENES			6.835	J	5.06	J	10				1.68			
C4-NAPHTHALENES			41.5		31.4		24.2				9.31	U		
C4-PHENANTHRENES/ANTHRACENES			64.8	J	19.6	J	37.7				11.4			

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-101B**		**OU4-SD-M08-101B-2**		**OU4-SD-M08-101B-2-AVG**		**OU4-SD-M08-101B-2-D**		**OU4-SD-M08-101B-AVG**		**OU4-SD-M08-101B-D**		**OU4-SD-M08-201B**	
sample_dat	20010508		20010508		20010508		20010508		20010508		20010508		20010507	
round	04		04		04		04		04		04		04	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL	5.5								5.7		5.9		9.6	J
1-METHYLNAPHTHALENE	18.5								16.8		15.1		27.1	J
1-METHYLPHENANTHRENE	24.4								27.9		31.4		85.2	J
2,3,5-TRIMETHYLNAPHTHALENE	11								9.55		8.1		8.9	J
2,6-DIMETHYLNAPHTHALENE	12.1								13		13.9		17.4	
2-METHYLNAPHTHALENE	29.7								28.2		26.7		41.9	J
ACENAPHTHENE	33.7	J							30.5	J	27.3	J	62.9	J
ACENAPHTHYLENE	81.8	J							66.3	J	50.8		102.4	J
ANTHRACENE	267.3	J							242.95	J	218.6	J	410.2	J
BENZO(A)ANTHRACENE	371								334.6		298.2		502.8	J
BENZO(A)PYRENE	653.7	J							526	J	398.3	J	768.7	J
BENZO(B)FLUORANTHENE	643.1								552	J	460.9	J	688.6	J
BENZO(E)PYRENE	332.3	J							279.05	J	225.8		342.9	J
BENZO(G,H,I)PERYLENE	250	J							218.85	J	187.7	J	322.5	J
BENZO(K)FLUORANTHENE	183.1	J							191.5	J	199.9		208.1	
CHRYSENE	372.8	J							330.65	J	288.5		526.3	J
DIBENZO(A,H)ANTHRACENE	74.4	J							65.35	J	56.3	J	72.7	J
DIBENZOTHIOPHENE	14.6								13.05		11.5		28.8	J
FLUORANTHENE	658.8								580.55		502.3		1194.4	J
FLUORENE	52.9	J							46.05	J	39.2	J	92.2	J
HIGH MOLECULAR WEIGHT PAHS	2808.5								2437.45		2066.4		4155	
INDENO(1,2,3-CD)PYRENE	288.6	J							271.05	J	253.5	J	348.1	J
LOW MOLECULAR WEIGHT PAHS	788								705.75		623.5		1420.9	
NAPHTHALENE	41.7								38.1		34.5		60.3	J
PERYLENE	93.4								78.3		63.2		95.7	J
PHENANTHRENE	280.9								253.65		226.4		651	J
PYRENE	677.8								600.3		522.8		1090.1	J
TOTAL PAHS ECO	3596.5								3143.2		2689.9		5575.9	
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	180.334	J	281.295	J	293.7755	J	306.256	J	234.0525	J	287.771	J	354.371	J
CADMIUM	0.21	J							0.215	J	0.22	J	0.39	
COPPER	184	J							182.5	J	181	J	45.7	J
LEAD	154	J							250.5	J	347	J	73.1	
NICKEL	37.8								38.6		39.4		9.08	
ZINC	812								722.5		633		173	
HF Digestion Inorganics (mg/kg)														
ALUMINUM	49162.87								47336.465		45510.06		60698.61	
ARSENIC	11.64								11.194		10.748		13.95	
CADMIUM	0.35	J							0.43	J	0.51		0.1872	U
CHROMIUM	171.43								163.38		155.33		119.37	
COPPER	419.68								381.55		343.42		99.65	
IRON	53152.82								49349.2		45545.58		32465.97	
LEAD	253.95								253.19		252.43		104.71	
MANGANESE	409.31								383.045		356.78		336.26	
MERCURY	0.31	J							0.27	J	0.23	J	0.45	J
NICKEL	84.89								75.365		65.84		30.03	
SILVER	0.82								1.06	J	1.3	J	0.85	
ZINC	851.99	J							723.48	J	594.97		154.84	J
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-101B**		**OU4-SD-M08-101B-2**		**OU4-SD-M08-101B-2-AVG**		**OU4-SD-M08-101B-2-D**		**OU4-SD-M08-101B-AVG**		**OU4-SD-M08-101B-D**		**OU4-SD-M08-201B**	
sample_dat	20010508		20010508		20010508		20010508		20010508		20010508		20010507	
round	04		04		04		04		04		04		04	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE	0.15	J							0.165	J	0.18	J	0.14	
1,2,4,5-TETRACHLOROBENZENE	1.1	U							0.37	J	0.37	J	1.2	J
2,4'-DDD	37	J							40	J	43		8	J
2,4'-DDE	1.3	J							1.25	J	1.2		0.32	
2,4'-DDT	4.7	J							5.2	J	5.7		0.86	
4,4'-DDD	81	J							89	J	97		12	
4,4'-DDE	16	J							17	J	18		3.9	
4,4'-DDT	17	J							19	J	21		3.6	
ALDRIN	0.55	J							0.29125	J	0.065	UJ	0.029	U
ALPHA-BHC	0.20	J							0.12	J	0.04	J	0.10	U
ALPHA-CHLORDANE	2.4	J							2.6	J	2.8		0.58	
BETA-BHC	0.18	UJ							0.185	UJ	0.19	U	0.17	U
CHLORPYRIFOS	0.11	UJ							0.07	J	0.07	J	0.10	U
CIS-NONACHLOR	1.4	J							1.4	J	1.4		0.45	J
DELTA-BHC	0.061	UJ							0.06025	J	0.09		0.19	
DIELDRIN	0.70	J							0.47	J	0.24	J	0.05	J
ENDOSULFAN II	0.14	UJ							1.185	J	2.3	J	1.6	
ENDRIN	0.09	J							0.06125	J	0.065	U	0.07	J
GAMMA-BHC (LINDANE)	0.13	UJ							0.02	J	0.02	J	0.60	U
GAMMA-CHLORDANE	2.9	R							3		3		0.59	
HEPTACHLOR	0.32	R							0.16	UJ	0.16	UJ	0.22	J
HEPTACHLOR EPOXIDE	0.051	UJ							0.0525	UJ	0.054	U	0.087	U
HEXACHLOROBENZENE	0.051	UJ							0.04	J	0.04	J	0.073	U
MIREX	0.081	UJ							0.12025	J	0.20	J	0.10	
OXYCHLORDANE	0.13	J							0.205	J	0.28	J	0.14	
PCB-101														
PCB-101/90	9.7								10.85		12		4.8	
PCB-105	1.8								2.3		2.8		1.3	
PCB-118	5.5								6.45		7.4		3	
PCB-126	0.18	U							0.22	U	0.26	U	0.01	U
PCB-128	2.3								2.55		2.8		1.5	
PCB-138														
PCB-138/160	19								19		19		9.4	
PCB-149/123	18	J							16.5	J	15		6.6	
PCB-153														
PCB-153/132	25								25.5		26		12	J
PCB-156	2.5	J							2.35	J	2.2		1.9	
PCB-167	1.5								1.25		1		1.7	
PCB-169	0.02	J							0.02	J	0.26	UJ	0.35	U
PCB-170														
PCB-170/190	22	J							22	J	22	J	15.1	
PCB-18														
PCB-18/17	0.81								0.81		0.81		1.2	
PCB-180	22								18.5		15		8.3	J
PCB-187	18								15.5		13		6.1	
PCB-189	0.38	J							0.43	J	0.48		0.21	
PCB-195														
PCB-195/208	5.7	J							8.35	J	11	J	4.9	J
PCB-201/157/173	1.4								1.65		1.9		0.83	

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-101B**		**OU4-SD-M08-101B-2**		**OU4-SD-M08-101B-2-AVG**		**OU4-SD-M08-101B-2-D**		**OU4-SD-M08-101B-AVG**		**OU4-SD-M08-101B-D**		**OU4-SD-M08-201B**	
sample_dat	20010508		20010508		20010508		20010508		20010508		20010508		20010507	
round	04		04		04		04		04		04		04	
PCB-206	11	J							17	J	23	J	10	J
PCB-209	2.57	J							5.035	J	7.5	J	3.48	J
PCB-28	2.1								1.8		1.5		0.13	U
PCB-44	1.6								1.8		2		0.60	
PCB-52	3.3								3.55		3.8		1.4	
PCB-66	1.3								1.35		1.4		0.83	
PCB-77	0.36	J							0.24	J	0.12	J	0.03	U
PCB-8/5	0.51	U							0.3875		0.52		0.84	J
PCB-81	0.06	J							0.07	J	0.08	J	0.35	U
PENTACHLOROANISOLE	0.07	U							0.0775	J	0.12	J	0.19	U
PENTACHLOROBENZENE	0.091	UJ							0.0755	UJ	0.06	J	0.12	J
TEQ PCB	0.001586								0.001574		0.000959		0.000466	
TEQ PCB BIRD	0.024844								0.019895		0.014929		0.000518	
TEQ PCB BIRD HALFND	0.033864								0.030915		0.02808		0.019448	
TEQ PCB FISH	0.000223								0.000214		0.000206		0.000077	
TEQ PCB FISH HALFND	0.000674								0.000765		0.000863		0.000201	
TEQ PCB HALFND	0.010592								0.01258		0.017865		0.006272	
TOTAL DDT HALFND	157								171.45		185.9		28.68	
TOTAL DDT POS	157								171.45		185.9		28.68	
TOTAL PCB CONGENERS	307.87								325.465		343.06		169.63	
TRANS-NONACHLOR	1.4	J							1.55	J	1.7		0.33	
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	90.1	U							103.525	J	162	J	104.7	U
1,2,3,4,6,7,8,9-OCDF	8.7	U							10	U	11.3	U	8.1	U
1,2,3,4,6,7,8-HPCDD	10.8	U							15.35	J	25.3	J	15.3	U
1,2,3,4,6,7,8-HPCDF	3.1	J							4.4	J	5.7	J	4.2	
1,2,3,4,7,8,9-HPCDF	0.20	J							0.25	J	0.30	J	1.8	U
1,2,3,4,7,8-HXCDD	1.5	U							1.51	UJ	1.52	UJ	0.30	U
1,2,3,4,7,8-HXCDF	1.5	U							1.51	UJ	1.52	UJ	0.60	U
1,2,3,6,7,8-HXCDD	1.5	U							1.51	UJ	1.52	UJ	1	J
1,2,3,6,7,8-HXCDF	1.5	U							1.51	UJ	1.52	UJ	0.60	U
1,2,3,7,8,9-HXCDD	1.5	U							1.51	UJ	1.52	UJ	0.90	U
1,2,3,7,8,9-HXCDF	1.5	U							1.51	UJ	1.52	UJ	1.8	U
1,2,3,7,8-PECDD	1.5	U							1.51	UJ	1.52	UJ	1.8	UJ
1,2,3,7,8-PECDF	1.5	U							0.95	U	0.40	U	1.8	UJ
2,3,4,6,7,8-HXCDF	1.5	U							1.51	UJ	1.52	UJ	0.90	U
2,3,4,7,8-PECDF	1.5	U							1	U	0.50	U	1.8	UJ
2,3,7,8-TCDD	0.30	U							0.30	UJ	0.30	UJ	0.40	UJ
2,3,7,8-TCDF	0.30	U							0.30	UJ	0.30	UJ	0.50	U
TEQ	0.033								0.231058		0.3616		0.142	
TEQ BIRD	0.033								0.072202		0.1015		0.052	
TEQ BIRD HALFND	2.33834								2.098002		1.857665		2.66179	
TEQ FISH	0.033								0.072202		0.1015		0.052	
TEQ FISH HALFND	2.05334								1.953552		1.853765		1.95629	
TEQ HALFND	1.78932								1.845308		1.901295		1.92142	
TOTAL DIOXINS	123	U							149.75	J	238	J	157.4	U
TOTAL FURANS	16.3	U							24.05	U	31.8	U	25.9	U

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-101B**		**OU4-SD-M08-101B-2**		**OU4-SD-M08-101B-2-AVG**		**OU4-SD-M08-101B-2-D**		**OU4-SD-M08-101B-AVG**		**OU4-SD-M08-101B-D**		**OU4-SD-M08-201B**	
sample_dat	20010508		20010508		20010508		20010508		20010508		20010508		20010507	
round	04		04		04		04		04		04		04	
TOTAL HPCDD	28	U							41.9	J	69.8	J	42.9	U
TOTAL HPCDF	3.2								3.2		13.7	U	9.4	
TOTAL HXCDD	4.9	U							4.375	J	6.3	J	9.8	U
TOTAL HXCDF	11.9	U							4.6	J	4.6	J	5.9	U
TOTAL PECDD	1.5	U							1.51	UJ	1.52	UJ	1.8	UJ
TOTAL PECDF	0.80	U							1.5	U	2.2	U	1.6	U
TOTAL TCDD	0.30	U							0.30	UJ	0.30	UJ	0.40	UJ
TOTAL TCDF	0.30	U							0.30	UJ	0.30	UJ	0.90	U
Miscellaneous Parameters (%)														
PERCENT CLAY	7.9								7.4		6.9		19.3	
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL														
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND	77.2								77.1		77		46.3	
PERCENT SILT	15								15.55		16.1		34.4	
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON	0.85	J							0.85	J	0.85	J	2.53	J
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES	261.8								220.6		179.4		310.6	J
C1-DIBENZOTHIOPHENES	13.2								13.15		13.1		26.1	
C1-FLUORANTHENES/PYRENES	273.4								254.1		234.8		567.9	
C1-FLUORENES	28.2								25.3		22.4		50	
C1-NAPHTHALENES	48.3								45.05		41.8		69	
C1-PHENANTHRENES/ANTHRACENES	110.8								115.15		119.5		301.3	J
C2-CHRYSENES	321.3	J							206.65	J	92	J	187.1	J
C2-DIBENZOTHIOPHENES	16.4								17.15		17.9		29.4	
C2-FLUORENES	25.6								26.35		27.1		42.2	
C2-NAPHTHALENES	38.7								34.25		29.8		55.4	
C2-PHENANTHRENES/ANTHRACENES	74								79.4		84.8		198.7	
C3-CHRYSENES	35.9	J							21.8	J	7.7	J	13.9	
C3-DIBENZOTHIOPHENES	12.5								11.9		11.3		20.4	
C3-FLUORENES	21.9								22.45		23		40.2	
C3-NAPHTHALENES	48.8	J							38.25	J	27.7	J	46.6	
C3-PHENANTHRENES/ANTHRACENES	43.3								49.1		54.9		111.7	
C4-CHRYSENES	105.9	J							61.65	J	17.4	J	54.7	
C4-NAPHTHALENES	36.1	J							27	J	17.9	J	33.4	
C4-PHENANTHRENES/ANTHRACENES	39.5	J							30.5	J	21.5	J	77.7	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-201B-2**		**OU4-SD-M08-301B**		**OU4-SD-M08-301B-2**		**OU4-SD-M08-101A**		**OU4-SD-M08-101A-2**		**OU4-SD-M08-101A-2-AVG**		**OU4-SD-M08-101A-2-D**	
sample_dat	20010507		20010508		20010508		20010819		20010819		20010819		20010819	
round	04		04		04		05		05		05		05	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL			1.8				5.8							
1-METHYLNAPHTHALENE			5.4				14.2							
1-METHYLPHENANTHRENE			13.5				54.7							
2,3,5-TRIMETHYLNAPHTHALENE			4.1				8							
2,6-DIMETHYLNAPHTHALENE			6.6				9.8							
2-METHYLNAPHTHALENE			11.9				19.3							
ACENAPHTHENE			7				49.1	J						
ACENAPHTHYLENE			20.5	J			51.9							
ANTHRACENE			66.4	J			227.1							
BENZO(A)ANTHRACENE			112.6	J			331.9							
BENZO(A)PYRENE			162.5				315.9							
BENZO(B)FLUORANTHENE			161.9				517.5							
BENZO(E)PYRENE			85.7	J			205.6							
BENZO(G,H,I)PERYLENE			80.3	J			197.7	J						
BENZO(K)FLUORANTHENE			46.6	J			516.4	J						
CHRYSENE			110.6	J			340.9	J						
DIBENZO(A,H)ANTHRACENE			19.3	J			53.6	J						
DIBENZOTHIOPHENE			4				23.3	J						
FLUORANTHENE			169.1				961.2	J						
FLUORENE			8.7				61.4	J						
HIGH MOLECULAR WEIGHT PAHS			726.2				2790.7							
INDENO(1,2,3-CD)PYRENE			80.3	J			218	J						
LOW MOLECULAR WEIGHT PAHS			199.6				850.5							
NAPHTHALENE			8.8				27.1	J						
PERYLENE			23.9				81.2	J						
PHENANTHRENE			76.3				414.6	J						
PYRENE			152.1				787.2	J						
TOTAL PAHS ECO			925.8				3641.2							
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	477.748	J	10.209	J	2.686	J	175.691	J	233.717	J	230.432	J	227.147	J
CADMIUM			0.10	U			0.38							
COPPER			423	J			76.52							
LEAD			105				116.39							
NICKEL			49.5				26.26							
ZINC			689				593.61							
HF Digestion Inorganics (mg/kg)														
ALUMINUM			54239.03				46489.93							
ARSENIC			9.64				10.51							
CADMIUM			0.38				0.64	J						
CHROMIUM			218.9				169.66	J						
COPPER			433.57				289.39							
IRON			78944.77				48806.76							
LEAD			218.8				207.94							
MANGANESE			304.54				425.41							
MERCURY			0.06	J			0.1997							
NICKEL			111.52				69.02							
SILVER			0.23				0.48	J						
ZINC			698.68	J			627.92							
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-201B-2**		**OU4-SD-M08-301B**		**OU4-SD-M08-301B-2**		**OU4-SD-M08-101A**		**OU4-SD-M08-101A-2**		**OU4-SD-M08-101A-2-AVG**		**OU4-SD-M08-101A-2-D**	
sample_dat	20010507		20010508		20010508		20010819		20010819		20010819		20010819	
round	04		04		04		05		05		05		05	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE			0.17				0.17	J						
1,2,4,5-TETRACHLOROBENZENE			0.60	U			1.28	U						
2,4'-DDD			18				25.96							
2,4'-DDE			0.96				0.87							
2,4'-DDT			36				3.42							
4,4'-DDD			30				45.24	J						
4,4'-DDE			15				10.43							
4,4'-DDT			125				14.97							
ALDRIN			0.93				0.07	U						
ALPHA-BHC			0.13				0.03	J						
ALPHA-CHLORDANE			3.3				3.27							
BETA-BHC			0.14	U			0.08	J						
CHLORPYRIFOS			0.07	J			0.11657	U						
CIS-NONACHLOR			1.2				1.17	J						
DELTA-BHC			0.048	U			0.07	U						
DIELDRIN			0.38				0.29	J						
ENDOSULFAN II			0.11	U			1.03							
ENDRIN			0.048	U			0.07	U						
GAMMA-BHC (LINDANE)			0.04	J			0.14	U						
GAMMA-CHLORDANE			4				3.86	J						
HEPTACHLOR			0.41				0.51							
HEPTACHLOR EPOXIDE			0.09				0.06	U						
HEXACHLOROBENZENE			0.10				0.02	J						
MIREX			0.063	U			0.09	U						
OXYCHLORDANE			0.04	U			0.18							
PCB-101														
PCB-101/90			4.4				10.44							
PCB-105			0.58				4.71	J						
PCB-118			1.4				5.52							
PCB-126			0.07	U			0.21	J						
PCB-128			1.3				6.55	J						
PCB-138														
PCB-138/160			15				33.98	J						
PCB-149/123			17	J			25.83	J						
PCB-153														
PCB-153/132			19				46.45	J						
PCB-156			0.84	J			5.73	J						
PCB-167			0.39				2.95							
PCB-169			0.45	J			0.01	J						
PCB-170														
PCB-170/190			6.8	J			21.3							
PCB-18														
PCB-18/17			0.09				0.39							
PCB-180			14				42.59	J						
PCB-187			8.3				26.88	J						
PCB-189			0.31	U			1.25	J						
PCB-195														
PCB-195/208			2				8.95	J						
PCB-201/157/173			0.75				2.74	J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-201B-2**		**OU4-SD-M08-301B**		**OU4-SD-M08-301B-2**		**OU4-SD-M08-101A**		**OU4-SD-M08-101A-2**		**OU4-SD-M08-101A-2-AVG**		**OU4-SD-M08-101A-2-D**	
sample_dat	20010507		20010508		20010508		20010819		20010819		20010819		20010819	
round	04		04		04		05		05		05		05	
PCB-206			2.6				11.21	J						
PCB-209			0.40				2.54	J						
PCB-28			0.21	U			0.75							
PCB-44			0.32				1.13							
PCB-52			0.59				2.3							
PCB-66			0.25				0.84	J						
PCB-77			0.15	J			0.13	J						
PCB-8/5			0.10	U			0.42							
PCB-81			0.05	J			0.46	U						
PENTACHLOROANISOLE			0.07	J			0.08	J						
PENTACHLOROBENZENE			0.03	J			0.10							
TEQ PCB			0.014158				0.022775							
TEQ PCB BIRD			0.013355				0.029183							
TEQ PCB BIRD HALFND			0.016873				0.052204							
TEQ PCB FISH			0.000167				0.001308							
TEQ PCB FISH HALFND			0.000344				0.001424							
TEQ PCB HALFND			0.017668				0.02285							
TOTAL DDT HALFND			224.96				100.89							
TOTAL DDT POS			224.96				100.89							
TOTAL PCB CONGENERS			154.37				453.9							
TRANS-NONACHLOR			1.9				2.08							
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD			80	U			830.6							
1,2,3,4,6,7,8,9-OCDF			2.2	UJ			52.4							
1,2,3,4,6,7,8-HPCDD			10.8	U			104.5							
1,2,3,4,6,7,8-HPCDF			4.7				27.2							
1,2,3,4,7,8,9-HPCDF			0.20	J			1.72	U						
1,2,3,4,7,8-HXCDD			1.1	U			1.72	U						
1,2,3,4,7,8-HXCDF			1	U			2.7							
1,2,3,6,7,8-HXCDD			0.70	U			5							
1,2,3,6,7,8-HXCDF			0.80	U			2.1							
1,2,3,7,8,9-HXCDD			1.1	U			3							
1,2,3,7,8,9-HXCDF			1.1	U			1.72	U						
1,2,3,7,8-PECDD			1.1	U			1.72	U						
1,2,3,7,8-PECDF			0.70	U			1.5	U						
2,3,4,6,7,8-HXCDF			1.1	U			3.2							
2,3,4,7,8-PECDF			1.1	U			2.7	J						
2,3,7,8-TCDD			0.10	U			0.34	UR						
2,3,7,8-TCDF			0.70	U			0.34	UR						
TEQ			0.049				3.9919							
TEQ BIRD			0.049				4.3148							
TEQ BIRD HALFND			1.87951				5.3874							
TEQ FISH			0.049				2.6948							
TEQ FISH HALFND			1.45251				4.1169							
TEQ HALFND			1.27083				5.055							
TOTAL DIOXINS			120.4	U			1126.4							
TOTAL FURANS			28.8	U			182							

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location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-201B-2**		**OU4-SD-M08-301B**		**OU4-SD-M08-301B-2**		**OU4-SD-M08-101A**		**OU4-SD-M08-101A-2**		**OU4-SD-M08-101A-2-AVG**		**OU4-SD-M08-101A-2-D**	
sample_dat	20010507		20010508		20010508		20010819		20010819		20010819		20010819	
round	04		04		04		05		05		05		05	
TOTAL HPCDD			31.4	U			256.5							
TOTAL HPCDF			8.1				58.5							
TOTAL HXCDD			6.5	U			31.9	J						
TOTAL HXCDF			9.8	U			36							
TOTAL PECDD			1.5	U			6.2	J						
TOTAL PECDF			10.2	U			23.7	U						
TOTAL TCDD			1	U			1.3	J						
TOTAL TCDF			0.70	U			11.5	J						
Miscellaneous Parameters (%)														
PERCENT CLAY			0.90				7							
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL														
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND			98.8				81							
PERCENT SILT			0.30				12							
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON			0.29	J			0.67							
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES			60.6				176							
C1-DIBENZOTHIOPHENES			4.9				18.1							
C1-FLUORANTHENES/PYRENES			58.9				455.1							
C1-FLUORENES			8.1				28.7							
C1-NAPHTHALENES			17.3				33.5							
C1-PHENANTHRENES/ANTHRACENES			46.9				190.9							
C2-CHRYSENES			48.4				81.6	J						
C2-DIBENZOTHIOPHENES			7.6				17.7							
C2-FLUORENES			7.3				17.9							
C2-NAPHTHALENES			14.4				27.1	J						
C2-PHENANTHRENES/ANTHRACENES			34.7				114.9	J						
C3-CHRYSENES			6.6				9.6	J						
C3-DIBENZOTHIOPHENES			5.2				49	J						
C3-FLUORENES			11				64.7							
C3-NAPHTHALENES			15.5				22.2	J						
C3-PHENANTHRENES/ANTHRACENES			16.2				67.9	J						
C4-CHRYSENES			25.2				6.5	J						
C4-NAPHTHALENES			10.9				20	J						
C4-PHENANTHRENES/ANTHRACENES			5.5				158.1	J						

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-101A-AVG**		**OU4-SD-M08-101A-D**		**OU4-SD-M08-201A**		**OU4-SD-M08-201A-2**		**OU4-SD-M08-301A**		**OU4-SD-M08-301A-2**		**OU4-SD-M08-102A**	
sample_dat	20010819		20010819		20010820		20010820		20010819		20010819		20020810	
round	05		05		05		05		05		05		06	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL	5.7		5.6		9.9				2.1				7	J
1-METHYLNAPHTHALENE	13.25		12.3		22.4				4.3				14.1	J
1-METHYLPHENANTHRENE	45.1		35.5		66.5				19.8				38.8	
2,3,5-TRIMETHYLNAPHTHALENE	7.7		7.4		12.2				3				7	
2,6-DIMETHYLNAPHTHALENE	10.15		10.5		18.3				4.2				13.3	
2-METHYLNAPHTHALENE	19.95		20.6		33.7				7.1				24.7	
ACENAPHTHENE	39.2	J	29.3	J	61.1				8.9				47.4	
ACENAPHTHYLENE	66.5		81.1		80.7				28.6				74	
ANTHRACENE	255.75		284.4		270.4				74.9				247.9	J
BENZO(A)ANTHRACENE	346.8		361.7		472.4	J			142.9				440	J
BENZO(A)PYRENE	332.35		348.8		550.8	J			160.4				595.6	J
BENZO(B)FLUORANTHENE	497.05		476.6		622.1				211.7				619.2	
BENZO(E)PYRENE	225.55		245.5		293.7				116.1				310.7	
BENZO(G,H,I)PERYLENE	213.65	J	229.6	J	287.6	J			108.6	J			224.9	
BENZO(K)FLUORANTHENE	324.2	J	132	J	158.6	J			68.7				219.8	
CHRYSENE	385.9	J	430.9	J	448.8				203.5				444.1	
DIBENZO(A,H)ANTHRACENE	53.9	J	54.2	J	73.8	J			27.3				59.7	J
DIBENZOTHIOPHENE	19.9	J	16.5	J	29.3				10				19.3	
FLUORANTHENE	923.75	J	886.3	J	878.8				468.2				999.9	J
FLUORENE	50.35	J	39.3	J	92.9				13.1				49.6	J
HIGH MOLECULAR WEIGHT PAHS	2822.9		2855.1		3218.4				1343.9				3515.6	
INDENO(1,2,3-CD)PYRENE	238.05	J	258.1	J	343.1	J			117	J			288.9	J
LOW MOLECULAR WEIGHT PAHS	786.05		721.6		1059.3				370.1				836.7	
NAPHTHALENE	27.5	J	27.9	J	52.2				9.9				37	
PERYLENE	72.6	J	64	J	107.9				44.3				96.8	
PHENANTHRENE	326.8	J	239	J	468.3				227.6				356.1	
PYRENE	780.2	J	773.2	J	793.8				341.6				976.3	J
TOTAL PAHS ECO	3608.95		3576.7		4277.7				1714				4352.3	
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE	185.345	J	194.999	J	361.699	J	490.366	J	191.766	J	8.057	J		
CADMIUM	0.375		0.37		0.50				0.19	J				
COPPER	81.245		85.97		17.39				166.37					
LEAD	113.525		110.66		54.14				100.21					
NICKEL	26.205		26.15		4.9				38.61					
ZINC	538.44		483.27		102.78				564.41					
HF Digestion Inorganics (mg/kg)														
ALUMINUM	46157.615	J	45825.3	J	56874.92				48411.4	J			69786	
ARSENIC	10.74		10.97		14.13				13.21				11.4	
CADMIUM	0.4373		0.469	U	0.459	U			0.4575	U			3.1	U
CHROMIUM	166.54	J	163.42	J	113.16	J			184.55	J			179	
COPPER	311.26		333.13		57.49	J			1206.94				365	
IRON	48191.705		47576.65		28942.33				72737.65				94570	
LEAD	249.165		290.39		75.29				385.46				295	
MANGANESE	405.525		385.64		366				417.9				393	
MERCURY	0.1833	J	0.1668	J	0.3161				0.0433	U			0.28	J
NICKEL	72.37		75.72		27.75				130.09				114	
SILVER	0.485	J	0.49	J	2.13	J			0.92	J			0.63	
ZINC	668.91		709.9		147.3				1186.53				1014	
Inorganics (mg/kg)														
ALUMINUM														
ARSENIC														
CADMIUM														
CHROMIUM														
COPPER														
IRON														

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-101A-AVG**		**OU4-SD-M08-101A-D**		**OU4-SD-M08-201A**		**OU4-SD-M08-201A-2**		**OU4-SD-M08-301A**		**OU4-SD-M08-301A-2**		**OU4-SD-M08-102A**	
sample_dat	20010819		20010819		20010820		20010820		20010819		20010819		20020810	
round	05		05		05		05		05		05		06	
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SILVER														
ZINC														
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE	0.185		0.20		0.17	J			0.02	J			0.15	J
1,2,4,5-TETRACHLOROBENZENE	1.405	U	1.53	U	1.18	U			0.40	U			0.69	
2,4'-DDD	26.99		28.02		3.02				14.48				46	
2,4'-DDE	0.955		1.04		0.74				0.88				1.6	J
2,4'-DDT	3.32		3.22		0.32				11.14				6.3	J
4,4'-DDD	61.38	J	77.52	J	5.43				42.64				131	
4,4'-DDE	12.73		15.03		2.06				13.78				15	
4,4'-DDT	16.645		18.32		2.85				28.4				19	J
ALDRIN	0.07	U	0.07	U	0.10	U			0.05	U			4.6	
ALPHA-BHC	0.05	J	0.07	J	0.18				0.03	J			0.06	
ALPHA-CHLORDANE	2.66		2.05		0.66				1.46				1.7	
BETA-BHC	0.125	J	0.17	J	2.54	U			0.14	J			0.20	U
CHLORPYRIFOS	0.1133	U	0.11	U	0.17	U			0.09	U			0.12	U
CIS-NONACHLOR	0.805	J	0.44	J	0.33				0.36				0.93	
DELTA-BHC	0.07	U	0.07	U	0.11				0.05	U			0.07	U
DIELDRIN	0.395	J	0.50	J	0.05	U			0.16				0.68	
ENDOSULFAN II	1.24		1.45		1.34				0.59				0.21	
ENDRIN	0.2825		0.53		0.57				0.05	U			0.07	U
GAMMA-BHC (LINDANE)	0.14	U	0.14	U	0.20	U			0.10	U			0.14	U
GAMMA-CHLORDANE	2.945	J	2.03	J	0.22				1.26				3.7	
HEPTACHLOR	0.295		0.16	U	0.23	U			0.27				0.10	J
HEPTACHLOR EPOXIDE	0.06	U	0.06	U	0.08	U			0.04	U			0.05	U
HEXACHLOROBENZENE	0.06	J	0.10	J	0.11				0.08				0.06	
MIREX	0.09	U	0.09	U	0.09	J			0.07	U			0.17	
OXYCHLORDANE	0.19		0.20		0.07	U			0.04	J			0.27	
PCB-101														
PCB-101/90	8.71		6.98		4.32				3.43				13	
PCB-105	3.195	J	1.68	J	1.93				0.84				0.91	
PCB-118	5.1		4.68		3.59				1				5.4	
PCB-126	0.135	J	0.06	J	0.67	U			0.02	J			0.08	J
PCB-128	4.45	J	2.35	J	1.93				1.13				1.7	
PCB-138														
PCB-138/160	22.915	J	11.85	J	6.63				9.58				17	
PCB-149/123	16.285	J	6.74	J	3.81				7.3				12	
PCB-153														
PCB-153/132	30.57	J	14.69	J	7.01				12.54				21	
PCB-156	3.85	J	1.97	J	0.60	U			0.92				0.65	
PCB-167	2.38		1.81		2.44				0.71				0.93	
PCB-169	0.01	J	0.47	U	0.69	J			0.35	U			0.02	J
PCB-170														
PCB-170/190	20.475		19.65		10.29	J			11.16				21	J
PCB-18														
PCB-18/17	0.48		0.57		0.32				0.37				1.5	
PCB-180	25.69	J	8.79	J	4.13				9.59				13	
PCB-187	16.23	J	5.58	J	3.19				5.85				11	
PCB-189	0.91	J	0.57	J	0.29	J			0.37				0.15	J
PCB-195														
PCB-195/208	5.72	J	2.49	J	2.6				1.8				4.8	
PCB-201/157/173	1.755	J	0.77	J	0.80				0.49				1.6	

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-101A-AVG**		**OU4-SD-M08-101A-D**		**OU4-SD-M08-201A**		**OU4-SD-M08-201A-2**		**OU4-SD-M08-301A**		**OU4-SD-M08-301A-2**		**OU4-SD-M08-102A**	
sample_dat	20010819		20010819		20010820		20010820		20010819		20010819		20020810	
round	05		05		05		05		05		05		06	
PCB-206	7.99	J	4.77	J	5.9				2.04				9.1	
PCB-209	1.975	J	1.41	J	1.73				0.51				2.1	
PCB-28	0.82		0.89		1.33				0.31				2.6	
PCB-44	1.24		1.35		0.50				0.48				2.1	
PCB-52	2.76		3.22		1.14				0.92				3.9	
PCB-66	1.455	J	2.07	J	0.60				0.33				2.2	
PCB-77	0.12	J	0.11	J	0.26	J			0.10	J			0.07	J
PCB-8/5	0.535		0.65		0.66				0.46				2.1	
PCB-81	0.13	J	0.13	J	0.01	J			0.02	J			0.01	J
PENTACHLOROANISOLE	0.14	J	0.20	J	0.19				0.09				0.08	J
PENTACHLOROBENZENE	0.08	J	0.06	J	0.14	U			0.06	J			0.12	
TEQ PCB	0.014856		0.006595		0.021115				0.002365				0.009259	
TEQ PCB BIRD	0.033638		0.02508		0.015064				0.009319				0.013021	
TEQ PCB BIRD HALFND	0.033659		0.025336		0.048624				0.00951				0.013043	
TEQ PCB FISH	0.00092		0.000467		0.000129				0.000178				0.000522	
TEQ PCB FISH HALFND	0.000921		0.00048		0.001808				0.000188				0.000523	
TEQ PCB HALFND	0.014862		0.013651		0.054633				0.00762				0.009265	
TOTAL DDT HALFND	122.02		143.15		14.42				111.32				218.9	
TOTAL DDT POS	122.02		143.15		14.42				111.32				218.9	
TOTAL PCB CONGENERS	320.62		187.34		115.6				124.68				268.82	
TRANS-NONACHLOR	1.665		1.25		0.20				0.95				1.4	
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	899.1		967.6		2219.7				275				1047.7	
1,2,3,4,6,7,8,9-OCDF	53.9		55.4		164.3				20.7				71.1	
1,2,3,4,6,7,8-HPCDD	111.35		118.2		283.2				22.5	U			142.3	J
1,2,3,4,6,7,8-HPCDF	28.7		30.2		79.2				9.1				33.6	J
1,2,3,4,7,8,9-HPCDF	1.5412	U	1.3624	U	3.8				1.44	U			0.60	J
1,2,3,4,7,8-HXCDD	1.4		1.4		2.87	U			1.44	U			1.78	U
1,2,3,4,7,8-HXCDF	3.15		3.6		5.4				0.90	J			1.78	U
1,2,3,6,7,8-HXCDD	5.15		5.3		14.3				1.2	J			1.78	U
1,2,3,6,7,8-HXCDF	2.1		2.1		3.9				1	J			1.78	U
1,2,3,7,8,9-HXCDD	3		3.4	U	8.7				1.44	U			1.78	U
1,2,3,7,8,9-HXCDF	1.54	U	1.36	U	2.87	U			1.44	U			1.78	U
1,2,3,7,8-PECDD	0.90	J	0.90	J	2.87	U			0.20	J			1.78	U
1,2,3,7,8-PECDF	1.43	U	1.36	U	3	U			0.80	U			1.5	J
2,3,4,6,7,8-HXCDF	3.15		3.1		6.5				1.1	U			1.78	U
2,3,4,7,8-PECDF	1.69	J	1.36	UJ	2.87	U			0.60	U			2	
2,3,7,8-TCDD	0.135	UR	0.27	UR	0.57	UR			0.29	UR			0.36	U
2,3,7,8-TCDF	1.4	J	1.4	J	2.4	J			0.40	J			0.36	U
TEQ	5.0284		4.3809		8.4972				0.72971				2.74564	
TEQ BIRD	5.74515		3.8255		6.3446				0.92257				2.74618	
TEQ BIRD HALFND	5.901356		4.818312		9.57985				1.51602				4.49458	
TEQ FISH	3.93015		3.1255		3.2816				0.54257				1.67118	
TEQ FISH HALFND	4.050606		3.591312		6.3701				1.22522				3.56898	
TEQ HALFND	5.134556		4.850112		10.6947				1.22241				4.45664	
TOTAL DIOXINS	1235.4		1344.4		3002				1059.7				1512.2	
TOTAL FURANS	186.85		191.7		500.1				120				217.5	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.3		MS-8 LOC.1	
nsample	**OU4-SD-M08-101A-AVG**		**OU4-SD-M08-101A-D**		**OU4-SD-M08-201A**		**OU4-SD-M08-201A-2**		**OU4-SD-M08-301A**		**OU4-SD-M08-301A-2**		**OU4-SD-M08-102A**	
sample_dat	20010819		20010819		20010820		20010820		20010819		20010819		20020810	
round	05		05		05		05		05		05		06	
TOTAL HPCDD	282.75		309		626.5				212.1				389.5	
TOTAL HPCDF	63.15		67.8		194.8				37.1				78.5	
TOTAL HXCDD	47.05	J	62.2	J	140.2				16.4				69.4	
TOTAL HXCDF	37.6		39.2		87.7				16.2				44.5	
TOTAL PECDD	4.55	J	2.9	J	13.8				1.44	U			2.2	
TOTAL PECDF	22.95	U	22.2	U	34.7	U			10.8	U			18.8	
TOTAL TCDD	1.95	J	2.6	J	1.8	J			0.50	J			3.3	
TOTAL TCDF	9.3	J	7.1	J	18.7	J			3.5	J			4.6	U
Miscellaneous Parameters (%)														
PERCENT CLAY	7		7		23.8				0.90				10.7	
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL													0.00	
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND	81		81		36.4				98.6				73.6	
PERCENT SILT	12		12		39.8				0.50				15.8	
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON	0.635		0.60		1.58				0.26				0.89	J
TOTAL SOLIDS														
Alkylated PAHs (ug/kg)														
C1-CHRYSENES	196.05		216.1		282.2				87.5				167.3	
C1-DIBENZOTHIOPHENES	18.55		19		25				6.5				17.7	
C1-FLUORANTHENES/PYRENES	428.6		402.1		455.6				108.3				337.1	
C1-FLUORENES	25		21.3		41.7				6.7				21.8	
C1-NAPHTHALENES	33.2		32.9		56.1				11.4				38.8	
C1-PHENANTHRENES/ANTHRACENES	171.7		152.5		187.1				77.2				103.6	
C2-CHRYSENES	78.65	J	75.7	J	106.8				33.5				81.1	
C2-DIBENZOTHIOPHENES	21.4		25.1		27.6				8.2				20.2	
C2-FLUORENES	20.1		22.3		44.6				8.4				22.5	
C2-NAPHTHALENES	26.65	J	26.2	J	42.1				9.5				26.6	
C2-PHENANTHRENES/ANTHRACENES	119.4	J	123.9	J	137.8				41.9				87.8	
C3-CHRYSENES	7.95	J	6.3	J	5.4	J			4.2				16.3	
C3-DIBENZOTHIOPHENES	33.95	J	18.9	J	16.7				5.9				16.1	
C3-FLUORENES	43.85		23		27.6				8.3				22.7	
C3-NAPHTHALENES	23.5	J	24.8	J	30.4				10.3				20.2	
C3-PHENANTHRENES/ANTHRACENES	61.95	J	56	J	72				19.6				55.7	
C4-CHRYSENES	4.2	J	1.9	J	40.2				0.90	J			7.5	
C4-NAPHTHALENES	18.9	J	17.8	J	23.7				7.9				11.7	
C4-PHENANTHRENES/ANTHRACENES	93.2	J	28.3	J	21.5				9.3				20.4	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-102A-AVG**		**OU4-SD-M08-102A-D**		**OU4-SD-M08-202A**		**OU4-SD-M08-302A**		**OU4-SD-M08-103A**		**OU4-SD-M08-103A-AVG**		**OU4-SD-M08-103A-D**	
sample_dat	20020810		20020810		20020810		20020810		20030810		20030810		20030810	
round	06		06		06		06		07		07		07	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL	8.05	J	9.1		11.9		2.8		103	J	79.5	J	56	J
1-METHYLNAPHTHALENE	16.65	J	19.2		30.2		9.7		129.7	J	101.5	J	73.3	J
1-METHYLPHENANTHRENE	40.1		41.4		190.4		29.8		242.6	J	188.15	J	133.7	J
2,3,5-TRIMETHYLNAPHTHALENE	9		11		16.1		8.8		190.7	J	143.45	J	96.2	J
2,6-DIMETHYLNAPHTHALENE	16.4		19.5		25.5		14.2		172.3	J	130.3	J	88.3	J
2-METHYLNAPHTHALENE	29.65		34.6		53.2		18.2		242.9	J	188.6	J	134.3	J
ACENAPHTHENE	50.6		53.8		52.3		6.8		187.9		151.55		115.2	
ACENAPHTHYLENE	51.45	J	28.9	J	100.1		90.1		232.1	J	172.15	J	112.2	J
ANTHRACENE	217.05	J	186.2	J	463.8	J	257.8	J	1088.1	J	852.6	J	617.1	J
BENZO(A)ANTHRACENE	446.5	J	453		937.6	J	506.4	J	1642.2	J	1283.45	J	924.7	J
BENZO(A)PYRENE	597.05	J	598.5		917.4	J	638.6	J	2295.9	J	1790.05	J	1284.2	J
BENZO(B)FLUORANTHENE	650.9		682.6		1139.3		616.9		2348.2		1893.65		1439.1	
BENZO(E)PYRENE	331.2		351.7		534		296.3		1308.2	J	1023.35	J	738.5	J
BENZO(G,H,I)PERYLENE	270.7		316.5		428.1		226.5		1478.3	J	1153.05	J	827.8	J
BENZO(K)FLUORANTHENE	209.85	J	199.9	J	264.5		183		839.8	J	653.5	J	467.2	J
CHRYSENE	471.4		498.7		761.5		445.4		2479.2		2071.7		1664.2	
DIBENZO(A,H)ANTHRACENE	69.2	J	78.7		108.9	J	62.9	J	353.3	J	275.1	J	196.9	J
DIBENZOTHIOPHENE	22.65		26		29.9		7.9		148	J	117.95	J	87.9	J
FLUORANTHENE	885.75	J	771.6		1862.4	J	1159.8	J	3367.9		2761.3		2154.7	
FLUORENE	56.45	J	63.3		70.5		14.5		365.9		292.95		220	
HIGH MOLECULAR WEIGHT PAHS	3359.25		3202.9		6396.1		3772.3		12954.7		10539.65		8124.6	
INDENO(1,2,3-CD)PYRENE	305.6	J	322.3		554.4	J	286.7	J	1624.6	J	900.8	J	177	J
LOW MOLECULAR WEIGHT PAHS	814.95		793.2		1591.9		552.5		4089.2		3261		2432.8	
NAPHTHALENE	38.9		40.8		83.1		16.7		368	J	281.8	J	195.6	J
PERYLENE	119.1		141.4		133.6		106.3		385.8	J	598.15	J	810.5	J
PHENANTHRENE	370.85		385.6		768.9		148.4		1604.3		1321.35		1038.4	
PYRENE	889.35	J	802.4		1808.3	J	959.2	J	2816.2		2358.05		1899.9	
TOTAL PAHS ECO	4174.2		3996.1		7988		4324.8		17043.9		13800.65		10557.4	
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE														
CADMIUM														
COPPER														
LEAD														
NICKEL														
ZINC														
HF Digestion Inorganics (mg/kg)														
ALUMINUM	63928		58070		67430		57965		39663.92	J	39716.07	J	39768.22	J
ARSENIC	11.85		12.3		13.2		13.8		21.2		21.33		21.46	
CADMIUM	2.6		2.6		1.7	U	3.1	U	8.49		8.735		8.98	
CHROMIUM	175.5		172		98.7		117		188.33		185.02		181.71	
COPPER	404.5		444		104		354		1958.09		1917.995		1877.9	
IRON	82429.5		70289		36568		87247		56464.74		57311.16		58157.58	
LEAD	287.5	J	280	J	92.5		265		2187.2		2081.8		1976.4	
MANGANESE	374		355		345		456		554.2		545.835		537.47	
MERCURY	0.25	J	0.22	J	0.31	J	0.13	J	7.9		8.435		8.97	
NICKEL	102.15		90.3		30.5		119		197.43		193.905		190.38	
SILVER	0.44		0.50	U	0.56	U	0.36	U	3.67		3.76		3.85	
ZINC	943.5		873		177		824		1581.33		1543.63		1505.93	
Inorganics (mg/kg)														
ALUMINUM									19100	J	18100	J	17100	J
ARSENIC									17.6	J	16.9	J	16.2	J
CADMIUM									3	J	2.85	J	2.7	J
CHROMIUM									133	J	125.5	J	118	J
COPPER									1880	J	1785	J	1690	J
IRON									43300	J	41750	J	40200	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-102A-AVG**		**OU4-SD-M08-102A-D**		**OU4-SD-M08-202A**		**OU4-SD-M08-302A**		**OU4-SD-M08-103A**		**OU4-SD-M08-103A-AVG**		**OU4-SD-M08-103A-D**	
sample_dat	20020810		20020810		20020810		20020810		20030810		20030810		20030810	
round	06		06		06		06		07		07		07	
LEAD									1690	J	1625	J	1560	J
MANGANESE									350	J	332.5	J	315	J
MERCURY														
NICKEL									179	J	176	J	173	J
SILVER									3.4	J	3.55	J	3.7	J
ZINC									1530	J	1410	J	1290	J
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE	0.24	J	0.33	J	0.09	J	0.07	J	2.71		2.83		2.95	
1,2,4,5-TETRACHLOROBENZENE	1.04	J	1.39	J	0.51		0.05	J	4.04		4.165		4.29	
2,4'-DDD	52.195		58.39		6.4		9.7		1785.99		1601.47		1416.95	
2,4'-DDE	2.045	J	2.49		0.24	J	0.58	J	21.22		19.6		17.98	
2,4'-DDT	5.095	J	3.89		1.6	J	7.8	J	193.72		187.04		180.36	
4,4'-DDD	146.56		162.12		17		18		5369.63		4757.265		4144.9	
4,4'-DDE	17.27		19.54		5.1		8.1		302.78		272.755		242.73	
4,4'-DDT	15.36	J	11.72		4.6	J	34	J	1129.48		1044.015		958.55	
ALDRIN	2.775	J	0.95	J	1.3		0.40		8.53	J	6.02	J	3.51	J
ALPHA-BHC	0.05	J	0.04	J	0.04	J	0.04	J	0.064	U	0.081		0.13	
ALPHA-CHLORDANE	2.75	J	3.8	J	0.46		1.4		4.8	J	4.31	J	3.82	J
BETA-BHC	0.02	J	0.02	J	0.26	U	0.04	J	0.23	UJ	1.5275	J	2.94	J
CHLORPYRIFOS	0.165		0.27		0.48		0.09	U	0.141	U	0.1245	U	0.108	U
CIS-NONACHLOR	1.36	J	1.79	J	0.56		0.74		4.23	J	6.795	J	9.36	J
DELTA-BHC	0.01	J	0.01	J	0.03	J	0.05	U	0.077	U	0.068	U	0.059	U
DIELDRIN	0.89		1.1		0.05		0.22		12.81		13.49		14.17	
ENDOSULFAN II	0.50	J	0.79	J	0.20	U	0.17		2.17		2.15		2.13	
ENDRIN	0.06	J	0.06	J	0.09	U	0.03	J	0.58		0.59		0.60	
GAMMA-BHC (LINDANE)	0.07	J	0.07	J	0.19	U	0.10	U	0.36	J	0.49	J	0.62	J
GAMMA-CHLORDANE	4.515		5.33		0.92		1.8		3.18		3.935		4.69	
HEPTACHLOR	0.19	J	0.28	J	0.07	J	0.42		6.93		8.61		10.29	
HEPTACHLOR EPOXIDE	0.1825		0.34		0.07	U	0.04	U	0.064	U	0.0565	U	0.049	U
HEXACHLOROBENZENE	0.08		0.10		0.18		0.05		1.26		1.325		1.39	
MIREX	0.095	J	0.02	J	0.13		0.09		0.102	U	0.09	U	0.078	U
OXYCHLORDANE	0.40	J	0.53	J	0.20		0.08		0.39		0.365		0.34	
PCB-101														
PCB-101/90	13.865		14.73		4.8		8.8		128.7		130.6		132.5	
PCB-105	1.8	J	2.69	J	0.79	U	1.4		20.48		20.415		20.35	
PCB-118	6.935		8.47		3.3		4.6		86.54		86.955		87.37	
PCB-126	0.07	J	0.06	J	0.03	J	0.05	J	5.71		6.45		7.19	
PCB-128	2.39	J	3.08	J	1.1		1.9		15.64		16.335		17.03	
PCB-138														
PCB-138/160	18.84		20.68		8.1		11		140.81		133.78		126.75	
PCB-149/123	15.875		19.75		6		7.8		88.22		75.075		61.93	
PCB-153														
PCB-153/132	22.765		24.53		12		13		153.92		147.685		141.45	
PCB-156	0.4325		0.43	U	0.43	J	0.53		10.05		10.805		11.56	
PCB-167	1.245	J	1.56	J	0.58		0.78		8.69		9.05		9.41	
PCB-169	0.03	J	0.04	J	0.02	J	0.31	U	0.04	J	0.045	J	0.05	J
PCB-170														
PCB-170/190	19.935	J	18.87	J	24	J	12	J	49.03	J	48.075	J	47.12	J
PCB-18														
PCB-18/17	1.905		2.31		0.48		0.36		2.56	J	3.515	J	4.47	J
PCB-180	16.23		19.46		9		10		87.17		74.055		60.94	
PCB-187	12.27		13.54		5.5		6.4		44.15		40.46		36.77	
PCB-189	0.45	J	0.75	J	0.52	J	0.30	J	1.41	J	0.84	J	0.27	J
PCB-195														
PCB-195/208	6.105		7.41		2.3		1.4		9.7		11.53		13.36	
PCB-201/157/173	1.82		2.04		0.11	J	0.54		2.98		3.12		3.26	

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location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-102A-AVG**		**OU4-SD-M08-102A-D**		**OU4-SD-M08-202A**		**OU4-SD-M08-302A**		**OU4-SD-M08-103A**		**OU4-SD-M08-103A-AVG**		**OU4-SD-M08-103A-D**	
sample_dat	20020810		20020810		20020810		20020810		20030810		20030810		20030810	
round	06		06		06		06		07		07		07	
PCB-206	11.27		13.44		3.3		1.6		15.31		18.405		21.5	
PCB-209	2.89	J	3.68	J	1.1		0.30		31.12		29.18		27.24	
PCB-28	2.905		3.21		1.2		0.68		4.23	J	5.83	J	7.43	J
PCB-44	2.55		3		0.94		1.7		21.98		26.85		31.72	
PCB-52	4.715		5.53		1.4		2.5		57.42	J	86.925	J	116.43	J
PCB-66	2.015		1.83		0.73		0.95		6.93	J	10.27	J	13.61	J
PCB-77	0.11	J	0.15	J	0.05	J	0.04	J	4.42		4.43		4.44	
PCB-8/5	1.795		1.49		0.72		0.14	U	1.88	J	2.73	J	3.58	J
PCB-81	0.05	J	0.09	J	0.04	J	0.06	J	3.07		3.24		3.41	
PENTACHLOROANISOLE	0.12	J	0.16	J	0.09	J	0.05	J	0.56	J	0.3045	J	0.098	UJ
PENTACHLOROBENZENE	0.13		0.14		0.12	J	0.03	J	2.8		2.565		2.33	
TEQ PCB	0.008783		0.008299		0.003945		0.0055		0.580114		0.653953		0.727791	
TEQ PCB BIRD	0.018179		0.02332		0.009678		0.013382		1.104239		1.195698		1.287157	
TEQ PCB BIRD HALFND	0.018201		0.023364		0.009746		0.013553		1.104264		1.19572		1.287176	
TEQ PCB FISH	0.00053		0.000538		0.000231		0.000365		0.03162		0.035346		0.039072	
TEQ PCB FISH HALFND	0.000531		0.00054		0.000234		0.000374		0.031621		0.035347		0.039073	
TEQ PCB HALFND	0.008789		0.008311		0.003966		0.010155		0.580121		0.65396		0.727797	
TOTAL DDT HALFND	238.525		258.15		34.94		78.18		8802.82		7882.145		6961.47	
TOTAL DDT POS	238.525		258.15		34.94		78.18		8802.82		7882.145		6961.47	
TOTAL PCB CONGENERS	302.36		335.9		160.73		157.32		1755.14		1787.19		1819.24	
TRANS-NONACHLOR	1.91	J	2.42	J	0.44		1.1		2.21	J	14.89	J	27.57	J
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	1071.45		1095.2		2075.8		129.3		64.2	U	888.9	U	1713.6	U
1,2,3,4,6,7,8,9-OCDF	72.65		74.2		128		15.2		3.32	UJ	73.51	UJ	143.7	U
1,2,3,4,6,7,8-HPCDD	154.4	J	166.5		275.5	J	19.4	J	7.3	U	133.6	U	259.9	U
1,2,3,4,6,7,8-HPCDF	17.275	J	1.9	UJ	64.9		1.49	U	14.4	J	157.2	J	300	J
1,2,3,4,7,8,9-HPCDF	0.60	J	1.9	U	2.84	U	1.49	U	1.66	UJ	8.715	J	16.6	J
1,2,3,4,7,8-HXCDD	1.84	U	1.9	U	2.84	U	1.49	U	1.66	U	1.965	J	3.1	J
1,2,3,4,7,8-HXCDF	1.84	U	1.9	U	2.4	J	1.49	U	1.66	UJ	24.165	J	47.5	J
1,2,3,6,7,8-HXCDD	3.445	J	6	J	9.5		1.49	U	0.50	J	3.25	J	6	
1,2,3,6,7,8-HXCDF	1.84	U	1.9	U	1.7	J	1.49	U	2.5	J	24.65	J	46.8	J
1,2,3,7,8,9-HXCDD	1.84	U	1.9	U	2.84	U	1.49	U	1.66	UJ	1.45	UJ	1.24	UJ
1,2,3,7,8,9-HXCDF	1.84	U	1.9	U	2.84	U	1.49	U	1.66	UJ	7.515	J	14.2	J
1,2,3,7,8-PECDD	1.84	U	1.9	U	2.84	U	1.49	U	1.66	UJ	6.265	J	11.7	J
1,2,3,7,8-PECDF	1.5	J	1.9	U	2.1	J	0.80	J	0.70	J	12.3	J	23.9	J
2,3,4,6,7,8-HXCDF	1.84	U	1.9	U	2.84	U	1.49	U	2.7	J	29.85	J	57	J
2,3,4,7,8-PECDF	1.475		1.9	U	2.84	U	2.4		1.5	J	25.35	J	49.2	J
2,3,7,8-TCDD	0.29	J	0.40	J	0.57	U	0.30	U	0.33	UJ	0.29	UJ	0.25	UJ
2,3,7,8-TCDF	0.38	U	0.40	U	0.57	U	0.30	U	0.33	UJ	0.29	UJ	0.25	UJ
TEQ	3.18798		3.01582		5.48814		0.98135		1.185		25.03765		47.803	
TEQ BIRD	2.39701		0.74344		1.85988		2.51385		2.239		43.2529		83.221	
TEQ BIRD HALFND	4.01301		3.47994		5.78108		3.99095		3.704826		43.730321		83.755815	
TEQ FISH	1.58451		0.74344		1.75488		1.27385		1.454		30.84715		58.821	
TEQ FISH HALFND	3.35121		3.10944		5.20653		2.87665		3.061876		31.121571		59.181265	
TEQ HALFND	4.67898		4.88832		8.22984		2.42775		2.583428		26.082011		49.580595	
TOTAL DIOXINS	1559		1605.8		2930.1		196.5		3.4	J	347.8	J	692.2	J
TOTAL FURANS	171.7	J	125.9	J	443.4		52.7		52.6	J	1145.75	J	2238.9	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
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PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1	
nsample	**OU4-SD-M08-102A-AVG**		**OU4-SD-M08-102A-D**		**OU4-SD-M08-202A**		**OU4-SD-M08-302A**		**OU4-SD-M08-103A**		**OU4-SD-M08-103A-AVG**		**OU4-SD-M08-103A-D**	
sample_dat	20020810		20020810		20020810		20020810		20030810		20030810		20030810	
round	06		06		06		06		07		07		07	
TOTAL HPCDD	406.3		423.1		692.8		44.5		7.3	U	180.675	J	357.7	J
TOTAL HPCDF	39.725		1.9	U	161.8		8.9		19.7	J	225	J	430.3	J
TOTAL HXCDD	76.15		82.9		148.8		17.8		3.3	J	87.6	J	171.9	J
TOTAL HXCDF	38.05		31.6		81.9		13.5		19.4	J	297.15	J	574.9	J
TOTAL PECDD	1.575		1.9	U	4		1.49	U	1.66	UJ	64.615	J	128.4	J
TOTAL PECDF	17.65		16.5		43.3		13.3		2.2	J	325.05	J	647.9	J
TOTAL TCDD	3.95		4.6		8.8		4.9		0.33	UJ	17.1825	J	34.2	J
TOTAL TCDF	3.7		3.7		28.4		1.8	U	5.4	J	223.75	J	442.1	J
Miscellaneous Parameters (%)														
PERCENT CLAY	9.7		8.7		17.6		1.5		7.3		7.3		7.3	
PERCENT COARSE SAND														
PERCENT FINE SAND														
PERCENT FINES														
PERCENT GRAVEL	0.00		0.00		0.00		34.8		0.00		0.00		0.00	
PERCENT MEDIUM SAND														
PERCENT MOISTURE														
PERCENT SAND	74.1		74.6		46.1		63.1		60.6		57.65		54.7	
PERCENT SILT	16.25		16.7		36.4		0.60		32.1		35.05		38	
PERCENT SOLIDS														
SIEVE 1"														
SIEVE 1-1/2"														
SIEVE 2"														
SIEVE 3"														
SIEVE 3/4"														
SIEVE 3/8"														
SIEVE NO. 004														
SIEVE NO. 010														
SIEVE NO. 020														
SIEVE NO. 040														
SIEVE NO. 060														
SIEVE NO. 080														
SIEVE NO. 100														
SIEVE NO. 140														
SIEVE NO. 200														
TOTAL ORGANIC CARBON	0.77	J	0.65	J	1.56	J	0.21	J	2.4		2.335		2.27	
TOTAL SOLIDS									59		61		63	
Alkylated PAHs (ug/kg)														
C1-CHRYSENES	209.4		251.5		434		142.5		884.3		736.7		589.1	
C1-DIBENZOTHIOPHENES	20.55		23.4		36.7		11.2		244.5	J	189.4	J	134.3	J
C1-FLUORANTHENES/PYRENES	344.4		351.7		1091.3		326.4		1828.6		1501.7		1174.8	
C1-FLUORENES	24.35		26.9		74.3		13.9		299.1	J	225.45	J	151.8	J
C1-NAPHTHALENES	46.3		53.8		83.4		27.9		372.6	J	290.1	J	207.6	J
C1-PHENANTHRENES/ANTHRACENES	131.75		159.9		353.7		92.8		841	J	665.65	J	490.3	J
C2-CHRYSENES	105.85		130.6		236.9		81.3		440.9		416.5		392.1	
C2-DIBENZOTHIOPHENES	21.15		22.1		24.3		14.2		409.7		337.05		264.4	
C2-FLUORENES	23.35		24.2		35.5		10.5		435.8	J	327.65	J	219.5	J
C2-NAPHTHALENES	34.3		42		58.4		30.9		408.4	J	312.55	J	216.7	J
C2-PHENANTHRENES/ANTHRACENES	97		106.2		444.8		67.4		846.1		693.45		540.8	
C3-CHRYSENES	22.75	J	29.2	J	63.5		32.2		103		96.85		90.7	
C3-DIBENZOTHIOPHENES	17.65		19.2		37.7		11		344.8		312.75		280.7	
C3-FLUORENES	29.25		35.8		82.9		20		580.1	J	434.25	J	288.4	J
C3-NAPHTHALENES	31	J	41.8	J	42.2		26.4		625.6	J	480.15	J	334.7	J
C3-PHENANTHRENES/ANTHRACENES	54.8		53.9		367.5		29.6		692.4		639.8		587.2	
C4-CHRYSENES	23.5	J	39.5	J	8.7		10.9		10.3	J	7.6	J	4.9	J
C4-NAPHTHALENES	20	J	28.3	J	33		13		668.3	J	512.4	J	356.5	J
C4-PHENANTHRENES/ANTHRACENES	23.65		26.9		570.9		11.3		570		515.45		460.9	

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location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2	
nsample	**OU4-SD-M08-203A**		**OU4-SD-M08-303A**		**OU4-SD-M08-105A**		**OU4-SD-M08-105A-AVG**		**OU4-SD-M08-105A-D**		**OU4-SD-M08-205A**		**OU4-SD-M08-205A-AVG**	
sample_dat	20030810		20030809		20050823		20050823		20050823		20050820		20050820	
round	07		07		08		08		08		08		08	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL	26.3		7.3		2.5	U	2.6	U	2.7	U	10	J	10	J
1-METHYLNAPHTHALENE	38.5		17.3		2.5	U	2.6	U	2.7	U	18	J	18	J
1-METHYLPHENANTHRENE	83.9		50.9		2.5	U	2.6	U	2.7	U	110		110	
2,3,5-TRIMETHYLNAPHTHALENE	26.7		9		2.5	U	2.6	U	2.7	U	20	J	20	J
2,6-DIMETHYLNAPHTHALENE	43.8		13.9		2.5	U	2.6	U	2.7	U	20	J	20	J
2-METHYLNAPHTHALENE	67.3		26.2		2.5	U	2.6	U	2.7	U	20	J	20	J
ACENAPHTHENE	75.7		61.6		2.5	U	2.6	U	2.7	U	46		46	
ACENAPHTHYLENE	101.4		56.3		2.5	U	2.6	U	2.7	U	25	J	25	J
ANTHRACENE	402.7		308.5		1.6	J	1.6	J	2.7	U	370		370	
BENZO(A)ANTHRACENE	684.3		467.6		5.7		5.4		5.1		740		740	
BENZO(A)PYRENE	964.1		585.3		5.6		5.2		4.8		810		810	
BENZO(B)FLUORANTHENE	1059.9		732.9		4.4		4.9		5.4		750		750	
BENZO(E)PYRENE	542.5		332.9		4.7		4.5		4.3		550		550	
BENZO(G,H,I)PERYLENE	571		358.5		4.7		4.35		4		480		480	
BENZO(K)FLUORANTHENE	394.5		187.8		6.6		5.7		4.8		700		700	
CHRYSENE	832.1		524.6		6.9		6.7		6.5		790		790	
DIBENZO(A,H)ANTHRACENE	141.3		88.9		1.3	J	1.35	J	1.4	J	84		84	
DIBENZOTHIOPHENE	43.9		30.1		2.5	U	2.6	U	2.7	U	47		47	
FLUORANTHENE	1460.6		1103.2		12		12.5		13		1600		1600	
FLUORENE	113.3		92.5		2.5	U	2.6	U	2.7	U	75		75	
HIGH MOLECULAR WEIGHT PAHS	5336.6		3619.4		42.5		42.15		41.8		5424		5424	
INDENO(1,2,3-CD)PYRENE	635.2		411.9		3.9		3.9		3.9		420		420	
LOW MOLECULAR WEIGHT PAHS	1509.7		1170.4		13.45		14.05		14.4		1231		1231	
NAPHTHALENE	94.5		27		2.5	U	2.6	U	2.7	U	35	J	35	J
PERYLENE	183.7		116.2		1.5	J	1.4	J	1.3	J	270		270	
PHENANTHRENE	654.8		598.3		5.6		5.95		6.3		660		660	
PYRENE	1254.2		849.8		11		11		11		1400		1400	
TOTAL PAHS ECO	6846.3		4789.8		55.95		56.2		56.2		6655		6655	
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE														
CADMIUM														
COPPER														
LEAD														
NICKEL														
ZINC														
HF Digestion Inorganics (mg/kg)														
ALUMINUM	45645.77	J	40019.62	J	45657		45657				44635		44635	
ARSENIC	13.59		12.81		18.748		18.748				13.28		13.28	
CADMIUM	3.06		7.33		0.046		0.046				0.34		0.34	
CHROMIUM	115.03		196.2		24.104	J	24.104	J			74.63	J	74.63	J
COPPER	446.39		665.97		12.575	J	12.575	J			128.73	J	128.73	J
IRON	34023.76		84916.33		16835	J	16835	J			25353	J	25353	J
LEAD	439.2		309.9		20.15	J	20.15	J			116.76	J	116.76	J
MANGANESE	393.52		642.84		381.33		381.33				384		384	
MERCURY	1.5		0.10											
NICKEL	64.08		160.1		8.341		8.341				29.99		29.99	
SILVER	1.47		0.39		0.326	J	0.326	J			1.61	J	1.61	J
ZINC	364.86		1459.38		36.22	J	36.22	J			165.33	J	165.33	J
Inorganics (mg/kg)														
ALUMINUM	12600	J												
ARSENIC	10.9	J												
CADMIUM	0.71	J												
CHROMIUM	74.3	J												
COPPER	349	J												
IRON	21600	J												

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location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2	
nsample	**OU4-SD-M08-203A**		**OU4-SD-M08-303A**		**OU4-SD-M08-105A**		**OU4-SD-M08-105A-AVG**		**OU4-SD-M08-105A-D**		**OU4-SD-M08-205A**		**OU4-SD-M08-205A-AVG**	
sample_dat	20030810		20030809		20050823		20050823		20050823		20050820		20050820	
round	07		07		08		08		08		08		08	
LEAD	372	J												
MANGANESE	175	J												
MERCURY														
NICKEL	51.4	J												
SILVER	1.1	J												
ZINC	323	J												
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE	0.77		0.16											
1,2,4,5-TETRACHLOROBENZENE	2.86		1.08	U										
2,4'-DDD	156.81		58.29		0.74		0.74				54	R	54	R
2,4'-DDE	3.07		2.41		0.25	R	0.25	R			15	R	15	R
2,4'-DDT	20.31		57.62		0.14	J	0.14	J			5.5	J	5.5	J
4,4'-DDD	466.14		158.22		2		2				140		140	
4,4'-DDE	36.96		21.8		0.21	J	0.21	J			15		15	
4,4'-DDT	120.85		166.77		0.46	U	0.46	U			60	J	60	J
ALDRIN	0.093	U	0.01	J	0.04	U	0.04	U			0.39	J	0.39	J
ALPHA-BHC	0.06	J	0.04		0.077	U	0.077	U			0.39	U	0.39	U
ALPHA-CHLORDANE	3.19	J	3.14	J	0.27	R	0.27	R			3.5	R	3.5	R
BETA-BHC	0.279	U	0.144	U	0.18	U	0.18	U			4.7	R	4.7	R
CHLORPYRIFOS	1.05		0.088	U										
CIS-NONACHLOR	4.01		1.09		0.25	U	0.25	U			3.9	U	3.9	U
DELTA-BHC	0.093	U	0.048	U	0.053	J	0.053	J			0.35	J	0.35	J
DIELDRIN	2.18		0.024	U	0.091	J	0.091	J			8	R	8	R
ENDOSULFAN II	0.217	U	0.112	U	0.063	U	0.063	U			3.9	U	3.9	U
ENDRIN	0.06	J	0.24		0.065	U	0.065	U			3.9	U	3.9	U
GAMMA-BHC (LINDANE)	0.13	J	0.104	U	0.25	U	0.25	U			3.9	U	3.9	U
GAMMA-CHLORDANE	3.7		3.78		0.32	R	0.32	R			6.6	R	6.6	R
HEPTACHLOR	1.76		0.88		0.11	U	0.11	U			1.1	R	1.1	R
HEPTACHLOR EPOXIDE	0.078	U	0.04	U	0.064	R	0.064	R			5.6	R	5.6	R
HEXACHLOROBENZENE	0.40		0.50		0.084	J	0.084	J			1.4	R	1.4	R
MIREX	0.124	U	0.064	U	0.13	R	0.13	R			5.7	R	5.7	R
OXYCHLORDANE	0.31		0.14		0.25	U	0.25	U			1.3	J	1.3	J
PCB-101					0.04	U	0.04	U	0.04	U	4.6	R	4.6	R
PCB-101/90	31.13		7.73											
PCB-105	4.8		2.65		0.041	U	0.041	U	0.041	U	1.2	J	1.2	J
PCB-118	20.08		2.36		0.04	U	0.04	U	0.04	U	4.6		4.6	
PCB-126	1.22		0.21	J	0.051	U	0.0515	U	0.052	U	0.086	U	0.086	U
PCB-128	5.79		2.22		0.04	U	0.04	U	0.04	U	1.4	J	1.4	J
PCB-138					0.042	U	0.037	J	0.053	J	5.2	J	5.2	J
PCB-138/160	38.89		29.96	J										
PCB-149/123	24.57		24.58											
PCB-153					0.069	J	0.0845	J	0.10	J	7.3	J	7.3	J
PCB-153/132	45.75		36.55											
PCB-156	4.44		1.67	J	0.04	U	0.04	U	0.04	U	1.1	J	1.1	J
PCB-167	1.25		1.5		0.031	U	0.031	U	0.031	U	0.39	J	0.39	J
PCB-169	0.01	J	0.02	J	0.039	U	0.039	U	0.039	U	0.064	U	0.064	U
PCB-170					0.04	U	0.04	U	0.04	U	2.9		2.9	
PCB-170/190	29.83	J	33.66	J										
PCB-18					0.027	U	0.03375	J	0.054	J	0.50	R	0.50	R
PCB-18/17	2.07		0.23											
PCB-180	29.6		39.52	J	0.062	J	0.0645	J	0.067	J	4.1	J	4.1	J
PCB-187	15.2		21.83	J	0.041	U	0.03275	J	0.045	J	3	J	3	J
PCB-189	0.67		0.89		0.042	U	0.042	U	0.042	U	0.11	J	0.11	J
PCB-195					0.04	U	0.04	U	0.04	U	0.48	J	0.48	J
PCB-195/208	5.1		4.98											
PCB-201/157/173	1.62		1.66											

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2	
nsample	**OU4-SD-M08-203A**		**OU4-SD-M08-303A**		**OU4-SD-M08-105A**		**OU4-SD-M08-105A-AVG**		**OU4-SD-M08-105A-D**		**OU4-SD-M08-205A**		**OU4-SD-M08-205A-AVG**	
sample_dat	20030810		20030809		20050823		20050823		20050823		20050820		20050820	
round	07		07		08		08		08		08		08	
PCB-206	7.41		4.21		0.039	U	0.039	U	0.039	U	4.6	J	4.6	J
PCB-209	5.33		1.37		0.042	U	0.042	U	0.042	U	4.8	J	4.8	J
PCB-28	3.1		0.67		0.044	U	0.044	U	0.044	U	0.47	J	0.47	J
PCB-44	5.05		1.04	U	0.064	J	0.042	J	0.04	U	0.99		0.99	
PCB-52	11.94		1.88		0.039	U	0.039	U	0.039	U	1.7		1.7	
PCB-66	3.81		0.66	U	0.096	J	0.0955	J	0.095	J	1.2	R	1.2	R
PCB-77	0.57	J	0.15	J	0.043	U	0.043	U	0.043	U	0.40	R	0.40	R
PCB-8/5	1.82		0.38											
PCB-81	0.84	J	0.24	J	0.031	U	0.031	U	0.031	U	0.53	J	0.53	J
PENTACHLOROANISOLE	0.34		0.16											
PENTACHLOROBENZENE	0.75	U	0.56	U										
TEQ PCB	0.124332		0.022747		0	U	0	U	0	U	0.000381		0.000381	
TEQ PCB BIRD	0.236062		0.053412		0	U	0	U	0	U	0.053281		0.053281	
TEQ PCB BIRD HALFND	0.236092		0.053428		0.005203	U	0.005228	U	0.005253	U	0.057619		0.057619	
TEQ PCB FISH	0.006863		0.001362		0	U	0	U	0	U	0.000303		0.000303	
TEQ PCB FISH HALFND	0.006865		0.001363		0.000139	U	0.00014	U	0.000141	U	0.00052		0.00052	
TEQ PCB HALFND	0.124341		0.022752		0.003149	U	0.003174	U	0.003199	U	0.005643		0.005643	
TOTAL DDT HALFND	804.14		465.11		3.32		3.32				220.5		220.5	
TOTAL DDT POS	804.14		465.11		3.09		3.09				220.5		220.5	
TOTAL PCB CONGENERS	533.4		382.1		1.1		1.19		1.27		85.5		85.5	
TRANS-NONACHLOR	1.37		2.39		0.28	R	0.28	R			3.6	R	3.6	R
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	210.3	U	63.5	U	12		12		12		1600		1650	
1,2,3,4,6,7,8,9-OCDF	11.9	U	2.14	U	1.2	U	1.1	U	1	U	100		110	
1,2,3,4,6,7,8-HPCDD	27.5	U	8.9	U	1.4	U	1.4	U	1.4	U	180		190	
1,2,3,4,6,7,8-HPCDF	16.9		8		0.65	U	0.675	U	0.70	U	80		90	
1,2,3,4,7,8,9-HPCDF	1.78	U	1.07	U	0.75	U	0.725	U	0.70	U	4.4	U	4.25	J
1,2,3,4,7,8-HXCDD	1.78	U	1.07	U	0.72	U	0.745	U	0.77	U	3.8	UJ	3.65	UJ
1,2,3,4,7,8-HXCDF	2		1.07	U	0.65	U	0.625	U	0.60	U	11		13.5	
1,2,3,6,7,8-HXCDD	1.7	J	1.07	U	0.61	U	0.655	U	0.70	U	10	J	11.5	J
1,2,3,6,7,8-HXCDF	1.78	U	1.07	U	0.54	U	0.515	U	0.49	U	7.8	J	9.4	J
1,2,3,7,8,9-HXCDD	1.78	U	1.07	U	0.64	U	0.67	U	0.70	U	8.9	J	8.95	J
1,2,3,7,8,9-HXCDF	1.78	U	1.07	U	0.56	U	0.52	U	0.48	U	1.1	U	1.035	U
1,2,3,7,8-PECDD	1.78	U	1.07	U	0.68	U	0.705	U	0.73	U	2.3	U	2.4	U
1,2,3,7,8-PECDF	1.78	U	1.07	U	0.45	U	0.46	U	0.47	U	5.8	J	5.6	J
2,3,4,6,7,8-HXCDF	1.1	J	0.30	J	0.44	U	0.41	U	0.38	U	13		13.5	
2,3,4,7,8-PECDF	1.78	U	0.90	J	0.56	U	0.57	U	0.58	U	13		13.5	
2,3,7,8-TCDD	0.36	U	0.20	J	0.38	U	0.36	U	0.34	U	0.69	U	0.68	U
2,3,7,8-TCDF	2.2		0.60		0.31	U	0.325	U	0.34	U	6.1		6.15	
TEQ	0.869		0.64		0.0036		0.0036		0.0036		12.864		13.8885	
TEQ BIRD	2.696		1.81		0.0012		0.0012		0.0012		25		26.1685	
TEQ BIRD HALFND	5.09026		2.657682		1.15901		1.170855		1.1827		26.667		27.8515	
TEQ FISH	0.606		0.79		0.0012		0.0012		0.0012		11.614		12.4905	
TEQ FISH HALFND	2.83116		1.803532		0.99371		0.999955		1.0062		14.136		14.99475	
TEQ HALFND	2.76843		1.571746		0.86203		0.865915		0.8698		14.626		15.66275	
TOTAL DIOXINS	39.2		3.3											
TOTAL FURANS	56.8		29.5											

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.2	
nsample	**OU4-SD-M08-203A**		**OU4-SD-M08-303A**		**OU4-SD-M08-105A**		**OU4-SD-M08-105A-AVG**		**OU4-SD-M08-105A-D**		**OU4-SD-M08-205A**		**OU4-SD-M08-205A-AVG**	
sample_dat	20030810		20030809		20050823		20050823		20050823		20050820		20050820	
round	07		07		08		08		08		08		08	
TOTAL HPCDD	34.6		8.9	U	1.6	U	1.6	U	1.6	U	410		475	
TOTAL HPCDF	16.9		14.3		0.75	U	0.725	U	0.70	U	160		180	
TOTAL HXCDD	1.7	J	3.2		0.72	U	0.745	U	0.77	U	120	J	145	J
TOTAL HXCDF	14.3		7.9		0.65	U	0.625	U	0.60	U	95		107.5	
TOTAL PECDD	3		1.07	U	1	U	1.1	U	1.2	U	4.1	U	5.75	U
TOTAL PECDF	11.5		6.7		0.56	U	0.57	U	0.58	U	96		108	
TOTAL TCDD	0.36	U	0.10	J	0.38	U	0.36	U	0.34	U	6		7.05	
TOTAL TCDF	2.2		0.60		0.31	U	0.325	U	0.34	U	100		110	
Miscellaneous Parameters (%)														
PERCENT CLAY	9.9		0.10		3.2		3.2				16.2		16.2	
PERCENT COARSE SAND					4.8		4.8				0.10		0.10	
PERCENT FINE SAND					61.3		61.3				27.8		27.8	
PERCENT FINES														
PERCENT GRAVEL	0.00		52.8		4		4				0.00		0.00	
PERCENT MEDIUM SAND					6		6				1.1		1.1	
PERCENT MOISTURE					18.2		17.45		16.7		46.8		48.15	
PERCENT SAND	46.3		46.5											
PERCENT SILT	43.8		0.50		20.9		20.9				54.7		54.7	
PERCENT SOLIDS					85.3		85.2		85.1		51.2		51.2	
SIEVE 1"					100		100				100		100	
SIEVE 1-1/2"					100		100				100		100	
SIEVE 2"					100		100				100		100	
SIEVE 3"					100		100				100		100	
SIEVE 3/4"					100		100				100		100	
SIEVE 3/8"					100		100				100		100	
SIEVE NO. 004					96		96				100		100	
SIEVE NO. 010					91.3		91.3				99.9		99.9	
SIEVE NO. 020					87.2		87.2				99.6		99.6	
SIEVE NO. 040					85.3		85.3				98.8		98.8	
SIEVE NO. 060					77.3		77.3				96.8		96.8	
SIEVE NO. 080					64.8		64.8				94.1		94.1	
SIEVE NO. 100					55.7		55.7				91.3		91.3	
SIEVE NO. 140														
SIEVE NO. 200					24		24				71		71	
TOTAL ORGANIC CARBON	1.57		0.43		0.16		0.164		0.168		1.64		1.64	
TOTAL SOLIDS	54													
Alkylated PAHs (ug/kg)														
C1-CHRYSENES	372.4		181.6											
C1-DIBENZOTHIOPHENES	49.5		20.5											
C1-FLUORANTHENES/PYRENES	821.6		341.4											
C1-FLUORENES	68.6		33.3											
C1-NAPHTHALENES	105.8		43.5											
C1-PHENANTHRENES/ANTHRACENES	332.3		186											
C2-CHRYSENES	155.4		70.3											
C2-DIBENZOTHIOPHENES	76.7		22.4											
C2-FLUORENES	107.4		20.8											
C2-NAPHTHALENES	88.1		31.9											
C2-PHENANTHRENES/ANTHRACENES	252.4		86.8											
C3-CHRYSENES	33.3		15.8											
C3-DIBENZOTHIOPHENES	55.2		16.6											
C3-FLUORENES	128.9		33.7											
C3-NAPHTHALENES	79.5		27.3											
C3-PHENANTHRENES/ANTHRACENES	162.1		43.9											
C4-CHRYSENES	2.3	J	1.2	J										
C4-NAPHTHALENES	78.6		16.6											
C4-PHENANTHRENES/ANTHRACENES	119.2		18.3											

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location	MS-8 LOC.2		MS-8 LOC.3A		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-205A-D**		**OU4-SD-M08-305A**		**OU4-SD-M08-107A**		**OU4-SD-M08-207A**		**OU4-SD-M08-307A**		**OU4-SD-M08-108A**		**OU4-SD-M08-208A**	
sample_dat	20050820		20050823		20071107		20071106		20071107		20081217		20081217	
round	08		08		09		09		09		10		10	
Semivolatile Organics (ug/kg)														
1,1-BIPHENYL			2.8	U	4	U	6	J	4	U	4.6	U	9.6	
1-METHYLNAPHTHALENE			1.6	J	4	U	8	J	4	U	4.6	U	6.4	U
1-METHYLPHENANTHRENE			6.7		4	U	42	J	7		4.6	U	24	
2,3,5-TRIMETHYLNAPHTHALENE			2.8	U	4	U	6	J	4	U	4.6	U	6.4	U
2,6-DIMETHYLNAPHTHALENE			1.8	J	4	U	25	J	8		25		24	
2-METHYLNAPHTHALENE			1.9	J	4	U	9	J	4	U	4.6	U	6.8	
ACENAPHTHENE			4.9		4	U	27	J	4	U	4.6	U	16	
ACENAPHTHYLENE			1.4	J	4	U	45	J	8		5.9		33	
ANTHRACENE			23		7		100	J	25		12		74	
BENZO(A)ANTHRACENE			56		24		290	J	67		32		170	
BENZO(A)PYRENE			51		20		250	J	65		36		200	
BENZO(B)FLUORANTHENE			40		27		310	J	83		52		260	
BENZO(E)PYRENE			40		14		150	J	40		25		130	
BENZO(G,H,I)PERYLENE			41		14		150	J	43		22		120	
BENZO(K)FLUORANTHENE			59		11		130	J	25		19		110	
CHRYSENE			66		26		250	J	80		40		220	
DIBENZO(A,H)ANTHRACENE			8.8		4	U	44	J	12		5.5		34	
DIBENZOTHIOPHENE			3.6		4	U	18	J	4	U	4.6	U	11	
FLUORANTHENE			110		43		460	J	120		69		340	
FLUORENE			8.6		4	U	37	J	5		4.6	U	19	
HIGH MOLECULAR WEIGHT PAHS			401.8		152		1714		454		244.5		1284	
INDENO(1,2,3-CD)PYRENE			33		12		140	J	38		22		110	
LOW MOLECULAR WEIGHT PAHS			104.5		40		493		95		68.1		332.8	
NAPHTHALENE			2.7	J	4	U	15	J	4	U	4.6	U	14	
PERYLENE			14		5		62	J	15		8.9		50	
PHENANTHRENE			62		23		260	J	51		41		170	
PYRENE			110		37		420	J	110		62		320	
TOTAL PAHS ECO			506.3		192		2207		549		312.6		1616.8	
AVS/SEM Inorganics (mg/kg)														
ACID VOLATILE SULFIDE														
CADMIUM														
COPPER														
LEAD														
NICKEL														
ZINC														
HF Digestion Inorganics (mg/kg)														
ALUMINUM			46918		42990		61770		49650		59500		58200	
ARSENIC			17.969		22.6		15.4		11.0		17.8		12.4	
CADMIUM			0.071		0.072	J	0.32	J	0.20	J	0.142		0.388	
CHROMIUM			28.325	J	29.9	J	73.8	J	64.8	J	49.6		79.3	
COPPER			39.431	J	26.6	J	115	J	112	J	35		97.3	
IRON			16346	J	18010	J	22820	J	24360	J	21900		24800	
LEAD			35.438	J	31.1	J	137	J	66.4	J	47.1		95.5	
MANGANESE			295.73		488	J	419	J	590	J	380		378	
MERCURY					0.0156		0.297		0.0998		0.0919		0.356	
NICKEL			13.851		11.6	J	27.4	J	28.6	J	15.4		26.3	
SILVER			0.397	J	0.23		0.70		0.36		0.284		0.642	
ZINC			56.9	J	49.1	J	163	J	162	J	75.5		148	
Inorganics (mg/kg)														
ALUMINUM											7560		12300	
ARSENIC											14		12	
CADMIUM											0.711	U	1	U
CHROMIUM											24		55.1	
COPPER											36.6		104	
IRON											15300		21200	

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PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3A		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-205A-D**		**OU4-SD-M08-305A**		**OU4-SD-M08-107A**		**OU4-SD-M08-207A**		**OU4-SD-M08-307A**		**OU4-SD-M08-108A**		**OU4-SD-M08-208A**	
sample_dat	20050820		20050823		20071107		20071106		20071107		20081217		20081217	
round	08		08		09		09		09		10		10	
LEAD											30.2		89	
MANGANESE											120		187	
MERCURY											0.123		0.541	
NICKEL											12.1		26.1	
SILVER											0.725	U	0.996	U
ZINC											77.4		144	
Pesticides/PCBs (ug/kg)														
1,2,3,4-TETRACHLOROBENZENE														
1,2,4,5-TETRACHLOROBENZENE														
2,4'-DDD			1.5	J	4	J	18		9		4.6	U	7.6	
2,4'-DDE			0.34	J	4	U	5	U	4	U	4.6	U	6.4	U
2,4'-DDT			0.11	J	4	U	5	U	4	U	4.6	U	6.4	U
4,4'-DDD			3.5	J	12		49		24		5.5		23	
4,4'-DDE			0.47	J	4	U	7	J	4	U	4.6	U	6.4	U
4,4'-DDT			0.40	U	4	U	12		4	U	4.6	U	6.4	U
ALDRIN			0.28	UJ	2	U	2	U	2	U	2.4	U	3.3	U
ALPHA-BHC			0.054	R	2	U	2	U	2	U	2.4	U	3.3	U
ALPHA-CHLORDANE			0.32	R	2	U	2	U	2	U	2.4	U	3.3	U
BETA-BHC			0.22	U	2	U	2	U	2	U	2.4	U	4.5	J
CHLORPYRIFOS														
CIS-NONACHLOR			0.28	UJ	2	U	2	U	2	U	2.4	U	3.3	U
DELTA-BHC			0.049	R	2	U	2	U	2	U	2.4	U	3.3	U
DIELDRIN			0.16	R	4	U	5	U	4	U	4.6	U	6.4	U
ENDOSULFAN II			0.28	UJ	4	U	5	U	4	U	4.6	U	6.4	U
ENDRIN			0.28	UJ	4	U	5	U	4	U	4.6	U	6.4	U
GAMMA-BHC (LINDANE)			0.047	U	2	U	2	U	2	U	2.4	U	3.3	U
GAMMA-CHLORDANE			0.40	R	2	U	2	U	2	U	2.4	U	3.3	U
HEPTACHLOR			0.11	U	2	U	2	U	2	U	2.4	U	3.3	U
HEPTACHLOR EPOXIDE			0.27	R	2	U	2	U	2	U	2.4	U	3.3	U
HEXACHLOROBENZENE			0.052	U										
MIREX			0.13	U	2	U	2	U	2	U	2.4	U	3.3	U
OXYCHLORDANE			0.28	UJ	2	U	2	U	2	U	2.4	U	3.3	U
PCB-101			0.67	R	6.8	U	8.6	U	6.9	U	7	U	16	
PCB-101/90														
PCB-105			0.22	J	6.8	U	8.6	U	6.9	U	7	U	11	J
PCB-118			0.47		6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-126			0.054	U	6.8	U	8.6	U	6.9	U	7	U	12	
PCB-128			0.14	R	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-138			0.77		6.8	U	8.6	U	6.9	U	7	U	39	
PCB-138/160														
PCB-149/123														
PCB-153			0.87		6.8	U	8.6	U	6.9	U	7	U	34	J
PCB-153/132														
PCB-156			0.063	J	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-167			0.051	J	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-169			0.04	U	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-170			0.46		6.8	U	8.6	U	6.9	U	7	U	16	J
PCB-170/190														
PCB-18			0.065	R	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-18/17														
PCB-180			0.87		6.8	U	8.6	U	6.9	U	7	U	29	
PCB-187			0.73	J	6.8	U	8.6	U	6.9	U	7	U	15	
PCB-189			0.044	U	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-195			0.11	J	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-195/208														
PCB-201/157/173														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3A		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-205A-D**		**OU4-SD-M08-305A**		**OU4-SD-M08-107A**		**OU4-SD-M08-207A**		**OU4-SD-M08-307A**		**OU4-SD-M08-108A**		**OU4-SD-M08-208A**	
sample_dat	20050820		20050823		20071107		20071106		20071107		20081217		20081217	
round	08		08		09		09		09		10		10	
PCB-206			0.34	J	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-209			0.29		6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-28			0.096	J	6.8	U	8.6	U	6.9	U	7	J	21	J
PCB-44			0.23		6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-52			0.16	J	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-66			0.13	J	6.8	U	8.6	U	6.9	U	7	U	9.7	U
PCB-77			0.045	U	14	J	26	J	6.9	U	7	U	9.7	U
PCB-8/5														
PCB-81			0.033	U	6.8	U	8.6	U	6.9	U	7	U	13	J
PENTACHLOROANISOLE														
PENTACHLOROBENZENE														
TEQ PCB			0.000025		0.0014		0.0026		0	U	0	U	1.20423	
TEQ PCB BIRD			0.000034		0.7		1.3		0	U	0	U	2.5011	
TEQ PCB BIRD HALFND			0.005531		1.384896		2.166192		0.867466	U	0.88004	U	2.750097	
TEQ PCB FISH			0.000003		0.0014		0.0026		0	U	0	U	0.066555	
TEQ PCB FISH HALFND			0.000149		0.020406		0.026641		0.019628	U	0.019919	U	0.06745	
TEQ PCB HALFND			0.003335		0.445236		0.563922		0.450712	U	0.45724	U	1.351237	
TOTAL DDT HALFND			6.12		24		91		41		17		43.4	
TOTAL DDT POS			5.92		16		86		33		5.5		30.6	
TOTAL PCB CONGENERS			11.5		74.8		94.6		75.9		84		219.9	
TRANS-NONACHLOR			0.32	R	2	U	2	U	2	U	2.4	U	5.6	
Dioxins (ng/kg)														
1,2,3,4,6,7,8,9-OCDD	1700		110		17		870		100		399		941	
1,2,3,4,6,7,8,9-OCDF	120		6.9	J	1.7	U	72		8.3	J	28.7		79.4	
1,2,3,4,6,7,8-HPCDD	200		14		2.1	U	96		13		47.8		122	
1,2,3,4,6,7,8-HPCDF	100		7		0.65	U	44		3.8	J	15.1		46.4	
1,2,3,4,7,8,9-HPCDF	6.3	J	1.1	U	0.25	U	2.9	J	0.32	J	5.00	U	5.00	U
1,2,3,4,7,8-HXCDD	3.5	UJ	1.1	U	0.2	U	1.7	J	0.28	U	5.00	U	5.00	U
1,2,3,4,7,8-HXCDF	16		2.6	U	0.19	U	8.7	J	0.75	J	5.00	U	5.00	U
1,2,3,6,7,8-HXCDD	13	J	0.99	U	0.22	U	5.8		0.76	U	5.00	U	5.57	
1,2,3,6,7,8-HXCDF	11		0.81	U	0.19	U	4.1	J	0.47	J	5.00	U	5.00	U
1,2,3,7,8,9-HXCDD	9	J	1	U	0.11	U	4.1	J	0.41	J	5.00	U	5.00	U
1,2,3,7,8,9-HXCDF	0.97	U	0.76	U	0.16	U	1	J	0.24	U	5.00	U	5.00	U
1,2,3,7,8-PECDD	2.5	U	1	U	0.33	U	1.5	J	0.37	U	5.00	U	5.00	U
1,2,3,7,8-PECDF	5.4	J	0.71	U	1.1	J	11.0	J	6.2	J	5.00	U	5.00	U
2,3,4,6,7,8-HXCDF	14		0.80	U	0.17	U	5.4		0.64	J	5.00	U	5.64	
2,3,4,7,8-PECDF	14		1.1	U	0.21	U	6		0.56	J	5.00	U	5.68	
2,3,7,8-TCDD	0.67	U	0.49	U	0.15	U	0.39	J	0.19	U	1.00	U	1.00	U
2,3,7,8-TCDF	6.2		0.42	U	0.14	U	3.6		0.52	J	1.37		4.32	
TEQ	14.891		0.24507		0.0381		9.1716		0.83669		0.89431		5.24712	
TEQ BIRD	27.315		0.09569		0.1117		15.7222		1.99203		1.61157		11.30774	
TEQ BIRD HALFND	29.036		1.97264		0.579435		15.7222		2.29483		8.78657		15.70774	
TEQ FISH	13.345		0.09569		0.0567		9.1482		0.87113		0.31007		4.36374	
TEQ FISH HALFND	15.8535		1.68289		0.445485		9.1482		1.23693		7.01007		9.53874	
TEQ HALFND	16.6995		1.59522		0.393855		9.1716		1.18069		6.49431		9.59712	
TOTAL DIOXINS														
TOTAL FURANS														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.2		MS-8 LOC.3A		MS-8 LOC.1		MS-8 LOC.2		MS-8 LOC.3		MS-8 LOC.1		MS-8 LOC.2	
nsample	**OU4-SD-M08-205A-D**		**OU4-SD-M08-305A**		**OU4-SD-M08-107A**		**OU4-SD-M08-207A**		**OU4-SD-M08-307A**		**OU4-SD-M08-108A**		**OU4-SD-M08-208A**	
sample_dat	20050820		20050823		20071107		20071106		20071107		20081217		20081217	
round	08		08		09		09		09		10		10	
TOTAL HPCDD	540		33		5.5		240		53		107		281	
TOTAL HPCDF	200		12		0.24	U	88		4.7	J	31.9		95.6	
TOTAL HXCDD	170	J	2.7	U	0.18	U	55		6.3		20		68.5	
TOTAL HXCDF	120		2.6	U	0.35	U	49		3.9	J	7.73		52.9	
TOTAL PECDD	7.4	U	1	U	0.33	U	22		1.3	J	5.00	U	4.93	
TOTAL PECDF	120		2.4	U	0.6	J	39		2.4	J	5.00	U	47.2	
TOTAL TCDD	8.1		0.49	U	0.15	U	12		0.44	J	1.76		6.72	
TOTAL TCDF	120		10		0.52	J	54		4.3		10.7		70.2	
Miscellaneous Parameters (%)														
PERCENT CLAY			2.2		1				1					
PERCENT COARSE SAND			2.7											
PERCENT FINE SAND			65.8											
PERCENT FINES											33.3		70.5	
PERCENT GRAVEL			2.5								5.3		0.1	
PERCENT MEDIUM SAND			3.7											
PERCENT MOISTURE	49.5		18.9											
PERCENT SAND											61.3		29.3	
PERCENT SILT			23.1		11				6					
PERCENT SOLIDS			81.3		78.9		58.3		75.1					
SIEVE 1"			100											
SIEVE 1-1/2"			100											
SIEVE 2"			100											
SIEVE 3"			100											
SIEVE 3/4"			100											
SIEVE 3/8"			99											
SIEVE NO. 004			97.5		5		0		11					
SIEVE NO. 010			94.8		4		1		5					
SIEVE NO. 020			92		5		5		70					
SIEVE NO. 040			91		5		6		9					
SIEVE NO. 060			84.3		7		6		12					
SIEVE NO. 080			72.7											
SIEVE NO. 100			63.7											
SIEVE NO. 140					43		26		33					
SIEVE NO. 200			25.2		11		17		12					
TOTAL ORGANIC CARBON			0.228		1.0	UJ	1.0	J	0.99	UJ	0.53		1.5	
TOTAL SOLIDS											69.2		52.33	
Alkylated PAHs (ug/kg)														
C1-CHRYSENES														
C1-DIBENZOTHIOPHENES														
C1-FLUORANTHENES/PYRENES														
C1-FLUORENES														
C1-NAPHTHALENES														
C1-PHENANTHRENES/ANTHRACENES														
C2-CHRYSENES														
C2-DIBENZOTHIOPHENES														
C2-FLUORENES														
C2-NAPHTHALENES														
C2-PHENANTHRENES/ANTHRACENES														
C3-CHRYSENES														
C3-DIBENZOTHIOPHENES														
C3-FLUORENES														
C3-NAPHTHALENES														
C3-PHENANTHRENES/ANTHRACENES														
C4-CHRYSENES														
C4-NAPHTHALENES														
C4-PHENANTHRENES/ANTHRACENES														

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3	
nsample	**OU4-SD-M08-308A**	
sample_dat	20081217	
round	10	
Semivolatile Organics (ug/kg)		
1,1-BIPHENYL	7	
1-METHYLNAPHTHALENE	5.3	
1-METHYLPHENANTHRENE	14	
2,3,5-TRIMETHYLNAPHTHALENE	4.9	U
2,6-DIMETHYLNAPHTHALENE	22	
2-METHYLNAPHTHALENE	7.4	
ACENAPHTHENE	11	
ACENAPHTHYLENE	24	
ANTHRACENE	52	
BENZO(A)ANTHRACENE	140	
BENZO(A)PYRENE	150	
BENZO(B)FLUORANTHENE	210	
BENZO(E)PYRENE	100	
BENZO(G,H,I)PERYLENE	95	
BENZO(K)FLUORANTHENE	85	
CHRYSENE	180	
DIBENZO(A,H)ANTHRACENE	28	
DIBENZOTHIOPHENE	8.2	
FLUORANTHENE	270	
FLUORENE	15	
HIGH MOLECULAR WEIGHT PAHS	1028	
INDENO(1,2,3-CD)PYRENE	89	
LOW MOLECULAR WEIGHT PAHS	240.4	
NAPHTHALENE	11	
PERYLENE	37	
PHENANTHRENE	120	
PYRENE	260	
TOTAL PAHS ECO	1268.4	
AVS/SEM Inorganics (mg/kg)		
ACID VOLATILE SULFIDE		
CADMIUM		
COPPER		
LEAD		
NICKEL		
ZINC		
HF Digestion Inorganics (mg/kg)		
ALUMINUM	55700	
ARSENIC	14.7	
CADMIUM	0.397	
CHROMIUM	58.5	
COPPER	179	
IRON	22500	
LEAD	163	
MANGANESE	442	
MERCURY	0.615	
NICKEL	36.9	
SILVER	0.67	
ZINC	204	
Inorganics (mg/kg)		
ALUMINUM	9880	
ARSENIC	13.9	
CADMIUM	0.715	U
CHROMIUM	36.1	
COPPER	204	
IRON	19600	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3	
nsample	**OU4-SD-M08-308A**	
sample_dat	20081217	
round	10	
LEAD	148	
MANGANESE	158	
MERCURY	0.388	
NICKEL	36.7	
SILVER	0.729	U
ZINC	326	
Pesticides/PCBs (ug/kg)		
1,2,3,4-TETRACHLOROBENZENE		
1,2,4,5-TETRACHLOROBENZENE		
2,4'-DDD	45	
2,4'-DDE	25	U
2,4'-DDT	25	U
4,4'-DDD	120	
4,4'-DDE	25	U
4,4'-DDT	25	U
ALDRIN	13	U
ALPHA-BHC	13	U
ALPHA-CHLORDANE	13	U
BETA-BHC	13	U
CHLORPYRIFOS		
CIS-NONACHLOR	13	U
DELTA-BHC	13	U
DIELDRIN	25	U
ENDOSULFAN II	25	U
ENDRIN	25	U
GAMMA-BHC (LINDANE)	13	U
GAMMA-CHLORDANE	13	U
HEPTACHLOR	13	U
HEPTACHLOR EPOXIDE	13	U
HEXACHLOROBENZENE		
MIREX	13	U
OXYCHLORDANE	13	U
PCB-101	7.2	U
PCB-101/90		
PCB-105	7.2	U
PCB-118	7.2	U
PCB-126	7.2	U
PCB-128	7.2	U
PCB-138	37	
PCB-138/160		
PCB-149/123		
PCB-153	13	R
PCB-153/132		
PCB-156	7.2	U
PCB-167	7.2	U
PCB-169	7.2	U
PCB-170	7.2	U
PCB-170/190		
PCB-18	7.2	U
PCB-18/17		
PCB-180	9.2	
PCB-187	7.2	U
PCB-189	7.2	U
PCB-195	7.2	U
PCB-195/208		
PCB-201/157/173		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 08 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-8 LOC.3	
nsample	**OU4-SD-M08-308A**	
sample_dat	20081217	
round	10	
PCB-206	7.2	U
PCB-209	7.2	U
PCB-28	7.2	UJ
PCB-44	7.2	U
PCB-52	7.2	U
PCB-66	7.2	U
PCB-77	14	R
PCB-8/5		
PCB-81	20	J
PENTACHLOROANISOLE		
PENTACHLOROBENZENE		
TEQ PCB	0.006	
TEQ PCB BIRD	2	
TEQ PCB BIRD HALFND	2.365184	
TEQ PCB FISH	0.01	
TEQ PCB FISH HALFND	0.028324	
TEQ PCB HALFND	0.474864	
TOTAL DDT HALFND	215	
TOTAL DDT POS	165	
TOTAL PCB CONGENERS	90.4	
TRANS-NONACHLOR	13	U
Dioxins (ng/kg)		
1,2,3,4,6,7,8,9-OCDD	690	
1,2,3,4,6,7,8,9-OCDF	60.3	
1,2,3,4,6,7,8-HPCDD	90.5	
1,2,3,4,6,7,8-HPCDF	52.7	
1,2,3,4,7,8,9-HPCDF	5.00	U
1,2,3,4,7,8-HXCDD	5.00	U
1,2,3,4,7,8-HXCDF	8.3	
1,2,3,6,7,8-HXCDD	5.26	
1,2,3,6,7,8-HXCDF	6.98	
1,2,3,7,8,9-HXCDD	5.00	U
1,2,3,7,8,9-HXCDF	5.00	U
1,2,3,7,8-PECDD	5.00	U
1,2,3,7,8-PECDF	5.00	U
2,3,4,6,7,8-HXCDF	10.2	
2,3,4,7,8-PECDF	8.96	
2,3,7,8-TCDD	1.00	U
2,3,7,8-TCDF	5.59	
TEQ	7.97809	
TEQ BIRD	17.84313	
TEQ BIRD HALFND	21.74313	
TEQ FISH	8.05263	
TEQ FISH HALFND	12.72763	
TEQ HALFND	11.82809	
TOTAL DIOXINS		
TOTAL FURANS		

location	MS-8 LOC.3	
nsample	**OU4-SD-M08-308A**	
sample_dat	20081217	
round	10	
TOTAL HPCDD	207	
TOTAL HPCDF	93.4	
TOTAL HXCDD	56.7	
TOTAL HXCDF	85.8	
TOTAL PECDD	7.63	
TOTAL PECDF	71.8	
TOTAL TCDD	11.9	
TOTAL TCDF	111	
Miscellaneous Parameters (%)		
PERCENT CLAY		
PERCENT COARSE SAND		
PERCENT FINE SAND		
PERCENT FINES	43.4	
PERCENT GRAVEL	4.8	
PERCENT MEDIUM SAND		
PERCENT MOISTURE		
PERCENT SAND	51.8	
PERCENT SILT		
PERCENT SOLIDS		
SIEVE 1"		
SIEVE 1-1/2"		
SIEVE 2"		
SIEVE 3"		
SIEVE 3/4"		
SIEVE 3/8"		
SIEVE NO. 004		
SIEVE NO. 010		
SIEVE NO. 020		
SIEVE NO. 040		
SIEVE NO. 060		
SIEVE NO. 080		
SIEVE NO. 100		
SIEVE NO. 140		
SIEVE NO. 200		
TOTAL ORGANIC CARBON	0.61	
TOTAL SOLIDS	67.39	
Alkylated PAHs (ug/kg)		
C1-CHRYSENES		
C1-DIBENZOTHIOPHENES		
C1-FLUORANTHENES/PYRENES		
C1-FLUORENES		
C1-NAPHTHALENES		
C1-PHENANTHRENES/ANTHRACENES		
C2-CHRYSENES		
C2-DIBENZOTHIOPHENES		
C2-FLUORENES		
C2-NAPHTHALENES		
C2-PHENANTHRENES/ANTHRACENES		
C3-CHRYSENES		
C3-DIBENZOTHIOPHENES		
C3-FLUORENES		
C3-NAPHTHALENES		
C3-PHENANTHRENES/ANTHRACENES		
C4-CHRYSENES		
C4-NAPHTHALENES		
C4-PHENANTHRENES/ANTHRACENES		

POSTIVE DETECTIONS FOR MONITORING STATION 9

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-199A**		**OU4-SD-M09-199A-2**		**OU4-SD-M09-299A**		**OU4-SD-M09-299A-2**		**OU4-SD-M09-399A**		**OU4-SD-M09-399A-2**		**OU4-SD-M09-100B**		**OU4-SD-M09-100B-2**	
sample_dat	19990909		19990909		19990909		19990909		19990908		19990908		20000503		20000503	
round	01		01		01		01		01		01		02		02	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	3.1	U			2.37	U			9.19	U			1.08			
1-METHYLNAPHTHALENE	8.39	U			4.42	U			30.9	U			1.11	J		
1-METHYLPHENANTHRENE	8.1				21				50.7				1.63			
2,3,5-TRIMETHYLNAPHTHALENE	3.31				2.02				11.5				0.64	J		
2,6-DIMETHYLNAPHTHALENE	10.4				5.98				14.8				1.19	J		
2-METHYLNAPHTHALENE	11.9	U			6.83	U			44.9	U			1.85	J		
ACENAPHTHENE	10.4				29.5				66.1				0.80			
ACENAPHTHYLENE	5.68	J			14.1	J			66.4	J			5.38			
ANTHRACENE	26.1				83				252				11.8			
BENZO(A)ANTHRACENE	54.9				173				472				10.1			
BENZO(A)PYRENE	78.2	J			169	J			701				9.88			
BENZO(B)FLUORANTHENE	79.5				215				607				17.7	J		
BENZO(E)PYRENE	41.3				87.4				315				9.44			
BENZO(G,H,I)PERYLENE	44.5	J			80.3	J			370				6.87			
BENZO(K)FLUORANTHENE	35.3				47.5				254				6.34			
CHRYSENE	62.4				188				489				12.2			
DIBENZO(A,H)ANTHRACENE	13.1	J			23.1	J			101				2.04			
DIBENZOTHIOPHENE	5.63				15.5				36.1				0.48			
FLUORANTHENE	122				597				976	U			14.8			
FLUORENE	11.5				15.4				80.5				1.65			
HIGH MOLECULAR WEIGHT PAHS	428.5				1601.1				3065				62.42			
INDENO(1,2,3-CD)PYRENE	52.4	J			90.7	J			409				7.4	J		
LOW MOLECULAR WEIGHT PAHS	141.28				434.815				1124.55				32.03			
NAPHTHALENE	14.9	U			12.8	U			97.1				3.14			
PERYLENE	17.2				33.2				76.3				2.72			
PHENANTHRENE	74.2				283				540				7.41			
PYRENE	97.9	J			451	J			814	J			13.4			
TOTAL PAHS ECO	569.78				2035.915				4189.55				94.45			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	16.9	J	188	J	494	J	128	J	2110	J	1876	J	0.211		1.06	U
CADMIUM	0.07				0.12				0.36				0.045			
COPPER	43.3				26				4	U			50.8			
LEAD	33.4	J			40.4	J			38.7	J			26.8			
NICKEL	17.8				9.9				5.5				8.01			
ZINC	55.1				149				93.8				31.7			
HF Digestion Inorganics (mg/kg)																
ALUMINUM	50500				47371				66568				51200			
ARSENIC	8.3				6.7				14				12.6			
CADMIUM	0.14				0.16				0.61				0.31			
CHROMIUM	119	J			69.5	J			123	J			133			
COPPER	98				119				106				511			
IRON	41861				25268				32659				43900			
LEAD	65.5	J			190	J			102	J			188			
MANGANESE	780				652				455				1160			
MERCURY	0.10	J			0.04	J			0.39	J			0.17			
NICKEL	114	J			41.4	J			41.8	J			160			
SILVER	0.21				0.30				0.64				0.70			
ZINC	156				426				245				484			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
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location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-199A**		**OU4-SD-M09-199A-2**		**OU4-SD-M09-299A**		**OU4-SD-M09-299A-2**		**OU4-SD-M09-399A**		**OU4-SD-M09-399A-2**		**OU4-SD-M09-100B**		**OU4-SD-M09-100B-2**	
sample_dat	19990909		19990909		19990909		19990909		19990908		19990908		20000503		20000503	
round	01		01		01		01		01		01		02		02	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.15	J			0.065	J			0.84				0.42			
1,2,4,5-TETRACHLOROBENZENE	0.78				0.42				4.7				0.93			
2,4'-DDD	0.54				1				3.5				0.11			
2,4'-DDE	0.14				0.11				0.60				0.05	J		
2,4'-DDT	1				0.58				0.74				0.28			
4,4'-DDD	1.4				2.1				4.3				0.28			
4,4'-DDE	0.85				1.2				3.7				0.20			
4,4'-DDT	2.7	J			1.3	J			2.6	J			0.60			
ALDRIN	0.94				3.6				6				0.046	U		
ALPHA-BHC	0.059	U			0.048	U			0.15	U			0.03	J		
ALPHA-CHLORDANE	0.26				0.54				0.85				0.07			
BETA-BHC	0.019	J			0.032	J			3.6				0.28			
CHLORPYRIFOS	0.18	J			0.24	U			0.48	U			0.22	U		
CIS-NONACHLOR	0.17				0.18				0.33				0.07			
DELTA-BHC	0.026	J			0.024	J			0.26				0.035	U		
DIELDRIN	0.10				0.11				0.28				0.001	J		
ENDOSULFAN II	0.079	U			0.077	U			0.15	U			0.11			
ENDRIN	0.12	U			0.11	U			0.23	U			0.10	U		
GAMMA-BHC (LINDANE)	0.36	U			0.22	U			1.8	U			0.19	U		
GAMMA-CHLORDANE	0.17				0.26				0.87				0.02	J		
HEPTACHLOR	0.096	J			0.16				0.43				0.03	J		
HEPTACHLOR EPOXIDE	0.007	J			0.39				0.30				0.15			
HEXACHLOROBENZENE	0.32	U			0.14	U			5.6				1.2			
MIREX	0.026	U			0.01	J			0.12				0.023	U		
OXYCHLORDANE	0.013	U			0.013	U			0.025	U			0.012	UJ		
PCB-101																
PCB-101/90	2.5				2.2				4.1				0.93			
PCB-105	0.91				0.68				1.2	J			0.60	J		
PCB-118	1.2				1.1				2.1				0.73			
PCB-123																
PCB-126	0.041	J			0.047	J			0.083	J			0.14	J		
PCB-128	0.66				0.58				1.3				0.27			
PCB-138																
PCB-138/160	3.3				2.5				5.2				1.2			
PCB-149/123	2.2				1.6				3				0.60			
PCB-153																
PCB-153/132	3.4				2.7				5.8				1			
PCB-156	0.33				0.53				1.56				0.14	U		
PCB-167	0.11	J			0.077	J			0.87				0.16			
PCB-169	0.009	J			0.15	U			0.035	J			0.13	J		
PCB-170																
PCB-170/190	0.69	J			0.45	J			0.90	J			1.4	U		
PCB-18																
PCB-18/17	0.42	J			0.67	J			9.1	J			0.10	J		
PCB-180	2.6	J			1.9	J			4.6	J			0.78	J		

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location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-199A**		**OU4-SD-M09-199A-2**		**OU4-SD-M09-299A**		**OU4-SD-M09-299A-2**		**OU4-SD-M09-399A**		**OU4-SD-M09-399A-2**		**OU4-SD-M09-100B**		OU4-SD-M09-100B-2	
sample_dat	19990909		19990909		19990909		19990909		19990908		19990908		20000503		20000503	
round	01		01		01		01		01		01		02		02	
PCB-187	2.1				2.3				3.9				0.91			
PCB-189	0.011	J			0.15	U			0.30	U			0.20			
PCB-195																
PCB-195/208	1.7				2				2.5				1.6			
PCB-201/157/173	0.46				0.63				0.42				0.26			
PCB-206	3.9				5.1				5.9				4.1			
PCB-209	0.82	J			0.86	J			1.4	J			1.1			
PCB-28	0.57				0.41				1.3				0.32			
PCB-44	0.52				0.27				3.2				0.28			
PCB-52	0.77				0.65				1.9				0.63			
PCB-66	0.36				0.53				1.6				0.20			
PCB-77	0.098	J			0.075	J			0.22	J			0.32			
PCB-8/5	0.22	J			0.23	J			0.32	J			0.20	J		
PCB-81	0.008	J			0.032	J			0.065	J			0.18			
PENTACHLOROANISOLE	0.16	J			0.054	J			0.59	J			0.06	J		
PENTACHLOROBENZENE	0.18				0.045	J			0.64				1.2			
TEQ PCB	0.004538				0.004856				0.009667				0.018063			
TEQ PCB BIRD	0.010014				0.011862				0.026213				0.048233			
TEQ PCB BIRD HALFND	0.010022				0.011946				0.02623				0.048247			
TEQ PCB FISH	0.000246				0.000282				0.000516				0.000841			
TEQ PCB FISH HALFND	0.000246				0.000286				0.000518				0.000841			
TEQ PCB HALFND	0.00454				0.00711				0.009675				0.018067			
TOTAL DDT HALFND	6.63				6.29				15.44				1.52			
TOTAL DDT POS	6.63				6.29				15.44				1.52			
TOTAL PCB CONGENERS	53.28				50.26				112.64				31.3			
TRANS-NONACHLOR	0.34				0.50				0.69				0.02	J		
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	191	U			223	U			142	U			94.6	J		
1,2,3,4,6,7,8,9-OCDF	27.3	U			15.6	U			11.5	U			32	J		
1,2,3,4,6,7,8-HPCDD	39.7				32.3				19				20.4	J		
1,2,3,4,6,7,8-HPCDF	87.1	U			30.2	U			6.88	U			102	J		
1,2,3,4,7,8,9-HPCDF	4.59	U			1.13	U			2.2	U			7.3	J		
1,2,3,4,7,8-HXCDD	2.38	J			0.98	J			0.25	J			1	J		
1,2,3,4,7,8-HXCDF	18.1	U			5.97	U			2.2	U			15.2	J		
1,2,3,6,7,8-HXCDD	4.34	J			2.26	J			1.06	J			2.1	J		
1,2,3,6,7,8-HXCDF	15.8	U			5.43	U			2.2	U			13.2	J		
1,2,3,7,8,9-HXCDD	2.97	U			1.38	UJ			2.2	U			1.2	J		
1,2,3,7,8,9-HXCDF	4.22				1.33				2.2	U			1.4	UJ		
1,2,3,7,8-PECDD	1.79	U			1.4	U			2.2	U			0.90	J		
1,2,3,7,8-PECDF	6.25	U			2.65	U			2.2	U			4.7	U		
2,3,4,6,7,8-HXCDF	17.9	U			6.45	U			2.2	U			16.3	J		
2,3,4,7,8-PECDF	14.4	U			6.3	U			2.2	U			8.2	J		
2,3,7,8-TCDD	0.60	U			0.27	U			0.40	U			0.30	UJ		
2,3,7,8-TCDF	6.26	U			3.2	U			1.07	U			3.9	U		
TEQ	1.491				0.78				0.321				9.59498			
TEQ BIRD	0.6241				0.2369				0.0421				14.88706			
TEQ BIRD HALFND	15.669465				7.08448				3.690175				17.29206			
TEQ FISH	1.6951				0.6779				0.1546				11.12906			
TEQ FISH HALFND	9.877065				4.30213				2.590425				11.56406			
TEQ HALFND	8.482445				3.91369				2.655925				10.08048			
TOTAL DIOXINS													149	J		
TOTAL FURANS													365	J		
TOTAL HPCDD	104				78				45.9				46.3	J		
TOTAL HPCDF	124	U			46.6	U			15.2	U			125	J		
TOTAL HXCDD	56.8	U			25.4	U			6.44	U			4.4	J		
TOTAL HXCDF	56	U			19.2	U			2.2	U			110	J		
TOTAL PECDD	25.9	U			4.85	U			2.2	U			0.90	J		
TOTAL PECDF	84.7	U			43.8	U			2.85	U			59.7	J		
TOTAL TCDD	6.97	J			5.02	U			0.40	U			3.2	J		
TOTAL TCDF	108	U			55.8	U			2.16	U			38.9	J		

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location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-199A**		**OU4-SD-M09-199A-2**		**OU4-SD-M09-299A**		**OU4-SD-M09-299A-2**		**OU4-SD-M09-399A**		**OU4-SD-M09-399A-2**		**OU4-SD-M09-100B**		OU4-SD-M09-100B-2	
sample_dat	19990909		19990909		19990909		19990909		19990908		19990908		20000503		20000503	
round	01		01		01		01		01		01		02		02	
Miscellaneous Parameters (%)																
PERCENT CLAY	2.05				5.14				33.95				0.51			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT MOISTURE																
PERCENT SAND	97.79				92.99				15.13				98.65			
PERCENT SILT	0.16				1.87				50.92				0.84			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	0.91				0.46				2.49				0.28			
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	33.1				74.5				266				7.7			
C1-DIBENZOTHIOPHENES	7.86				11.1				30.5				0.63	J		
C1-FLUORANTHENES/PYRENES	55.2				176				504				6.3			
C1-FLUORENES	12.4	U			9.95	U			37.3				1.72			
C1-NAPHTHALENES	20.3	U			11.3	U			75.7	U			2.96	J		
C1-PHENANTHRENES/ANTHRACENES	44.3				103				254				5.39			
C2-CHRYSENES	14.5				31.8				92.2				4.04			
C2-DIBENZOTHIOPHENES	8.03				11.8				35.1				0.81	J		
C2-FLUORENES	15.6				10.9	U			32.7				2.03			
C2-NAPHTHALENES	27.5	U			16	U			68.9				2.76	J		
C2-PHENANTHRENES/ANTHRACENES	30				54.5				176				3.69			
C3-CHRYSENES	1.77				3.62				6.97				0.27	J		
C3-DIBENZOTHIOPHENES	3.97				9.4				23.8				0.44	J		
C3-FLUORENES	7.17				14.2				12.7				1.91			
C3-NAPHTHALENES	26.7	J			12.8	J			90.2	J			2.46	J		
C3-PHENANTHRENES/ANTHRACENES	11.5				31				80				1.96			
C4-CHRYSENES	5.58				9.4				29.1				0.09	J		
C4-NAPHTHALENES	8.53				5.26				31.6				0.40	J		
C4-PHENANTHRENES/ANTHRACENES	8.36				10.2				34.6				0.47	J		

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location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.4		MS-9 LOC.4		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-200B**		**OU4-SD-M09-200B-2**		**OU4-SD-M09-300B**		**OU4-SD-M09-300B-2**		**OU4-SD-M09-400B**		**OU4-SD-M09-400B-2**		**OU4-SD-M09-100A**		**OU4-SD-M09-100A-2**	
sample_dat	20000503		20000503		20000503		20000503		20000506		20000506		20000830		20000830	
round	02		02		02		02		02		02		03		03	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	1.38				7.7	J			5.9	J			3.89	J		
1-METHYLNAPHTHALENE	2.41				15.2				12.6	J			47.6	J		
1-METHYLPHENANTHRENE	29.4				50.2				47.7	J			6.96			
2,3,5-TRIMETHYLNAPHTHALENE	11.7				11.3				6.7				9.54			
2,6-DIMETHYLNAPHTHALENE	4.51				16.2				9.9				22.7			
2-METHYLNAPHTHALENE	4.41				23.1				20.5	J			50.7			
ACENAPHTHENE	3.66				51.6	J			49.2	J			2.23			
ACENAPHTHYLENE	9.1				61.4	J			41.5	J			6.81	J		
ANTHRACENE	78.9				208	J			243	J			13.3			
BENZO(A)ANTHRACENE	117				352				361	J			25.1	J		
BENZO(A)PYRENE	105				432				412	J			43.4	J		
BENZO(B)FLUORANTHENE	98.5	J			424				419	J			51.6	J		
BENZO(E)PYRENE	53.4				233				230	J			27.1			
BENZO(G,H,I)PERYLENE	44.4				226				211				26.4	J		
BENZO(K)FLUORANTHENE	33.3				154				152	J			14.4			
CHRYSENE	91.4				340				403	J			36.3			
DIBENZO(A,H)ANTHRACENE	16				65.5				61.6	J			6.44	J		
DIBENZOTHIOPHENE	4.89				19.6				18.3	J			2.19			
FLUORANTHENE	203				725	J			717	J			54.7	J		
FLUORENE	15.4				68.8	J			66.2	J			6.72			
HIGH MOLECULAR WEIGHT PAHS	709.4				2563.5				2619.6				209.14			
INDENO(1,2,3-CD)PYRENE	49.2	J			236				219	J			26.6			
LOW MOLECULAR WEIGHT PAHS	191.42				784.7				821				159.36			
NAPHTHALENE	5.95				37.8				39.6	J			50.9			
PERYLENE	18.7				96.2	J			108				9.21			
PHENANTHRENE	74				334				361	J			28.7			
PYRENE	177				649	J			665	J			43.2	J		
TOTAL PAHS ECO	900.82				3348.2				3440.6				368.5			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	66.4		34.9	U	1540		494	J	906		528	U	1.03	U	4.91	U
CADMIUM	0.0721				0.225	J			0.23				0.21	J		
COPPER	32.6				1.94	U			5.34	J			123.28	J		
LEAD	21.5				22.4	J			25				52.42	J		
NICKEL	4.33				2.09	U			5.1				9.43	J		
ZINC	57.2				34.5	J			59.4				53.54	J		
HF Digestion Inorganics (mg/kg)																
ALUMINUM	46500				66500				69300				45148			
ARSENIC	7.4				14.3				15.9				17.1			
CADMIUM	0.27				0.68				0.68				0.43	J		
CHROMIUM	69.2				136				138				115			
COPPER	207				73.3				152				413	J		
IRON	30100				31700				38200				43601	J		
LEAD	142				100				162				87.7	J		
MANGANESE	946				436				552				592			
MERCURY	0.08				0.35				0.30				0.12			
NICKEL	61.5				38.6				50.2				72.3	J		
SILVER	0.42				0.66	J			0.75				3.93			
ZINC	225				166				246				106	J		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.4		MS-9 LOC.4		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-200B**		**OU4-SD-M09-200B-2**		**OU4-SD-M09-300B**		**OU4-SD-M09-300B-2**		**OU4-SD-M09-400B**		**OU4-SD-M09-400B-2**		**OU4-SD-M09-100A**		**OU4-SD-M09-100A-2**	
sample_dat	20000503		20000503		20000503		20000503		20000506		20000506		20000830		20000830	
round	02		02		02		02		02		02		03		03	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.21				0.78				0.32				0.29			
1,2,4,5-TETRACHLOROBENZENE	0.33	J			0.68	J			0.50	J			0.84	U		
2,4'-DDD	1				2.7				2.7				0.33			
2,4'-DDE	0.16				0.50				0.30				0.10			
2,4'-DDT	0.94				0.22				1.1				0.28			
4,4'-DDD	1.5				2.7				3.3	J			0.49			
4,4'-DDE	1				3.1				2				0.37			
4,4'-DDT	2.4				1.3				3.6	J			1.4			
ALDRIN	0.048	U			4.1				3.6				0.044	U		
ALPHA-BHC	0.05				0.38				0.10				0.03	U		
ALPHA-CHLORDANE	0.23				0.99				0.25				1			
BETA-BHC	0.16	U			0.58				0.53				0.15	U		
CHLORPYRIFOS	0.23	U			0.59	U			0.33	U			0.91	U		
CIS-NONACHLOR	0.21				0.25				0.30				0.23			
DELTA-BHC	0.03	J			0.26				0.04	J			0.01	J		
DIELDRIN	0.01	J			0.18				0.081	U			0.01	J		
ENDOSULFAN II	0.77				0.64				0.70				0.03	J		
ENDRIN	0.11	U			0.28	U			0.16	U			0.10	U		
GAMMA-BHC (LINDANE)	0.01	J			0.14	J			0.23	J			0.18	U		
GAMMA-CHLORDANE	0.28				0.14	U			0.081	U			1.4			
HEPTACHLOR	0.14				0.11	J			0.20	U			0.12	J		
HEPTACHLOR EPOXIDE	0.024	U			0.061	U			0.04	U			0.05			
HEXACHLOROBENZENE	0.08				0.30				0.051	U			0.13			
MIREX	0.12				0.061	U			0.04	U			0.022	U		
OXYCHLORDANE	0.012	UJ			0.07	U			0.07	U			0.011	U		
PCB-101																
PCB-101/90	2.6				4.2				3.7				1.3			
PCB-105	1.6				2				1.9				0.43	J		
PCB-118	2.2				3.3				2.9				0.85			
PCB-123																
PCB-126	0.08	J			0.09	J			0.04	J			0.13	U		
PCB-128	0.89				0.98				1.2				0.32			
PCB-138																
PCB-138/160	3.7				5.4				4.1				1.8			
PCB-149/123	1.8				2.3				3.1				1.1			
PCB-153																
PCB-153/132	2.9				4.3				5				1.9			
PCB-156	0.14	U			0.47				0.47				0.31			
PCB-167	0.53				0.40				1.3				0.21			
PCB-169	0.09	J			0.37	U			0.21	U			0.04	U		
PCB-170																
PCB-170/190	3.2	U			13	J			31	J			0.17	J		
PCB-18																
PCB-18/17	0.072	U			1				0.82				0.28			
PCB-180	1.4	J			4.1				3.4				1.3			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.4		MS-9 LOC.4		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-200B**		**OU4-SD-M09-200B-2**		**OU4-SD-M09-300B**		**OU4-SD-M09-300B-2**		**OU4-SD-M09-400B**		**OU4-SD-M09-400B-2**		**OU4-SD-M09-100A**		**OU4-SD-M09-100A-2**	
sample_dat	20000503		20000503		20000503		20000503		20000506		20000506		20000830		20000830	
round	02		02		02		02		02		02		03		03	
PCB-187	1.2				3.1				2.8				1			
PCB-189	0.14	J			0.27	J			0.21	J			0.12	J		
PCB-195																
PCB-195/208	0.80				3.4				1.8	J			0.81			
PCB-201/157/173	0.20				0.90				0.70				0.26			
PCB-206	1.9				7.3				3.3	J			1.7			
PCB-209	0.56				3.3				0.99	J			0.45			
PCB-28	0.45				2.5				1.8				0.59			
PCB-44	0.42				0.80				1.6				0.84			
PCB-52	1.2				2.9				1.4				0.74			
PCB-66	0.34				0.89				0.75				0.52			
PCB-77	0.67				0.10	J			0.05	J			0.01	U		
PCB-8/5	0.38				2.2				0.57				0.15	U		
PCB-81	0.19				0.02	J			0.21	U			0.02	J		
PENTACHLOROANISOLE	0.06	J			0.29	J			0.21	J			0.10	U		
PENTACHLOROBENZENE	0.15				0.54				0.17				0.21	U		
TEQ PCB	0.011018				0.009305				0.004322				0.000105			
TEQ PCB BIRD	0.060816				0.0164				0.006882				0.002122			
TEQ PCB BIRD HALFND	0.06083				0.016603				0.017497				0.008898			
TEQ PCB FISH	0.000599				0.000517				0.000258				0.000027			
TEQ PCB FISH HALFND	0.000599				0.000527				0.000316				0.000353			
TEQ PCB HALFND	0.011022				0.014861				0.007507				0.007207			
TOTAL DDT HALFND	7				10.52				13				2.97			
TOTAL DDT POS	7				10.52				13				2.97			
TOTAL PCB CONGENERS	48.352				129.34				138.06				30.15			
TRANS-NONACHLOR	0.16				0.52				0.23				0.56			
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	108	J			3172				168	J			128	U		
1,2,3,4,6,7,8,9-OCDF	10.1	J			178				10.7	J			11.4	U		
1,2,3,4,6,7,8-HPCDD	16.7	J			346				27.4	J			22.6	U		
1,2,3,4,6,7,8-HPCDF	13.8	J			122				9.1	J			21.5	U		
1,2,3,4,7,8,9-HPCDF	1.1	U			4.4				1.6	UJ			1.5	J		
1,2,3,4,7,8-HXCDD	0.50	J			3.3				1.6	UJ			1.3	J		
1,2,3,4,7,8-HXCDF	2.9	J			6.4				1.2	U			6.9	J		
1,2,3,6,7,8-HXCDD	1.1	J			14.2				1.6	UJ			2.6	J		
1,2,3,6,7,8-HXCDF	2.7	U			6.9				0.90	J			5.3	J		
1,2,3,7,8,9-HXCDD	0.60	J			9.6				1.6	UJ			1.8	J		
1,2,3,7,8,9-HXCDF	0.20	J			1.5	J			1.6	UJ			0.66	UJ		
1,2,3,7,8-PECDD	1.1	UJ			3.1	U			1.6	UJ			0.66	UJ		
1,2,3,7,8-PECDF	1.6	U			2.8	U			1.4	J			2.7	J		
2,3,4,6,7,8-HXCDF	3.4	J			8.3				1.3	J			8.1	J		
2,3,4,7,8-PECDF	3	U			6.8				1.6	UJ			6.3	J		
2,3,7,8-TCDD	0.20	J			0.60	U			0.32	UJ			0.13	UJ		
2,3,7,8-TCDF	0.80	U			3.3				1.8	J			2	J		
TEQ	1.41043				13.119				0.86061				4.786			
TEQ BIRD	1.11251				15.622				2.29627				10.886			
TEQ BIRD HALFND	3.78301				17.612				4.33227				11.43977			
TEQ FISH	1.28351				9.708				0.51627				6.124			
TEQ FISH HALFND	2.78401				11.628				2.44027				6.67777			
TEQ HALFND	2.61493				15.011				2.44861				5.45541			
TOTAL DIOXINS	161	J			4152				253	J			239	U		
TOTAL FURANS	79.8	J			619				50.6	J			150	U		
TOTAL HPCDD	37.8	J			784				69.9	J			54.4	U		
TOTAL HPCDF	21	J			260				18	J			32.3	U		
TOTAL HXCDD	13.1	J			197				13.8	J			35.3	J		
TOTAL HXCDF	19.1	J			124				14.3	J			41.6	J		
TOTAL PECDD	1.1	UJ			3.1	U			1.6	UJ			20	J		
TOTAL PECDF	21.7	J			46				1.4	J			24.8	J		
TOTAL TCDD	2.1	J			0.60	U			1.1	J			1.7	J		
TOTAL TCDF	7.9	U			10.7				6.2	J			39.6	J		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
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location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.4		MS-9 LOC.4		MS-9 LOC.1		MS-9 LOC.1	
nsample	**OU4-SD-M09-200B**		**OU4-SD-M09-200B-2**		**OU4-SD-M09-300B**		**OU4-SD-M09-300B-2**		**OU4-SD-M09-400B**		**OU4-SD-M09-400B-2**		**OU4-SD-M09-100A**		**OU4-SD-M09-100A-2**	
sample_dat	20000503		20000503		20000503		20000503		20000506		20000506		20000830		20000830	
round	02		02		02		02		02		02		03		03	
Miscellaneous Parameters (%)																
PERCENT CLAY	0.41				31.01				10.87				0.60			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT MOISTURE																
PERCENT SAND	98.77				12.98				69.49				98.1			
PERCENT SILT	0.82				56.01				19.64				1.2			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	0.54				2.14				2.56				1.03	J		
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	96.6				225				223				16.7			
C1-DIBENZOTHIOPHENES	13.2				21.6				16.6				3.83			
C1-FLUORANTHENES/PYRENES	170				324				361				16.3			
C1-FLUORENES	42.8				35.7				30.2				10.1			
C1-NAPHTHALENES	6.82				38.3				33.1				98.3			
C1-PHENANTHRENES/ANTHRACENES	136				178				173	J			21.9			
C2-CHRYSENES	66.2				85.1				87.6				9.72			
C2-DIBENZOTHIOPHENES	13.2				24.9				23.4				3.67			
C2-FLUORENES	37				36.6				25.5				14.7			
C2-NAPHTHALENES	15.4				43.6				31.9				102			
C2-PHENANTHRENES/ANTHRACENES	90				118				95.7				14			
C3-CHRYSENES	5.91				7.5				8.8				0.77	J		
C3-DIBENZOTHIOPHENES	9.39				20.7				23				1.77			
C3-FLUORENES	20				30.4				35.9				11			
C3-NAPHTHALENES	39.4				33.2				25.6				75.6			
C3-PHENANTHRENES/ANTHRACENES	45.1				72.9				64				5.64			
C4-CHRYSENES	1.31				1.3				3.7				0.44	J		
C4-NAPHTHALENES	11.4				10.5				10.1				22.3			
C4-PHENANTHRENES/ANTHRACENES	12.7				15.3				21.5				3.03			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
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location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-200A**		**OU4-SD-M09-200A-2**		**OU4-SD-M09-300A**		**OU4-SD-M09-300A-2**		**OU4-SD-M09-300A-2-AVG**		**OU4-SD-M09-300A-2-D**		**OU4-SD-M09-300A-AVG**		**OU4-SD-M09-300A-D**	
sample_dat	20000829		20000829		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	5.97	J			10.9								11.65		12.4	J
1-METHYLNAPHTHALENE	16.3	J			32.9	J							33.65	J	34.4	J
1-METHYLPHENANTHRENE	26.4				44.8	J							50.5	J	56.2	
2,3,5-TRIMETHYLNAPHTHALENE	7.11				14.4	J							15.55	J	16.7	
2,6-DIMETHYLNAPHTHALENE	11.2				21.4	J							23.05	J	24.7	
2-METHYLNAPHTHALENE	27.6	J			49.2	J							50.45	J	51.7	J
ACENAPHTHENE	33	J			76.8	J							84.15	J	91.5	
ACENAPHTHYLENE	54.9				101	J							113	J	125	
ANTHRACENE	128				224	J							257.5	J	291	
BENZO(A)ANTHRACENE	304				479	J							567	J	655	
BENZO(A)PYRENE	124	J			102	J							188	J	274	J
BENZO(B)FLUORANTHENE	437	J			803	J							913	J	1023	J
BENZO(E)PYRENE	239				421	J							471.5	J	522	
BENZO(G,H,I)PERYLENE	261	J			418	J							478	J	538	J
BENZO(K)FLUORANTHENE	167				271	J							309	J	347	
CHRYSENE	327				548	J							603.5	J	659	
DIBENZO(A,H)ANTHRACENE	63.9	J			110	J							117	J	124	J
DIBENZOTHIOPHENE	12.7				30.3	J							31.5	J	32.7	
FLUORANTHENE	492				1024	J							1120	J	1216	
FLUORENE	35.6				87.9	J							100.95	J	114	
HIGH MOLECULAR WEIGHT PAHS	1778.9				3210								3633.5		4057	
INDENO(1,2,3-CD)PYRENE	271				466	J							507	J	548	J
LOW MOLECULAR WEIGHT PAHS	533.1				1113.2								1231.2		1349.2	
NAPHTHALENE	30	J			77.3	J							74.65	J	72	
PERYLENE	91.1				206	J							209.5	J	213	
PHENANTHRENE	224				497	J							550.5	J	604	
PYRENE	468	J			947	J							1038	J	1129	J
TOTAL PAHS ECO	2312				4323.2								4864.7		5406.2	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	242	J	134	J	243	J	396	J	343	J	290	J	309.5	J	376	J
CADMIUM	0.1405	U			0.52	J							0.46	J	0.40	J
COPPER	33.39	J			25.71	J							27.645	J	29.58	J
LEAD	40.45	J			67.25	J							67.86	J	68.47	J
NICKEL	7.64	J			7.3	J							7.305	J	7.31	J
ZINC	75.26	J			120.04	J							108.71	J	97.38	J
HF Digestion Inorganics (mg/kg)																
ALUMINUM	52761				61780								60448		59116	
ARSENIC	13.7				19								18.5		18	
CADMIUM	0.46				0.82								0.82		0.82	
CHROMIUM	76.9				118								114		110	
COPPER	101				76.9	J							77.95	J	79	
IRON	31552				34799	J							33589	J	32379	
LEAD	97.7				100								99.7		99.4	
MANGANESE	389				359								352.5		346	
MERCURY	0.25				0.31								0.32		0.33	
NICKEL	32.4	J			31.5	J							32.8	J	34.1	J
SILVER	3.33				7	J							5.68	J	4.36	
ZINC	208				114	J							126.5	J	139	

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location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-200A**		**OU4-SD-M09-200A-2**		**OU4-SD-M09-300A**		**OU4-SD-M09-300A-2**		**OU4-SD-M09-300A-2-AVG**		**OU4-SD-M09-300A-2-D**		**OU4-SD-M09-300A-AVG**		**OU4-SD-M09-300A-D**	
sample_dat	20000829		20000829		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.18	U			0.24	U							0.34	U	0.44	U
1,2,4,5-TETRACHLOROBENZENE	0.70				1.8	U							1.3		1.3	
2,4'-DDD	2.2				3.1								3.7		4.3	
2,4'-DDE	0.09	J			0.30								0.315		0.33	J
2,4'-DDT	0.55				0.38	J							0.68	J	0.98	J
4,4'-DDD	3.9				3.4								3.9		4.4	
4,4'-DDE	1.9				3.3								3.15		3	
4,4'-DDT	3.1				2.3								2.85		3.4	
ALDRIN	0.064	U			0.11	U							0.11	U	0.11	U
ALPHA-BHC	0.06	J			0.24	J							0.17	J	0.10	J
ALPHA-CHLORDANE	0.55				0.70								0.715		0.73	
BETA-BHC	0.24				0.37	UJ							0.7925	J	1.4	J
CHLORPYRIFOS	0.30	U			1.6	U							2.5	J	4.2	J
CIS-NONACHLOR	0.17				0.35								0.30		0.25	
DELTA-BHC	0.06				0.14								0.175		0.21	
DIELDRIN	0.072	U			0.12	U							0.12	U	0.12	U
ENDOSULFAN II	0.53				2								1.75		1.5	
ENDRIN	0.14	U			0.25	U							0.245	U	0.24	U
GAMMA-BHC (LINDANE)	0.26	U			0.44	U							0.435	U	0.43	U
GAMMA-CHLORDANE	0.62				0.39								0.36		0.33	
HEPTACHLOR	0.18	U			0.32	U							0.315	U	0.31	U
HEPTACHLOR EPOXIDE	0.032	U			0.055	U							0.0545	U	0.054	U
HEXACHLOROBENZENE	0.15				0.24								0.29		0.34	
MIREX	0.032	U			0.055	UJ							0.0545	UJ	0.054	U
OXYCHLORDANE	0.016	U			0.24								0.16		0.08	J
PCB-101																
PCB-101/90	2.8				3.7								4		4.3	
PCB-105	1.8	J			1.5								2		2.5	J
PCB-118	1.9				4								3.45		2.9	
PCB-123																
PCB-126	0.19	U			0.33	U							0.325	U	0.32	U
PCB-128	0.70				1.5								1.35		1.2	
PCB-138																
PCB-138/160	4.5				7.2								6.8		6.4	
PCB-149/123	3.1				4								4.45		4.9	
PCB-153																
PCB-153/132	3.8				7.3								6.55		5.8	
PCB-156	1.6				1.9	J							1.75	J	1.6	J
PCB-167	1				0.42	J							1.36	J	2.3	J
PCB-169	0.06	U			0.05	U							0.185	U	0.32	U
PCB-170																
PCB-170/190	10	J			1.1	J							11.55	J	22	J
PCB-18																
PCB-18/17	0.21				1.2	J							0.92	J	0.64	J
PCB-180	4.2				5.7								5.15		4.6	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-200A**		**OU4-SD-M09-200A-2**		**OU4-SD-M09-300A**		**OU4-SD-M09-300A-2**		**OU4-SD-M09-300A-2-AVG**		**OU4-SD-M09-300A-2-D**		**OU4-SD-M09-300A-AVG**		**OU4-SD-M09-300A-D**	
sample_dat	20000829		20000829		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
PCB-187	2.8				4.1								3.9		3.7	
PCB-189	0.25				0.63	J							0.50	J	0.37	J
PCB-195																
PCB-195/208	2.7				4.3	J							3.4	J	2.5	J
PCB-201/157/173	0.69				1.45	J							1.135	J	0.82	J
PCB-206	9				12	J							8.6	J	5.2	J
PCB-209	1.9				4.3	J							3.05	J	1.8	J
PCB-28	1.6				2.1								2.35		2.6	
PCB-44	1.1				1.3	J							3.25	J	5.2	J
PCB-52	1.2				3.2								2.95		2.7	
PCB-66	0.75				1.2								1.35		1.5	
PCB-77	0.08	U			0.05	J							0.05	J	0.16	U
PCB-8/5	0.51				0.58	J							0.94	J	1.3	J
PCB-81	0.11	J			0.10	U							0.09	J	0.13	J
PENTACHLOROANISOLE	0.12	U			0.25	U							0.25	U	0.25	U
PENTACHLOROBENZENE	0.20	U			0.48	U							0.485	U	0.49	U
TEQ PCB	0.000344				0.000423								0.000472		0.000501	
TEQ PCB BIRD	0.011471				0.003075								0.012086		0.013597	
TEQ PCB BIRD HALFND	0.023011				0.024616								0.028444		0.033773	
TEQ PCB FISH	0.000107				0.000075								0.000123		0.000141	
TEQ PCB FISH HALFND	0.000588				0.000927								0.000941		0.000958	
TEQ PCB HALFND	0.010751				0.017693								0.019502		0.021314	
TOTAL DDT HALFND	11.74				12.78								14.595		16.41	
TOTAL DDT POS	11.74				12.78								14.595		16.41	
TOTAL PCB CONGENERS	102.94				132.56								143.12		153.68	
TRANS-NONACHLOR	0.31				0.33								0.365		0.40	
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	934				71.7	J							1610.85	J	3150	J
1,2,3,4,6,7,8,9-OCDF	48.7				3.98	J							66.99	J	130	J
1,2,3,4,6,7,8-HPCDD	119				10.9	J							190.45	J	370	J
1,2,3,4,6,7,8-HPCDF	36.6				3.03	J							59.515	J	116	J
1,2,3,4,7,8,9-HPCDF	1.79				0.08	J							2.775	J	5.47	J
1,2,3,4,7,8-HXCDD	1.32	U			2.44	UJ							3.325	J	5.43	J
1,2,3,4,7,8-HXCDF	3.92				2.44	UJ							5.14	J	9.06	J
1,2,3,6,7,8-HXCDD	6.17				2.44	UJ							9.46	J	17.7	J
1,2,3,6,7,8-HXCDF	3.37				2.44	UJ							4.78	J	8.34	J
1,2,3,7,8,9-HXCDD	3.7				2.44	UJ							6.11	J	11	J
1,2,3,7,8,9-HXCDF	0.19	J			2.44	U							0.89	J	0.89	J
1,2,3,7,8-PECDD	1.47				2.44	UJ							3.515	J	5.81	J
1,2,3,7,8-PECDF	2.36				0.15	U							2.4275	J	4.78	J
2,3,4,6,7,8-HXCDF	4.57				0.18	J							5.24	J	10.3	J
2,3,4,7,8-PECDF	3.16				2.44	U							4.4	J	7.58	J
2,3,7,8-TCDD	0.35				0.49	U							1.0275	J	1.81	J
2,3,7,8-TCDF	3.67				0.34	J							4.78	J	9.22	J
TEQ	7.26651				0.214804								12.938577		23.1301	
TEQ BIRD	11.12387				0.407568								17.423234		31.2182	
TEQ BIRD HALFND	11.15687				3.661268								17.423234		31.2182	
TEQ FISH	5.60637				0.084568								11.507209		19.8837	
TEQ FISH HALFND	5.93637				3.163718								11.507209		19.8837	
TEQ HALFND	7.33251				2.780054								12.938577		23.1301	
TOTAL DIOXINS	1304				101	J							2182	J	4263	J
TOTAL FURANS	247				14.8	J							373.9	J	733	J
TOTAL HPCDD	290				23.5	J							426.25	J	829	J
TOTAL HPCDF	78.7				6.49	J							126.245	J	246	J
TOTAL HXCDD	78.1				4.87	J							116.435	J	228	J
TOTAL HXCDF	61.2				3.24	J							65.62	J	128	J
TOTAL PECDD	1.47				2.44	U							13.16	J	25.1	J
TOTAL PECDF	22.7				0.15	U							40.9375	J	81.8	J
TOTAL TCDD	0.35	U			0.88	U							15.72	J	31	J
TOTAL TCDF	35.9				0.97	J							73.985	J	147	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-200A**		**OU4-SD-M09-200A-2**		**OU4-SD-M09-300A**		**OU4-SD-M09-300A-2**		**OU4-SD-M09-300A-2-AVG**		**OU4-SD-M09-300A-2-D**		**OU4-SD-M09-300A-AVG**		**OU4-SD-M09-300A-D**	
sample_dat	20000829		20000829		20000827		20000827		20000827		20000827		20000827		20000827	
round	03		03		03		03		03		03		03		03	
Miscellaneous Parameters (%)																
PERCENT CLAY	8.2				25.9								29		32.1	
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT MOISTURE																
PERCENT SAND	76.9				16.4								13.95		11.5	
PERCENT SILT	14.8				57.8								57.1		56.4	
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	1.48	J			2.9	J							2.785	J	2.67	J
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	213				365								420.5		476	
C1-DIBENZOTHIOPHENES	12.1				25								27.35		29.7	
C1-FLUORANTHENES/PYRENES	285				542								598.5		655	
C1-FLUORENES	24.5				45.5								51.3		57.1	
C1-NAPHTHALENES	44	J			82.1								84.1		86.1	
C1-PHENANTHRENES/ANTHRACENES	114				231								259		287	
C2-CHRYSENES	88.7				134								165		196	
C2-DIBENZOTHIOPHENES	15.1				30.5								33.75		37	
C2-FLUORENES	34.9				71.6								65.4		59.2	
C2-NAPHTHALENES	43.9				84.3								68.95		53.6	
C2-PHENANTHRENES/ANTHRACENES	78.8				152								169.5		187	
C3-CHRYSENES	7.74				10								10.8		11.6	
C3-DIBENZOTHIOPHENES	14.3				27.7								28.9		30.1	
C3-FLUORENES	24				21	J							35.45	J	49.9	J
C3-NAPHTHALENES	39.3				82.4								79.75		77.1	
C3-PHENANTHRENES/ANTHRACENES	43.8				85.6								94.3		103	
C4-CHRYSENES	5.88				11.6								12.35		13.1	
C4-NAPHTHALENES	27.5				34.7								36.9		39.1	
C4-PHENANTHRENES/ANTHRACENES	24.5				63.6								82.8		102	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-101B**		**OU4-SD-M09-101B-2**		**OU4-SD-M09-201B**		**OU4-SD-M09-201B-2**		**OU4-SD-M09-301B**		**OU4-SD-M09-301B-2**		**OU4-SD-M09-301B-2-AVG**		**OU4-SD-M09-301B-2-D**	
sample_dat	20010508		20010508		20010508		20010508		20010507		20010507		20010507		20010507	
round	04		04		04		04		04		04		04		04	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	2.5				4.5				12.9							
1-METHYLNAPHTHALENE	4.2				11.7				26.1							
1-METHYLPHENANTHRENE	13.8				35.7				76.3							
2,3,5-TRIMETHYLNAPHTHALENE	2.9				9.2				18.3							
2,6-DIMETHYLNAPHTHALENE	3.5				12.3				34.2							
2-METHYLNAPHTHALENE	7.8				18.1				41.9							
ACENAPHTHENE	15.9				30.3				79.9	J						
ACENAPHTHYLENE	15.9	J			46.8	J			96.6							
ANTHRACENE	132.9	J			193.5	J			394.9	J						
BENZO(A)ANTHRACENE	114.3	J			283.1	J			609.6							
BENZO(A)PYRENE	155.1				393.2				873.4	J						
BENZO(B)FLUORANTHENE	165.7				400				887.9	J						
BENZO(E)PYRENE	79.5	J			194.5	J			438.3	J						
BENZO(G,H,I)PERYLENE	65.6	J			153	J			400.5	J						
BENZO(K)FLUORANTHENE	47.9	J			115.5	J			403.5	J						
CHRYSENE	184.2				321.6				575.8							
DIBENZO(A,H)ANTHRACENE	16				40.2				121.7	J						
DIBENZOTHIOPHENE	5.8				14.2				29.7							
FLUORANTHENE	233.1				540.4				1131							
FLUORENE	26.4				40.6				116.1	J						
HIGH MOLECULAR WEIGHT PAHS	886.1				2046.7				4386.3							
INDENO(1,2,3-CD)PYRENE	73.6				182.2				552.3	J						
LOW MOLECULAR WEIGHT PAHS	332.6				614.3				1381.7							
NAPHTHALENE	10.3				27.2				63.5							
PERYLENE	27.6				70				145.4							
PHENANTHRENE	123.4				257.8				588.8							
PYRENE	183.4				468.2				1074.8							
TOTAL PAHS ECO	1218.7				2661				5768							
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	0.836	U	0.345	J	379.656	J	322.16	J	379.246	J	734.439	J	683.1505	J	631.862	J
CADMIUM	0.11	U			0.34	J			0.51	J						
COPPER	67.6	J			29.6	J			32.4	J						
LEAD	49.8				42.6				59.4	J						
NICKEL	20				10.8				9.3							
ZINC	93.4	U			102	U			114	U						
HF Digestion Inorganics (mg/kg)																
ALUMINUM	45555.32				53812.49				55578.44							
ARSENIC	10.15				14.81				14.51							
CADMIUM	0.1819	U			0.186	U			0.1841	U						
CHROMIUM	109.69				110.64				119.73							
COPPER	227.15				132.21				72.78							
IRON	39738.82				34230.56				32290.84							
LEAD	164.58				108.52				89.19							
MANGANESE	555.65				349.45				361.99							
MERCURY	0.15	J			0.26	J			0.32	J						
NICKEL	79.08				61.53				33.75							
SILVER	0.40				0.80				0.83							
ZINC	273.03	J			188.4	J			147.13	J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-101B**		**OU4-SD-M09-101B-2**		**OU4-SD-M09-201B**		**OU4-SD-M09-201B-2**		**OU4-SD-M09-301B**		**OU4-SD-M09-301B-2**		**OU4-SD-M09-301B-2-AVG**		**OU4-SD-M09-301B-2-D**	
sample_dat	20010508		20010508		20010508		20010508		20010507		20010507		20010507		20010507	
round	04		04		04		04		04		04		04		04	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.15	J			0.26	J			0.41	J						
1,2,4,5-TETRACHLOROBENZENE	0.69	U			0.97	U			1.6	J						
2,4'-DDD	0.43				7.1				5.1	J						
2,4'-DDE	0.07				0.27				0.43	J						
2,4'-DDT	0.60				0.87				0.49	J						
4,4'-DDD	0.83				2.7				5.1	J						
4,4'-DDE	0.83				2				3.6	J						
4,4'-DDT	2.6				4.6				3.3	J						
ALDRIN	1.3				2.8				0.12	UJ						
ALPHA-BHC	0.03	J			0.13				0.18	J						
ALPHA-CHLORDANE	0.15				0.40				1.2	J						
BETA-BHC	0.17	U			0.17	J			0.37	UJ						
CHLORPYRIFOS	0.10	U			0.16	U			0.22	UJ						
CIS-NONACHLOR	0.14				0.34				0.53	J						
DELTA-BHC	0.055	U			0.04	J			0.27	J						
DIELDRIN	0.028	U			0.043	U			0.99	J						
ENDOSULFAN II	0.13	U			0.20	U			2.5	J						
ENDRIN	0.055	U			0.086	U			0.12	UJ						
GAMMA-BHC (LINDANE)	0.02	J			0.14	J			0.26	UJ						
GAMMA-CHLORDANE	0.10				0.29				0.061	UJ						
HEPTACHLOR	0.07	J			0.37				0.05	J						
HEPTACHLOR EPOXIDE	0.046	U			0.072	U			0.10	UJ						
HEXACHLOROBENZENE	0.13				0.072	U			0.23	J						
MIREX	0.074	U			0.11	U			0.16	UJ						
OXYCHLORDANE	0.046	U			0.18				0.16	J						
PCB-101																
PCB-101/90	1.1				2.9				8.2	J						
PCB-105	0.36	J			0.97				2.9	J						
PCB-118	0.72				2.4				6.2	J						
PCB-123																
PCB-126	0.22	UJ			0.03	U			0.19	J						
PCB-128	0.32				0.83				2.2	J						
PCB-138																
PCB-138/160	2.1				4.4				11	J						
PCB-149/123	1.7	J			3.5	J			7.3	J						
PCB-153																
PCB-153/132	2.5				5.4				12	J						
PCB-156	0.62	J			2.2	J			0.79	UJ						
PCB-167	0.19	J			1.2				1	J						
PCB-169	0.09	J			0.01	J			0.04	J						
PCB-170																
PCB-170/190	2.3	J			12	J			33	J						
PCB-18																
PCB-18/17	0.13				0.11	U			0.91	J						
PCB-180	2.2				2.7				6.3	J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-101B**		**OU4-SD-M09-101B-2**		**OU4-SD-M09-201B**		**OU4-SD-M09-201B-2**		**OU4-SD-M09-301B**		**OU4-SD-M09-301B-2**		**OU4-SD-M09-301B-2-AVG**		**OU4-SD-M09-301B-2-D**	
sample_dat	20010508		20010508		20010508		20010508		20010507		20010507		20010507		20010507	
round	04		04		04		04		04		04		04		04	
PCB-187	1.3				2.4				5.2	J						
PCB-189	0.03	J			0.14	J			0.44	J						
PCB-195																
PCB-195/208	1.5				2				6.1	J						
PCB-201/157/173	0.36	J			0.59				1.2	J						
PCB-206	3.6				3.5				13	J						
PCB-209	0.46				1.12				5.2	J						
PCB-28	0.82				0.39	U			3.9	J						
PCB-44	0.31				0.55				2.7	J						
PCB-52	0.47				1.4				4.4	J						
PCB-66	0.36				1.1				1.6	J						
PCB-77	0.44	J			0.12	J			0.04	J						
PCB-8/5	0.15	U			0.66	U			1.3	J						
PCB-81	0.22	U			0.03	J			0.49	UJ						
PENTACHLOROANISOLE	0.05	U			0.11	J			0.24	J						
PENTACHLOROBENZENE	0.26				0.13	U			0.31	J						
TEQ PCB	0.002865				0.000651				0.020775							
TEQ PCB BIRD	0.02225				0.009458				0.021599							
TEQ PCB BIRD HALFND	0.044268				0.010986				0.046179							
TEQ PCB FISH	0.000068				0.000083				0.00105							
TEQ PCB FISH HALFND	0.000674				0.000159				0.001176							
TEQ PCB HALFND	0.013903				0.002159				0.020873							
TOTAL DDT HALFND	5.36				17.54				18.02							
TOTAL DDT POS	5.36				17.54				18.02							
TOTAL PCB CONGENERS	41.25				88.5				252.22							
TRANS-NONACHLOR	0.05	J			0.12	J			0.67	J						
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	227.3	U			52.8	U			36.1	U						
1,2,3,4,6,7,8,9-OCDF	25.8	U			4.2	U			3.3	U						
1,2,3,4,6,7,8-HPCDD	28.4	U			2.11	U			5.8	U						
1,2,3,4,6,7,8-HPCDF	14.6				2	J			2.7	UJ						
1,2,3,4,7,8,9-HPCDF	1.3	U			2.11	U			2.7	U						
1,2,3,4,7,8-HXCDD	0.50	U			2.11	U			2.7	U						
1,2,3,4,7,8-HXCDF	3.5	U			2.11	U			2.7	U						
1,2,3,6,7,8-HXCDD	2.3				2.11	U			2.7	UJ						
1,2,3,6,7,8-HXCDF	2.4	U			2.11	U			2.7	U						
1,2,3,7,8,9-HXCDD	1.3	U			2.11	U			2.7	U						
1,2,3,7,8,9-HXCDF	1.3	U			2.11	U			2.7	U						
1,2,3,7,8-PECDD	0.70	U			2.11	UJ			2.7	UJ						
1,2,3,7,8-PECDF	1.7	U			2.11	U			2.7	U						
2,3,4,6,7,8-HXCDF	3.3	U			2.11	U			2.7	U						
2,3,4,7,8-PECDF	1.3	U			0.70	U			2.7	U						
2,3,7,8-TCDD	0.30	U			0.40	U			0.50	U						
2,3,7,8-TCDF	0.30	U			0.40	U			0.50	U						
TEQ	0.376				0.02				0	U						
TEQ BIRD	0.169				0.02				0	U						
TEQ BIRD HALFND	2.189855				2.535755				4.12287	U						
TEQ FISH	0.169				0.02				0	U						
TEQ FISH HALFND	1.733855				2.497805				3.62887	U						
TEQ HALFND	1.912965				2.1998				3.07741	U						
TOTAL DIOXINS	330.7	U			66.2	U			49.2	U						
TOTAL FURANS	103.3	U			13	U			5.1	U						
TOTAL HPCDD	71.7	U			9.8	U			12	U						
TOTAL HPCDF	23.1				4				1.8	J						
TOTAL HXCDD	25	U			2.4	U			0.80	U						
TOTAL HXCDF	23.8	U			2	U			2.7	U						
TOTAL PECDD	4.4	U			0.60	U			0.30	U						
TOTAL PECDF	17.2	U			1.9	U			2.7	U						
TOTAL TCDD	2.2	U			0.50	U			0.50	U						
TOTAL TCDF	13.5	U			0.90	U			0.50	U						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-101B**		**OU4-SD-M09-101B-2**		**OU4-SD-M09-201B**		**OU4-SD-M09-201B-2**		**OU4-SD-M09-301B**		**OU4-SD-M09-301B-2**		**OU4-SD-M09-301B-2-AVG**		**OU4-SD-M09-301B-2-D**	
sample_dat	20010508		20010508		20010508		20010508		20010507		20010507		20010507		20010507	
round	04		04		04		04		04		04		04		04	
Miscellaneous Parameters (%)																
PERCENT CLAY	6.2				1.9				24.1							
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT MOISTURE																
PERCENT SAND	76.1				97.1				23.1							
PERCENT SILT	17.7				1				52.9							
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	1.21	J			2.52	J			2.18	J						
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	56.8				160.7				462.4							
C1-DIBENZOTHIOPHENES	4.4				14.5				28							
C1-FLUORANTHENES/PYRENES	81.9				208.3				598.9							
C1-FLUORENES	10.5				23.1				59.6							
C1-NAPHTHALENES	12				29.8				68							
C1-PHENANTHRENES/ANTHRACENES	46.9				123.2				291.8							
C2-CHRYSENES	23.6				110.8				260.9	J						
C2-DIBENZOTHIOPHENES	4.5				19.5				35.5							
C2-FLUORENES	11				25.7				57.2							
C2-NAPHTHALENES	8.9				26.9				54.9							
C2-PHENANTHRENES/ANTHRACENES	28.1				84.2				246.6							
C3-CHRYSENES	1.6	J			9.7				13.7							
C3-DIBENZOTHIOPHENES	2.8				13.3				30.1							
C3-FLUORENES	8				17.8				45.1							
C3-NAPHTHALENES	9.8				26.6				47.6							
C3-PHENANTHRENES/ANTHRACENES	11.9				42.8				134.1	J						
C4-CHRYSENES	12.7				44.3				39.1							
C4-NAPHTHALENES	5.8				17.8				33.8							
C4-PHENANTHRENES/ANTHRACENES	4.7				15.9				46.5							

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301B-AVG**		**OU4-SD-M09-301B-D**		**OU4-SD-M09-101A**		**OU4-SD-M09-101A-2**		**OU4-SD-M09-201A**		**OU4-SD-M09-201A-2**		**OU4-SD-M09-301A**		OU4-SD-M09-301A-2	
sample_dat	20010507		20010507		20010820		20010820		20010820		20010820		20010820		20010820	
round	04		04		05		05		05		05		05		05	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	10.7		8.5		2				7.9				10.2	J		
1-METHYLNAPHTHALENE	23.4		20.7		2.7				18.3				22.1	J		
1-METHYLPHENANTHRENE	72.95		69.6		13.6				53.2				54.5	J		
2,3,5-TRIMETHYLNAPHTHALENE	15.7		13.1		2				10				13.9	J		
2,6-DIMETHYLNAPHTHALENE	27.3	J	20.4	J	2.6				16.4				23	J		
2-METHYLNAPHTHALENE	37.05		32.2		4.4				27.4				36.2	J		
ACENAPHTHENE	71.95	J	64	J	3.3				58.6				46.6	J		
ACENAPHTHYLENE	88.2	J	79.8	J	15.5				63.7				84.3	J		
ANTHRACENE	414.75	J	434.6	J	42.2				193.8				210.4	J		
BENZO(A)ANTHRACENE	571.7		533.8		74	J			405.5	J			432.6	J		
BENZO(A)PYRENE	816.95	J	760.5	J	62.2	J			462.7	J			497.2	J		
BENZO(B)FLUORANTHENE	815.75	J	743.6		91.4	J			550				630.2	J		
BENZO(E)PYRENE	392.9	J	347.5	J	45				278.3				297.9	J		
BENZO(G,H,I)PERYLENE	362.9	J	325.3	J	36.4	J			248.8	J			292.1	J		
BENZO(K)FLUORANTHENE	314.15	J	224.8	J	25.3	J			158.1	J			155.5	J		
CHRYSENE	548.45	J	521.1	J	157.4				417.7				456.4	J		
DIBENZO(A,H)ANTHRACENE	101.6	J	81.5	J	9.1	J			63	J			74.3	J		
DIBENZOTHIOPHENE	30.05		30.4		3				24.9				25.6	J		
FLUORANTHENE	1085.1		1039.2		208.1	J			869.4				852.6	J		
FLUORENE	105.75	J	95.4	J	6.8				67.4				71.7	J		
HIGH MOLECULAR WEIGHT PAHS	4117		3847.7		735.1				2965.1				3080.4			
INDENO(1,2,3-CD)PYRENE	474.55	J	396.8	J	40.7	J			288.9	J			346.6	J		
LOW MOLECULAR WEIGHT PAHS	1345.1		1308.5		131				848.2				892.9			
NAPHTHALENE	56.1		48.7		7.8				40.3				63	J		
PERYLENE	135.25		125.1		15.7				111.5				123.8	J		
PHENANTHRENE	571.3		553.8		51				397				380.7	J		
PYRENE	993.2		911.6		224.3				746.8				767.3	J		
TOTAL PAHS ECO	5462.1		5156.2		866.1				3813.3				3973.3			
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	339.549	J	299.852	J	0.116	J	1.189	J	340.914	J	594.465	J	459.873	J	521.962	J
CADMIUM	0.45	J	0.39	J	0.17	J			0.59				0.66			
COPPER	31.4	J	30.4	J	39.21				30.86				26.74			
LEAD	56.45	J	53.5	J	41.5				54.51				59.64			
NICKEL	8.265		7.23		14.73				9.38				7.28			
ZINC	103.25	U	92.5	U	60.31				108.86				108.33			
HF Digestion Inorganics (mg/kg)																
ALUMINUM	55499.79		55421.14		50176.36				52747.4				58680.69			
ARSENIC	14.24		13.97		12.95				15.08				17.5			
CADMIUM	0.161025	J	0.23	J	0.4493	U			0.4588	U			0.4402	U		
CHROMIUM	121.94		124.15		133.02	J			107.29	J			120.77	J		
COPPER	77.395		82.01		57.7	J			79.86	J			87.83	J		
IRON	32582.62		32874.4		47298.72				31170.04				32920.51			
LEAD	91.705		94.22		50.34				93				92.23			
MANGANESE	367.005		372.02		608.12				339.36				359.24			
MERCURY	0.33	J	0.34	J	0.1176	U			0.2262				0.2588			
NICKEL	34.735		35.72		77.11				41.03				33.34			
SILVER	0.80		0.77		0.2645	UR			0.50	J			0.65	J		
ZINC	151.715	J	156.3	J	136.04				138.41				136.99			

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301B-AVG**		**OU4-SD-M09-301B-D**		**OU4-SD-M09-101A**		**OU4-SD-M09-101A-2**		**OU4-SD-M09-201A**		**OU4-SD-M09-201A-2**		**OU4-SD-M09-301A**		**OU4-SD-M09-301A-2**	
sample_dat	20010507		20010507		20010820		20010820		20010820		20010820		20010820		20010820	
round	04		04		05		05		05		05		05		05	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.315	J	0.22	J	0.25				0.35	J			0.42			
1,2,4,5-TETRACHLOROBENZENE	1.6	J	3.1	U	0.15	U			1.62	U			2.56	U		
2,4'-DDD	4.25	J	3.4	J	0.76				2.06				0.77	J		
2,4'-DDE	0.43	J	0.43	J	0.12				1.03				0.28	J		
2,4'-DDT	0.65	J	0.81	J	0.31				2.07				0.35			
4,4'-DDD	4.55	J	4	J	0.41				3.86				2.23			
4,4'-DDE	3.1	J	2.6	J	0.53				3.33				1.77			
4,4'-DDT	4.75	J	6.2	J	1.5				10.88				2.79			
ALDRIN	5.53	J	11	J	0.06	U			0.12	U			0.13	U		
ALPHA-BHC	0.175	J	0.17	J	0.03	J			0.12				0.25	J		
ALPHA-CHLORDANE	0.955	J	0.71	J	0.26				0.61				0.48	J		
BETA-BHC	0.24	J	0.24	J	0.16	U			2.11	U			0.38	U		
CHLORPYRIFOS	0.215	UJ	0.21	UJ	0.10	U			0.21	U			0.23	U		
CIS-NONACHLOR	0.485	J	0.44	J	0.18				0.42				0.25			
DELTA-BHC	0.37	J	0.47	J	0.06	U			0.14				0.46	J		
DIELDRIN	0.5095	J	0.058	UJ	0.04				0.06	U			0.07	UJ		
ENDOSULFAN II	1.3175	J	0.27	UJ	0.39				1.06				1.23			
ENDRIN	0.18	J	0.30	J	0.17				1.34				0.14	U		
GAMMA-BHC (LINDANE)	0.21	J	0.29	J	0.12	U			0.26	U			0.28	U		
GAMMA-CHLORDANE	0.19525	J	0.36	J	0.06				0.23				0.26	J		
HEPTACHLOR	0.18	J	0.31	J	0.14	U			0.29	U			0.52			
HEPTACHLOR EPOXIDE	0.04	J	0.04	J	0.04	J			0.10	U			0.11	U		
HEXACHLOROBENZENE	0.23	J	0.23	J	0.25				0.53				0.79			
MIREX	0.195	J	0.31	J	0.08	U			0.17	U			0.15	J		
OXYCHLORDANE	0.145	J	0.13	J	0.04	U			0.10	U			0.10	U		
PCB-101																
PCB-101/90	5.8	J	3.4	J	1.65				2.98				2.01	J		
PCB-105	2.15	J	1.4	J	0.48	J			1.42				1.21	J		
PCB-118	4.5	J	2.8	J	0.86				2.89				2.43			
PCB-123																
PCB-126	0.2125	J	0.47	UJ	0.03	J			0.86	U			0.93	U		
PCB-128	1.65	J	1.1	J	0.40				1.49				1.56			
PCB-138																
PCB-138/160	8.6	J	6.2	J	2.65				5.89				5.35	J		
PCB-149/123	5.55	J	3.8	J	1.87				3.47				3.19			
PCB-153																
PCB-153/132	9.1	J	6.2	J	2.53				5.98				5.5	J		
PCB-156	1.2975	J	2.2	J	0.40				0.77	U			0.83	U		
PCB-167	1.3	J	1.6		0.47				1.55				1.74	J		
PCB-169	0.04	J	0.04	J	0.40	U			0.01	J			0.01	J		
PCB-170																
PCB-170/190	24.5	J	16	J	6.23				12.26	J			14.68	J		
PCB-18																
PCB-18/17	0.495	J	0.16	UJ	0.47				0.97				0.21	J		
PCB-180	4.8	J	3.3	J	2.28				3.56				5.01	J		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301B-AVG**		**OU4-SD-M09-301B-D**		**OU4-SD-M09-101A**		**OU4-SD-M09-101A-2**		**OU4-SD-M09-201A**		**OU4-SD-M09-201A-2**		**OU4-SD-M09-301A**		OU4-SD-M09-301A-2	
sample_dat	20010507		20010507		20010820		20010820		20010820		20010820		20010820		20010820	
round	04		04		05		05		05		05		05		05	
PCB-187	6	J	6.8		1.93				2.55				3.63	J		
PCB-189	0.325	J	0.21	J	0.11	J			0.57	J			0.35	J		
PCB-195																
PCB-195/208	4.2	J	2.3	J	1.32				2.78				9	J		
PCB-201/157/173	0.90	J	0.60	J	0.38				0.78				1.11			
PCB-206	9.1	J	5.2	J	2.24				5.29				20.26	J		
PCB-209	3.27	J	1.34	J	0.54				2.32				9.4	J		
PCB-28	2.08	J	0.26	J	0.77				2.35				2.67			
PCB-44	1.66	J	0.62	J	0.50				0.73				0.70	J		
PCB-52	2.7	J	1	J	0.83				0.95				1.29			
PCB-66	1.4	J	1.2		0.34				0.60				1.27			
PCB-77	0.085	J	0.13	J	0.01	J			0.24	J			0.17	J		
PCB-8/5	0.775	J	0.50	U	0.32				1.14				0.90			
PCB-81	0.10	J	0.10	J	0.40	U			0.04	J			0.03	J		
PENTACHLOROANISOLE	0.1475	J	0.11	U	0.12				0.18	J			0.25			
PENTACHLOROBENZENE	0.20	J	0.18	UJ	0.22				0.24				0.19	J		
TEQ PCB	0.022968		0.001621		0.003137				0.000656				0.000626			
TEQ PCB BIRD	0.036092		0.017044		0.00366				0.016316				0.011819			
TEQ PCB BIRD HALFND	0.036131		0.040582		0.023878				0.059358				0.058403			
TEQ PCB FISH	0.001201		0.000128		0.000173				0.000097				0.000083			
TEQ PCB FISH HALFND	0.001203		0.001305		0.000284				0.002249				0.002412			
TEQ PCB HALFND	0.02298		0.025132		0.009202				0.043669				0.04715			
TOTAL DDT HALFND	17.73		17.44		3.63				23.23				8.19			
TOTAL DDT POS	17.73		17.44		3.63				23.23				8.19			
TOTAL PCB CONGENERS	185.56		118.9		52.68				112.3				174.16			
TRANS-NONACHLOR	0.585	J	0.50	J	0.09				0.25				0.35			
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	380.3	U	724.5	U	282.6				889.6				2889.4			
1,2,3,4,6,7,8,9-OCDF	27.8	U	52.3	U	19.8				54.1				144.8			
1,2,3,4,6,7,8-HPCDD	48.3	U	90.8	U	36.2	U			119.1				297.2			
1,2,3,4,6,7,8-HPCDF	13.825	J	26.3	J	29.3				32.2	U			92.2			
1,2,3,4,7,8,9-HPCDF	1.2	J	1.2	J	1.8				2	J			4.8			
1,2,3,4,7,8-HXCDD	2.05	U	1.4	U	1.42	U			1.3	J			3.9			
1,2,3,4,7,8-HXCDF	3	U	3.3	U	6.3				3.5				9.5			
1,2,3,6,7,8-HXCDD	3.125	J	4.9	J	2.5				6.1				13.6			
1,2,3,6,7,8-HXCDF	2.5	U	2.3	U	5.5				3				8.5			
1,2,3,7,8,9-HXCDD	2.9	U	3.1	U	1.42	U			3.5				8.6			
1,2,3,7,8,9-HXCDF	2.95	U	3.2	U	1.42	U			2.53	U			3.11	U		
1,2,3,7,8-PECDD	2.275	J	3.2	J	1.42	U			2.53	U			3.11	U		
1,2,3,7,8-PECDF	2.95	U	3.2	U	2.6	U			2.53	U			3.11	U		
2,3,4,6,7,8-HXCDF	3.15	U	3.6	U	7				4.9				11			
2,3,4,7,8-PECDF	2.95	U	3.2	U	6.8				3.3				3.11	UJ		
2,3,7,8-TCDD	0.55	U	0.60	U	0.28	UR			0.51	UR			0.62	UR		
2,3,7,8-TCDF	1.3	U	2.1	U	0.28	UR			0.51	UR			2.1	J		
TEQ	2.73775		3.965		4.57172				4.71411				10.57226			
TEQ BIRD	2.4565		3.524		9.04624				5.14947				7.76162			
TEQ BIRD HALFND	5.824805		7.52824		10.08184				6.82847				11.18262			
TEQ FISH	2.4565		3.524		5.64624				3.76947				6.74762			
TEQ FISH HALFND	4.726805		5.82624		6.87244				5.38522				9.31337			
TEQ HALFND	4.694715		6.31352		5.71472				6.30456				12.79591			
TOTAL DIOXINS	521.7	U	994.2	U	2600.5				1244.2				3753.9			
TOTAL FURANS	85.7	U	166.3	U	383				220.5				540			
TOTAL HPCDD	112.75	U	213.5	U	323.8				279.6				688.4			
TOTAL HPCDF	27.05	J	52.3	J	97				74.5				189			
TOTAL HXCDD	26.3	U	51.8	U	47				65.9				151.6			
TOTAL HXCDF	18.35	U	34	U	45.2				48				113.3			
TOTAL PECDD	1.7	U	3.1	U	7.9				8				21.4			
TOTAL PECDF	10.75	U	18.8	U	48.4	U			30.4	U			64.7	U		
TOTAL TCDD	0.85	U	1.2	U	2.2	J			1.1	J			3.1	J		
TOTAL TCDF	4.7	U	8.9	U	28.3	J			13.4	J			28.2	J		

location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301B-AVG**		**OU4-SD-M09-301B-D**		**OU4-SD-M09-101A**		**OU4-SD-M09-101A-2**		**OU4-SD-M09-201A**		**OU4-SD-M09-201A-2**		**OU4-SD-M09-301A**		**OU4-SD-M09-301A-2**	
sample_dat	20010507		20010507		20010820		20010820		20010820		20010820		20010820		20010820	
round	04		04		05		05		05		05		05		05	
Miscellaneous Parameters (%)																
PERCENT CLAY	23.55		23		1.9				22.6				33.1			
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL																
PERCENT MEDIUM SAND																
PERCENT MOISTURE																
PERCENT SAND	23.4		23.7		95.9				48.2				13.1			
PERCENT SILT	53.1		53.3		2.2				29.2				53.8			
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON	2.68	J	3.18	J	0.44				1.79				0.89	J		
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	376.45		290.5		56.9				228.1				280.9	J		
C1-DIBENZOTHIOPHENES	25.5		23		4.7				20.5				24.3	J		
C1-FLUORANTHENES/PYRENES	520.7		442.5		102.6				365.8				404.9	J		
C1-FLUORENES	51.2		42.8		5.6				31.7				41	J		
C1-NAPHTHALENES	60.45		52.9		7				45.6				58.3	J		
C1-PHENANTHRENES/ANTHRACENES	264.75		237.7		43.7				145.3				163.3	J		
C2-CHRYSENES	186.4	J	111.9	J	17				133.5				118.9	J		
C2-DIBENZOTHIOPHENES	31.65		27.8		5.9				24.9				27.8	J		
C2-FLUORENES	46.35		35.5		8.9				36.5				43.7	J		
C2-NAPHTHALENES	49.2		43.5		5.3				35.1				49.2	J		
C2-PHENANTHRENES/ANTHRACENES	203.5		160.4		36.7				123.4				140.6	J		
C3-CHRYSENES	12.15		10.6		1	J			13.5				11.4	J		
C3-DIBENZOTHIOPHENES	25.45		20.8		3.7				21.9				23.8	J		
C3-FLUORENES	36.35		27.6		7.5				23.7				30.1	J		
C3-NAPHTHALENES	42.05		36.5		6.3				31.3				42.5	J		
C3-PHENANTHRENES/ANTHRACENES	104.1	J	74.1	J	16				58.6				70.1	J		
C4-CHRYSENES	51.85		64.6		0.90	J			13.8				34.2	J		
C4-NAPHTHALENES	28.55		23.3		3.9				22.7				28.9	J		
C4-PHENANTHRENES/ANTHRACENES	39.95		33.4		2.7				16.4				42.6	J		

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location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301A-2-AVG**		**OU4-SD-M09-301A-2-D**		**OU4-SD-M09-301A-AVG**		**OU4-SD-M09-301A-D**		**OU4-SD-M09-102A**		**OU4-SD-M09-202A**		**OU4-SD-M09-302A**		**OU4-SD-M09-302A-AVG**	
sample_dat	20010820		20010820		20010820		20010820		20020810		20020810		20020810		20020810	
round	05		05		05		05		06		06		06		06	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL					12.15		14.1		12.7	J	4		12.7		15	J
1-METHYLNAPHTHALENE					25.35		28.6		22.1	J	6.9		30.6		27.85	
1-METHYLPHENANTHRENE					69.85		85.2		168.8	J	22.4		87.8		91.8	
2,3,5-TRIMETHYLNAPHTHALENE					15.4		16.9		16.6	J	5.2		15.6	J	18.25	J
2,6-DIMETHYLNAPHTHALENE					23.3		23.6		22.7	J	7.2		18.8		22.4	
2-METHYLNAPHTHALENE					39.6		43		25	J	13.8		46.6	J	43	J
ACENAPHTHENE					66.25	J	85.9	J	140	J	24		93.4	J	90.1	J
ACENAPHTHYLENE					92.7		101.1		30.4	J	27.3		117.7	J	97.45	J
ANTHRACENE					292.8	J	375.2	J	867.9	J	109.4	J	536.2	J	428.2	J
BENZO(A)ANTHRACENE					610.45	J	788.3	J	803.2	J	324.9	J	888.4	J	780.75	J
BENZO(A)PYRENE					716.5	J	935.8	J	1203.1	J	310.4	J	857.1	J	929	J
BENZO(B)FLUORANTHENE					817.95		1005.7		999.4	J	360		988.6	J	942.75	J
BENZO(E)PYRENE					388.7		479.5		586	J	168.2		445.6	J	480.8	J
BENZO(G,H,I)PERYLENE					403.1	J	514.1	J	474.3	J	140.9		392.9	J	439	J
BENZO(K)FLUORANTHENE					244.9	J	334.3	J	379.3	J	114.5		315.5	J	365.5	J
CHRYSENE					605.6		754.8		692.7	J	242.4		827.8	J	802.75	J
DIBENZO(A,H)ANTHRACENE					105.75	J	137.2	J	134.5	J	40.3	J	96.6	J	102.7	J
DIBENZOTHIOPHENE					36.25	J	46.9	J	76.3	J	11.1		41.1	J	42.2	J
FLUORANTHENE					1122.45		1392.3		2573	J	498.6	J	2048.9	J	1713.6	J
FLUORENE					92.8		113.9		179.5	J	22.7		112.5	J	110.5	J
HIGH MOLECULAR WEIGHT PAHS					4167.55		5254.7		8082.5		1861.3		6508		5845.75	
INDENO(1,2,3-CD)PYRENE					470.5	J	594.4	J	608	J	181.7	J	516.4	J	514.85	J
LOW MOLECULAR WEIGHT PAHS					1210.95		1529		2893		392.7		1829.3		1586.05	
NAPHTHALENE					68.75		74.5		44.7	J	23.7		81.8	J	74.6	J
PERYLENE					157.1	J	190.4	J	143.2	J	70.9		129.7	J	168.45	J
PHENANTHRENE					558.05	J	735.4	J	1605.5	J	171.8		841.1	J	742.2	J
PYRENE					1006.8		1246.3		2676	J	444.7	J	1789.2	J	1516.95	J
TOTAL PAHS ECO					5378.5		6783.7		10975.5		2254		8337.3		7431.8	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE	563.7375	J	605.513	J	531.931	J	603.989	J								
CADMIUM					0.685		0.71									
COPPER					27.565		28.39									
LEAD					63.005		66.37									
NICKEL					7.945		8.61									
ZINC					114.23	J	120.13	J								
HF Digestion Inorganics (mg/kg)																
ALUMINUM					56459.97		54239.25		51817		57401		55562		57934.5	
ARSENIC					16.24		14.98		10.5		15		15.8		15.35	
CADMIUM					0.4547	U	0.4692	U	2.2	U	1.5	U	2	U	1.4	
CHROMIUM					120.69	J	120.61	J	115		70.9		119		118	
COPPER					76.755		65.68		128		211		77.8		73.35	
IRON					32511.615		32102.72		52212		35885		38994		34484	
LEAD					88.31	J	84.39	J	85.3		121		94.5		90.75	J
MANGANESE					369.2		379.16		515		299		382		373	
MERCURY					0.2692		0.2795		0.13	J	0.18	J	0.27	J	0.265	J
NICKEL					33.97	J	34.6	J	107		43.3		39.2		36.35	
SILVER					0.64	J	0.63	J	0.21	U	0.46	U	0.72		0.73	
ZINC					139.435		141.88		170		350		142		145	

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location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301A-2-AVG**		**OU4-SD-M09-301A-2-D**		**OU4-SD-M09-301A-AVG**		**OU4-SD-M09-301A-D**		**OU4-SD-M09-102A**		**OU4-SD-M09-202A**		**OU4-SD-M09-302A**		**OU4-SD-M09-302A-AVG**	
sample_dat	20010820		20010820		20010820		20010820		20020810		20020810		20020810		20020810	
round	05		05		05		05		06		06		06		06	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE					0.425		0.43		2.5		0.20		0.39	J	0.40	J
1,2,4,5-TETRACHLOROBENZENE					2.72	U	2.88	U	4.3		0.62		1.4	J	2.13	J
2,4'-DDD					1.885	J	3	J	3.9		1.1		1.2	J	3.175	J
2,4'-DDE					0.205	J	0.13	J	0.27	J	0.01	J	0.14	U	0.165	
2,4'-DDT					0.46		0.57		16	J	0.67	J	0.53		0.63	
4,4'-DDD					2.84		3.45		15		3		4.3	J	5.9	J
4,4'-DDE					2.185		2.6		12		1.8		2	J	2.92	J
4,4'-DDT					2.63		2.47		108	J	3.3	J	2.1		2.525	J
ALDRIN					0.13	U	0.13	U	4.3		0.60		2.5	J	2.015	J
ALPHA-BHC					0.195	J	0.14	J	0.05		0.05	J	0.05	J	0.10	J
ALPHA-CHLORDANE					0.975	J	1.47	J	0.85		0.25		0.40	J	0.63	J
BETA-BHC					0.895	U	1.41	U	0.18	U	0.20	U	0.39	U	0.24	J
CHLORPYRIFOS					0.23	U	0.23	U	1.5		0.12	U	0.17	J	0.19	J
CIS-NONACHLOR					0.43	J	0.61	J	0.41		0.28		0.38		0.495	
DELTA-BHC					0.355	J	0.25	J	0.06	U	0.07	U	0.13	U	0.13	U
DIELDRIN					0.07	U	0.07	U	0.04		0.16		0.05	J	0.15	J
ENDOSULFAN II					1.53		1.83		0.08	J	0.06	J	0.25	J	0.54	J
ENDRIN					1.67		3.27		0.05	J	0.07	U	0.14	U	0.14	U
GAMMA-BHC (LINDANE)					0.10	J	0.10	J	0.13	U	0.14	U	0.29	U	0.11	J
GAMMA-CHLORDANE					0.26	J	0.54	U	0.79		0.45		0.34	J	0.505	J
HEPTACHLOR					0.445		0.37		0.18		0.17	U	0.33	U	0.14	J
HEPTACHLOR EPOXIDE					0.11	U	0.11	U	0.05	U	0.06	U	0.11	U	0.01	J
HEXACHLOROBENZENE					0.66		0.53		0.82		0.13		0.13	J	0.26	J
MIREX					0.43	J	0.71	J	0.21		0.05	J	0.25		0.29	
OXYCHLORDANE					0.155		0.26		0.19		0.06	U	0.16		0.20	
PCB-101																
PCB-101/90					3.075	J	4.14	J	4.1		3.4		4.5		5.85	J
PCB-105					1.95	J	2.69	J	0.80		0.61		1.1	J	2.085	J
PCB-118					3.205		3.98		2.3		2		3.3	J	4.78	J
PCB-123																
PCB-126					0.9313	U	0.9326	U	0.07	J	0.02	J	0.06	J	0.07	J
PCB-128					1.73		1.9		0.83		0.66		1.1		1.46	J
PCB-138																
PCB-138/160					6.655		7.96		5.6		4.7		5.8	J	8.54	J
PCB-149/123					4.005		4.82		4.2		3.6		4.4		5.545	J
PCB-153																
PCB-153/132					6.89		8.28		7.5		6.5		8.1		9.69	J
PCB-156					0.83	U	0.83	U	1.1		0.09	J	2		1.215	
PCB-167					2.46	J	3.18	J	0.77		0.49		0.74	J	0.93	J
PCB-169					0.01	J	0.01	J	0.01	J	0.01	J	0.04	J	0.0325	J
PCB-170																
PCB-170/190					18.96	J	23.24	J	8.8	J	6	J	26	J	27.145	J
PCB-18																
PCB-18/17					0.415	J	0.62	J	0.19		0.33		0.69	J	1.07	J
PCB-180					5.52		6.03		4.3		3.2		5.6		7.17	J

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location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301A-2-AVG**		**OU4-SD-M09-301A-2-D**		**OU4-SD-M09-301A-AVG**		**OU4-SD-M09-301A-D**		**OU4-SD-M09-102A**		**OU4-SD-M09-202A**		**OU4-SD-M09-302A**		**OU4-SD-M09-302A-AVG**	
sample_dat	20010820		20010820		20010820		20010820		20020810		20020810		20020810		20020810	
round	05		05		05		05		06		06		06		06	
PCB-187					3.45		3.27		5.5		3.2		3.9		4.825	
PCB-189					0.505	J	0.66	J	0.34	J	0.14	J	0.27	J	0.37	J
PCB-195																
PCB-195/208					5.88	J	2.76	J	2.4		2.3		3.5	J	3.5	J
PCB-201/157/173					1.15		1.19		1.1		0.76		0.60	J	1.205	J
PCB-206					13.12	J	5.98	J	4.3		4.9		5.2	J	5.655	J
PCB-209					5.98	J	2.56	J	0.84		1		2.9	J	2.75	J
PCB-28					1.475		0.56	U	1.4		0.97		2.4		3.085	J
PCB-44					1.17	J	1.64	J	2.3		0.54		0.98	J	1.59	J
PCB-52					1.36		1.43		2		1.3		2.1	J	3.005	J
PCB-66					1.26		1.25		0.81		0.41		0.83	J	1.495	J
PCB-77					0.14	J	0.11	J	0.03	J	0.04	J	0.42	J	0.275	J
PCB-8/5					1.2		1.5		0.47		0.48		0.90	J	1.55	J
PCB-81					0.03	J	0.03	J	0.02	J	0.03	J	0.09	J	0.09	J
PENTACHLOROANISOLE					0.22	J	0.19	J	0.11		0.06	J	0.12	J	0.235	J
PENTACHLOROBENZENE					0.145		0.20	U	2.5		0.14		0.21	J	0.46	J
TEQ PCB					0.00072		0.000816		0.007627		0.002544		0.007641		0.008513	
TEQ PCB BIRD					0.010422		0.009025		0.010886		0.007218		0.036497		0.030348	
TEQ PCB BIRD HALFND					0.057071		0.055739		0.010906		0.00724		0.036539		0.030391	
TEQ PCB FISH					0.000096		0.000108		0.000418		0.000157		0.000451		0.000506	
TEQ PCB FISH HALFND					0.002428		0.002444		0.000419		0.000158		0.000453		0.000508	
TEQ PCB HALFND					0.047309		0.04747		0.007633		0.00255		0.007654		0.008526	
TOTAL DDT HALFND					10.205		12.22		155.17		9.88		10.2		15.315	
TOTAL DDT POS					10.205		12.22		155.17		9.88		10.13		15.315	
TOTAL PCB CONGENERS					166.59		159.02		108.88		85		157.8		190.49	
TRANS-NONACHLOR					0.35		0.35		0.57		0.25		0.24	J	0.385	J
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD					2633.8		2378.2		296.8		571.8		2386.9	J	1721.15	J
1,2,3,4,6,7,8,9-OCDF					134.5		124.2		38.1		37.1		65.8	J	35.1	J
1,2,3,4,6,7,8-HPCDD					296.15		295.1		48.1	J	87.3	J	344.1	J	238	J
1,2,3,4,6,7,8-HPCDF					92.2		89.7	U	40		34		74.5	J	56.8	J
1,2,3,4,7,8,9-HPCDF					4.55		4.3		1.71	U	1.72	U	4.24	UJ	4.32	UJ
1,2,3,4,7,8-HXCDD					2.6075		2.63	U	1.2	J	1.72	U	4.24	U	4.32	U
1,2,3,4,7,8-HXCDF					8.6		7.7		1.71	U	6		8.1		7	
1,2,3,6,7,8-HXCDD					13.75		13.9		2		1.72	U	4.24	U	4.32	U
1,2,3,6,7,8-HXCDF					7.35		6.2		1.71	U	3.5		4.24	U	4.32	U
1,2,3,7,8,9-HXCDD					8.45		8.3		2.2		1.72	U	4.24	U	4.32	U
1,2,3,7,8,9-HXCDF					2.87	U	2.63	U	1.71	U	1.72	U	4.24	U	4.32	U
1,2,3,7,8-PECDD					2.4275		3.3		1.71	U	1.72	U	4.24	U	0.80	J
1,2,3,7,8-PECDF					3		3		1.71	U	1.72	U	4.24	UJ	4.32	UJ
2,3,4,6,7,8-HXCDF					10.45		9.9		1.71	U	1.72	U	4.24	U	4.32	U
2,3,4,7,8-PECDF					3.9775	J	6.4	J	1.71	U	1.72	U	4.24	UJ	3.26	
2,3,7,8-TCDD					0.53	U	0.53	U	0.34	U	0.34	U	0.85	U	0.875	UJ
2,3,7,8-TCDF					4	J	5.9	J	0.34	U	0.34	U	0.85	U	0.875	U
TEQ					13.99099		14.24472		1.52147		2.34567		5.73181		5.952875	
TEQ BIRD					15.998355		19.83734		0.78159		1.43819		2.14437		5.741625	
TEQ BIRD HALFND					16.406855		20.74809		3.26764		3.90239		8.44277		7.847825	
TEQ FISH					10.47248		10.13534		1.12359		1.43819		2.14437		4.111625	
TEQ FISH HALFND					10.88098		11.63784		2.97789		3.57749		7.63622		6.4718	
TEQ HALFND					14.39949		15.22122		3.19617		4.11507		10.31211		7.816525	
TOTAL DIOXINS					3520.45		3287		455.5		849		4334.9		2889.5	J
TOTAL FURANS					531.35		522.7		199.6		184.4		281.9		190.65	
TOTAL HPCDD					692.25		696.1		121.7		220.7		1369.3		855.7	J
TOTAL HPCDF					189		199.2	U	52.4		61.6		92.2		65.65	
TOTAL HXCDD					162.8		174		30.3		51.4		552		298.9	J
TOTAL HXCDF					107.9		102.5		51.2		41.2		107.9		70.95	
TOTAL PECDD					22.45		23.5		1.71	U	1.72	U	26.7		13.75	J
TOTAL PECDF					53.5		53.5		14		17.2		60.7		41.25	
TOTAL TCDD					9.2	J	15.3	J	6.7		5.1		0.85	U	0.875	U
TOTAL TCDF					35.75		43.3		43.8		27.4		21		12.75	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3	
nsample	**OU4-SD-M09-301A-2-AVG**		**OU4-SD-M09-301A-2-D**		**OU4-SD-M09-301A-AVG**		**OU4-SD-M09-301A-D**		**OU4-SD-M09-102A**		**OU4-SD-M09-202A**		**OU4-SD-M09-302A**		**OU4-SD-M09-302A-AVG**	
sample_dat	20010820		20010820		20010820		20010820		20020810		20020810		20020810		20020810	
round	05		05		05		05		06		06		06		06	
Miscellaneous Parameters (%)																
PERCENT CLAY					32.55		32		6.1		7.9		27.7		28.75	
PERCENT COARSE SAND																
PERCENT FINE SAND																
PERCENT FINES																
PERCENT GRAVEL									29.6		24.8		0.00		0.00	
PERCENT MEDIUM SAND																
PERCENT MOISTURE																
PERCENT SAND					13.05		13		59.8		57.1		18.6		15.05	
PERCENT SILT					54.35		54.9		4.5		10.1		53.7		56.2	
PERCENT SOLIDS																
SIEVE 1"																
SIEVE 1-1/2"																
SIEVE 2"																
SIEVE 3"																
SIEVE 3/4"																
SIEVE 3/8"																
SIEVE NO. 004																
SIEVE NO. 010																
SIEVE NO. 020																
SIEVE NO. 040																
SIEVE NO. 060																
SIEVE NO. 080																
SIEVE NO. 100																
SIEVE NO. 140																
SIEVE NO. 200																
TOTAL ORGANIC CARBON					1.61	J	2.33	J	0.39	J	0.78	J	3.09	J	2.805	J
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES					370.3		459.7		359.2	J	139.6		383.4	J	414.2	J
C1-DIBENZOTHIOPHENES					30.6		36.9		82.7	J	11.6		36.1	J	39.15	J
C1-FLUORANTHENES/PYRENES					526.95		649		982.3	J	206.5		771.3	J	737.25	J
C1-FLUORENES					45.1		49.2		118.2	J	12.5		49.3	J	51.6	J
C1-NAPHTHALENES					64.95		71.6		47.1	J	20.7		77.2	J	70.85	J
C1-PHENANTHRENES/ANTHRACENES					236.8	J	310.3	J	728.6	J	68.2		220.8	J	273.9	J
C2-CHRYSENES					140.5		162.1		135.4	J	102.4		153.2	J	181.45	J
C2-DIBENZOTHIOPHENES					35.3		42.8		57.5	J	11.8		37.7	J	39.95	J
C2-FLUORENES					49.7		55.7		121.9	J	13.1		45.6	J	50.15	J
C2-NAPHTHALENES					49.5		49.8		48.2	J	12.5		58	J	55.55	J
C2-PHENANTHRENES/ANTHRACENES					178.55		216.5		314.1	J	64.9		196.9	J	221.45	J
C3-CHRYSENES					9.5	J	7.6	J	18	J	60.7		14	J	24.85	J
C3-DIBENZOTHIOPHENES					25.65		27.5		30.5	J	14.3		30.4	J	31.9	J
C3-FLUORENES					30.95		31.8		102	J	17.6		63.4	J	69.45	J
C3-NAPHTHALENES					38.85		35.2		37.5	J	13		46.4	J	51.5	J
C3-PHENANTHRENES/ANTHRACENES					85.6		101.1		146.9	J	33.5		112.2	J	120.8	J
C4-CHRYSENES					19.25	J	4.3	J	19.7	J	30.4		35.8	J	41.7	J
C4-NAPHTHALENES					30.95		33		14.5	J	11.7		38	J	35.6	J
C4-PHENANTHRENES/ANTHRACENES					40.2		37.8		29.5	J	10.5		37.6	J	49.1	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1A		MS-9 LOC.1A	
nsample	**OU4-SD-M09-302A-D**		**OU4-SD-M09-103A**		**OU4-SD-M09-203A**		**OU4-SD-M09-303A**		**OU4-SD-M09-303A-AVG**		**OU4-SD-M09-303A-D**		**OU4-SD-M09-105A**		**OU4-SD-M09-105A-AVG**	
sample_dat	20020810		20030811		20030810		20030810		20030810		20030810		20050820		20050820	
round	06		07		07		07		07		07		08		08	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	17.3	J	42.1		33.2		34.4		32.75		31.1		53	J	42.5	J
1-METHYLNAPHTHALENE	25.1		90.6		54.7		63.1		59.25		55.4		110		88.5	
1-METHYLPHENANTHRENE	95.8		218.5		169.3		190.8		176.35		161.9		360		315	
2,3,5-TRIMETHYLNAPHTHALENE	20.9		49.6		25.9		46.7		43.55		40.4		63	J	56	J
2,6-DIMETHYLNAPHTHALENE	26		76.9		41.2		67.2		63.2		59.2		84	J	72	J
2-METHYLNAPHTHALENE	39.4		148.2		65.9		113.6		105.25		96.9		150		120.5	
ACENAPHTHENE	86.8		420.6		435.3		263.5		245.9		228.3		540	J	425	J
ACENAPHTHYLENE	77.2	J	145.7		96.4		164.7		156.05		147.4		42	J	39	J
ANTHRACENE	320.2	J	1198.5		1009.2		967.3		915.1		862.9		1200		980	
BENZO(A)ANTHRACENE	673.1		2225.2		1514.5		1554.3		1527.15		1500		2400		2150	
BENZO(A)PYRENE	1000.9		2923.8	J	1750.1		2257		2206.85		2156.7		2400		2200	
BENZO(B)FLUORANTHENE	896.9	J	2887.3		1729.3		2255.7		2139.7		2023.7		3400	J	2700	J
BENZO(E)PYRENE	516		1398.8	J	896		1127.7		1088.1		1048.5		1600		1450	
BENZO(G,H,I)PERYLENE	485.1		1463.1	J	990.3		1322.8		1278.3		1233.8		1600		1450	
BENZO(K)FLUORANTHENE	415.5		980.2	J	540.8		650.3		643.05		635.8		1700		1750	
CHRYSENE	777.7		1997.2	J	1051.4		1431		1310.35		1189.7		2200		2050	
DIBENZO(A,H)ANTHRACENE	108.8		369.4	J	243.7		325		310.6		296.2		570		510	
DIBENZOTHIOPHENE	43.3	J	143.7		144.4		105.3		98.65		92		250		200	
FLUORANTHENE	1378.3	J	4510.6		3846.9		3472		3203.95		2935.9		6700	J	5850	J
FLUORENE	108.5		473.5		539.9		333.9		311.3		288.7		530	J	415	J
HIGH MOLECULAR WEIGHT PAHS	5183.5		15650.8		11516.5		11946.1		11260.75		10575.4		19370		17210	
INDENO(1,2,3-CD)PYRENE	513.3		1853	J	1128.9		1489.6		1450.8		1412		1600		1450	
LOW MOLECULAR WEIGHT PAHS	1342.8		5104.5		4348.3		3718.9		3477.35		3235.8		6712		5394.5	
NAPHTHALENE	67.4		205.2		110.9		140.8		133.55		126.3		350	J	265	J
PERYLENE	207.2		531.5		341.2		471.1		438.6		406.1		620		570	
PHENANTHRENE	643.3		2512.8		2090.7		1735.1		1610.2		1485.3		3900		3150	
PYRENE	1244.7	J	3624.6		3109.9		2906.8		2701.85		2496.9		5100	J	4450	J
TOTAL PAHS ECO	6526.3		20755.3		15864.8		15665		14738.1		13811.2		26082		22604.5	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE																
CADMIUM																
COPPER																
LEAD																
NICKEL																
ZINC																
HF Digestion Inorganics (mg/kg)																
ALUMINUM	60307		54927.42	J	34865.73	J	39764.32	J	44980.47	J	50196.62	J	51720		51720	
ARSENIC	14.9		24.22		13		21.15		22.16		23.17		18.81		18.81	
CADMIUM	1.4		5.64		4.3		5.76		5.575		5.39		0.98		0.98	
CHROMIUM	117		138.24		93.97		138.4		137.94		137.48		123.13	J	123.13	J
COPPER	68.9		1144.58		525.58		785.47		761.365		737.26		891.58	J	891.58	J
IRON	29974		50715.66		31908.7		39955.31		41942.065		43928.82		37221	J	37221	J
LEAD	87	J	761.6		518.6		703.7		706.65		709.6		506.38	J	506.38	J
MANGANESE	364		771.47		719.92		688.7		669.215		649.73		571		571	
MERCURY	0.26	J	1.38	J	2.79		4.19		4.21		4.23					
NICKEL	33.5		227.65		139.77		208		201.535		195.07		188.05		188.05	
SILVER	0.74		2.52		2.09		3.01		2.92		2.83		2.79	J	2.79	J
ZINC	148		694.67		515.04		618.03		603.805		589.58		703.31	J	703.31	J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1A		MS-9 LOC.1A	
nsample	**OU4-SD-M09-302A-D**		**OU4-SD-M09-103A**		**OU4-SD-M09-203A**		**OU4-SD-M09-303A**		**OU4-SD-M09-303A-AVG**		**OU4-SD-M09-303A-D**		**OU4-SD-M09-105A**		**OU4-SD-M09-105A-AVG**	
sample_dat	20020810		20030811		20030810		20030810		20030810		20030810		20050820		20050820	
round	06		07		07		07		07		07		08		08	
Inorganics (mg/kg)																
ALUMINUM			18400	J	7960	J	16600	J								
ARSENIC			20.6	J	11.7	J	19.2	J								
CADMIUM			1.2	J	0.63	J	1.2	J								
CHROMIUM			103	J	47.5	J	93	J								
COPPER			1100	J	517	J	608	J								
IRON			36200	J	22800	J	30700	J								
LEAD			614	J	382	J	568	J								
MANGANESE			595	J	491	J	466	J								
MERCURY																
NICKEL			217	J	153	J	175	J								
SILVER			2.6	J	1.2	J	2.5	J								
ZINC			733	J	465	J	569	J								
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE	0.41	J	5.55		3.74		5.47		5.165		4.86					
1,2,4,5-TETRACHLOROBENZENE	2.86	J	11.17		7.26		10.43		10.135		9.84					
2,4'-DDD	5.15		11.36		7.54		21.24		25.605		29.97		18		18	
2,4'-DDE	0.26		0.73		0.50		0.84		0.905		0.97		55	R	55	R
2,4'-DDT	0.73		9.25		11.43		13.79		15.295		16.8		7.5	J	7.5	J
4,4'-DDD	7.5	J	49.13		183.39		66.87		68.985		71.1		49		49	
4,4'-DDE	3.84	J	13.33		10.33		28.98		30.705		32.43		31	J	31	J
4,4'-DDT	2.95	J	46.54		90.19		83.9		84.1		84.3		64	R	64	R
ALDRIN	1.53	J	0.50		0.062	U	0.104	U	0.096	U	0.088	U	1.7	R	1.7	R
ALPHA-BHC	0.15	J	0.02	J	0.08		0.09		0.09		0.09		1	U	1	U
ALPHA-CHLORDANE	0.86	J	3.48		1	J	2.3	J	2.24	J	2.18	J	4.8	J	4.8	J
BETA-BHC	0.24	J	0.10	J	0.185	U	0.311	U	0.287	U	0.263	U	2.7	J	2.7	J
CHLORPYRIFOS	0.21	J	0.18	U	0.113	U	1.27	J	1.84	J	2.41	J				
CIS-NONACHLOR	0.61		2.89	J	2.29		3.02		3.025		3.03		2.3	U	2.3	U
DELTA-BHC	0.13	U	0.02	J	0.37		0.67		0.655		0.64		2.3	R	2.3	R
DIELDRIN	0.25	J	1.59		1.77		2.61	J	1.316	J	0.044	UJ	34	J	34	J
ENDOSULFAN II	0.83	J	0.23	U	1.4		3.1		3.215		3.33		2.3	U	2.3	U
ENDRIN	0.14	U	0.10	U	0.062	U	0.104	U	0.096	U	0.088	U	6.2	R	6.2	R
GAMMA-BHC (LINDANE)	0.11	J	0.24		0.134	U	0.224	U	0.207	U	0.19	U	1.6	J	1.6	J
GAMMA-CHLORDANE	0.67	J	0.21		0.31		1.4		1.36		1.32		6.4	J	6.4	J
HEPTACHLOR	0.14	J	1.05		0.59		0.66		0.54		0.42		1.7	R	1.7	R
HEPTACHLOR EPOXIDE	0.01	J	0.08	U	0.051	U	0.086	U	0.0795	U	0.073	U	9.1	J	9.1	J
HEXACHLOROBENZENE	0.39	J	3.72		2.87		4.82		5.47		6.12		2.6		2.6	
MIREX	0.33		0.51		0.082	U	0.138	U	0.1275	U	0.117	U	23	R	23	R
OXYCHLORDANE	0.24		0.08	U	0.47		0.55		0.57		0.59		3.9	R	3.9	R
PCB-101													66		67	
PCB-101/90	7.2	J	97.58		89.05		118.91		117.78		116.65					
PCB-105	3.07	J	12.78		26.27		37.56		38.775		39.99		15	J	13	J
PCB-118	6.26	J	69.07		57.56		81.14		81.41		81.68		45		47	
PCB-123													1.7	R	7.6	J
PCB-126	0.08	J	2.22		1.93		2.24		2.09		1.94		2	U	3.95	U
PCB-128	1.82	J	12.71		20.41		29.79		29.36		28.93		18	R	17	J
PCB-138													76		75	
PCB-138/160	11.28	J	126.24		108.06		123.56		122.725		121.89					
PCB-149/123	6.69	J	83.63		69.24		66.83		66.66		66.49					
PCB-153													71		68.5	
PCB-153/132	11.28	J	144.86		119.86		124.6		121.655		118.71					
PCB-156	0.86	U	6.62	J	7.46		12.78		14.765		16.75		9.1	J	5.7	J
PCB-167	1.12		6.15		6.71		9.3		9.64		9.98		1.2	U	2.4	U
PCB-169	0.01	J	0.05	J	0.07	J	0.05	J	0.04	J	0.03	J	1.5	U	2.95	U
PCB-170													1.6	U	3.1	U
PCB-170/190	28.29	J	81.07	J	51.67	J	54.91	J	54.58	J	54.25	J				
PCB-18													11		11	J
PCB-18/17	1.45	J	5.29		5.15		8.11		8.605		9.1					
PCB-180	8.74	J	88.83		70.57		52.73		53.63		54.53		75		68.5	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1A		MS-9 LOC.1A	
nsample	**OU4-SD-M09-302A-D**		**OU4-SD-M09-103A**		**OU4-SD-M09-203A**		**OU4-SD-M09-303A**		**OU4-SD-M09-303A-AVG**		**OU4-SD-M09-303A-D**		**OU4-SD-M09-105A**		**OU4-SD-M09-105A-AVG**	
sample_dat	20020810		20030811		20030810		20030810		20030810		20030810		20050820		20050820	
round	06		07		07		07		07		07		08		08	
PCB-187	5.75		90.08		47.53		48.29		45.88		43.47		58		57	
PCB-189	0.47	J	1.16		0.79		1.07		1.21		1.35		1.7	U	3.25	U
PCB-195													9.1		8.25	J
PCB-195/208	3.5		101.32		37.28		54.66		47.89		41.12					
PCB-201/157/173	1.81	J	9.3		4.02		6.3		5.945		5.59					
PCB-206	6.11	J	234.3		79.98		122.76		106.89		91.02		230		215	
PCB-209	2.6		69.63		28.68		42.33		37.235		32.14		53		49.5	
PCB-28	3.77	J	12.92		10.84		20.91		26.805		32.7		13	J	14	J
PCB-44	2.2	J	15.99		25.53		42.27		41.78		41.29		19		20.5	J
PCB-52	3.91	J	60.01		46.23		68.84		67.64		66.44		32		32	
PCB-66	2.16	J	6.76		6.68		10.96		12.34		13.72		21	R	24	J
PCB-77	0.13	J	1.57		1.19		2.12		2		1.88		4.7	R	4.9	U
PCB-8/5	2.2	J	2.87		3.56		4.01		4.385		4.76					
PCB-81	0.09	J	1.88		1.21		1.64		1.52		1.4		1.2	U	2.4	U
PENTACHLOROANISOLE	0.35	J	1.37		1.39		2.15		2.13		2.11					
PENTACHLOROBENZENE	0.71	J	6.34		4.3		6.21		6.225		6.24					
TEQ PCB	0.008923		0.229882		0.200744		0.232653		0.217407		0.202162		0.002073		0.002199	
TEQ PCB BIRD	0.024144		0.493021		0.378688		0.501297		0.468577		0.435859		0.00286		0.002416	
TEQ PCB BIRD HALFND	0.02423		0.493053		0.378708		0.501331		0.468608		0.435887		0.163774		0.444215	
TEQ PCB FISH	0.000554		0.013142		0.011238		0.013309		0.012504		0.011699		0.000346		0.000366	
TEQ PCB FISH HALFND	0.000558		0.013144		0.011239		0.013311		0.012506		0.0117		0.005699		0.011189	
TEQ PCB HALFND	0.008949		0.229892		0.20075		0.232663		0.217416		0.202171		0.124842		0.244727	
TOTAL DDT HALFND	20.43		130.34		303.38		215.62		225.595		235.57		105.5		105.5	
TOTAL DDT POS	20.43		130.34		303.38		215.62		225.595		235.57		105.5		105.5	
TOTAL PCB CONGENERS	223.18		2464.62		1669.82		2092.68		2038.73		1984.78		1549		1581	
TRANS-NONACHLOR	0.53	J	1.46		0.22		1.28		1.145		1.01		10	R	10	R
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	1055.4	J	499.5		616.7	U	5344.3		3877.775		4822.5	U	2900		3000	
1,2,3,4,6,7,8,9-OCDF	8.8	UJ	47.8		64.6	U	554.9		493.4		431.9		320		355	
1,2,3,4,6,7,8-HPCDD	131.9	J	83.8		133.3	U	830.3		729.2		628.1		450		480	
1,2,3,4,6,7,8-HPCDF	39.1	J	103.4		105.2		699.8		641.7		583.6		630		720	
1,2,3,4,7,8,9-HPCDF	4.4	U	6.3		14.2		43.7		41.55		39.4		42		49	
1,2,3,4,7,8-HXCDD	4.4	U	1.51	U	1.38	U	23.4		22.5		21.6		24		28.5	J
1,2,3,4,7,8-HXCDF	5.9		22.6		32.6		154.9		146.2		137.5		160		190	
1,2,3,6,7,8-HXCDD	4.4	U	1.51	U	3.6		53.2		51.15		49.1		49	J	53	J
1,2,3,6,7,8-HXCDF	4.4	U	19.4		20		122.4		118.1		113.8		120		135	
1,2,3,7,8,9-HXCDD	4.4	U	1.51	U	1.38	U	33		32.25		31.5		47	J	56.5	J
1,2,3,7,8,9-HXCDF	4.4	U	5.6		1.38	U	35.9		33.5		31.1		3.8	U	3.9	U
1,2,3,7,8-PECDD	0.80	J	1.51	U	1.38	UJ	41.5	J	32	J	22.5	J	20		22	
1,2,3,7,8-PECDF	4.4	U	11.6		10.3	J	74.4		66.65		58.9		78		85.5	
2,3,4,6,7,8-HXCDF	4.4	U	24.3		33.9		163.3		152.2		141.1		160		175	
2,3,4,7,8-PECDF	4.4		18.9		19.2		148.9		139.3		129.7		170		185	
2,3,7,8-TCDD	0.90	UJ	2		0.28	U	6.9	J	7.95	J	9		4.5		5.05	
2,3,7,8-TCDF	0.90	U	0.30	U	0.28	U	56.6	J	28.3675	J	0.27	UJ	77		82.5	
TEQ	4.73662		17.30719		16.273		177.07976		157.602102		137.38757		153.726		170.6615	
TEQ BIRD	6.41844		30.48553		30.11		322.84722		272.142818		221.06229		337.182		369.2105	
TEQ BIRD HALFND	8.57288		31.51133		31.353215		322.84722		272.142818		221.438415		337.372		369.4055	
TEQ FISH	4.21844		20.45553		19.995		198.46722		179.433693		160.15229		181.702		201.8005	
TEQ FISH HALFND	6.62738		21.61063		21.353615		198.46722		179.433693		160.400165		181.892		201.9955	
TEQ HALFND	6.64094		18.30369		18.092695		177.07976		157.602102		138.124445		153.916		170.8565	
TOTAL DIOXINS	1444.1	J	786.4		199		7824		5037.9		2251.8					
TOTAL FURANS	99.4		671.4		994.8		5901.1		5511.9		5122.7					
TOTAL HPCDD	342.1	J	162		102.6		1648.4		1521.4		1394.4		1000		1100	
TOTAL HPCDF	39.1		144.6		184.4		1210.2		1087.2		964.2		970		1085	
TOTAL HXCDD	45.8	J	79.8		3.6		600.1		609.4		618.7		640	J	715	J
TOTAL HXCDF	34		174.9		276.7		1377		1220.2		1063.4		1400		1450	
TOTAL PECDD	0.80	J	19.1		1.38	U	165		174.9		184.8		240		250	
TOTAL PECDF	21.8		169.1		283.6		1776.3		1700.2		1624.1		1600		1650	
TOTAL TCDD	0.90	U	26		21.7		66.3	J	60.1	J	53.9		150		160	
TOTAL TCDF	4.5	J	134.9		185.6		982.7		1010.9		1039.1		1600		1600	

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location	MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.3		MS-9 LOC.1A		MS-9 LOC.1A	
nsample	**OU4-SD-M09-302A-D**		**OU4-SD-M09-103A**		**OU4-SD-M09-203A**		**OU4-SD-M09-303A**		**OU4-SD-M09-303A-AVG**		**OU4-SD-M09-303A-D**		**OU4-SD-M09-105A**		**OU4-SD-M09-105A-AVG**	
sample_dat	20020810		20030811		20030810		20030810		20030810		20030810		20050820		20050820	
round	06		07		07		07		07		07		08		08	
Miscellaneous Parameters (%)																
PERCENT CLAY	29.8		13.8		0.00		24.2		20.1		16		18.7		18.7	
PERCENT COARSE SAND													0.70		0.70	
PERCENT FINE SAND													22.9		22.9	
PERCENT FINES																
PERCENT GRAVEL	0.00		0.00		5.3		0.00		0.00		0.00		21.2		21.2	
PERCENT MEDIUM SAND													5.2		5.2	
PERCENT MOISTURE													48.5		47.55	
PERCENT SAND	11.5		40.9		83.6		24		24.6		25.2					
PERCENT SILT	58.7		45.3		11.2		51.8		55.3		58.8		31.3		31.3	
PERCENT SOLIDS													51.6		48.1	
SIEVE 1"													100		100	
SIEVE 1-1/2"													100		100	
SIEVE 2"													100		100	
SIEVE 3"													100		100	
SIEVE 3/4"													81.9		81.9	
SIEVE 3/8"													81.9		81.9	
SIEVE NO. 004													78.8		78.8	
SIEVE NO. 010													78		78	
SIEVE NO. 020													76.5		76.5	
SIEVE NO. 040													72.9		72.9	
SIEVE NO. 060													67		67	
SIEVE NO. 080													62.2		62.2	
SIEVE NO. 100													59.2		59.2	
SIEVE NO. 140																
SIEVE NO. 200													50		50	
TOTAL ORGANIC CARBON	2.52	J	1.36		1		2.38		2.305		2.23		2.59		2.56	
TOTAL SOLIDS			50		79		48									
Alkylated PAHs (ug/kg)																
C1-CHRYSENES	445		980.9		583.1		762.7		701.75		640.8					
C1-DIBENZOTHIOPHENES	42.2		96.6		67.6		84.6		79.7		74.8					
C1-FLUORANTHENES/PYRENES	703.2		1669.3		1220.9		1392.5		1260.95		1129.4					
C1-FLUORENES	53.9	J	141.1		140.1		130.7		119.4		108.1					
C1-NAPHTHALENES	64.5		238.9		120.6		176.7		164.5		152.3					
C1-PHENANTHRENES/ANTHRACENES	327		798.9		650.2		689.1		641.9		594.7					
C2-CHRYSENES	209.7		489.6		235.9		315.6		291.2		266.8					
C2-DIBENZOTHIOPHENES	42.2		115.2		63.9		110.5		98.2		85.9					
C2-FLUORENES	54.7		133.9		100.6		172.9		139.95		107					
C2-NAPHTHALENES	53.1		163.3		95.8		139.1		128.7		118.3					
C2-PHENANTHRENES/ANTHRACENES	246		549.1		332.2		449.3		428.15		407					
C3-CHRYSENES	35.7	J	70.6		59.3		59		58.25		57.5					
C3-DIBENZOTHIOPHENES	33.4		74.7		69.2		68.9		64.05		59.2					
C3-FLUORENES	75.5		126.3		129.7		105.6		97.75		89.9					
C3-NAPHTHALENES	56.6		155.7		84.3		154.7		140.6		126.5					
C3-PHENANTHRENES/ANTHRACENES	129.4		289.1		198.6		288.6		277		265.4					
C4-CHRYSENES	47.6		7	J	3.6	J	7.1	J	4.85	J	2.6	J				
C4-NAPHTHALENES	33.2		111.7		44.2		103.2		96.25		89.3					
C4-PHENANTHRENES/ANTHRACENES	60.6		163.6		116		171.4		153.6		135.8					

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location	MS-9 LOC.1A		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-105A-D**		**OU4-SD-M09-205A**		**OU4-SD-M09-305A**		**OU4-SD-M09-107A**		**OU4-SD-M09-207A**		**OU4-SD-M09-207A-AVG**		**OU4-SD-M09-207A-D**		**OU4-SD-M09-307A**	
sample_dat	20050820		20050820		20050820		20071106		20071106		20071106		20071106		20071106	
round	08		08		08		09		09		09		09		09	
Semivolatile Organics (ug/kg)																
1,1-BIPHENYL	32	J	11	J	22	J	12		9	U	9	U	9	U	10	
1-METHYLNAPHTHALENE	67		19	J	39	J	16		22		19		16		21	
1-METHYLPHENANTHRENE	270		87		270		51		120		115		110		98	
2,3,5-TRIMETHYLNAPHTHALENE	49	J	16	J	36	J	8	U	15		14		13		16	
2,6-DIMETHYLNAPHTHALENE	60	J	21	J	43	J	70		28		32		36		28	
2-METHYLNAPHTHALENE	91		25	J	52	J	21		26		24		22		28	
ACENAPHTHENE	310	J	55		170		100		75		69		63		96	
ACENAPHTHYLENE	36	J	31	J	55	J	57		59		61		63		91	
ANTHRACENE	760		200		600		220		280		265		250		410	
BENZO(A)ANTHRACENE	1900		630		1500		500		730		735		740		950	
BENZO(A)PYRENE	2000		740		1700		470		690		710		730		840	
BENZO(B)FLUORANTHENE	2000	J	800		1600		620		790		760		730		1000	
BENZO(E)PYRENE	1300		530		1200		290		390		400		410		520	
BENZO(G,H,I)PERYLENE	1300		550		1200		300		440		460		480		590	
BENZO(K)FLUORANTHENE	1800		590		1500		230		320		370		420		400	
CHRYSENE	1900		640		1500		520		580		590		600		800	
DIBENZO(A,H)ANTHRACENE	450		170		340		89		120		125		130		170	
DIBENZOTHIOPHENE	150		40	J	110	J	42		49		45		41		65	
FLUORANTHENE	5000	J	1500		4700		950		1200		1150		1100		1600	
FLUORENE	300	J	66		180		96		86		78		70		110	
HIGH MOLECULAR WEIGHT PAHS	15050		5080		13640		3319		4300		4300		4300		5660	
INDENO(1,2,3-CD)PYRENE	1300		530		1100		280		400		415		430		560	
LOW MOLECULAR WEIGHT PAHS	4077		986		3241		1073		1300		1202.5		1105		1681	
NAPHTHALENE	180	J	39	J	84	J	39		34		30.5		27		46	
PERYLENE	520		200		470		130		180		185		190		250	
PHENANTHRENE	2400		570		2100		540		740		675		610		900	
PYRENE	3800	J	1400		3900		790		980		990		1000		1300	
TOTAL PAHS ECO	19127		6066		16881		4392		5600		5502.5		5405		7341	
AVS/SEM Inorganics (mg/kg)																
ACID VOLATILE SULFIDE																
CADMIUM																
COPPER																
LEAD																
NICKEL																
ZINC																
HF Digestion Inorganics (mg/kg)																
ALUMINUM			55218		71002	J	49100		52140		52485		52830		52170	
ARSENIC			14.44		20.77	J	17.6		16.6		17.45		18.3		13.8	
CADMIUM			0.50		0.92	J	0.74	J	0.70	J	0.79	J	0.88	J	0.66	J
CHROMIUM			102.85	J	148.33	J	131	J	113	J	119.5	J	126	J	108	J
COPPER			228.76	J	407.73	J	376	J	202	J	213.5	J	225	J	232	J
IRON			32464	J	39719	J	38050	J	30180	J	31900	J	33620	J	27260	J
LEAD			198.12	J	414.76	J	233	J	349	J	373.5	J	398	J	225	J
MANGANESE			410		559	J	564	J	487	J	518.5	J	550	J	432	J
MERCURY							0.363		0.715		0.8275		0.94		1.001	
NICKEL			61.59		119.86	J	102	J	49.2	J	52.75	J	56.3	J	61.6	J
SILVER			1.58	J	2.12	J	1.58		0.80		1.05		1.3		1.1	
ZINC			236.95	J	460.46	J	505	J	312	J	345.5	J	379	J	301	J

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PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1A		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-105A-D**		**OU4-SD-M09-205A**		**OU4-SD-M09-305A**		**OU4-SD-M09-107A**		**OU4-SD-M09-207A**		**OU4-SD-M09-207A-AVG**		**OU4-SD-M09-207A-D**		**OU4-SD-M09-307A**	
sample_dat	20050820		20050820		20050820		20071106		20071106		20071106		20071106		20071106	
round	08		08		08		09		09		09		09		09	
Inorganics (mg/kg)																
ALUMINUM																
ARSENIC																
CADMIUM																
CHROMIUM																
COPPER																
IRON																
LEAD																
MANGANESE																
MERCURY																
NICKEL																
SILVER																
ZINC																
Pesticides/PCBs (ug/kg)																
1,2,3,4-TETRACHLOROBENZENE																
1,2,4,5-TETRACHLOROBENZENE																
2,4'-DDD			6.1	J	11	J	8	U	10	U	9.5	U	9	U	8	U
2,4'-DDE			20	R	33	R	8	U	10	U	9.5	U	9	U	8	U
2,4'-DDT			1.8		3	J	8	U	10	U	9.5	U	9	U	8	U
4,4'-DDD			13		20		8	U	10	U	9.5	U	9	U	8	U
4,4'-DDE			9.2	R	13	R	8	U	11		7.75		9	U	8	U
4,4'-DDT			18	R	23	R	11	J	10	U	9.5	U	9	U	8	U
ALDRIN			0.77	R	0.64	R	4	U	5	U	4.5	U	4	U	4	U
ALPHA-BHC			0.79	U	0.68	U	4	U	5	U	4.5	U	4	U	4	U
ALPHA-CHLORDANE			1		0.94		4	U	5	U	4.5	U	4	U	4	U
BETA-BHC			12	R	17	J	4	U	5	U	4.5	U	4	U	4	U
CHLORPYRIFOS																
CIS-NONACHLOR			1.3		0.53	U	11	J	7	J	4.5	J	4	U	4	J
DELTA-BHC			1.3	R	1.1	R	4	U	5	U	4.5	U	4	U	4	U
DIELDRIN			11	J	15	J	8	U	10	U	9.5	U	9	U	8	U
ENDOSULFAN II			0.63	U	0.53	U	8	U	10	U	9.5	U	9	U	8	U
ENDRIN			2	R	2.2	R	8	U	10	U	9.5	U	9	U	8	U
GAMMA-BHC (LINDANE)			0.27	U	0.32	J	5	J	5	U	4.5	U	4	U	4	U
GAMMA-CHLORDANE			1.5	J	1.7	J	4	U	5	U	4.5	U	4	U	4	U
HEPTACHLOR			1	R	1.1	R	4	U	5	U	4.5	U	4	U	4	U
HEPTACHLOR EPOXIDE			3.4	J	3.6	J	5	J	5	U	4.5	U	4	U	4	U
HEXACHLOROBENZENE			1.1	J	1.7	J										
MIREX			7.6	R	14	R	5	J	11	J	8	J	5	J	9	
OXYCHLORDANE			1.6	R	1.7	R	12	J	5	U	3.75		5		5	
PCB-101	68		17		25		13	J	15	U	14.5	U	14	U	12	U
PCB-101/90																
PCB-105	11	J	3.9		8.5	J	13	U	15	U	14.5	U	14	U	12	U
PCB-118	49		17		23		13	U	15	U	14.5	U	14	U	12	U
PCB-123	7.6	J	1.6	J	1.7	J	13	U	15	U	14.5	U	14	U	12	U
PCB-126	5.9	U	0.97	U	0.78	U	13	U	15	U	14.5	U	14	U	12	U
PCB-128	17	J	5.1		6.6	J	13	U	15	U	14.5	U	14	U	12	U
PCB-138	74		19		24		23		16		24.5		33		23	
PCB-138/160																
PCB-149/123																
PCB-153	66		18		21		15		15	U	14.5	U	14	U	16	
PCB-153/132																
PCB-156	4.6	U	2.4	J	4		13	U	15	U	14.5	U	14	U	12	U
PCB-167	3.6	U	1.6	J	1.5	J	13	U	15	U	14.5	U	14	U	12	U
PCB-169	4.4	U	0.72	U	0.58	U	13	U	15	U	14.5	U	14	U	12	U
PCB-170	4.6	U	0.76	U	0.61	U	17	J	15	U	14.5	U	14	U	12	U
PCB-170/190																
PCB-18	11	J	5.6		4.4		13	U	15	U	14.5	U	14	U	12	U
PCB-18/17																
PCB-180	62		12		14		13		15	U	14.5	U	14	U	12	U

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1A		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-105A-D**		**OU4-SD-M09-205A**		**OU4-SD-M09-305A**		**OU4-SD-M09-107A**		**OU4-SD-M09-207A**		**OU4-SD-M09-207A-AVG**		**OU4-SD-M09-207A-D**		**OU4-SD-M09-307A**	
sample_dat	20050820		20050820		20050820		20071106		20071106		20071106		20071106		20071106	
round	08		08		08		09		09		09		09		09	
PCB-187	56		9.3		11		13	U	15	U	14.5	U	14	U	12	U
PCB-189	4.8	U	0.79	U	0.63	U	16		15	U	14.5	U	14	U	12	U
PCB-195	7.4	J	1.5	J	1.7	J	13	U	15	U	14.5	U	14	U	12	U
PCB-195/208																
PCB-201/157/173																
PCB-206	200		21		37		50		16		15.5		15		17	
PCB-209	46		6.5		11		20		15	U	14.5	U	14	U	12	U
PCB-28	15	J	5.6		5.6		13	U	15	U	14.5	U	14	U	12	U
PCB-44	22	J	6		7		13	U	15	U	14.5	U	14	U	12	U
PCB-52	32		9		10		13	U	15	U	14.5	U	14	U	12	U
PCB-66	24	J	5.9		6.1	R	13	U	15	U	14.5	U	14	U	12	U
PCB-77	4.9	U	0.80	U	0.65	U	13	U	15	U	14.5	U	14	U	12	U
PCB-8/5																
PCB-81	3.6	U	0.59	U	0.74	J	13	U	15	U	14.5	U	14	U	12	U
PENTACHLOROANISOLE																
PENTACHLOROBENZENE																
TEQ PCB	0.002028		0.000795		0.001383		0.00048		0	U	0	U	0	U	0	U
TEQ PCB BIRD	0.001666		0.000832		0.075512		0.00016		0	U	0	U	0	U	0	U
TEQ PCB BIRD HALFND	0.602078		0.099268		0.131113		1.634455		1.8858	U	1.822938	U	1.76008	U	1.50864	U
TEQ PCB FISH	0.000338		0.000133		0.000563		0.00008		0	U	0	U	0	U	0	U
TEQ PCB FISH HALFND	0.016398		0.00277		0.002564		0.037029		0.042679	U	0.04125	U	0.03983	U	0.03414	U
TEQ PCB HALFND	0.36414		0.060257		0.049141		0.849445		0.9798	U	0.947144	U	0.91448	U	0.78384	U
TOTAL DDT HALFND			20.9		34		31		36		31.5		27		24	
TOTAL DDT POS			20.9		34		11		11		7.75		0	U	0	U
TOTAL PCB CONGENERS	1530		326		420		270		182		176		170		154	
TRANS-NONACHLOR			2.8	R	3.5	R	12	J	11		9.5		8		8	
Dioxins (ng/kg)																
1,2,3,4,6,7,8,9-OCDD	3100		2300		2900		2500		2600		2550		2500		2400	
1,2,3,4,6,7,8,9-OCDF	390		150		230		230		140		160		180		150	
1,2,3,4,6,7,8-HPCDD	510		340		370		320		260		260		260		280	
1,2,3,4,6,7,8-HPCDF	810		180		260		260		130	J	130	J	130	J	170	
1,2,3,4,7,8,9-HPCDF	56		13	J	21		21		7.6	J	7.45	J	7.3	J	12	
1,2,3,4,7,8-HXCDD	33	J	8	J	12	J	8.9		4.1	J	3.8	J	3.5	J	5.4	
1,2,3,4,7,8-HXCDF	220		42		52		60		22	J	23	J	24	J	35	
1,2,3,6,7,8-HXCDD	57	J	17		24		22		13		12.5		12		14	
1,2,3,6,7,8-HXCDF	150		32		44		50	J	15		13.5		12		24	
1,2,3,7,8,9-HXCDD	66	J	13	J	20		15		8.4		7.95		7.5		9.2	
1,2,3,7,8,9-HXCDF	4	U	1.4	U	2	U	12		5.8	J	4.15	J	2.5	J	10	J
1,2,3,7,8-PECDD	24		5.7	U	8.9	J	8.7		4	J	4.05	J	4.1	J	7.7	
1,2,3,7,8-PECDF	93		19		29		29		3.6	J	5.2	J	6.8	J	10	
2,3,4,6,7,8-HXCDF	190		38		56		64		23		19.5		16		34	
2,3,4,7,8-PECDF	200		40		61		49		17	J	13.3	J	9.6	J	39	J
2,3,7,8-TCDD	5.6		1.8	J	1.3	U	2		0.76	J	0.76	J	0.76	J	1.4	
2,3,7,8-TCDF	88		15		26		21		6.9	J	10.45	J	14	J	13	
TEQ	187.597		36.935		58.919		58.389		24.586		23.2285		21.871		40.945	
TEQ BIRD	401.239		74.285		120.333		107.768		38.685		38.1105		37.536		76.085	
TEQ BIRD HALFND	401.439		77.205		121.083		107.768		38.685		38.1105		37.536		76.085	
TEQ FISH	221.899		41.515		67.283		64.523		24.539		22.2675		19.996		45.337	
TEQ FISH HALFND	222.099		44.435		68.033		64.523		24.539		22.2675		19.996		45.337	
TEQ HALFND	187.797		39.855		59.669		58.389		24.586		23.2285		21.871		40.945	
TOTAL DIOXINS																
TOTAL FURANS																
TOTAL HPCDD	1200		920		960		670		630		625		620		680	
TOTAL HPCDF	1200		320		470		470		230	J	240	J	250	J	310	
TOTAL HXCDD	790	J	270		360		270		180		180		180		200	
TOTAL HXCDF	1500		300		470		530		220		205		190		390	
TOTAL PECDD	260		18		70		120		31		37.5		44		68	
TOTAL PECDF	1700		320		570		570		62		72		82		110	
TOTAL TCDD	170		47		56		93		27		29		31		54	
TOTAL TCDF	1600		340		570		630		140		135		130		330	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1A		MS-9 LOC.2		MS-9 LOC.3		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.2		MS-9 LOC.3	
nsample	***OU4-SD-M09-105A-D***		**OU4-SD-M09-205A**		**OU4-SD-M09-305A**		**OU4-SD-M09-107A**		**OU4-SD-M09-207A**		**OU4-SD-M09-207A-AVG**		**OU4-SD-M09-207A-D**		**OU4-SD-M09-307A**	
sample_dat	20050820		20050820		20050820		20071106		20071106		20071106		20071106		20071106	
round	08		08		08		09		09		09		09		09	
Miscellaneous Parameters (%)																
PERCENT CLAY			26.5		23.4											
PERCENT COARSE SAND			0.10		0.00											
PERCENT FINE SAND			7.6		9.6											
PERCENT FINES																
PERCENT GRAVEL			0.00		0.00											
PERCENT MEDIUM SAND			0.20		0.50											
PERCENT MOISTURE	46.6		68.6		59.7											
PERCENT SAND																
PERCENT SILT			65.7		66.5											
PERCENT SOLIDS	44.6		31.8		39.5		40.2		37.8		37.65		37.5		42.6	
SIEVE 1"			100		100											
SIEVE 1-1/2"			100		100											
SIEVE 2"			100		100											
SIEVE 3"			100		100											
SIEVE 3/4"			100		100											
SIEVE 3/8"			100		100											
SIEVE NO. 004			100		100		0		1		2.5		4		1	
SIEVE NO. 010			99.9		100		10		17		14		11		9	
SIEVE NO. 020			99.8		99.8		21		22		20.5		19		16	
SIEVE NO. 040			99.8		99.5		14		10		10		10		9	
SIEVE NO. 060			98.4		98.8		10		5		5.5		6		6	
SIEVE NO. 080			97.2		97.8											
SIEVE NO. 100			96.6		96.8											
SIEVE NO. 140							15		8		8.5		9		11	
SIEVE NO. 200			92.2		89.9		5		5		5		5		7	
TOTAL ORGANIC CARBON	2.53		4.05		2.4		2.0	J	3.0	J	3	J	3.0	J	2.0	J
TOTAL SOLIDS																
Alkylated PAHs (ug/kg)																
C1-CHRYSENES																
C1-DIBENZOTHIOPHENES																
C1-FLUORANTHENES/PYRENES																
C1-FLUORENES																
C1-NAPHTHALENES																
C1-PHENANTHRENES/ANTHRACENES																
C2-CHRYSENES																
C2-DIBENZOTHIOPHENES																
C2-FLUORENES																
C2-NAPHTHALENES																
C2-PHENANTHRENES/ANTHRACENES																
C3-CHRYSENES																
C3-DIBENZOTHIOPHENES																
C3-FLUORENES																
C3-NAPHTHALENES																
C3-PHENANTHRENES/ANTHRACENES																
C4-CHRYSENES																
C4-NAPHTHALENES																
C4-PHENANTHRENES/ANTHRACENES																

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-108A**		**OU4-SD-M09-108A-AVG**		**OU4-SD-M09-108A-D**		**OU4-SD-M09-208A**		**OU4-SD-M09-308A**	
sample_dat	20081217		20081217		20081217		20081217		20081217	
round	10		10		10		10		10	
Semivolatile Organics (ug/kg)										
1,1-BIPHENYL	19	J	19	J			21		25	
1-METHYLNAPHTHALENE	17	J	17	J			22		60	
1-METHYLPHENANTHRENE	86	J	86	J			72		170	
2,3,5-TRIMETHYLNAPHTHALENE	11	UJ	11	UJ			32		40	
2,6-DIMETHYLNAPHTHALENE	150	J	150	J			110		88	
2-METHYLNAPHTHALENE	18	J	18	J			30		77	
ACENAPHTHENE	50	J	50	J			55		220	
ACENAPHTHYLENE	70	J	70	J			89		82	
ANTHRACENE	210	J	210	J			250		550	
BENZO(A)ANTHRACENE	410	J	410	J			630		1300	
BENZO(A)PYRENE	420	J	420	J			730		1300	
BENZO(B)FLUORANTHENE	530	J	530	J			940		1900	
BENZO(E)PYRENE	280	J	280	J			460		730	
BENZO(G,H,I)PERYLENE	210	J	210	J			370		520	
BENZO(K)FLUORANTHENE	230	J	230	J			360		590	
CHRYSENE	530	J	530	J			610		1300	
DIBENZO(A,H)ANTHRACENE	62	J	62	J			120		190	
DIBENZOTHIOPHENE	32	J	32	J			44		120	
FLUORANTHENE	1100	J	1100	J			1300		2700	
FLUORENE	59	J	59	J			61		270	
HIGH MOLECULAR WEIGHT PAHS	3622		3622				4690		9190	
INDENO(1,2,3-CD)PYRENE	200	J	200	J			380		560	
LOW MOLECULAR WEIGHT PAHS	935		935				1158		3559	
NAPHTHALENE	38	J	38	J			43		160	
PERYLENE	100	J	100	J			180		290	
PHENANTHRENE	490	J	490	J			630		2200	
PYRENE	1100	J	1100	J			1300		2400	
TOTAL PAHS ECO	4557		4557				5848		12749	
AVS/SEM Inorganics (mg/kg)										
ACID VOLATILE SULFIDE										
CADMIUM										
COPPER										
LEAD										
NICKEL										
ZINC										
HF Digestion Inorganics (mg/kg)										
ALUMINUM	63500						63400		61500	
ARSENIC	18.9						17.5		14.9	
CADMIUM	0.671						0.916		0.902	
CHROMIUM	112						121		117	
COPPER	159						150		169	
IRON	36200						36600		31300	
LEAD	110						271		174	
MANGANESE	433						457		419	
MERCURY	0.353						0.624		0.683	
NICKEL	51.4						44.5		49.7	
SILVER	0.756						0.943		1.14	
ZINC	213						284		256	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-108A**		**OU4-SD-M09-108A-AVG**		**OU4-SD-M09-108A-D**		**OU4-SD-M09-208A**		**OU4-SD-M09-308A**	
sample_dat	20081217		20081217		20081217		20081217		20081217	
round	10		10		10		10		10	
Inorganics (mg/kg)										
ALUMINUM	18200	J	18200	J			19000		16500	
ARSENIC	16.8	J	16.8	J			15.5		13.3	
CADMIUM	1.9	UJ	1.9	UJ			1.5	U	1.4	U
CHROMIUM	91	J	91	J			86.6		81.4	
COPPER	168	J	168	J			142		167	
IRON	31300	J	31300	J			32100		28400	
LEAD	133	J	133	J			242		159	
MANGANESE	293	J	293	J			318		262	
MERCURY	0.316	J	0.316	J			0.615		0.693	
NICKEL	54.1	J	54.1	J			41.2		48.5	
SILVER	1.8	UJ	1.8	UJ			1.5	U	1.4	U
ZINC	192	J	192	J			267		244	
Pesticides/PCBs (ug/kg)										
1,2,3,4-TETRACHLOROBENZENE										
1,2,4,5-TETRACHLOROBENZENE										
2,4'-DDD	11	UJ	11	UJ			9.7	U	8.3	U
2,4'-DDE	11	UJ	11	UJ			9.7	U	8.3	U
2,4'-DDT	11	UJ	11	UJ			9.7	U	8.3	U
4,4'-DDD	11	UJ	11	UJ			9.7	U	8.3	U
4,4'-DDE	11	UJ	11	UJ			9.7	U	12	J
4,4'-DDT	11	UJ	11	UJ			9.7	U	8.3	U
ALDRIN	5.6	UJ	5.6	UJ			5	U	18	R
ALPHA-BHC	12	J	12	J			7.2	J	12	
ALPHA-CHLORDANE	5.6	UJ	5.6	UJ			5	U	7.9	R
BETA-BHC	19	J	19	J			17	J	15	J
CHLORPYRIFOS										
CIS-NONACHLOR	6.2	R	6.2	R			5	U	4.6	R
DELTA-BHC	5.6	UJ	5.6	UJ			5	U	4.3	U
DIELDRIN	11	UJ	11	UJ			9.7	U	8.3	U
ENDOSULFAN II	11	UJ	11	UJ			9.7	U	8.3	U
ENDRIN	11	UJ	11	UJ			9.7	U	8.3	U
GAMMA-BHC (LINDANE)	5.6	UJ	5.6	UJ			5.7	R	8	R
GAMMA-CHLORDANE	5.6	UJ	5.6	UJ			5	U	4.3	U
HEPTACHLOR	5.6	UJ	5.6	UJ			5	U	4.3	U
HEPTACHLOR EPOXIDE	5.6	UJ	5.6	UJ			5	U	4.3	U
HEXACHLOROBENZENE										
MIREX	7.4	J	7.4	J			5	U	4.3	U
OXYCHLORDANE	5.6	UJ	5.6	UJ			5	U	4.3	U
PCB-101	16	UJ	16	UJ			15	U	15	J
PCB-101/90										
PCB-105	16	UJ	16	UJ			15	U	13	U
PCB-118	16	UJ	16	UJ			15	U	13	U
PCB-123	16	UJ	16	UJ			15	U	13	U
PCB-126	16	UJ	16	UJ			15	U	13	U
PCB-128	16	UJ	16	UJ			15	U	13	U
PCB-138	16	UJ	16	UJ			15		23	
PCB-138/160										
PCB-149/123										
PCB-153	16	UJ	16	UJ			15	U	15	
PCB-153/132										
PCB-156	16	UJ	16	UJ			15	U	13	U
PCB-167	16	UJ	16	UJ			15	U	13	U
PCB-169	16	UJ	16	UJ			15	U	13	U
PCB-170	16	UJ	16	UJ			15	U	13	U
PCB-170/190										
PCB-18	16	UJ	16	UJ			15	U	13	U
PCB-18/17										
PCB-180	16	UJ	16	UJ			15	U	13	U

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-108A**		**OU4-SD-M09-108A-AVG**		**OU4-SD-M09-108A-D**		**OU4-SD-M09-208A**		**OU4-SD-M09-308A**	
sample_dat	20081217		20081217		20081217		20081217		20081217	
round	10		10		10		10		10	
PCB-187	16	UJ	16	UJ			15	U	13	U
PCB-189	16	UJ	16	UJ			15	U	13	U
PCB-195	16	UJ	16	UJ			15	U	13	U
PCB-195/208										
PCB-201/157/173										
PCB-206	16	UJ	16	UJ			23		13	
PCB-209	16	UJ	16	UJ			15	U	13	U
PCB-28	16	UJ	16	UJ			15	UJ	25	J
PCB-44	16	UJ	16	UJ			15	U	13	U
PCB-52	16	UJ	16	UJ			15	U	13	U
PCB-66	16	UJ	16	UJ			15	U	13	U
PCB-77	16	UJ	16	UJ			15	U	13	U
PCB-8/5										
PCB-81	16	UJ	16	UJ			15	U	13	U
PENTACHLOROANISOLE										
PENTACHLOROBENZENE										
TEQ PCB	0	U	0	U			0	U	0	U
TEQ PCB BIRD	0	U	0	U			0	U	0	U
TEQ PCB BIRD HALFND	2.01152	U	2.01152	U			1.8858	U	1.63436	U
TEQ PCB FISH	0	U	0	U			0	U	0	U
TEQ PCB FISH HALFND	0.04552	U	0.04552	U			0.042679	U	0.036981	U
TEQ PCB HALFND	1.04512	U	1.04512	U			0.9798	U	0.84916	U
TOTAL DDT HALFND	33		33				29.1		32.75	
TOTAL DDT POS	0	U	0	U			0	U	12	
TOTAL PCB CONGENERS	176		176				196		193	
TRANS-NONACHLOR	6.6	J	6.6	J			11		17	
Dioxins (ng/kg)										
1,2,3,4,6,7,8,9-OCDD	693	J	851.5	J	1010	J	1000		1360	
1,2,3,4,6,7,8,9-OCDF	49.6	J	64.95	J	80.3	J	68.9		98.6	
1,2,3,4,6,7,8-HPCDD	82.9	J	102.45	J	122	J	128		180	
1,2,3,4,6,7,8-HPCDF	27.8	J	33.5	J	39.2	J	41.4		74.9	
1,2,3,4,7,8,9-HPCDF	5.00	UJ	5	UJ	5.00	UJ	5.00	U	5.00	U
1,2,3,4,7,8-HXCDD	5.00	UJ	5	UJ	5.00	UJ	5.00	U	5.00	U
1,2,3,4,7,8-HXCDF	5.00	UJ	3.75	J	5.00	J	5.00	U	12.3	
1,2,3,6,7,8-HXCDD	5.00	UJ	5	UJ	5.00	UJ	5.99		8.72	
1,2,3,6,7,8-HXCDF	5.00	UJ	5	UJ	5.00	UJ	5.00	U	9.48	
1,2,3,7,8,9-HXCDD	5.00	UJ	5	UJ	5.00	UJ	5.00	U	5.82	
1,2,3,7,8,9-HXCDF	5.00	UJ	5	UJ	5.00	UJ	5.00	U	5.00	U
1,2,3,7,8-PECDD	5.00	UJ	5	UJ	5.00	UJ	5.00	U	5.00	U
1,2,3,7,8-PECDF	5.00	UJ	5	UJ	5.00	UJ	5.00	U	6.01	
2,3,4,6,7,8-HXCDF	5.00	UJ	4.195	J	5.89	J	5.9		13.2	
2,3,4,7,8-PECDF	5.00	UJ	3.84	J	5.18	J	5.61		11.5	
2,3,7,8-TCDD	1.00	UJ	1	UJ	1.00	UJ	1.00	U	1.00	U
2,3,7,8-TCDF	2.82	J	3.13	J	3.44	J	3.93		7.53	
TEQ	1.61178		3.893935		4.92609		5.27967		12.32188	
TEQ BIRD	3.25516		8.293595		10.33203		10.83879		24.87306	
TEQ BIRD HALFND	10.43016		12.468595		14.50703		15.23879		28.27306	
TEQ FISH	0.57616		3.400095		4.47403		4.30029		11.14526	
TEQ FISH HALFND	7.27616		8.350095		9.42403		9.47529		15.67026	
TEQ HALFND	7.21178		8.243935		9.27609		9.62967		15.84688	
TOTAL DIOXINS										
TOTAL FURANS										
TOTAL HPCDD	241	J	292	J	343	J	285		406	
TOTAL HPCDF	59	J	71.85	J	84.7	J	85.8		142	
TOTAL HXCDD	33.7	J	40.3	J	46.9	J	64.8		103	
TOTAL HXCDF	22.6	J	26.5	J	30.4	J	52.7	J	122	
TOTAL PECDD	5.00	UJ	5	UJ	5.00	UJ	5.00	U	13.1	
TOTAL PECDF	5.00	UJ	15.1	J	27.7	J	30.1		86.7	
TOTAL TCDD	5.34	J	6.25	J	7.16	J	8.72		32.7	
TOTAL TCDF	46.1	J	49.5	J	52.9	J	62		164	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 09 IN ROUNDS 1 THROUGH 10
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.1		MS-9 LOC.2		MS-9 LOC.3	
nsample	**OU4-SD-M09-108A**		**OU4-SD-M09-108A-AVG**		**OU4-SD-M09-108A-D**		**OU4-SD-M09-208A**		**OU4-SD-M09-308A**	
sample_dat	20081217		20081217		20081217		20081217		20081217	
round	10		10		10		10		10	
Miscellaneous Parameters (%)										
PERCENT CLAY										
PERCENT COARSE SAND										
PERCENT FINE SAND										
PERCENT FINES	89.6		89.6				94.2		90	
PERCENT GRAVEL	0		0.00				0		0	
PERCENT MEDIUM SAND										
PERCENT MOISTURE										
PERCENT SAND	10.4		10.4				5.8		10	
PERCENT SILT										
PERCENT SOLIDS										
SIEVE 1"										
SIEVE 1-1/2"										
SIEVE 2"										
SIEVE 3"										
SIEVE 3/4"										
SIEVE 3/8"										
SIEVE NO. 004										
SIEVE NO. 010										
SIEVE NO. 020										
SIEVE NO. 040										
SIEVE NO. 060										
SIEVE NO. 080										
SIEVE NO. 100										
SIEVE NO. 140										
SIEVE NO. 200										
TOTAL ORGANIC CARBON	3.5		3.5				3.1		2.9	
TOTAL SOLIDS	33.2						36.58		41.08	
Alkylated PAHs (ug/kg)										
C1-CHRYSENES										
C1-DIBENZOTHIOPHENES										
C1-FLUORANTHENES/PYRENES										
C1-FLUORENES										
C1-NAPHTHALENES										
C1-PHENANTHRENES/ANTHRACENES										
C2-CHRYSENES										
C2-DIBENZOTHIOPHENES										
C2-FLUORENES										
C2-NAPHTHALENES										
C2-PHENANTHRENES/ANTHRACENES										
C3-CHRYSENES										
C3-DIBENZOTHIOPHENES										
C3-FLUORENES										
C3-NAPHTHALENES										
C3-PHENANTHRENES/ANTHRACENES										
C4-CHRYSENES										
C4-NAPHTHALENES										
C4-PHENANTHRENES/ANTHRACENES										

POSTIVE DETECTIONS FOR MONITORING STATION 12

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.2
nsample	**OU4-SD-M12-199A**	**OU4-SD-M12-100B**	**OU4-SD-M12-100A**	**OU4-SD-M12-101B**	**OU4-SD-M12-101A**	**OU4-SD-M12-102A**	**OU4-SD-M12-103A**	**OU4-SD-M12-299A**
sample_dat	19990909	20000505	20000829	20010508	20010821	20020812	20030809	19990909
round	01	02	03	04	05	06	07	01
Semivolatile Organics (ug/kg)								
1,1-BIPHENYL	63.4 J	23.5 J	66.8 J	47.3 U	57	186.3 J	142.2	11 U
1-METHYLNAPHTHALENE	198	112	251	130.9 U	361.4	623 J	397	34.1
1-METHYLPHENANTHRENE	658	240	550	340.7	704.4	1123.1 J	1152	103
2,3,5-TRIMETHYLNAPHTHALENE	49	25.4	54.9	52.2	37.1 J	156.6 J	92.7	12.4
2,6-DIMETHYLNAPHTHALENE	103	40.7	113	115.6	81.8	580.3 J	195.2	17.6
2-METHYLNAPHTHALENE	245	149	317	157.3 J	501.5	843.1 J	532.9	43.7 U
ACENAPHTHENE	1866	682	2561	1489.9 J	1549.3	5408.7 J	5152	161
ACENAPHTHYLENE	217 J	116	303 J	167.9 U	159.6	512.9 J	303.2	68.9 J
ANTHRACENE	2880	1220	2205	2432.2 J	4036.2	9286 J	7418.8	355
BENZO(A)ANTHRACENE	4938	2170	5833	2948.9	2561.4 J	10577.7 J	10566.8	628
BENZO(A)PYRENE	5396	2290 J	8467	4549.7 J	2950.8 J	18544.1 J	12413.8	814
BENZO(B)FLUORANTHENE	6312	2500	7235	4187.1	2996.8	15594.1 J	13043.9	811
BENZO(E)PYRENE	2913	1240	3370 J	1883.8	1443.1	9679.3 J	5985.1	433
BENZO(G,H,I)PERYLENE	2172	1270	3248	1609.7	1424.6 J	7670.8 J	5581.1	394
BENZO(K)FLUORANTHENE	1866	511	2332	1439.6	1123.7 J	6619 J	4693.6	331
CHRYSENE	5741	2030	6585	2831.7	2251.3	10603.4 J	10699.5	759
DIBENZO(A,H)ANTHRACENE	684	459 J	790	463.7	363.3 J	2026.8 J	1571.1	99.8
DIBENZOTHIOPHENE	512	155 J	481	251	677.3	969.7 J	1070.9	58.7
FLUORANTHENE	12106	3460	13836.8 J	8175.2	16792.8	31162.4 J	30214.3	1672
FLUORENE	1393	680 J	2434	1245.7 J	1388.8	4010.8 J	4060.9	146
HIGH MOLECULAR WEIGHT PAHS	39579	13329	46931.4	22194.6	38253.2	106039	87937.8	5352.8
INDENO(1,2,3-CD)PYRENE	2602	1560	3740	1938.2	1704.7 J	9036.6 J	7068.5	448
LOW MOLECULAR WEIGHT PAHS	17276	5690	18354	11709.5	21394.1	43925.8	38585.6	1909.05
NAPHTHALENE	451	293	582	267.5 U	1067.9	1616.1 J	1017	72.6 U
PERYLENE	918	219	1016	663.5	571.9 J	3883 J	2302	120
PHENANTHRENE	10224	2550 J	9952 J	6166.7	12690.8	22248.2 J	20100.8	1120
PYRENE	10714	2920	11419.5 J	6450.7 U	13333.6	33124.7 J	22472.3	1380
Alkylated Polynuclear Aromatic Hydrocarbons (ug/kg)								
C1-CHRYSENES	1833	1170	2119	1172.3	829.4	3847.8 J	3930.9	267
C1-DIBENZOTHIOPHENES	184	47.6	180	86.3	208.8	367.9 J	379.3	31.3
C1-FLUORANTHENES/PYRENES	4814	1410	3584	2360.6	4875.8	9495.2 J	8592.6	701
C1-FLUORENES	317	177	423	284.3	263.1	796.4 J	826.9	50.5
C1-NAPHTHALENES	443	261	568	288.2 J	862.9	1466.1 J	929.9	77.8 U
C1-NAPHTHOBENZOTHIOPHENES								
C1-PHENANTHRENES/ANTHRACENES	2452	814	1901	1207.6	2220.2	4030.5 J	4402.7	362
C2-CHRYSENES	508	331	489	452.1	262.1 J	1235.1 J	1044.9	124
C2-DIBENZOTHIOPHENES	115	44	101	53.8 J	93.2	191.5 J	218	31.2
C2-FLUORANTHENES/PYRENES								
C2-FLUORENES	187	88.6	303	120.4 J	156.9 J	460.9 J	447.1	50.3
C2-NAPHTHALENES	281	230	465	274.9	437.2	1073.4 J	485.5	66.5 U
C2-NAPHTHOBENZOTHIOPHENES								
C2-PHENANTHRENES/ANTHRACENES	991	334	730	488.5	933.8	1261.4 J	1899.1	205
C3-CHRYSENES	17.8	15.7	44.4 J	17.1 J	6.9 J	139.8 J	126.2	4.28
C3-DIBENZOTHIOPHENES	82.3	21.7	76.4	22 J	45.7 J	101 J	99.7	17.8
C3-FLUORANTHENES/PYRENES								
C3-FLUORENES	56.1	64.6	293	68.4 J	93.1 J	438.3 J	151.5	28.3
C3-NAPHTHALENES	230	148	284	187.8	243.6	425.1 J	302.6	64.5
C3-NAPHTHOBENZOTHIOPHENES								

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.2
nsample	**OU4-SD-M12-199A**	**OU4-SD-M12-100B**	**OU4-SD-M12-100A**	**OU4-SD-M12-101B**	**OU4-SD-M12-101A**	**OU4-SD-M12-102A**	**OU4-SD-M12-103A**	**OU4-SD-M12-299A**
sample_dat	19990909	20000505	20000829	20010508	20010821	20020812	20030809	19990909
round	01	02	03	04	05	06	07	01
C3-PHENANTHRENES/ANTHRACENES	460	177	292	184.3	310.6	790.1 J	758.6	94.3
C4-CHRYSENES	73.4	4.94	45.4 J	297.2	34.7 J	95.1 J	3.5 J	14.1
C4-DIBENZOTHIOPHENES								
C4-FLUORANTHENES/PYRENES								
C4-NAPHTHALENES	81.5 J	32.2	84.5	68.7 J	118.8	103.5 J	121.2	38.2
C4-NAPHTHOBENZOTHIOPHENES								
C4-PHENANTHRENES/ANTHRACENES	126	31.7	88.5	45.8 J	85.9	144.6 J	227.6	34.6
Dioxins/Furans (ng/kg)								
1,2,3,4,6,7,8,9-OCDD	1749 U	1564	3173	2145 J	1206.4	3883.9	3709.1 U	1223 U
1,2,3,4,6,7,8,9-OCDF	3 U	76.1	187 U	139 U	90.1	310.3	205.3 U	74 U
1,2,3,4,6,7,8-HPCDD	202	162	366	244 J	156.2	594.2 J	347.3 U	140
1,2,3,4,6,7,8-HPCDF	1.5 U	41.2	86.9 U	58.3 J	38.4	88.2	70.1	32.5 U
1,2,3,4,7,8,9-HPCDF	53.5 U	2.4 U	5.9	1.57 UR	1.77 U	2.78 U	6.3	1.49 U
1,2,3,4,7,8-HXCDD	2.26	1.4 J	1.76 U	1.57 UR	1.77 U	2.78 U	2.2	1.19 J
1,2,3,4,7,8-HXCDF	3.34 U	2.9	6.2	1.57 UR	3.4	5.9	5.7	1.93 U
1,2,3,6,7,8-HXCDD	9.02	5.8	14.4	1.57 UR	1.77 U	2.78 U	7.6	6.13
1,2,3,6,7,8-HXCDF	4.19 U	1.6 U	4.8	1.57 UR	2	2.78 U	1.24 U	1.4 U
1,2,3,7,8,9-HXCDD	4.51 U	1.8	8.3	1.57 UR	1.77 U	2.78 U	3.2	1.72 U
1,2,3,7,8,9-HXCDF	4.08	1.4 U	1.76 U	1.57 UR	0.9 J	2.78 U	1.6	1.4
1,2,3,7,8-PECDD	1.5 U	1 J	1.76 U	1.57 UR	0.8 J	2.78 U	1.24 U	1.4 U
1,2,3,7,8-PECDF	3.72 U	1.4 U	1.76 U	1.5 U	1.3 U	2.78 U	1.9	1.4 U
2,3,4,6,7,8-HXCDF	2.49 U	2.6	1.76 U	1.57 UR	2.1	4.9	3.6	1.96 U
2,3,4,7,8-PECDF	1.7 U	2 U	1.76 U	1.57 UR	1.8	2.78 U	1.24 U	1.4 U
2,3,7,8-TCDD	0.3 U	0.3 U	0.35 U	0.3 UR	0.35 U	0.56 U	0.25 U	0.32 U
2,3,7,8-TCDF	0.3 U	4.5 U	0.35 U	0.3 UR	1.8	8	3.4	2.03 U
TOTAL HPCDD	665	631	1029	677 J	473.2	1648.3	2407.4	329
TOTAL HPCDF	132 U	109	227	148 J	96.2	287.9	252.6	85.6 U
TOTAL HXCDD	103 U	80	100	107 J	91.2	350.9	138.2	66.1 U
TOTAL HXCDF	11.8 U	40.2	108	25.5 J	52.2	163.4	76	5.15 U
TOTAL PECDD	1.5 U	1 J	1.76 U	1.57 UR	7.1	9.5	1.24 U	4.4 U
TOTAL PECDF	22.5 U	14.4 U	39.3	1.5 U	23.7 U	70.4	15.1	7.57 U
TOTAL TCDD	5.23	4.1	3.8	0.3 UR	2.8	3.9	0.25 U	4.67
TOTAL TCDF	19.8 U	7.5 U	15	0.3 UR	9.9	43.3	6.4	6.09 U
Pesticides/PCBs (ug/kg)								
1,2,3,4-TETRACHLOROBENZENE	0.23 U	0.02 J	0.08 J	0.15 UJ	0.22 U	0.25 J	0.34	0.075 J
1,2,4,5-TETRACHLOROBENZENE	0.72	0.34 J	1.3 U	0.58 U	1.31 U	1.1	2.22 U	0.55 J
2,4'-DDD	11	4.4	7.4	5.2 J	7.34	8	8.01	1.6
2,4'-DDE	0.36	0.28	0.099 U	0.059 UJ	0.18	0.31 J	3.02	0.12
2,4'-DDT	0.025 U	0.56	0.43	0.43 J	0.62	1.5 J	0.89	0.12
4,4'-DDD	6.1	2.3	5	6.7 J	5.61	6.3	3.28	0.9
4,4'-DDE	0.82	1.5	3.1	2.8 J	2.05	5.8	0.77	0.69
4,4'-DDT	3.2	2.4	2.8	4.9 J	3.08	2.5 J	0.52	0.52
ALDRIN	77	0.074 U	0.072 U	0.05 UJ	0.08 U	22	2.61	0.078 U
ALPHA-BHC	0.33 U	0.48	0.23	0.19 J	0.07	0.06 J	0.12	0.15 U
ALPHA-CHLORDANE	0.074 U	0.94	1.6	1.2 J	1.36	1.8	0.121 U	0.59
BETA-BHC	0.22 U	0.86	0.24 U	0.16 U	0.18 J	0.25 U	0.198 U	0.26 U
CHLORPYRIFOS	0.31 U	0.35 U	0.34 U	0.13 J	0.13 U	0.15 U	0.121 U	0.019 J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.2
nsample	**OU4-SD-M12-199A**	**OU4-SD-M12-100B**	**OU4-SD-M12-100A**	**OU4-SD-M12-101B**	**OU4-SD-M12-101A**	**OU4-SD-M12-102A**	**OU4-SD-M12-103A**	**OU4-SD-M12-299A**
sample_dat	19990909	20000505	20000829	20010508	20010821	20020812	20030809	19990909
round	01	02	03	04	05	06	07	01
CIS-NONACHLOR	0.55	0.38	0.67	0.58 J	1.24	1	1.19	0.25
DELTA-BHC	0.46	0.055 U	0.054 U	0.77 J	0.08 U	0.16	0.066 U	0.097
DIELDRIN	0.074 U	0.22	0.33	1.4 J	0.09	0.19	2.03	0.025 J
ENDOSULFAN II	0.99	3	0.35	2.6 J	6.39	0.23	0.154 U	0.84
ENDRIN	0.15 U	0.17 U	0.16 U	0.05 UJ	0.44	0.08 U	0.066 U	0.28
GAMMA-BHC (LINDANE)	0.59 U	0.3 U	0.29 U	0.1 U	0.16 U	0.18 U	0.22	0.76 U
GAMMA-CHLORDANE	0.12	0.083 U	0.081 U	0.14 J	0.03 U	0.04 U	0.033 U	0.17
HEPTACHLOR	0.19 U	0.21 U	0.21 U	0.06 J	0.34	0.21 U	0.18	0.22 U
HEPTACHLOR EPOXIDE	0.033 U	0.037 U	0.036 U	0.042 UJ	0.06 U	0.07 U	0.11	0.039 U
HEXACHLOROBENZENE	0.05 U	0.055 U	0.054 U	0.042 UJ	0.02 J	0.07 U	0.055 U	0.041 U
MIREX	1.7	0.36	0.036 U	2.3 J	0.21	1.7	0.088 U	0.2
OXYCHLORDANE	0.25	0.38 J	0.72	0.042 UJ	0.64	0.07 U	0.055 U	0.14
PCB-101/90	6.1	3.6	7.9	9.1	19.68	16	16.22	2.6
PCB-105	3.2 J	1.7	2	2.7 J	6.17	3.3	5.84	1.2 J
PCB-118	5.7	4.8	10	12	18.79	14	13.27	2.8
PCB-126	0.14 J	0.11 J	0.15 J	0.03 J	0.08 J	0.05 J	0.32 J	0.006 J
PCB-128	0.56 J	1.1	1.8	5.7	4.81	2.6	2.3	1.9 J
PCB-138/160	2.6	4	9.2	25	17.39	15	7.3	5.4
PCB-149/123	3.5	2.1	4.9	8.4	7.91	14	5.96	2.4
PCB-153/132	8.8	3.9	12	27	21.06	25	14.94	5.4
PCB-156	0.2 U	5	9.9	8	9.62	4.6	19.54	2.44
PCB-167	1.1	2	3.2	2	2.52	0.5 J	2.25	2.8
PCB-169	0.8 U	0.34	0.22 U	0.01 J	0.55 U	0.54 U	0.12 J	0.11 J
PCB-170/190	1.1 U	63 J	98 J	117	95.26	192 J	277.87 J	20 J
PCB-18/17	3.9 J	2.8 J	2.5	2.4	1.47	3.6	0.17	0.12 U
PCB-180	13 J	3.6 J	8.6	57	8.59	17	9.86	6.2 J
PCB-187	44	2.5	6.6	78	38.11	14	7.57	3.1
PCB-189	1.2	0.6	0.75	1.5	1.21	0.54 U	1.44	0.32
PCB-195/208	7.9	2.2	6.4	35	5.35	12	10.54	1.5
PCB-201/157/173	0.02 U	1.69	4.13	12	3.24	2.9	3.91	0.64
PCB-206	0.57	3.7	11	107	10.67	27	14.29	2.7
PCB-209	3.7 J	1.6	34	15.81 J	4.45	6.4	3.87	1 J
PCB-28	11	7.2	4.3	8	3.35	8.4	21.24	1.7
PCB-44	6.2	3.3	3.5	5.1	6.03	4.5	18.23	0.9
PCB-52	11	5.3	6.4	7.3	15.76	9.7	22.37	1.5
PCB-66	1.3	5	7.8	8.5	5.65	2.3	2.92	0.81
PCB-77	0.065 J	0.63	0.17 U	0.08 U	0.21 J	0.09 J	0.94	0.1 J
PCB-8/5	0.36 U	2.1	7.8	7.4	3.45	2.4	5.98	0.66 J
PCB-81	0.072 J	0.25	0.18 J	0.2 UR	0.21 J	0.07 J	0.21 J	0.94 U
PENTACHLOROANISOLE	0.032 J	0.1 J	0.09 U	0.15 U	0.04 J	0.12 J	0.11 U	0.097 J
PENTACHLOROBENZENE	0.1	0.1	0.27 U	0.03 J	0.12 U	0.04 J	0.15 U	0.063 J
TRANS-NONACHLOR	0.071	0.52	0.48	0.16 J	0.12 U	0.06 J	0.099 U	0.17
AVS/SEM (mg/kg)								
ACID VOLATILE SULFIDE	1013 J	275	203 J	364.147 J	265.06 J			424 J
CADMIUM	0.21	0.0993	0.12 J	0.7	0.75			0.08
COPPER	2.2 U	1.78 U	51.16 J	165 J	70.5			0.71 U
LEAD	36.3 J	16.2	89.09 J	240 J	183.11			12.2 J
NICKEL	4.6	1.85	12.59 J	45.6	17.79			1.1 U
ZINC	191	72.2	448.44 J	1328	609.82			25.1

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.1	MS-12 LOC.2
nsample	**OU4-SD-M12-199A**	**OU4-SD-M12-100B**	**OU4-SD-M12-100A**	**OU4-SD-M12-101B**	**OU4-SD-M12-101A**	**OU4-SD-M12-102A**	**OU4-SD-M12-103A**	**OU4-SD-M12-299A**
sample_dat	19990909	20000505	20000829	20010508	20010821	20020812	20030809	19990909
round	01	02	03	04	05	06	07	01
HF Metals (mg/kg)								
ALUMINUM	56351	55700	47914	48499.5	50089.6	51696	45716.5 J	55859
ARSENIC	10.4	7.7	14.9	11.857	15.83	14.6	17.97	6.4
CADMIUM	0.52	0.6	0.59 J	0.51	0.4508 U	2.3 U	5.59	0.31
CHROMIUM	95.2	86.1	125	157.38	134.83 J	158	144.9	64.6
COPPER	162 J	87.9	375 J	266.31	165.89 J	269	421.04	27.1 J
IRON	25046	21400	30833 J	32312.7	28462.3	30968 J	52818.1	17012
LEAD	190 J	118	330 J	379.24	240.25	307	410.4	53.3 J
MANGANESE	501	449	442	399.19	358.94	371	491.82	420
MERCURY	1.7 J	0.38	0.64	0.74 J	0.684	0.99 J	0.6	0.47 J
NICKEL	51.3	39.8	72.8 J	69.09	47.11	69.9	101.02	24.7
SILVER	0.35	0.65	3.88	0.72 J	0.85 J	0.84	0.78	0.25
ZINC	552	343	1497 J	1046.47	574.85	925	1937.35	86
Inorganics (mg/kg)								
ALUMINUM							10500 J	
ARSENIC							11.9 J	
CADMIUM							0.5 J	
CHROMIUM							63 J	
COPPER							322 J	
IRON							32400 J	
LEAD							372 J	
MANGANESE							251 J	
NICKEL							98.5 J	
SILVER							0.36 J	
ZINC							1800 J	
Miscellaneous Parameters (%)								
PERCENT CLAY	19.13	9.08	13.3	7.2	14.7	8.9	3.6	14.55
PERCENT GRAVEL						0	23.8	
PERCENT SAND	57.81	73.69	55.8	75.3	57.2	57.8	66.5	64.87
PERCENT SILT	23.06	17.23	30.9	17.5	28.1	33.3	6.1	20.58
PERCENT SOLIDS								
TOTAL ORGANIC CARBON	2.29	1.4	1.38 J	1.33 J	1.92	0.82 J	1.84	1.4
TOTAL SOLIDS							70	

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2
nsample	**OU4-SD-M12-200B**	**OU4-SD-M12-200B-D**	**OU4-SD-M12-200A**	**OU4-SD-M12-200A-D**	**OU4-SD-M12-201B**	**OU4-SD-M12-201B-D**	**OU4-SD-M12-201A**
sample_dat	20000505	20000505	20000829	20000829	20010508	20010508	20010820
round	02	02	03	03	04	04	05
Semivolatile Organics (ug/kg)							
1,1-BIPHENYL	27 J	23.3 J	42.6 J	41	71.6	61	35.6 J
1-METHYLNAPHTHALENE	137 J	68.5 J	118 J	115	202.2	176.3	164.9 J
1-METHYLPHENANTHRENE	246	199	266 J	346	325.9	278	314 J
2,3,5-TRIMETHYLNAPHTHALENE	26	22	32.1	35.5	63.3 J	39.8	24.8 J
2,6-DIMETHYLNAPHTHALENE	41.8	32.8	59.3 J	60.7	95.5	83.8	51 J
2-METHYLNAPHTHALENE	187 J	93.9 J	153	153	247.7	257	220.9 J
ACENAPHTHENE	565	567 J	1239 J	1032 J	1394.5	1355.6	813.7 J
ACENAPHTHYLENE	98.4	88.3 J	191 J	242 J	167	117	122.9 J
ANTHRACENE	1140	1016 J	1031	1075	2267.4 J	2733.4 J	1777.8 J
BENZO(A)ANTHRACENE	2180	1727	3620	3230	2957.4 J	3066.8	2307.5 J
BENZO(A)PYRENE	2290 J	1883	4055 J	3903 J	3938.2	3750.9 J	2466.9 J
BENZO(B)FLUORANTHENE	2240	1809	4172	4334	3452 J	3678.1	2408 J
BENZO(E)PYRENE	1180	935	2126 J	1978 J	1501.6 J	1662.1	1185.7 J
BENZO(G,H,I)PERYLENE	1230	949	2123 J	1875	1432.1 J	1516.5 J	1198.9 J
BENZO(K)FLUORANTHENE	807	664	1852	1364 J	1175.7	1097.6	880.6 J
CHRYSENE	1860	1624	3317	3310 J	2840.5	2665	1800.1 J
DIBENZO(A,H)ANTHRACENE	433 J	336	540	475	242.1 J	448.9 J	298.7 J
DIBENZOTHIOPHENE	155 J	140	279	276	225.8	272.7	271.4 J
FLUORANTHENE	3470	3262 J	8200	8280	7463.9	7119.2	7371 J
FLUORENE	666 J	634 J	1057	1055	1513.1 J	1769.4 J	835.1 J
HIGH MOLECULAR WEIGHT PAHS	13073	11431	26371	25839	23073.6	22826.8	19865.8
INDENO(1,2,3-CD)PYRENE	1480	1134	2234	2322 J	1379.3 J	2009 J	1457.3 J
LOW MOLECULAR WEIGHT PAHS	5573.4	4975.2	9908	9395	11839.7	13292.8	9549.8
NAPHTHALENE	397 J	219 J	354	327	508.6	470.4	462.1 J
PERYLENE	313	291 J	848 J	653	485.7	496.5	449.2 J
PHENANTHRENE	2520 J	2357	5883 J	5511	5741.4	6590	5317.3 J
PYRENE	2840	2599 J	6639 J	6641	5631.5	5776	5621.6 J
Alkylated Polynuclear Aromatic Hydrocarbons (ug/kg)							
C1-CHRYSENES	1040	900	1288	1606	966.9	1172.2	688.5 J
C1-DIBENZOTHIOPHENES	47	60.8	116	117	83	98.2	97.6 J
C1-FLUORANTHENES/PYRENES	1340	1252	1931	2007	1906.9	2199	2177.1 J
C1-FLUORENES	178	161	318	269	318.8	291.6	162.6 J
C1-NAPHTHALENES	324 J	162 J	272	269	449.8	433.3	385.8 J
C1-NAPHTHOBENZOTHIOPHENES							
C1-PHENANTHRENES/ANTHRACENES	837	733	1107	1231	1190.8	1367.2	992 J
C2-CHRYSENES	306	260	362	404	277.9 J	440.7	227.7 J
C2-DIBENZOTHIOPHENES	49.7	42.4	52.6	57.4	47.9 J	55.7	40.1 J
C2-FLUORANTHENES/PYRENES							
C2-FLUORENES	106	97.6	122	180	162.1 J	163	95.8 J
C2-NAPHTHALENES	242 J	123 J	164	252	284.4	244.6	191.7 J
C2-NAPHTHOBENZOTHIOPHENES							
C2-PHENANTHRENES/ANTHRACENES	337	281	465	566	412.6	488.3	425.5 J
C3-CHRYSENES	16.6	14.9	16.8 J	9.14 J	13.3 J	18.2 J	6.6 J
C3-DIBENZOTHIOPHENES	18.9	21	37.4 J	37	21.5 J	25.7 J	21.5 J
C3-FLUORANTHENES/PYRENES							
C3-FLUORENES	64.9	53.6	77.3 J	155 J	137.6 J	98.8 J	44.6 J
C3-NAPHTHALENES	150 J	79.4 J	114	129	183.5	161.6	121.7 J
C3-NAPHTHOBENZOTHIOPHENES							

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
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ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2
nsample	**OU4-SD-M12-200B**	**OU4-SD-M12-200B-D**	**OU4-SD-M12-200A**	**OU4-SD-M12-200A-D**	**OU4-SD-M12-201B**	**OU4-SD-M12-201B-D**	**OU4-SD-M12-201A**
sample_dat	20000505	20000505	20000829	20000829	20010508	20010508	20010820
round	02	02	03	03	04	04	05
C3-PHENANTHRENES/ANTHRACENES	149	142	183	209	155	198.5	169.3 J
C4-CHRYSENES	1.87	2.9	4.82 J	109 J	225 J	174	33.4 J
C4-DIBENZOTHIOPHENES							
C4-FLUORANTHENES/PYRENES							
C4-NAPHTHALENES	30.1	19.8	47.5	60.1	95.8	65.2	57.5 J
C4-NAPHTHOBENZOTHIOPHENES							
C4-PHENANTHRENES/ANTHRACENES	47	63.3	47 J	67	64.5 J	52.5	65.1 J
Dioxins/Furans (ng/kg)							
1,2,3,4,6,7,8,9-OCDD	494	275 J	138 J	1540 J	309.6 U	1437 J	1079.1
1,2,3,4,6,7,8,9-OCDF	34.5	15.2	9.24 J	69.3 J	22.1 U	78.9 U	64.7
1,2,3,4,6,7,8-HPCDD	57.2	36.7 J	13 J	207 J	27.2 U	145 J	115.1
1,2,3,4,6,7,8-HPCDF	18.4	9.3 J	3.31 J	53.3 J	2.1 UJ	39.1 J	25.7
1,2,3,4,7,8,9-HPCDF	0.9 U	2.4 U	1.65 UJ	2 J	2.1 U	1.7 J	1.7 J
1,2,3,4,7,8-HXCDD	2.2 U	2.4 UJ	1.65 UJ	3.1 J	2.1 U	1.5 J	1.5 J
1,2,3,4,7,8-HXCDF	1.3 J	1.2 U	1.65 UJ	4.38 J	2.1 U	3.7 U	2.1
1,2,3,6,7,8-HXCDD	2.2 U	2.4 UJ	1.65 UJ	9.55 J	2.1 UJ	6.4 J	5.2
1,2,3,6,7,8-HXCDF	1.3 J	0.8 J	1.65 U	1.42 U	2.1 U	1.7 J	1.89 U
1,2,3,7,8,9-HXCDD	1 U	2.4 UJ	1.65 UJ	6.98 J	2.1 UJ	3.9 J	3
1,2,3,7,8,9-HXCDF	2.2 U	2.4 U	1.65 U	1.12 J	2.1 U	0.7 J	1.89 U
1,2,3,7,8-PECDD	2.2 U	2.4 U	1.65 U	1.42 U	2.1 UJ	1.4 J	1.89 U
1,2,3,7,8-PECDF	0.8 U	2.4 U	1.65 U	1.42 U	0.2 U	1.4 U	1.2 U
2,3,4,6,7,8-HXCDF	0.7 U	2.4 UJ	1.65 UJ	4.84 J	2.1 U	2.6 J	1.89 U
2,3,4,7,8-PECDF	0.9 J	2.4 U	1.65 U	1.42 U	2.1 UJ	2.8 U	1.89 U
2,3,7,8-TCDD	0.4 U	0.48 U	0.33 U	0.28 U	0.4 UJ	0.5 J	0.38 U
2,3,7,8-TCDF	1.4	0.48 U	0.33 U	0.28 U	0.4 UJ	2.5 U	0.38 U
TOTAL HPCDD	145	96.1 J	74.1 J	616 J	167.7 U	473 J	420.9
TOTAL HPCDF	43	23.6 J	9.2 J	110 J	9.9	96.2 U	68.9
TOTAL HXCDD	1 U	2.4 UJ	5.16 J	157 J	10.6 U	81.3 J	61.7
TOTAL HXCDF	11.9	2 U	1.52 J	67.4 J	2.4 U	43.9 J	30 J
TOTAL PECDD	2.2 U	2.4 UJ	1.65 U	1.42 U	0.4 U	1.4 J	2.4
TOTAL PECDF	2.6 U	2.4 U	1.35 J	27.2 J	0.3 U	18.6 U	7.2 U
TOTAL TCDD	3.8	1.7 J	0.33 UJ	6.09 J	0.4 UJ	4 J	0.8 J
TOTAL TCDF	1.4	0.48 U	0.33 UJ	7.58 J	0.4 UJ	8.3 U	2.6
Pesticides/PCBs (ug/kg)							
1,2,3,4-TETRACHLOROBENZENE	0.08 J	0.05 J	0.06 J	0.17 J	0.04 J	0.1 J	0.04 J
1,2,4,5-TETRACHLOROBENZENE	0.06 J	0.81 J	1 U	2.8 J	0.64 U	0.12 J	0.57 U
2,4'-DDD	4	3.6	7.1	5.8	26 J	9.4 J	1.38 J
2,4'-DDE	0.32	0.25	0.1 U	0.098 U	0.13	0.096 UJ	0.08 U
2,4'-DDT	0.86	1	0.17 J	0.34 J	0.91 J	0.082 UJ	0.12 J
4,4'-DDD	1.9	1.6	1.8	2.4	2.2 J	5 J	1.95 J
4,4'-DDE	0.72	1	1.2	1.3	1.3	0.93 J	0.88
4,4'-DDT	2.3	2.6	0.98	0.9 J	8.1 J	2.8 J	2.05 J
ALDRIN	0.08 U	21 J	0.05 J	0.03 J	51 J	0.082 UJ	0.07 U
ALPHA-BHC	0.13	0.09	0.2	0.22 J	0.16 J	0.07 J	0.05 U
ALPHA-CHLORDANE	0.48	0.2 J	0.68	0.92 J	1.4	1.2 J	0.9
BETA-BHC	1.9	1.2	0.25 U	0.24 U	0.22 J	0.25 UJ	0.25 J
CHLORPYRIFOS	0.38 U	0.34 U	0.76 U	0.34 U	0.16 U	0.15 UJ	0.12 U

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2
nsample	**OU4-SD-M12-200B**	**OU4-SD-M12-200B-D**	**OU4-SD-M12-200A**	**OU4-SD-M12-200A-D**	**OU4-SD-M12-201B**	**OU4-SD-M12-201B-D**	**OU4-SD-M12-201A**
sample_dat	20000505	20000505	20000829	20000829	20010508	20010508	20010820
round	02	02	03	03	04	04	05
CIS-NONACHLOR	0.21	0.89 J	0.37	0.5 J	0.58 J	0.33 J	0.46
DELTA-BHC	0.06 U	0.051 U	0.055 U	0.054 U	0.085 UJ	0.15 J	0.07 U
DIELDRIN	0.02 J	0.22 J	0.08 J	0.08 UJ	0.2	0.12 J	0.04 U
ENDOSULFAN II	3.1	2.1	0.4 J	0.11 UJ	0.2 UJ	5.5 J	3.34 J
ENDRIN	0.18 U	0.16 U	0.16 U	0.16 U	0.085 U	0.082 UJ	0.07 U
GAMMA-BHC (LINDANE)	0.32 U	0.29 U	0.29 U	0.29 U	0.18 U	0.18 UJ	0.15 U
GAMMA-CHLORDANE	0.26	0.22 J	0.15 J	0.08 UJ	0.042 U	0.041 UJ	0.03 UR
HEPTACHLOR	0.41	0.2 UJ	0.21 U	0.21 U	0.18 J	0.07 J	0.17 J
HEPTACHLOR EPOXIDE	0.04 U	0.04 U	0.036 U	0.036 U	0.071 U	0.069 UJ	0.06 U
HEXACHLOROBENZENE	4.9	0.051 U	0.055 U	0.01 J	0.34 J	0.05 J	0.02 J
MIREX	0.39	0.04 UJ	0.036 U	0.036 U	0.48 J	0.11 UJ	1.23 J
OXYCHLORDANE	0.22 J	0.87 J	0.018 UJ	0.31 J	0.071 UJ	0.75 J	0.06 U
PCB-101/90	2.8	9.6 J	4.1	6.7	5.3	5 J	8.19 J
PCB-105	0.98 J	5.1 J	0.9 J	3.8 J	0.75 J	2 J	0.73 J
PCB-118	2.7	4.1	4.5	5.1	2.2 J	4.9 J	4.64 J
PCB-126	0.14 J	0.21 J	0.22 U	0.21 U	0.34 UJ	0.33 UJ	0.01 J
PCB-128	1.1	3.5 J	1.1	1.3	1.8	2 J	2.31
PCB-138/160	3.4	32 J	7.6 J	15 J	12	10 J	29.36 J
PCB-149/123	2.1	22 J	5 J	9.7 J	9.8 J	7.1 J	18.26 J
PCB-153/132	3.4	43 J	12 J	25 J	18	13 J	38.68 J
PCB-156	3.8	3	2.3	2.1 J	7.4 J	6.2 J	6.9
PCB-167	1.3	2	1.8	2.5	1.9	2.3 J	2.49 J
PCB-169	0.23 J	0.21 U	0.03 U	0.01 U	0.16 J	0.01 J	0.02 J
PCB-170/190	46 J	31 J	57 J	68 J	72 J	65 J	68.97 J
PCB-18/17	0.12 U	1.3 J	0.11 UJ	1 J	0.11 U	0.11 UJ	0.39
PCB-180	2.2 J	35 J	11	17	12	9 J	34.11 J
PCB-187	1.4	20 J	5.6 J	11 J	33 J	1.1 UJ	16.55
PCB-189	0.47	1.1 J	0.77	0.82	0.28 J	0.71 J	1.33
PCB-195/208	0.92	4.1 J	3.3	3.4 J	3.3 J	1 J	8.69 J
PCB-201/157/173	1.19	1.56	2.46	2.06	1.4	1.1 J	1.88 J
PCB-206	1.2	2.1 J	4.4	5.3 J	5.4	3.4 J	10.51 J
PCB-209	0.55	0.07 J	2.2	1.6	1.95 J	0.45 J	1.58 J
PCB-28	1.4	2	2	1.9	3 J	1.4 J	1.61 J
PCB-44	1	1.5	1.3	1.9	1	0.85 J	1.01
PCB-52	1.2	2.2 J	3.4	2.2	1.1	1.7 J	2.33
PCB-66	0.27	0.98 J	2.6	2.1	1.1 J	4 J	1.49
PCB-77	0.69	0.21 UJ	0.2 U	0.02 J	0.34 U	0.15 J	0.08 J
PCB-8/5	3.2	1.5 J	2.1	2.2	0.37 U	0.71 J	1.64 J
PCB-81	0.31	0.21 UJ	0.21 J	0.32	3.6 J	0.03 J	0.1 J
PENTACHLOROANISOLE	0.17 J	0.13 J	0.56 U	0.08 U	0.16 J	0.09 U	0.11 J
PENTACHLOROBENZENE	0.07 J	0.11	0.35 U	0.53 U	0.13 U	0.01 J	0.11 U
TRANS-NONACHLOR	0.19	0.22	0.046 UJ	0.05 J	0.07 J	0.12 UJ	0.07 J
AVS/SEM (mg/kg)							
ACID VOLATILE SULFIDE	77.1	58.5	251 J	249 J	311.639 J	286.761 J	250.442 J
CADMIUM	0.073	0.132	0.0876 U	0.084 U	0.29 J	0.24 J	0.44
COPPER	2.88 U	9.44 J	31.41 J	13.96 J	37.2 J	37.6 J	80.28
LEAD	15.2	23.7	67.17 J	67.45 J	108	65.6 J	124.1
NICKEL	1.14	2.89	9.94 J	11.8 J	8.6	9.84	22.09
ZINC	26.7 J	58.2 J	283.35 J	348.76 J	225 U	223	646.01

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2
nsample	**OU4-SD-M12-200B**	**OU4-SD-M12-200B-D**	**OU4-SD-M12-200A**	**OU4-SD-M12-200A-D**	**OU4-SD-M12-201B**	**OU4-SD-M12-201B-D**	**OU4-SD-M12-201A**
sample_dat	20000505	20000505	20000829	20000829	20010508	20010508	20010820
round	02	02	03	03	04	04	05
HF Metals (mg/kg)							
ALUMINUM	54300	60600	44621	50651	49949.4	46112.4	50071.5
ARSENIC	7.2	6.7	10.7	10.8	10.12	9.767	10.37
CADMIUM	0.24	0.21	0.27 J	0.33 J	0.188 U	0.74	0.4655 U
CHROMIUM	59.7	74.3	77.5	100	89.25	81.53	91.31 J
COPPER	34.5	40.2	128 J	254 J	90.31	79.01	171.93 J
IRON	15800	19300	17959 J	29130 J	23182.2	19617.2	24185.5
LEAD	56.5	54.4	142 J	204 J	102.52	93.96	305.86
MANGANESE	422	542	328	432	336.47	346.5	342.32
MERCURY	0.16	0.16	0.29	0.32	0.24 J	0.2 J	0.3293
NICKEL	22.7	22.9	28.1 J	50 J	28.55	26.85	42.44
SILVER	0.2	0.21	3.21	3.48	0.43 J	0.3 J	0.33 J
ZINC	117	141	399 J	1164 J	219.29	243.76	709.19
Inorganics (mg/kg)							
ALUMINUM							
ARSENIC							
CADMIUM							
CHROMIUM							
COPPER							
IRON							
LEAD							
MANGANESE							
NICKEL							
SILVER							
ZINC							
Miscellaneous Parameters (%)							
PERCENT CLAY	6.75	10.04	10.5	8	9.7	10.7	10.3
PERCENT GRAVEL							
PERCENT SAND	78.4	73.46	72.6	71.5	69.5	71	71.7
PERCENT SILT	14.85	16.5	16.9	20.5	20.8	18.3	18.1
PERCENT SOLIDS							
TOTAL ORGANIC CARBON	1.14	1.14	1.17 J	1.22 J	2.03 J	2.3 J	1.08
TOTAL SOLIDS							

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-201A-D**	**OU4-SD-M12-202A**	**OU4-SD-M12-202A-D**	**OU4-SD-M12-203A**	**OU4-SD-M12-203A-D**	**OU4-SD-M12-399A**	**OU4-SD-M12-399A-D**
sample_dat	20010820	20020813	20020813	20030809	20030809	19990909	19990909
round	05	06	06	07	07	01	01
Semivolatile Organics (ug/kg)							
1,1-BIPHENYL	62.3 J	31.9 J	21.2	46	42.6	11.1 U	9.82 U
1-METHYLNAPHTHALENE	178.6	49 J	56.7	113.2	122	38.8	24.7 U
1-METHYLPHENANTHRENE	454.8	204.2 J	180.4	372.7	315.2	107	98.8
2,3,5-TRIMETHYLNAPHTHALENE	40.5	27.8 J	24.1	36.6	32	16.4	10.3 J
2,6-DIMETHYLNAPHTHALENE	82.4	47.2 J	40.2	62.6	62.5	22.1	16.3 J
2-METHYLNAPHTHALENE	235.5	76 J	77.7	144.9	162.3	54.6	33.1 U
ACENAPHTHENE	1499.2 J	802.8 J	342.9 J	1125	1022.9	181	151
ACENAPHTHYLENE	235.9 J	79.9 J	57.6	138.3	143	78.5 J	67.5 J
ANTHRACENE	2648	1607.6 J	858.3 J	2195	1883.7	479	318
BENZO(A)ANTHRACENE	2296.7 J	1557.4 J	1675.2	3340.8	2611.8	769	638
BENZO(A)PYRENE	2934.6 J	2692.8 J	1965.5	4031.3	3341.9	949	819
BENZO(B)FLUORANTHENE	2678.9	1814.4 J	1778.6	4037.4	3666	1033	886
BENZO(E)PYRENE	1388.1	1091.8 J	969	1910.8	1618.6	535	456
BENZO(G,H,I)PERYLENE	1394.9 J	948 J	820.2	1964.2	1687.5	454	376
BENZO(K)FLUORANTHENE	1477.4 J	727.6 J	638.1	1468.3	1295.5	377	329
CHRYSENE	2527.4	1415.8 J	1685.3	3147.5	2550.4	934	811
DIBENZO(A,H)ANTHRACENE	181.5 J	251 J	219.5	495.7	414.6	122	99.2
DIBENZOTHIOPHENE	448.3	213.4 J	123.8 J	308.8	271.4	74.7	59
FLUORANTHENE	11335.6	5149.2 J	2372.9 J	8125.8	7019.5	1903	1876
FLUORENE	1402.5 J	585.4 J	389.9	1105.2	991	151	126
HIGH MOLECULAR WEIGHT PAHS	27779.3	15578.3	9998.8	25428.2	21452	6475	5795.2
INDENO(1,2,3-CD)PYRENE	1503.7 J	1116.9 J	879.7	2305.6	1978.9	533	425
LOW MOLECULAR WEIGHT PAHS	14920.3	7633.3	3729.3	10892.7	9764.1	2416.45	1933.9
NAPHTHALENE	492.2	203 J	145.4	275.3	316.7	90.7 U	51.7 U
PERYLENE	477.2 J	390.9 J	180.3 J	762.1	627.1	130	148
PHENANTHRENE	8407	4278.6 J	1857.5 J	5909	5244.5	1427	1229
PYRENE	8503.5	4512.1 J	2080.4 J	6287.1	5513.8	1798	1552
Alkylated Polynuclear Aromatic Hydrocarbons (ug/kg)							
C1-CHRYSENES	797.8	557.8 J	993.7 J	1268.8	1070.8	401	290
C1-DIBENZOTHIOPHENES	149.2	92.1 J	68.3	102.1	94.4	43.9	29
C1-FLUORANTHENES/PYRENES	2728.7	1553.5 J	1277.5	2572.8	2192.3	955	707
C1-FLUORENES	290.3 J	125.5 J	105.5	246.1	219.6	60.6	40.2
C1-NAPHTHALENES	414.1	125.1 J	134.4	258.1	284.3	93.3 U	57.8 U
C1-NAPHTHOBENZOTHIOPHENES							
C1-PHENANTHRENES/ANTHRACENES	1635.5	824.4 J	635.8	1403.3	1203.6	503	365
C2-CHRYSENES	89.8 J	196.1 J	441.5 J	358.9	310	190	125
C2-DIBENZOTHIOPHENES	67	56.8 J	85.9	85.6	73.5	48	25.8
C2-FLUORANTHENES/PYRENES							
C2-FLUORENES	105.1 J	94.8 J	94.3	155.7	116.3	54.4	45.3
C2-NAPHTHALENES	237.9	66.8 J	108.7	160.4	160.9	85.3 U	43.4 U
C2-NAPHTHOBENZOTHIOPHENES							
C2-PHENANTHRENES/ANTHRACENES	594.6	348.6 J	356	580.4	499.5	286	208
C3-CHRYSENES	1 J	23.2 J	92.2 J	49.6	33.3	6.53	5.15 J
C3-DIBENZOTHIOPHENES	33.7 J	38.9 J	96.8 J	38.5	38.8	44.5	27.2
C3-FLUORANTHENES/PYRENES							
C3-FLUORENES	63.1 J	53.4 J	158.5 J	82.2	113.7	32.5	23.2
C3-NAPHTHALENES	141.1	46.8 J	93.1 J	104.9	96.1	97	43.1 J
C3-NAPHTHOBENZOTHIOPHENES							

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ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-201A-D**	**OU4-SD-M12-202A**	**OU4-SD-M12-202A-D**	**OU4-SD-M12-203A**	**OU4-SD-M12-203A-D**	**OU4-SD-M12-399A**	**OU4-SD-M12-399A-D**
sample_dat	20010820	20020813	20020813	20030809	20030809	19990909	19990909
round	05	06	06	07	07	01	01
C3-PHENANTHRENES/ANTHRACENES	238.1	161.9 J	234.5	223	211.7	144	102
C4-CHRYSENES	5.6 J	14.6 J	95.7 J	3.2 J	1.9 J	20.3	10.8
C4-DIBENZOTHIOPHENES							
C4-FLUORANTHENES/PYRENES							
C4-NAPHTHALENES	45.6 J	24.1 J	45.3 J	58.1	42.4	54.4	22.3 J
C4-NAPHTHOBENZOTHIOPHENES							
C4-PHENANTHRENES/ANTHRACENES	45.2 J	44.2 J	148.3 J	53.4 J	734.6 J	37.5	46.3
Dioxins/Furans (ng/kg)							
1,2,3,4,6,7,8,9-OCDD	1051.7	759.6 J	974.6	1060.9 U	1440.1 U	2470 U	2273 U
1,2,3,4,6,7,8,9-OCDF	64.9	49.2	4.4 UJ	62.9 U	72.1 U	130 U	129 U
1,2,3,4,6,7,8-HPCDD	114.1	81.5 J	2.2 UJ	134.1 U	183.5 U	274	259
1,2,3,4,6,7,8-HPCDF	28.9 U	28.1 J	2.2 UJ	33.1	44.2	66.1 U	62.3 U
1,2,3,4,7,8,9-HPCDF	1.6	2.4 U	2.2 U	1.55 U	1.76 U	3.4 U	3.25 U
1,2,3,4,7,8-HXCDD	1.3	2.4 U	2.2 U	1.4 J	1.76 U	3.04	1.93
1,2,3,4,7,8-HXCDF	2.6	3.2	2.2 U	2.5	2.6	6.04 U	4.45 U
1,2,3,6,7,8-HXCDD	5.5	2.4 U	2.2 U	5.3	5.1	11.8	11.1
1,2,3,6,7,8-HXCDF	0.97 U	2.4 U	2.2 U	1.7	0.7 J	2.69 U	2.86 U
1,2,3,7,8,9-HXCDD	2.9	2.4 U	2.2 U	4.3	1.76 UJ	6.18 U	5.85 U
1,2,3,7,8,9-HXCDF	0.5 J	2.4 U	2.2 U	1.55 U	1.76 U	1.8	1.5
1,2,3,7,8-PECDD	0.97 U	2.4 U	2.2 U	0.4 J	1.76 U	1.8 U	1.5 U
1,2,3,7,8-PECDF	0.97 U	2.4 U	2.2 U	1.55 U	1.76 U	2.24 U	1.5 U
2,3,4,6,7,8-HXCDF	2.1	2.4 U	2.2 U	0.6 J	1.76 U	3.85 U	4.06 U
2,3,4,7,8-PECDF	0.97 U	2.4 U	2.2 U	1.55 U	1.76 U	2.21 U	2.53 U
2,3,7,8-TCDD	0.97 U	0.5 J	0.4 UJ	0.31 U	0.35 U	0.52 U	0.4 U
2,3,7,8-TCDF	0.97 U	0.5 UJ	0.4 UJ	1.8	1.4	3.98 U	3.35 U
TOTAL HPCDD	413.6	240.7	223.8	347.9	493.8	808	779
TOTAL HPCDF	78.1 U	64.2	36.7 J	81.4	110.9	174 U	166 U
TOTAL HXCDD	61.9	31.1 J	62.6 J	63.2	51.6	80.4 U	68.3 U
TOTAL HXCDF	10.8 J	25.5	2.2 U	27.4	49.4 J	13.4 U	12.3 U
TOTAL PECDD	2	3.6 J	2.2 UJ	3	1.76 U	1.8 U	3.96 U
TOTAL PECDF	12.7 J	10.1	2.4 J	2.8	6.4 J	13.3 U	14 U
TOTAL TCDD	2.1 J	1.6	0.4 UJ	0.31 U	0.35 U	9.68	8.26
TOTAL TCDF	4	3.3	6 J	3.6	1.4 J	16 U	14.9 U
Pesticides/PCBs (ug/kg)							
1,2,3,4-TETRACHLOROBENZENE	0.33	0.12 J	0.06 J	0.236 U	0.53 U	0.23 J	0.13 J
1,2,4,5-TETRACHLOROBENZENE	1.71 U	0.35	1.21 J	3.17	3.83	0.31 J	0.26 J
2,4'-DDD	7.96 J	0.68	3.15 J	4.32	4.06	1.6	1.6
2,4'-DDE	0.09	0.03 J	0.65 J	0.16 J	0.44 J	0.06 J	0.15
2,4'-DDT	0.37 J	0.16 J	0.25	0.12 J	0.58 J	0.25	0.27
4,4'-DDD	3.72 J	0.62	1.93 J	2.42	2.51	1.6	1.3
4,4'-DDE	1.46	0.56	0.83	0.91	1.22	1.5	1.2
4,4'-DDT	4.29 J	1.2 J	0.75	1.64	1.28	0.27	0.24
ALDRIN	0.08 U	5.5	4.14	0.079 U	0.07 J	0.079 U	0.079 U
ALPHA-BHC	0.1	0.04 J	0.1 J	0.08 J	0.14 J	0.088 U	0.041 U
ALPHA-CHLORDANE	1.66 J	0.24	0.41 J	0.78 J	1.09 J	0.74	0.76
BETA-BHC	0.34 U	0.24 U	0.15 J	0.236 U	0.256 U	0.27 U	0.27 U
CHLORPYRIFOS	0.13 U	0.14 U	0.23	1.69 J	0.157 UJ	0.11 J	0.09 J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-201A-D**	**OU4-SD-M12-202A**	**OU4-SD-M12-202A-D**	**OU4-SD-M12-203A**	**OU4-SD-M12-203A-D**	**OU4-SD-M12-399A**	**OU4-SD-M12-399A-D**
sample_dat	20010820	20020813	20020813	20030809	20030809	19990909	19990909
round	05	06	06	07	07	01	01
CIS-NONACHLOR	0.72	0.19	0.39 J	0.36 J	0.83 J	0.31	0.32
DELTA-BHC	0.07 U	0.08 U	0.1	0.17	0.05 J	0.065	0.059 U
DIELDRIN	0.04 U	0.06	0.25 J	0.15	0.043 U	0.052 J	0.047 J
ENDOSULFAN II	6.08 J	0.05 J	1.17 J	0.71	0.58	2.4	2.9
ENDRIN	0.08 U	0.08 U	0.05 J	0.079 U	0.085 U	0.12 J	0.18
GAMMA-BHC (LINDANE)	0.16 U	0.17 U	0.26	0.171 U	0.185 U	0.52 U	0.68 U
GAMMA-CHLORDANE	0.035 U	0.02 J	0.05 J	0.039 U	0.043 U	0.077 J	0.089 U
HEPTACHLOR	0.18 U	0.2 U	0.25	0.02	0.213 U	0.089 J	0.14 J
HEPTACHLOR EPOXIDE	0.06 U	0.07 U	0.03 J	0.066 U	0.071 U	0.04 U	0.039 U
HEXACHLOROBENZENE	0.09	0.07 U	0.06 J	0.066 U	0.54	0.025 U	0.027 U
MIREX	0.53 J	0.26	0.49 J	0.105 U	0.114 U	0.34	0.039 U
OXYCHLORDANE	2.37	0.53	0.8	0.92	0.071 U	0.28	0.32
PCB-101/90	6.9	3.1	5.47 J	10.7 J	5.69 J	4.4	3.3
PCB-105	1.7 J	0.42 J	1.46 J	3.98 J	1.06 J	1.7 J	2 J
PCB-118	7.55	1.6	4.07 J	8.24	5.03	3.4	3.8
PCB-126	0.53 U	0.01 J	0.02 J	0.14 J	0.11 J	0.006 J	0.95 U
PCB-128	2.48	0.38	1.23 J	1.12	1.14	1.4 J	1.4 J
PCB-138/160	16.33 J	4.4	7.46 J	7.24	9.3	6.6	5.3
PCB-149/123	10.12 J	3.7	4.61	4.34	6.24	4.3	2.6
PCB-153/132	25.43	7	9.1	10.21	15.54	7.2	4.8
PCB-156	8.13	1.3	0.52 U	0.75 J	6.54 J	3.44	2.85
PCB-167	4.7 J	0.75	1.29 J	7.29 J	2.33 J	2.6	3.3
PCB-169	0.05 J	0.01 J	0.52 U	0.43 J	0.33 J	0.95 U	0.95 U
PCB-170/190	132.23 J	33 J	25.63 J	112.68 J	137.98 J	27 J	34 J
PCB-18/17	0.1 U	0.13	0.45 J	0.9 J	0.23 J	0.011 J	0.12 U
PCB-180	28.96	4.2	5.48	11.02	10.85	4.8 J	4 J
PCB-187	24.56	5.3	3.37	3.75	5.3	3.7	1.8
PCB-189	1.59	0.35 J	0.51 J	0.74	1.04	0.29	0.43
PCB-195/208	21.92 J	1	1.05	8.11 J	2.81 J	7.1	1.5
PCB-201/157/173	9.15 J	0.68	0.86	2.45	2.54	1.11	0.87
PCB-206	42.95 J	0.83	1.2	15.86 J	3.28 J	17	4.3
PCB-209	10.96 J	0.39	0.79 J	6.54	2.72	7.8 J	1.3 J
PCB-28	3.99 J	1	3.62 J	11.62 J	2.68 J	2	2
PCB-44	1.34	0.39	1.27 J	13.53 J	1.9 J	0.72	0.72
PCB-52	2.98	1.3	2.9 J	14.87 J	4.66 J	1.8	1.3
PCB-66	2.45	0.27	0.87 J	19.43 J	2.57 J	0.86	1.2
PCB-77	0.53 U	0.02 J	0.07 J	2.03	0.15 J	0.059 J	0.059 J
PCB-8/5	3.28 J	0.34	1.99 J	1.51 J	2.87 J	0.65 J	0.57 J
PCB-81	0.21 J	0.07 J	0.08 J	0.64 J	0.43 J	0.021 J	0.032 J
PENTACHLOROANISOLE	0.22	0.05 J	0.1 J	0.18	0.21	0.098 J	0.1 J
PENTACHLOROBENZENE	0.11 U	0.12 U	0.2	0.39 U	0.85 U	0.12	0.058 J
TRANS-NONACHLOR	0.05 J	0.04 J	0.1 J	0.08 J	0.31	0.17	0.067
AVS/SEM (mg/kg)							
ACID VOLATILE SULFIDE	239.336 J					974 J	1646 J
CADMIUM	0.44					0.11	0.33
COPPER	109.07					0.95 U	4.5 U
LEAD	168.5					21.9 J	50.3 J
NICKEL	25.37					1.6 U	4.1
ZINC	716.39 J					91	69.5

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ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.2	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-201A-D**	**OU4-SD-M12-202A**	**OU4-SD-M12-202A-D**	**OU4-SD-M12-203A**	**OU4-SD-M12-203A-D**	**OU4-SD-M12-399A**	**OU4-SD-M12-399A-D**
sample_dat	20010820	20020813	20020813	20030809	20030809	19990909	19990909
round	05	06	06	07	07	01	01
HF Metals (mg/kg)							
ALUMINUM	47235.14	42054	43574	46666.2 J	41701 J	61067	58443
ARSENIC	10.96	9.8	11.2	10.04	9.7	8.9	9.2
CADMIUM	0.4643 U	1.3	1.2	2.89	2.74	0.38	0.38
CHROMIUM	113.74 J	57.6	58.2	86.8	104.86	79.5	83.2
COPPER	253.44	36.8	29.7	119.27	123.39	50.9 J	43.5 J
IRON	26093.73	16040	17551	24031.5	24144	22065	22779
LEAD	202.55 J	152	100	146.62	122.4	87.7 J	83.1 J
MANGANESE	353.8	286	295	364.11	345.22	417	420
MERCURY	0.2343	0.2 J	0.27 J	0.34	0.33	0.32 J	0.35 J
NICKEL	61.34 J	15.2	16.3	39.21	47.83	27.4	26
SILVER	0.43 J	0.18 U	0.21 U	0.4	0.35	0.83	0.48
ZINC	841.2	132	108	400.6	408.01	131	121
Inorganics (mg/kg)							
ALUMINUM							
ARSENIC							
CADMIUM							
CHROMIUM							
COPPER							
IRON							
LEAD							
MANGANESE							
NICKEL							
SILVER							
ZINC							
Miscellaneous Parameters (%)							
PERCENT CLAY	7.1	4.3	10.8	9.8	6.5	13.69	16.05
PERCENT GRAVEL		0	0	0	0		
PERCENT SAND	73.9	80.9	75.2	65.4	74	44.3	46.51
PERCENT SILT	19	14.7	13.9	24.8	19.5	42.01	37.44
PERCENT SOLIDS							
TOTAL ORGANIC CARBON	1.12	0.92 J	0.92 J	1.09	1.56	1.84	1.73
TOTAL SOLIDS							

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-300B**	**OU4-SD-M12-300B-D**	**OU4-SD-M12-300A**	**OU4-SD-M12-301B**	**OU4-SD-M12-301A**	**OU4-SD-M12-302A**	**OU4-SD-M12-303A**
sample_dat	20000505	20000507	20000829	20010508	20010820	20020813	20030809
round	02	02	03	04	05	06	07
Semivolatile Organics (ug/kg)							
1,1-BIPHENYL	6.9 J	8.7 J	11.1	18.9	25	10.1 J	27.9
1-METHYLNAPHTHALENE	15.6 J	18.6	25.2 J	47.3	74.8	13.9 J	67.3
1-METHYLPHENANTHRENE	66.8 J	112	70.4	93.4	156.6	83.9 J	182.9
2,3,5-TRIMETHYLNAPHTHALENE	16.2 J	17.8	11.5	17.7	18.1	9.3 J	17.9
2,6-DIMETHYLNAPHTHALENE	15.2 J	21.5	19	27.7	34.5	13.3 J	33.5
2-METHYLNAPHTHALENE	23.3 J	31.2	36.1	67.3	113.3	21.7 J	98.3
ACENAPHTHENE	51.8 J	49.9	133	217.5	544.3	93.7 J	821.5
ACENAPHTHYLENE	64.1 J	95.9	84.6	102.6 J	83.4	62.6 J	76.8
ANTHRACENE	258 J	582	196	497.6 J	762.4 J	371.5 J	1049.5
BENZO(A)ANTHRACENE	440 J	1150	438 J	846.3 J	1250.5	897.8 J	1615.5
BENZO(A)PYRENE	448 J	955	692	996.1	1312.4	916.5 J	2042.7
BENZO(B)FLUORANTHENE	657 J	1120 J	795 J	1092	1360.9	982.2 J	2077.1
BENZO(E)PYRENE	283 J	484 J	361 J	441.4 J	714.2	475.3 J	1002.4
BENZO(G,H,I)PERYLENE	249 J	447 J	343 J	345.6 J	567 J	323.4 J	982.2
BENZO(K)FLUORANTHENE	150 J	283	203	238.7 J	412.3	316 J	777.8
CHRYSENE	605 J	855 J	511	765.1 J	1230.5	743.6 J	1577.5
DIBENZO(A,H)ANTHRACENE	78.1 J	152	97.5	96.9 J	174.5	83.7 J	239.2
DIBENZOTHIOPHENE	23.6 J	29.4	33.5	57	130.3	45 J	179.4
FLUORANTHENE	1324 J	1972	843 J	1608.5	2782.6	1932.2 J	4307.8
FLUORENE	70 J	121	117	251.4 J	424.1	83.4 J	605.6
HIGH MOLECULAR WEIGHT PAHS	3916.1	6589	3371.5	5604.7	8985	6497.3	13206.4
INDENO(1,2,3-CD)PYRENE	283 J	515 J	411 J	456.6 J	765.4 J	408.2 J	1170.2
LOW MOLECULAR WEIGHT PAHS	842.3	1470.5	1189.2	2368.9	4056.2	1449.3	6066.1
NAPHTHALENE	36.1 J	52.5 J	70.5	142.2	230.4	103.9 J	210.9
PERYLENE	95.4 J	131	112	164.3	234.2	173.2 J	404.8
PHENANTHRENE	339 J	538 J	552	1090.3	1898.3	712.5 J	3203.5
PYRENE	1021 J	1505	790 J	1291.8	2234.5	1923.5 J	3423.7
Alkylated Polynuclear Aromatic Hydrocarbons (ug/kg)							
C1-CHRYSENES	278 J	573	238	408.7	704.3	389.7 J	716.4
C1-DIBENZOTHIOPHENES	27.2 J	35.1	23.9	32	60.5	41 J	60.1
C1-FLUORANTHENES/PYRENES	464 J	807	308	527	1205.5	789.5 J	1306.1
C1-FLUORENES	45 J	60.5	52.8	77.2	101.7	36.1 J	140.4
C1-NAPHTHALENES	38.9 J	49.8	61.3	114.7	188.1	35.5 J	165.6
C1-NAPHTHOBENZOTHIOPHENES							
C1-PHENANTHRENES/ANTHRACENES	223 J	353	197	329.3	591.9	314 J	676.3
C2-CHRYSENES	101 J	173	106	226.2	285.9	187.8 J	242.6
C2-DIBENZOTHIOPHENES	33.7 J	40.5	25.9	42.3	73.7	47 J	66.1
C2-FLUORANTHENES/PYRENES							
C2-FLUORENES	41.5 J	71.6	62.1	80.1	95.5	31 J	81
C2-NAPHTHALENES	44.2 J	55	71.3	81.5	108.8	20.9 J	84.4
C2-NAPHTHOBENZOTHIOPHENES							
C2-PHENANTHRENES/ANTHRACENES	144 J	272	104	187.5	333.6	175.8 J	332.6
C3-CHRYSENES	8.4 J	7.7	1.73	15.3	17.8	21.3 J	27.6
C3-DIBENZOTHIOPHENES	22.9 J	30.2	21.2	40	80.5	41.4 J	63.5
C3-FLUORANTHENES/PYRENES							
C3-FLUORENES	37 J	94.8	50.3	68.6	69.6	61 J	84.3
C3-NAPHTHALENES	45.1 J	56.2	58.8	70.6	74	17.6 J	59.1
C3-NAPHTHOBENZOTHIOPHENES							

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ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-300B**	**OU4-SD-M12-300B-D**	**OU4-SD-M12-300A**	**OU4-SD-M12-301B**	**OU4-SD-M12-301A**	**OU4-SD-M12-302A**	**OU4-SD-M12-303A**
sample_dat	20000505	20000507	20000829	20010508	20010820	20020813	20030809
round	02	02	03	04	05	06	07
C3-PHENANTHRENES/ANTHRACENES	87.7 J	134	62.1	115.4	212.2	121.1 J	214.2
C4-CHRYSENES	2 J	4.4	0.49 J	66.3	8.8	12.4 J	2.7 J
C4-DIBENZOTHIOPHENES							
C4-FLUORANTHENES/PYRENES							
C4-NAPHTHALENES	15.6 J	23.5	30.2	46.9	51.1	12.1 J	35
C4-NAPHTHOBENZOTHIOPHENES							
C4-PHENANTHRENES/ANTHRACENES	19.4 J	63	36.3	62.4	81.5	43.5 J	143
Dioxins/Furans (ng/kg)							
1,2,3,4,6,7,8,9-OCDD	265 J	1460 J	92.1	204.4 U	2330.8 J	2794.9	2064.3 U
1,2,3,4,6,7,8,9-OCDF	22.3	65.4	6.19	22.3 U	136.6 J	128.5	133.4 U
1,2,3,4,6,7,8-HPCDD	40.8 J	186 J	11.9	26.1 U	260.2 J	403.7	245.7 U
1,2,3,4,6,7,8-HPCDF	11.3 J	42.3 J	1.69 U	7	56.9 J	70.7	60.6
1,2,3,4,7,8,9-HPCDF	2.4 U	1.7 J	1.69 U	2.4 U	2.6 J	2 U	3.1
1,2,3,4,7,8-HXCDD	2.4 U	2.1 J	1.69 U	2.4 U	2.51 UJ	2 U	2.8
1,2,3,4,7,8-HXCDF	2.4 U	2.6 U	1.69 U	2.4 U	3.6 J	2 U	4.6
1,2,3,6,7,8-HXCDD	2.4 UJ	8.1 J	1.69 U	1.1 J	10.9 J	2 U	11.4
1,2,3,6,7,8-HXCDF	2.4 U	1.5 J	1.69 U	2.4 U	2.51 UJ	2 U	3.2
1,2,3,7,8,9-HXCDD	2.4 UJ	4.1 J	1.69 U	2.4 U	5.5 J	2 U	7
1,2,3,7,8,9-HXCDF	2.4 U	2.4 U	1.69 U	2.4 U	0.8 J	2 U	1.57 U
1,2,3,7,8-PECDD	2.4 U	2.4 U	1.69 U	2.4 UJ	1.4 J	2 U	0.9 J
1,2,3,7,8-PECDF	2.4 U	1.8 J	1.69 U	2.4 UJ	1.9 U	2 U	1.5 J
2,3,4,6,7,8-HXCDF	2.4 UJ	2.8 J	1.69 U	2.4 U	2.51 UJ	2 U	3.7
2,3,4,7,8-PECDF	2.4 U	1.7 J	1.69 U	2.4 UJ	2.3 J	2 U	0.6 J
2,3,7,8-TCDD	0.47 U	0.48 U	0.34 U	0.5 UJ	0.5 U	0.4 UJ	0.31 U
2,3,7,8-TCDF	0.47 UJ	2.5 J	0.34 U	0.5 UJ	3	5.5	4
TOTAL HPCDD	40.8 J	585 J	38.9	77.3 U	636 J	1425	532
TOTAL HPCDF	34.7	101	4.49	9.4	148.8 J	174.8	152.2
TOTAL HXCDD	13.7 J	92 J	6.17	10 U	113.8 J	117.7	131
TOTAL HXCDF	4.2 U	42.8 J	2.95	6.1 U	67.4 J	50.9	86.9
TOTAL PECDD	2.4 U	2.4 U	1.69 U	0.2 U	12.3	2 U	3.3
TOTAL PECDF	2.4 UJ	8 J	1.69 U	1.6 U	34.7 U	14.9	6.1
TOTAL TCDD	0.47 UJ	9.7 J	0.34 U	0.5 UJ	1.9	7.7	3.4
TOTAL TCDF	0.47 UJ	6.7 J	0.27 J	0.5 UJ	18	16.4	6.3
Pesticides/PCBs (ug/kg)							
1,2,3,4-TETRACHLOROBENZENE	0.35	0.3 U	0.01 J	0.09 J	0.12 J	0.07 J	0.22 J
1,2,4,5-TETRACHLOROBENZENE	1.2 J	0.16 J	0.83 U	1.9 U	0.71	0.36	2.65
2,4'-DDD	2 J	0.64 J	1.9	11	1.43	2.7	4.42
2,4'-DDE	0.26	0.2	0.11 U	0.08 J	0.03 J	0.03 J	0.04 J
2,4'-DDT	0.1	0.03 U	0.16	1.6	1.92 J	0.3 J	0.3
4,4'-DDD	1.5 J	0.62 J	1.2	2.3	3.63	3.9	2.4
4,4'-DDE	1.2 J	0.54 J	0.97	1.9	1.86	1.8	2.44
4,4'-DDT	0.85 J	0.16 J	0.86	7.3	11.94	0.46 J	1.32
ALDRIN	6.4 J	0.091 UJ	0.02 J	13	0.1 U	2.8	0.083 U
ALPHA-BHC	0.06 J	0.14 J	0.23	0.08	0.08 U	0.02 J	0.15
ALPHA-CHLORDANE	0.28 J	0.04 J	0.49	0.8	0.83 J	0.22	0.84
BETA-BHC	1.6 J	0.29 UJ	0.26 U	0.14 J	0.09 J	0.22 U	0.248 U
CHLORPYRIFOS	0.45 U	0.4 U	1.4 U	0.17 U	0.18 U	0.13 J	0.6

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
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location	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-300B**	**OU4-SD-M12-300B-D**	**OU4-SD-M12-300A**	**OU4-SD-M12-301B**	**OU4-SD-M12-301A**	**OU4-SD-M12-302A**	**OU4-SD-M12-303A**
sample_dat	20000505	20000507	20000829	20010508	20010820	20020813	20030809
round	02	02	03	04	05	06	07
CIS-NONACHLOR	0.24 J	0.12 J	0.33	0.65	0.5 J	0.3	0.57
DELTA-BHC	0.071 U	0.061 U	0.059 U	0.05 J	0.1 U	0.02 J	0.083 U
DIELDRIN	0.1 UJ	0.29 J	0.05 J	0.42	0.36	0.12	0.19
ENDOSULFAN II	1.5 J	0.15 J	0.26	0.21 U	3.64	0.09 J	0.193 U
ENDRIN	0.21 U	0.19 U	0.18 U	0.091 U	0.11 U	0.07 U	0.083 U
GAMMA-BHC (LINDANE)	0.46 J	0.04 J	0.31 U	0.2 U	0.22 U	0.16 U	0.179 U
GAMMA-CHLORDANE	0.33 J	0.08 J	0.22	0.046 U	0.04 U	0.17	0.26
HEPTACHLOR	0.27 U	0.24 U	0.23 U	0.28	0.14 J	0.07 J	0.207 U
HEPTACHLOR EPOXIDE	0.051 U	0.04 U	0.039 U	0.076 U	0.09 U	0.17	0.069 U
HEXACHLOROBENZENE	0.071 UJ	0.13 J	0.059 U	0.076 U	0.09	0.28	0.069 U
MIREX	0.051 U	0.04 U	0.039 U	0.11 J	0.11 J	0.1 J	0.11 U
OXYCHLORDANE	0.18 U	0.12 J	0.05	0.13	0.24	0.14	0.069 U
PCB-101/90	2.8	2.1	2.9	5.3	4.69	4.3	4.26
PCB-105	1.3	1.1	0.91 J	1.3	1.03	0.65 U	1.14
PCB-118	1.8	2.1	2.3	3.8	3.43	2.6	4.48
PCB-126	0.18 J	0.01 J	0.24 U	0.36 J	0.09 J	0.06 J	0.17 J
PCB-128	0.74 J	0.32 J	0.97	1.2	1.42	0.73	1.28
PCB-138/160	4.4 J	2.4 J	6.5	7.5	7.07	6.2	6.44
PCB-149/123	2.9 J	1.2 J	3.8	5 J	5.56	5.4	3.89
PCB-153/132	4.2 J	2.4 J	7.9	8.1	9.9	11	8.25
PCB-156	0.7 J	0.31 J	1.1	3 J	4.17 J	0.64	0.537 U
PCB-167	1.8 J	0.27 J	0.54	2.3	0.46 J	0.83	1.47
PCB-169	0.28 U	0.01 J	0.01 U	0.01 J	0.02 J	0.02 J	0.04 J
PCB-170/190	44 J	1.5 U	1.4 J	27 J	1.37 U	29 J	99.63 J
PCB-18/17	1.7	0.13 U	0.12 U	2.1	1.77	0.95	0.65
PCB-180	3.4 J	2 J	6.5	4	5.69	6.6	6.01
PCB-187	2.2 J	1.1 J	4.1	7.2	4.36	5.1	5.21
PCB-189	0.35 J	0.09 J	0.35	0.1 J	0.41 J	0.18 J	0.97
PCB-195/208	0.88 J	0.4 J	1.4	3.5	0.31 J	1.3	5.32
PCB-201/157/173	0.67	0.52	0.84	0.82	0.24 J	0.12 J	1.87
PCB-206	1.1 J	0.24 J	1.7	8.1	3.5 J	1.6	13.57
PCB-209	0.79	0.71	2.3	2.37	0.36	0.58	3.66
PCB-28	2.8 J	1.4 J	1	4.4	2.85	2.3	2.55
PCB-44	0.54	0.43	0.78	1.8	1.75	1.3	1.7 U
PCB-52	1.2	1.6	1.7	3.4	3.27	2	3.5
PCB-66	0.3	0.33	1.2	1.3	1.17	0.59	2.16
PCB-77	0.28 U	0.03 J	0.05 U	0.21 J	0.33 J	0.06 J	0.14 J
PCB-8/5	0.21 J	0.28 J	0.71	1.6 U	1.96	0.73	1.6
PCB-81	0.02 J	0.03 J	0.24 U	0.14 J	0.21 J	0.08 J	0.46 J
PENTACHLOROANISOLE	0.12 J	0.04 J	0.15 U	0.26	0.1 J	0.04 J	0.21
PENTACHLOROBENZENE	0.18	0.27 U	0.3 U	0.14 U	0.1 J	0.03 J	0.31 U
TRANS-NONACHLOR	0.45 J	0.09 J	0.13	0.15	0.15	0.08 J	0.32
AVS/SEM (mg/kg)							
ACID VOLATILE SULFIDE	1760	2000	274 J	245.198 J	252.791 J		
CADMIUM	0.22	0.157	0.12 J	0.49	0.63		
COPPER	8.86 J	2.95 J	6 J	41.8 J	38.29		
LEAD	68.4 J	30.4 J	48.97 J	223	119.26		
NICKEL	9.37	4.46 J	2.62 J	11.1	12.46		
ZINC	128 J	66.6 J	54.07 J	217 U	208.73		

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 IN
ROUNDS 1 THROUGH 7
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3	MS-12 LOC.3
nsample	**OU4-SD-M12-300B**	**OU4-SD-M12-300B-D**	**OU4-SD-M12-300A**	**OU4-SD-M12-301B**	**OU4-SD-M12-301A**	**OU4-SD-M12-302A**	**OU4-SD-M12-303A**
sample_dat	20000505	20000507	20000829	20010508	20010820	20020813	20030809
round	02	02	03	04	05	06	07
HF Metals (mg/kg)							
ALUMINUM	56700	56600	51367	48814.7	53987.1	48973	45920 J
ARSENIC	13.1	11.9	18.6	8.6	13.16	15.4	11.61
CADMIUM	0.38	0.35	0.57 J	0.19 U	0.4543 U	1.9	5.3
CHROMIUM	128	97.1	93.2	102.24	108.81 J	103	127.39
COPPER	111	79.6	76.5 J	82.82	84.71 J	98.5	688.94
IRON	27500	27600	23639 J	26941.8	31438.5	26098	45986.6
LEAD	124	107	201 J	126.04	175.09	148	555.1
MANGANESE	439	415	370	366.42	368.85	364	422.62
MERCURY	1 J	0.3 J	0.48	0.27 J	1.6807	0.3 J	0.8
NICKEL	39.8	34.7	28.4 J	32.71	36.68	33.5	90.71
SILVER	0.43	0.41	3.85	0.48	0.49 J	0.58	0.51
ZINC	165	162	189 J	200.24	240.69	198	1578.82
Inorganics (mg/kg)							
ALUMINUM							
ARSENIC							
CADMIUM							
CHROMIUM							
COPPER							
IRON							
LEAD							
MANGANESE							
NICKEL							
SILVER							
ZINC							
Miscellaneous Parameters (%)							
PERCENT CLAY	19	15.34	20.7	11.3	27.7	17	11.5
PERCENT GRAVEL						0	18.8
PERCENT SAND	53.56	54.71	46.3	50.8	26.8	50.7	45.7
PERCENT SILT	27.44	29.95	33.1	37.9	45.5	32.3	24
PERCENT SOLIDS							
TOTAL ORGANIC CARBON	1.8	1.68	1.42 J	1.57 J	2.02	1.01 J	1.45
TOTAL SOLIDS							

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-CB02	AS12-SD01	AS12-SD02	AS12-SD03	AS12-SD04	AS12-SD05	AS12-SD06	AS12-SD06	AS12-SD06
nsample	**AS12-CP-CB02**	**AS12-SD-SD01**	**AS12-SD-SD02**	**AS12-SD-SD03**	**AS12-SD-SD04**	**AS12-SD-SD05**	**AS12-SD-SD06**	**AS12-SD-SD06-0004**	**AS12-SD-SD06-0412**
sample_dat	20050824	20050822	20050823	20050823	20050823	20050823	20050823	20050823	20050823
Polynuclear Aromatic Hydrocarbons (ug/kg)									
1,1-BIPHENYL	27	28	110					36 J	50 J
1-METHYLNAPHTHALENE								100 J	140 J
1-METHYLPHENANTHRENE								250 J	280 J
11H-BENZO(B)FLUORENE	78	500	1400						
2,3,5-TRIMETHYLNAPHTHALENE								27 J	38 J
2,6-DIMETHYLNAPHTHALENE								52 J	76 J
2-METHYLNAPHTHALENE								120 J	180 J
ACENAPHTHENE	28	400	1800					880 J	920 J
ACENAPHTHYLENE	110	99	270					29 J	44 J
ANTHRACENE	170	840	3200					1200 J	1500 J
BENZO(A)ANTHRACENE	300	1400	6500					1800 J	2200 J
BENZO(A)FLUORANTHENE	75	210	950						
BENZO(A)PYRENE	350	1100	5300					1800 J	2100 J
BENZO(B)FLUORANTHENE	360	1100	5300					1600 J	2300 J
BENZO(E)PYRENE	290	830	3800					1200 J	1500 J
BENZO(G,H,I)PERYLENE	230	600	3200					1100 J	1400 J
BENZO(K)FLUORANTHENE	340	1100	5000					1700 J	2200 J
CHRYSENE								2200 J	2300 J
CHRYSENE/TRIPHENYLENE	440	1700	7300						
DIBENZO(A,H)ANTHRACENE	61	200	930					370 J	440 J
DIBENZOFURAN	24	200	940						
DIBENZOTHIOPHENE	32	180	770					290 J	320 J
FLUORANTHENE	800	4400	18000					5400 J	5300 J
FLUORENE	32	380	1900					640 J	750 J
INDENO(1,2,3-CD)PYRENE	250	760	3500					1400 J	1700 J
NAPHTHALENE	54	200	660					290 J	390 J
NAPHTHOBENZOTHIOPHENE	110	400	1600						
PERYLENE	100	300	1400					440 J	550 J
PHENANTHRENE	350	3000	14000					4000 J	3900 J
PYRENE	710	3300	14000					4300 J	5600 J
RETENE	99	1.1 U	130						
Alkylated PAHs (ug/kg)									
C1-CHRYSENES	240	610	2300						
C1-DIBENZOTHIOPHENES	51	91	350						
C1-FLUORANTHENES/PYRENES	450	1500	5900						
C1-FLUORENES	40	100	390						
C1-NAPHTHALENES	54	85	380						
C1-NAPHTHOBENZOTHIOPHENES	130	160	600						
C1-PHENANTHRENES/ANTHRACENES	280	870	3500						
C2-CHRYSENES	170	250	860						
C2-DIBENZOTHIOPHENES	98	76	260						
C2-FLUORANTHENES/PYRENES	360	930	3400						
C2-FLUORENES	96	120	360						
C2-NAPHTHALENES	110	110	430						
C2-NAPHTHOBENZOTHIOPHENES	140	97	290						
C2-PHENANTHRENES/ANTHRACENES	260	440	1500						
C3-CHRYSENES	170	210	610						
C3-DIBENZOTHIOPHENES	99	77	210						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-CB02	AS12-SD01	AS12-SD02	AS12-SD03	AS12-SD04	AS12-SD05	AS12-SD06	AS12-SD06	AS12-SD06
nsample	**AS12-CP-CB02**	**AS12-SD-SD01**	**AS12-SD-SD02**	**AS12-SD-SD03**	**AS12-SD-SD04**	**AS12-SD-SD05**	**AS12-SD-SD06**	**AS12-SD-SD06-0004**	**AS12-SD-SD06-0412**
sample_dat	20050824	20050822	20050823	20050823	20050823	20050823	20050823	20050823	20050823
C3-FLUORANTHENES/PYRENES	240	350	1200						
C3-FLUORENES	180	370	1200						
C3-NAPHTHALENES	81	95	290						
C3-NAPHTHOBENZOTHIOPHENES	130	74	200						
C3-PHENANTHRENES/ANTHRACENES	180	210	630						
C4-CHRYSENES	81	88	250						
C4-DIBENZOTHIOPHENES	93	52	120						
C4-FLUORANTHENES/PYRENES	190	250	770						
C4-NAPHTHALENES	64	54	160						
C4-NAPHTHOBENZOTHIOPHENES	92	45	90						
C4-PHENANTHRENES/ANTHRACENES	150	83	220						
Semivolatile Biomarkers (ug/kg)									
13A,17B-20S-ETHYLDIACHOLESTANE	0.78 U	1.6	2.1						
13B(H),17A(H)-20R-DIACHOLESTANE	69	7.2	11						
13B(H),17A(H)-20S-DIACHOLESTANE	150	13	20						
13B,17A-20R-ETHYLDIACHOLESTANE	240	7.1	13						
13B,17A-20S-METHYLDIACHOLESTANE	220	8	12						
14A(H),17A(H)-20R-CHOLESTANE	750	25	44						
14A(H),17A(H)-20R-ETHYLCHOLESTANE	220	16	25						
14A(H),17A(H)-20S-CHOLESTANE	270	11	13						
14A(H),17A(H)-20S-ETHYLCHOLESTANE	360	14	18						
14A,17A-20R-METHYLCHOLESTANE	200	13	21						
14A,17A-20S-METHYLCHOLESTANE	210	7.1	9.5						
14B(H),17B(H)-20R-CHOLESTANE	140	9.4	17						
14B(H),17B(H)-20R-ETHYLCHOLESTANE	770	30	43						
14B(H),17B(H)-20S-CHOLESTANE	170	10	18						
14B(H),17B(H)-20S-ETHYLCHOLESTANE	760	17	27						
14B,17B-20R-METHYLCHOLESTANE	450	16	25						
14B,17B-20S-METHYLCHOLESTANE	620	18	28						
17A(H),21B(H)-25-NORHOPANE	49	2.2	4.6						
17A(H)-22,29,30-TRISNORHOPANE-TM	470	27	37						
17A(H)-DIAHOPANE	90	5.7	8.2						
17A/B,21B/A 28,30-BISNORHOPANE	180	10	16						
18A(H)&18B(H)-OLEANANES	250	12	18						
18A(H)-30-NORNEOHOPANE-C29TS	360	22	26						
18A-22,29,30-TRISNORNEOHOPANE-TS	500	23	30						
30,31-BISHOMOHOPANE-22R	220	25	29						
30,31-BISHOMOHOPANE-22S	430	52	60						
30,31-TRISHOMOHOPANE-22R	91	14	18						
30,31-TRISHOMOHOPANE-22S	200	30	34						
30-HOMOHOPANE-22R	440	44	55						
30-HOMOHOPANE-22S	550	50	58						
30-NORHOPANE	1300	89	110						
30-NORMORETANE	210	18	22						
C23 TRICYCLIC TERPANE	150	14	27						
C24 TETRACYCLIC TERPANE	140	7.8	10						
C24 TRICYCLIC TERPANE	110	8.1	14						
C25 TRICYCLIC TERPANE	130	8.9	15						
C26 TRICYCLIC TERPANE-22R	39	3.7	5.8						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-CB02	AS12-SD01	AS12-SD02	AS12-SD03	AS12-SD04	AS12-SD05	AS12-SD06	AS12-SD06	AS12-SD06
nsample	**AS12-CP-CB02**	**AS12-SD-SD01**	**AS12-SD-SD02**	**AS12-SD-SD03**	**AS12-SD-SD04**	**AS12-SD-SD05**	**AS12-SD-SD06**	**AS12-SD-SD06-0004**	**AS12-SD-SD06-0412**
sample_dat	20050824	20050822	20050823	20050823	20050823	20050823	20050823	20050823	20050823
C26 TRICYCLIC TERPANE-22S	36	3.6	6.2						
C28 TRICYCLIC TERPANE-22R	57	3.8	6.9						
C28 TRICYCLIC TERPANE-22S	43	3.9	6.7						
C29 TRICYCLIC TERPANE-22R	110	4.4	8.9						
C29 TRICYCLIC TERPANE-22S	69	4.6	9.2						
C30 TRICYCLIC TERPANE-22R	24	3.2	6.2						
C30 TRICYCLIC TERPANE-22S	43	3.6	8.3						
HOPANE	1700	130	160						
MORETANE	210	23	28						
PENTAKISHOMOHOPANE-22R	58	12	17						
PENTAKISHOMOHOPANE-22S	86	15	23						
TETRAKISHOMOHOPANE-22R	65	11	14						
TETRAKISHOMOHOPANE-22S	92	16	20						
Petroleum Hydrocarbons (mg/kg)									
TPH (C09-C40)	2000	280	620		400	150			
Inorganics (mg/kg)									
LEAD	401 J	409	128 J	50.8 J	116 J	63.1 J	118 J		610 J
Miscellaneous Parameters (%)									
PERCENT SOLIDS	30.2	61.7	53.2	61.3	48.6	60.6	60.4	63.5	54.3
TOTAL ORGANIC CARBON	1.1 J	0.39 J	0.52 J						

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-SD06	AS12-SD06	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD08	AS12-SD09
nsample	**AS12-SD-SD06-1220**	**AS12-SD-SD06-2031**	**AS12-SD-SD07**	**AS12-SD-SD07-0412**	**AS12-SD-SD07-1220**	**AS12-SD-SD07-2028**	**AS12-SD-SD07-D**	**AS12-SD-SD08**	**AS12-SD-SD09**
sample_dat	20050823	20050823	20050823	20050823	20050823	20050823	20050823	20050823	20050822
Polynuclear Aromatic Hydrocarbons (ug/kg)									
1,1-BIPHENYL	38 J	240 J	32	50 J	38 J	210 J			89
1-METHYLNAPHTHALENE	100 J	1800 J		130 J	97 J	480 J			
1-METHYLPHENANTHRENE	260 J	3200 J		380 J	220 J	490 J			
11H-BENZO(B)FLUORENE			680						1300
2,3,5-TRIMETHYLNAPHTHALENE	33 J	2200 J		36 J	30 J	150 J			
2,6-DIMETHYLNAPHTHALENE	58 J	3600 J		70 J	49 J	240 J			
2-METHYLNAPHTHALENE	130 J	1900 J		170 J	100 J	170 J			
ACENAPHTHENE	510 J	2900 J	740	1500 J	860 J	2300 J			2000
ACENAPHTHYLENE	61 J	110 J	88	47 J	39 J	37 J			200
ANTHRACENE	1300 J	3600 J	990	1700 J	1100 J	1500 J			2500
BENZO(A)ANTHRACENE	2400 J	5400 J	2100	3100 J	1500 J	2200 J			6000
BENZO(A)FLUORANTHENE			340						900
BENZO(A)PYRENE	2100 J	4000 J	1700	3000 J	1500 J	1700 J			5000
BENZO(B)FLUORANTHENE	1800 J	3600 J	1600	3000 J	1600 J	1400 J			4800
BENZO(E)PYRENE	1400 J	3200 J	1200	1700 J	1300 J	1100 J			3500
BENZO(G,H,I)PERYLENE	1200 J	2500 J	1000	1600 J	1200 J	1100 J			3000
BENZO(K)FLUORANTHENE	2100 J	3500 J	1700	3200 J	1500 J	1600 J			5100
CHRYSENE	2500 J	6000 J		3700 J	1700 J	2100 J			
CHRYSENE/TRIPHENYLENE			2200						6600
DIBENZO(A,H)ANTHRACENE	370 J	1200 J	330	490 J	390 J	360 J			940
DIBENZOFURAN			270						860
DIBENZOTHIOPHENE	230 J	1200 J	250	460 J	250 J	670 J			750
FLUORANTHENE	8300 J	20000 J	5500	7900 J	4500 J	8800 J			16000
FLUORENE	500 J	3000 J	500	950 J	640 J	2100 J			1500
INDENO(1,2,3-CD)PYRENE	1400 J	2000 J	1100	2000 J	1500 J	1300 J			3400
NAPHTHALENE	230 J	3500 J	220	420 J	240 J	370 J			620
NAPHTHOBENZOTHIOPHENE			610						1500
PERYLENE	520 J	1500 J	540	640 J	570 J	450 J			1300
PHENANTHRENE	2700 J	17000 J	3700	5300 J	2500 J	8600 J			12000
PYRENE	6600 J	18000 J	4500	6000 J	3600 J	6500 J			13000
RETENE			75						68
Alkylated PAHs (ug/kg)									
C1-CHRYSENES			900						2200
C1-DIBENZOTHIOPHENES			120						300
C1-FLUORANTHENES/PYRENES			2300						6100
C1-FLUORENES			110						310
C1-NAPHTHALENES			110						330
C1-NAPHTHOBENZOTHIOPHENES			250						560
C1-PHENANTHRENES/ANTHRACENES			1100						3000
C2-CHRYSENES			370						750
C2-DIBENZOTHIOPHENES			100						200
C2-FLUORANTHENES/PYRENES			1200						3200
C2-FLUORENES			120						300
C2-NAPHTHALENES			120						360
C2-NAPHTHOBENZOTHIOPHENES			170						220
C2-PHENANTHRENES/ANTHRACENES			530						1300
C3-CHRYSENES			280						520
C3-DIBENZOTHIOPHENES			110						150

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-SD06	AS12-SD06	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD08	AS12-SD09
nsample	**AS12-SD-SD06-1220**	**AS12-SD-SD06-2031**	**AS12-SD-SD07**	**AS12-SD-SD07-0412**	**AS12-SD-SD07-1220**	**AS12-SD-SD07-2028**	**AS12-SD-SD07-D**	**AS12-SD-SD08**	**AS12-SD-SD09**
sample_dat	20050823	20050823	20050823	20050823	20050823	20050823	20050823	20050823	20050822
C3-FLUORANTHENES/PYRENES			460						1100
C3-FLUORENES			450						1300
C3-NAPHTHALENES			100						240
C3-NAPHTHOBENZOTHIOPHENES			130						140
C3-PHENANTHRENES/ANTHRACENES			280						520
C4-CHRYSENES			120						180
C4-DIBENZOTHIOPHENES			75						79
C4-FLUORANTHENES/PYRENES			330						740
C4-NAPHTHALENES			63						120
C4-NAPHTHOBENZOTHIOPHENES			89						63
C4-PHENANTHRENES/ANTHRACENES			140						180
Semivolatile Biomarkers (ug/kg)									
13A,17B-20S-ETHYLDIACHOLESTANE			4.9						3.7
13B(H),17A(H)-20R-DIACHOLESTANE			24						24
13B(H),17A(H)-20S-DIACHOLESTANE			42						42
13B,17A-20R-ETHYLDIACHOLESTANE			25						20
13B,17A-20S-METHYLDIACHOLESTANE			24						22
14A(H),17A(H)-20R-CHOLESTANE			85						69
14A(H),17A(H)-20R-ETHYLCHOLESTANE			47						32
14A(H),17A(H)-20S-CHOLESTANE			25						28
14A(H),17A(H)-20S-ETHYLCHOLESTANE			40						26
14A,17A-20R-METHYLCHOLESTANE			36						28
14A,17A-20S-METHYLCHOLESTANE			21						17
14B(H),17B(H)-20R-CHOLESTANE			21						26
14B(H),17B(H)-20R-ETHYLCHOLESTANE			97						61
14B(H),17B(H)-20S-CHOLESTANE			25						29
14B(H),17B(H)-20S-ETHYLCHOLESTANE			50						45
14B,17B-20R-METHYLCHOLESTANE			46						36
14B,17B-20S-METHYLCHOLESTANE			52						43
17A(H),21B(H)-25-NORHOPANE			4.4						5.9
17A(H)-22,29,30-TRISNORHOPANE-TM			85						53
17A(H)-DIAHOPANE			16						17
17A/B,21B/A 28,30-BISNORHOPANE			25						18
18A(H)&18B(H)-OLEANANES			32						26
18A(H)-30-NORNEOHOPANE-C29TS			67						49
18A-22,29,30-TRISNORNEOHOPANE-TS			79						51
30,31-BISHOMOHOPANE-22R			69						48
30,31-BISHOMOHOPANE-22S			120						94
30,31-TRISHOMOHOPANE-22R			40						31
30,31-TRISHOMOHOPANE-22S			76						57
30-HOMOHOPANE-22R			120						85
30-HOMOHOPANE-22S			150						94
30-NORHOPANE			280						160
30-NORMORETANE			46						34
C23 TRICYCLIC TERPANE			32						28
C24 TETRACYCLIC TERPANE			26						16
C24 TRICYCLIC TERPANE			18						18
C25 TRICYCLIC TERPANE			20						20
C26 TRICYCLIC TERPANE-22R			8.9						8

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-SD06	AS12-SD06	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD07	AS12-SD08	AS12-SD09
nsample	**AS12-SD-SD06-1220**	**AS12-SD-SD06-2031**	**AS12-SD-SD07**	**AS12-SD-SD07-0412**	**AS12-SD-SD07-1220**	**AS12-SD-SD07-2028**	**AS12-SD-SD07-D**	**AS12-SD-SD08**	**AS12-SD-SD09**
sample_dat	20050823	20050823	20050823	20050823	20050823	20050823	20050823	20050823	20050822
C26 TRICYCLIC TERPANE-22S			8.6						8
C28 TRICYCLIC TERPANE-22R			9.3						10
C28 TRICYCLIC TERPANE-22S			9.8						9.8
C29 TRICYCLIC TERPANE-22R			13						12
C29 TRICYCLIC TERPANE-22S			12						12
C30 TRICYCLIC TERPANE-22R			7.5						7.5
C30 TRICYCLIC TERPANE-22S			8.6						10
HOPANE			410						270
MORETANE			56						43
PENTAKISHOMOHOPANE-22R			29						29
PENTAKISHOMOHOPANE-22S			40						35
TETRAKISHOMOHOPANE-22R			27						23
TETRAKISHOMOHOPANE-22S			40						33
Petroleum Hydrocarbons (mg/kg)									
TPH (C09-C40)			470						640
Inorganics (mg/kg)									
LEAD	544 J	681 J	297 J	534 J	1350 J	651 J	768 J	757 J	144
Miscellaneous Parameters (%)									
PERCENT SOLIDS	47.8	45.6	62.9	60.4	53.1	73	61.1	77.1	62.8
TOTAL ORGANIC CARBON			0.32 J						0.33 J

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location **nsample** sample_dat	AS12-SD09 **AS12-SD-SD09-D** 20050822	AS12-SD10 **AS12-SD-SD10** 20050823	AS12-SD11 **AS12-SD-SD11** 20050823	AS12-SD12 **AS12-SD-SD12** 20050822	AS12-SD13 **AS12-SD-SD13** 20050822	AS12-SD14 **AS12-SD-SD14** 20050822	AS12-SD15 **AS12-SD-SD15** 20050824	AS12-SD16 **AS12-SD-SD16** 20050824	AS12-SD16 **AS12-SD-SD16-D** 20050824
Polynuclear Aromatic Hydrocarbons (ug/kg)									
1,1-BIPHENYL							480	58	45
1-METHYLNAPHTHALENE									
1-METHYLPHENANTHRENE									
11H-BENZO(B)FLUORENE							3100	540	510
2,3,5-TRIMETHYLNAPHTHALENE									
2,6-DIMETHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE							6200	930	920
ACENAPHTHYLENE							670	120	100
ANTHRACENE							11000	1500	1200
BENZO(A)ANTHRACENE							19000	2700	2300
BENZO(A)FLUORANTHENE							3300	430	380
BENZO(A)PYRENE							16000	2200	2000
BENZO(B)FLUORANTHENE							15000	2300	2000
BENZO(E)PYRENE							11000	1600	1400
BENZO(G,H,I)PERYLENE							9200	1200	1100
BENZO(K)FLUORANTHENE							12000	1900	1700
CHRYSENE									
CHRYSENE/TRIPHENYLENE							19000	3100	2600
DIBENZO(A,H)ANTHRACENE							2600	510	430
DIBENZOFURAN							3600	520	390
DIBENZOTHIOPHENE							3100	390	310
FLUORANTHENE							57000	9000	6700
FLUORENE							6400	880	690
INDENO(1,2,3-CD)PYRENE							10000	1300	1300
NAPHTHALENE							3400	410	270
NAPHTHOBENZOTHIOPHENE							4400	810	630
PERYLENE							4100	670	580
PHENANTHRENE							53000	7500	5400
PYRENE							44000	6900	5300
RETENE							23	17	19
Alkylated PAHs (ug/kg)									
C1-CHRYSENES							6600	1000	830
C1-DIBENZOTHIOPHENES							1200	180	150
C1-FLUORANTHENES/PYRENES							19000	2900	2400
C1-FLUORENES							1300	180	130
C1-NAPHTHALENES							1700	190	140
C1-NAPHTHOBENZOTHIOPHENES							1900	300	260
C1-PHENANTHRENES/ANTHRACENES							13000	1800	1400
C2-CHRYSENES							2200	360	290
C2-DIBENZOTHIOPHENES							660	130	130
C2-FLUORANTHENES/PYRENES							11000	1700	1200
C2-FLUORENES							1000	160	130
C2-NAPHTHALENES							1400	190	140
C2-NAPHTHOBENZOTHIOPHENES							690	130	130
C2-PHENANTHRENES/ANTHRACENES							5000	800	730
C3-CHRYSENES							1700	300	210
C3-DIBENZOTHIOPHENES							570	110	99

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

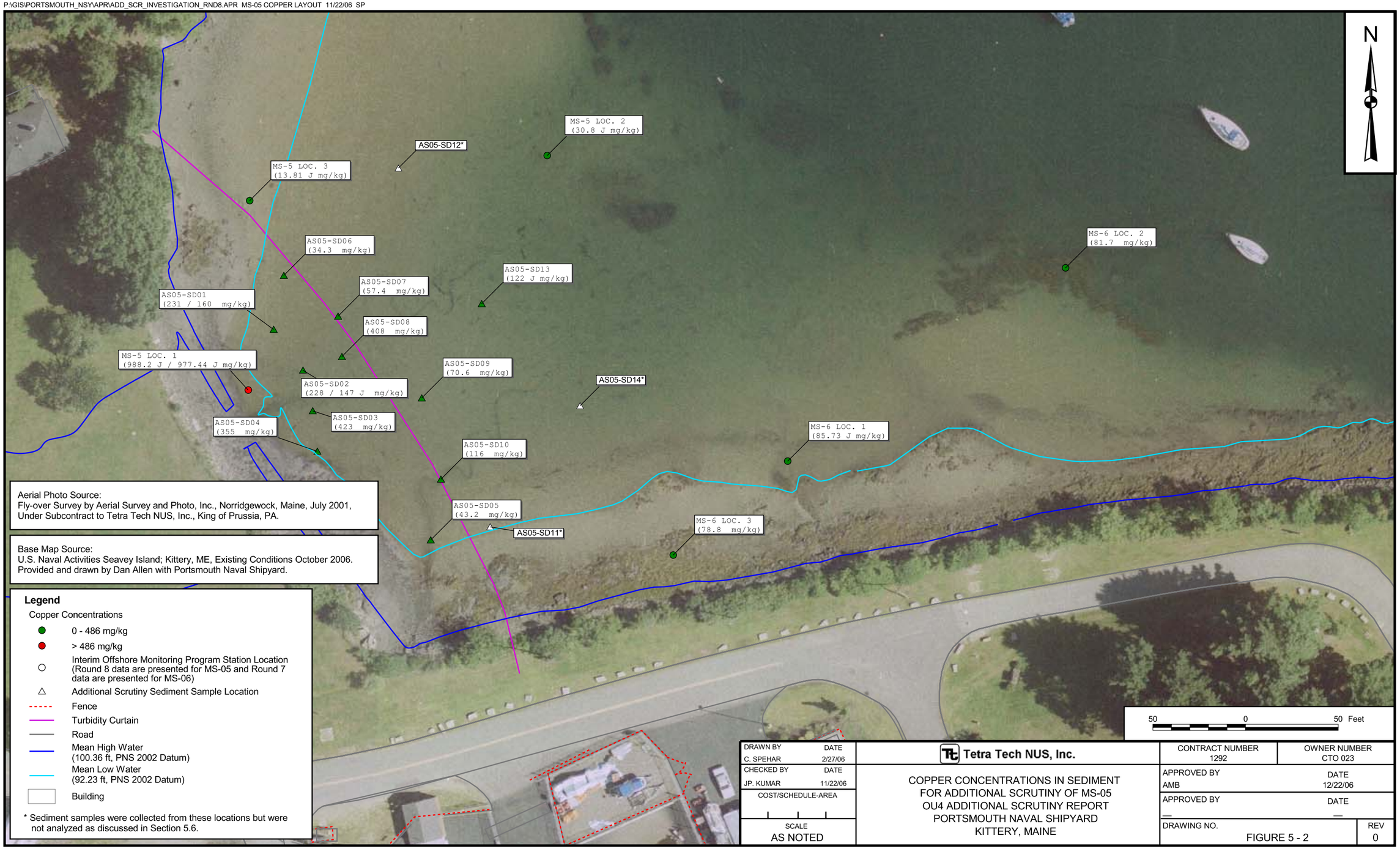
location	AS12-SD09	AS12-SD10	AS12-SD11	AS12-SD12	AS12-SD13	AS12-SD14	AS12-SD15	AS12-SD16	AS12-SD16
nsample	**AS12-SD-SD09-D**	**AS12-SD-SD10**	**AS12-SD-SD11**	**AS12-SD-SD12**	**AS12-SD-SD13**	**AS12-SD-SD14**	**AS12-SD-SD15**	**AS12-SD-SD16**	**AS12-SD-SD16-D**
sample_dat	20050822	20050823	20050823	20050822	20050822	20050822	20050824	20050824	20050824
C3-FLUORANTHENES/PYRENES							3600	580	450
C3-FLUORENES							4500	690	570
C3-NAPHTHALENES							870	140	120
C3-NAPHTHOBENZOTHIOPHENES							370	96	85
C3-PHENANTHRENES/ANTHRACENES							1800	310	300
C4-CHRYSENES							630	120	86
C4-DIBENZOTHIOPHENES							120	45	41
C4-FLUORANTHENES/PYRENES							2200	390	310
C4-NAPHTHALENES							370	68	85
C4-NAPHTHOBENZOTHIOPHENES							140	48	44
C4-PHENANTHRENES/ANTHRACENES							470	100	95
Semivolatile Biomarkers (ug/kg)									
13A,17B-20S-ETHYLDIACHOLESTANE							1.5	4.1	3.2
13B(H),17A(H)-20R-DIACHOLESTANE							5.3	14	13
13B(H),17A(H)-20S-DIACHOLESTANE							10	26	26
13B,17A-20R-ETHYLDIACHOLESTANE							7.8	20	18
13B,17A-20S-METHYLDIACHOLESTANE							8.5	21	20
14A(H),17A(H)-20R-CHOLESTANE							27	61	58
14A(H),17A(H)-20R-ETHYLCHOLESTANE							16	28	28
14A(H),17A(H)-20S-CHOLESTANE							13	30	25
14A(H),17A(H)-20S-ETHYLCHOLESTANE							15	26	25
14A,17A-20R-METHYLCHOLESTANE							13	23	22
14A,17A-20S-METHYLCHOLESTANE							5.5	14	16
14B(H),17B(H)-20R-CHOLESTANE							7.5	17	16
14B(H),17B(H)-20R-ETHYLCHOLESTANE							27	55	58
14B(H),17B(H)-20S-CHOLESTANE							8.8	19	19
14B(H),17B(H)-20S-ETHYLCHOLESTANE							21	40	35
14B,17B-20R-METHYLCHOLESTANE							15	30	28
14B,17B-20S-METHYLCHOLESTANE							20	40	38
17A(H),21B(H)-25-NORHOPANE							1	2	1.7
17A(H)-22,29,30-TRISNORHOPANE-TM							24	57	50
17A(H)-DIAHOPANE							4.6	13	12
17A/B,21B/A 28,30-BISNORHOPANE							8	19	16
18A(H)&18B(H)-OLEANANES							11	30	30
18A(H)-30-NORNEOHOPANE-C29TS							20	52	50
18A-22,29,30-TRISNORNEOHOPANE-TS							18	51	46
30,31-BISHOMOHOPANE-22R							28	37	32
30,31-BISHOMOHOPANE-22S							42	74	67
30,31-TRISHOMOHOPANE-22R							16	21	16
30,31-TRISHOMOHOPANE-22S							28	41	36
30-HOMOHOPANE-22R							46	70	60
30-HOMOHOPANE-22S							57	83	72
30-NORHOPANE							92	170	150
30-NORMORETANE							14	33	30
C23 TRICYCLIC TERPANE							8.6	23	21
C24 TETRACYCLIC TERPANE							4.4	17	16
C24 TRICYCLIC TERPANE							6.3	15	15
C25 TRICYCLIC TERPANE							8	17	16
C26 TRICYCLIC TERPANE-22R							2.6	6.3	5.6

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT AT MONITORING STATION 12 DURING PHASE I ADDITIONAL SCRUTINY INVESTIGATION
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

location	AS12-SD09	AS12-SD10	AS12-SD11	AS12-SD12	AS12-SD13	AS12-SD14	AS12-SD15	AS12-SD16	AS12-SD16
nsample	**AS12-SD-SD09-D**	**AS12-SD-SD10**	**AS12-SD-SD11**	**AS12-SD-SD12**	**AS12-SD-SD13**	**AS12-SD-SD14**	**AS12-SD-SD15**	**AS12-SD-SD16**	**AS12-SD-SD16-D**
sample_dat	20050822	20050823	20050823	20050822	20050822	20050822	20050824	20050824	20050824
C26 TRICYCLIC TERPANE-22S							2.6	6.2	5.8
C28 TRICYCLIC TERPANE-22R							3	7.3	6.4
C28 TRICYCLIC TERPANE-22S							3.3	8.2	7.7
C29 TRICYCLIC TERPANE-22R							3.4	8.3	7.8
C29 TRICYCLIC TERPANE-22S							3	8	7.3
C30 TRICYCLIC TERPANE-22R							1.9	4.7	4.1
C30 TRICYCLIC TERPANE-22S							2.7	5.8	5.5
HOPANE							130	250	220
MORETANE							17	40	36
PENTAKISHOMOHOPANE-22R							14	14	11
PENTAKISHOMOHOPANE-22S							22	20	17
TETRAKISHOMOHOPANE-22R							13	15	12
TETRAKISHOMOHOPANE-22S							18	21	17
Petroleum Hydrocarbons (mg/kg)									
TPH (C09-C40)		300				450	1200	410	420
Inorganics (mg/kg)									
LEAD	163	290 J	155 J	3120	148	42	643 J	423 J	
Miscellaneous Parameters (%)									
PERCENT SOLIDS	60.4	72.4	52.6	74.9	48.3	39.2	78.3	74	
TOTAL ORGANIC CARBON							0.88 J	0.79 J	0.58 J

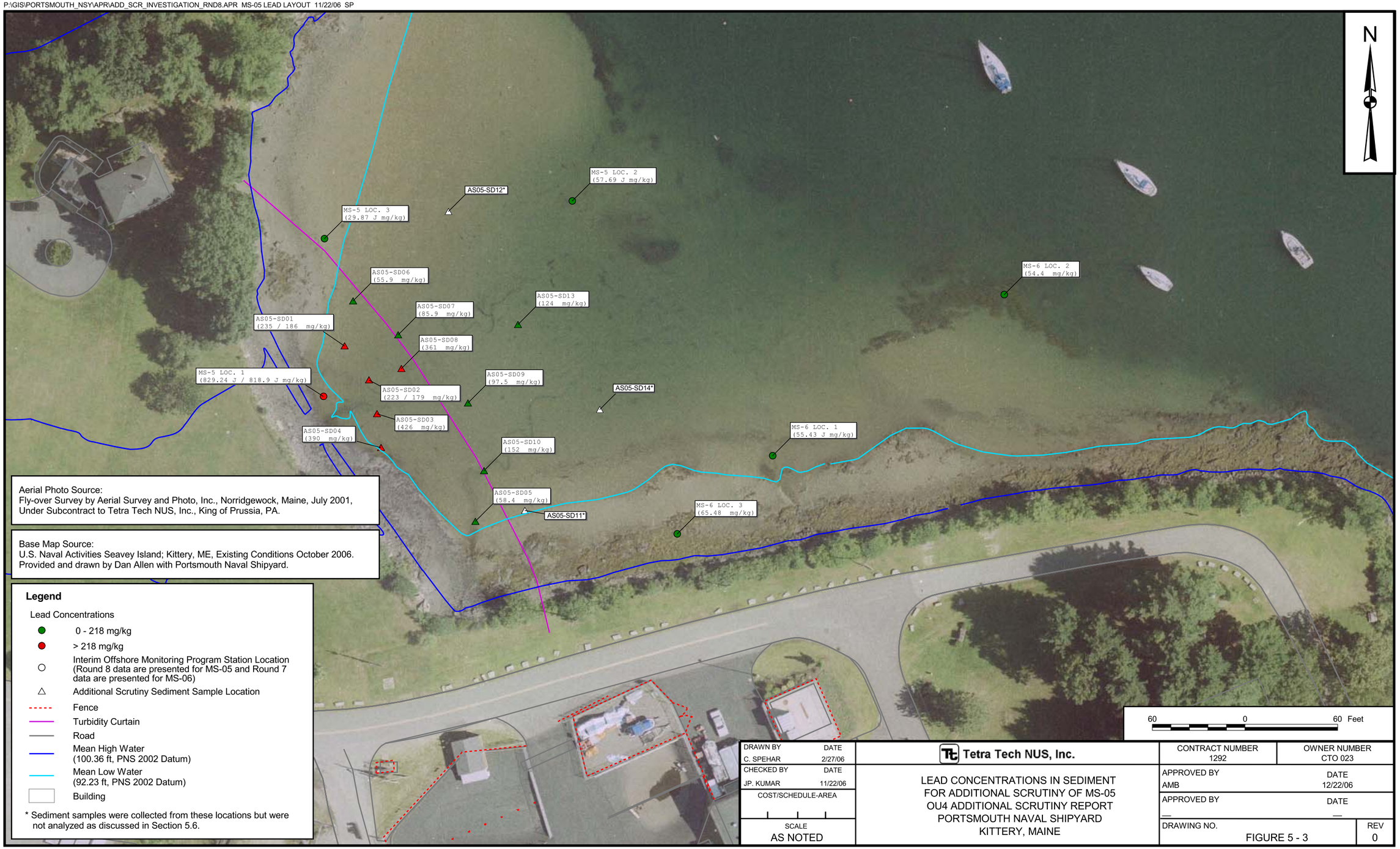
B.3 CONCENTRATION FIGURES FOR MS-05 AND MS-09

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-05 COPPER LAYOUT 11/22/06 SP



DRAWN BY C. SPEHAR — DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292	OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR — DATE 11/22/06	COPPER CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-05 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB	DATE 12/22/06
COST/SCHEDULE-AREA		APPROVED BY —	DATE —
SCALE AS NOTED		DRAWING NO. FIGURE 5 - 2	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-05 LEAD LAYOUT 11/22/06 SP

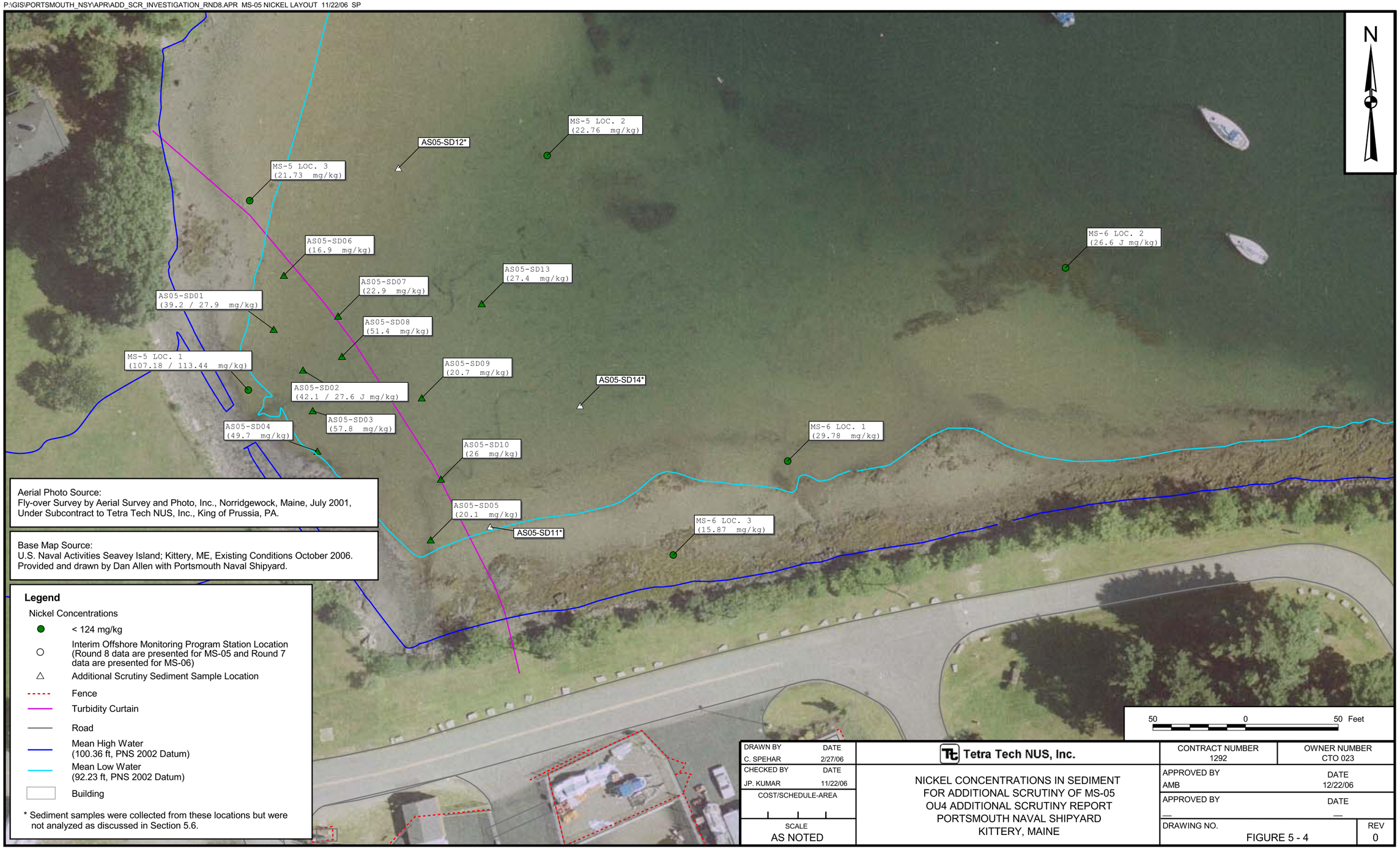


Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001, Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006. Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

DRAWN BY C. SPEHAR	DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292	OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR	DATE 11/22/06	LEAD CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-05 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB	DATE 12/22/06
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 - 3	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-05 NICKEL LAYOUT 11/22/06 SP



Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001, Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006. Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Legend

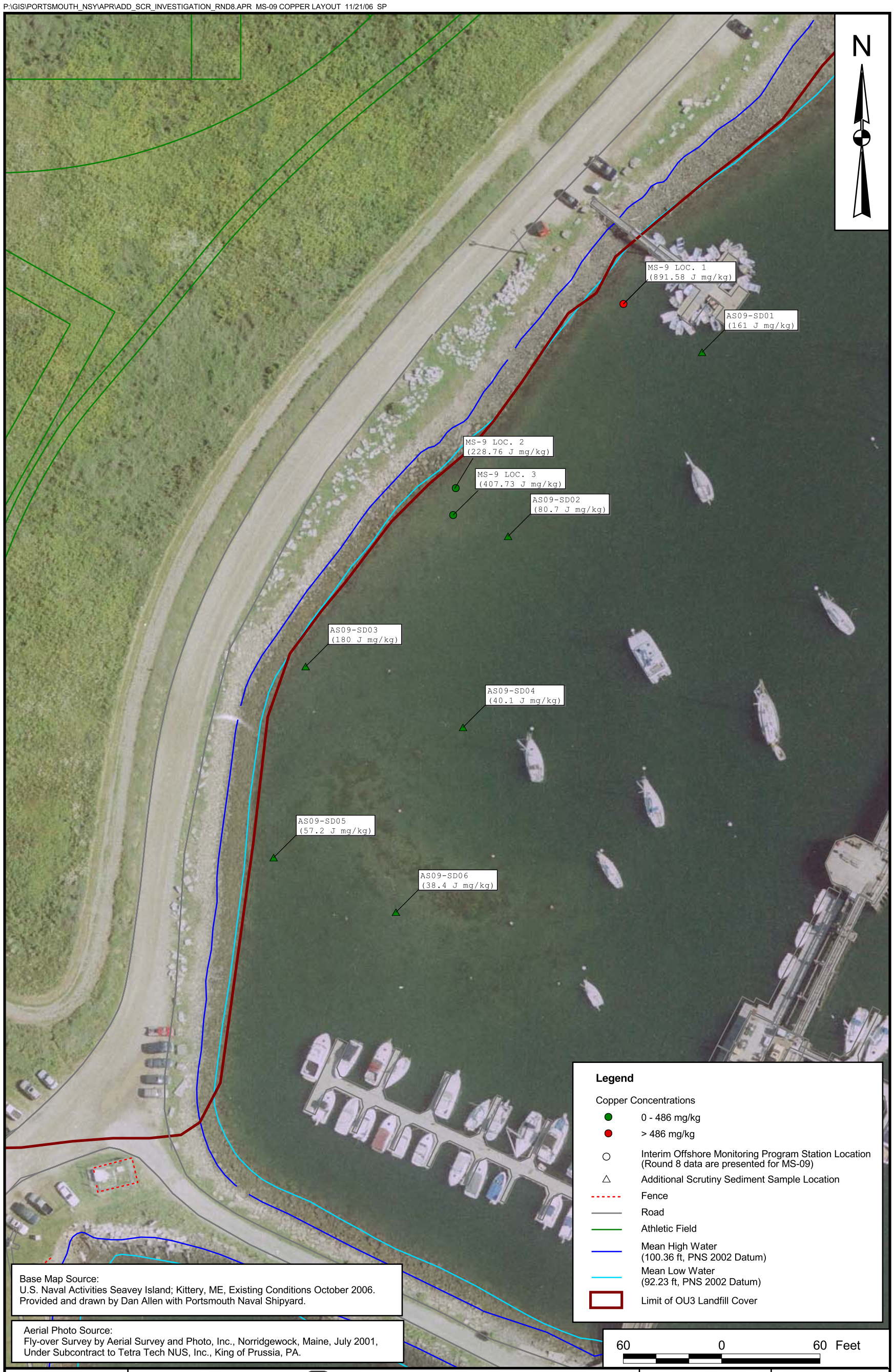
Nickel Concentrations

- ● < 124 mg/kg
- ○ Interim Offshore Monitoring Program Station Location (Round 8 data are presented for MS-05 and Round 7 data are presented for MS-06)
- △ Additional Scrutiny Sediment Sample Location
- Fence
- Turbidity Curtain
- Road
- Mean High Water (100.36 ft, PNS 2002 Datum)
- Mean Low Water (92.23 ft, PNS 2002 Datum)
- Building

* Sediment samples were collected from these locations but were not analyzed as discussed in Section 5.6.

DRAWN BY C. SPEHAR	DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292	OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR	DATE 11/22/06	NICKEL CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-05 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB	DATE 12/22/06
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 - 4	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 COPPER LAYOUT 11/21/06 SP

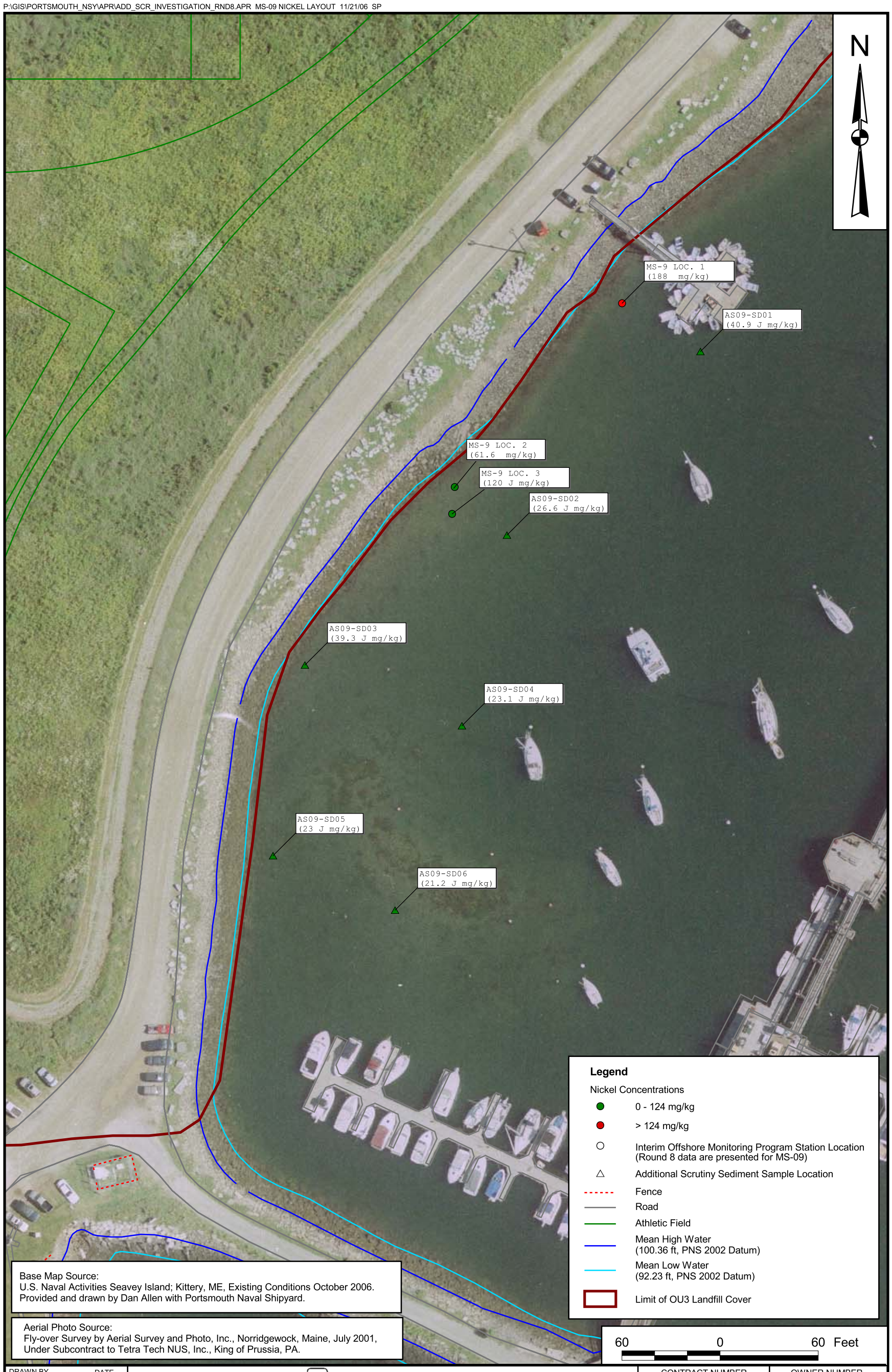


Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

DRAWN BY C. SPEHAR — DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292	OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR — DATE 11/21/06	COPPER CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-09 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB — DATE 12/22/06	
COST/SCHEDULE-AREA		APPROVED BY — — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 5 - 5	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 NICKEL LAYOUT 11/21/06 SP

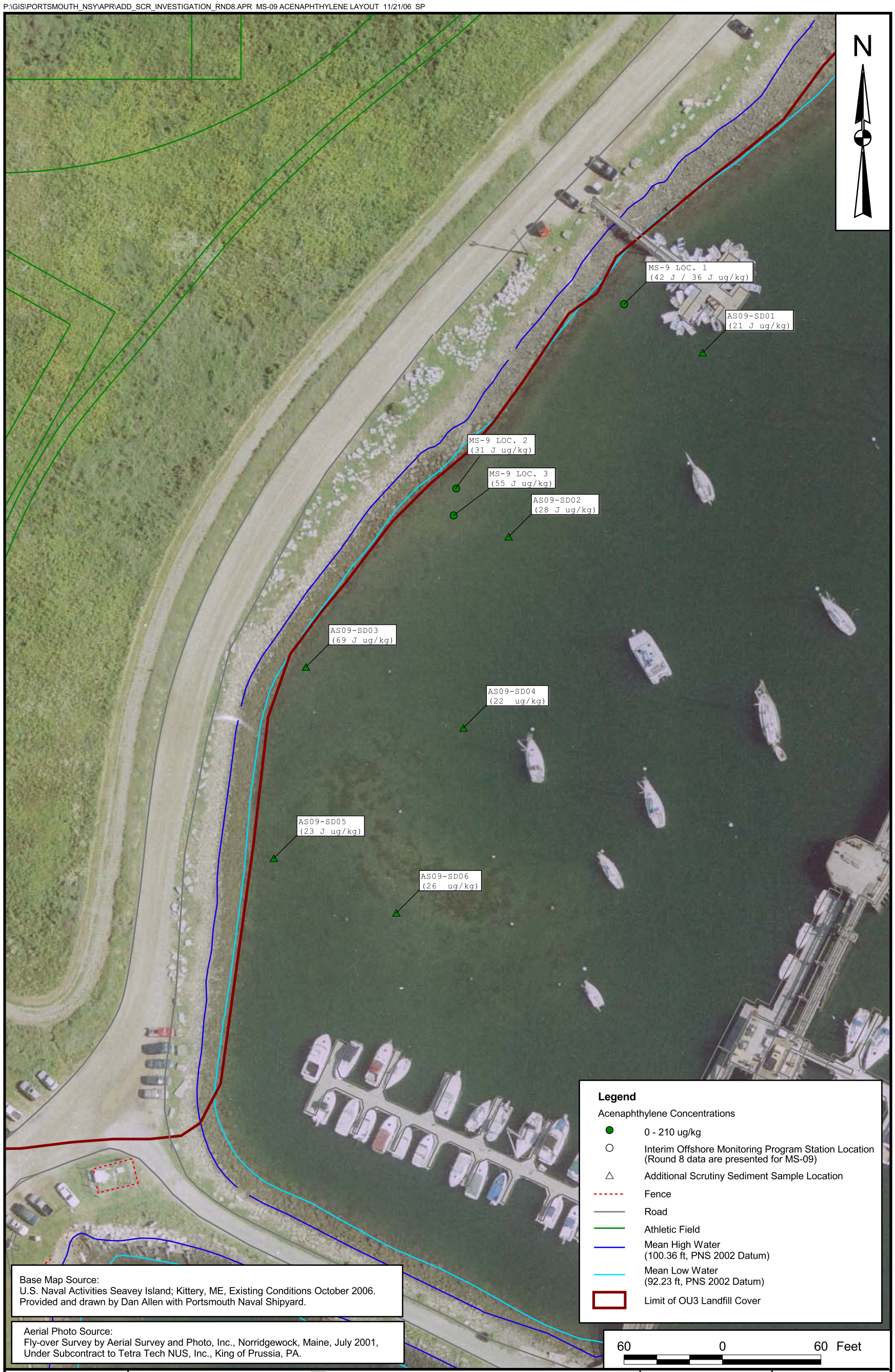


Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

DRAWN BY C. SPEHAR	DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292	OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR	DATE 11/21/06	NICKEL CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-09 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB	DATE 12/22/06
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 - 6	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 ACENAPHTHYLENE LAYOUT 11/21/06 SP

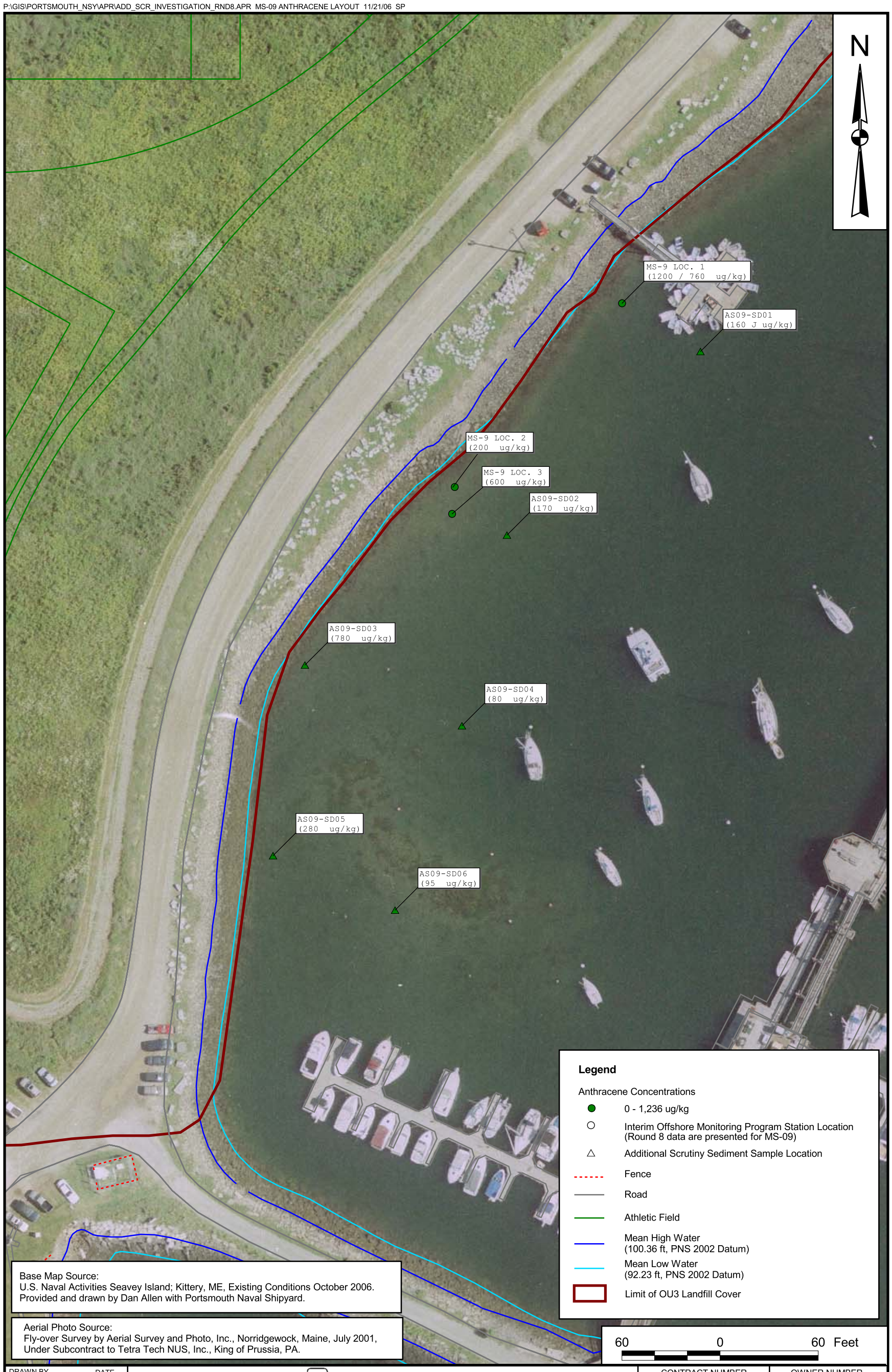


Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

DRAWN BY C. SPEHAR	DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292 / OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR	DATE 11/21/06	ACENAPHTHYLENE CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-09 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB / DATE 12/22/06
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 - 7 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 ANTHRACENE LAYOUT 11/21/06 SP

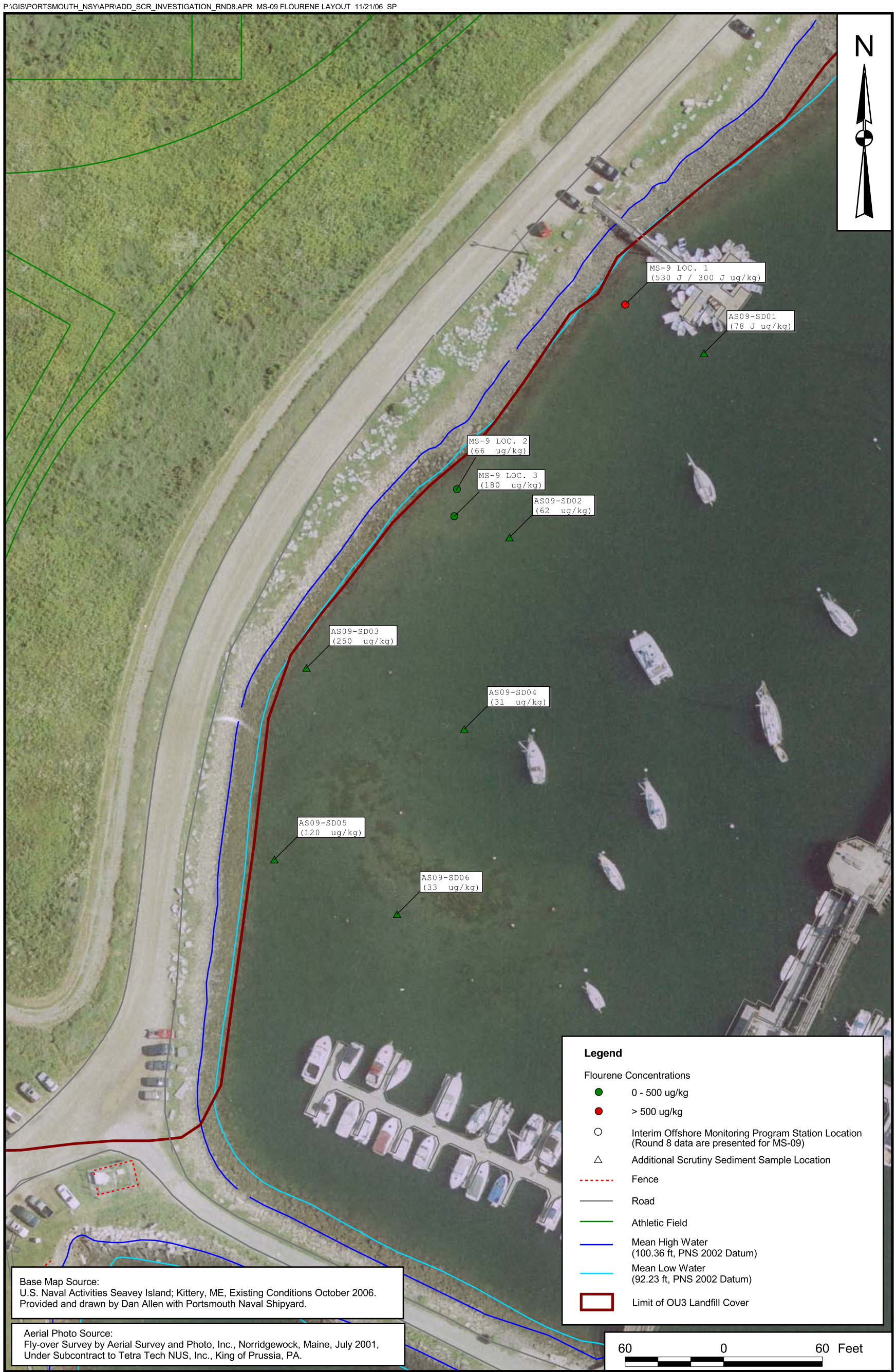


Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

DRAWN BY C. SPEHAR	DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292 / OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR	DATE 11/21/06	ANTHRACENE CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-09 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB / DATE 12/22/06
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 - 8 / REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 FLOURENE LAYOUT 11/21/06 SP

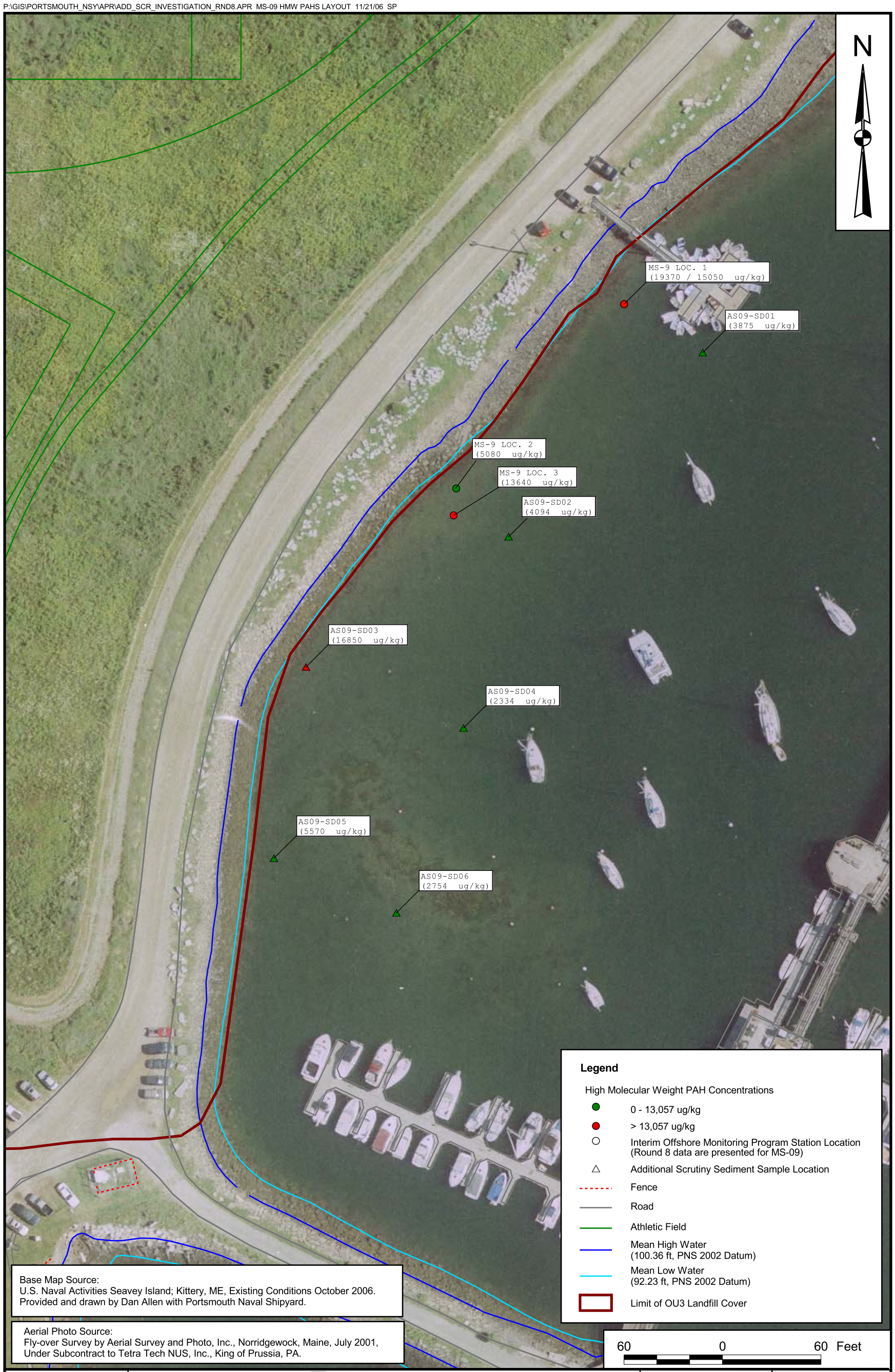


Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

DRAWN BY C. SPEHAR — DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292	OWNER NUMBER CTO 023
CHECKED BY JP. KUMAR — DATE 11/21/06	FLOURENE CONCENTRATIONS IN SEDIMENT FOR ADDITIONAL SCRUTINY OF MS-09 OU4 ADDITIONAL SCRUTINY REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY AMB	DATE 12/22/06
COST/SCHEDULE-AREA		APPROVED BY —	DATE —
SCALE AS NOTED		DRAWING NO. FIGURE 5 - 9	REV 0

P:\GIS\PORTSMOUTH_NSY\APR\ADD_SCR_INVESTIGATION_RND8.APR MS-09 HMW PAHS LAYOUT 11/21/06 SP



Base Map Source:
U.S. Naval Activities Seavey Island; Kittery, ME, Existing Conditions October 2006.
Provided and drawn by Dan Allen with Portsmouth Naval Shipyard.

Aerial Photo Source:
Fly-over Survey by Aerial Survey and Photo, Inc., Norridgewock, Maine, July 2001,
Under Subcontract to Tetra Tech NUS, Inc., King of Prussia, PA.

DRAWN BY C. SPEHAR	DATE 2/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1292 / OWNER NUMBER CTO 023
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COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 - 10 / REV 0

APPENDIX C

DATA QUALITY ASSESSMENTS

APPENDIX C.1

ANALYTICAL DATA QUALITY REVIEW
ROUND 8 - INTERIM OFFSHORE MONITORING PROGRAM
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

A description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making is presented in this data quality review (DQR). The review began with data verification and validation. Verification is a process used to ensure that contractual requirements were satisfied. Validation is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria to assess analytical method performance. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. Together, verification and validation are the first steps in evaluating data completeness, precision, accuracy, sensitivity, comparability, and representativeness. The data review process culminates with a data usability assessment during which the final usability of the data is established relative to the intended data use.

1.0 Data Validation Process

All of the results from analytical laboratory samples were validated according to several specifications. Various validation guidelines are applicable to this project. To the extent practical, assignment of data qualification flags of non-contract laboratory data conformed to rules established in:

- USEPA Region 1 Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses – Part II (December 1996) – Part III (February 2004),
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (February 1989) – (November 2008),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Organic Analyses (October 1999),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Inorganic Analyses (October 2004),
- Department of Defense (DoD) document entitled Quality Systems Manual (QSM) for Environmental Laboratories (January 2006).

If no qualifier is assigned to a result that has been validated, the data user is assured that no analytical performance deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit noted. Non-detected results are reported with a “U” qualifier when received from the laboratory. Additionally, a “U” qualifier is added to a result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate.

J – Indicates that the chemical was detected. However, the associated numerical result may not be an accurate representation of the amount that is actually present in the sample. The reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. The “UR” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control [QC] recoveries).

R – Indicates that the chemical may or may not be present. The analytical result reported by the laboratory is considered to be unreliable and unusable. The “R” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low QC recoveries).

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with “UR” or “R” data validation qualifiers. Rejected data are considered invalid and are not used for decision making purposes unless used in a qualitative way and the use is justified and documented. Less severe deficiencies, associated with “U”, “J”, and “UJ” data validation qualifiers, are defined as issues resulting in the estimation of data. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. Also, a “U” qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the “U” qualifier regardless of whether a quality deficiency has been detected.

Some of the pesticide and PCBs results generated for Round 8 of the Interim Offshore Monitoring Program for OU4 were qualified as rejected. Qualified data and reasons for qualification are presented in

Table C-1. Any impacts regarding the data evaluation based on the results of the data evaluation are discussed in the remainder of this review.

2.0 DATA VALIDATION OUTPUTS

After laboratory data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgments and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Data validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. A complete printout of the data results with validation flags is presented in Table C-1. Pertinent quality estimates are summarized in a more quantitative format in the following section.

3.0 GENERAL DATA QUALITY REVIEW

The DQR provided herein provides an overall quantitative measure of analytical performance not provided by data validation. The quantitative evaluations are frequently analyte-specific and reflect deficiencies such as biases associated with the quantification of particular analytes in a particular sample matrix. The data user must be aware that different chemicals in the same analytical fraction (e.g. lead and copper in the metals fraction) may exhibit different degrees of quality.

4.0 <u>Completeness</u>

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on two different bases: samples collected and laboratory measurements.

- Sample completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

The sample completeness percentage for sediment was 100%, respectively. The ideal percent completeness goal for all projects is 100 percent; however, that goal is not always obtainable so a more realistic goal of 95 percent was established during project planning (TtNUS, October 1999). Sediment sample completeness is summarized below:

Analytical fraction	Number of proposed sediment samples(1)	Actual number of sediment samples collected(1)	% Completeness
PAH	**18 (3)**	**18 (3)**	**100**
Pesticides	**9 (1)**	**9 (1)**	**100**
PCBs	**9 (3)**	**9 (3)**	**100**
Dioxins	**6 (3)**	**6 (3)**	**100**
Metals	**9 (1)**	**9 (1)**	**100**

(1) Field duplicates noted in parentheses.

The percent completeness for laboratory measurements was 100 percent for all fractions except laboratory completeness was 61% for pesticides, 93% for PCBs and 92% for metals. There were a total of 230 data points based on 23 pesticide parameters were measured at MS-05, MS-08, and MS-09 and one duplicate at MS-05. A total of 336 data points based on 28 PCB parameters were measured at MS-05, MS-08, and MS-09 and duplicates at each station. Of the 230 data points for pesticide parameters, 90 points were qualified as rejected or 39% of the pesticide sediment results. Of the 336 data points for PCB parameters, 26 points were qualified as rejected or 8% of the PCB sediment results. All positive rejected data points, except 4 data points, were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. Four data points were rejected due to other problems that can encompass a number of issues. The rejection of these results represents a data gap that has little negative effect on the project because interim remediation goals (IRGs) were not developed for pesticides and PCBs.

Mercury was inadvertently not analyzed for by the laboratory. There were a total of 120 data points based on 12 metal parameters for analysis at MS-05, MS-08, and MS-09 and one duplicate at MS-05. Analyses were performed for 11 of 12 metal parameters, resulting in a laboratory completeness of 92%. The absence of mercury analyses represents a data gap that has little negative effect on the project because an IRG was not developed for mercury.

5.0 Sensitivity

Several method detection limits (MDLs) reported by the laboratory were greater than the target MDL specified in Interim Offshore Monitoring Plan (TtNUS, 1999) for the sediment matrices. Non-detected results for one PAH and 16 pesticides/PCBs exceeded target MDLs specified in the Interim Offshore Monitoring Plan for OU4 Portsmouth Naval Shipyard, Kittery, Maine. Table C-2 presents exceedances of target MDLs.

For benzo(k)fluoranthene the nondetect result was reported at the reporting limit; however, the MDL for benzo(k)fluoranthene is 0.54 ug/kg, which is well below the target MDL. Sensitivity for the pesticides/PCBs exceeding the target MDLs is considered acceptable because IRGs have not been established for those compounds.

Several pesticides were qualified for laboratory blank contamination; however, results for these samples were below the target MDLs. Therefore, the sensitivity for these pesticides is acceptable.

6.0 Laboratory Accuracy

Accuracy in the laboratory was measured through the comparison of a spiked sample, spiked sample duplicate, Laboratory control sample (LCS), or laboratory control sample duplicate (LCSD) result to a known or calculated value and is expressed as a percent recovery (%R). Accuracy was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods and the analytical recovery of calibration standards for all analyses. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. Matrix spike/matrix spike duplicate (MS/MSD) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix. Laboratory accuracy was assessed by comparing calculated percent recovery (%R) values to accuracy control limits specified by the laboratory.

%R is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where	%R	=	%R
	Ss	=	result of spiked sample
	So	=	result of non-spiked sample
	S	=	concentration of spiked amount.

MS noncompliance indicates that the sample matrix is interfering with the accurate quantitation of target analytes. Understanding how chemical fractions are evaluated for MS noncompliance is essential in assessing the affect of MS non-compliances on data quality. Inorganic analytes are qualified for MS non-compliance by SDG. This means, for example, that if the MS %R for analyte "A" is non-compliant with the applicable %R criterion then analyte "A" results are qualified for MS noncompliance in sample 1 and all other samples in the same SDG. Although an SDG comprises samples of similar matrix, if different samples in a batch have different matrix compositions such as different relative proportions of clay or sand because the spiked sample may not represent matrix effects in all samples of the SDG. This effect is most pronounced on soil and sediment samples, which have a significant potential for compositional differences. Results for organic compounds are qualified only for the sample exhibiting the noncompliant %R values. These differences in qualification protocol emphasize qualification of organic data more than organic data. This can lead to conclusions that the inorganic data are of lesser quality than organic data quality even though the quality is similar for inorganic and organic analyses.

Results for chromium, copper, lead, silver, and zinc were qualified due to MS/MSD %R noncompliance in all nine sediment samples. Chromium, lead, silver, and zinc had MSDs %R that were less than the minimum QC target limits. Copper had a MSD with a zero %R, but a compliant MSD. The results were qualified as estimated. As sediment is not homogenous, only inorganic results from samples actually spiked truly indicate that the accuracy of those results are impacted due to MS noncompliance. One PAH compound (acenaphthylene) in one of 21 samples and four pesticides (2,4'-DDD, dieldrin, and hexachlorobenzene) in one to two of 10 samples were qualified due to MS/MSD %R noncompliance.

LCS/LCSD %R noncompliance was noted for 2,4-DDE in one sample and heptachlor epoxide in seven samples. Surrogate recovery noncompliance was noted for 2,4'-DDD, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, cis-nonachlor, dieldrin, endosulfan II, endrin, heptachlor, and oxychlordane in one to two of 10 samples. With the exception of several pesticide results, LCS/LCSD and surrogate QC samples were compliance with QC criteria indicating that laboratory procedures and analytical equipment were functioning properly.

Fluoranthene and pyrene were qualified for instrument calibration range exceedance in two samples. The results were qualified as estimated as the concentration of the compounds may not be accurately determined outside the instrument calibration range; however, the data are considered acceptable for the usability assessment.

7.0 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, sub sampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Field duplicate imprecision was noted for several PAHs, gamma-chlordane, and three PCBs in samples OU4-SD-MD09-0105A and OU4-SD-MD09-0105A-D. Qualified data due to field duplicate imprecision were not rejected and therefore are considered acceptable for the data usability assessment.

8.0 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and

analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the quality assurance (QA) plan.

9.0 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The Interim Offshore Monitoring Plan (TtNUS, October 1999) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. After completion of the DQR, it was determined that data for Round 8 of the Interim Offshore Monitoring Program for OU4 is representative of site conditions. However, two salient data quality issues were discovered during this DQR.

Sample OU4-SD-M09-305A contained <30% solids for the metal analysis. The metals in this sediment sample were qualified as estimated due to the low percent solids. Due to the low percent solids, this sample may not be representative of sediment at the site as a high portion of the sample is aqueous.

Laboratory completeness was 61% for pesticides and 93% for PCBs. All positive rejected data points, except 4 data points, were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. Four data points were rejected due to other problems were can encompass a number of issues. The rejection of these results represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides and PCBs. Pesticides and PCBs have not been identified as chemicals of concern at the site and are not used in decision making.

Laboratory completeness was 92% for metals. Mercury was included on the scope of work, but was not analyzed by the laboratory in any of the ten samples. The absence of mercury analyses represents a data gap that has little negative effect on the project because an IRG was not developed for mercury.

APPENDIX C.2

ANALYTICAL DATA QUALITY REVIEW
ROUND 9 - INTERIM OFFSHORE MONITORING PROGRAM
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

A description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making is presented in this data quality review (DQR). The review began with data verification and validation. Verification is a process used to ensure that contractual requirements were satisfied. Validation is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria to assess analytical method performance. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. Together, verification and validation are the first steps in evaluating data completeness, precision, accuracy, sensitivity, comparability, and representativeness. The data review process culminates with a data usability assessment during which the final usability of the data is established relative to the intended data use.

1.0 Data Validation Process

All of the results from analytical laboratory samples were validated according to several specifications. Various validation guidelines are applicable to this project. To the extent practical, assignment of data qualification flags of non-contract laboratory data conformed to rules established in:

- USEPA Region 1 Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses – Part II (December 1996) – Part III (February 2004),
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (February 1989) – (November 2008),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Organic Analyses (October 1999),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Inorganic Analyses (October 2004),
- Department of Defense (DoD) document entitled Quality Systems Manual (QSM) for Environmental Laboratories (January 2006).

If no qualifier is assigned to a result that has been validated, the data user is assured that no analytical performance deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit noted. Non-detected results are reported with a “U” qualifier when received from the laboratory. Additionally, a “U” qualifier is added to a result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate.

J – Indicates that the chemical was detected. However, the associated numerical result may not be an accurate representation of the amount that is actually present in the sample. The reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. The “UR” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control [QC] recoveries).

R – Indicates that the chemical may or may not be present. The analytical result reported by the laboratory is considered to be unreliable and unusable. The “R” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low QC recoveries).

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with “UR” or “R” data validation qualifiers. Rejected data are considered invalid and are not used for decision making purposes unless used in a qualitative way and the use is justified and documented. Less severe deficiencies, associated with “U”, “J”, and “UJ” data validation qualifiers, are defined as issues resulting in the estimation of data. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. Also, a “U” qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the “U” qualifier regardless of whether a quality deficiency has been detected.

Some of the pesticide and PCBs results generated for Round 9 of the Interim Offshore Monitoring Program for OU4 were qualified as rejected. Qualified data and reasons for qualification are presented in

Table C-3. Any impacts regarding the data evaluation based on the results of the data evaluation are discussed in the remainder of this review.

2.0 DATA VALIDATION OUTPUTS

After laboratory data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgments and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Data validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. A complete printout of the data results with validation flags is presented in Table C-3. Pertinent quality estimates are summarized in a more quantitative format in the following section.

3.0 GENERAL DATA QUALITY REVIEW

The DQR provided herein provides an overall quantitative measure of analytical performance not provided by data validation. The quantitative evaluations are frequently analyte-specific and reflect deficiencies such as biases associated with the quantification of particular analytes in a particular sample matrix. The data user must be aware that different chemicals in the same analytical fraction (e.g. lead and copper in the metals fraction) may exhibit different degrees of quality.

4.0 <u>Completeness</u>

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on two different bases: samples collected and laboratory measurements.

- Sample completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

The sample completeness percentage for sediment was 100%, respectively. The ideal percent completeness goal for all projects is 100 percent; however, that goal is not always obtainable so a more realistic goal of 95 percent was established during project planning (TtNUS, October 1999). Sediment sample completeness is summarized below:

Analytical fraction	Number of proposed sediment samples(1)	Actual number of sediment samples collected(1)	% Completeness
PAH	**9 (1)**	**9 (1)**	**100**
Pesticides	**9 (1)**	**9 (1)**	**100**
PCBs	**9 (1)**	**9 (1)**	**100**
Dioxins	**6 (1)**	**6 (1)**	**100**
Metals	**9 (1)**	**9 (1)**	**100**
Copper and Lead	**1**	**1**	**100**

(1) Field duplicates noted in parentheses.

The percent completeness for laboratory measurements was 100 percent for all fractions, except laboratory completeness was 94% for pesticides and 99% for PCBs. There were a total of 230 data points based on 23 pesticide parameters for analysis at MS-05, MS-08, and MS-09 and one duplicate at MS-09. The pesticide hexachlorobenzene was included in the scope of work , but was not analyzed by the laboratory.. A total of 280 data points based on 28 PCB parameters were measured at MS-05, MS-08, and MS-09 and one duplicate at MS-09. Of the 230 data points for pesticide parameters, 3 pesticides in sample OU4-SD-M05-207A were qualified as rejected and hexachlorobenzene was not analyzed in any of the 10 samples. Of the 280 data points for PCB parameters, 2 PCBs in sample OU4-SD-M05-207A were qualified as rejected or 0.7% of the PCB sediment results. All positive rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. The rejection of these results and the absent of hexachlorbenzene analysis

represents a data gap that has little negative effect on the project because interim remediation goals (IRGs) were not developed for pesticides and PCBs.

5.0 Sensitivity

Several method detection limits (MDLs) reported by the laboratory were greater than the target MDL specified in Interim Offshore Monitoring Plan (TtNUS, 1999) for the sediment matrices. Non-detected results for two PAHs and all 50 pesticides/PCBs exceeded target MDLs specified in the Interim Offshore Monitoring Plan for OU4 Portsmouth Naval Shipyard, Kittery, Maine. Table C-4 presents exceedances of target MDLs.

The two PAHs, fluoranthene and pyrene, were qualified as non-detected due to laboratory blank contamination, and therefore were reported as non-detected at concentrations greater than project screening criteria due to the nature of the laboratory blank data qualification process which is designed to qualify the corresponding target analyte with a concentration less than 5 times the maximum concentration found in a laboratory blank as non-detected. Several dioxins were qualified as non-detected in one sample due to laboratory blank contamination; however, these results did not exceed the target MDLs.

Sensitivity for the pesticides/PCBs exceeding the target MDLs is considered acceptable because IRGs have not been established for those compounds. Two PAHs were qualified for laboratory blank contamination, resulting in exceedances of the target MDLs. An IRG has been established for high molecular weight (HMW) PAHs, which includes fluoranthene and pyrene. The results for fluoranthene and pyrene are well below the IRG for HMW PAHs; therefore, the sensitivity for these compounds is acceptable.

6.0 Laboratory Accuracy

Accuracy in the laboratory was measured through the comparison of a spiked sample, spiked sample duplicate, Laboratory control sample (LCS), or laboratory control sample duplicate (LCSD) result to a known or calculated value and is expressed as a percent recovery (%R). Accuracy was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods and the analytical recovery of calibration standards for all analyses. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. Matrix spike/matrix spike duplicate (MS/MSD) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix. Laboratory

accuracy was assessed by comparing calculated percent recovery (%R) values to accuracy control limits specified by the laboratory.

%R is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where	%R	=	%R
	Ss	=	result of spiked sample
	So	=	result of non-spiked sample
	S	=	concentration of spiked amount.

Percent recovery calibration noncompliances were noted for iron and manganese in sediment at all monitoring stations. Calibration noncompliances were greater than target QC limits; however, those noncompliances were not egregious enough to qualify the affected data as rejected and therefore are considered acceptable for the data usability assessment.

MS noncompliance indicates that the sample matrix is interfering with the accurate quantitation of target analytes. Understanding how chemical fractions are evaluated for MS noncompliance is essential in assessing the affect of MS non-compliances on data quality. Inorganic analytes are qualified for MS non-compliance by SDG. This means, for example, that if the MS %R for analyte “A” is non-compliant with the applicable %R criterion then analyte “A” results are qualified for MS noncompliance in sample 1 and all other samples in the same SDG. Although an SDG comprises samples of similar matrix, if different samples in a batch have different matrix compositions such as different relative proportions of clay or sand because the spiked sample may not represent matrix effects in all samples of the SDG. This effect is most pronounced on soil and sediment samples, which have a significant potential for compositional differences. Results for organic compounds are qualified only for the sample exhibiting the noncompliant %R values. These differences in qualification protocol emphasize qualification of organic data more than organic data. This can lead to conclusions that the inorganic data are of lesser quality than organic data quality even though the quality is similar for inorganic and organic analyses.

Results for total organic carbon were qualified due to MS/MSD %R noncompliance in sediment at all monitoring stations. Matrix spike %R for TOC was less than the minimum QC target limits. As sediment is not homogenous, only inorganic results from samples actually spiked truly indicate that the accuracy of those results is impacted due to MS noncompliance.

LCS/LCSD %R noncompliance was noted for cadmium, chromium, copper, lead, nickel, and zinc in sediment at all monitoring stations. The LCS %R was greater than quality control limits for these metals. No samples were qualified due to surrogate recovery noncompliance. With the exception of several metals results, LCS/LCSD and surrogate QC samples were compliance with QC criteria indicating that laboratory procedures and analytical equipment were functioning properly.

Several dioxins were qualified due to noncompliances that can encompass a number of issues; however as the data were not rejected, the data are considered acceptable for the usability assessment.

All PAH compounds reported for sample OU4-SD-M08-207A were qualified due to holding time exceedance, because those samples were extracted beyond the holding time limit. The initial analysis resulted in surrogate recoveries less than the quality control limits; therefore, the samples were re-extracted outside of the extraction hold time. The re-extracted samples were used for validation as the PAH concentrations were higher in the re-extractions. Upon consideration of the matrix, the affected analytes, and the applicable storage conditions, loss of analyte due to delayed analysis was considered not to be a significant concern. The PAH data qualified due to holding time exceedance are considered acceptable for the usability assessment.

7.0 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from

analyzing duplicate laboratory samples incorporate only homogenization, sub sampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Several pesticides and PCBs were qualified due to noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. As discussed in the section above on laboratory completeness, a few pesticides and PCBs were rejected due to a severe percent difference noncompliance. When the noncompliance was not severe enough to reject the data, the data was considered acceptable for the data usability assessment.

Field duplicate imprecision was noted for three dioxins in samples OU4-SD-MD09-0207A and OU4-SD-MD09-0207A-D. Qualified data due to field duplicate imprecision were not rejected and therefore are considered acceptable for the data usability assessment.

8.0 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the quality assurance (QA) plan.

9.0 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The Interim Offshore Monitoring Plan (TtNUS, October 1999) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. After completion of the DQR, it was determined that data for Round 9 of the Interim Offshore Monitoring Program for OU4 is representative of site conditions. However, two salient data quality issues were discovered during this DQR.

All PAH compounds reported for sample OU4-SD-M08-207A were qualified due to holding time exceedance, because those samples were extracted beyond the holding time limit. The initial analysis resulted in surrogate recoveries less than the quality control limits; therefore, the samples were re-extracted outside of the extraction hold time. The re-extracted samples were used for validation as the

PAH concentrations were higher in the re-extractions. Upon consideration of the matrix, the affected analytes, and the applicable storage conditions, loss of analyte due to delayed analysis was considered not to be a significant concern. The PAH data qualified due to holding time exceedance are considered acceptable for the usability assessment.

Laboratory completeness was 95% for pesticides. Three pesticides in sample OU4-SD-M05-207A were qualified as rejected and hexachlorobenzene was not analyzed in any of the 10 samples. Hexachlorobenzene was included in the scope of work, but was not analyzed by the laboratory. The rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. The rejection of these results and the absence of hexachlorobenzene results represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides.

APPENDIX C.3

ANALYTICAL DATA QUALITY REVIEW
ROUND 10 - INTERIM OFFSHORE MONITORING PROGRAM
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

A description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making is presented in this data quality review (DQR). The review began with data verification and validation. Verification is a process used to ensure that contractual requirements were satisfied. Validation is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria to assess analytical method performance. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. Together, verification and validation are the first steps in evaluating data completeness, precision, accuracy, sensitivity, comparability, and representativeness. The data review process culminates with a data usability assessment during which the final usability of the data is established relative to the intended data use.

1.0 Data Validation Process

All of the results from analytical laboratory samples were validated according to several specifications. Various validation guidelines are applicable to this project. To the extent practical, assignment of data qualification flags of non-contract laboratory data conformed to rules established in:

- USEPA Region 1 Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses – Part II (December 1996) – Part III (February 2004),
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (February 1989) – (November 2008),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Organic Analyses (October 1999),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Inorganic Analyses (October 2004),
- Department of Defense (DoD) document entitled Quality Systems Manual (QSM) for Environmental Laboratories (January 2006).

If no qualifier is assigned to a result that has been validated, the data user is assured that no analytical performance deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit noted. Non-detected results are reported with a “U” qualifier when received from the laboratory. Additionally, a “U” qualifier is added to a result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate.

J – Indicates that the chemical was detected. However, the associated numerical result may not be an accurate representation of the amount that is actually present in the sample. The reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. The “UR” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control [QC] recoveries).

R – Indicates that the chemical may or may not be present. The analytical result reported by the laboratory is considered to be unreliable and unusable. The “R” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low QC recoveries).

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with “UR” or “R” data validation qualifiers. Rejected data are considered invalid and are not used for decision making purposes unless used in a qualitative way and the use is justified and documented. Less severe deficiencies, associated with “U”, “J”, and “UJ” data validation qualifiers, are defined as issues resulting in the estimation of data. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. Also, a “U” qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the “U” qualifier regardless of whether a quality deficiency has been detected.

Some of the pesticide and PCBs results generated for Round 10 of the Interim Offshore Monitoring Program for OU4 were qualified as rejected. Qualified data and reasons for qualification are presented in

Table C-5. Any impacts regarding the data evaluation based on the results of the data evaluation are discussed in the remainder of this review.

2.0 DATA VALIDATION OUTPUTS

After laboratory data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgments and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Data validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. A complete printout of the data results with validation flags is presented in Table C-5. Pertinent quality estimates are summarized in a more quantitative format in the following section.

3.0 GENERAL DATA QUALITY REVIEW

The DQR provided herein provides an overall quantitative measure of analytical performance not provided by data validation. The quantitative evaluations are frequently analyte-specific and reflect deficiencies such as biases associated with the quantification of particular analytes in a particular sample matrix. The data user must be aware that different chemicals in the same analytical fraction (e.g. lead and copper in the metals fraction) may exhibit different degrees of quality.

4.0 <u>Completeness</u>

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on two different bases: samples collected and laboratory measurements.

- Sample completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

The sample completeness percentage for sediment was 100% for all fractions, except sample completeness was 110% samples analyzed for metals by USEPA methods. Sample OU4-M05-408A was proposed to be sampled for copper and lead only; however, the sample was analyzed for TAL metals. The ideal percent completeness goal for all projects is 100 percent; however, that goal is not always obtainable so a more realistic goal of 95 percent was established during project planning (TtNUS, October 1999). Sediment sample completeness is summarized below:

Analytical fraction	Number of proposed sediment samples(1)	Actual number of sediment samples collected(1)	% Completeness
PAH	9 (1)	9 (1)	100
Pesticides	9 (1)	9 (1)	100
PCBs	9 (1)	9 (1)	100
Dioxins	6 (1)	6 (1)	100
Metals (NOAA)(2)	9 (1)	9 (1)	100
Metals (USEPA) (2,3)	9 (1)	10 (1)	110
Copper and Lead(3)	1	1	100

(1) Field duplicates noted in parentheses.
(2) Method of analysis.
(3) The sample intended for copper and lead analysis only was analyzed for all metals using USEPA analytical methods.

The percent completeness for laboratory measurements was 100 percent for all fractions, except laboratory completeness was 93% for pesticides and 99% for PCBs. There were a total of 230 data points based on 23 pesticide parameters for analysis at MS-05, MS-08, and MS-09 and one duplicate at MS-05. The pesticide hexachlorobenzene was included in the scope of work, but was not analyzed by the laboratory. A total of 280 data points based on 28 PCB parameters were measured at MS-05, MS-08, and MS-09 and one duplicate at MS-05. Of the 230 data points for pesticide parameters, 6 pesticides were qualified as rejected and hexachlorobenzene was not analyzed in any of the 10 samples. Of the

280 data points for PCB parameters, 2 PCBs in sample OU4-SD-M08-308A were qualified as rejected or 0.7% of the PCB sediment results. All positive rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. The rejection of these results and the absent of hexachlorobenzene analysis represents a data gap that has little negative effect on the project because interim remediation goals (IRGs) were not developed for pesticides and PCBs.

5.0 Sensitivity

Several method detection limits (MDLs) reported by the laboratory were greater than the target MDL specified in Interim Offshore Monitoring Plan (TtNUS, 1999) for the sediment matrices. Non-detected results for all 50 pesticides/PCBs and two metals analyzed by USEPA methods, cadmium and silver, exceeded target MDLs specified in the Interim Offshore Monitoring Plan for OU4 Portsmouth Naval Shipyard, Kittery, Maine. Table C-6 presents exceedances of target MDLs.

The target MDLs for cadmium and silver were exceeded since the samples were run at a 5X dilution due to matrix interferences. Sensitivity for the pesticides/PCBs and metals exceeding the target MDLs is considered acceptable because IRGs have not been established for those compounds.

6.0 Laboratory Accuracy

Accuracy in the laboratory was measured through the comparison of a spiked sample, spiked sample duplicate, Laboratory control sample (LCS), or laboratory control sample duplicate (LCSD) result to a known or calculated value and is expressed as a percent recovery (%R). Accuracy was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods and the analytical recovery of calibration standards for all analyses. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. Matrix spike/matrix spike duplicate (MS/MSD) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix. Laboratory accuracy was assessed by comparing calculated percent recovery (%R) values to accuracy control limits specified by the laboratory.

%R is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where %R = %R

Ss = result of spiked sample

So = result of non-spiked sample

S = concentration of spiked amount.

MS noncompliance indicates that the sample matrix is interfering with the accurate quantitation of target analytes. No data were qualified due to MS/MSD and LCS/LCSD. Three pesticides in sediment sample OU4-SD-M09-108A were qualified due to surrogate recovery noncompliance. With the exception of these pesticide results obtained from the sediment matrix, LCS/LCSD and surrogate QC samples in compliance with QC criteria indicated that laboratory procedures and analytical equipment were functioning properly.

7.0 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, sub sampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Initial calibration percent relative standard deviation (%RSD) noncompliances were noted for PCB-28 in sediment at all monitoring stations. Calibration noncompliances were outside of target QC limits; however, those noncompliances were not egregious enough to qualify the affected data as rejected and therefore are considered acceptable for the data usability assessment.

Several pesticides and PCBs were qualified due to noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. As discussed in the section above on laboratory completeness, a few pesticides and PCBs were rejected due to a severe percent difference noncompliance. When the noncompliance was not severe enough to reject the data, the data was considered acceptable for the data usability assessment.

Field duplicate imprecision was noted for one dioxin, 14 PAHs, one pesticide, and one PCB. Total PECDF was qualified in samples OU4-SD-MD09-0108A and OU4-SD-MD09-0108A-D. Several PAHs, oxychlordane, and PCB-8 were qualified in samples OU4-SD-MD05-0108A and OU4-SD-MD05-0108A-D. Qualified data due to field duplicate imprecision were not rejected and therefore are considered acceptable for the data usability assessment.

8.0 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the quality assurance (QA) plan.

9.0 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The Interim Offshore Monitoring Plan (TtNUS, October 1999) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. After completion of the DQR, it was determined that data for Round 10 of the Interim Offshore Monitoring Program for OU4 is representative of site conditions. However, two salient data quality issues were discovered during this DQR.

Samples OU4-SD-M09-108A and OU4-SD-M09-108A-D contained <30% solids. All parameters analyzed for in these sediment samples were qualified as estimated due to the low percent solids. Due to the low

percent solids, this sample may not be representative of sediment at the site as a high portion of the sample is aqueous.

Laboratory completeness was 93% for pesticides. Six pesticides were qualified as rejected and hexachlorobenzene was not analyzed in any of the 10 samples. Hexachlorobenzene was included in the scope of work, but was not analyzed by the laboratory. All positive rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. The rejection of these results and the absent of hexachlorobenzene analysis represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides.

APPENDIX C.4

ANALYTICAL DATA QUALITY REVIEW
ADDITIONAL SCRUTINY PHASE I
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

A description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making is presented in this data quality review (DQR). The review began with data verification and validation. Verification is a process used to ensure that contractual requirements were satisfied. Validation is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria to assess analytical method performance. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. Together, verification and validation are the first steps in evaluating data completeness, precision, accuracy, sensitivity, comparability, and representativeness. The data review process culminates with a data usability assessment during which the final usability of the data is established relative to the intended data use.

1.0 Data Validation Process

All of the results from analytical laboratory samples were validated according to several specifications. Various validation guidelines are applicable to this project. To the extent practical, assignment of data qualification flags of non-contract laboratory data conformed to rules established in:

- USEPA Region 1 Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses – Part II (December 1996) – Part III (February 2004),
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (February 1989) – (November 2008),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Organic Analyses (October 1999),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Inorganic Analyses (October 2004),
- Department of Defense (DoD) document entitled Quality Systems Manual (QSM) for Environmental Laboratories (January 2006).

If no qualifier is assigned to a result that has been validated, the data user is assured that no analytical performance deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit noted. Non-detected results are reported with a “U” qualifier when received from the laboratory. Additionally, a “U” qualifier is added to a result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate.

J – Indicates that the chemical was detected. However, the associated numerical result may not be an accurate representation of the amount that is actually present in the sample. The reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. The “UR” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control [QC] recoveries).

R – Indicates that the chemical may or may not be present. The analytical result reported by the laboratory is considered to be unreliable and unusable. The “R” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low QC recoveries).

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with “UR” or “R” data validation qualifiers. Rejected data are considered invalid and are not used for decision making purposes unless used in a qualitative way and the use is justified and documented. Less severe deficiencies, associated with “U”, “J”, and “UJ” data validation qualifiers, are defined as issues resulting in the estimation of data. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. Also, a “U” qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the “U” qualifier regardless of whether a quality deficiency has been detected.

Some of the pesticide results generated for the Phase I Additional Scrutiny investigation were qualified as rejected. Qualified data and reasons for qualification are presented in Table C-7. Any impacts regarding

the data evaluation based on the results of the data evaluation are discussed in the remainder of this review.

2.0 DATA VALIDATION OUTPUTS

After laboratory data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgments and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Data validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. A complete printout of the data results with validation flags is presented in C-7. Pertinent quality estimates are summarized in a more quantitative format in the following section.

3.0 GENERAL DATA QUALITY REVIEW

The DQR provided herein provides an overall quantitative measure of analytical performance not provided by data validation. The quantitative evaluations are frequently analyte-specific and reflect deficiencies such as biases associated with the quantification of particular analytes in a particular sample matrix. The data user must be aware that different chemicals in the same analytical fraction (e.g. lead and copper in the metals fraction) may exhibit different degrees of quality.

4.0 Completeness

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on two different bases: samples collected and laboratory measurements.

- Sample completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness

V = number of samples (or results) determined to be valid

T = total number of planned samples (or results)

The sample completeness percentage for sediment was 100% for all fractions, except sample completeness was 86% for PAHs, 97% for lead, and 105% for forensic analysis. Sample AS12-CP-CB01proposed for PAH and lead analysis was not collected because sediment was not present at the location. Sample AS12-CP-CB02 was not proposed for forensic analysis, but was analyzed for these parameters. The ideal percent completeness goal for all projects is 100 percent; however, that goal is not always obtainable so a more realistic goal of 95 percent was established during project planning (TtNUS, October 1999). Sediment sample completeness is summarized below:

Analytical fraction	Number of proposed sediment samples(1)	Actual number of sediment samples collected(1)	% Completeness
Forensic(2,3)	**20 (2)**	**21 (2)**	**105**
PAH(4)	**7**	**6**	**86**
Pesticides	**9 (1)**	**9 (1)**	**100**
Lead(3)	**32 (6)**	**31 (6)**	**97**
Copper & Nickel	**20 (2)**	**20 (2)**	**100**

(1) Field duplicates noted in parentheses.

(2) All samples analyzed for TPH, and based on results of TPH analysis, samples analyzed for PAH, biomarker, and TOC analyses.

(3) Two samples collected at four different depths; multiple depths not counted as separate samples.

(4) Samples not included in forensic analysis.

The percent completeness for laboratory measurements was 100 percent for all fractions, except laboratory completeness was 64% for pesticides. There were a total of 230 data points based on 23 pesticide parameters for analysis at MS-01 and one duplicate. Of the 230 data points for pesticide parameters, 82 pesticides results were qualified as rejected. All positive rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC or other problems which can encompass a number of issues. The rejection of these results represents a data gap that has little negative effect on the project because interim remediation goals (IRGs) were not developed for pesticides.

5.0 Sensitivity

Several method detection limits (MDLs) reported by the laboratory were greater than the target MDL specified in Interim Offshore Monitoring Plan (TtNUS, 1999) for the sediment matrices. Non-detected results for eight pesticides exceeded target MDLs specified in the Interim Offshore Monitoring Plan for OU4 Portsmouth Naval Shipyard, Kittery, Maine. Table C-8 presents exceedances of target MDLs.

The four pesticides, alpha-chlordane, beta-BHC, gamma-BHC, and gamma-chlordane, were qualified as non-detected due to laboratory blank contamination, and therefore were reported as non-detected at concentrations greater than project screening criteria due to the nature of the laboratory blank data qualification process which is designed to qualify the corresponding target analyte with a concentration less than 5 times the maximum concentration found in a laboratory blank as non-detected. Several other pesticides were qualified as non-detected due to laboratory blank contamination; however, these results did not exceed the target MDLs.

Sensitivity for the pesticides exceeding the target MDLs is considered acceptable because IRGs have not been established for those compounds.

6.0 Laboratory Accuracy

Accuracy in the laboratory was measured through the comparison of a spiked sample, spiked sample duplicate, Laboratory control sample (LCS), or laboratory control sample duplicate (LCSD) result to a known or calculated value and is expressed as a percent recovery (%R). Accuracy was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods and the analytical recovery of calibration standards for all analyses. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. Matrix spike/matrix spike duplicate (MS/MSD) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix. Laboratory accuracy was assessed by comparing calculated percent recovery (%R) values to accuracy control limits specified by the laboratory.

%R is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where	%R	=	%R
	Ss	=	result of spiked sample
	So	=	result of non-spiked sample
	S	=	concentration of spiked amount.

MS noncompliance indicates that the sample matrix is interfering with the accurate quantitation of target analytes. Understanding how chemical fractions are evaluated for MS noncompliance is essential in assessing the affect of MS non-compliances on data quality. Inorganic analytes are qualified for MS non-compliance by SDG. This means, for example, that if the MS %R for analyte “A” is non-compliant with the applicable %R criterion then analyte “A” results are qualified for MS noncompliance in sample 1 and all other samples in the same SDG. Although an SDG comprises samples of similar matrix, if different samples in a batch have different matrix compositions such as different relative proportions of clay or sand because the spiked sample may not represent matrix effects in all samples of the SDG. This effect is most pronounced on soil and sediment samples, which have a significant potential for compositional differences. Results for organic compounds are qualified only for the sample exhibiting the noncompliant %R values. These differences in qualification protocol emphasize qualification of organic data more than organic data. This can lead to conclusions that the inorganic data are of lesser quality than organic data quality even though the quality is similar for inorganic and organic analyses.

Results for four PAHs (benzo[a]pyrene, fluoranthene, indeno[1,2,3,-cd]pyrene, and pyrene) in sample AS01-SD-SD01 were qualified due to MS/MSD %R noncompliance in sediment. Copper, nickel, and total organic carbon were qualified due to MS/MSD %R noncompliance in several sediment samples. As sediment is not homogenous, only inorganic results from samples actually spiked truly indicate that the accuracy of those results is impacted due to MS noncompliance.

LCS/LCSD %R noncompliance was noted for heptachlor epoxide in sediment at AS01-CP-CB01, AS-SD-SD03 duplicate, and AS01-SD-SD07. The LCS %R was greater than quality control limits for heptachlor epoxide. Several pesticides in sample AS01-CP-CB01 were qualified due to surrogate recovery noncompliance. With the exception of several pesticide results, LCS/LCSD and surrogate QC samples were compliance with QC criteria indicating that laboratory procedures and analytical equipment were functioning properly.

Total organic carbon reported for several samples at MS-01 and MS-12 were qualified due to holding time exceedance. Upon consideration of the matrix, the affected analytes, and the applicable storage conditions, loss of analyte due to delayed analysis was considered not to be a significant concern. The TOC data qualified due to holding time exceedance are considered acceptable for the usability assessment.

Fluoranthene and pyrene were qualified for instrument calibration range exceedance in one sample. The results were qualified as estimated as the concentration of the compounds may not be accurately determined outside the instrument calibration range; however, the data are considered acceptable for the usability assessment.

7.0 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, sub sampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Several pesticides were qualified due to noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC. As discussed in the section above on laboratory completeness, a few pesticides were rejected due to a severe percent difference noncompliance. When the noncompliance was not severe enough to reject the data, the data was considered acceptable for the data usability assessment.

Field duplicate imprecision was noted for several PAHs, one biomarker, and two pesticides at MS-01. Copper was qualified for field duplicate imprecision at MS11. Lead was qualified for filed duplicate imprecision at MS12. Laboratory duplicate imprecision was noted for TOC in several samples from MS-01 and MS-12. Qualified data due to field and laboratory duplicate imprecision were not rejected and therefore are considered acceptable for the data usability assessment.

Serial dilution analysis identifies the presence of interferences due to the sample matrix. Serial dilution noncompliance was noted for copper and nickel in one sample from MS-05 and all six samples from MS-09. Qualified data due to serial dilution noncompliance were not rejected and therefore are considered acceptable for the data usability assessment.

8.0 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the quality assurance (QA) plan.

9.0 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The Interim Offshore Monitoring Plan (TtNUS, October 1999) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. After completion of the DQR, it was determined that data for the Additional Scrutiny Phase I Investigation of the Interim Offshore Monitoring Program for OU4 is representative of site conditions. However, two salient data quality issues were discovered during this DQR.

Sample AS09-SD-SD01 contained <30% solids. PAHs analyzed for in this sediment sample were qualified as estimated due to the low percent solids. Due to the low percent solids, this sample may not be representative of sediment at the site as a high portion of the sample is aqueous.

Sample completeness was 86% for PAHs, because one sample was not collected due to the absence of sediment at the proposed sampling location. Laboratory completeness was 64% for pesticides. 82 pesticides were qualified as rejected. All positive rejected data points were due to a severe noncompliance of the percent difference between columns/detectors for results determined via GC/HPLC or other problems which can encompass a number of issues. The rejection of these results represents a data gap that has little negative effect on the project because IRGs were not developed for pesticides.

APPENDIX C.5

ANALYTICAL DATA QUALITY REVIEW
ADDITIONAL SCRUTINY PHASE II
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

A description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making is presented in this data quality review (DQR). The review began with data verification and validation. Verification is a process used to ensure that contractual requirements were satisfied. Validation is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria to assess analytical method performance. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. Together, verification and validation are the first steps in evaluating data completeness, precision, accuracy, sensitivity, comparability, and representativeness. The data review process culminates with a data usability assessment during which the final usability of the data is established relative to the intended data use.

1.0 Data Validation Process

All of the results from analytical laboratory samples were validated according to several specifications. Various validation guidelines are applicable to this project. To the extent practical, assignment of data qualification flags of non-contract laboratory data conformed to rules established in:

- USEPA Region 1 Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses – Part II (December 1996) – Part III (February 2004),
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (February 1989) – (November 2008),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Organic Analyses (October 1999),
- USEPA Contract Laboratory Program National Functional Guidelines for Evaluating Inorganic Analyses (October 2004),
- Department of Defense (DoD) document entitled Quality Systems Manual (QSM) for Environmental Laboratories (January 2006).

If no qualifier is assigned to a result that has been validated, the data user is assured that no analytical performance deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit noted. Non-detected results are reported with a “U” qualifier when received from the laboratory. Additionally, a “U” qualifier is added to a result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate.

J – Indicates that the chemical was detected. However, the associated numerical result may not be an accurate representation of the amount that is actually present in the sample. The reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. The “UR” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control [QC] recoveries).

R – Indicates that the chemical may or may not be present. The analytical result reported by the laboratory is considered to be unreliable and unusable. The “R” qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low QC recoveries).

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with “UR” or “R” data validation qualifiers. Rejected data are considered invalid and are not used for decision making purposes unless used in a qualitative way and the use is justified and documented. Less severe deficiencies, associated with “U”, “J”, and “UJ” data validation qualifiers, are defined as issues resulting in the estimation of data. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. Also, a “U” qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the “U” qualifier regardless of whether a quality deficiency has been detected.

No results generated for the Phase II Additional Scrutiny investigation were qualified as rejected. Qualified data and reasons for qualification are presented in Table C-9. Any impacts regarding the data evaluation based on the results of the data evaluation are discussed in the remainder of this review.

2.0 DATA VALIDATION OUTPUTS

After laboratory data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgments and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Data validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. A complete printout of the data results with validation flags is presented in Table C-9. Pertinent quality estimates are summarized in a more quantitative format in the following section.

3.0 GENERAL DATA QUALITY REVIEW

The DQR provided herein provides an overall quantitative measure of analytical performance not provided by data validation. The quantitative evaluations are frequently analyte-specific and reflect deficiencies such as biases associated with the quantification of particular analytes in a particular sample matrix. The data user must be aware that different chemicals in the same analytical fraction (e.g. lead and copper in the metals fraction) may exhibit different degrees of quality.

4.0 <u>Completeness</u>

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on two different bases: samples collected and laboratory measurements.

- Sample completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

The sample completeness percentage for sediment was 100% for the sample collected at MS-05 for copper and lead analysis (AS05-SD-SD15). The sample completeness percentage for all other fractions was over 100%. Although only one sediment sample was to be collected if the sediment was less than 18 inches, two sediment samples were collected at several locations to provided additional extent information. In addition, sediment samples were collected from seven discretionary locations (SD-100 through SD-106) to provide additional information regarding the contaminant concentrations at those locations. Sediment samples could not be collected from several proposed locations in the offshore area at MS-12. The ideal percent completeness goal for all projects is 100 percent; however, that goal is not always obtainable so a more realistic goal of 95 percent was established during project planning (TtNUS, October 1999). Sediment sample completeness is summarized below:

Analytical fraction	Number of proposed sediment samples(1)	Actual number of sediment samples collected(1)	% Completeness
PAH	**30 (8)**	**46 (4)**	**132**
Lead	**30 (8)**	**46 (4)**	**132**
TOC	**11 (2)**	**31 (2)**	**254**
Copper & Lead	**1**	**1**	**100**

(1) Field duplicates noted in parentheses.

The percent completeness for laboratory measurements was 100 percent for all fractions. No data points were rejected.

5.0 Sensitivity

Several method detection limits (MDLs) reported by the laboratory were greater than the target MDL specified in Interim Offshore Monitoring Plan (TtNUS, 1999) for the sediment matrices. Non-detected results for six PAHs exceeded target MDLs specified in the Interim Offshore Monitoring Plan for OU4 Portsmouth Naval Shipyard, Kittery, Maine. Table C-10 presents exceedances of target MDLs.

1,1-Biphenyl, 1-methylnaphthalene, 2,3,5-trimethylnaphthalene, 2,6-dimethylnaphthalene, 2-methylnaphthalene, and acenaphthylene exceeded the target MDLs because samples were analyzed at

dilution as the concentrations for various PAHs exceeded the linear calibration range of the instrument. Sensitivity for the PAHs exceeding the target MDLs is considered acceptable because IRGs have not been established for those compounds.

6.0 Laboratory Accuracy

Accuracy in the laboratory was measured through the comparison of a spiked sample, spiked sample duplicate, Laboratory control sample (LCS), or laboratory control sample duplicate (LCSD) result to a known or calculated value and is expressed as a percent recovery (%R). Accuracy was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods and the analytical recovery of calibration standards for all analyses. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. Matrix spike/matrix spike duplicate (MS/MSD) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix. Laboratory accuracy was assessed by comparing calculated percent recovery (%R) values to accuracy control limits specified by the laboratory.

%R is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where %R = %R
Ss = result of spiked sample
So = result of non-spiked sample
S = concentration of spiked amount.

MS noncompliance indicates that the sample matrix is interfering with the accurate quantitation of target analytes. Understanding how chemical fractions are evaluated for MS noncompliance is essential in assessing the affect of MS non-compliances on data quality. Inorganic analytes are qualified for MS non-compliance by SDG. This means, for example, that if the MS %R for analyte “A” is non-compliant with the applicable %R criterion then analyte “A” results are qualified for MS noncompliance in sample 1 and all other samples in the same SDG. Although an SDG comprises samples of similar matrix, if different samples in a batch have different matrix compositions such as different relative proportions of clay or sand because the spiked sample may not represent matrix effects in all samples of the SDG. This effect is most pronounced on soil and sediment samples, which have a significant potential for compositional differences. Results for organic compounds are qualified only for the sample exhibiting the noncompliant

%R values. These differences in qualification protocol emphasize qualification of organic data more than organic data. This can lead to conclusions that the inorganic data are of lesser quality than organic data quality even though the quality is similar for inorganic and organic analyses.

Results for all PAHs in sample AS12-SD-SD41-00 were qualified due to MS/MSD %R noncompliance in sediment. Lead and total organic carbon were qualified due to MS/MSD %R noncompliance in several sediment samples. As sediment is not homogenous, only inorganic results from samples actually spiked truly indicate that the accuracy of those results is impacted due to MS noncompliance.

No data were qualified due to LCS/LCSD. Most PAHs in samples AS12-SD-SD22-00 and AS12-SD-SD26-00 were qualified due to surrogate recovery noncompliance. With the exception of several PAH results, LCS/LCSD and surrogate QC samples were compliance with QC criteria indicating that laboratory procedures and analytical equipment were functioning properly.

PAHs in samples AS12-SD-SD20-00, AS12-SD-SD22-00, AS12-SD-SD22-00-D, AS12-SD-SD23-00, AS12-SD-SD25-00, AS12-SD-SD27-00, AS12-SD-SD28-00, AS12-SD-SD29-00, and AS12-SD-SD30-00 were qualified due to holding time exceedance. During the initial analysis, low surrogate recoveries or the addition of an improper spike surrogate was noted. The samples reextracted outside of the holding time were used for validation. Upon consideration of the matrix, the affected analytes, and the applicable storage conditions, loss of analyte due to delayed analysis was considered not to be a significant concern. The PAH data qualified due to holding time exceedance are considered acceptable for the usability assessment.

7.0 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, sub sampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Percent difference (%D) calibration noncompliances were noted for benzo(b)fluoranthene in sediment. Calibration noncompliances were outside of target QC limits; however, those noncompliances were not egregious enough to qualify the affected data as rejected.

Field duplicate imprecision was noted for several PAHs in samples AS12-SD-SD103-00, AS12-SD-SD22-00, AS12-SD-SD33-00, and AS12-SD-SD38-00 and their respective duplicates. Qualified data due to field duplicate imprecision were not rejected and therefore are considered acceptable for the data usability assessment.

Serial dilution analysis identifies the presence of interferences due to the sample matrix. Serial dilution noncompliance was noted for lead. Qualified data due to serial dilution noncompliance were not rejected and therefore are considered acceptable for the data usability assessment.

8.0 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the quality assurance (QA) plan.

9.0 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The Interim Offshore Monitoring Plan (TtNUS, October 1999) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. After completion of the DQR, it was determined that data for

Additional Scrutiny Phase II Investigation of the Interim Offshore Monitoring Program for OU4 is representative of site conditions. However, one data quality issue was discovered during this DQR.

The sample completeness percentage for all fractions was ≥100%. Although only one sediment sample was to be collected if the sediment was less than 18 inches, two sediment samples were collected at several locations to provided additional extent information. In addition, sediment samples were collected from seven discretionary locations (SD-100 through SD-106) to provide additional information regarding the contaminant concentrations at those locations. Sediment samples could not be collected from several proposed locations in the offshore area at MS-12.

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-305A	DIOX	1,2,3,4,6,7,8,9-OCDF	6.9	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A-D	DIOX	1,2,3,4,7,8,9-HPCDF	6.3	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	DIOX	1,2,3,4,7,8,9-HPCDF	13	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	DIOX	1,2,3,4,7,8-HXCDD	3.8	NG/KG	UJ	N	Internal Standard Noncompliance
8	OU4-SD-M08-205A-D	DIOX	1,2,3,4,7,8-HXCDD	3.5	NG/KG	UJ	N	Internal Standard Noncompliance
8	OU4-SD-M09-105A-D	DIOX	1,2,3,4,7,8-HXCDD	33	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-205A	DIOX	1,2,3,4,7,8-HXCDD	8	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	DIOX	1,2,3,4,7,8-HXCDD	12	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	DIOX	1,2,3,6,7,8-HXCDD	10	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M08-205A-D	DIOX	1,2,3,6,7,8-HXCDD	13	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-105A	DIOX	1,2,3,6,7,8-HXCDD	49	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-105A-D	DIOX	1,2,3,6,7,8-HXCDD	57	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M08-205A	DIOX	1,2,3,6,7,8-HXCDF	7.8	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	DIOX	1,2,3,7,8,9-HXCDD	8.9	NG/KG	J	PN	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Internal Standard Noncompliance
8	OU4-SD-M08-205A-D	DIOX	1,2,3,7,8,9-HXCDD	9	NG/KG	J	PN	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Internal Standard Noncompliance
8	OU4-SD-M09-105A	DIOX	1,2,3,7,8,9-HXCDD	47	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-105A-D	DIOX	1,2,3,7,8,9-HXCDD	66	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-205A	DIOX	1,2,3,7,8,9-HXCDD	13	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	DIOX	1,2,3,7,8-PECDD	8.9	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	DIOX	1,2,3,7,8-PECDF	5.8	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A-D	DIOX	1,2,3,7,8-PECDF	5.4	NG/KG	J	PW	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), EMPC result
8	OU4-SD-M09-205A	DIOX	2,3,7,8-TCDD	1.8	NG/KG	J	PW	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), EMPC result
8	OU4-SD-M08-205A	DIOX	TOTAL HXCDD	120	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M08-205A-D	DIOX	TOTAL HXCDD	170	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-105A	DIOX	TOTAL HXCDD	640	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-105A-D	DIOX	TOTAL HXCDD	790	NG/KG	J	N	Internal Standard Noncompliance
8	OU4-SD-M09-305A	HFM	ALUMINUM	71002	MG/KG	J	Y	Percent solids <30%
8	OU4-SD-M09-305A	HFM	ARSENIC	20.77	MG/KG	J	Y	Percent solids <30%
8	OU4-SD-M09-305A	HFM	CADMIUM	0.92	MG/KG	J	Y	Percent solids <30%
8	OU4-SD-M05-105A	HFM	CHROMIUM	102.26	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M05-105A-D	HFM	CHROMIUM	100.03	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M05-205A	HFM	CHROMIUM	79.69	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-305A	HFM	CHROMIUM	67.9	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-105A	HFM	CHROMIUM	24.104	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-205A	HFM	CHROMIUM	74.63	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-305A	HFM	CHROMIUM	28.325	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M09-105A	HFM	CHROMIUM	123.13	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M09-205A	HFM	CHROMIUM	102.85	MG/KG	J	DQ	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M09-305A	HFM	CHROMIUM	148.33	MG/KG	J	DQY	MS/MSD Recovery Noncompliance, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.), Percent solids <30%
8	OU4-SD-M05-105A	HFM	COPPER	988.2	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-105A-D	HFM	COPPER	977.44	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-205A	HFM	COPPER	30.8	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-305A	HFM	COPPER	13.81	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-105A	HFM	COPPER	12.575	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-205A	HFM	COPPER	128.73	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-305A	HFM	COPPER	39.431	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M09-105A	HFM	COPPER	891.58	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M09-205A	HFM	COPPER	228.76	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M09-305A	HFM	COPPER	407.73	MG/KG	J	DY	MS/MSD Recovery Noncompliance, Percent solids <30%
8	OU4-SD-M05-105A	HFM	IRON	43428	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M05-105A-D	HFM	IRON	44296	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M05-205A	HFM	IRON	23784	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M05-305A	HFM	IRON	20011	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-105A	HFM	IRON	16835	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-205A	HFM	IRON	25353	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-305A	HFM	IRON	16346	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M09-105A	HFM	IRON	37221	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M09-205A	HFM	IRON	32464	MG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M09-305A	HFM	IRON	39719	MG/KG	J	QY	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.), Percent solids <30%
8	OU4-SD-M05-105A	HFM	LEAD	829.24	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-105A-D	HFM	LEAD	818.9	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-205A	HFM	LEAD	57.69	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-305A	HFM	LEAD	29.87	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-105A	HFM	LEAD	20.15	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-205A	HFM	LEAD	116.76	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-305A	HFM	LEAD	35.438	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M09-105A	HFM	LEAD	506.38	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M09-205A	HFM	LEAD	198.12	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M09-305A	HFM	LEAD	414.76	MG/KG	J	DY	MS/MSD Recovery Noncompliance, Percent solids <30%
8	OU4-SD-M09-305A	HFM	MANGANESE	559	MG/KG	J	Y	Percent solids <30%
8	OU4-SD-M09-305A	HFM	NICKEL	119.86	MG/KG	J	Y	Percent solids <30%
8	OU4-SD-M05-105A	HFM	SILVER	2.62	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-105A-D	HFM	SILVER	2.88	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-205A	HFM	SILVER	0.78	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M05-305A	HFM	SILVER	0.64	MG/KG	J	D	MS/MSD Recovery Noncompliance
8	OU4-SD-M08-105A	HFM	SILVER	0.326	MG/KG	J	D	

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-305A	OS	1-METHYLNAPHTHALENE	4.4	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	OS	1-METHYLNAPHTHALENE	18	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	OS	1-METHYLNAPHTHALENE	1.6	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	OS	1-METHYLNAPHTHALENE	19	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	1-METHYLNAPHTHALENE	39	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-305A	OS	2,3,5-TRIMETHYLNAPHTHALENE	5.1	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	OS	2,3,5-TRIMETHYLNAPHTHALENE	20	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	2,3,5-TRIMETHYLNAPHTHALENE	63	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A-D	OS	2,3,5-TRIMETHYLNAPHTHALENE	49	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	OS	2,3,5-TRIMETHYLNAPHTHALENE	16	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	2,3,5-TRIMETHYLNAPHTHALENE	36	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-305A	OS	2,6-DIMETHYLNAPHTHALENE	4.3	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	OS	2,6-DIMETHYLNAPHTHALENE	20	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	OS	2,6-DIMETHYLNAPHTHALENE	1.8	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	2,6-DIMETHYLNAPHTHALENE	84	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A-D	OS	2,6-DIMETHYLNAPHTHALENE	60	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	OS	2,6-DIMETHYLNAPHTHALENE	21	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	2,6-DIMETHYLNAPHTHALENE	43	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-305A	OS	2-METHYLNAPHTHALENE	5.4	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	OS	2-METHYLNAPHTHALENE	20	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	OS	2-METHYLNAPHTHALENE	1.9	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	OS	2-METHYLNAPHTHALENE	25	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	2-METHYLNAPHTHALENE	52	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	ACENAPHTHENE	540	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M09-105A-D	OS	ACENAPHTHENE	310	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M05-105A	OS	ACENAPHTHYLENE	24	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-105A-D	OS	ACENAPHTHYLENE	26	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	OS	ACENAPHTHYLENE	25	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	OS	ACENAPHTHYLENE	1.4	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	ACENAPHTHYLENE	42	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A-D	OS	ACENAPHTHYLENE	36	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	OS	ACENAPHTHYLENE	31	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	ACENAPHTHYLENE	55	UG/KG	J	DP	MS/MSD Recovery Noncompliance, Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-105A	OS	ANTHRACENE	1.6	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	BENZO(B)FLUORANTHENE	3400	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M09-105A-D	OS	BENZO(B)FLUORANTHENE	2000	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M08-105A	OS	DIBENZO(A,H)ANTHRACENE	1.3	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-105A-D	OS	DIBENZO(A,H)ANTHRACENE	1.4	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-205A	OS	DIBENZOTHIOPHENE	18	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-305A	OS	DIBENZOTHIOPHENE	7.6	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	OS	DIBENZOTHIOPHENE	40	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	DIBENZOTHIOPHENE	110	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	FLUORANTHENE	6700	UG/KG	J	L	Instrument Calibration Range Exceedance
8	OU4-SD-M09-105A-D	OS	FLUORANTHENE	5000	UG/KG	J	L	Instrument Calibration Range Exceedance
8	OU4-SD-M09-105A	OS	FLUORENE	530	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M09-105A-D	OS	FLUORENE	300	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M05-205A	OS	NAPHTHALENE	20	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	OS	NAPHTHALENE	35	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	OS	NAPHTHALENE	2.7	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-105A	OS	NAPHTHALENE	350	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M09-105A-D	OS	NAPHTHALENE	180	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M09-205A	OS	NAPHTHALENE	39	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	OS	NAPHTHALENE	84	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-105A	OS	PERYLENE	1.5	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-105A-D	OS	PERYLENE	1.3	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M09-105A	OS	PYRENE	5100	UG/KG	J	L	Instrument Calibration Range Exceedance
8	OU4-SD-M09-105A-D	OS	PYRENE	3800	UG/KG	J	L	Instrument Calibration Range Exceedance
8	OU4-SD-M05-105A	PEST/PCB	2,4'-DDD	27	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	2,4'-DDD	29	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	2,4'-DDD	2.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	2,4'-DDD	1.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	2,4'-DDD	54	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	2,4'-DDD	1.5	UG/KG	J	R	Surrogates Recovery Noncompliance
8	OU4-SD-M09-205A	PEST/PCB	2,4'-DDD	6.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	2,4'-DDD	11	UG/KG	J	DU	MS/MSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	2,4'-DDE	110	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	2,4'-DDE	94	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	2,4'-DDE	4.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	2,4'-DDE	2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	2,4'-DDE	0.25	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	2,4'-DDE	15	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	2,4'-DDE	55	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	2,4'-DDE	20	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	2,4'-DDE	33	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-305A	PEST/PCB	2,4'-DDE	0.34	UG/KG	J	EUR	LCS/LCSD Recovery Noncompliance, Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	2,4'-DDT	4.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	2,4'-DDT	4.1	UG/KG	R	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M05-205A	PEST/PCB	2,4'-DDT	0.46	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-305A	PEST/PCB	2,4'-DDT	0.21	UG/KG	J	PR	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Surrogates Recovery Noncompliance
8	OU4-SD-M08-105A	PEST/PCB	2,4'-DDT	0.14	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	2,4'-DDT	5.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	2,4'-DDT	0.11	UG/KG	J	PUR	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	2,4'-DDT	7.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	2,4'-DDT	3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	4,4'-DDD	65	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	4,4'-DDD	52	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	4,4'-DDD	1.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	4,4'-DDD	1.5	UG/KG	J	R	Surrogates Recovery Noncompliance
8	OU4-SD-M08-305A	PEST/PCB	4,4'-DDD	3.5	UG/KG	J	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-105A	PEST/PCB	4,4'-DDE	39	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	4,4'-DDE	34	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	4,4'-DDE	9.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M09-305A	PEST/PCB	4,4'-DDE	13	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	4,4'-DDE	1.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	4,4'-DDE	0.59	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	4,4'-DDE	0.21	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	PEST/PCB	4,4'-DDE	0.47	UG/KG	J	R	Surrogates Recovery Noncompliance
8	OU4-SD-M09-105A	PEST/PCB	4,4'-DDE	31	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	4,4'-DDT	160	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	4,4'-DDT	130	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	4,4'-DDT	64	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	4,4'-DDT	18	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	4,4'-DDT	23	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	4,4'-DDT	2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	4,4'-DDT	0.8	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	4,4'-DDT	0.46	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-205A	PEST/PCB	4,4'-DDT	60	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	4,4'-DDT	0.4	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M05-105A	PEST/PCB	ALDRIN	11	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	ALDRIN	9.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	ALDRIN	1.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	ALDRIN	0.35	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M09-205A	PEST/PCB	ALDRIN	0.77	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	ALDRIN	0.64	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	ALDRIN	0.12	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-105A	PEST/PCB	ALDRIN	0.04	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-205A	PEST/PCB	ALDRIN	0.39	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	ALDRIN	0.28	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-105A	PEST/PCB	ALPHA-BHC	6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	ALPHA-BHC	5.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	ALPHA-BHC	0.35	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-305A	PEST/PCB	ALPHA-BHC	0.054	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	ALPHA-BHC	0.099	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-105A	PEST/PCB	ALPHA-BHC	0.077	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-205A	PEST/PCB	ALPHA-BHC	0.39	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-105A	PEST/PCB	ALPHA-BHC	1	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-205A	PEST/PCB	ALPHA-BHC	0.79	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-305A	PEST/PCB	ALPHA-BHC	0.68	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M05-105A	PEST/PCB	ALPHA-CHLORDANE	8	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	ALPHA-CHLORDANE	0.55	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	ALPHA-CHLORDANE	0.27	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	ALPHA-CHLORDANE	3.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	ALPHA-CHLORDANE	0.32	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	ALPHA-CHLORDANE	0.3	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-105A	PEST/PCB	ALPHA-CHLORDANE	4.8	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	BETA-BHC	10	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	BETA-BHC	1.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	BETA-BHC	1.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-205A	PEST/PCB	BETA-BHC	4.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	BETA-BHC	12	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	BETA-BHC	0.18	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-305A	PEST/PCB	BETA-BHC	0.22	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-105A	PEST/PCB	BETA-BHC	2.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	BETA-BHC	17	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	CIS-NONACHLOR	0.47	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	CIS-NONACHLOR	0.14	UG/KG	R	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-305A	PEST/PCB	CIS-NONACHLOR	0.28	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-205A	PEST/PCB	DELTA-BHC	0.25	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A	PEST/PCB	DELTA-BHC	6.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	DELTA-BHC	5.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	DELTA-BHC	0.14	UG/KG	J	PR	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Surrogates Recovery Noncompliance
8	OU4-SD-M08-305A	PEST/PCB	DELTA-BHC	0.049	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	DELTA-BHC	2.3	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	DELTA-BHC	1.3	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	DELTA-BHC	1.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	DELTA-BHC	0.053	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	DELTA-BHC	0.35	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-105A	PEST/PCB	DIELDRIN	88	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	DIELDRIN	0.43	UG/KG	J	R	Surrogates Recovery Noncompliance
8	OU4-SD-M08-205A	PEST/PCB	DIELDRIN	8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	DIELDRIN	0.16	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	DIELDRIN	0.091	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	DIELDRIN	34	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	DIELDRIN	11	UG/KG	J	DU	MS/MSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	DIELDRIN	15	UG/KG	J	DU	MS/MSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	ENDOSULFAN II	8.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	ENDOSULFAN II	0.23	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-105A	PEST/PCB	ENDOSULFAN II	0.063	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-305A	PEST/PCB	ENDOSULFAN II	0.28	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-305A	PEST/PCB	ENDRIN	0.27	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-105A	PEST/PCB	ENDRIN	35	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	ENDRIN	28	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	ENDRIN	0.065	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-105A	PEST/PCB	ENDRIN	6.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	ENDRIN	2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	ENDRIN	2.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	ENDRIN	0.28	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-105A	PEST/PCB	GAMMA-BHC (LINDANE)	0.5	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-205A	PEST/PCB	GAMMA-BHC (LINDANE)	0.12	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-305A	PEST/PCB	GAMMA-BHC (LINDANE)	0.12	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M05-105A-D	PEST/PCB	GAMMA-BHC (LINDANE)	0.46	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	GAMMA-BHC (LINDANE)	0.047	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-105A	PEST/PCB	GAMMA-BHC (LINDANE)	1.6	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	GAMMA-BHC (LINDANE)	0.27	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-305A	PEST/PCB	GAMMA-BHC (LINDANE)	0.32	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A	PEST/PCB	GAMMA-CHLORDANE	6.3	UG/KG	J	G	Field Duplicate Imprecision
8	OU4-SD-M05-105A-D	PEST/PCB	GAMMA-CHLORDANE	29	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	GAMMA-CHLORDANE	0.88	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	GAMMA-CHLORDANE	0.16	UG/KG	R	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
8	OU4-SD-M08-105A	PEST/PCB	GAMMA-CHLORDANE	0.32	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	GAMMA-CHLORDANE	6.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	GAMMA-CHLORDANE	0.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	GAMMA-CHLORDANE	6.4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	GAMMA-CHLORDANE	1.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	GAMMA-CHLORDANE	1.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	HEPTACHLOR	0.27	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M08-105A	PEST/PCB	HEPTACHLOR	0.11	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M05-205A	PEST/PCB	HEPTACHLOR	0.47	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	HEPTACHLOR	1.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	HEPTACHLOR	1.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	HEPTACHLOR	1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	HEPTACHLOR	1.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-305A	PEST/PCB	HEPTACHLOR	0.11	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M05-105A	PEST/PCB	HEPTACHLOR EPOXIDE	29	UG/KG	J	E	LCS/LCSD Recovery Noncompliance
8	OU4-SD-M05-105A-D	PEST/PCB	HEPTACHLOR EPOXIDE	24	UG/KG	J	E	LCS/LCSD Recovery Noncompliance
8	OU4-SD-M05-205A	PEST/PCB	HEPTACHLOR EPOXIDE	0.55	UG/KG	J	E	LCS/LCSD Recovery Noncompliance
8	OU4-SD-M05-305A	PEST/PCB	HEPTACHLOR EPOXIDE	0.22	UG/KG	J	EPR	LCS/LCSD Recovery Noncompliance, Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Surrogates Recovery Noncompliance
8	OU4-SD-M08-105A	PEST/PCB	HEPTACHLOR EPOXIDE	0.064	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	HEPTACHLOR EPOXIDE	5.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	HEPTACHLOR EPOXIDE	0.27	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	HEPTACHLOR EPOXIDE	9.1	UG/KG	J	EU	LCS/LCSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	HEPTACHLOR EPOXIDE	3.4	UG/KG	J	EU	LCS/LCSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	HEPTACHLOR EPOXIDE	3.6	UG/KG	J	E	LCS/LCSD Recovery Noncompliance
8	OU4-SD-M05-105A	PEST/PCB	HEXACHLOROBENZENE	0.94	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A-D	PEST/PCB	HEXACHLOROBENZENE	0.61	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-305A	PEST/PCB	HEXACHLOROBENZENE	0.11	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-105A	PEST/PCB	HEXACHLOROBENZENE	0.084	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	HEXACHLOROBENZENE	1.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	HEXACHLOROBENZENE	1.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	HEXACHLOROBENZENE	0.052	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M09-205A	PEST/PCB	HEXACHLOROBENZENE	1.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	HEXACHLOROBENZENE	1.7	UG/KG	J	DU	MS/MSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	MIREX	23	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	MIREX	1.3	UG/KG	R	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-205A	PEST/PCB	MIREX	2.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	MIREX	0.31	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	MIREX	0.13	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	MIREX	5.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	MIREX	23	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	MIREX	7.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	MIREX	14	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	MIREX	0.13	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M05-305A	PEST/PCB	OXYCHLORDANE	0.14	UG/KG	U	A	Lab Blank Contamination
8	OU4-SD-M08-205A	PEST/PCB	OXYCHLORDANE	1.3	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	OXYCHLORDANE	0.28	UG/KG	UJ	R	Surrogates Recovery Noncompliance
8	OU4-SD-M05-105A	PEST/PCB	OXYCHLORDANE	14	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	OXYCHLORDANE	11	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	OXYCHLORDANE	0.55	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	OXYCHLORDANE	3.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	OXYCHLORDANE	1.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	OXYCHLORDANE	1.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-101	270	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-101	0.99	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-101	4.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-305A	PEST/PCB	PCB-101	0.67	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	PCB-105	36	UG/KG	J	GU	Field Duplicate Imprecision, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-105	67	UG/KG	J	GU	Field Duplicate Imprecision, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-105	0.47	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-105	1.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-105	0.22	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-105	15	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-105	11	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	PCB-105	8.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-114	0.05	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-118	1.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-118	0.076	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-123	0.097	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-123	1.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-123	7.6	UG/KG	J	GPU	Field Duplicate Imprecision, Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	PCB-123	1.6	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

TABLE C-1
DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M09-305A	PEST/PCB	PCB-123	1.7	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	PCB-128	37	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-128	45	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-128	0.51	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-128	0.081	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-128	1.4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-128	0.14	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-128	18	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-128	17	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	PCB-128	6.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-138	0.053	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-138	5.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	PCB-153	0.069	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-153	0.1	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-153	7.3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-156	33	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-205A	PEST/PCB	PCB-156	0.33	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-156	1.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-156	0.063	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-156	9.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	PCB-156	2.4	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A	PEST/PCB	PCB-167	12	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-167	15	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-167	0.17	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-167	0.39	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-167	0.051	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	PCB-167	1.6	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	PEST/PCB	PCB-167	1.5	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	PCB-170	98	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-170	110	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-170	0.24	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-105A	PEST/PCB	PCB-18	5.7	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-18	10	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-18	0.054	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-18	0.75	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-18	0.12	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-18	0.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-18	0.065	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-18	11	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-205A	PEST/PCB	PCB-180	1.3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-180	0.46	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	PCB-180	0.062	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-180	0.067	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-180	4.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-187	0.045	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	PEST/PCB	PCB-187	3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-187	0.73	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-189	0.11	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-105A	PEST/PCB	PCB-195	24	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-195	28	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-195	0.12	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	PEST/PCB	PCB-195	0.48	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-195	0.11	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-195	7.4	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-205A	PEST/PCB	PCB-195	1.5	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M09-305A	PEST/PCB	PCB-195	1.7	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-205A	PEST/PCB	PCB-206	0.66	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-206	0.13	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-206	4.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-206	0.34	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-209	0.092	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-209	4.8	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	PCB-28	6.9	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-28	9.3	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-28	0.34	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-205A	PEST/PCB	PCB-28	0.47	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-28	0.096	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-28	13	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-28	0.069	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-28	15	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A	PEST/PCB	PCB-44	42	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-44	0.64	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-44	0.14	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	PCB-44	0.064	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-44	22	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-52	0.62	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-52	0.11	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	PEST/PCB	PCB-52	0.16	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-66	0.39	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-66	0.12	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	PCB-66	0.096	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

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DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-66	0.095	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-305A	PEST/PCB	PCB-66	0.13	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	PCB-66	44	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A-D	PEST/PCB	PCB-66	24	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-66	54	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-66	1.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-66	21	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	PCB-66	6.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-77	0.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	PCB-77	4.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	PCB-8	0.82	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	PCB-8	0.07	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	PCB-8	0.056	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A-D	PEST/PCB	PCB-8	0.067	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	PCB-8	1.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	PCB-8	0.08	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	PCB-8	0.66	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A	PEST/PCB	PCB-81	4.6	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ROUND 8 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	REASON CODE
8	OU4-SD-M05-105A-D	PEST/PCB	PCB-81	6.7	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M08-205A	PEST/PCB	PCB-81	0.53	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	PCB-81	0.74	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
8	OU4-SD-M05-105A	PEST/PCB	TRANS-NONACHLOR	19	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-105A-D	PEST/PCB	TRANS-NONACHLOR	16	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-205A	PEST/PCB	TRANS-NONACHLOR	0.65	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M05-305A	PEST/PCB	TRANS-NONACHLOR	0.53	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-105A	PEST/PCB	TRANS-NONACHLOR	0.28	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-205A	PEST/PCB	TRANS-NONACHLOR	3.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M08-305A	PEST/PCB	TRANS-NONACHLOR	0.32	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-105A	PEST/PCB	TRANS-NONACHLOR	10	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-205A	PEST/PCB	TRANS-NONACHLOR	2.8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
8	OU4-SD-M09-305A	PEST/PCB	TRANS-NONACHLOR	3.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-2
RANGE OF NON-DETECT DATA FOR THE ROUND 8 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Semivolatile Organics (ug/kg)				
1,1-BIPHENYL	14/18	2.5	13	20
1-METHYLNAPHTHALENE	17/18	2.5	2.7	20
1-METHYLPHENANTHRENE	17/18	2.5	2.7	20
2,3,5-TRIMETHYLNAPHTHALENE	16/18	2.5	2.8	20
2,6-DIMETHYLNAPHTHALENE	17/18	2.5	2.7	20
2-METHYLNAPHTHALENE	17/18	2.5	2.7	20
ACENAPHTHENE	17/18	2.5	2.7	20
ACENAPHTHYLENE	17/18	2.5	2.7	20
ANTHRACENE	18/18	2.7	2.7	20
BENZO(A)ANTHRACENE	18/18			20
BENZO(A)PYRENE	18/18			20
BENZO(B)FLUORANTHENE	18/18			20
BENZO(E)PYRENE	18/18			20
BENZO(G,H,I)PERYLENE	18/18			20
BENZO(K)FLUORANTHENE	17/18	**35**	**35**	20
CHRYSENE	18/18			20
DIBENZO(A,H)ANTHRACENE	18/18			20
DIBENZOTHIOPHENE	17/18	2.5	2.7	20
FLUORANTHENE	18/18			20
FLUORENE	17/18	2.5	2.7	20
INDENO(1,2,3-CD)PYRENE	18/18			20
NAPHTHALENE	17/18	2.5	2.7	20
PERYLENE	18/18			20
PHENANTHRENE	18/18			20
PYRENE	18/18			20
Dioxins (ng/kg)				
1,2,3,4,6,7,8,9-OCDD	6/6			20
1,2,3,4,6,7,8,9-OCDF	5/6	1	1.2	20
1,2,3,4,6,7,8-HPCDD	5/6	1.4	1.4	10
1,2,3,4,6,7,8-HPCDF	5/6	0.65	0.7	10
1,2,3,4,7,8,9-HPCDF	4/6	0.7	4.4	10
1,2,3,4,7,8-HXCDD	3/6	0.72	3.8	10
1,2,3,4,7,8-HXCDF	4/6	0.6	2.6	10
1,2,3,6,7,8-HXCDD	4/6	0.61	0.99	10
1,2,3,6,7,8-HXCDF	4/6	0.49	0.81	10
1,2,3,7,8,9-HXCDD	4/6	0.64	1	10
1,2,3,7,8,9-HXCDF	0/6	0.48	4	10
1,2,3,7,8-PECDD	2/6	0.68	5.7	10
1,2,3,7,8-PECDF	4/6	0.45	0.71	10
2,3,4,6,7,8-HXCDF	4/6	0.38	0.8	10
2,3,4,7,8-PECDF	4/6	0.56	1.1	10
2,3,7,8-TCDD	2/6	0.34	1.3	2
2,3,7,8-TCDF	4/6	0.31	0.42	2
TOTAL HPCDD	5/6	1.6	1.6	10
TOTAL HPCDF	5/6	0.7	0.75	10
TOTAL HXCDD	4/6	0.72	2.7	10
TOTAL HXCDF	4/6	0.6	2.6	10

TABLE C-2
RANGE OF NON-DETECT DATA FOR THE ROUND 8 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
TOTAL PECDD	3/6	1	7.4	10
TOTAL PECDF	4/6	0.56	2.4	10
TOTAL TCDD	4/6	0.34	0.49	2
TOTAL TCDF	5/6	0.31	0.34	2
Pesticides/PCBs (ug/kg)				
2,4'-DDD	6/6			2
2,4'-DDE	1/1			2
2,4'-DDT	9/9			2
4,4'-DDD	9/9			2
4,4'-DDE	7/7			2
4,4'-DDT	3/5	0.4	0.46	2
ALDRIN	2/5	0.04	0.28	2
ALPHA-BHC	1/8	0.077	1	2
ALPHA-CHLORDANE	5/6	0.3	0.3	2
BETA-BHC	3/5	0.18	0.22	2
CIS-NONACHLOR	2/8	0.25	**3.9**	2
DELTA-BHC	4/4			2
DIELDRIN	7/7			2
ENDOSULFAN II	1/9	0.063	**3.9**	2
ENDRIN	0/5	0.065	**3.9**	2
GAMMA-BHC (LINDANE)	4/9	0.047	**3.9**	2
GAMMA-CHLORDANE	4/4			2
HEPTACHLOR	1/4	0.11	0.27	2
HEPTACHLOR EPOXIDE	6/6			2
HEXACHLOROBENZENE	5/7	0.052	0.11	2
MIREX	0/1	0.13	0.13	2
OXYCHLORDANE	1/4	0.14	0.28	2
PCB-101	6/7	0.04	0.04	1
PCB-105	7/9	0.041	0.046	1
PCB-114	0/8	0.036	**5.3**	1
PCB-118	8/9	0.04	0.04	1
PCB-123	3/8	0.034	**5**	1
PCB-126	0/9	0.051	**7.5**	1
PCB-128	7/8	0.04	0.04	1
PCB-138	9/9	0.042	0.042	1
PCB-153	9/9			1
PCB-156	7/9	0.04	**5.5**	1
PCB-157	0/9	0.041	**6**	1
PCB-167	6/9	0.031	**3.6**	1
PCB-169	0/9	0.039	**5.6**	1
PCB-170	5/9	0.04	**4.6**	1
PCB-18	5/5	0.027	0.027	1

TABLE C-2
RANGE OF NON-DETECT DATA FOR THE ROUND 8 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
PCB-180	9/9			1
PCB-187	9/9	0.041	0.041	1
PCB-189	1/9	0.042	**6.1**	1
PCB-195	7/9	0.04	0.045	1
PCB-206	8/9	0.039	0.039	1
PCB-209	8/9	0.042	0.042	1
PCB-28	7/8	0.044	0.044	1
PCB-44	9/9	0.04	0.04	1
PCB-52	8/9	0.039	0.039	1
PCB-66	6/6			1
PCB-77	0/8	0.043	**6.3**	1
PCB-8	0/3	0.76	**5.9**	1
PCB-81	3/9	0.031	**3.6**	1
HF Metals (mg/kg)				
ALUMINUM	9/9			50
ARSENIC	9/9			5
CADMIUM	9/9			0.3
CHROMIUM	9/9			5
COPPER	9/9			5
IRON	9/9			50
LEAD	9/9			5
MANGANESE	9/9			5
NICKEL	9/9			5
SILVER	9/9			0.1
ZINC	9/9			15

Notes:
- Shading indicates the nondetected result exceeded the target MDL.
- The sample and duplicate were counted as two separate samples when determining the minimum and maximum detected concentrations, but were only counted as as one sample when determining the frequency of detection.

Associated Samples

OU4-SD-M05-105A	OU4-SD-M09-205A
OU4-SD-M05-105A-AVG	OU4-SD-M09-305A
OU4-SD-M05-105A-D	OU4-SD-M10-105A
OU4-SD-M05-205A	OU4-SD-M10-205A
OU4-SD-M05-305A	OU4-SD-M10-305A
OU4-SD-M08-105A	OU4-SD-M13-105A
OU4-SD-M08-105A-AVG	OU4-SD-M13-105A-AVG
OU4-SD-M08-105A-D	OU4-SD-M13-105A-D
OU4-SD-M08-205A	OU4-SD-M13-205A
OU4-SD-M08-205A-AVG	OU4-SD-M13-205A-AVG
OU4-SD-M08-205A-D	OU4-SD-M13-205A-D
OU4-SD-M08-305A	OU4-SD-M13-305A
OU4-SD-M09-105A	OU4-SD-M14-105A
OU4-SD-M09-105A-AVG	OU4-SD-M14-205A
OU4-SD-M09-105A-D	OU4-SD-M14-305A

TABLE C-3
DATA VALIDATION QUALIFICATIONS FOR ROUND 9 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
9	OU4-SD-M08-107A	DIOX	1,2,3,4,6,7,8,9-OCDF	1.7	NG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-307A	DIOX	1,2,3,4,6,7,8,9-OCDF	8.3	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-107A	DIOX	1,2,3,4,6,7,8-HPCDD	2.1	NG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-107A	DIOX	1,2,3,4,6,7,8-HPCDF	0.65	NG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-307A	DIOX	1,2,3,4,6,7,8-HPCDF	3.8	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M09-207A	DIOX	1,2,3,4,6,7,8-HPCDF	130	NG/KG	J	N01	Internal Standard Recovery Noncompliance Dioxins
9	OU4-SD-M09-207A-D	DIOX	1,2,3,4,6,7,8-HPCDF	130	NG/KG	J	N01	Internal Standard Recovery Noncompliance Dioxins
9	OU4-SD-M08-207A	DIOX	1,2,3,4,7,8,9-HPCDF	2.9	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-307A	DIOX	1,2,3,4,7,8,9-HPCDF	0.32	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M09-207A	DIOX	1,2,3,4,7,8,9-HPCDF	7.6	NG/KG	J	N01	Internal Standard Recovery Noncompliance Dioxins
9	OU4-SD-M09-207A-D	DIOX	1,2,3,4,7,8,9-HPCDF	7.3	NG/KG	J	N01	Internal Standard Recovery Noncompliance Dioxins
9	OU4-SD-M08-207A	DIOX	1,2,3,4,7,8-HXCDD	1.7	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	1,2,3,4,7,8-HXCDD	4.1	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A-D	DIOX	1,2,3,4,7,8-HXCDD	3.5	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-207A	DIOX	1,2,3,4,7,8-HXCDF	8.7	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-307A	DIOX	1,2,3,4,7,8-HXCDF	0.75	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	1,2,3,4,7,8-HXCDF	22	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M09-207A-D	DIOX	1,2,3,4,7,8-HXCDF	24	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-307A	DIOX	1,2,3,6,7,8-HXCDD	0.76	NG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-207A	DIOX	1,2,3,6,7,8-HXCDF	4.1	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	1,2,3,6,7,8-HXCDF	0.47	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M09-107A	DIOX	1,2,3,6,7,8-HXCDF	50	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-207A	DIOX	1,2,3,7,8,9-HXCDD	4.1	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	1,2,3,7,8,9-HXCDD	0.41	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-207A	DIOX	1,2,3,7,8,9-HXCDF	1	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	1,2,3,7,8,9-HXCDF	5.8	NG/KG	J	G	Field Duplicate Imprecision
9	OU4-SD-M09-207A-D	DIOX	1,2,3,7,8,9-HXCDF	2.5	NG/KG	J	GP	Field Duplicate Imprecision, Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-307A	DIOX	1,2,3,7,8,9-HXCDF	10	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-207A	DIOX	1,2,3,7,8-PECDD	1.5	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)

TABLE C-3
DATA VALIDATION QUALIFICATIONS FOR ROUND 9 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
9	OU4-SD-M09-207A	DIOX	1,2,3,7,8-PECDD	4	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A-D	DIOX	1,2,3,7,8-PECDD	4.1	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-107A	DIOX	1,2,3,7,8-PECDF	1.1	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-207A	DIOX	1,2,3,7,8-PECDF	11	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-307A	DIOX	1,2,3,7,8-PECDF	6.2	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M09-207A	DIOX	1,2,3,7,8-PECDF	3.6	NG/KG	J	GP	Field Duplicate Imprecision, Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A-D	DIOX	1,2,3,7,8-PECDF	6.8	NG/KG	J	G	Field Duplicate Imprecision
9	OU4-SD-M08-307A	DIOX	2,3,4,6,7,8-HXCDF	0.64	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	2,3,4,7,8-PECDF	0.56	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	2,3,4,7,8-PECDF	17	NG/KG	J	GQ	Field Duplicate Imprecision, Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M09-207A-D	DIOX	2,3,4,7,8-PECDF	9.6	NG/KG	J	G	Field Duplicate Imprecision
9	OU4-SD-M09-307A	DIOX	2,3,4,7,8-PECDF	39	NG/KG	J	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
9	OU4-SD-M08-207A	DIOX	2,3,7,8-TCDD	0.39	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	2,3,7,8-TCDD	0.76	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A-D	DIOX	2,3,7,8-TCDD	0.76	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	2,3,7,8-TCDF	0.52	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	2,3,7,8-TCDF	6.9	NG/KG	J	G	Field Duplicate Imprecision
9	OU4-SD-M09-207A-D	DIOX	2,3,7,8-TCDF	14	NG/KG	J	G	Field Duplicate Imprecision
9	OU4-SD-M08-307A	DIOX	TOTAL HPCDF	4.7	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M09-207A	DIOX	TOTAL HPCDF	230	NG/KG	J	N01	Internal Standard Recovery Noncompliance Dioxins
9	OU4-SD-M09-207A-D	DIOX	TOTAL HPCDF	250	NG/KG	J	N01	Internal Standard Recovery Noncompliance Dioxins
9	OU4-SD-M08-107A	DIOX	TOTAL HXCDF	0.35	NG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-307A	DIOX	TOTAL HXCDF	3.9	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	TOTAL PECDD	1.3	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-107A	DIOX	TOTAL PECDF	0.6	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	TOTAL PECDF	2.4	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-307A	DIOX	TOTAL TCDD	0.44	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M08-107A	DIOX	TOTAL TCDF	0.52	NG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
9	OU4-SD-M05-107A	HFM	CADMIUM	0.64	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-207A	HFM	CADMIUM	1.93	MG/KG	J	E	LCS/LCSD Recovery Noncompliance

TABLE C-3
DATA VALIDATION QUALIFICATIONS FOR ROUND 9 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
9	OU4-SD-M05-307A	HFM	CADMIUM	0.3	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-107A	HFM	CADMIUM	0.072	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-207A	HFM	CADMIUM	0.32	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-307A	HFM	CADMIUM	0.2	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-107A	HFM	CADMIUM	0.74	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-207A	HFM	CADMIUM	0.7	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-207A-D	HFM	CADMIUM	0.88	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-307A	HFM	CADMIUM	0.66	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-107A	HFM	CHROMIUM	99	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-207A	HFM	CHROMIUM	118	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-307A	HFM	CHROMIUM	77.2	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-107A	HFM	CHROMIUM	29.9	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-207A	HFM	CHROMIUM	73.8	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-307A	HFM	CHROMIUM	64.8	MG/KG	J	E	LCS/LCSD Recovery Noncompliance

TABLE C-3
DATA VALIDATION QUALIFICATIONS FOR ROUND 9 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
9	OU4-SD-M05-307A	HFM	MANGANESE	650	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M08-107A	HFM	MANGANESE	488	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M08-207A	HFM	MANGANESE	419	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M08-307A	HFM	MANGANESE	590	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M09-107A	HFM	MANGANESE	564	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M09-207A	HFM	MANGANESE	487	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M09-207A-D	HFM	MANGANESE	550	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M09-307A	HFM	MANGANESE	432	MG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
9	OU4-SD-M05-107A	HFM	NICKEL	37.6	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-207A	HFM	NICKEL	61.4	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-307A	HFM	NICKEL	21.1	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-107A	HFM	NICKEL	11.6	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-207A	HFM	NICKEL	27.4	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-307A	HFM	NICKEL	28.6	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-107A	HFM	NICKEL	102	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-207A	HFM	NICKEL	49.2	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-207A-D	HFM	NICKEL	56.3	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-307A	HFM	NICKEL	61.6	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-107A	HFM	ZINC	267	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-207A	HFM	ZINC	713	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-307A	HFM	ZINC	83.7	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-107A	HFM	ZINC	49.1	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-207A	HFM	ZINC	163	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M08-307A	HFM	ZINC	162	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-107A	HFM	ZINC	505	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-207A	HFM	ZINC	312	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-207A-D	HFM	ZINC	379	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M09-307A	HFM	ZINC	301	MG/KG	J	E	LCS/LCSD Recovery Noncompliance
9	OU4-SD-M05-107A	MISC	TOTAL ORGANIC CARBON	2	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M05-207A	MISC	TOTAL ORGANIC CARBON	2	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M05-307A	MISC	TOTAL ORGANIC CARBON	0.99	%	UJ	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M08-107A	MISC	TOTAL ORGANIC CARBON	1	%	UJ	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M08-207A	MISC	TOTAL ORGANIC CARBON	1	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M08-307A	MISC	TOTAL ORGANIC CARBON	0.99	%	UJ	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M09-107A	MISC	TOTAL ORGANIC CARBON	2	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M09-207A	MISC	TOTAL ORGANIC CARBON	3	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M09-207A-D	MISC	TOTAL ORGANIC CARBON	3	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M09-307A	MISC	TOTAL ORGANIC CARBON	2	%	J	D	MS/MSD Recovery Noncompliance
9	OU4-SD-M08-207A	OS	1,1-BIPHENYL	6	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	1-METHYLNAPHTHALENE	8	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	1-METHYLPHENANTHRENE	42	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	2,3,5-TRIMETHYLNAPHTHALENE	6	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	2,6-DIMETHYLNAPHTHALENE	25	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	2-METHYLNAPHTHALENE	9	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	ACENAPHTHENE	27	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	ACENAPHTHYLENE	45	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	ANTHRACENE	100	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	BENZO(A)ANTHRACENE	290	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	BENZO(A)PYRENE	250	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	BENZO(B)FLUORANTHENE	310	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	BENZO(E)PYRENE	150	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	BENZO(G,H,I)PERYLENE	150	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	BENZO(K)FLUORANTHENE	130	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	CHRYSENE	250	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	DIBENZO(A,H)ANTHRACENE	44	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	DIBENZOTHIOPHENE	18	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M05-107A	OS	FLUORANTHENE	28	UG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-207A	OS	FLUORANTHENE	460	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	FLUORENE	37	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	INDENO(1,2,3-CD)PYRENE	140	UG/KG	J	H	Holding Time Exceedance

TABLE C-3
DATA VALIDATION QUALIFICATIONS FOR ROUND 9 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
9	OU4-SD-M08-207A	OS	NAPHTHALENE	15	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	PERYLENE	62	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M08-207A	OS	PHENANTHRENE	260	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M05-107A	OS	PYRENE	27	UG/KG	U	A	Lab Blank Contamination
9	OU4-SD-M08-207A	OS	PYRENE	420	UG/KG	J	H	Holding Time Exceedance
9	OU4-SD-M05-207A	PEST/PCB	2,4'-DDD	14	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M08-107A	PEST/PCB	2,4'-DDD	4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M08-207A	PEST/PCB	4,4'-DDE	7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	4,4'-DDT	11	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	CIS-NONACHLOR	11	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-207A	PEST/PCB	CIS-NONACHLOR	7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-307A	PEST/PCB	CIS-NONACHLOR	4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	DIELDRIN	36	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	ENDRIN	11	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	GAMMA-BHC (LINDANE)	5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	GAMMA-CHLORDANE	13	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	HEPTACHLOR EPOXIDE	6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	HEPTACHLOR EPOXIDE	5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	MIREX	5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	MIREX	5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-207A	PEST/PCB	MIREX	11	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-207A-D	PEST/PCB	MIREX	5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	OXYCHLORDANE	4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	OXYCHLORDANE	12	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-101	100	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	PCB-101	13	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-105	49	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-126	40	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-3
DATA VALIDATION QUALIFICATIONS FOR ROUND 9 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
9	OU4-SD-M05-207A	PEST/PCB	PCB-128	15	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-107A	PEST/PCB	PCB-153	14	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-153	150	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-167	16	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	PCB-170	17	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-44	15	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-52	45	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-66	44	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M08-107A	PEST/PCB	PCB-77	14	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M08-207A	PEST/PCB	PCB-77	26	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M05-207A	PEST/PCB	PCB-81	22	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
9	OU4-SD-M09-107A	PEST/PCB	TRANS-NONACHLOR	12	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-4
RANGE OF NON-DETECT DATA FOR THE ROUND 9 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Semivolatile Organics (ug/kg)				
1,1-BIPHENYL	4/9	4	9	20
1-METHYLNAPHTHALENE	5/9	4	7	20
1-METHYLPHENANTHRENE	7/9	4	7	20
2,3,5-TRIMETHYLNAPHTHALENE	4/9	4	8	20
2,6-DIMETHYLNAPHTHALENE	7/9	4	7	20
2-METHYLNAPHTHALENE	5/9	4	7	20
ACENAPHTHENE	6/9	4	7	20
ACENAPHTHYLENE	7/9	4	7	20
ANTHRACENE	8/9	7	7	20
BENZO(A)ANTHRACENE	9/9			20
BENZO(A)PYRENE	9/9			20
BENZO(B)FLUORANTHENE	9/9			20
BENZO(E)PYRENE	9/9			20
BENZO(G,H,I)PERYLENE	9/9			20
BENZO(K)FLUORANTHENE	9/9			20
CHRYSENE	9/9			20
DIBENZO(A,H)ANTHRACENE	7/9	4	7	20
DIBENZOTHIOPHENE	5/9	4	7	20
FLUORANTHENE	8/9	**28**	**28**	20
FLUORENE	7/9	4	7	20
INDENO(1,2,3-CD)PYRENE	9/9			20
NAPHTHALENE	5/9	4	7	20
PERYLENE	8/9	7	7	20
PHENANTHRENE	9/9			20
PYRENE	8/9	**27**	**27**	20
Dioxins (ng/kg)				
1,2,3,4,6,7,8,9-OCDD	6/6			20
1,2,3,4,6,7,8,9-OCDF	5/6	1.7	1.7	20
1,2,3,4,6,7,8-HPCDD	5/6	2.1	2.1	10
1,2,3,4,6,7,8-HPCDF	5/6	0.65	0.65	10
1,2,3,4,7,8,9-HPCDF	5/6	0.25	0.25	10
1,2,3,4,7,8-HXCDD	4/6	0.2	0.28	10
1,2,3,4,7,8-HXCDF	5/6	0.19	0.19	10
1,2,3,6,7,8-HXCDD	4/6	0.22	0.76	10
1,2,3,6,7,8-HXCDF	5/6	0.19	0.19	10
1,2,3,7,8,9-HXCDD	5/6	0.11	0.11	10
1,2,3,7,8,9-HXCDF	4/6	0.16	0.24	10
1,2,3,7,8-PECDD	4/6	0.33	0.37	10
1,2,3,7,8-PECDF	6/6			10
2,3,4,6,7,8-HXCDF	5/6	0.17	0.17	10
2,3,4,7,8-PECDF	5/6	0.21	0.21	10
2,3,7,8-TCDD	4/6	0.15	0.19	2
2,3,7,8-TCDF	5/6	0.14	0.14	2
TOTAL HPCDD	6/6			10
TOTAL HPCDF	5/6	0.24	0.24	10
TOTAL HXCDD	5/6	0.18	0.18	10

TABLE C-4
RANGE OF NON-DETECT DATA FOR THE ROUND 9 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
TOTAL HXCDF	5/6	0.35	0.35	10
TOTAL PECDD	5/6	0.33	0.33	10
TOTAL PECDF	6/6			10
TOTAL TCDD	5/6	0.15	0.15	2
TOTAL TCDF	6/6			2
Pesticides/PCBs (ug/kg)				
2,4'-DDD	4/9	**4**	**10**	2
2,4'-DDE	0/9	**4**	**10**	2
2,4'-DDT	0/9	**4**	**10**	2
4,4'-DDD	3/9	**4**	**10**	2
4,4'-DDE	3/9	**4**	**9**	2
4,4'-DDT	4/9	**4**	**10**	2
ALDRIN	0/9	2	**5**	2
ALPHA-BHC	0/9	2	**5**	2
ALPHA-CHLORDANE	0/9	2	**5**	2
BETA-BHC	0/9	2	**5**	2
CIS-NONACHLOR	3/9	2	**4**	2
DELTA-BHC	0/9	2	**5**	2
DIELDRIN	1/9	**4**	**10**	2
ENDOSULFAN II	0/9	**4**	**10**	2
ENDRIN	1/9	**4**	**10**	2
GAMMA-BHC (LINDANE)	1/9	2	**5**	2
GAMMA-CHLORDANE	1/9	2	**5**	2
HEPTACHLOR	0/9	2	**5**	2
HEPTACHLOR EPOXIDE	1/8	2	**5**	2
MIREX	3/8	2	**4**	2
OXYCHLORDANE	3/8	2	**5**	2
PCB-101	2/9	**6.5**	**15**	1
PCB-105	1/9	**6.5**	**15**	1
PCB-114	0/9	**6.5**	**15**	1
PCB-118	1/9	**6.5**	**15**	1
PCB-123	1/9	**6.5**	**15**	1
PCB-126	1/9	**6.5**	**15**	1
PCB-128	0/8	**6.5**	**15**	1
PCB-138	5/9	**6.5**	**8.6**	1
PCB-153	4/9	**6.5**	**15**	1
PCB-156	0/9	**6.5**	**15**	1
PCB-157	0/9	**6.5**	**15**	1
PCB-167	0/8	**6.5**	**15**	1
PCB-169	0/9	**6.5**	**15**	1
PCB-170	2/9	**6.5**	**15**	1
PCB-18	0/9	**6.5**	**15**	1
PCB-180	2/9	**6.5**	**15**	1
PCB-187	1/9	**6.5**	**15**	1
PCB-189	1/9	**6.5**	**15**	1
PCB-195	1/9	**6.5**	**15**	1
PCB-206	4/9	**6.5**	**11**	1

TABLE C-4
RANGE OF NON-DETECT DATA FOR THE ROUND 9 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
PCB-209	2/9	**6.5**	**15**	1
PCB-28	0/9	**6.5**	**15**	1
PCB-44	1/9	**6.5**	**15**	1
PCB-52	1/9	**6.5**	**15**	1
PCB-66	1/9	**6.5**	**15**	1
PCB-77	3/9	**6.5**	**15**	1
PCB-8	0/9	**6.5**	**15**	1
PCB-81	1/9	**6.5**	**15**	1
TRANS-NONACHLOR	3/9	2	**4**	2
HF Metals (mg/kg)				
ALUMINUM	9/9			50
ARSENIC	9/9			5
CADMIUM	9/9			0.3
CHROMIUM	9/9			5
COPPER	10/10			5
IRON	9/9			50
LEAD	10/10			5
MANGANESE	9/9			5
MERCURY	9/9			0.2
NICKEL	9/9			5
SILVER	9/9			0.1
ZINC	9/9			15

Notes:
- Shading indicates the nondetected result exceeded the target MDL.
- The sample and duplicate were counted as two separate samples when determining the minimum and maximum detected concentrations, but were only counted as as one sample when determining the frequency of detection.

Associated Samples

OU4-SD-M05-107A
OU4-SD-M05-207A
OU4-SD-M05-307A
OU4-SD-M05-407A
OU4-SD-M08-107A
OU4-SD-M08-207A
OU4-SD-M08-307A
OU4-SD-M09-107A
OU4-SD-M09-207A
OU4-SD-M09-207A-AVG
OU4-SD-M09-207A-D
OU4-SD-M09-307A

TABLE C-5
DATA VALIDATION QUALIFICATIONS FOR ROUND 10 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
10	OU4-SD-M09-108A	DIOX	1,2,3,4,6,7,8,9-OCDD	693	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,4,6,7,8,9-OCDF	49.6	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,4,6,7,8-HPCDD	82.9	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,4,6,7,8-HPCDF	27.8	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,4,7,8,9-HPCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,4,7,8-HXCDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,4,7,8-HXCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,6,7,8-HXCDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,6,7,8-HXCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,7,8,9-HXCDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,7,8,9-HXCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,7,8-PECDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	1,2,3,7,8-PECDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	2,3,4,6,7,8-HXCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	2,3,4,7,8-PECDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	2,3,7,8-TCDD	1	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	2,3,7,8-TCDF	2.82	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TEQ	1.61178	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TEQ BIRD	3.25516	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TEQ BIRD HALFND	10.43016	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TEQ FISH	0.57616	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TEQ FISH HALFND	7.27616	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TEQ HALFND	7.21178	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL HPCDD	241	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL HPCDF	59	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL HXCDD	33.7	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL HXCDF	22.6	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL PECDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL PECDF	5	NG/KG	UJ	GY	Field Duplicate Imprecision, Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL TCDD	5.34	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	DIOX	TOTAL TCDF	46.1	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,6,7,8,9-OCDD	1010	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,6,7,8,9-OCDF	80.3	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,6,7,8-HPCDD	122	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,6,7,8-HPCDF	39.2	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,7,8,9-HPCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,7,8-HXCDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,4,7,8-HXCDF	5	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,6,7,8-HXCDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,6,7,8-HXCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,7,8,9-HXCDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,7,8,9-HXCDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,7,8-PECDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	1,2,3,7,8-PECDF	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	2,3,4,6,7,8-HXCDF	5.89	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	2,3,4,7,8-PECDF	5.18	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	2,3,7,8-TCDD	1	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	2,3,7,8-TCDF	3.44	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TEQ	4.92609	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TEQ BIRD	10.33203	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TEQ BIRD HALFND	14.50703	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TEQ FISH	4.47403	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TEQ FISH HALFND	9.42403	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TEQ HALFND	9.27609	NG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL HPCDD	343	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL HPCDF	84.7	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL HXCDD	46.9	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL HXCDF	30.4	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL PECDD	5	NG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL PECDF	27.7	NG/KG	J	GY	Field Duplicate Imprecision, Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL TCDD	7.16	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A-D	DIOX	TOTAL TCDF	52.9	NG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-208A	DIOX	TOTAL HXCDF	52.7	NG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M09-108A	M	ALUMINUM	18200	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	ARSENIC	16.8	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	CADMIUM	1.9	MG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	CHROMIUM	91	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	COPPER	168	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	IRON	31300	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	LEAD	133	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	MANGANESE	293	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	MERCURY	0.316	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	NICKEL	54.1	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	M	SILVER	1.8	MG/KG	UJ	Y	Percent solids <30%

TABLE C-5
DATA VALIDATION QUALIFICATIONS FOR ROUND 10 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
10	OU4-SD-M09-108A	M	ZINC	192	MG/KG	J	Y	Percent solids <30%
10	OU4-SD-M05-108A	OS	1-METHYLNAPHTHALENE	7.6	UG/KG	UJ	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	1-METHYLPHENANTHRENE	31	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	2,3,5-TRIMETHYLNAPHTHALENE	7.6	UG/KG	UJ	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	2-METHYLNAPHTHALENE	7.6	UG/KG	UJ	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	ACENAPHTHENE	9.9	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	ANTHRACENE	59	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	BENZO(B)FLUORANTHENE	250	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	BENZO(K)FLUORANTHENE	110	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	DIBENZOTHIOPHENE	8.9	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	FLUORANTHENE	290	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	FLUORENE	17	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	NAPHTHALENE	18	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	PHENANTHRENE	130	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	OS	PYRENE	290	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	1-METHYLNAPHTHALENE	26	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	1-METHYLPHENANTHRENE	66	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	2,3,5-TRIMETHYLNAPHTHALENE	32	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	2-METHYLNAPHTHALENE	19	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	ACENAPHTHENE	30	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	ANTHRACENE	140	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	BENZO(B)FLUORANTHENE	500	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	BENZO(K)FLUORANTHENE	190	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	DIBENZOTHIOPHENE	26	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	FLUORANTHENE	580	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	FLUORENE	51	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	NAPHTHALENE	32	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	PHENANTHRENE	360	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	OS	PYRENE	580	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M09-108A	OS	1,1-BIPHENYL	19	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	1-METHYLNAPHTHALENE	17	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	1-METHYLPHENANTHRENE	86	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	2,3,5-TRIMETHYLNAPHTHALENE	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	2,6-DIMETHYLNAPHTHALENE	150	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	2-METHYLNAPHTHALENE	18	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	ACENAPHTHENE	50	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	ACENAPHTHYLENE	70	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	ANTHRACENE	210	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	BENZO(A)ANTHRACENE	410	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	BENZO(A)PYRENE	420	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	BENZO(B)FLUORANTHENE	530	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	BENZO(E)PYRENE	280	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	BENZO(G,H,I)PERYLENE	210	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	BENZO(K)FLUORANTHENE	230	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	CHRYSENE	530	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	DIBENZO(A,H)ANTHRACENE	62	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	DIBENZOTHIOPHENE	32	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	FLUORANTHENE	1100	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	FLUORENE	59	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	HIGH MOLECULAR WEIGHT PAHS	3622	UG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	INDENO(1,2,3-CD)PYRENE	200	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	LOW MOLECULAR WEIGHT PAHS	935	UG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	NAPHTHALENE	38	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	PERYLENE	100	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	PHENANTHRENE	490	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	PYRENE	1100	UG/KG	J	Y	Percent solids <30%
10	OU4-SD-M09-108A	OS	TOTAL PAHS ECO	4557	UG/KG		Y	Percent solids <30%
10	OU4-SD-M05-108A	PEST/PCB	CIS-NONACHLOR	8.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A	PEST/PCB	OXYCHLORDANE	7.5	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	PEST/PCB	PCB-28	11	UG/KG	UJ	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M05-108A	PEST/PCB	PCB-8	150	UG/KG	J	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A	PEST/PCB	TRANS-NONACHLOR	4.3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	4,4'-DDT	9.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	ALPHA-BHC	8	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	ALPHA-CHLORDANE	4.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

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ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
10	OU4-SD-M05-108A-D	PEST/PCB	CIS-NONACHLOR	7.3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	MIREX	6.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	OXYCHLORDANE	4.2	UG/KG	UJ	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	PEST/PCB	PCB-28	12	UG/KG	UJ	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M05-108A-D	PEST/PCB	PCB-8	12	UG/KG	UJ	G	Field Duplicate Imprecision
10	OU4-SD-M05-108A-D	PEST/PCB	TOTAL DDT HALFND	30.1	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	TOTAL DDT POS	9.6	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-108A-D	PEST/PCB	TRANS-NONACHLOR	6.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M05-208A	PEST/PCB	PCB-28	10	UG/KG	UJ	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M05-308A	PEST/PCB	PCB-28	7.2	UG/KG	UJ	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M08-108A	PEST/PCB	PCB-28	7	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M08-208A	PEST/PCB	BETA-BHC	4.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	PCB-105	11	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	PCB-153	34	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	PCB-170	16	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	PCB-28	21	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M08-208A	PEST/PCB	PCB-81	13	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TEQ PCB	1.20423	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TEQ PCB BIRD	2.5011	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TEQ PCB BIRD HALFND	2.750097	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TEQ PCB FISH	0.066555	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TEQ PCB FISH HALFND	0.06745	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TEQ PCB HALFND	1.351237	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-208A	PEST/PCB	TOTAL PCB CONGENERS	219.9	UG/KG		U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-308A	PEST/PCB	PCB-153	13	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-308A	PEST/PCB	PCB-28	7.2	UG/KG	UJ	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M08-308A	PEST/PCB	PCB-77	14	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M08-308A	PEST/PCB	PCB-81	20	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-108A	PEST/PCB	2,4'-DDD	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	2,4'-DDE	11	UG/KG	UJ	Y	Percent solids <30%

TABLE C-5
DATA VALIDATION QUALIFICATIONS FOR ROUND 10 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
10	OU4-SD-M09-108A	PEST/PCB	2,4'-DDT	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	4,4'-DDD	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	4,4'-DDE	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	4,4'-DDT	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	ALDRIN	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	ALPHA-BHC	12	UG/KG	J	RY	Surrogates Recovery Noncompliance, Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	ALPHA-CHLORDANE	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	BETA-BHC	19	UG/KG	J	UY	% Difference between columns/detectors >25% for positive results determined via GC/HPLC, Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	CIS-NONACHLOR	6.2	UG/KG	R	UY	% Difference between columns/detectors >25% for positive results determined via GC/HPLC, Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	DELTA-BHC	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	DIELDRIN	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	ENDOSULFAN II	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	ENDRIN	11	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	GAMMA-BHC (LINDANE)	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	GAMMA-CHLORDANE	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	HEPTACHLOR	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	HEPTACHLOR EPOXIDE	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	MIREX	7.4	UG/KG	J	RUY	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC, Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	OXYCHLORDANE	5.6	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-101	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-105	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-114	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-118	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-123	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-126	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-128	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-138	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-153	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-156	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-157	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-167	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-169	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-170	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-18	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-180	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-187	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-189	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-195	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-206	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-209	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-28	16	UG/KG	UJ	CY	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.), Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-44	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-52	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-66	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-77	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-8	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	PCB-81	16	UG/KG	UJ	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TEQ PCB	0	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TEQ PCB BIRD	0	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TEQ PCB BIRD HALFND	2.01152	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TEQ PCB FISH	0	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TEQ PCB FISH HALFND	0.04552	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TEQ PCB HALFND	1.04512	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TOTAL DDT HALFND	33	UG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TOTAL DDT POS	0	UG/KG	U	Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TOTAL PCB CONGENERS	176	UG/KG		Y	Percent solids <30%
10	OU4-SD-M09-108A	PEST/PCB	TRANS-NONACHLOR	6.6	UG/KG	J	RY	Surrogates Recovery Noncompliance, Percent solids <30%
10	OU4-SD-M09-208A	PEST/PCB	ALPHA-BHC	7.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-208A	PEST/PCB	BETA-BHC	17	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-5
DATA VALIDATION QUALIFICATIONS FOR ROUND 10 SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
10	OU4-SD-M09-208A	PEST/PCB	GAMMA-BHC (LINDANE)	5.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-208A	PEST/PCB	PCB-28	15	UG/KG	UJ	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
10	OU4-SD-M09-308A	PEST/PCB	4,4'-DDE	12	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	ALDRIN	18	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	ALPHA-CHLORDANE	7.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	BETA-BHC	15	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	CIS-NONACHLOR	4.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	GAMMA-BHC (LINDANE)	8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	PCB-101	15	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
10	OU4-SD-M09-308A	PEST/PCB	PCB-28	25	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)

TABLE C-6
RANGE OF NON-DETECT DATA FOR THE ROUND 10 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Semivolatile Organics (ug/kg)				
1,1-BIPHENYL	7/9	4.6	6.7	20
1-METHYLNAPHTHALENE	5/9	4.6	7.6	20
1-METHYLPHENANTHRENE	7/9	4.6	6.7	20
2,3,5-TRIMETHYLNAPHTHALENE	3/9	4.6	11	20
2,6-DIMETHYLNAPHTHALENE	8/9	6.7	6.7	20
2-METHYLNAPHTHALENE	6/9	4.6	7.6	20
ACENAPHTHENE	7/9	4.6	6.7	20
ACENAPHTHYLENE	8/9	6.7	6.7	20
ANTHRACENE	9/9			20
BENZO(A)ANTHRACENE	9/9			20
BENZO(A)PYRENE	8/9	6.7	6.7	20
BENZO(B)FLUORANTHENE	9/9			20
BENZO(E)PYRENE	8/9	6.7	6.7	20
BENZO(G,H,I)PERYLENE	8/9	6.7	6.7	20
BENZO(K)FLUORANTHENE	8/9	6.7	6.7	20
CHRYSENE	9/9			20
DIBENZO(A,H)ANTHRACENE	8/9	6.7	6.7	20
DIBENZOTHIOPHENE	7/9	4.6	6.7	20
FLUORANTHENE	9/9			20
FLUORENE	7/9	4.6	6.7	20
INDENO(1,2,3-CD)PYRENE	8/9	6.7	6.7	20
NAPHTHALENE	7/9	4.6	6.7	20
PERYLENE	8/9	6.7	6.7	20
PHENANTHRENE	9/9			20
PYRENE	9/9			20
Dioxins (ng/kg)				
1,2,3,4,6,7,8,9-OCDD	6/6			20
1,2,3,4,6,7,8,9-OCDF	6/6			20
1,2,3,4,6,7,8-HPCDD	6/6			10
1,2,3,4,6,7,8-HPCDF	6/6			10
1,2,3,4,7,8,9-HPCDF	0/6	5	5	10
1,2,3,4,7,8-HXCDD	0/6	5	5	10
1,2,3,4,7,8-HXCDF	3/6	5	5	10
1,2,3,6,7,8-HXCDD	4/6	5	5	10
1,2,3,6,7,8-HXCDF	2/6	5	5	10
1,2,3,7,8,9-HXCDD	1/6	5	5	10
1,2,3,7,8,9-HXCDF	0/6	5	5	10
1,2,3,7,8-PECDD	0/6	5	5	10
1,2,3,7,8-PECDF	1/6	5	5	10
2,3,4,6,7,8-HXCDF	5/6	5	5	10
2,3,4,7,8-PECDF	5/6	5	5	10
2,3,7,8-TCDD	0/6	1	1	2
2,3,7,8-TCDF	6/6			2
TOTAL HPCDD	6/6			10
TOTAL HPCDF	6/6			10

TABLE C-6
RANGE OF NON-DETECT DATA FOR THE ROUND 10 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
TOTAL HXCDD	6/6			10
TOTAL HXCDF	6/6			10
TOTAL PECDD	3/6	5	5	10
TOTAL PECDF	5/6	5	5	10
TOTAL TCDD	6/6			2
TOTAL TCDF	6/6			2
Pesticides/PCBs (ug/kg)				
2,4'-DDD	2/9	**4.6**	**11**	2
2,4'-DDE	0/9	**4.6**	**25**	2
2,4'-DDT	0/9	**4.6**	**25**	2
4,4'-DDD	3/9	**4.7**	**11**	2
4,4'-DDE	1/9	**4.6**	**25**	2
4,4'-DDT	1/9	**4.6**	**25**	2
ALDRIN	0/8	**2.4**	**13**	2
ALPHA-BHC	4/9	**2.4**	**13**	2
ALPHA-CHLORDANE	1/8	**2.4**	**13**	2
BETA-BHC	4/9	**2.4**	**13**	2
CIS-NONACHLOR	1/7	**2.4**	**13**	2
DELTA-BHC	0/9	**2.4**	**13**	2
DIELDRIN	0/9	**4.6**	**25**	2
ENDOSULFAN II	0/9	**4.6**	**25**	2
ENDRIN	0/9	**4.6**	**25**	2
GAMMA-BHC (LINDANE)	0/7	**2.4**	**13**	2
GAMMA-CHLORDANE	0/9	**2.4**	**13**	2
HEPTACHLOR	0/9	**2.4**	**13**	2
HEPTACHLOR EPOXIDE	0/9	**2.4**	**13**	2
MIREX	2/9	**2.4**	**13**	2
OXYCHLORDANE	2/9	**2.4**	**13**	2
PCB-101	2/9	**7**	**16**	1
PCB-105	1/9	**7**	**16**	1
PCB-114	0/9	**7**	**16**	1
PCB-118	0/9	**7**	**16**	1
PCB-123	0/9	**7**	**16**	1
PCB-126	1/9	**7**	**16**	1
PCB-128	0/9	**7**	**16**	1
PCB-138	5/9	**7**	**16**	1
PCB-153	3/8	**7**	**16**	1
PCB-156	0/9	**7**	**16**	1
PCB-157	0/9	**7**	**16**	1
PCB-167	0/9	**7**	**16**	1
PCB-169	0/9	**7**	**16**	1
PCB-170	1/9	**7**	**16**	1
PCB-18	0/9	**7**	**16**	1
PCB-180	3/9	**7**	**16**	1
PCB-187	1/9	**7**	**16**	1
PCB-189	0/9	**7**	**16**	1

TABLE C-6
RANGE OF NON-DETECT DATA FOR THE ROUND 10 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
PCB-195	0/9	**7**	**16**	1
PCB-206	2/9	**7**	**16**	1
PCB-209	0/9	**7**	**16**	1
PCB-28	3/9	**7.2**	**16**	1
PCB-44	0/9	**7**	**16**	1
PCB-52	0/9	**7**	**16**	1
PCB-66	0/9	**7**	**16**	1
PCB-77	0/8	**7**	**16**	1
PCB-8	1/9	**7**	**16**	1
PCB-81	2/9	**7**	**16**	1
TRANS-NONACHLOR	5/9	**2.4**	**13**	2
HF Metals (mg/kg)				
ALUMINUM	8/8			50
ARSENIC	8/8			5
CADMIUM	8/8			0.3
CHROMIUM	8/8			5
COPPER	8/8			5
IRON	8/8			50
LEAD	8/8			5
MANGANESE	8/8			5
MERCURY	8/8			0.2
NICKEL	8/8			5
SILVER	8/8			0.1
ZINC	8/8			15
Inorganics (mg/kg)				
ALUMINUM	10/10			50
ARSENIC	10/10			5
CADMIUM	0/10	**0.692**	**1.9**	0.3
CHROMIUM	10/10			5
COPPER	10/10			5
IRON	10/10			50
LEAD	10/10			5
MANGANESE	10/10			5
MERCURY	10/10			0.2
NICKEL	10/10			5
SILVER	0/10	**0.686**	**1.8**	0.1
ZINC	10/10			15

Notes:
- Shading indicates the nondetected result exceeded the target MDL.
- The sample and duplicate were counted as two separate samples when determining the minimum and maximum detected concentrations, but were only counted as as one sample when determining the frequency of detection.

TABLE C-6
RANGE OF NON-DETECT DATA FOR THE ROUND 10 SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Associated Samples				
OU4-SD-M05-108A	OU4-SD-M08-208A			
OU4-SD-M05-108A-AVG	OU4-SD-M08-308A			
OU4-SD-M05-108A-D	OU4-SD-M09-108A			
OU4-SD-M05-208A	OU4-SD-M09-108A-AVG			
OU4-SD-M05-308A	OU4-SD-M09-108A-D			
OU4-SD-M05-408A	OU4-SD-M09-208A			
OU4-SD-M08-108A	OU4-SD-M09-308A			

TABLE C-7
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE I SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS I	AS05-SD-SD02-D	M	COPPER	147	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS05-SD-SD02-D	M	NICKEL	27.6	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS05-SD-SD13	M	COPPER	122	MG/KG	J	D	MS/MSD Recovery Noncompliance
AS I	AS09-SD-SD01	M	COPPER	161	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD01	M	NICKEL	40.9	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD02	M	COPPER	80.7	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD02	M	NICKEL	26.6	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD03	M	COPPER	180	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD03	M	NICKEL	39.3	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD04	M	COPPER	40.1	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD04	M	NICKEL	23.1	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD05	M	COPPER	57.2	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD05	M	NICKEL	23	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD06	M	COPPER	38.4	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS I	AS09-SD-SD06	M	NICKEL	21.2	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS I	AS11-CP-CB01	M	NICKEL	36.7	MG/KG	J	D	MS/MSD Recovery Noncompliance
AS I	AS11-CP-SS01	M	COPPER	689	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS11-CP-SS01-D	M	COPPER	312	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS11-CP-SS02	M	LEAD	2330	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS11-CP-SS02-D	M	LEAD	22500	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-CP-CB02	M	LEAD	401	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD02	M	LEAD	128	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD03	M	LEAD	50.8	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD04	M	LEAD	116	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD05	M	LEAD	63.1	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD06	M	LEAD	118	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD07	M	LEAD	297	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD07-D	M	LEAD	768	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD08	M	LEAD	757	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD10	M	LEAD	290	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD11	M	LEAD	155	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD15	M	LEAD	643	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS12-SD-SD16	M	LEAD	423	MG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-CP-CB01	MISC	TOTAL ORGANIC CARBON	3.8	%	J	DF	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision
AS I	AS01-CP-SS01	MISC	TOTAL ORGANIC CARBON	6.3	%	J	H	Holding Time Exceedance
AS I	AS01-CP-SS02	MISC	TOTAL ORGANIC CARBON	4.5	%	J	H	Holding Time Exceedance
AS I	AS01-SD-SD01	MISC	TOTAL ORGANIC CARBON	0.32	%	J	DFG	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision, Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	MISC	TOTAL ORGANIC CARBON	0.32	%	J	DFG	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision, Field Duplicate Imprecision
AS I	AS01-SD-SD03	MISC	TOTAL ORGANIC CARBON	0.81	%	J	H	Holding Time Exceedance
AS I	AS01-SD-SD05	MISC	TOTAL ORGANIC CARBON	0.15	%	J	H	Holding Time Exceedance
AS I	AS01-SD-SD07	MISC	TOTAL ORGANIC CARBON	0.47	%	J	DF	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision
AS I	AS12-CP-CB02	MISC	TOTAL ORGANIC CARBON	1.1	%	J	H	Holding Time Exceedance
AS I	AS12-SD-SD01	MISC	TOTAL ORGANIC CARBON	0.39	%	J	H	Holding Time Exceedance
AS I	AS12-SD-SD02	MISC	TOTAL ORGANIC CARBON	0.52	%	J	H	Holding Time Exceedance
AS I	AS12-SD-SD07	MISC	TOTAL ORGANIC CARBON	0.32	%	J	H	Holding Time Exceedance
AS I	AS12-SD-SD09	MISC	TOTAL ORGANIC CARBON	0.33	%	J	H	Holding Time Exceedance
AS I	AS12-SD-SD15	MISC	TOTAL ORGANIC CARBON	0.88	%	J	DF	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision
AS I	AS12-SD-SD16	MISC	TOTAL ORGANIC CARBON	0.79	%	J	DF	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision
AS I	AS12-SD-SD16-D	MISC	TOTAL ORGANIC CARBON	0.58	%	J	DF	MS/MSD Recovery Noncompliance, Lab Duplicate Imprecision
AS I	AS09-SD-SD01	OS	1-METHYLNAPHTHALENE	20	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%
AS I	AS09-SD-SD01	OS	1-METHYLPHENANTHRENE	53	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	OS	2,3,5-TRIMETHYLNAPHTHALENE	13	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%
AS I	AS09-SD-SD01	OS	2,6-DIMETHYLNAPHTHALENE	18	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%

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AS I	AS09-SD-SD01	OS	2-METHYLNAPHTHALENE	23	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%
AS I	AS09-SD-SD01	OS	CHRYSENE	610	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD02	OS	1-METHYLNAPHTHALENE	16	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD02	OS	2,3,5-TRIMETHYLNAPHTHALENE	15	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD02	OS	2,6-DIMETHYLNAPHTHALENE	16	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD02	OS	2-METHYLNAPHTHALENE	21	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD03	OS	1-METHYLNAPHTHALENE	65	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD03	OS	2,3,5-TRIMETHYLNAPHTHALENE	62	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD03	OS	2,6-DIMETHYLNAPHTHALENE	74	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD04	OS	1-METHYLNAPHTHALENE	12	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD04	OS	2,3,5-TRIMETHYLNAPHTHALENE	9.3	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD04	OS	2,6-DIMETHYLNAPHTHALENE	11	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD04	OS	2-METHYLNAPHTHALENE	15	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	OS	1-METHYLNAPHTHALENE	26	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	OS	2,3,5-TRIMETHYLNAPHTHALENE	18	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	OS	2,6-DIMETHYLNAPHTHALENE	21	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	OS	2-METHYLNAPHTHALENE	31	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD06	OS	1-METHYLNAPHTHALENE	14	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD06	OS	2,3,5-TRIMETHYLNAPHTHALENE	8.6	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD06	OS	2,6-DIMETHYLNAPHTHALENE	12	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD06	OS	2-METHYLNAPHTHALENE	17	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD01	OSB	14A,17A-20S-METHYLCHOLESTANE	14	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	OSB	14A,17A-20S-METHYLCHOLESTANE	8	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD05	OSB	17A(H),21B(H)-25-NORHOPANE	0.85	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	OSB	13A,17B-20S-ETHYLDIACHOLESTANE	0.57	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	OSB	17A(H),21B(H)-25-NORHOPANE	0.59	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	OSB	C26 TRICYCLIC TERPANE-22R	0.5	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	OSB	C26 TRICYCLIC TERPANE-22S	0.53	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

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AS I	AS01-SD-SD07	OSB	C28 TRICYCLIC TERPANE-22R	0.77	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	OSB	C28 TRICYCLIC TERPANE-22S	0.68	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	OSB	C30 TRICYCLIC TERPANE-22S	0.77	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-CP-CB01	PAH	1,1-BIPHENYL	23	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD01	PAH	ACENAPHTHENE	3.7	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	ANTHRACENE	26	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	BENZO(A)PYRENE	66	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS I	AS01-SD-SD01	PAH	DIBENZOFURAN	3.4	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	DIBENZOTHIOPHENE	6.2	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	FLUORANTHENE	160	UG/KG	J	DG	MS/MSD Recovery Noncompliance, Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	FLUORENE	6.3	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	INDENO(1,2,3-CD)PYRENE	50	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS I	AS01-SD-SD01	PAH	NAPHTHALENE	6.2	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	PHENANTHRENE	74	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAH	PYRENE	140	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS I	AS01-SD-SD01	PAH	RETENE	5.8	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	11H-BENZO(B)FLUORENE	12	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	ACENAPHTHYLENE	27	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	DIBENZOFURAN	11	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	DIBENZOTHIOPHENE	12	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	FLUORANTHENE	280	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	FLUORENE	17	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	NAPHTHALENE	13	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	PHENANTHRENE	190	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAH	RETENE	2.5	UG/KG	J	GP	Field Duplicate Imprecision, Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD01	PAH	1,1-BIPHENYL	9.8	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%
AS I	AS09-SD-SD01	PAH	ACENAPHTHENE	76	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	ACENAPHTHYLENE	21	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%
AS I	AS09-SD-SD01	PAH	ANTHRACENE	160	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	BENZO(A)ANTHRACENE	610	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	BENZO(A)PYRENE	620	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	BENZO(B)FLUORANTHENE	470	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	BENZO(E)PYRENE	450	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	BENZO(G,H,I)PERYLENE	430	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	BENZO(K)FLUORANTHENE	710	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	DIBENZO(A,H)ANTHRACENE	75	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	DIBENZOTHIOPHENE	34	UG/KG	J	PY	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), Percent solids <30%
AS I	AS09-SD-SD01	PAH	FLUORANTHENE	1100	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	FLUORENE	78	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	INDENO(1,2,3-CD)PYRENE	360	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	NAPHTHALENE	46	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	PERYLENE	220	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	PHENANTHRENE	520	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD01	PAH	PYRENE	860	UG/KG	J	Y	Percent solids <30%
AS I	AS09-SD-SD02	PAH	1,1-BIPHENYL	7.9	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD02	PAH	ACENAPHTHYLENE	28	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD02	PAH	DIBENZOTHIOPHENE	33	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD02	PAH	NAPHTHALENE	37	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD03	PAH	1,1-BIPHENYL	29	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

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AS I	AS09-SD-SD03	PAH	ACENAPHTHYLENE	69	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD03	PAH	FLUORANTHENE	5700	UG/KG	J	L	Instrument Calibration Range Exceedance
AS I	AS09-SD-SD03	PAH	PYRENE	4800	UG/KG	J	L	Instrument Calibration Range Exceedance
AS I	AS09-SD-SD04	PAH	1,1-BIPHENYL	5.8	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	PAH	1,1-BIPHENYL	12	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	PAH	ACENAPHTHYLENE	23	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD05	PAH	NAPHTHALENE	58	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD06	PAH	1,1-BIPHENYL	6.9	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS09-SD-SD06	PAH	DIBENZOTHIOPHENE	20	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD01	PAHA	C1-PHENANTHRENES/ANTHRACENES	46	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01	PAHA	C2-NAPHTHALENES	16	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAHA	C1-PHENANTHRENES/ANTHRACENES	77	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD01-D	PAHA	C2-NAPHTHALENES	28	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-CP-CB01	PEST/PCB	2,4'-DDD	8.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	2,4'-DDE	22	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	2,4'-DDT	2.3	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	4,4'-DDD	9.9	UG/KG	J	R	Surrogates Recovery Noncompliance
AS I	AS01-CP-CB01	PEST/PCB	4,4'-DDE	4.3	UG/KG	J	R	Surrogates Recovery Noncompliance
AS I	AS01-CP-CB01	PEST/PCB	4,4'-DDT	7.1	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	ALDRIN	4.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	ALPHA-BHC	0.74	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-CP-CB01	PEST/PCB	ALPHA-CHLORDANE	0.52	UG/KG	J	R	Surrogates Recovery Noncompliance
AS I	AS01-CP-CB01	PEST/PCB	BETA-BHC	1.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	CIS-NONACHLOR	9.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	DELTA-BHC	2.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	DIELDRIN	1.5	UG/KG	J	R	Surrogates Recovery Noncompliance
AS I	AS01-CP-CB01	PEST/PCB	ENDOSULFAN II	0.61	UG/KG	J	R	Surrogates Recovery Noncompliance
AS I	AS01-CP-CB01	PEST/PCB	ENDRIN	0.51	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	GAMMA-BHC (LINDANE)	0.44	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	GAMMA-CHLORDANE	1	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC

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AS I	AS01-CP-CB01	PEST/PCB	HEPTACHLOR	6.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	HEPTACHLOR EPOXIDE	1	UG/KG	J	ERU	LCS/LCSD Recovery Noncompliance, Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	HEXACHLOROBENZENE	0.81	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	MIREX	19	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	OXYCHLORDANE	0.78	UG/KG	J	RU	Surrogates Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB01	PEST/PCB	TRANS-NONACHLOR	2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	2,4'-DDE	5.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	ALPHA-BHC	0.79	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-CP-CB02	PEST/PCB	ALPHA-CHLORDANE	0.9	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	BETA-BHC	3.3	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-CP-CB02	PEST/PCB	DELTA-BHC	0.78	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-CP-CB02	PEST/PCB	ENDRIN	0.29	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-CP-CB02	PEST/PCB	GAMMA-BHC (LINDANE)	1.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	GAMMA-CHLORDANE	2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	HEPTACHLOR	6.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	HEPTACHLOR EPOXIDE	5.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	HEXACHLOROBENZENE	2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	MIREX	2.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	OXYCHLORDANE	3.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-CP-CB02	PEST/PCB	TRANS-NONACHLOR	0.65	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	2,4'-DDD	2.4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	2,4'-DDE	5.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	ALDRIN	0.45	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	ALPHA-BHC	0.6	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD01	PEST/PCB	BETA-BHC	0.73	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD01	PEST/PCB	CIS-NONACHLOR	1.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE I SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

AS I	AS01-SD-SD01	PEST/PCB	DELTA-BHC	0.28	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	DIELDRIN	0.72	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	GAMMA-BHC (LINDANE)	0.32	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	GAMMA-CHLORDANE	0.78	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	HEPTACHLOR	2.3	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	HEPTACHLOR EPOXIDE	1.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	HEXACHLOROBENZENE	1.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	MIREX	3.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	OXYCHLORDANE	0.58	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD01	PEST/PCB	TRANS-NONACHLOR	0.45	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	2,4'-DDE	9.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	ALDRIN	0.52	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD02	PEST/PCB	ALPHA-BHC	0.32	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD02	PEST/PCB	BETA-BHC	5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	CIS-NONACHLOR	2.3	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	DELTA-BHC	0.57	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	GAMMA-BHC (LINDANE)	0.5	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD02	PEST/PCB	GAMMA-CHLORDANE	3.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	HEPTACHLOR	1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	HEPTACHLOR EPOXIDE	2.8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	HEXACHLOROBENZENE	2.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	MIREX	3.5	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD02	PEST/PCB	TRANS-NONACHLOR	1.5	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	2,4'-DDE	30	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	4,4'-DDD	85	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD03	PEST/PCB	4,4'-DDE	20	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD03	PEST/PCB	ALDRIN	1.7	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD03	PEST/PCB	ALPHA-BHC	0.52	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD03	PEST/PCB	BETA-BHC	140	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

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DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE I SEDIMENT
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PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

AS I	AS01-SD-SD03	PEST/PCB	CIS-NONACHLOR	17	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	DELTA-BHC	2	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	GAMMA-BHC (LINDANE)	2.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	HEPTACHLOR	4.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	HEPTACHLOR EPOXIDE	6.3	UG/KG	R	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
AS I	AS01-SD-SD03	PEST/PCB	HEXACHLOROBENZENE	3.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	MIREX	15	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03	PEST/PCB	OXYCHLORDANE	3.1	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	2,4'-DDD	61	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	2,4'-DDE	28	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	4,4'-DDD	180	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD03-D	PEST/PCB	4,4'-DDE	46	UG/KG	J	G	Field Duplicate Imprecision
AS I	AS01-SD-SD03-D	PEST/PCB	ALDRIN	2	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD03-D	PEST/PCB	ALPHA-BHC	0.83	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD03-D	PEST/PCB	ALPHA-CHLORDANE	6.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	BETA-BHC	31	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	CIS-NONACHLOR	18	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	DELTA-BHC	2.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	DIELDRIN	7.6	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	ENDRIN	5.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	GAMMA-BHC (LINDANE)	2.9	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD03-D	PEST/PCB	HEPTACHLOR	2.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	HEPTACHLOR EPOXIDE	8.3	UG/KG	J	EU	LCS/LCSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	HEXACHLOROBENZENE	1	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	MIREX	13	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	OXYCHLORDANE	3.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD03-D	PEST/PCB	TRANS-NONACHLOR	5.8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

AS I	AS01-SD-SD04	PEST/PCB	2,4'-DDD	31	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	2,4'-DDE	30	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	2,4'-DDT	5.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	4,4'-DDE	17	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	4,4'-DDT	13	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	ALPHA-BHC	2.4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	ALPHA-CHLORDANE	1.5	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	BETA-BHC	40	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	CIS-NONACHLOR	11	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	DIELDRIN	1.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	GAMMA-BHC (LINDANE)	3.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	HEPTACHLOR	12	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	HEPTACHLOR EPOXIDE	13	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	HEXACHLOROBENZENE	21	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD04	PEST/PCB	OXYCHLORDANE	6.8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	2,4'-DDD	56	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	2,4'-DDE	17	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	4,4'-DDE	9.4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	ALDRIN	0.55	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD05	PEST/PCB	ALPHA-BHC	0.12	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD05	PEST/PCB	ALPHA-CHLORDANE	6.2	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	BETA-BHC	1.1	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD05	PEST/PCB	CIS-NONACHLOR	4.7	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD05	PEST/PCB	DIELDRIN	8.3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	GAMMA-BHC (LINDANE)	1.1	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD05	PEST/PCB	HEPTACHLOR	0.52	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD05	PEST/PCB	HEPTACHLOR EPOXIDE	6.4	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	HEXACHLOROBENZENE	0.57	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD05	PEST/PCB	MIREX	9.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

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AS I	AS01-SD-SD05	PEST/PCB	TRANS-NONACHLOR	6.3	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	2,4'-DDD	27	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	2,4'-DDE	31	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	2,4'-DDT	6.3	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	4,4'-DDE	15	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	4,4'-DDT	18	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	ALDRIN	1.1	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	ALPHA-BHC	0.3	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD06	PEST/PCB	ALPHA-CHLORDANE	2.7	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD06	PEST/PCB	BETA-BHC	150	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	CIS-NONACHLOR	7.7	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	DELTA-BHC	1.7	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	DIELDRIN	2.9	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	GAMMA-BHC (LINDANE)	2.1	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	GAMMA-CHLORDANE	4.2	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD06	PEST/PCB	HEPTACHLOR	5.8	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	HEPTACHLOR EPOXIDE	2.6	UG/KG	R	Q	Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
AS I	AS01-SD-SD06	PEST/PCB	MIREX	4	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	OXYCHLORDANE	3.3	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD06	PEST/PCB	TRANS-NONACHLOR	6.9	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	2,4'-DDD	4.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	2,4'-DDE	4.6	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	4,4'-DDD	1.9	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	ALDRIN	0.17	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD07	PEST/PCB	ALPHA-BHC	0.12	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD07	PEST/PCB	ALPHA-CHLORDANE	0.52	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	BETA-BHC	3.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	DELTA-BHC	0.21	UG/KG	J	PU	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics), % Difference between columns/detectors >25% for positive results determined via GC/HPLC

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AS I	AS01-SD-SD07	PEST/PCB	GAMMA-BHC (LINDANE)	0.17	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD07	PEST/PCB	GAMMA-CHLORDANE	0.57	UG/KG	J	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	HEPTACHLOR	0.31	UG/KG	U	A	Lab Blank Contamination
AS I	AS01-SD-SD07	PEST/PCB	HEPTACHLOR EPOXIDE	0.49	UG/KG	J	EU	LCS/LCSD Recovery Noncompliance, % Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	HEXACHLOROBENZENE	0.28	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	MIREX	2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC
AS I	AS01-SD-SD07	PEST/PCB	OXYCHLORDANE	0.2	UG/KG	J	P	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
AS I	AS01-SD-SD07	PEST/PCB	TRANS-NONACHLOR	1.2	UG/KG	R	U	% Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE C-8
RANGE OF NON-DETECT DATA FOR THE ADDITIONAL SCRUTINY PHASE I SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Semivolatile Organics (ug/kg)				
1-METHYLNAPHTHALENE	6/6			20
1-METHYLPHENANTHRENE	6/6			20
2,3,5-TRIMETHYLNAPHTHALENE	6/6			20
2,6-DIMETHYLNAPHTHALENE	6/6			20
2-METHYLNAPHTHALENE	6/6			20
CHRYSENE	6/6			20
Semivolatile Biomarkers (ug/kg)				
13A,17B-20S-ETHYLDIACHOLESTANE	13/14	0.78	0.78	NA
13B(H),17A(H)-20R-DIACHOLESTANE	14/14			NA
13B(H),17A(H)-20S-DIACHOLESTANE	14/14			NA
13B,17A-20R-ETHYLDIACHOLESTANE	14/14			NA
13B,17A-20S-METHYLDIACHOLESTANE	14/14			NA
14A(H),17A(H)-20R-CHOLESTANE	14/14			NA
14A(H),17A(H)-20R-ETHYLCHOLESTANE	14/14			NA
14A(H),17A(H)-20S-CHOLESTANE	14/14			NA
14A(H),17A(H)-20S-ETHYLCHOLESTANE	14/14			NA
14A,17A-20R-METHYLCHOLESTANE	14/14			NA
14A,17A-20S-METHYLCHOLESTANE	14/14			NA
14B(H),17B(H)-20R-CHOLESTANE	14/14			NA
14B(H),17B(H)-20R-ETHYLCHOLESTANE	14/14			NA
14B(H),17B(H)-20S-CHOLESTANE	14/14			NA
14B(H),17B(H)-20S-ETHYLCHOLESTANE	14/14			NA
14B,17B-20R-METHYLCHOLESTANE	14/14			NA
14B,17B-20S-METHYLCHOLESTANE	14/14			NA
17A(H),21B(H)-25-NORHOPANE	14/14			NA
17A(H)-22,29,30-TRISNORHOPANE-TM	14/14			NA
17A(H)-DIAHOPANE	14/14			NA
17A/B,21B/A 28,30-BISNORHOPANE	14/14			NA
18A(H)&18B(H)-OLEANANES	14/14			NA
18A(H)-30-NORNEOHOPANE-C29TS	14/14			NA
18A-22,29,30-TRISNORNEOHOPANE-TS	14/14			NA
30,31-BISHOMOHOPANE-22R	14/14			NA
30,31-BISHOMOHOPANE-22S	14/14			NA
30,31-TRISHOMOHOPANE-22R	14/14			NA
30,31-TRISHOMOHOPANE-22S	14/14			NA
30-HOMOHOPANE-22R	14/14			NA
30-HOMOHOPANE-22S	14/14			NA
30-NORHOPANE	14/14			NA
30-NORMORETANE	14/14			NA
C23 TRICYCLIC TERPANE	14/14			NA
C24 TETRACYCLIC TERPANE	14/14			NA
C24 TRICYCLIC TERPANE	14/14			NA
C25 TRICYCLIC TERPANE	14/14			NA
C26 TRICYCLIC TERPANE-22R	14/14			NA
C26 TRICYCLIC TERPANE-22S	14/14			NA
C28 TRICYCLIC TERPANE-22R	14/14			NA
C28 TRICYCLIC TERPANE-22S	14/14			NA
C29 TRICYCLIC TERPANE-22R	14/14			NA

TABLE C-8
RANGE OF NON-DETECT DATA FOR THE ADDITIONAL SCRUTINY PHASE I SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
C29 TRICYCLIC TERPANE-22S	14/14			NA
C30 TRICYCLIC TERPANE-22R	14/14			NA
C30 TRICYCLIC TERPANE-22S	14/14			NA
HOPANE	14/14			NA
MORETANE	14/14			NA
PENTAKISHOMOHOPANE-22R	14/14			NA
PENTAKISHOMOHOPANE-22S	14/14			NA
TETRAKISHOMOHOPANE-22R	14/14			NA
TETRAKISHOMOHOPANE-22S	14/14			NA
1,1-BIPHENYL	20/20			20
11H-BENZO(B)FLUORENE	14/14			NA
ACENAPHTHENE	20/20			20
ACENAPHTHYLENE	20/20			20
ANTHRACENE	20/20			20
BENZO(A)ANTHRACENE	20/20			20
BENZO(A)FLUORANTHENE	14/14			NA
BENZO(A)PYRENE	20/20			20
BENZO(B)FLUORANTHENE	20/20			20
BENZO(E)PYRENE	20/20			20
BENZO(G,H,I)PERYLENE	20/20			20
BENZO(K)FLUORANTHENE	20/20			20
CHRYSENE/TRIPHENYLENE	14/14			NA
DIBENZO(A,H)ANTHRACENE	20/20			20
DIBENZOFURAN	14/14			NA
DIBENZOTHIOPHENE	20/20			20
FLUORANTHENE	20/20			20
FLUORENE	20/20			20
INDENO(1,2,3-CD)PYRENE	20/20			20
NAPHTHALENE	20/20			20
NAPHTHOBENZOTHIOPHENE	14/14			NA
PERYLENE	20/20			20
PHENANTHRENE	20/20			20
PYRENE	20/20			20
RETENE	10/14	0.69	1.9	NA
Alkylated Polynuclear Aromatic Hydrocarbons (ug/kg)				
C1-CHRYSENES	14/14			20
C1-DIBENZOTHIOPHENES	14/14			20
C1-FLUORANTHENES/PYRENES	14/14			20
C1-FLUORENES	14/14			20
C1-NAPHTHALENES	14/14			20
C1-NAPHTHOBENZOTHIOPHENES	14/14			20
C1-PHENANTHRENES/ANTHRACENES	14/14			20
C2-CHRYSENES	14/14			20
C2-DIBENZOTHIOPHENES	14/14			20
C2-FLUORANTHENES/PYRENES	14/14			20
C2-FLUORENES	14/14			20
C2-NAPHTHALENES	14/14			20
C2-NAPHTHOBENZOTHIOPHENES	14/14			20
C2-PHENANTHRENES/ANTHRACENES	14/14			20

TABLE C-8
RANGE OF NON-DETECT DATA FOR THE ADDITIONAL SCRUTINY PHASE I SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
C3-CHRYSENES	14/14			20
C3-DIBENZOTHIOPHENES	14/14			20
C3-FLUORANTHENES/PYRENES	14/14			20
C3-FLUORENES	14/14			20
C3-NAPHTHALENES	14/14			20
C3-NAPHTHOBENZOTHIOPHENES	14/14			20
C3-PHENANTHRENES/ANTHRACENES	14/14			20
C4-CHRYSENES	14/14			20
C4-DIBENZOTHIOPHENES	14/14			20
C4-FLUORANTHENES/PYRENES	14/14			20
C4-NAPHTHALENES	14/14			20
C4-NAPHTHOBENZOTHIOPHENES	14/14			20
C4-PHENANTHRENES/ANTHRACENES	14/14			20
Pesticides/PCBs (ug/kg)				
2,4'-DDD	5/5			2
2,4'-DDT	8/8			2
4,4'-DDD	9/9			2
4,4'-DDE	7/7			2
4,4'-DDT	9/9			2
ALDRIN	1/7	0.17	2	2
ALPHA-BHC	1/9	0.12	0.83	2
ALPHA-CHLORDANE	8/9	**2.7**	**2.7**	2
BETA-BHC	0/3	0.73	**3.3**	2
CIS-NONACHLOR	5/6	0.29	0.29	2
DELTA-BHC	6/7	**5.7**	**5.7**	2
DIELDRIN	9/9			2
ENDOSULFAN II	1/9	0.26	**6.7**	2
ENDRIN	0/8	0.26	**5.7**	2
GAMMA-BHC (LINDANE)	2/6	0.17	**2.9**	2
GAMMA-CHLORDANE	7/8	**4.2**	**4.2**	2
HEPTACHLOR	0/2	0.31	0.52	2
HEPTACHLOR EPOXIDE	3/3			2
HEXACHLOROBENZENE	1/2	1.4	1.4	2
MIREX	2/2			2
OXYCHLORDANE	3/5	1.5	**5.7**	2
TRANS-NONACHLOR	4/5	0.28	0.28	2

TABLE C-8
RANGE OF NON-DETECT DATA FOR THE ADDITIONAL SCRUTINY PHASE I SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Petroleum Hydrocarbons (mg/kg)				
TPH (C09-C40)	21/21			NA
Inorganics (mg/kg)				
COPPER	20/20			5
LEAD	31/31			5
NICKEL	20/20			5

Notes:
- Shading indicates the nondetected result exceeded the target MDL.
- The sample and duplicate were counted as two separate samples when determining the minimum and maximum detected concentrations, but were only counted as as one sample when determining the frequency of detection.

NA: Not available.

Associated Samples

AS01-CP-CB01
AS01-CP-CB02
AS01-CP-SS01
AS01-CP-SS02
AS01-SD-SD01
AS01-SD-SD01-AVG
AS01-SD-SD01-D
AS01-SD-SD02
AS01-SD-SD03
AS01-SD-SD03-AVG
AS01-SD-SD03-D
AS01-SD-SD04
AS01-SD-SD05
AS01-SD-SD06
AS01-SD-SD07
AS05-SD-SD01
AS05-SD-SD01-AVG
AS05-SD-SD01-D
AS05-SD-SD02
AS05-SD-SD02-AVG
AS05-SD-SD02-D
AS05-SD-SD03
AS05-SD-SD04
AS05-SD-SD05
AS05-SD-SD06
AS05-SD-SD07
AS05-SD-SD08
AS05-SD-SD09
AS05-SD-SD10
AS05-SD-SD13
AS09-SD-SD01
AS09-SD-SD02
AS09-SD-SD03
AS09-SD-SD04
AS09-SD-SD05
AS09-SD-SD06
AS11-CP-CB01
AS11-CP-SS01
AS11-CP-SS01-AVG
AS11-CP-SS01-D
AS11-CP-SS02
AS11-CP-SS02-AVG
AS11-CP-SS02-D
AS12-CP-CB02
AS12-SD-SD01
AS12-SD-SD02
AS12-SD-SD03
AS12-SD-SD04
AS12-SD-SD05
AS12-SD-SD06
AS12-SD-SD07
AS12-SD-SD07-AVG
AS12-SD-SD07-D
AS12-SD-SD08
AS12-SD-SD09
AS12-SD-SD09-AVG
AS12-SD-SD09-D
AS12-SD-SD10
AS12-SD-SD11
AS12-SD-SD12
AS12-SD-SD13
AS12-SD-SD14
AS12-SD-SD15
AS12-SD-SD16
AS12-SD-SD16-AVG
AS12-SD-SD16-D

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD100-00	M	LEAD	7810	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD100-01	M	LEAD	6970	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD101-00	M	LEAD	736	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD102-00	M	LEAD	1110	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD103-00	M	LEAD	202	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD103-00-D	M	LEAD	140	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD103-01	M	LEAD	114	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD104-00	M	LEAD	874	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD105-00	M	LEAD	608	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD106-00	M	LEAD	288	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD20-00	M	LEAD	422	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD21-00	M	LEAD	57.7	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD21-01	M	LEAD	68	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD22-00	M	LEAD	70.4	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD22-00-D	M	LEAD	74.9	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD23-00	M	LEAD	100	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD23-01	M	LEAD	124	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD25-00	M	LEAD	236	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD25-01	M	LEAD	327	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD26-00	M	LEAD	104	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD27-00	M	LEAD	369	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD28-00	M	LEAD	608	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD29-00	M	LEAD	761	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD30-00	M	LEAD	278	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD31-00	M	LEAD	41600	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD32-00	M	LEAD	324	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD32-01	M	LEAD	305	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD33-00	M	LEAD	823	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD33-00-D	M	LEAD	786	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD33-01	M	LEAD	719	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD34-00	M	LEAD	1820	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD34-01	M	LEAD	1270	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD35-00	M	LEAD	230	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD35-01	M	LEAD	261	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD36-00	M	LEAD	345	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD37-00	M	LEAD	3160	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD38-00	M	LEAD	2530	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD38-00-D	M	LEAD	1730	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD39-00	M	LEAD	690	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD40-00	M	LEAD	1090	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD41-00	M	LEAD	231	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD42-00	M	LEAD	777	MG/KG	J	I	ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD44-00	M	LEAD	53.8	MG/KG	J	DI	MS/MSD Recovery Noncompliance, ICP Serial Dilution Noncompliance
AS II	AS12-SD-SD43-00	MISC	TOTAL ORGANIC CARBON	0.99	%	UJ	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD45-00	MISC	TOTAL ORGANIC CARBON	1	%	UJ	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD49-00	MISC	TOTAL ORGANIC CARBON	1	%	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD50-00	MISC	TOTAL ORGANIC CARBON	1	%	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD103-00	PAH	1-METHYLPHENANTHRENE	21	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	2-METHYLNAPHTHALENE	8.1	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	ACENAPHTHENE	49	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	ANTHRACENE	42	UG/KG	J	G	Field Duplicate Imprecision

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD103-00	PAH	BENZO(A)ANTHRACENE	240	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	BENZO(A)PYRENE	250	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	BENZO(B)FLUORANTHENE	490	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	BENZO(E)PYRENE	200	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	BENZO(G,H,I)PERYLENE	170	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	BENZO(K)FLUORANTHENE	170	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	CHRYSENE	330	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	DIBENZO(A,H)ANTHRACENE	61	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	DIBENZOTHIOPHENE	20	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	FLUORANTHENE	730	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	FLUORENE	39	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	INDENO(1,2,3-CD)PYRENE	160	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	NAPHTHALENE	17	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	PERYLENE	64	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	PHENANTHRENE	430	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00	PAH	PYRENE	560	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	1-METHYLPHENANTHRENE	250	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	2-METHYLNAPHTHALENE	110	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	ACENAPHTHENE	760	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	ANTHRACENE	1300	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	BENZO(A)ANTHRACENE	2300	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	BENZO(A)PYRENE	1600	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	BENZO(B)FLUORANTHENE	3100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	BENZO(E)PYRENE	1100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	BENZO(G,H,I)PERYLENE	950	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	BENZO(K)FLUORANTHENE	820	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	CHRYSENE	2100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	DIBENZO(A,H)ANTHRACENE	310	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	DIBENZOTHIOPHENE	240	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	FLUORANTHENE	5700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	FLUORENE	700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	INDENO(1,2,3-CD)PYRENE	910	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	NAPHTHALENE	190	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	PERYLENE	390	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	PHENANTHRENE	5000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD103-00-D	PAH	PYRENE	4100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD20-00	PAH	1,1-BIPHENYL	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	1-METHYLNAPHTHALENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	1-METHYLPHENANTHRENE	1800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	2,6-DIMETHYLNAPHTHALENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	2-METHYLNAPHTHALENE	1200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	ACENAPHTHENE	4000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	ACENAPHTHYLENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	ANTHRACENE	7700	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	BENZO(A)ANTHRACENE	13000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	BENZO(A)PYRENE	11000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	BENZO(B)FLUORANTHENE	19000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	BENZO(E)PYRENE	7300	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	BENZO(G,H,I)PERYLENE	6300	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	BENZO(K)FLUORANTHENE	5500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	CHRYSENE	13000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	DIBENZO(A,H)ANTHRACENE	2200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD20-00	PAH	DIBENZOTHIOPHENE	2100	UG/KG	J	H	

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD22-00	PAH	2,6-DIMETHYLNAPHTHALENE	100	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	2-METHYLNAPHTHALENE	29	UG/KG	J	GHR	Field Duplicate Imprecision, Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	ACENAPHTHENE	150	UG/KG	J	GHR	Field Duplicate Imprecision, Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	ACENAPHTHYLENE	84	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	ANTHRACENE	270	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	BENZO(A)ANTHRACENE	600	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	BENZO(A)PYRENE	510	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	BENZO(B)FLUORANTHENE	620	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	BENZO(E)PYRENE	290	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	BENZO(G,H,I)PERYLENE	310	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	BENZO(K)FLUORANTHENE	280	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	CHRYSENE	590	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	DIBENZO(A,H)ANTHRACENE	98	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	DIBENZOTHIOPHENE	68	UG/KG	J	GHR	Field Duplicate Imprecision, Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	FLUORANTHENE	1600	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00	PAH	FLUORENE	150	UG/KG	J	GHR	Field Duplicate Imprecision, Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	INDENO(1,2,3-CD)PYRENE	300	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	NAPHTHALENE	46	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	PERYLENE	160	UG/KG	J	HR	Holding Time Exceedance, Surrogates Recovery Noncompliance
AS II	AS12-SD-SD22-00	PAH	PHENANTHRENE	1100	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00	PAH	PYRENE	1300	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	1,1-BIPHENYL	7.3	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	1-METHYLNAPHTHALENE	13	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	1-METHYLPHENANTHRENE	94	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	2,3,5-TRIMETHYLNAPHTHALENE	8.8	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	2,6-DIMETHYLNAPHTHALENE	94	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	2-METHYLNAPHTHALENE	15	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	ACENAPHTHENE	68	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	ACENAPHTHYLENE	76	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	ANTHRACENE	170	UG/KG	J	H	Holding Time Exceedance

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD22-00-D	PAH	BENZO(A)ANTHRACENE	450	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	BENZO(A)PYRENE	400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	BENZO(B)FLUORANTHENE	460	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	BENZO(E)PYRENE	230	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	BENZO(G,H,I)PERYLENE	250	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	BENZO(K)FLUORANTHENE	230	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	CHRYSENE	390	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	DIBENZO(A,H)ANTHRACENE	72	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	DIBENZOTHIOPHENE	34	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	FLUORANTHENE	900	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	FLUORENE	66	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	INDENO(1,2,3-CD)PYRENE	230	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	NAPHTHALENE	28	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	PERYLENE	130	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	PHENANTHRENE	460	UG/KG	J	GH	Field Duplicate Imprecision, Holding Time Exceedance
AS II	AS12-SD-SD22-00-D	PAH	PYRENE	790	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	1,1-BIPHENYL	18	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	1-METHYLNAPHTHALENE	41	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	1-METHYLPHENANTHRENE	150	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	15	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	2,6-DIMETHYLNAPHTHALENE	84	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	2-METHYLNAPHTHALENE	58	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	ACENAPHTHENE	250	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	ACENAPHTHYLENE	100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	ANTHRACENE	420	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	BENZO(A)ANTHRACENE	1200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	BENZO(A)PYRENE	970	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	BENZO(B)FLUORANTHENE	1100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	BENZO(E)PYRENE	510	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	BENZO(G,H,I)PERYLENE	540	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	BENZO(K)FLUORANTHENE	500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	CHRYSENE	1100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	DIBENZO(A,H)ANTHRACENE	170	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	DIBENZOTHIOPHENE	110	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	FLUORANTHENE	2200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	FLUORENE	220	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	INDENO(1,2,3-CD)PYRENE	520	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	NAPHTHALENE	110	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	PERYLENE	220	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	PHENANTHRENE	1700	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD23-00	PAH	PYRENE	1800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	1,1-BIPHENYL	51	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	1-METHYLNAPHTHALENE	100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	1-METHYLPHENANTHRENE	240	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	20	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	2,6-DIMETHYLNAPHTHALENE	94	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	2-METHYLNAPHTHALENE	180	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	ACENAPHTHENE	750	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	ACENAPHTHYLENE	77	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	ANTHRACENE	850	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	BENZO(A)ANTHRACENE	1600	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	BENZO(A)PYRENE	1400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	BENZO(B)FLUORANTHENE	1600	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	BENZO(E)PYRENE	770	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	BENZO(G,H,I)PERYLENE	780	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	BENZO(K)FLUORANTHENE	860	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	CHRYSENE	1500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	DIBENZO(A,H)ANTHRACENE	320	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	DIBENZOTHIOPHENE	240	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	FLUORANTHENE	3000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	FLUORENE	620	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	INDENO(1,2,3-CD)PYRENE	760	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	NAPHTHALENE	400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	PERYLENE	440	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	PHENANTHRENE	2800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD25-00	PAH	PYRENE	2600	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD26-00	PAH	1,1-BIPHENYL	8	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	1-METHYLNAPHTHALENE	16	UG/KG	J	R	Surrogates Recovery Noncompliance

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD26-00	PAH	1-METHYLPHENANTHRENE	40	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	6	UG/KG	UJ	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	2,6-DIMETHYLNAPHTHALENE	11	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	2-METHYLNAPHTHALENE	29	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	ACENAPHTHENE	140	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	ACENAPHTHYLENE	14	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	ANTHRACENE	170	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	BENZO(A)ANTHRACENE	380	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	BENZO(A)PYRENE	300	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	BENZO(B)FLUORANTHENE	370	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	BENZO(E)PYRENE	170	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	BENZO(G,H,I)PERYLENE	140	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	BENZO(K)FLUORANTHENE	180	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	CHRYSENE	390	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	DIBENZO(A,H)ANTHRACENE	44	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	DIBENZOTHIOPHENE	45	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	FLUORANTHENE	540	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	FLUORENE	98	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	INDENO(1,2,3-CD)PYRENE	150	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	NAPHTHALENE	74	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	PERYLENE	67	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	PHENANTHRENE	380	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD26-00	PAH	PYRENE	460	UG/KG	J	R	Surrogates Recovery Noncompliance
AS II	AS12-SD-SD27-00	PAH	1,1-BIPHENYL	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	1-METHYLNAPHTHALENE	1800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	1-METHYLPHENANTHRENE	2900	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	2,6-DIMETHYLNAPHTHALENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	2-METHYLNAPHTHALENE	2700	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	ACENAPHTHENE	9900	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	ACENAPHTHYLENE	850	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	ANTHRACENE	15000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	BENZO(A)ANTHRACENE	20000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	BENZO(A)PYRENE	18000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	BENZO(B)FLUORANTHENE	28000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	BENZO(E)PYRENE	11000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	BENZO(G,H,I)PERYLENE	10000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	BENZO(K)FLUORANTHENE	8500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	CHRYSENE	18000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	DIBENZO(A,H)ANTHRACENE	2700	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	DIBENZOTHIOPHENE	3200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	FLUORANTHENE	64000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	FLUORENE	8200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	INDENO(1,2,3-CD)PYRENE	8800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	NAPHTHALENE	8100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	PERYLENE	4400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	PHENANTHRENE	58000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD27-00	PAH	PYRENE	50000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	1,1-BIPHENYL	87	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	1-METHYLNAPHTHALENE	87	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	1-METHYLPHENANTHRENE	150	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	87	UG/KG	UJ	H	Holding Time Exceedance

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD28-00	PAH	2,6-DIMETHYLNAPHTHALENE	87	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	2-METHYLNAPHTHALENE	87	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	ACENAPHTHENE	400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	ACENAPHTHYLENE	87	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	ANTHRACENE	650	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	BENZO(A)ANTHRACENE	1400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	BENZO(A)PYRENE	1300	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	BENZO(B)FLUORANTHENE	2200	UG/KG	J	CH	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.), Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	BENZO(E)PYRENE	900	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	BENZO(G,H,I)PERYLENE	740	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	BENZO(K)FLUORANTHENE	870	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	CHRYSENE	1500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	DIBENZO(A,H)ANTHRACENE	260	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	DIBENZOTHIOPHENE	140	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	FLUORANTHENE	3800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	FLUORENE	340	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	INDENO(1,2,3-CD)PYRENE	760	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	NAPHTHALENE	140	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	PERYLENE	290	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	PHENANTHRENE	2600	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD28-00	PAH	PYRENE	2800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	1,1-BIPHENYL	44	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	1-METHYLNAPHTHALENE	44	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	1-METHYLPHENANTHRENE	110	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	44	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	2,6-DIMETHYLNAPHTHALENE	44	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	2-METHYLNAPHTHALENE	69	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	ACENAPHTHENE	400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	ACENAPHTHYLENE	44	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	ANTHRACENE	500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	BENZO(A)ANTHRACENE	900	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	BENZO(A)PYRENE	780	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	BENZO(B)FLUORANTHENE	1300	UG/KG	J	CH	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.), Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	BENZO(E)PYRENE	530	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	BENZO(G,H,I)PERYLENE	410	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	BENZO(K)FLUORANTHENE	550	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	CHRYSENE	950	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	DIBENZO(A,H)ANTHRACENE	160	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	DIBENZOTHIOPHENE	110	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	FLUORANTHENE	2500	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	FLUORENE	340	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	INDENO(1,2,3-CD)PYRENE	420	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	NAPHTHALENE	150	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	PERYLENE	160	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	PHENANTHRENE	2100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD29-00	PAH	PYRENE	1900	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	1,1-BIPHENYL	100	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	1-METHYLNAPHTHALENE	150	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	1-METHYLPHENANTHRENE	330	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	100	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	2,6-DIMETHYLNAPHTHALENE	100	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	2-METHYLNAPHTHALENE	230	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	ACENAPHTHENE	1600	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	ACENAPHTHYLENE	100	UG/KG	UJ	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	ANTHRACENE	1300	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	BENZO(A)ANTHRACENE	3100	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	BENZO(A)PYRENE	2600	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	BENZO(B)FLUORANTHENE	4800	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	BENZO(E)PYRENE	1700	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	BENZO(G,H,I)PERYLENE	1400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	BENZO(K)FLUORANTHENE	1300	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	CHRYSENE	3200	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	DIBENZO(A,H)ANTHRACENE	440	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	DIBENZOTHIOPHENE	460	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	FLUORANTHENE	10000	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	FLUORENE	970	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	INDENO(1,2,3-CD)PYRENE	1400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	NAPHTHALENE	560	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	PERYLENE	610	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	PHENANTHRENE	8400	UG/KG	J	H	Holding Time Exceedance
AS II	AS12-SD-SD30-00	PAH	PYRENE	7600	UG/KG	J	H	Holding Time Exceedance

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD31-00	PAH	BENZO(B)FLUORANTHENE	1100	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD32-00	PAH	BENZO(B)FLUORANTHENE	9100	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD32-01	PAH	BENZO(B)FLUORANTHENE	6500	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD33-00	PAH	1-METHYLNAPHTHALENE	140	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	1-METHYLPHENANTHRENE	150	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	2-METHYLNAPHTHALENE	140	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	ACENAPHTHENE	270	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	ANTHRACENE	420	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	BENZO(A)ANTHRACENE	1600	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	BENZO(A)PYRENE	1500	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	BENZO(B)FLUORANTHENE	2500	UG/KG	J	CG	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.), Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	BENZO(E)PYRENE	1000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	BENZO(K)FLUORANTHENE	1100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	CHRYSENE	1700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	DIBENZO(A,H)ANTHRACENE	300	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	DIBENZOTHIOPHENE	93	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	FLUORANTHENE	3800	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	FLUORENE	210	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	INDENO(1,2,3-CD)PYRENE	880	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	NAPHTHALENE	80	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	PERYLENE	340	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	PHENANTHRENE	1900	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00	PAH	PYRENE	2800	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	1-METHYLNAPHTHALENE	300	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	1-METHYLPHENANTHRENE	370	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	2-METHYLNAPHTHALENE	390	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	ACENAPHTHENE	1300	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	ANTHRACENE	1700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	BENZO(A)ANTHRACENE	3600	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	BENZO(A)PYRENE	3100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	BENZO(B)FLUORANTHENE	5000	UG/KG	J	CG	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.), Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	BENZO(E)PYRENE	2000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	BENZO(K)FLUORANTHENE	2000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	CHRYSENE	3500	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	DIBENZO(A,H)ANTHRACENE	590	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	DIBENZOTHIOPHENE	370	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	FLUORANTHENE	8800	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	FLUORENE	950	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	INDENO(1,2,3-CD)PYRENE	1600	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	NAPHTHALENE	350	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	PERYLENE	690	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	PHENANTHRENE	6700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-00-D	PAH	PYRENE	6500	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD33-01	PAH	BENZO(B)FLUORANTHENE	910	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD34-00	PAH	BENZO(B)FLUORANTHENE	420	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD35-00	PAH	BENZO(B)FLUORANTHENE	44000	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD35-01	PAH	BENZO(B)FLUORANTHENE	1100	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD36-00	PAH	BENZO(B)FLUORANTHENE	3900	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD37-00	PAH	BENZO(B)FLUORANTHENE	16000	UG/KG	J	C	Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
AS II	AS12-SD-SD38-00	PAH	1-METHYLPHENANTHRENE	1200	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00	PAH	2-METHYLNAPHTHALENE	1600	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00	PAH	ACENAPHTHENE	5700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00	PAH	BENZO(K)FLUORANTHENE	7300	UG/KG	J	G	Field Duplicate Imprecision

TABLE C-9
DATA VALIDATION QUALIFICATIONS FOR ADDITIONAL SCRUTINY PHASE II SEDIMENT
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

ROUND	SAMPLE	FRACTION	PARAMETER	RESULT	UNITS	VALIDATOR QUALIFIER	QUAL CODE	Reason Code
AS II	AS12-SD-SD38-00	PAH	DIBENZOTHIOPHENE	1400	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00	PAH	FLUORENE	3900	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00	PAH	NAPHTHALENE	2200	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00	PAH	PHENANTHRENE	28000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	1-METHYLPHENANTHRENE	680	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	2,3,5-TRIMETHYLNAPHTHALENE	260	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	2-METHYLNAPHTHALENE	1100	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	ACENAPHTHENE	2400	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	BENZO(K)FLUORANTHENE	3800	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	DIBENZOTHIOPHENE	650	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	FLUORENE	1700	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	NAPHTHALENE	1000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD38-00-D	PAH	PHENANTHRENE	13000	UG/KG	J	G	Field Duplicate Imprecision
AS II	AS12-SD-SD41-00	PAH	1,1-BIPHENYL	24	UG/KG	UJ	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	1-METHYLNAPHTHALENE	24	UG/KG	UJ	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	1-METHYLPHENANTHRENE	69	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	2,3,5-TRIMETHYLNAPHTHALENE	24	UG/KG	UJ	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	2,6-DIMETHYLNAPHTHALENE	24	UG/KG	UJ	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	2-METHYLNAPHTHALENE	34	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	ACENAPHTHENE	160	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	ACENAPHTHYLENE	67	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	ANTHRACENE	200	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	BENZO(A)ANTHRACENE	710	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	BENZO(A)PYRENE	620	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	BENZO(B)FLUORANTHENE	1100	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	BENZO(E)PYRENE	410	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	BENZO(G,H,I)PERYLENE	380	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	BENZO(K)FLUORANTHENE	270	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	CHRYSENE	690	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	DIBENZO(A,H)ANTHRACENE	110	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	DIBENZOTHIOPHENE	48	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	FLUORANTHENE	1500	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	FLUORENE	100	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	INDENO(1,2,3-CD)PYRENE	360	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	NAPHTHALENE	70	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	PERYLENE	140	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	PHENANTHRENE	850	UG/KG	J	D	MS/MSD Recovery Noncompliance
AS II	AS12-SD-SD41-00	PAH	PYRENE	1300	UG/KG	J	D	MS/MSD Recovery Noncompliance

TABLE C-10
RANGE OF NON-DETECT DATA FOR THE ADDITIONAL SCRUTINY PHASE II SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	FOD	Minimum Non-Detect	Maximum Non-Detect	Target MDL
Polynuclear Aromatic Hydrocarbons (ug/kg)				
1,1-BIPHENYL	17/46	5.4	**1500**	20
1-METHYLNAPHTHALENE	38/46	7.6	**1500**	20
1-METHYLPHENANTHRENE	46/46			20
2,3,5-TRIMETHYLNAPHTHALENE	16/46	5.4	**1500**	20
2,6-DIMETHYLNAPHTHALENE	27/46	7.6	**1500**	20
2-METHYLNAPHTHALENE	45/46	**87**	**87**	20
ACENAPHTHENE	45/46	4.2	4.2	20
ACENAPHTHYLENE	26/46	**39**	**1500**	20
ANTHRACENE	46/46			20
BENZO(A)ANTHRACENE	46/46			20
BENZO(A)PYRENE	46/46			20
BENZO(B)FLUORANTHENE	46/46			20
BENZO(E)PYRENE	46/46			20
BENZO(G,H,I)PERYLENE	46/46			20
BENZO(K)FLUORANTHENE	46/46			20
CHRYSENE	46/46			20
DIBENZO(A,H)ANTHRACENE	46/46			20
DIBENZOTHIOPHENE	46/46			20
FLUORANTHENE	46/46			20
FLUORENE	46/46			20
INDENO(1,2,3-CD)PYRENE	46/46			20
NAPHTHALENE	46/46			20
PERYLENE	46/46			20
PHENANTHRENE	46/46			20
PYRENE	46/46			20
Inorganics (mg/kg)				
COPPER	1/1			5
LEAD	50/50			5

Notes:
- Shading indicates the nondetected result exceeded the target MDL.
- The sample and duplicate were counted as two separate samples when determining the minimum and maximum detected concentrations, but were only counted as as one sample when determining the frequency of detection.

Associated Samples

AS05-SD-SD15	AS12-SD-SD22-00-D	AS12-SD-SD34-00
AS12-SD-SD100-00	AS12-SD-SD23-00	AS12-SD-SD34-01
AS12-SD-SD100-01	AS12-SD-SD23-01	AS12-SD-SD35-00
AS12-SD-SD101-00	AS12-SD-SD24-00	AS12-SD-SD35-01
AS12-SD-SD102-00	AS12-SD-SD24-01	AS12-SD-SD36-00
AS12-SD-SD103-00	AS12-SD-SD25-00	AS12-SD-SD37-00
AS12-SD-SD103-00-AVG	AS12-SD-SD25-01	AS12-SD-SD38-00
AS12-SD-SD103-00-D	AS12-SD-SD26-00	AS12-SD-SD38-00-AVG
AS12-SD-SD103-01	AS12-SD-SD27-00	AS12-SD-SD38-00-D

TABLE C-10
RANGE OF NON-DETECT DATA FOR THE ADDITIONAL SCRUTINY PHASE II SEDIMENT DATA COMPARED TO THE TARGET MDL
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

AS12-SD-SD104-00	AS12-SD-SD28-00	AS12-SD-SD39-00
AS12-SD-SD105-00	AS12-SD-SD29-00	AS12-SD-SD40-00
AS12-SD-SD106-00	AS12-SD-SD30-00	AS12-SD-SD41-00
AS12-SD-SD10700	AS12-SD-SD31-00	AS12-SD-SD42-00
AS12-SD-SD10800	AS12-SD-SD32-00	AS12-SD-SD43-00
AS12-SD-SD10900	AS12-SD-SD32-01	AS12-SD-SD44-00
AS12-SD-SD20-00	AS12-SD-SD33-00	AS12-SD-SD45-00
AS12-SD-SD21-00	AS12-SD-SD33-00-AVG	AS12-SD-SD46-00
AS12-SD-SD21-01	AS12-SD-SD33-00-D	AS12-SD-SD49-00
AS12-SD-SD22-00	AS12-SD-SD33-01	AS12-SD-SD50-00
AS12-SD-SD22-00-AVG		

APPENDIX D

CONCENTRATION TREND PLOTS

D.1 CONCENTRATION PLOTS AT MS-02

D.2 CONCENTRATION PLOTS AT MS-05

D.3 CONCENTRATION PLOTS AT MS-06

D.4 CONCENTRATION PLOTS AT MS-07

D.5 CONCENTRATION PLOTS AT MS-08

D.6 CONCENTRATION PLOTS AT MS-09

D.7 CONCENTRATION PLOTS AT MS-10

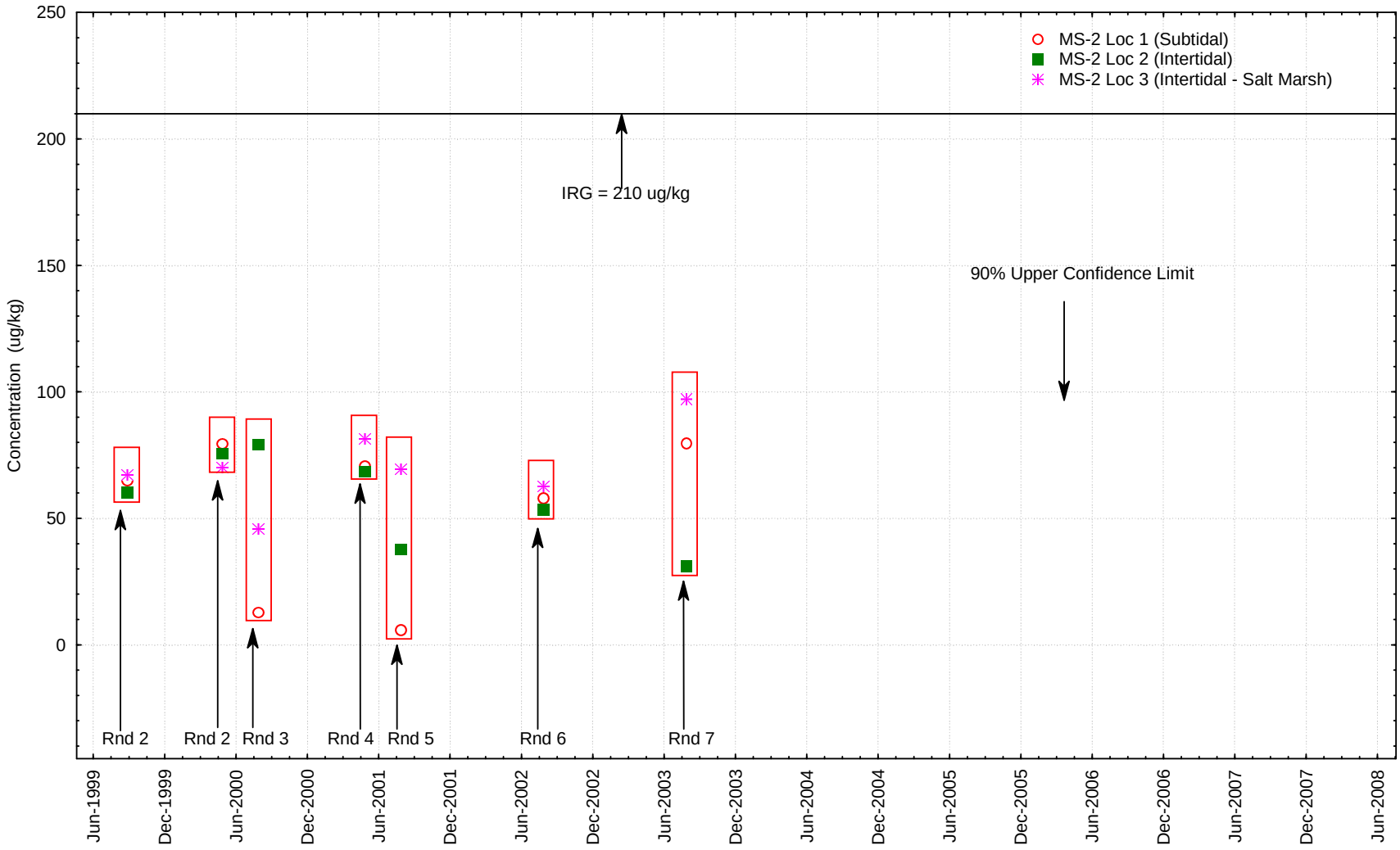
D.8 CONCENTRATION PLOTS AT MS-13

D.9 CONCENTRATION PLOTS AT MS-14

D.10 CONCENTRATION PLOTS AT REFERENCE STATIONS

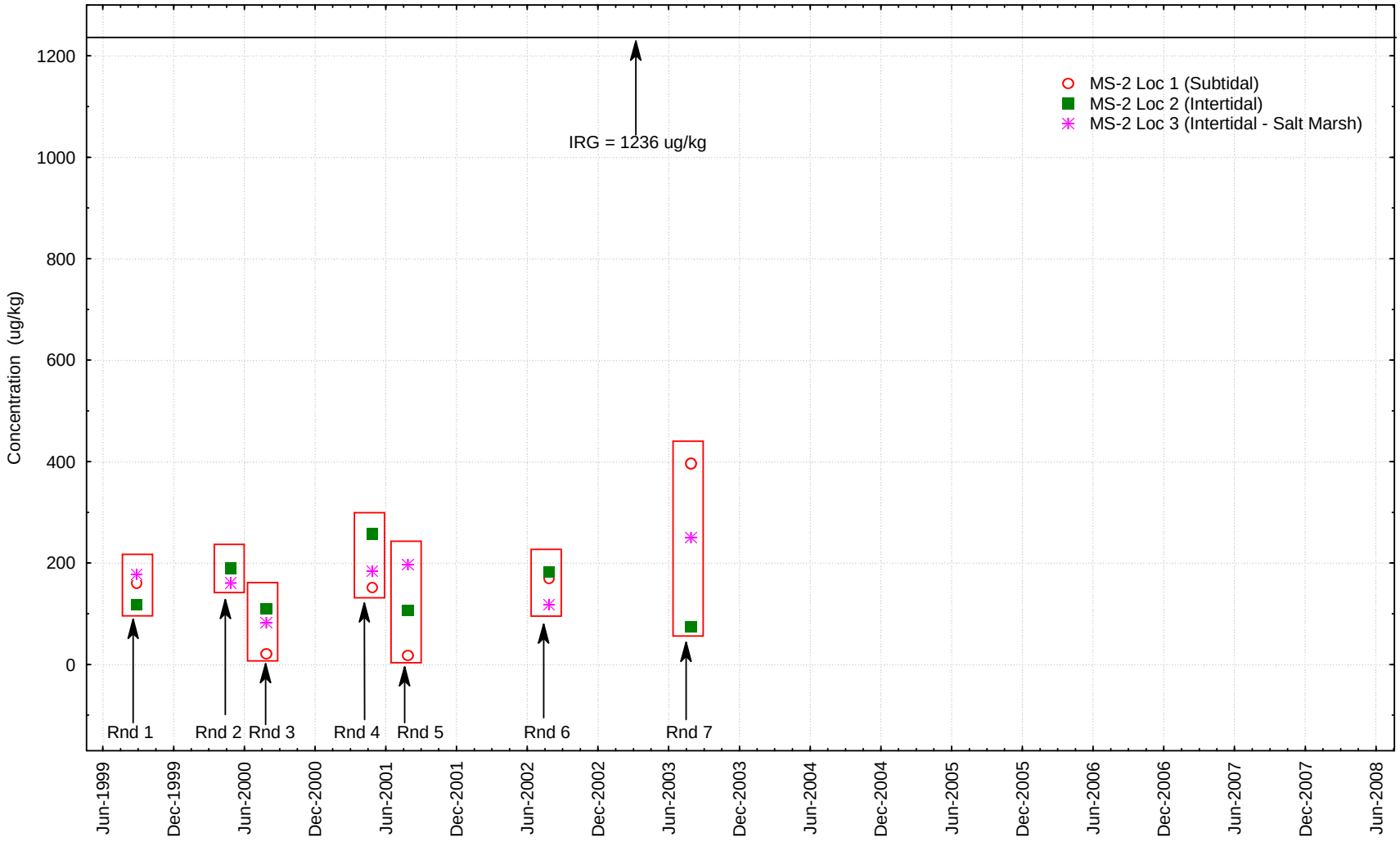
D.1 CONCENTRATION PLOTS AT MS-02

Monitoring Station 2 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



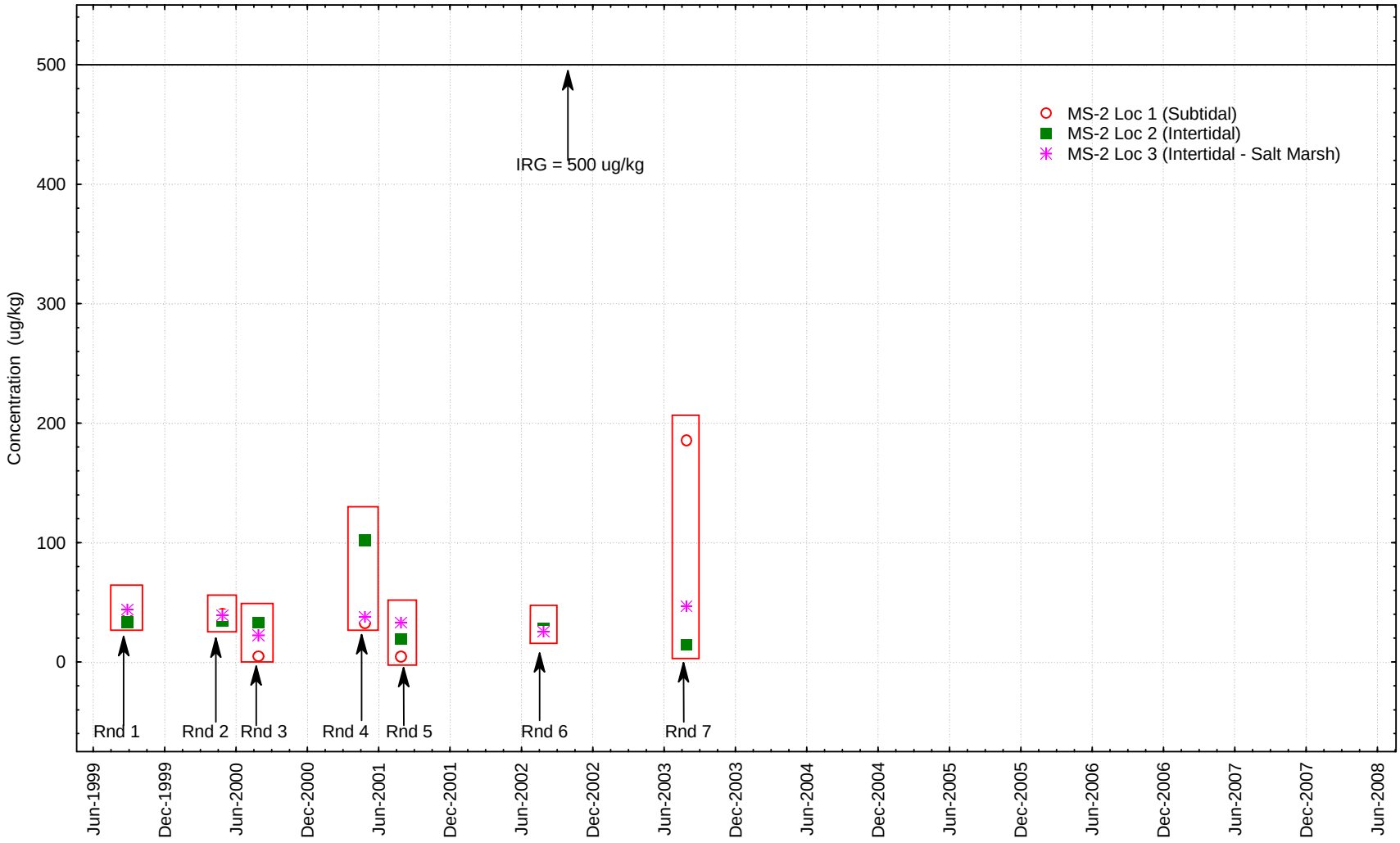
June 5, 2009

Monitoring Station 2 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



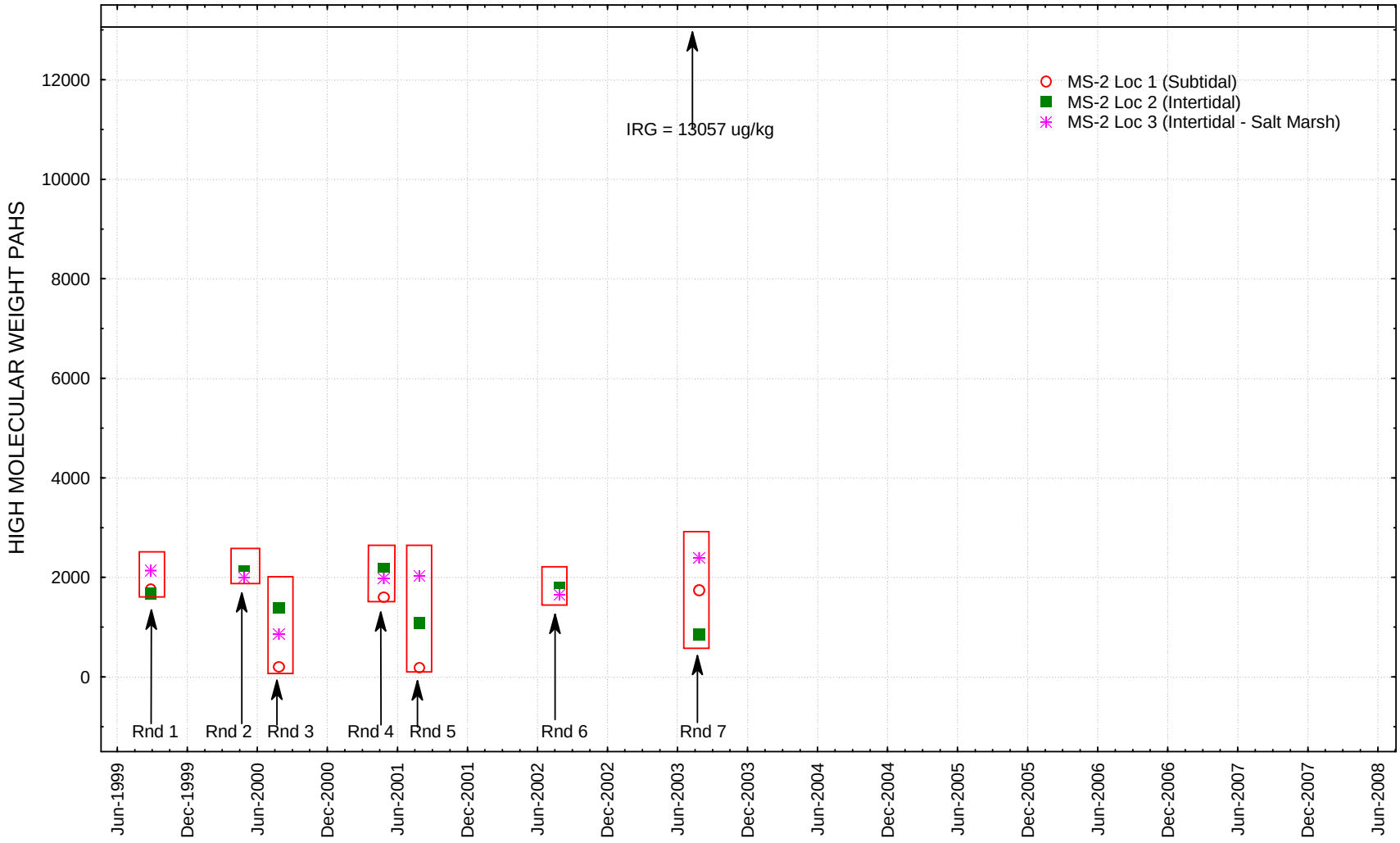
June 5, 2009

Monitoring Station 2 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



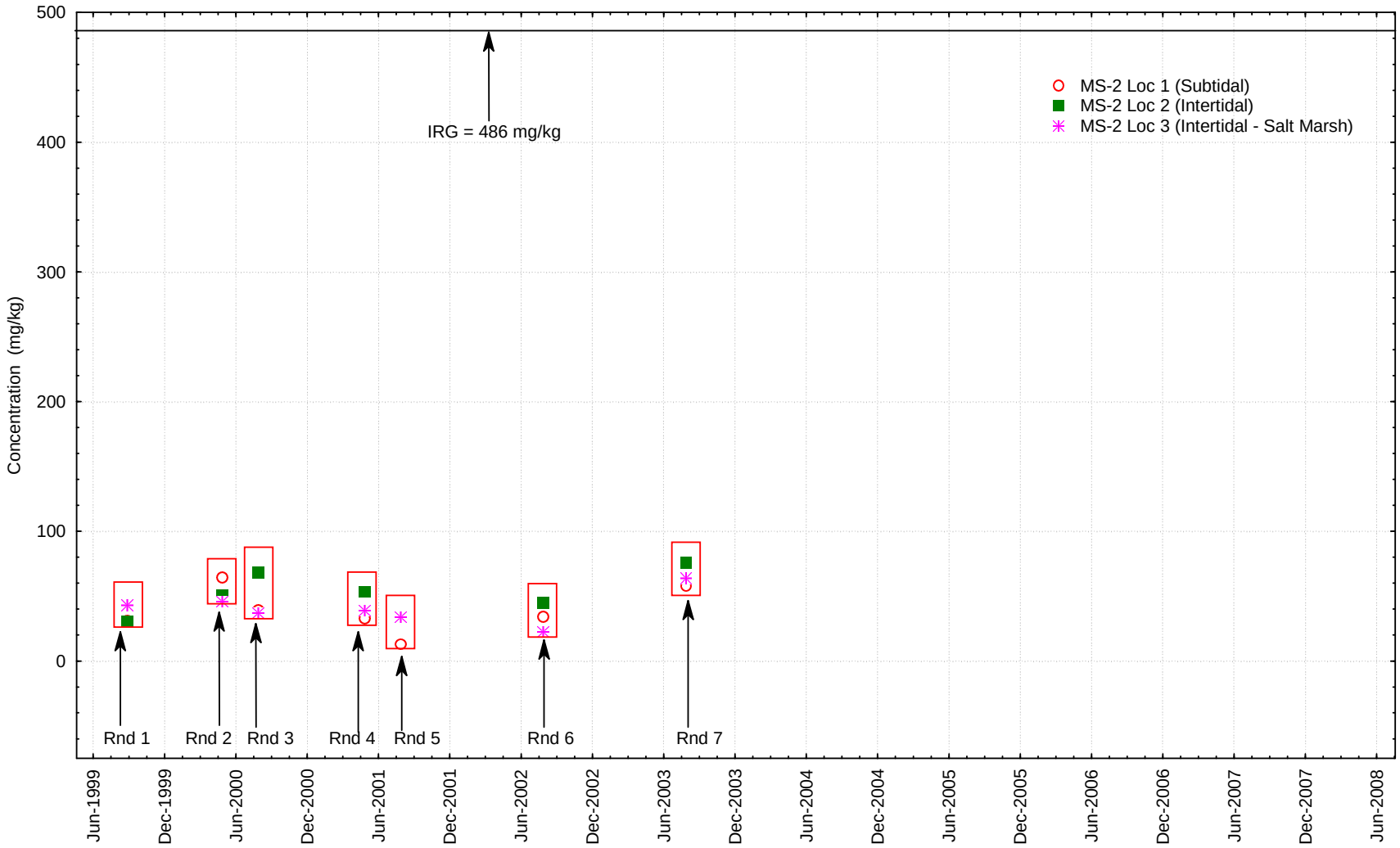
June 5, 2009

Monitoring Station 2 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



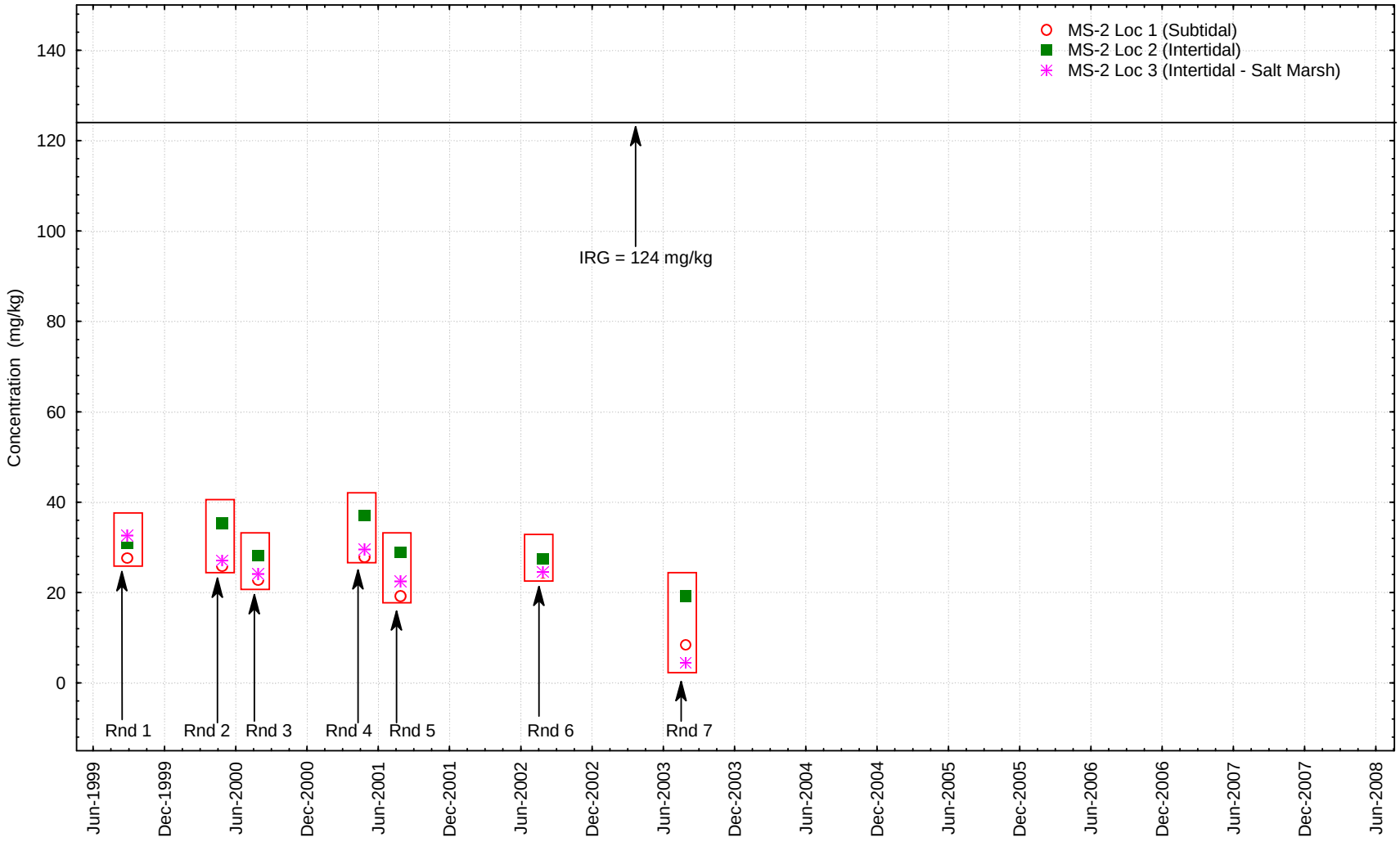
June 5, 2009

Monitoring Station 2 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

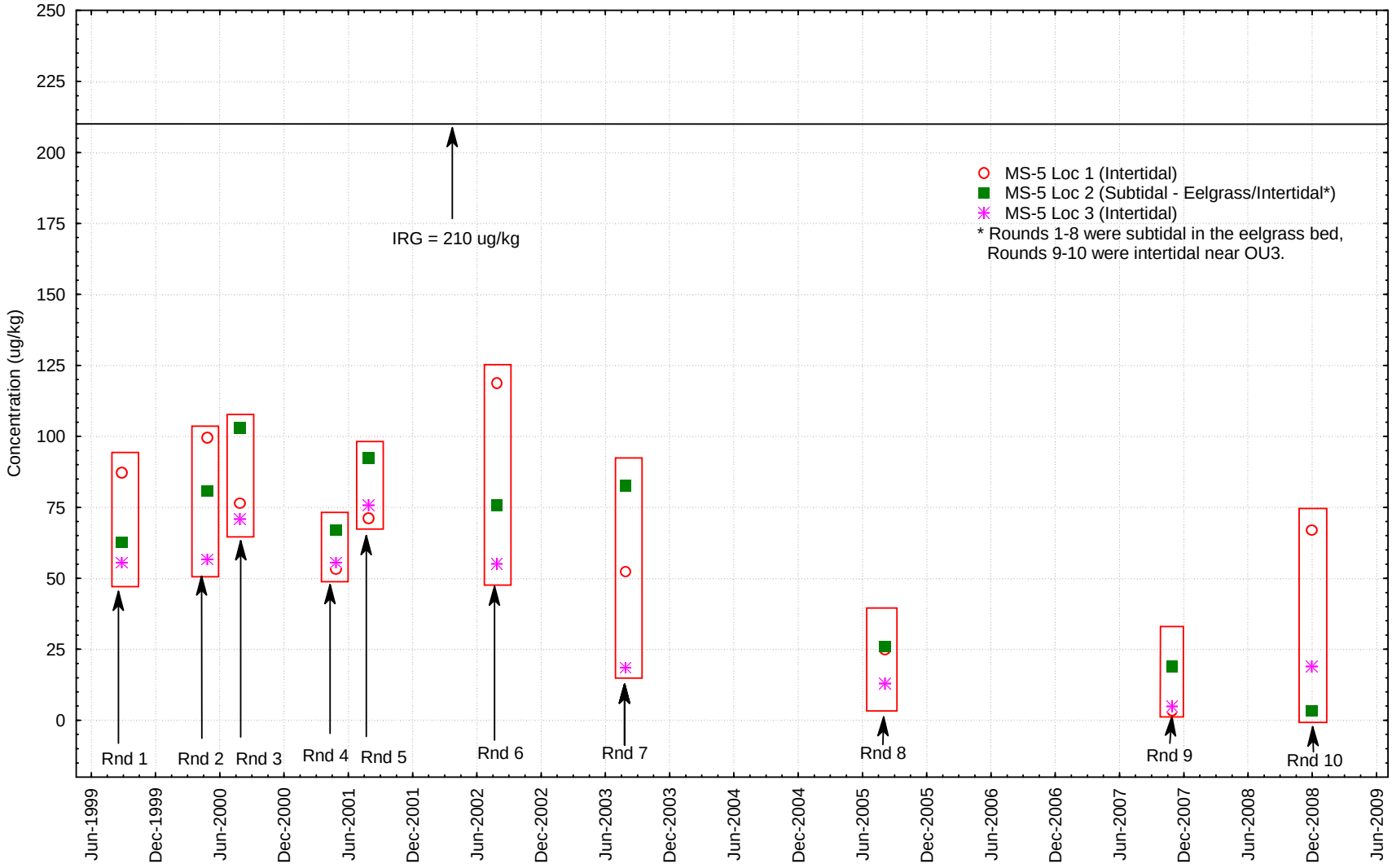
Monitoring Station 2 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

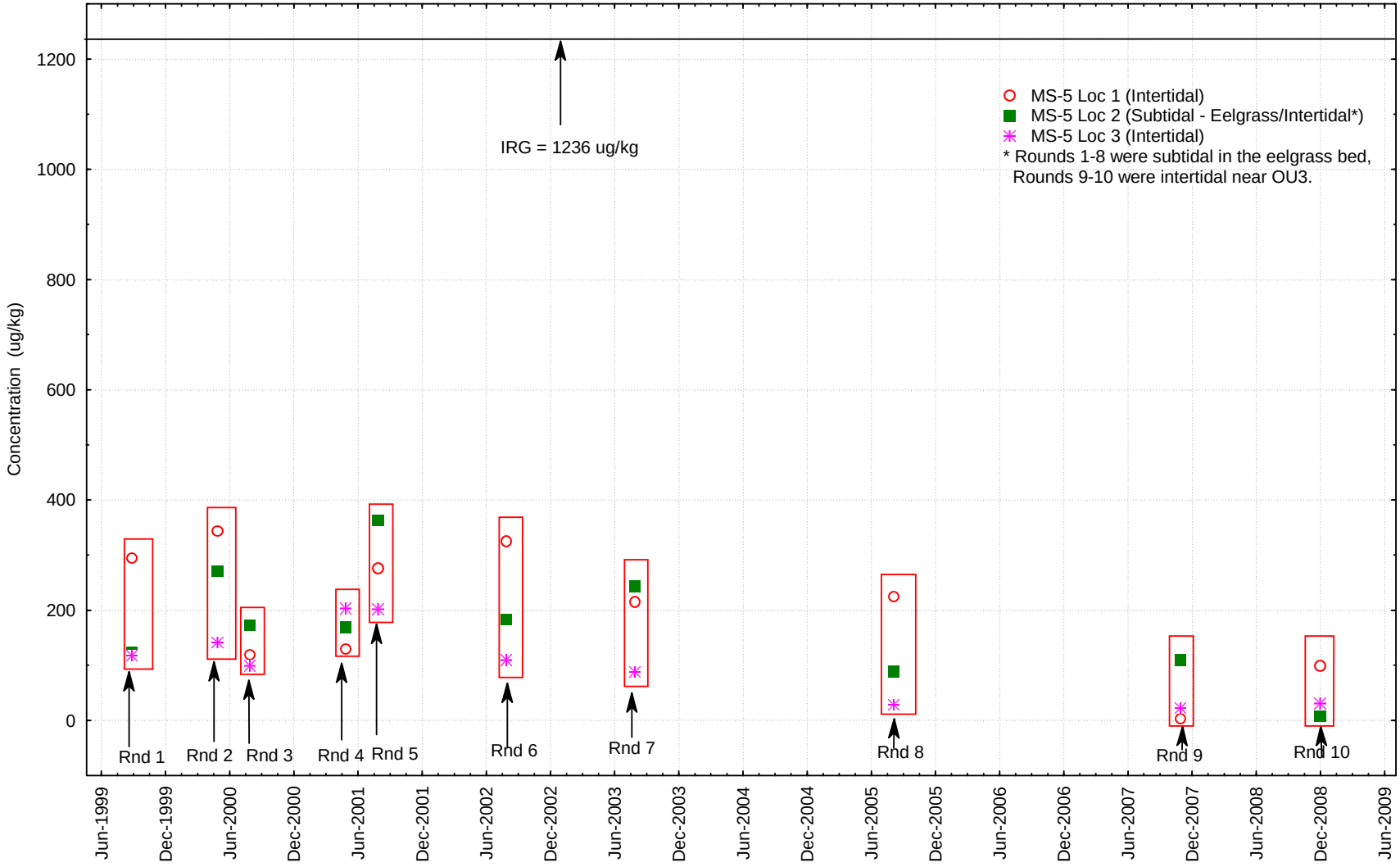
D.2 CONCENTRATION PLOTS AT MS-05

Monitoring Station 5 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



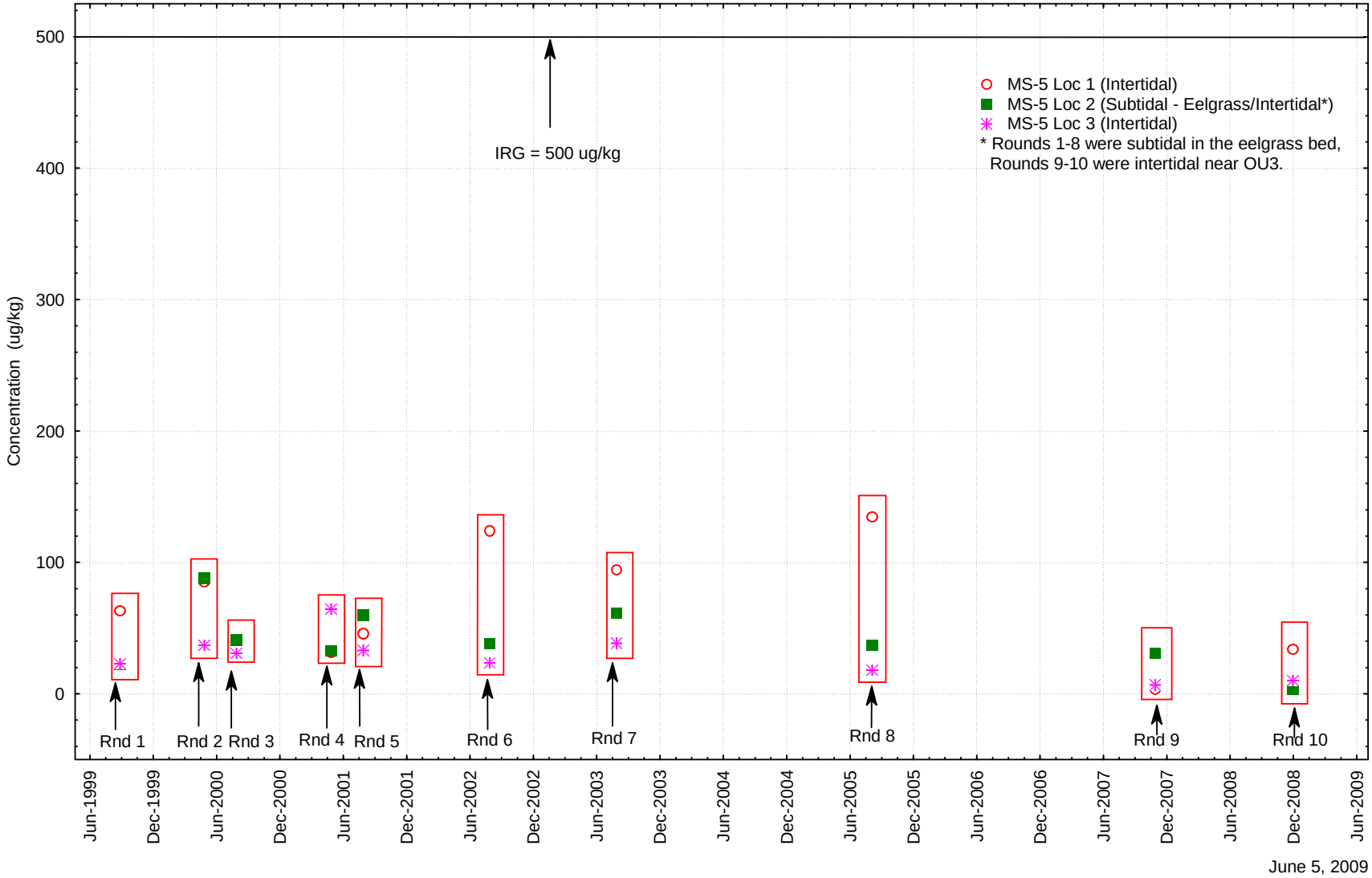
June 5, 2009

Monitoring Station 5 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



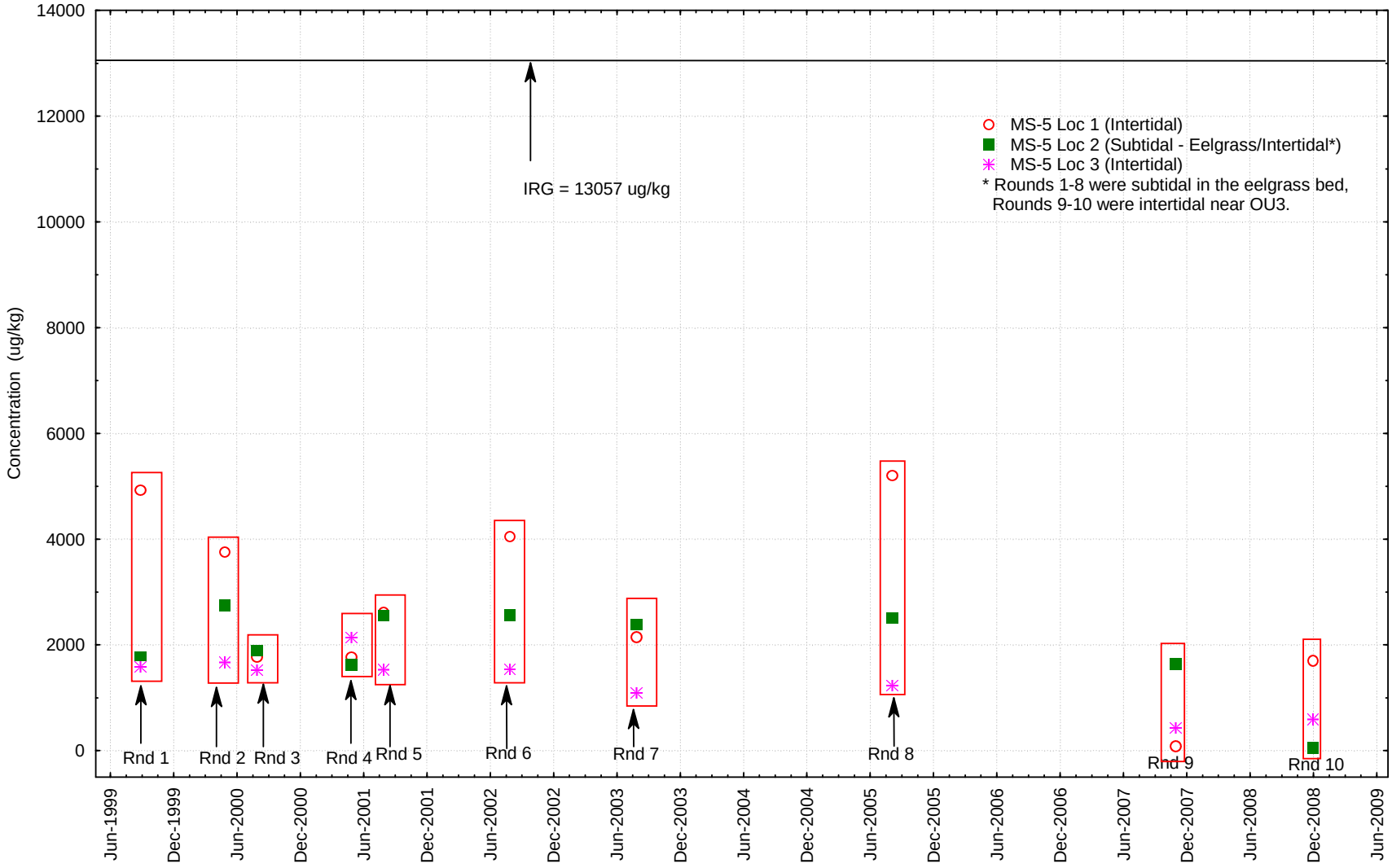
June 5, 2009

Monitoring Station 5 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



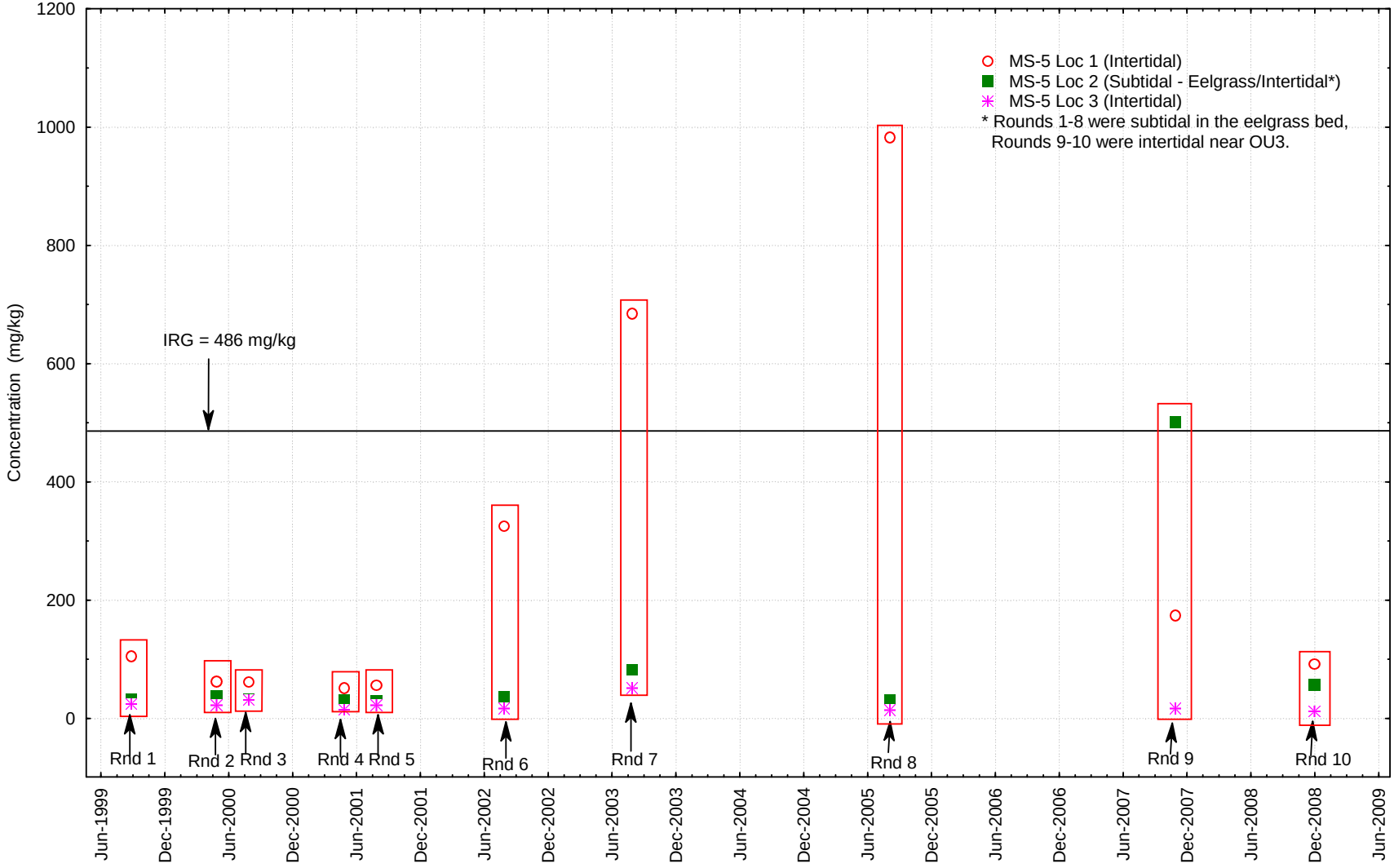
June 5, 2009

Monitoring Station 5 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



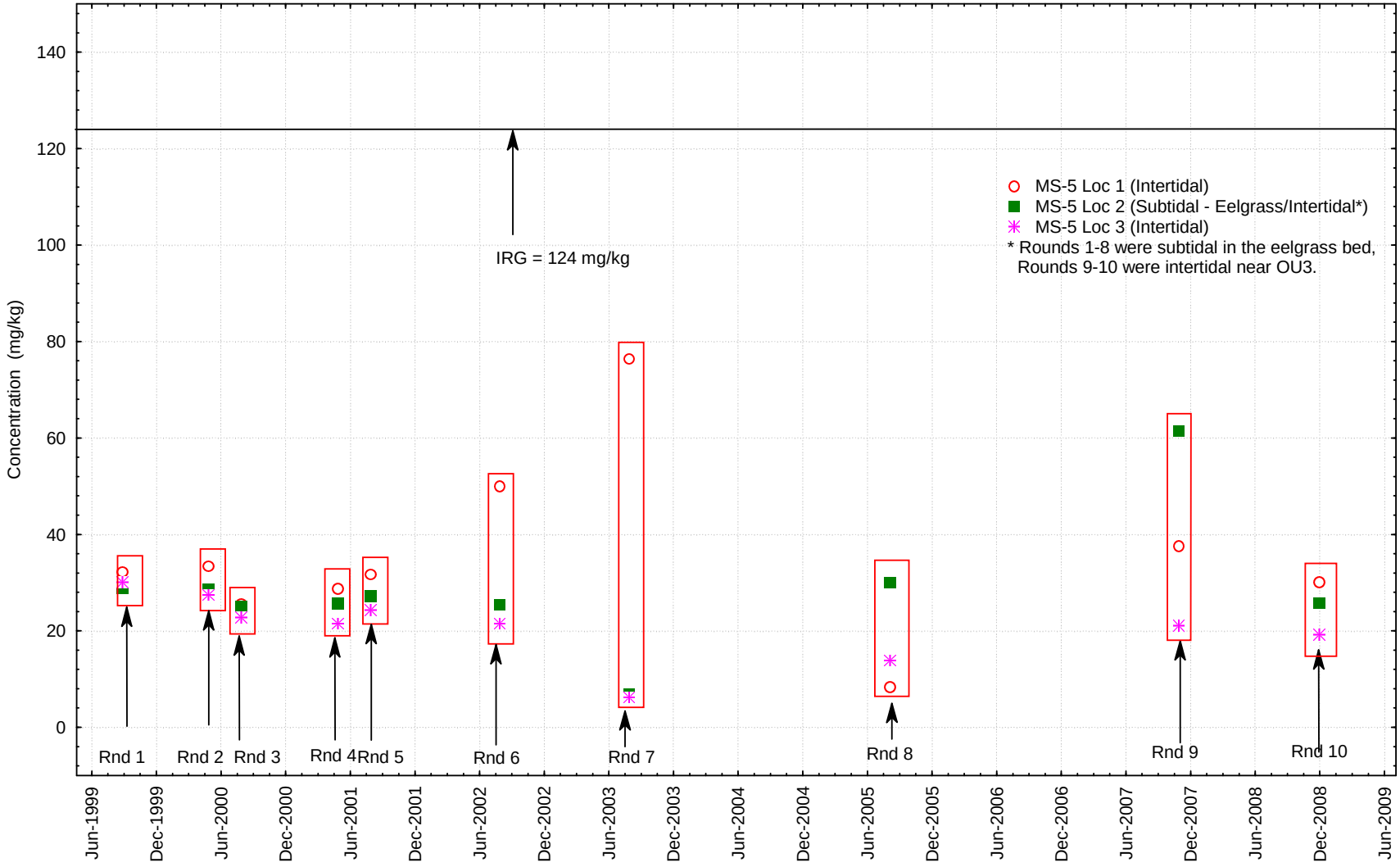
June 5, 2009

Monitoring Station 5 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



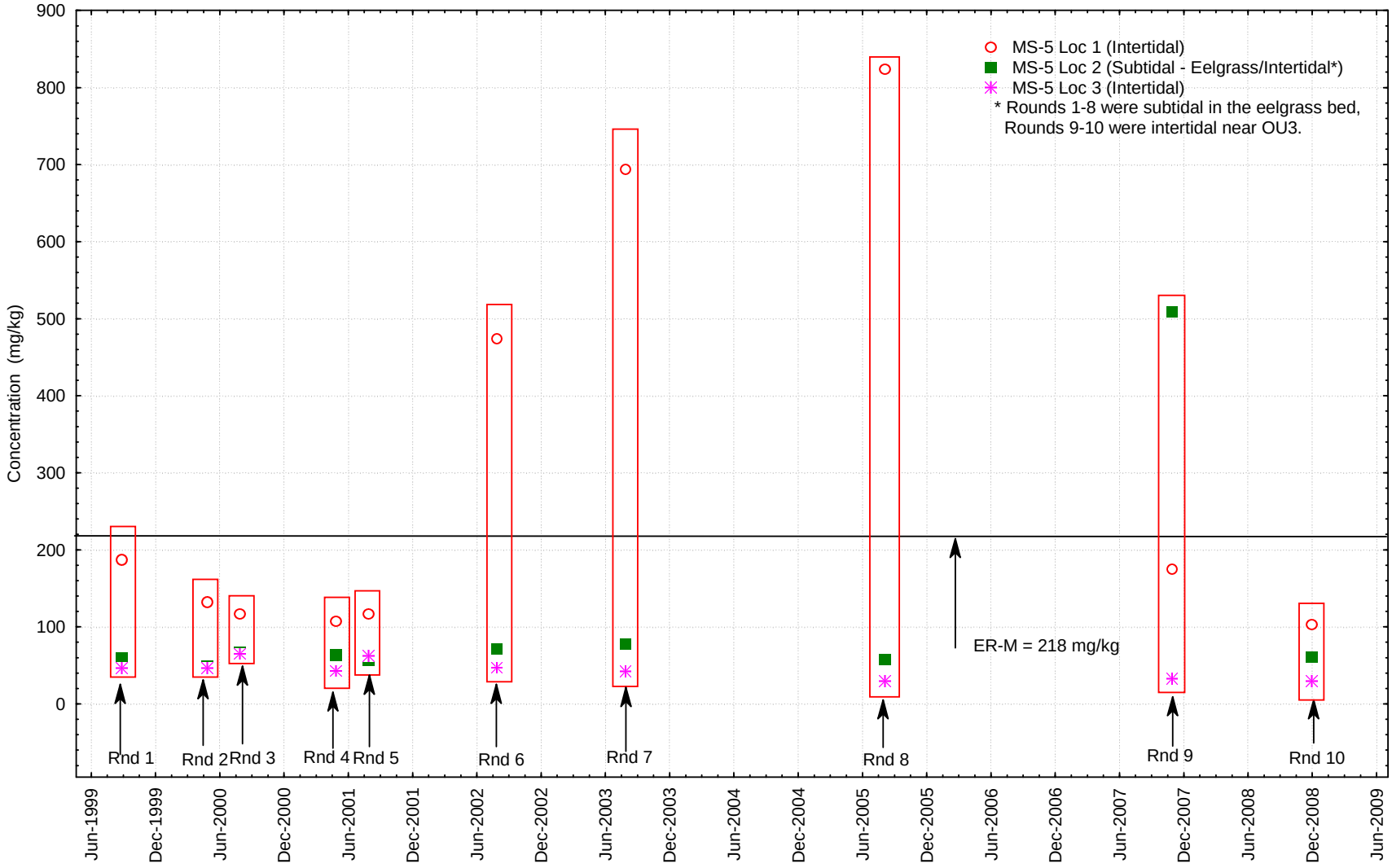
November 30, 2009

Monitoring Station 5 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

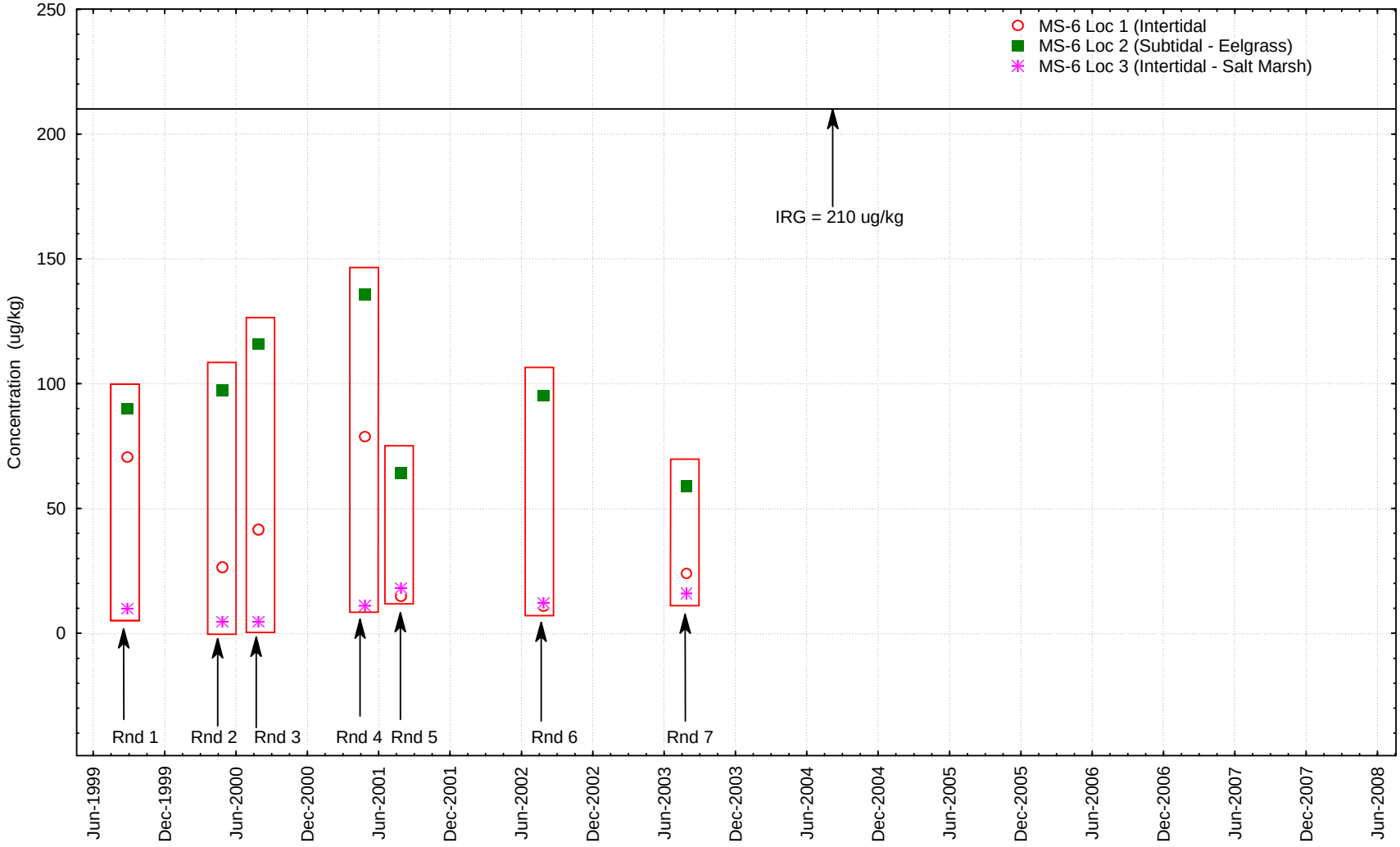
Monitoring Station 5 - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

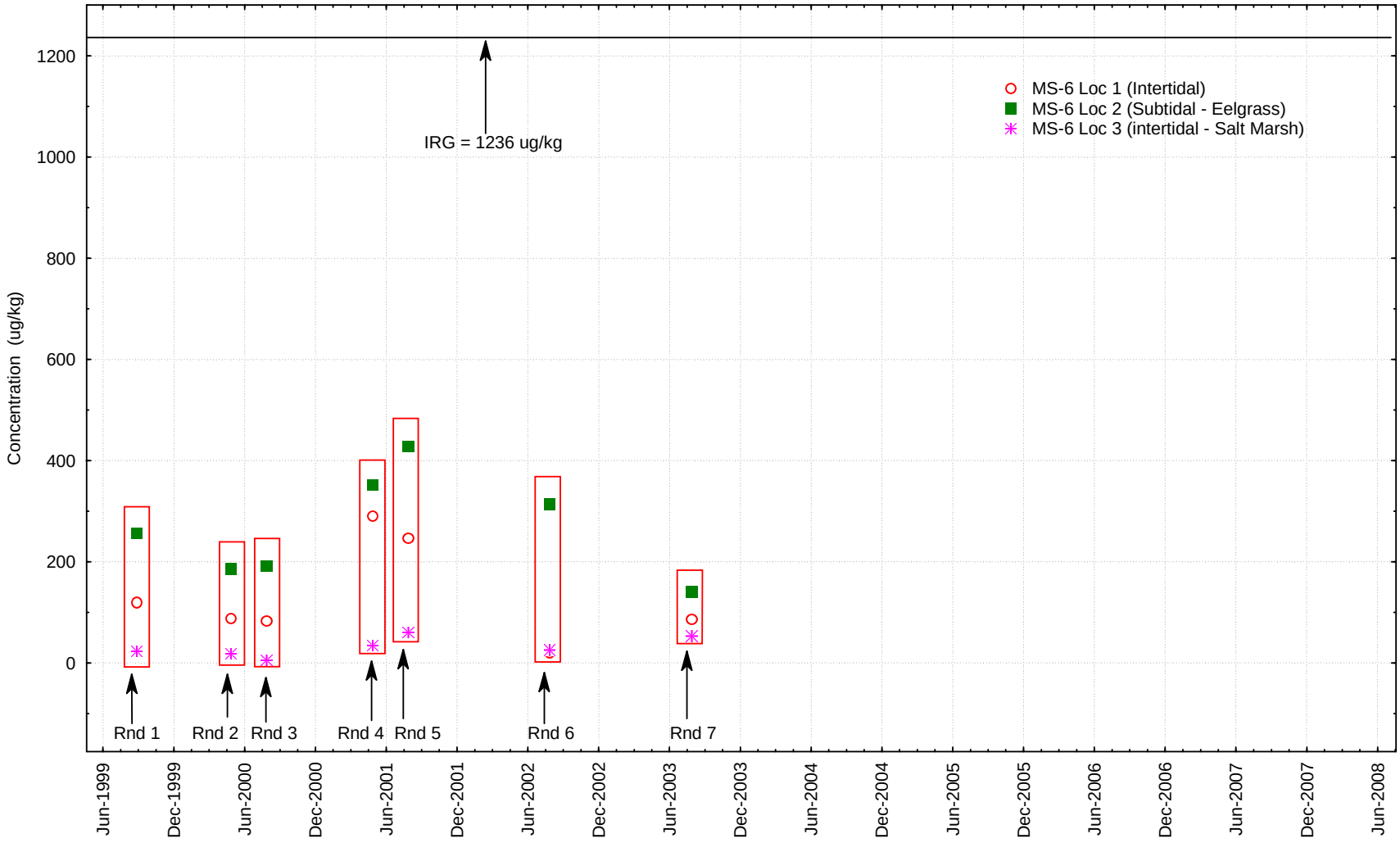
D.3 CONCENTRATION PLOTS AT MS-06

Monitoring Station 6 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



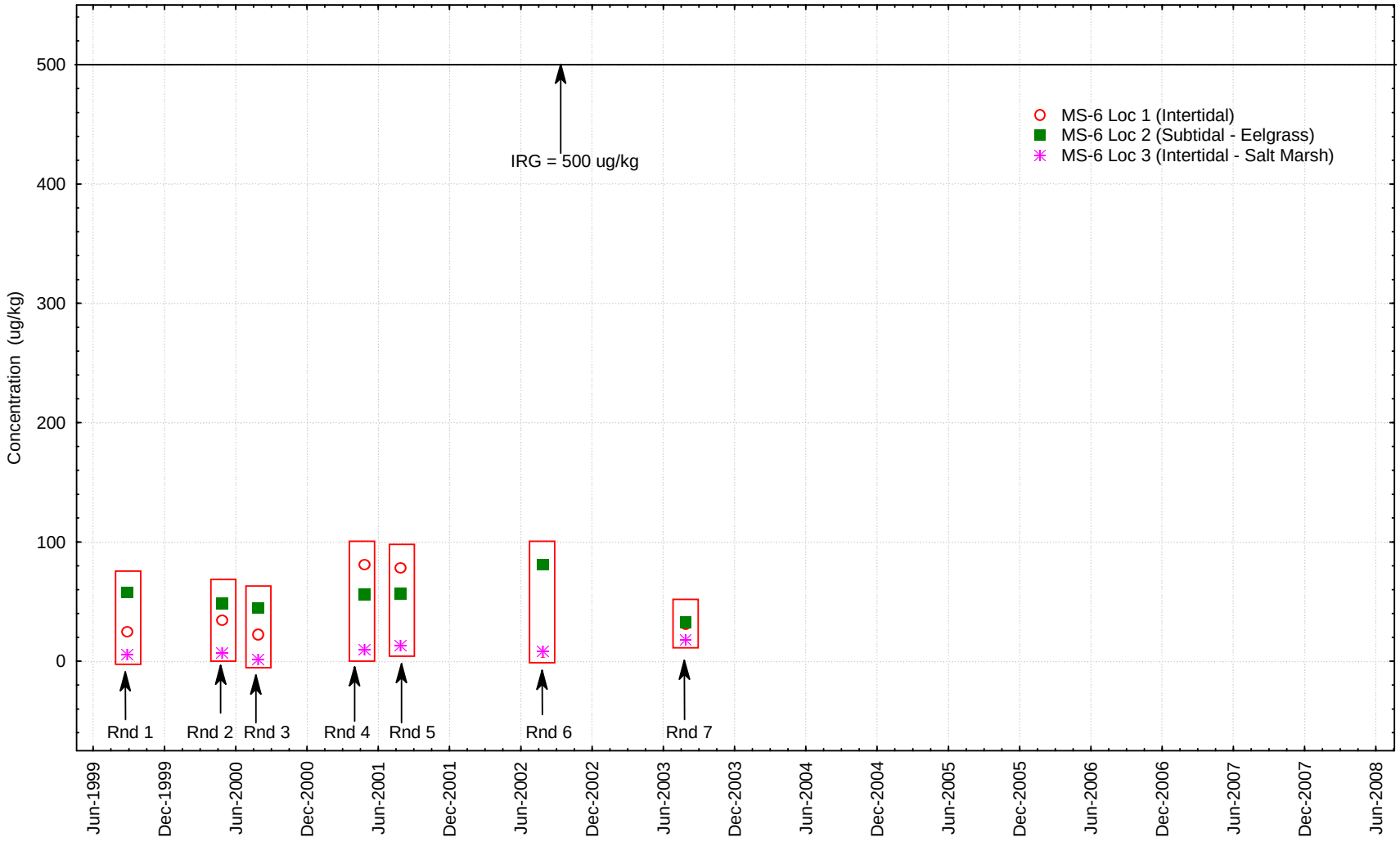
June 5, 2009

Monitoring Station 6 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



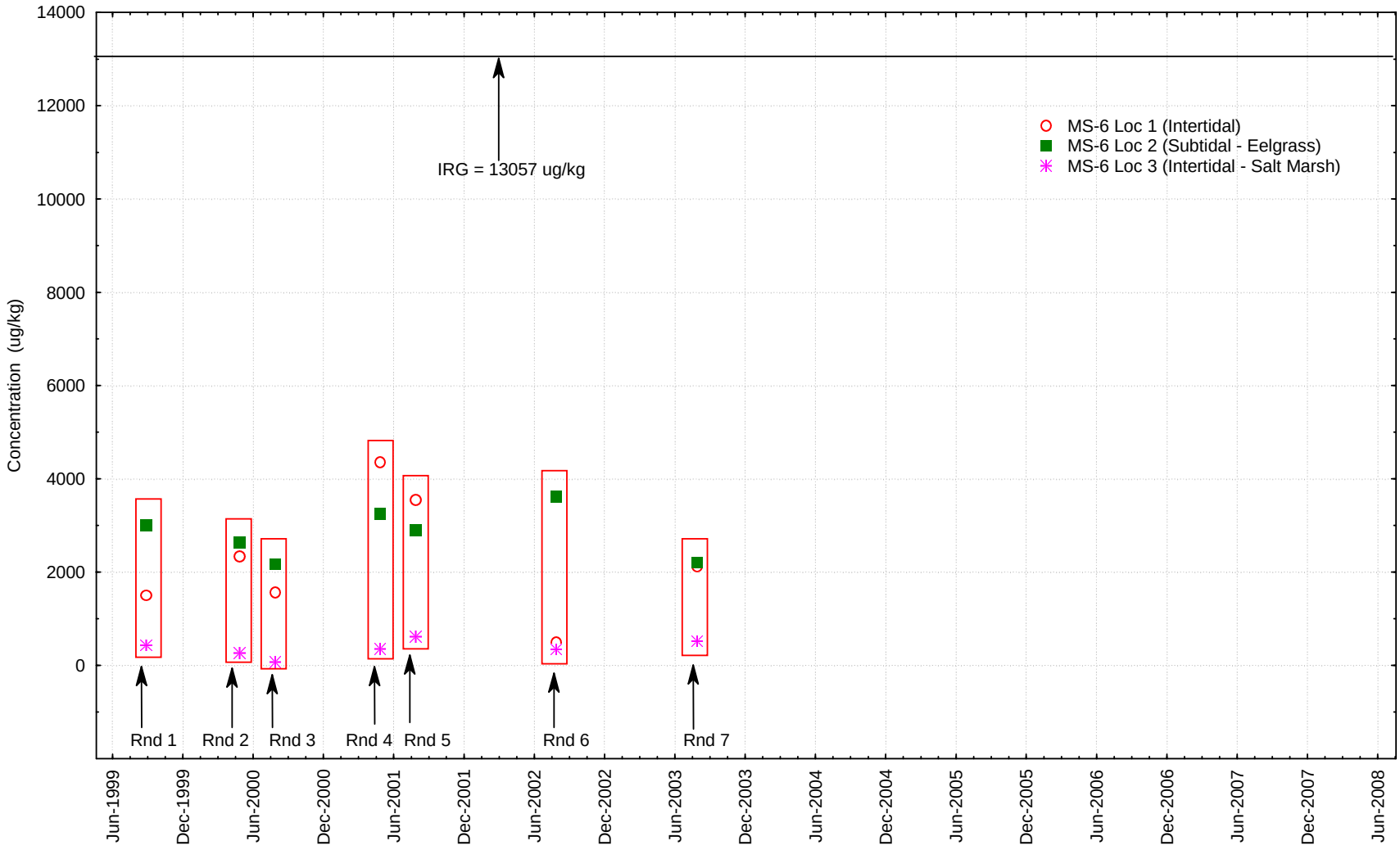
June 5, 2009

Monitoring Station 6 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



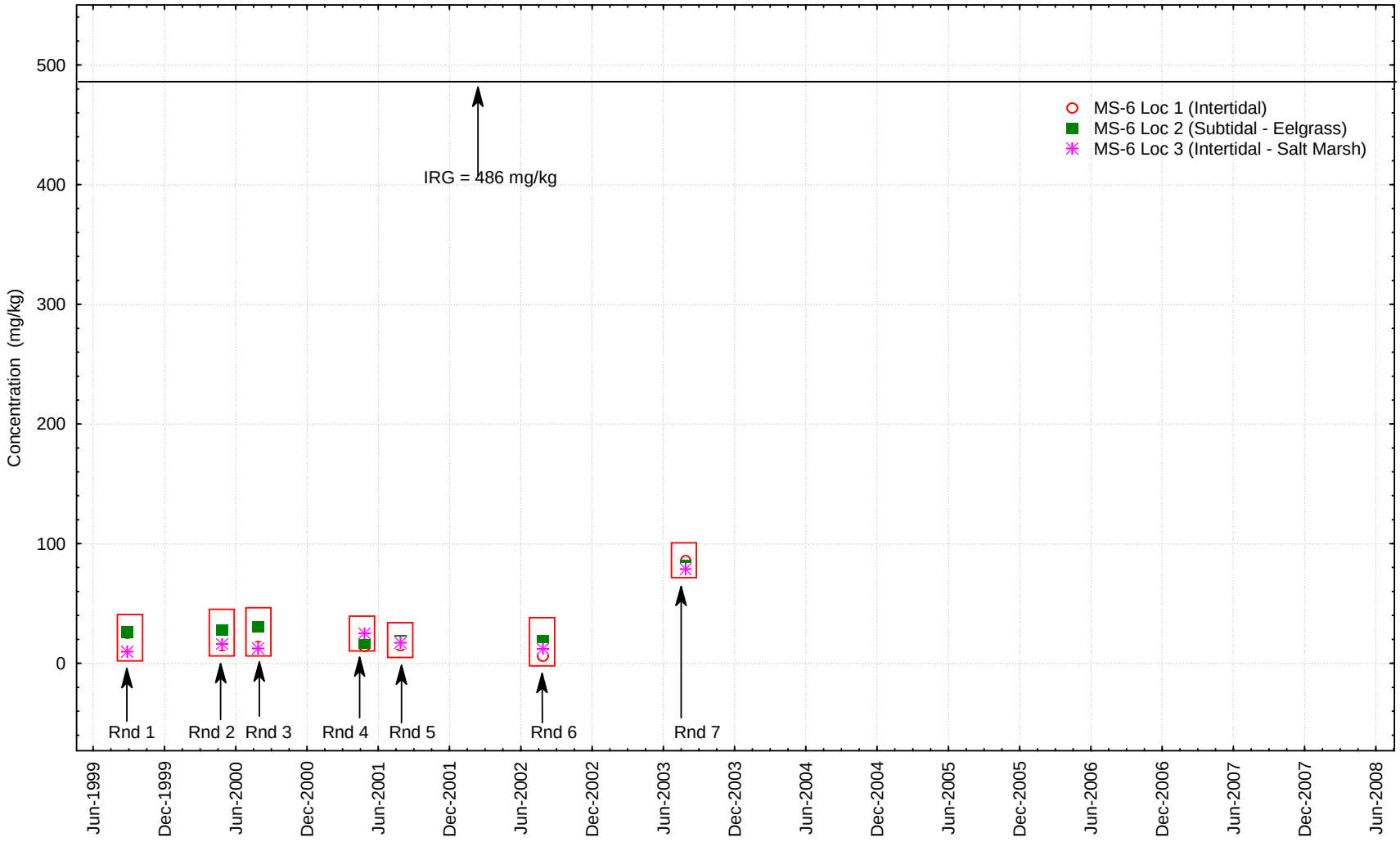
June 5, 2009

Monitoring Station 6 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



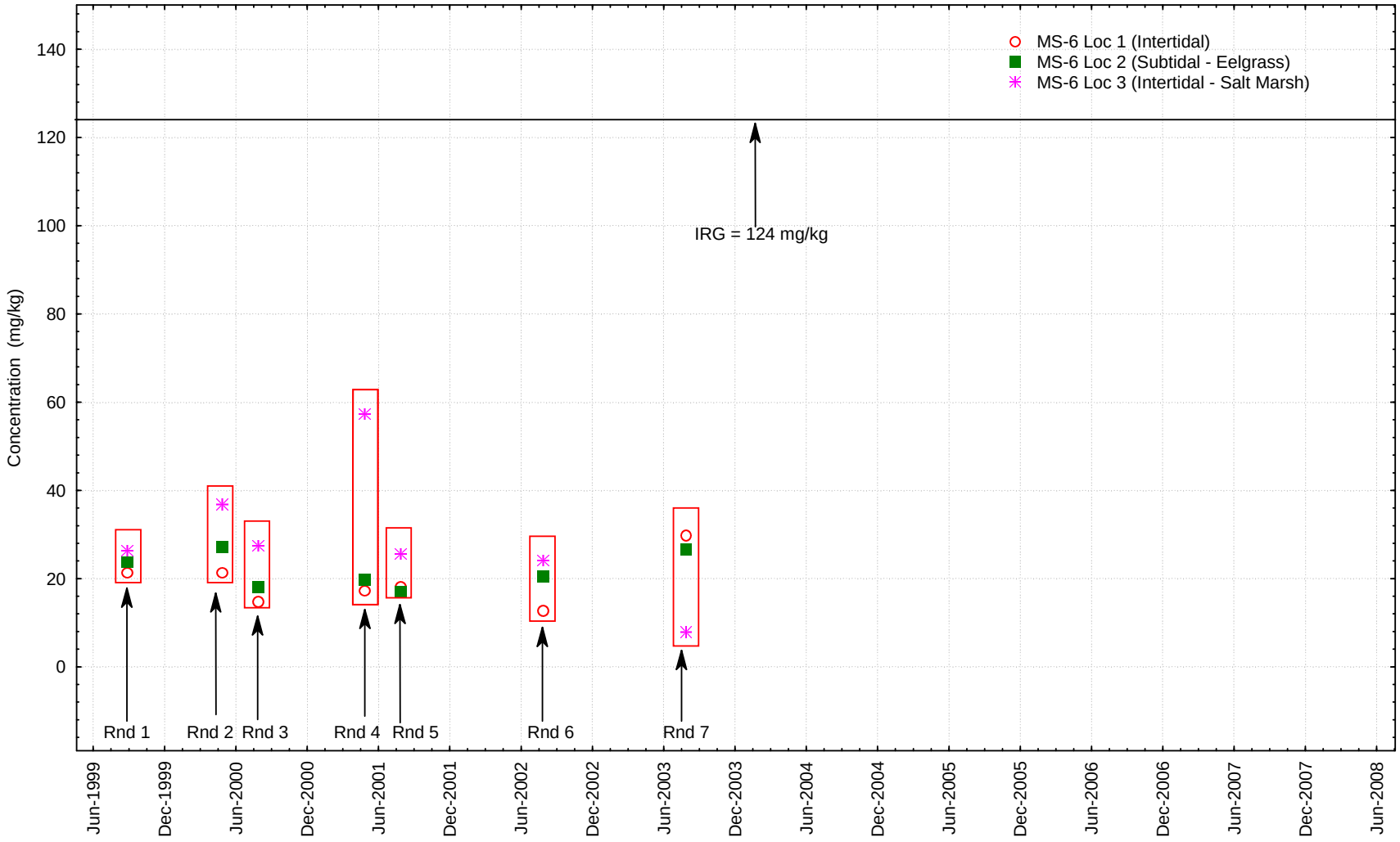
June 5, 2009

Monitoring Station 6 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

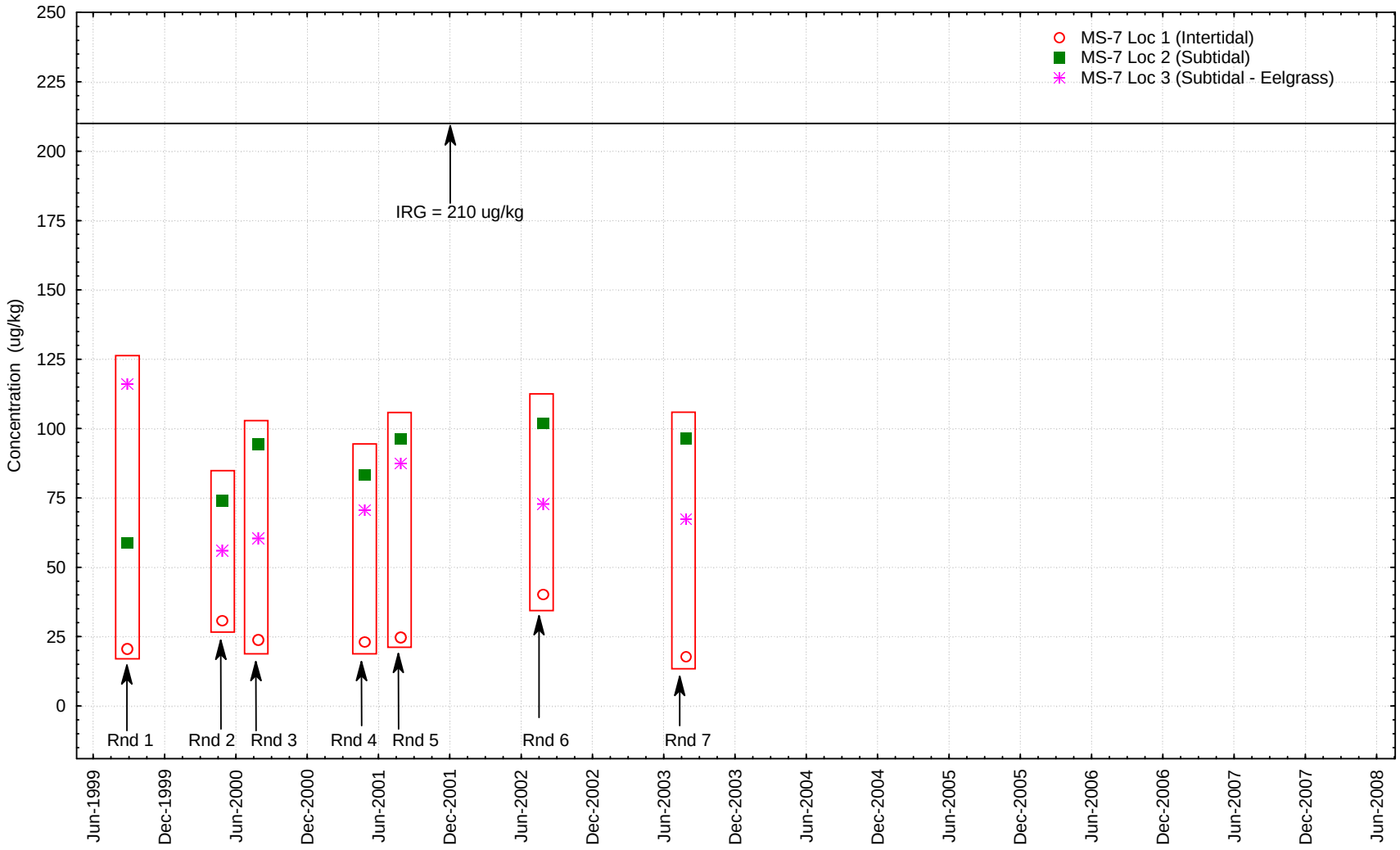
Monitoring Station 6 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

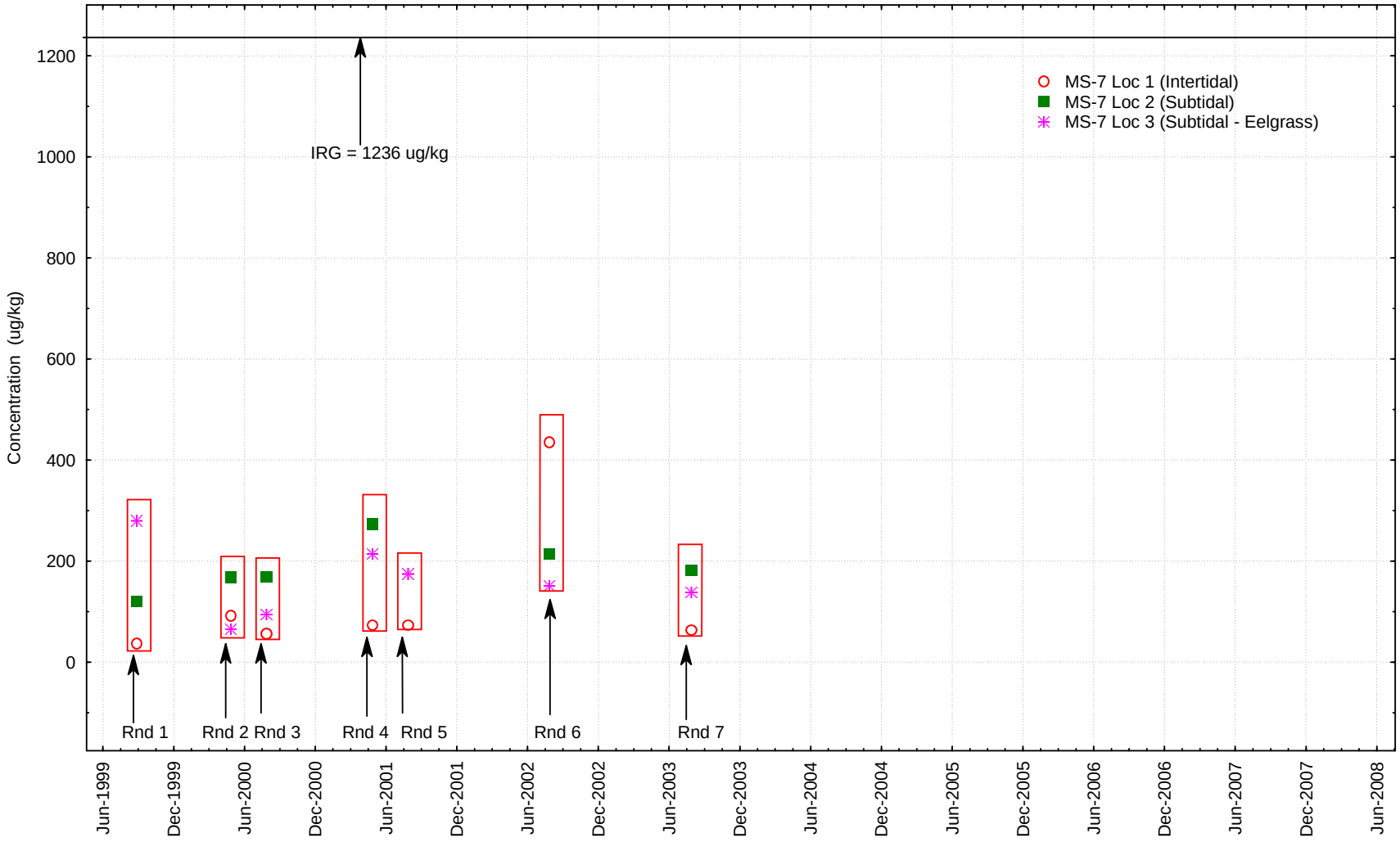
D.4 CONCENTRATION PLOTS AT MS-07

Monitoring Station 7 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



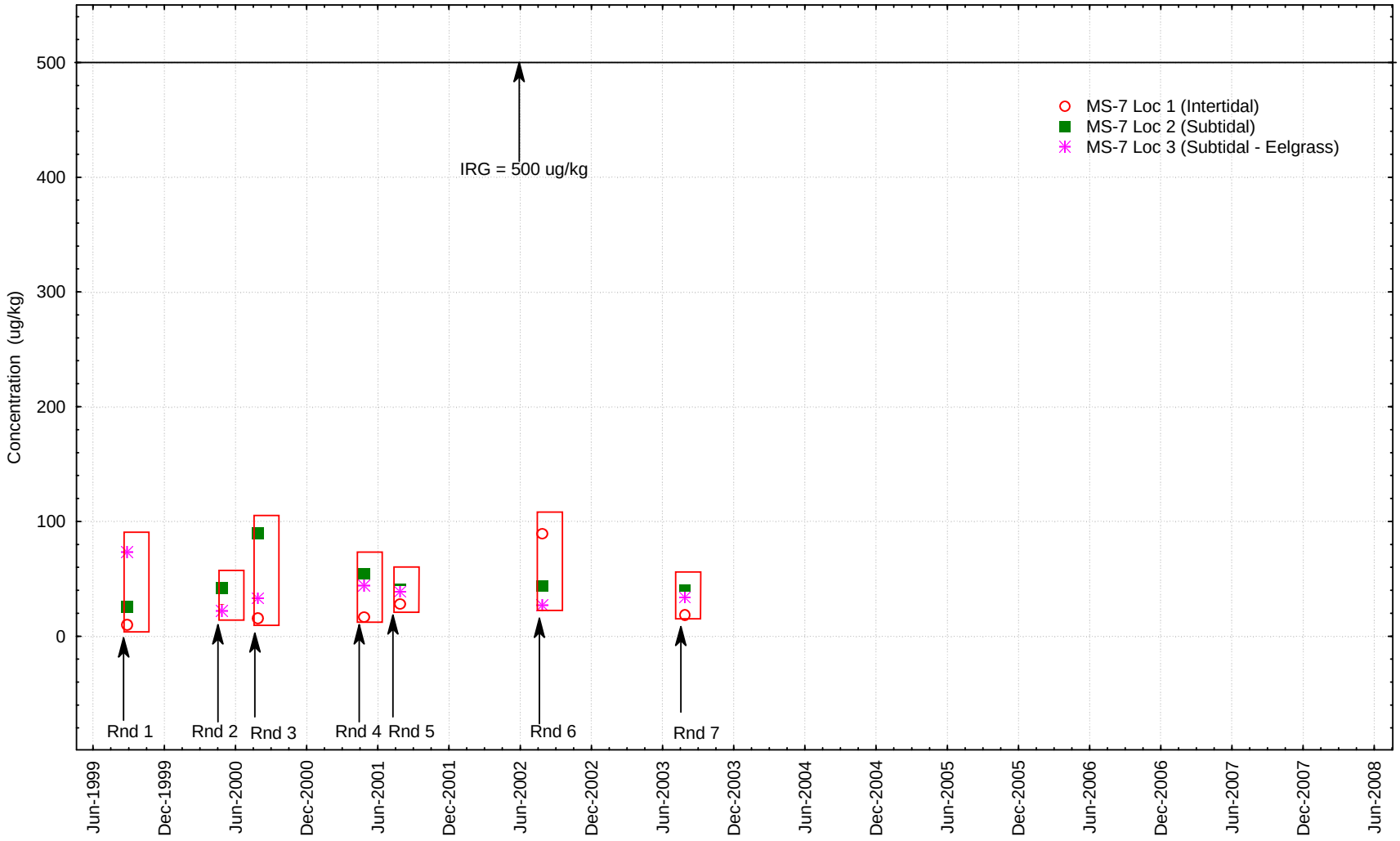
June 5, 2009

Monitoring Station 7 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



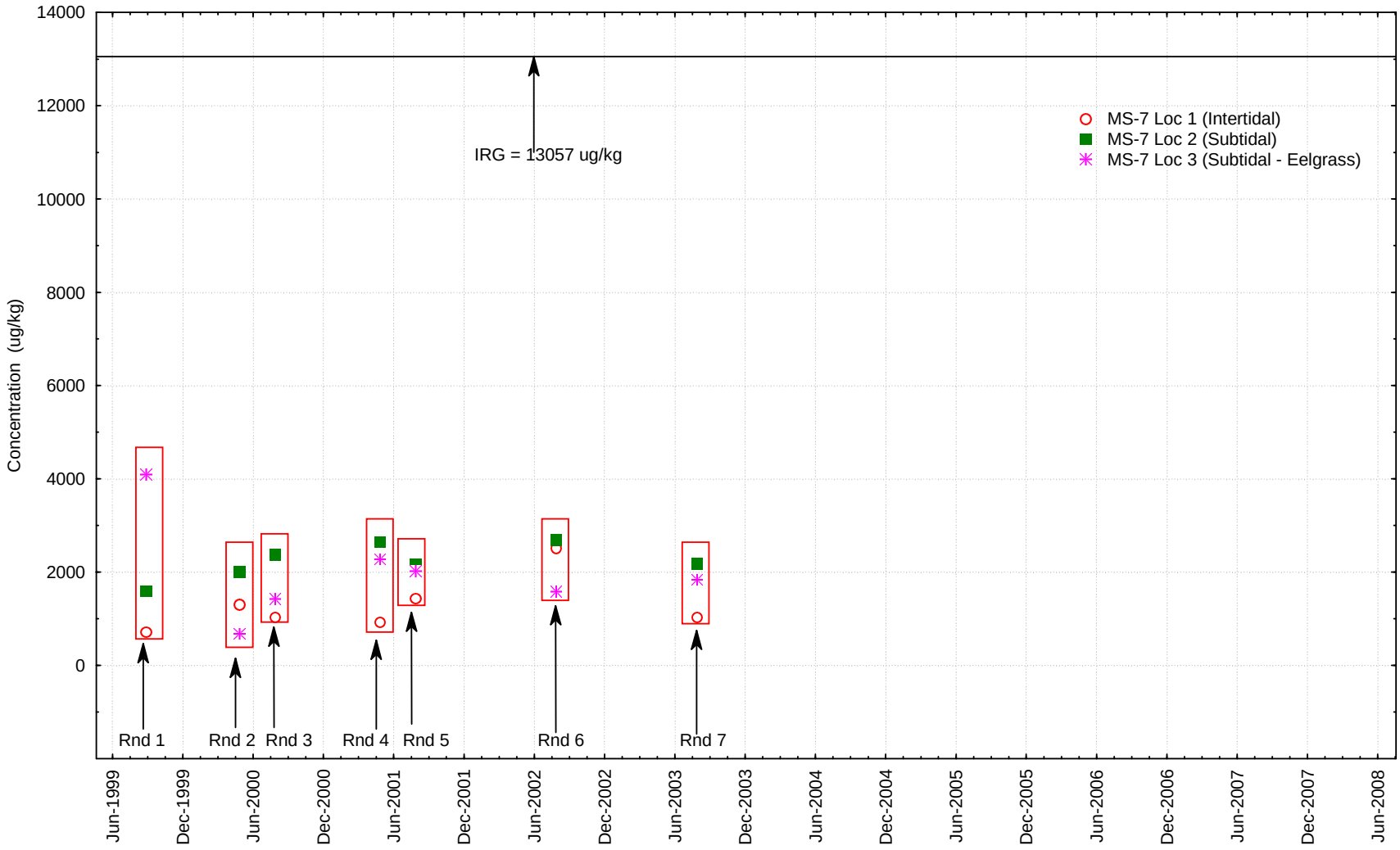
June 5, 2009

Monitoring Station 7 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



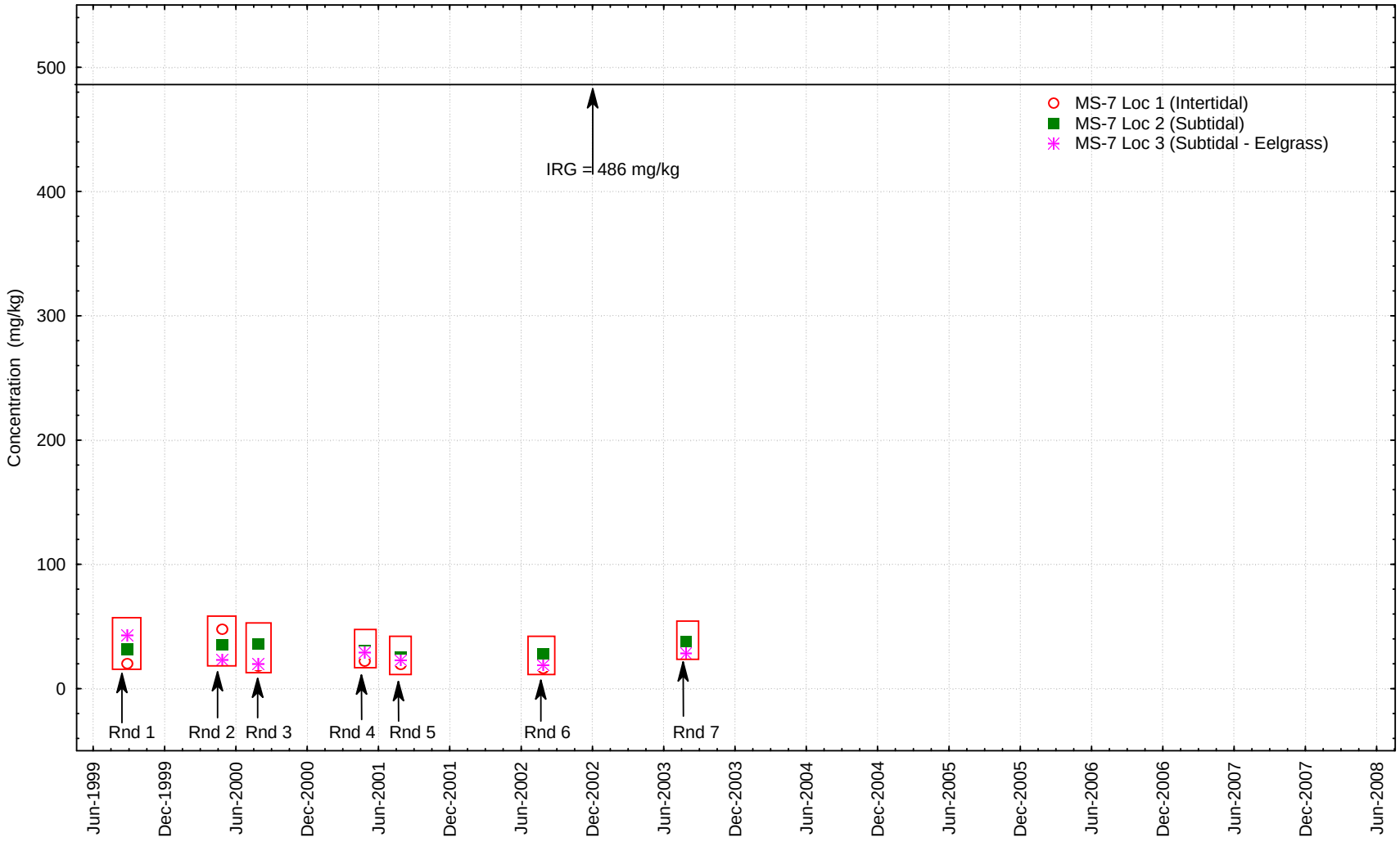
June 5, 2009

Monitoring Station 7 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



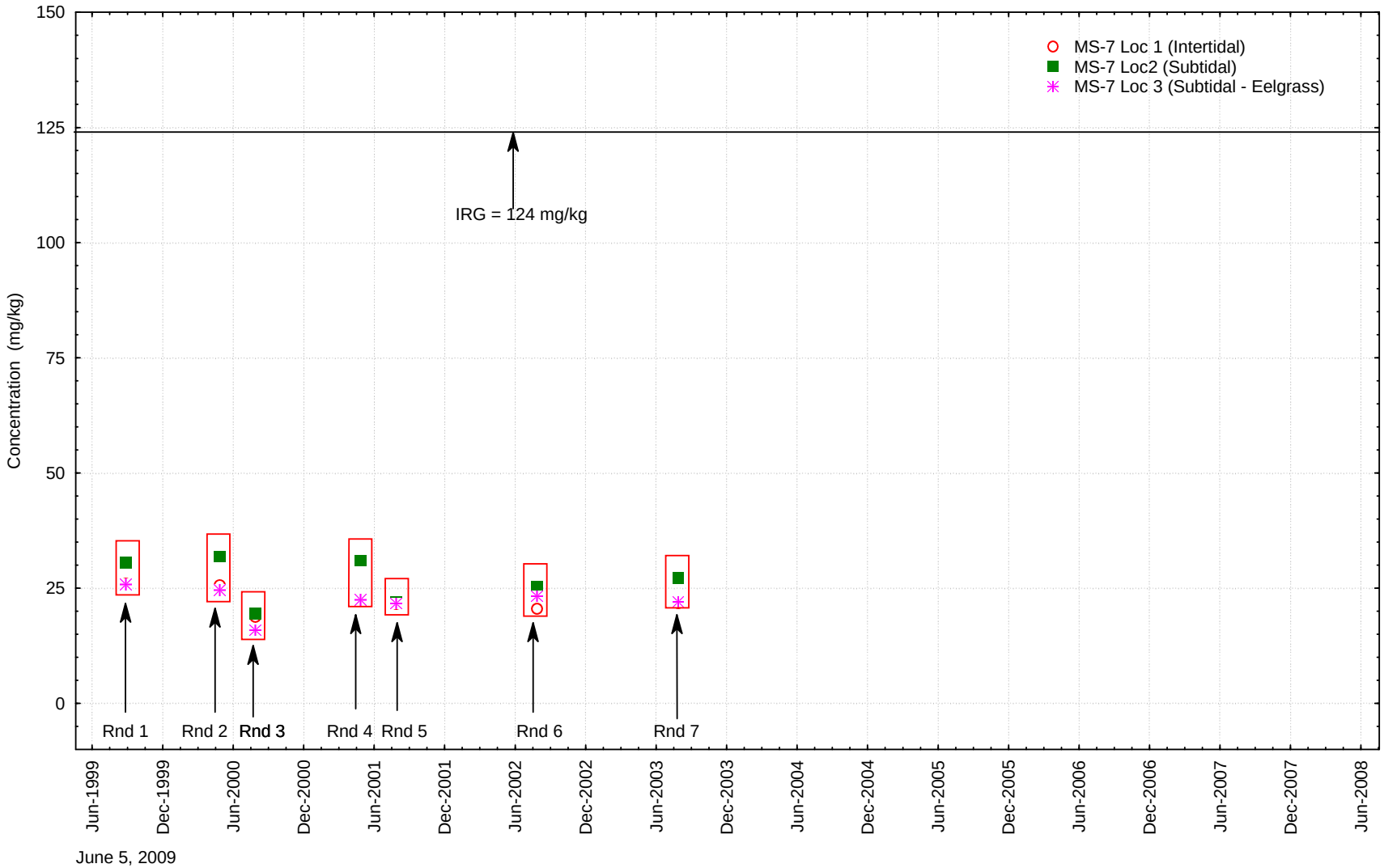
June 5, 2009

Monitoring Station 7 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

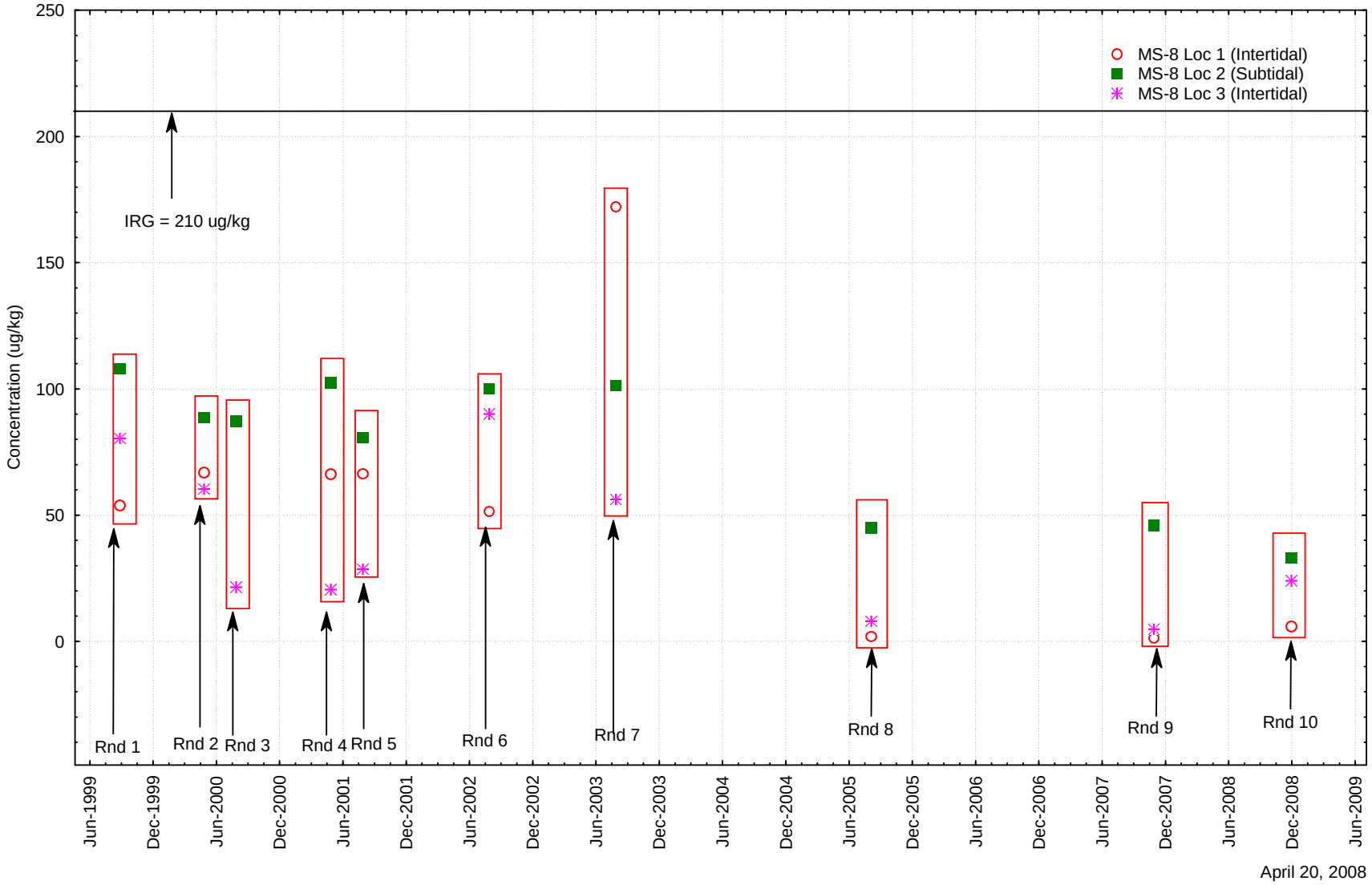
Monitoring Station 7 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

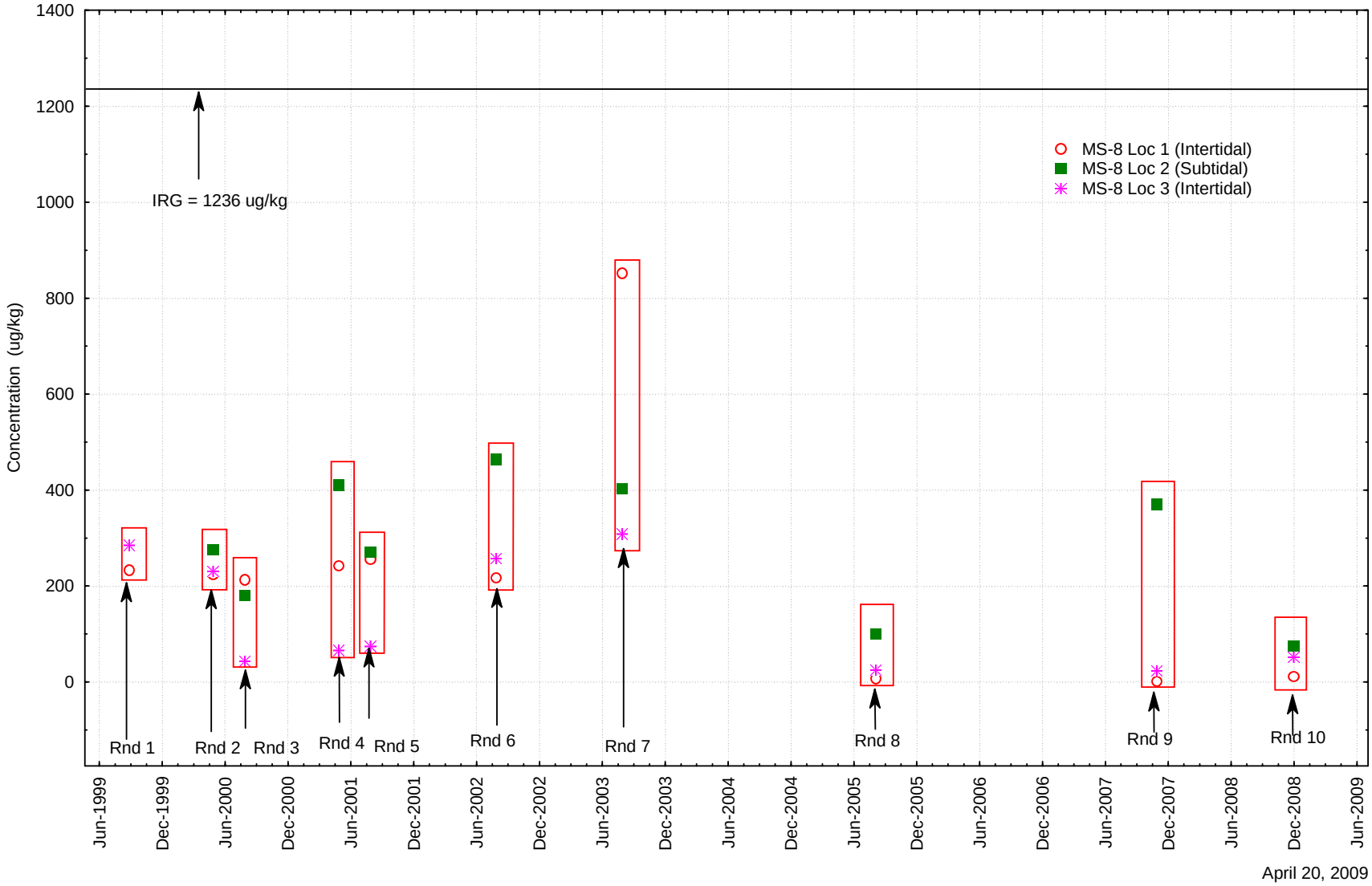
D.5 CONCENTRATION PLOTS AT MS-08

Monitoring Station 8 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



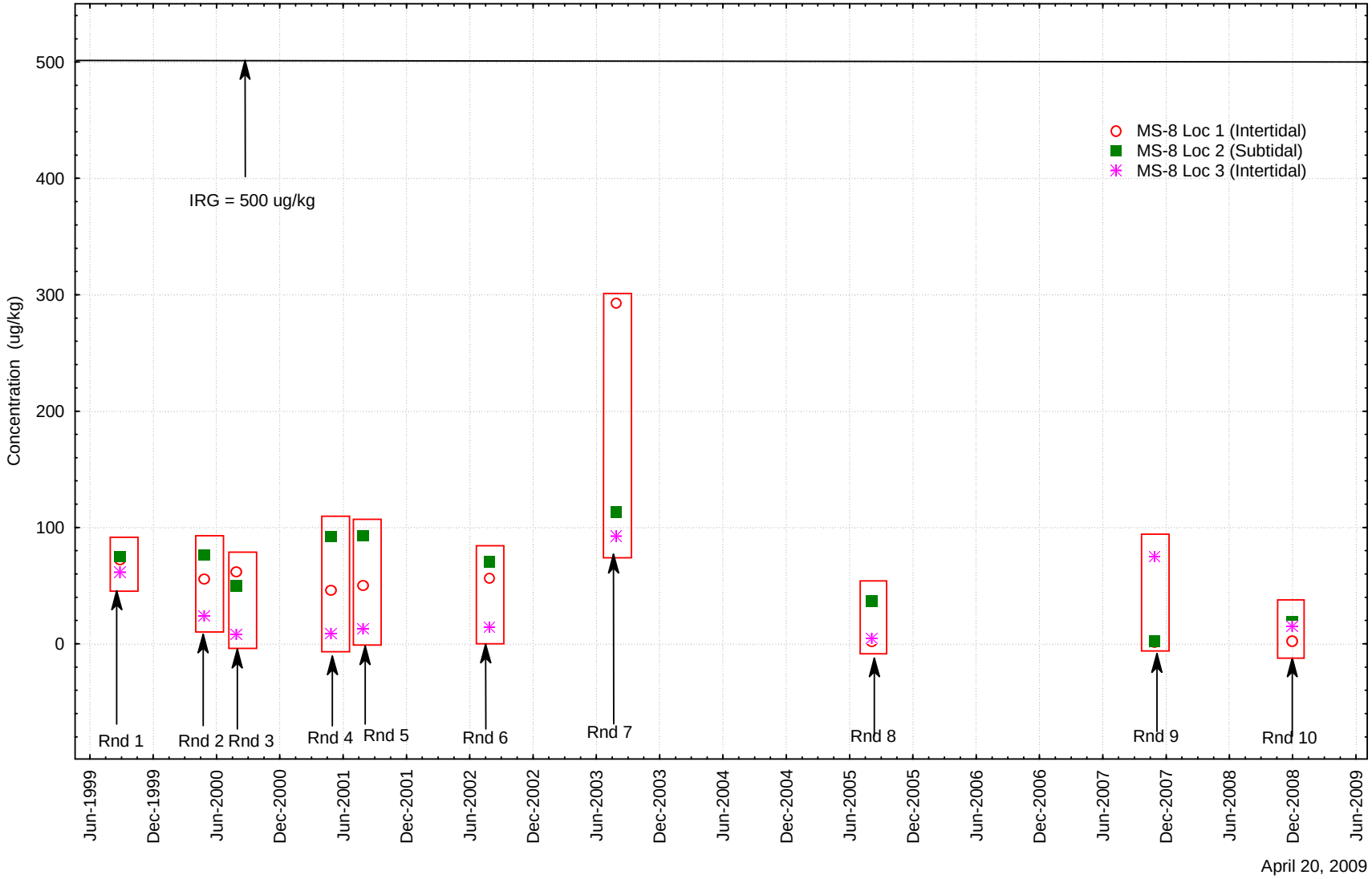
April 20, 2008

Monitoring Station 8 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



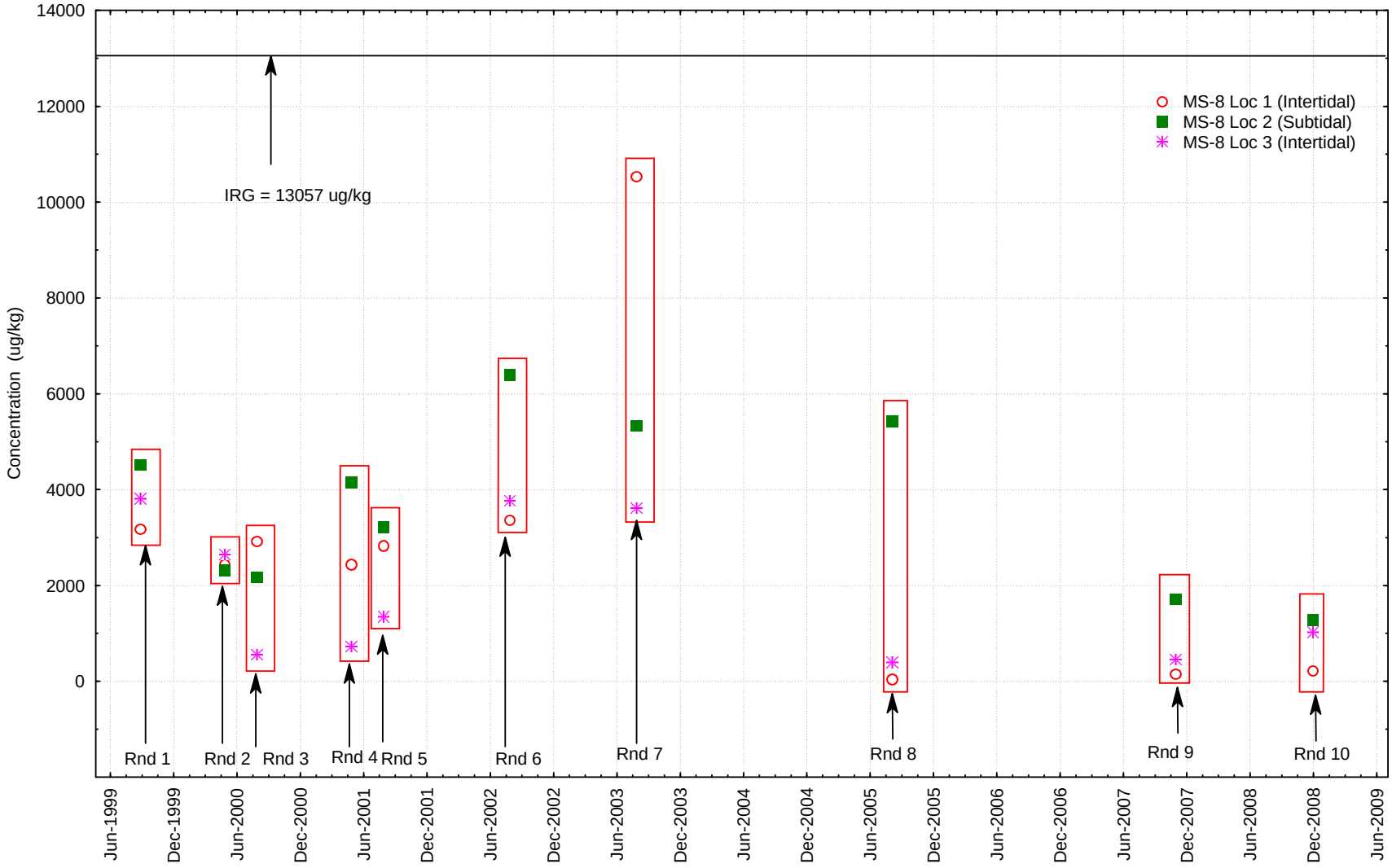
April 20, 2009

Monitoring Station 8 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



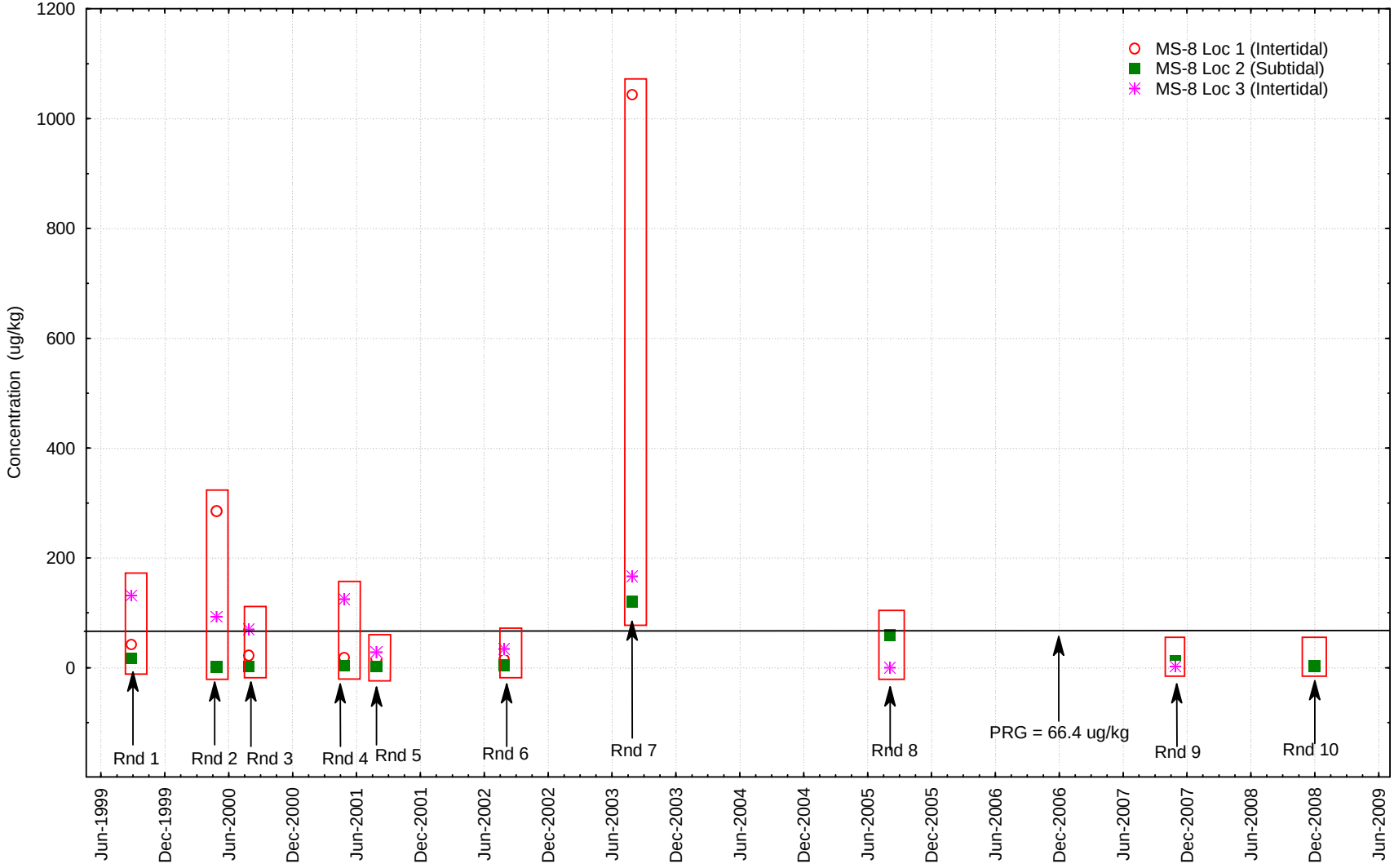
April 20, 2009

Monitoring Station 8 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



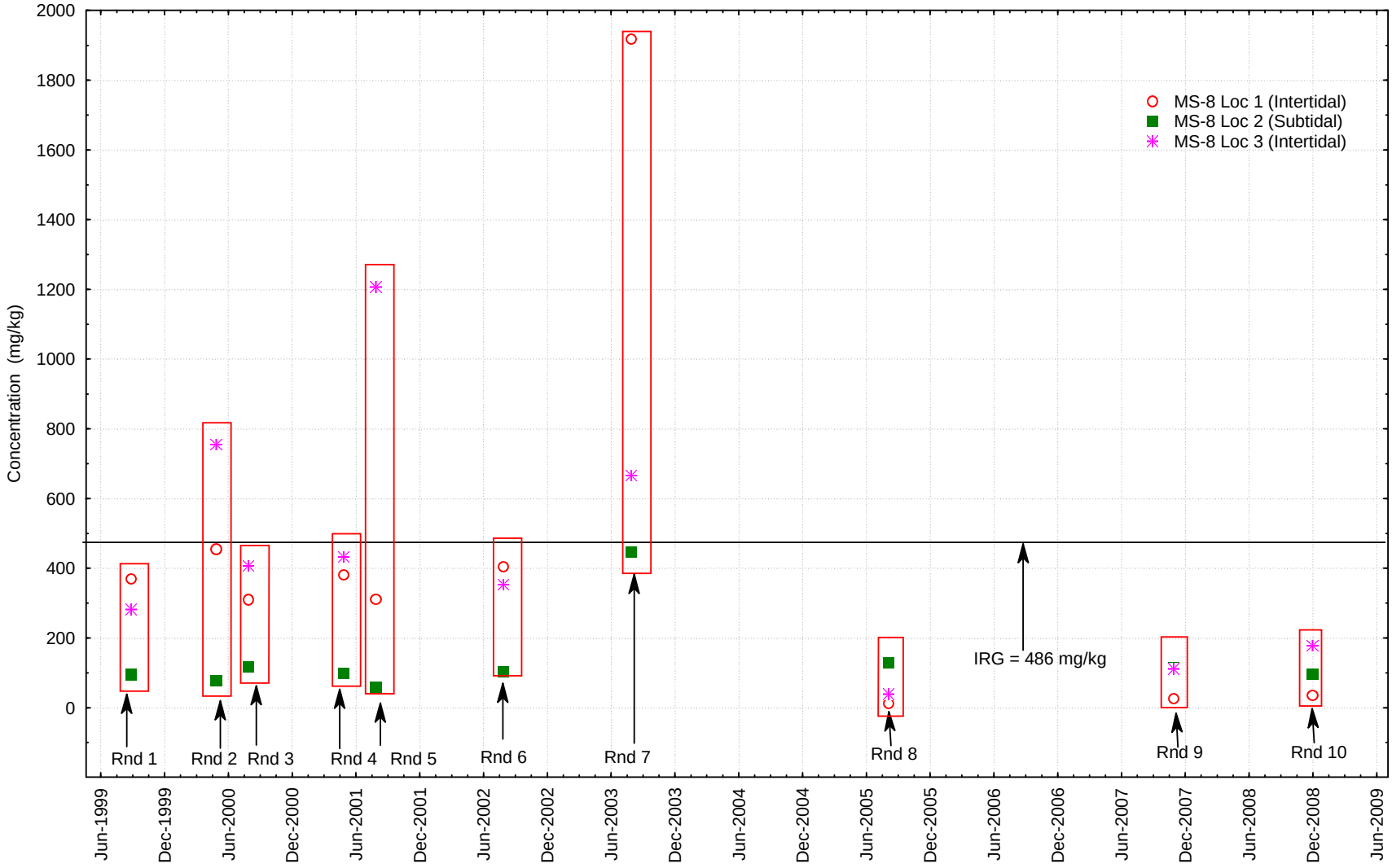
April 27, 2009

Monitoring Station 8 - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



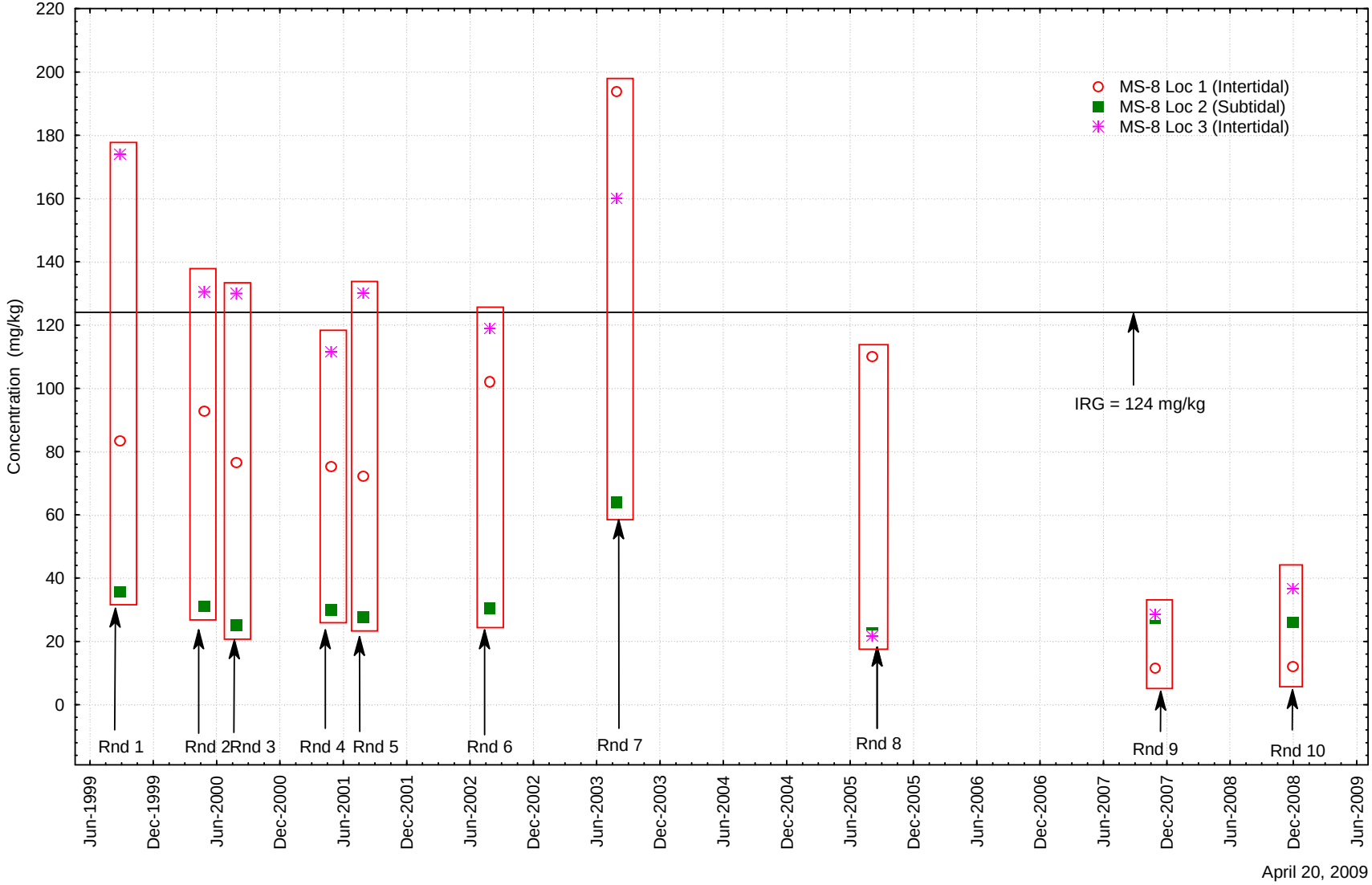
April 20, 2009

Monitoring Station 8 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



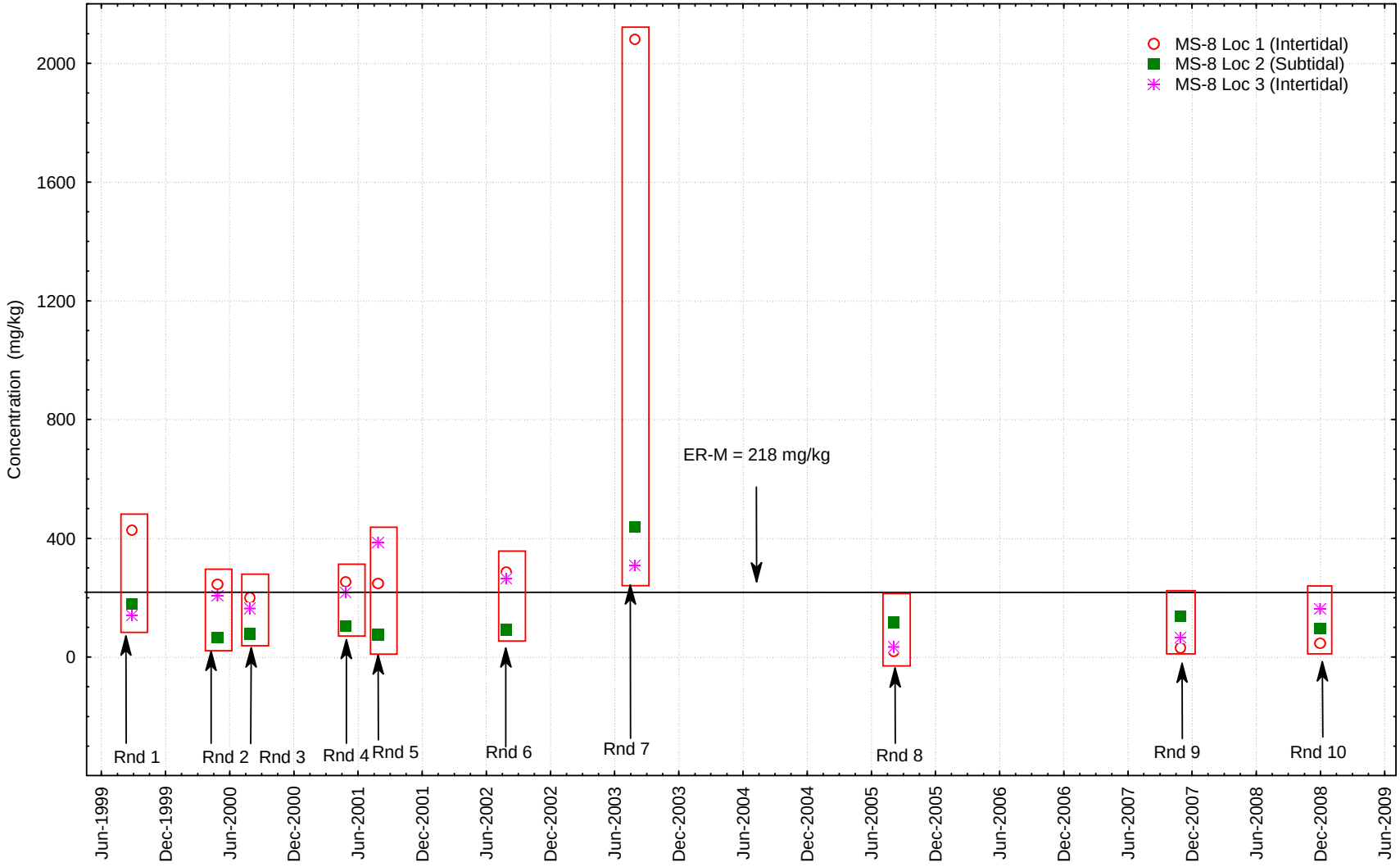
November 30, 2009

Monitoring Station 8 - Sediment
Nickel Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



April 20, 2009

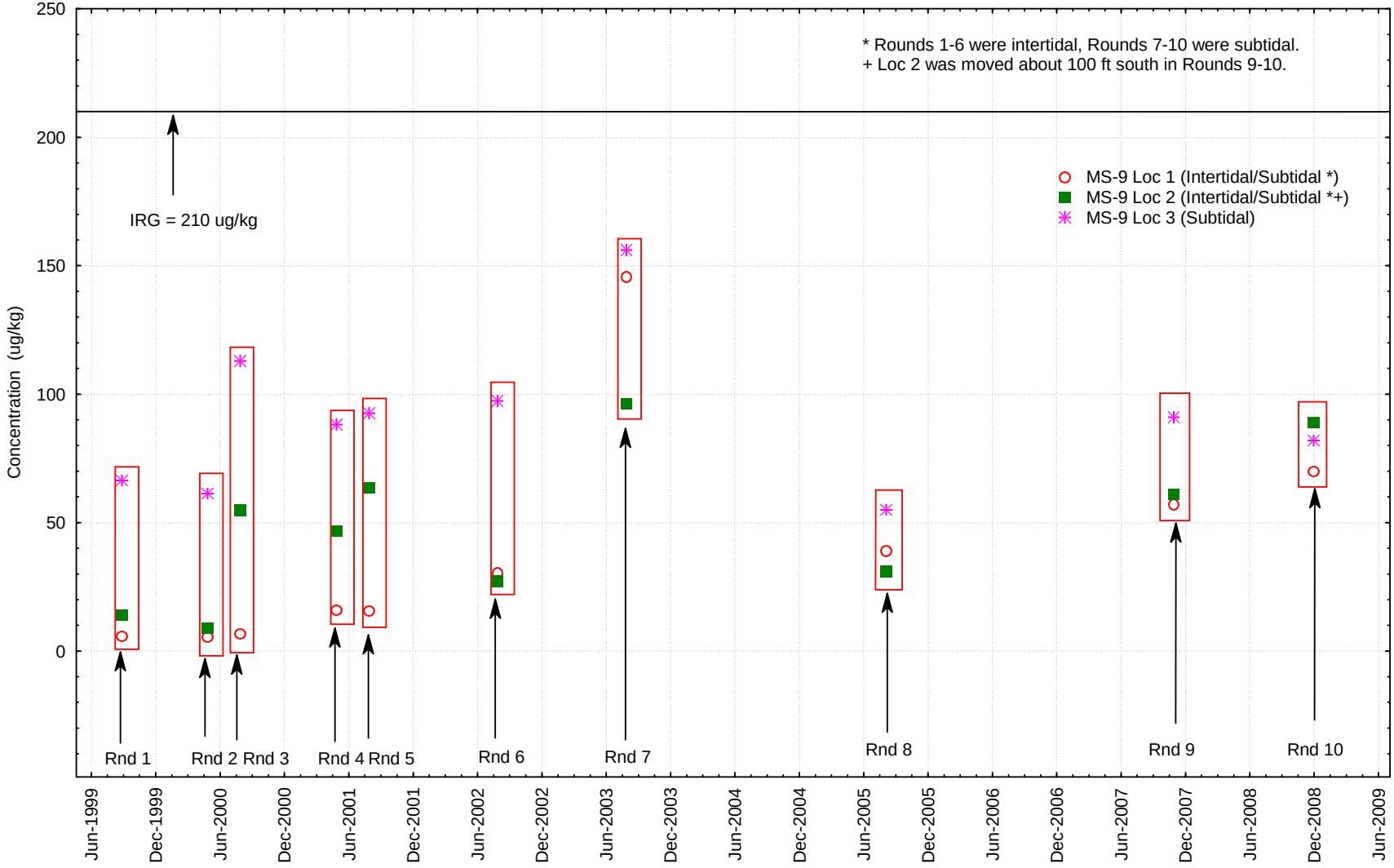
Monitoring Station 8 - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



May 11, 2009

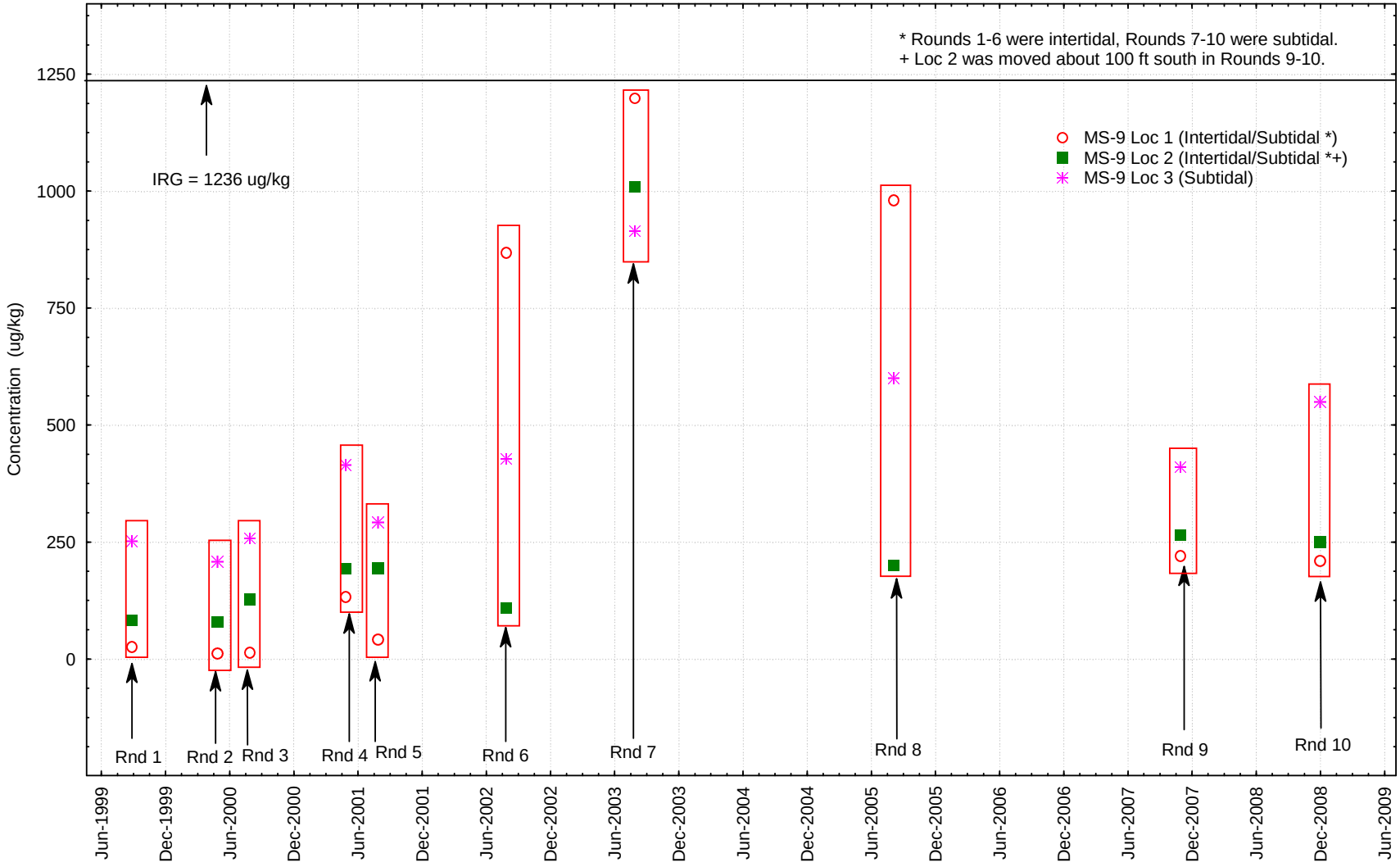
D.6 CONCENTRATION PLOTS AT MS-09

Monitoring Station 9 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



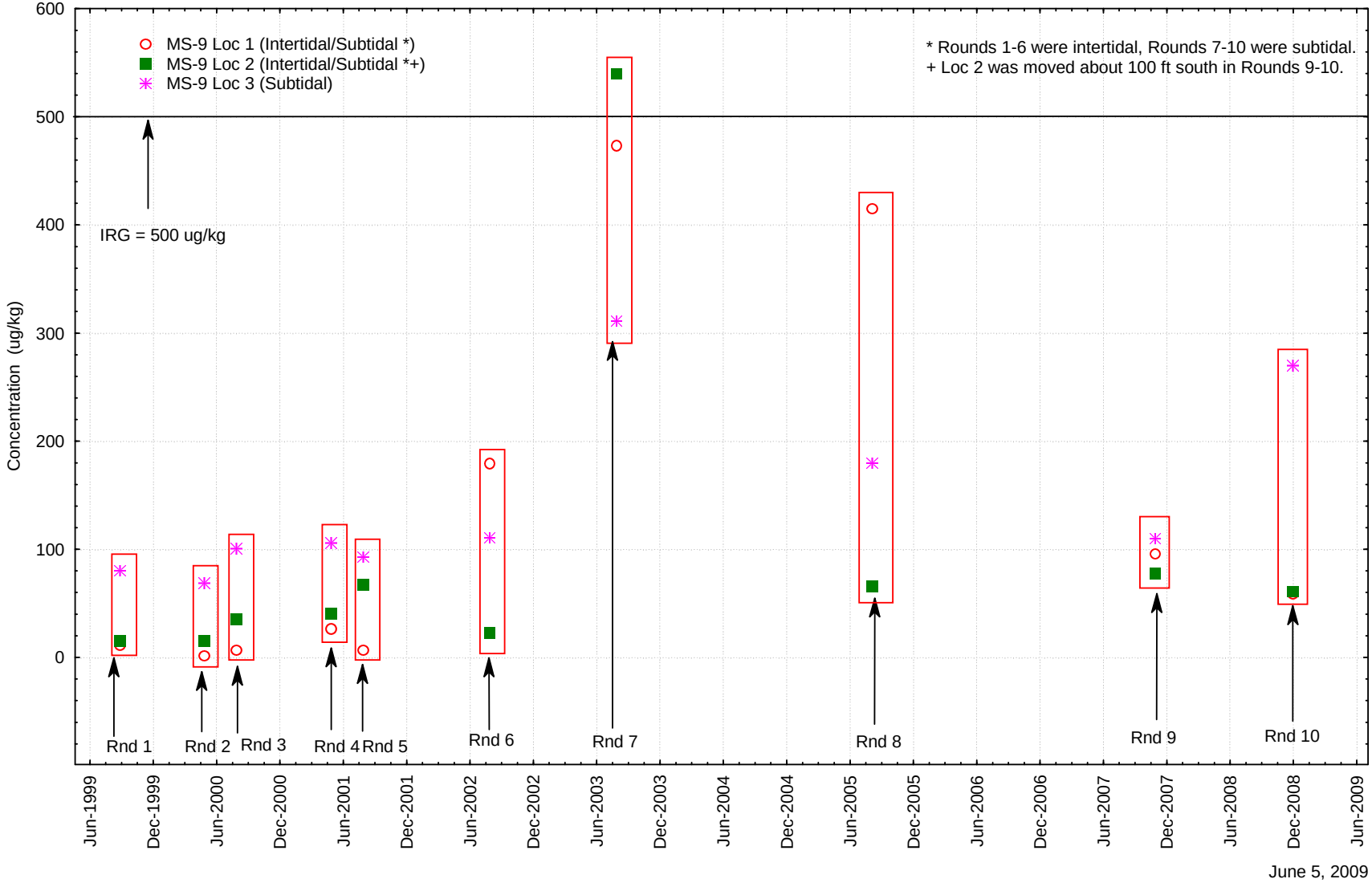
June 5, 2009

Monitoring Station 9 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



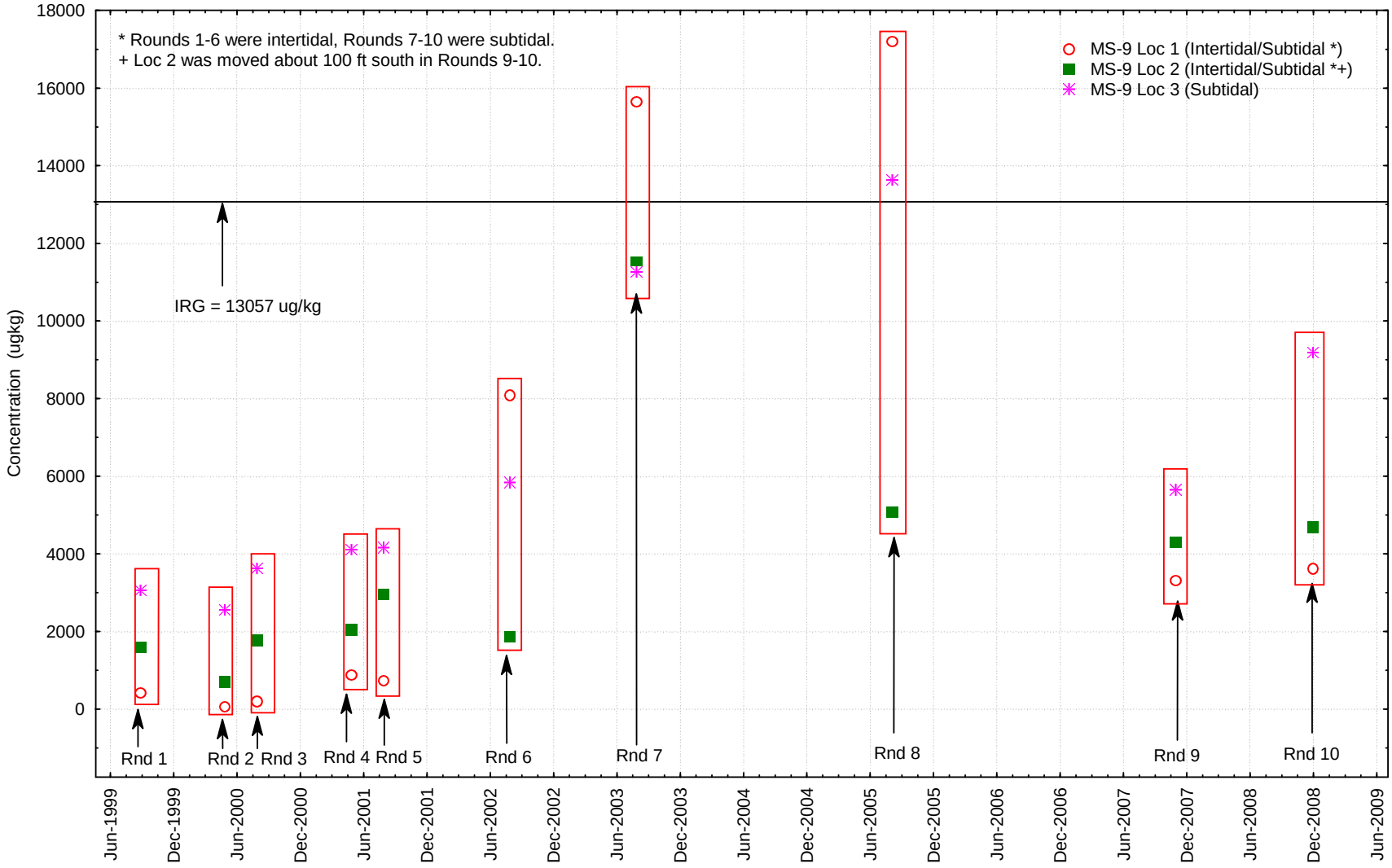
June 5, 2009

Monitoring Station 9 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



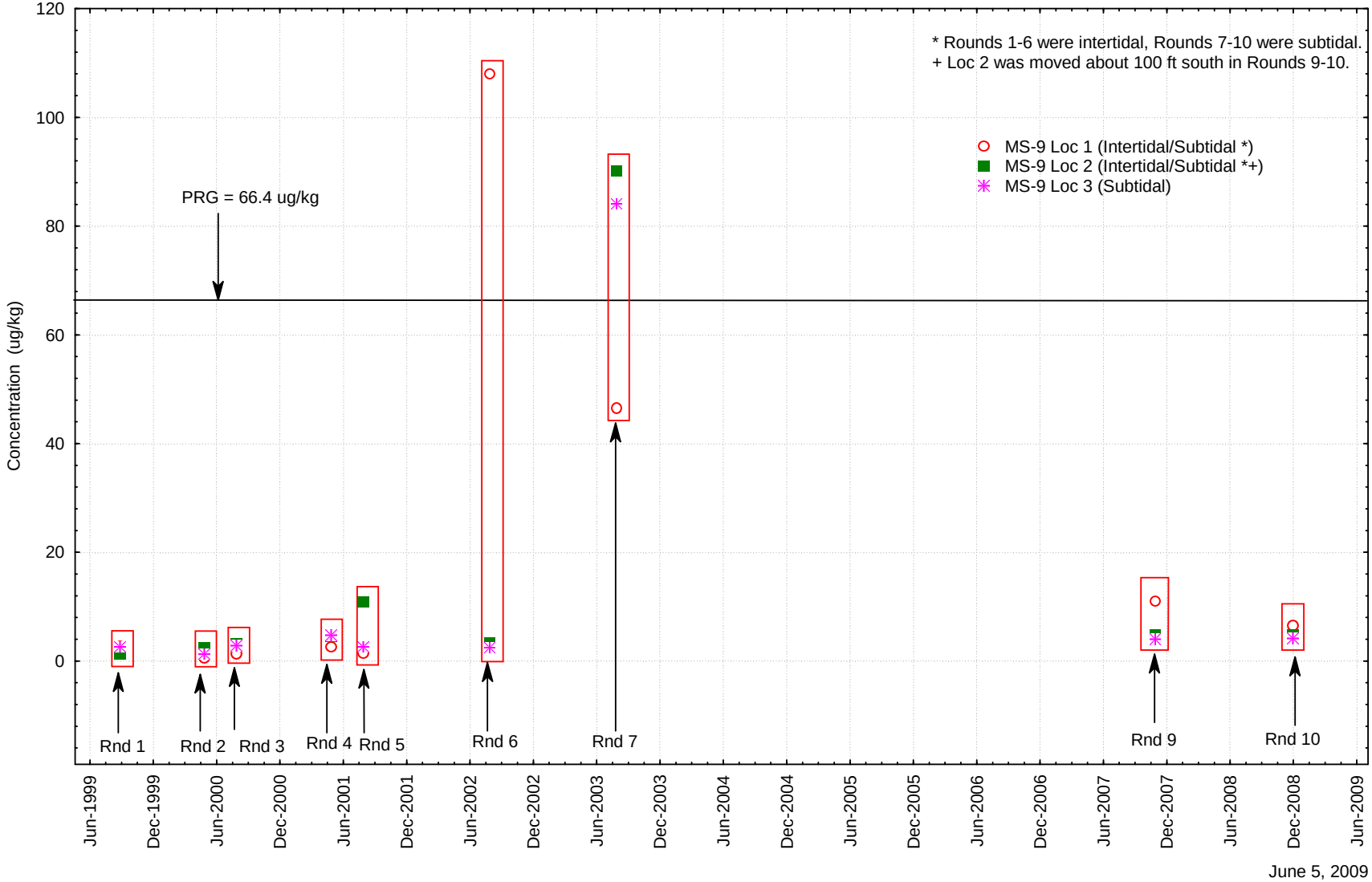
June 5, 2009

Monitoring Station 9 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



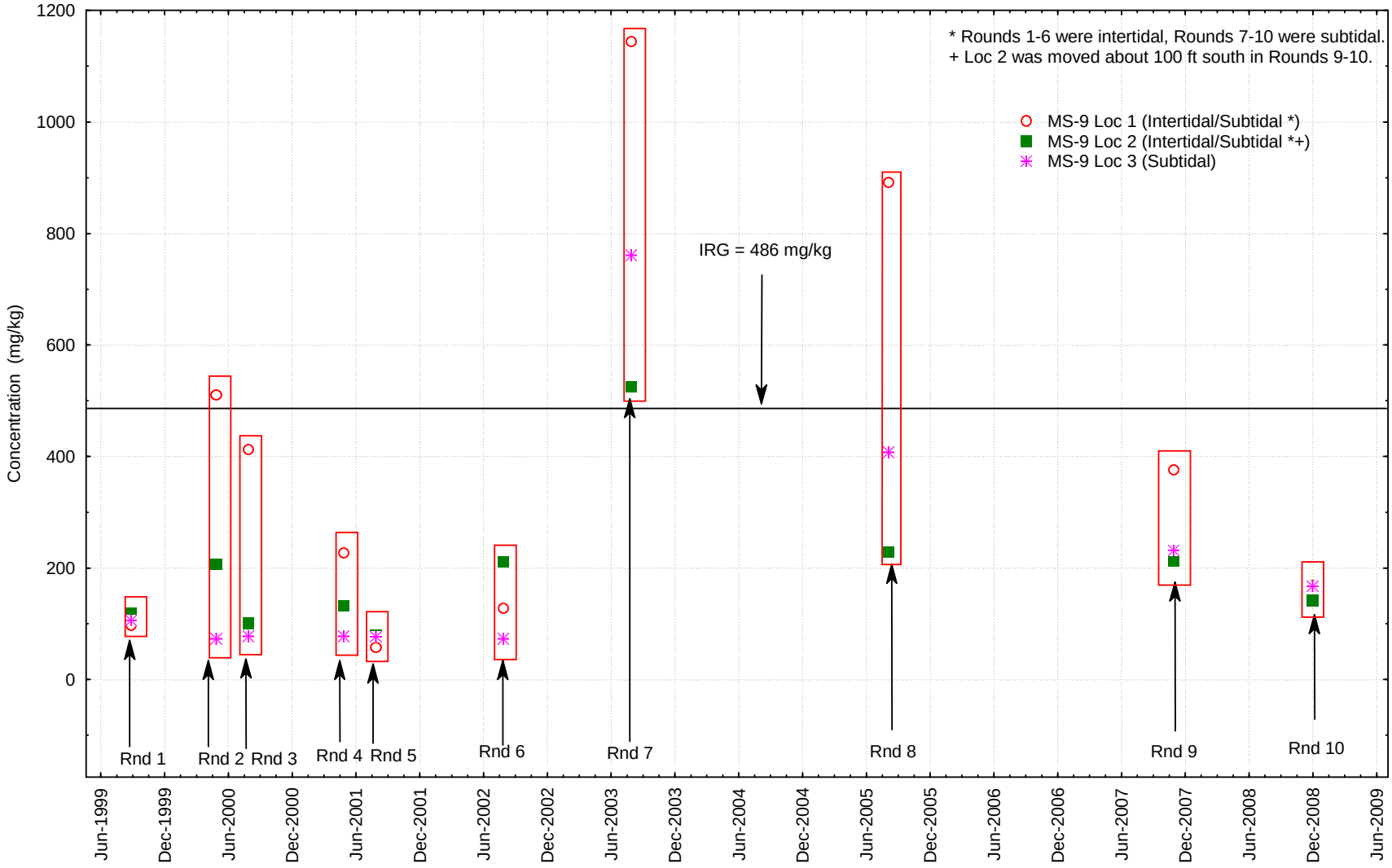
June 5, 2009

Monitoring Station 9 - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



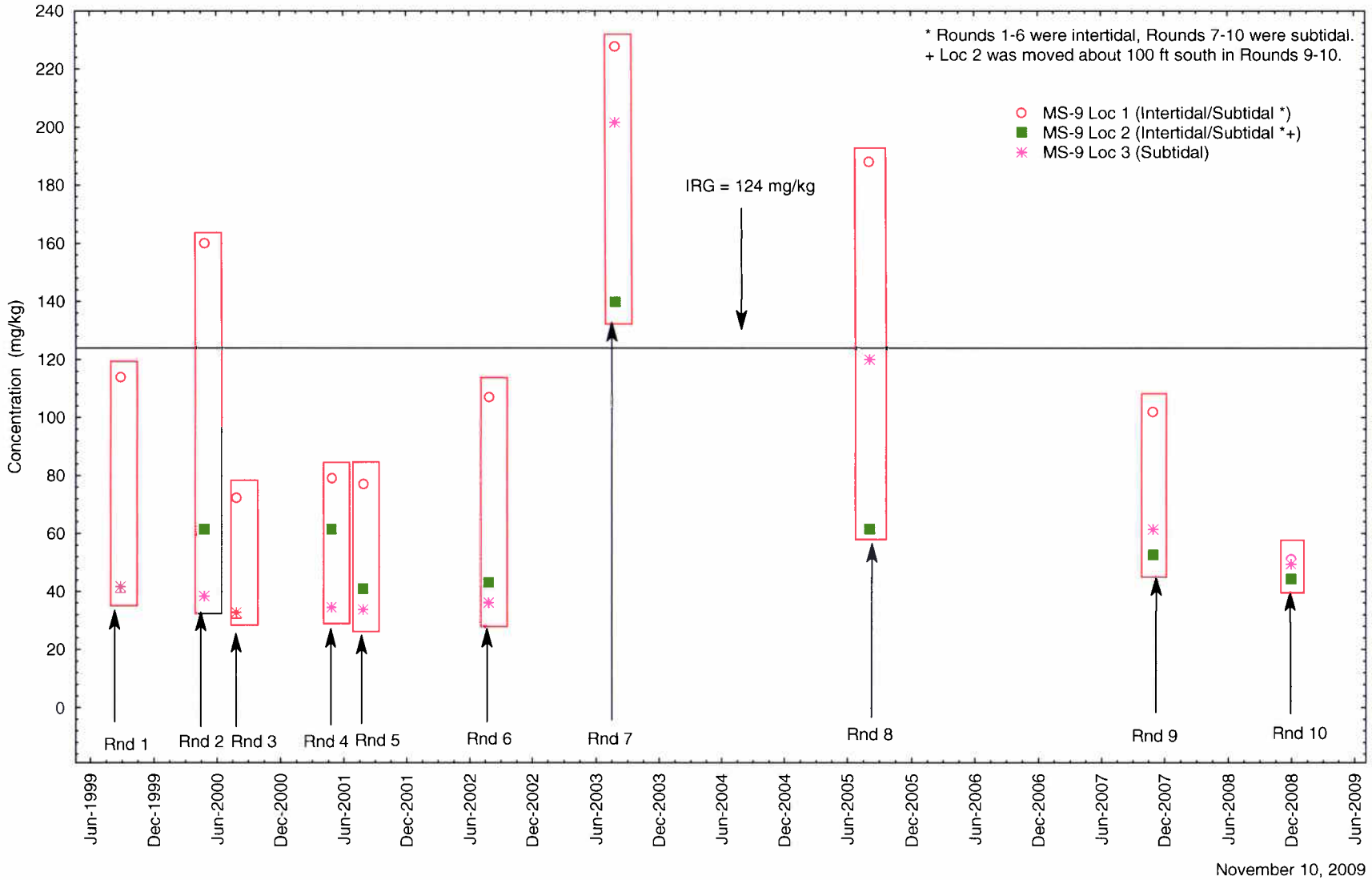
June 5, 2009

Monitoring Station 9 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



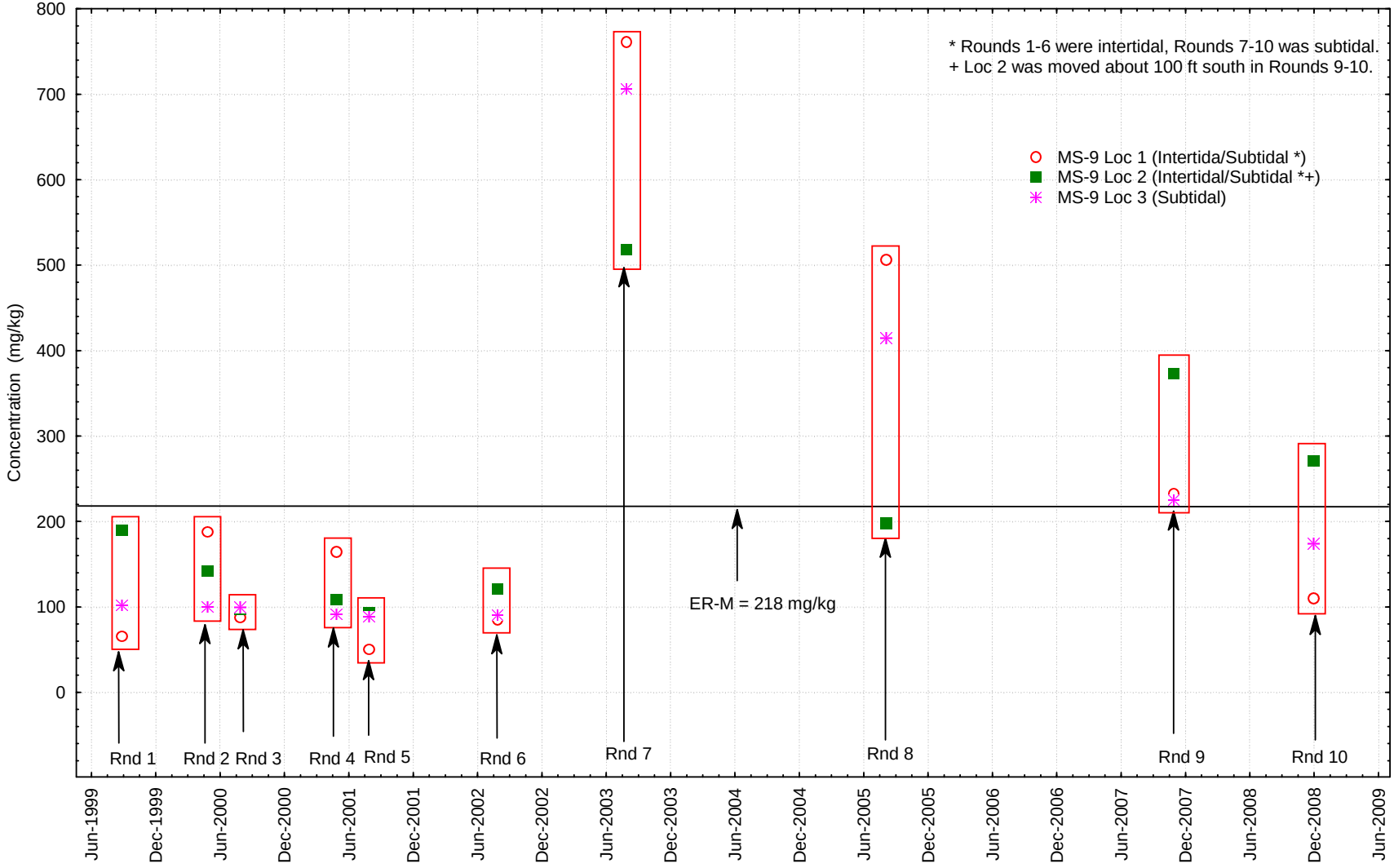
June 5, 2009

Monitoring Station 9 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



November 10, 2009

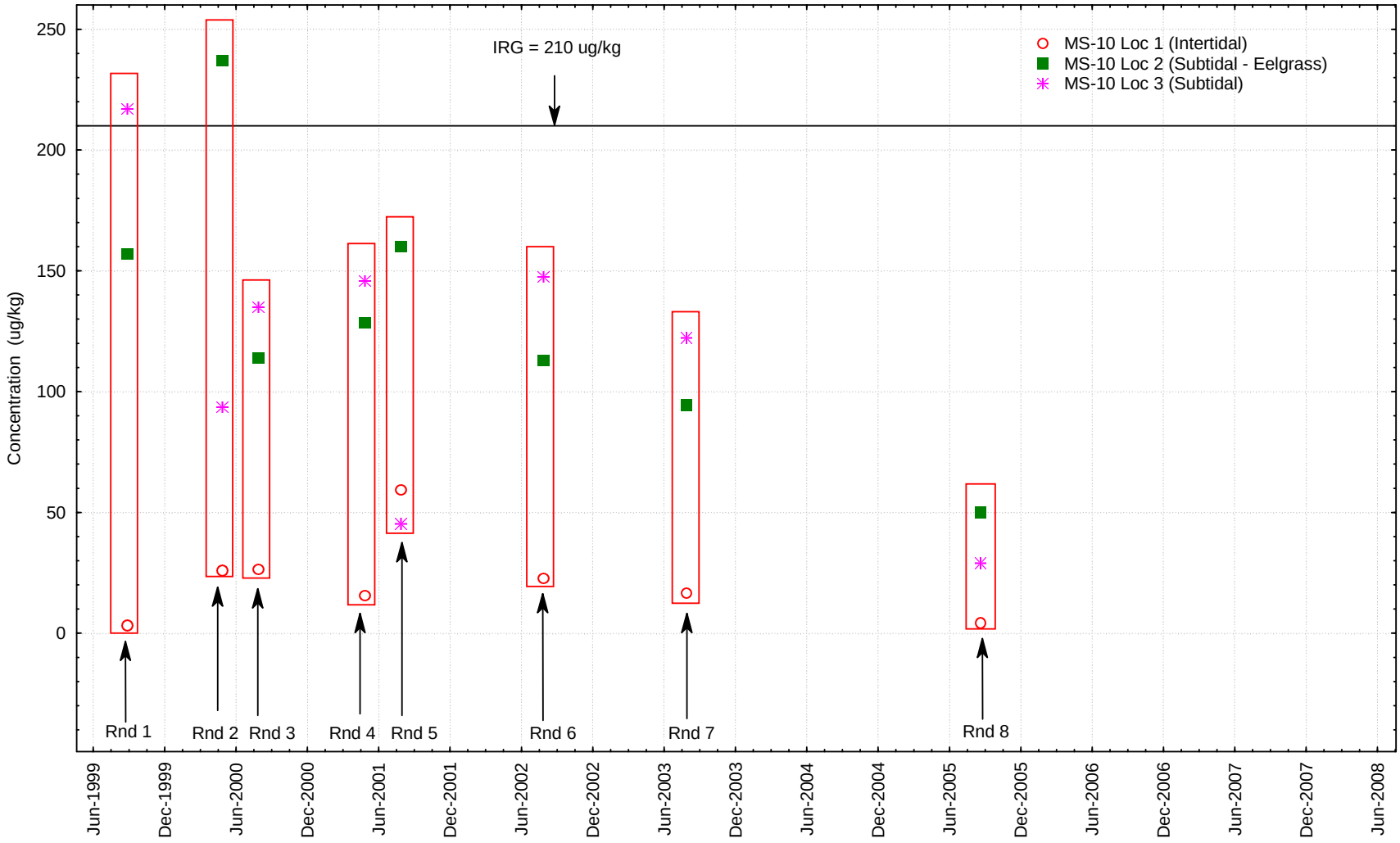
Monitoring Station 9 - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

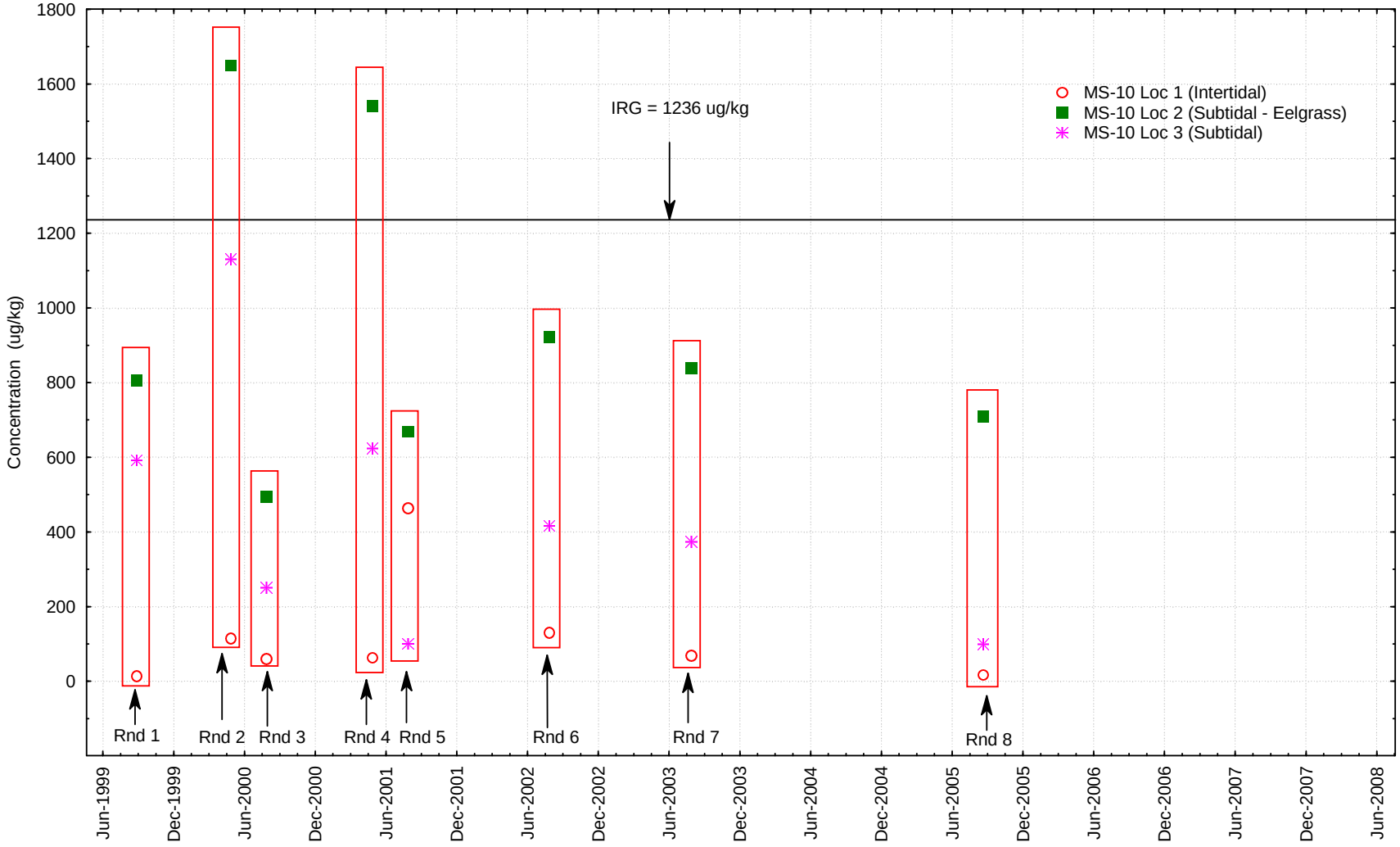
D.7 CONCENTRATION PLOTS AT MS-10

Monitoring Station 10 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



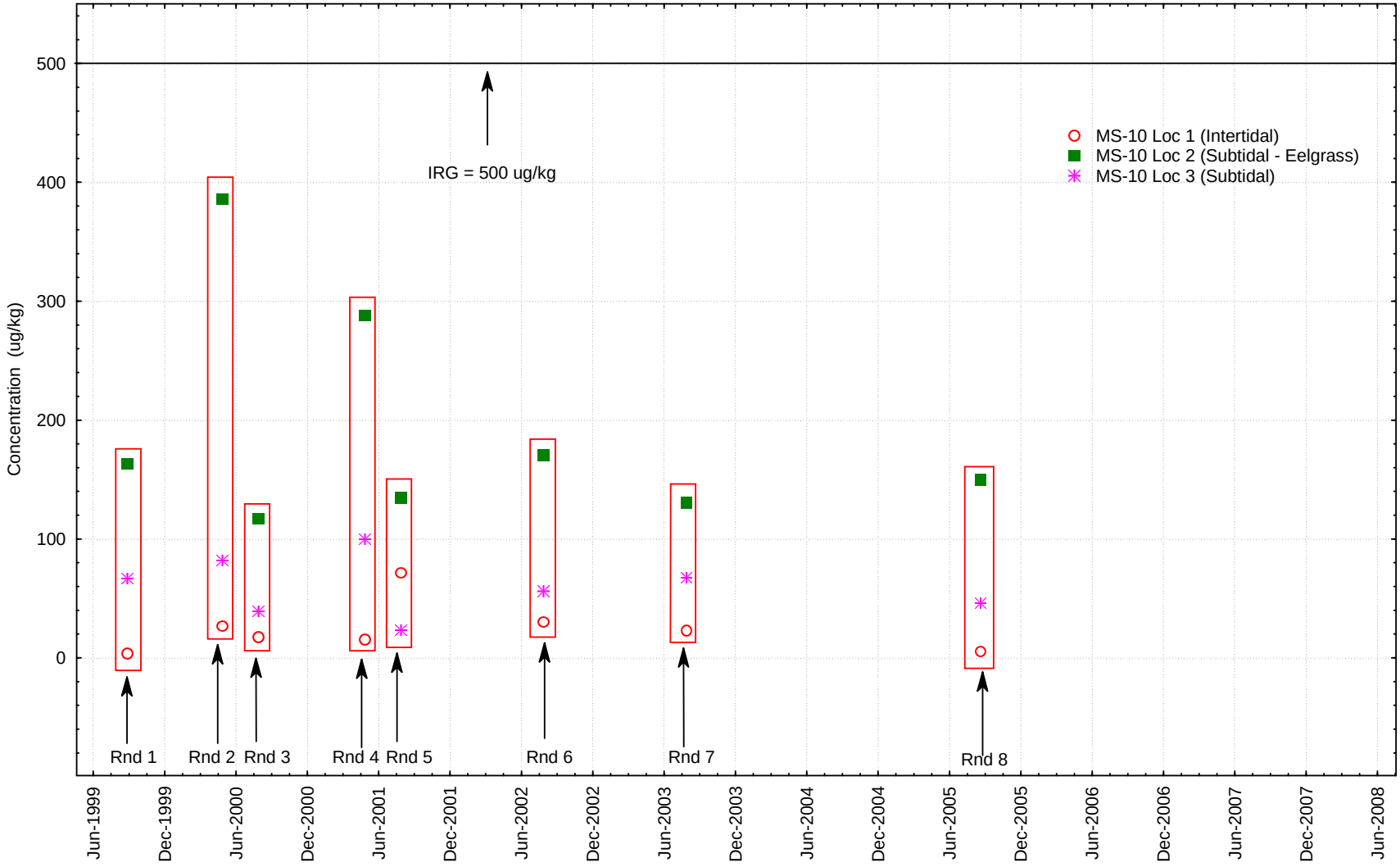
June 10, 2009

Monitoring Station 10 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



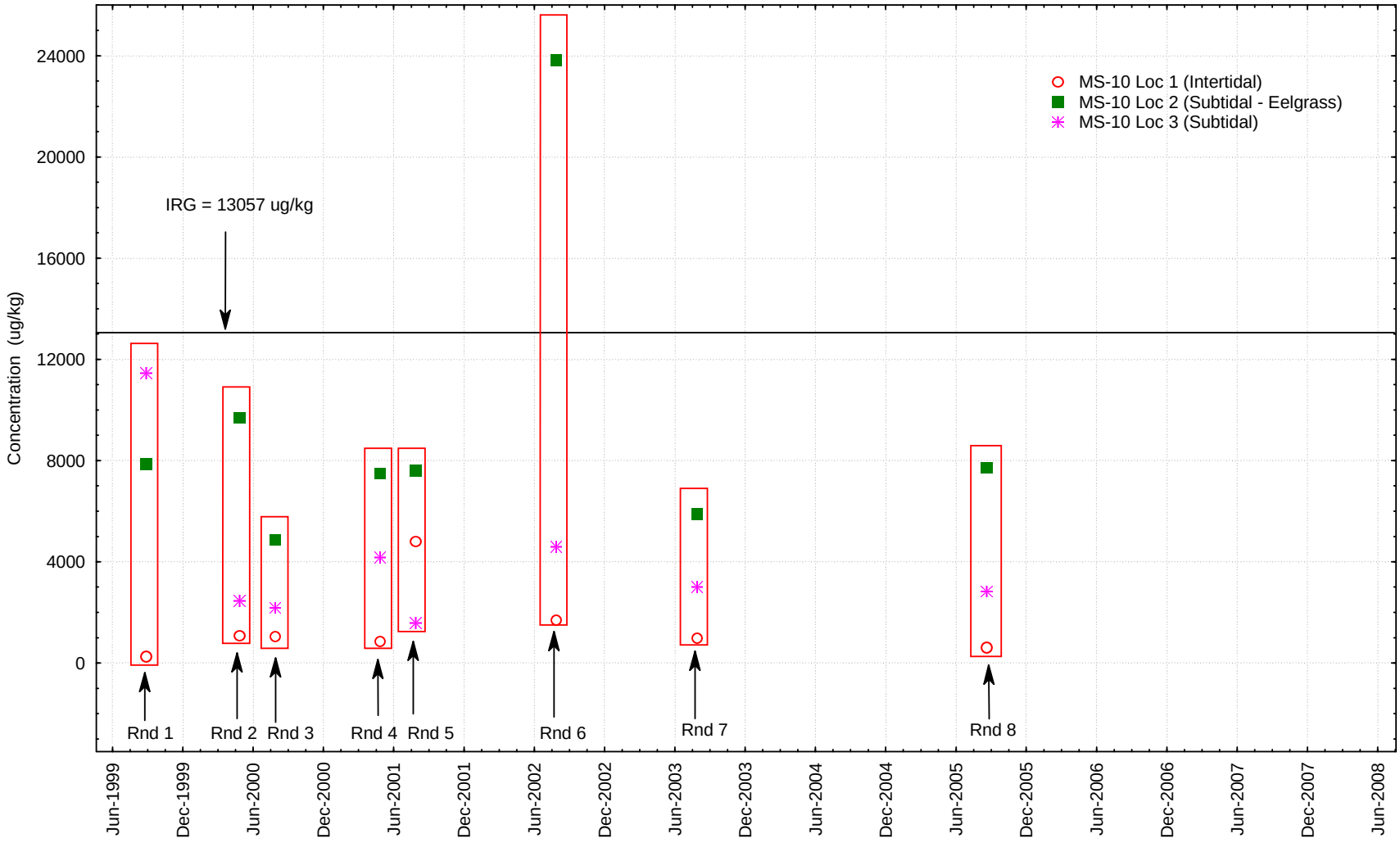
June 10, 2009

Monitoring Station 10 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 10, 2009

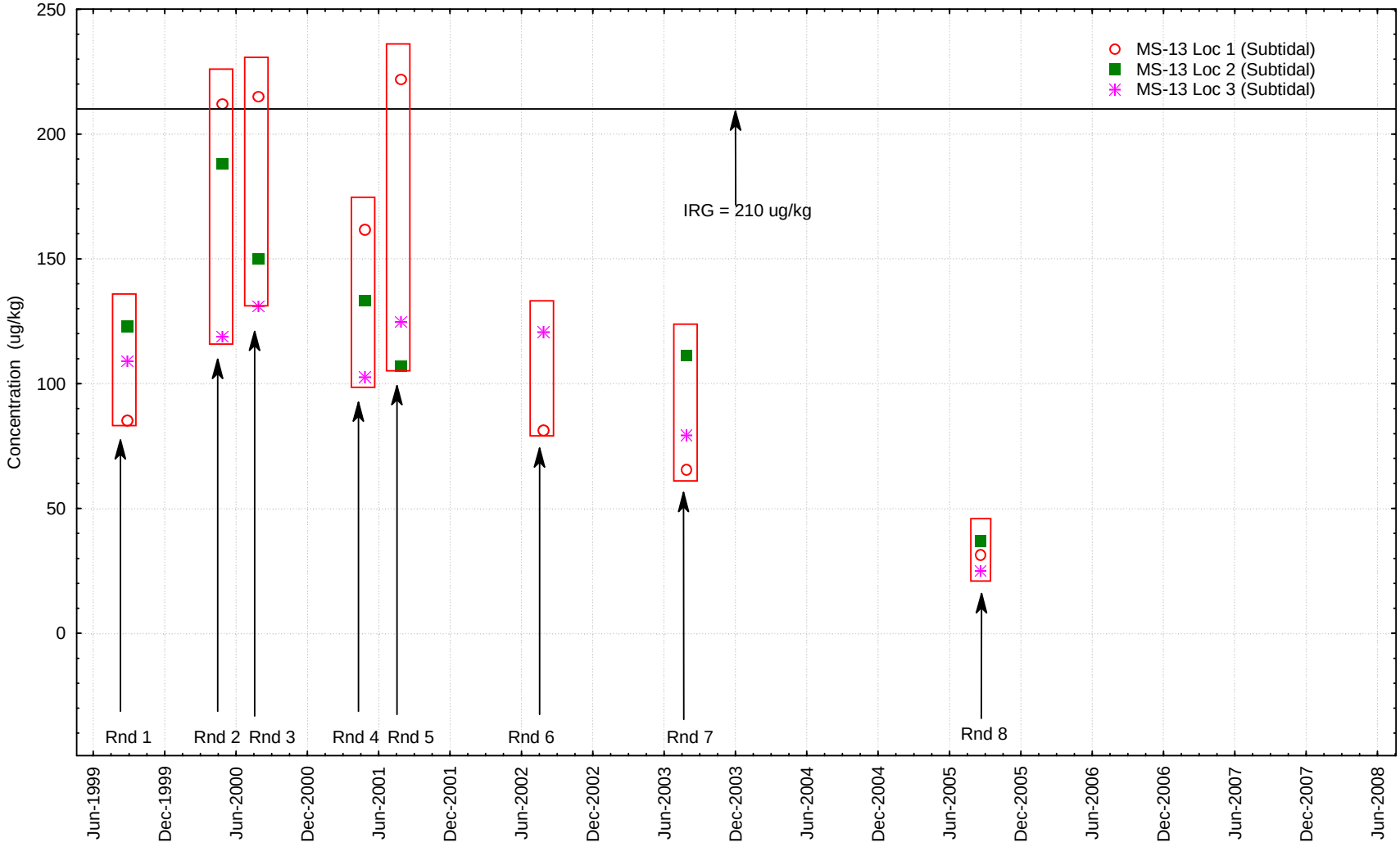
Monitoring Station 10 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 10, 2009

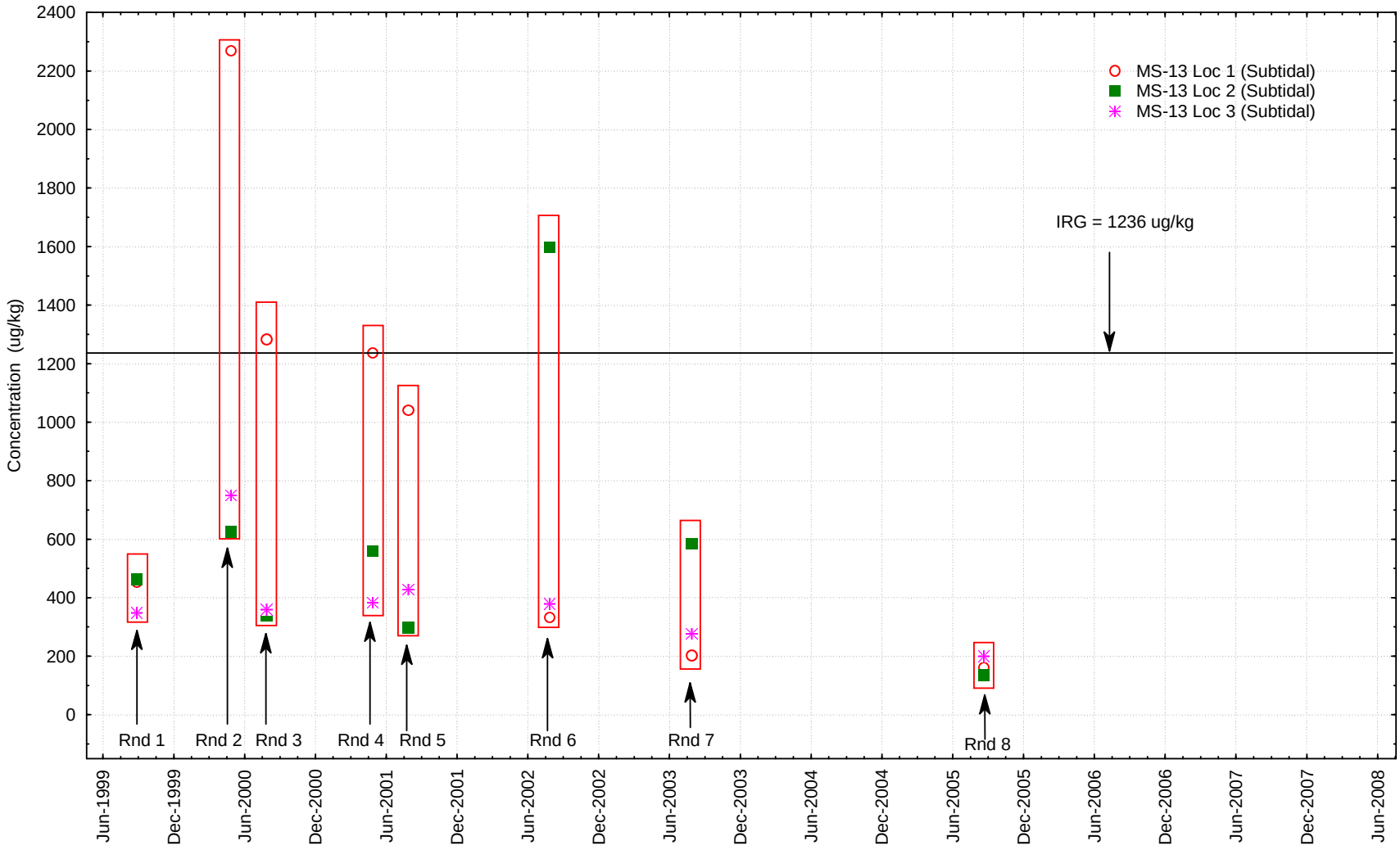
D.8 CONCENTRATION PLOTS AT MS-13

Monitoring Station 13 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



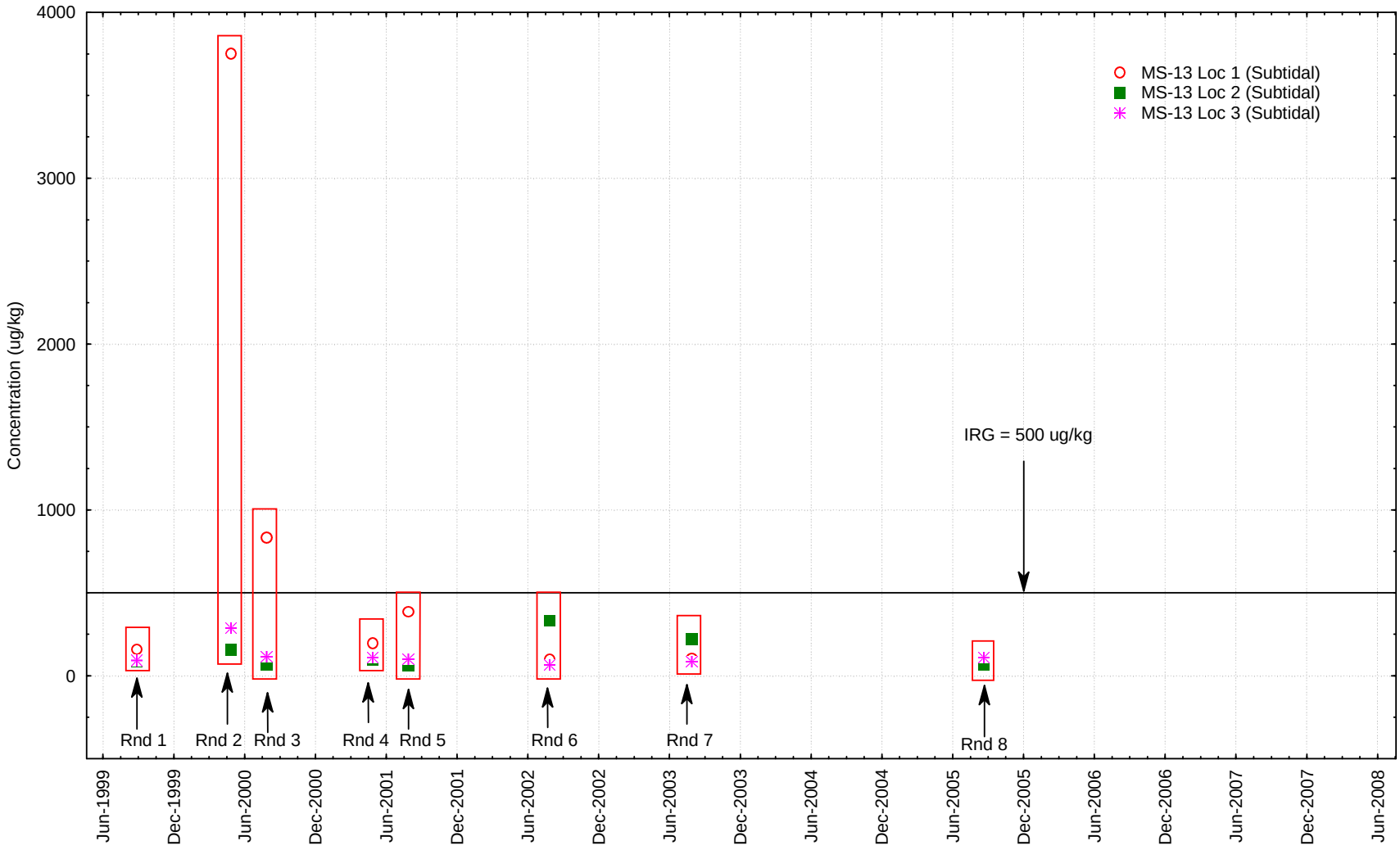
June 10, 2009

Monitoring Station 13 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



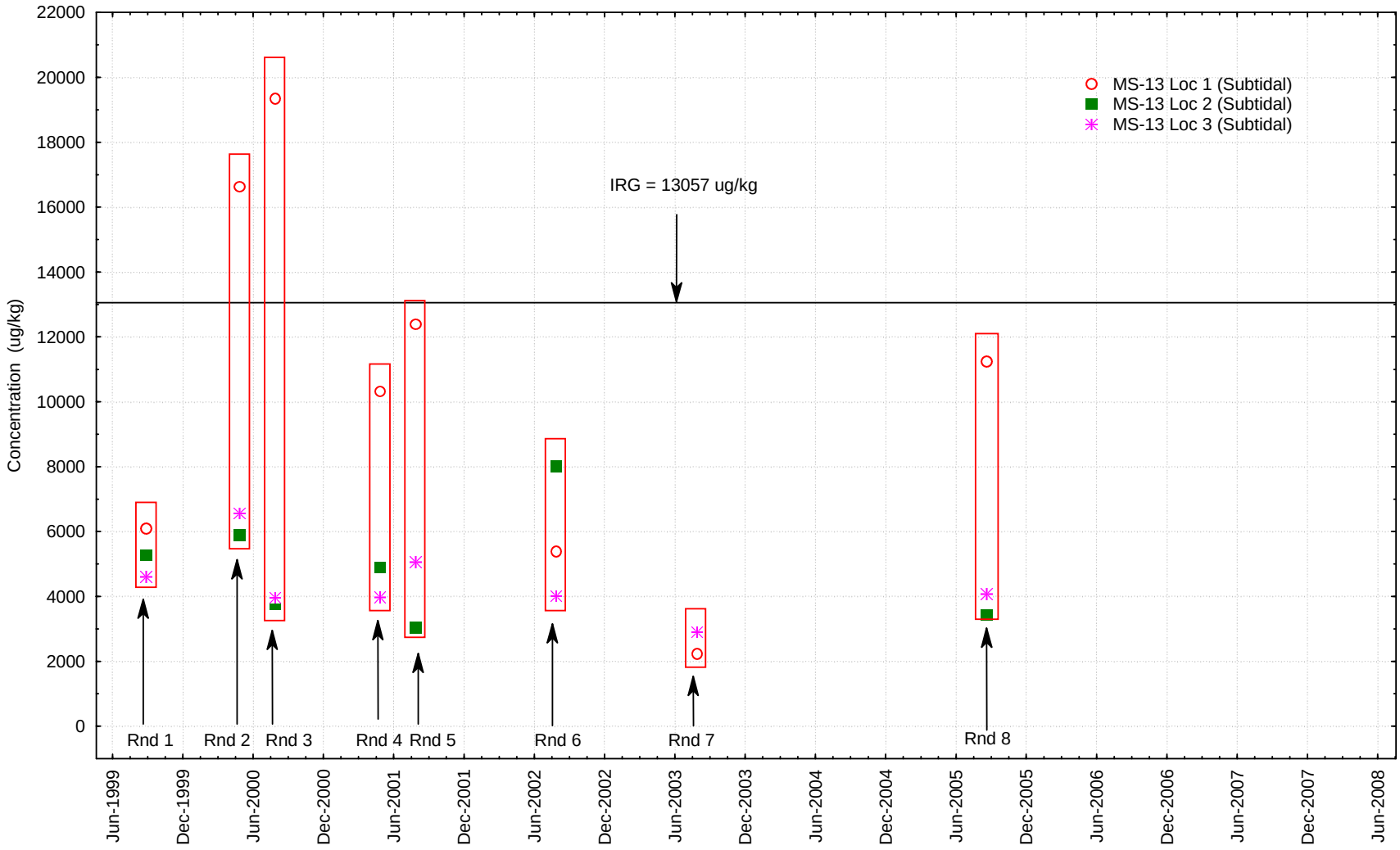
June 10, 2009

Monitoring Station 13 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 10, 2009

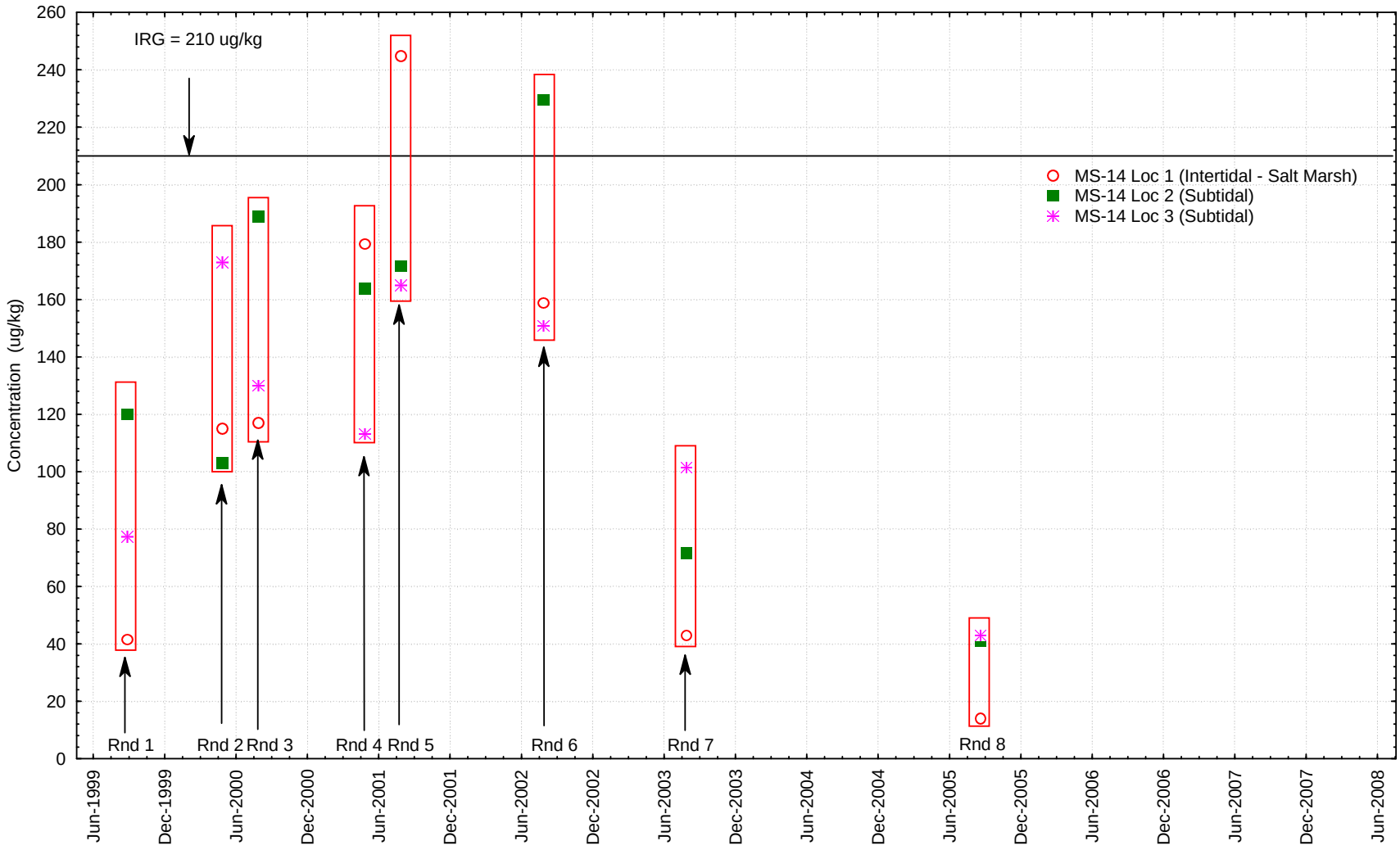
Monitoring Station 13 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 10, 2009

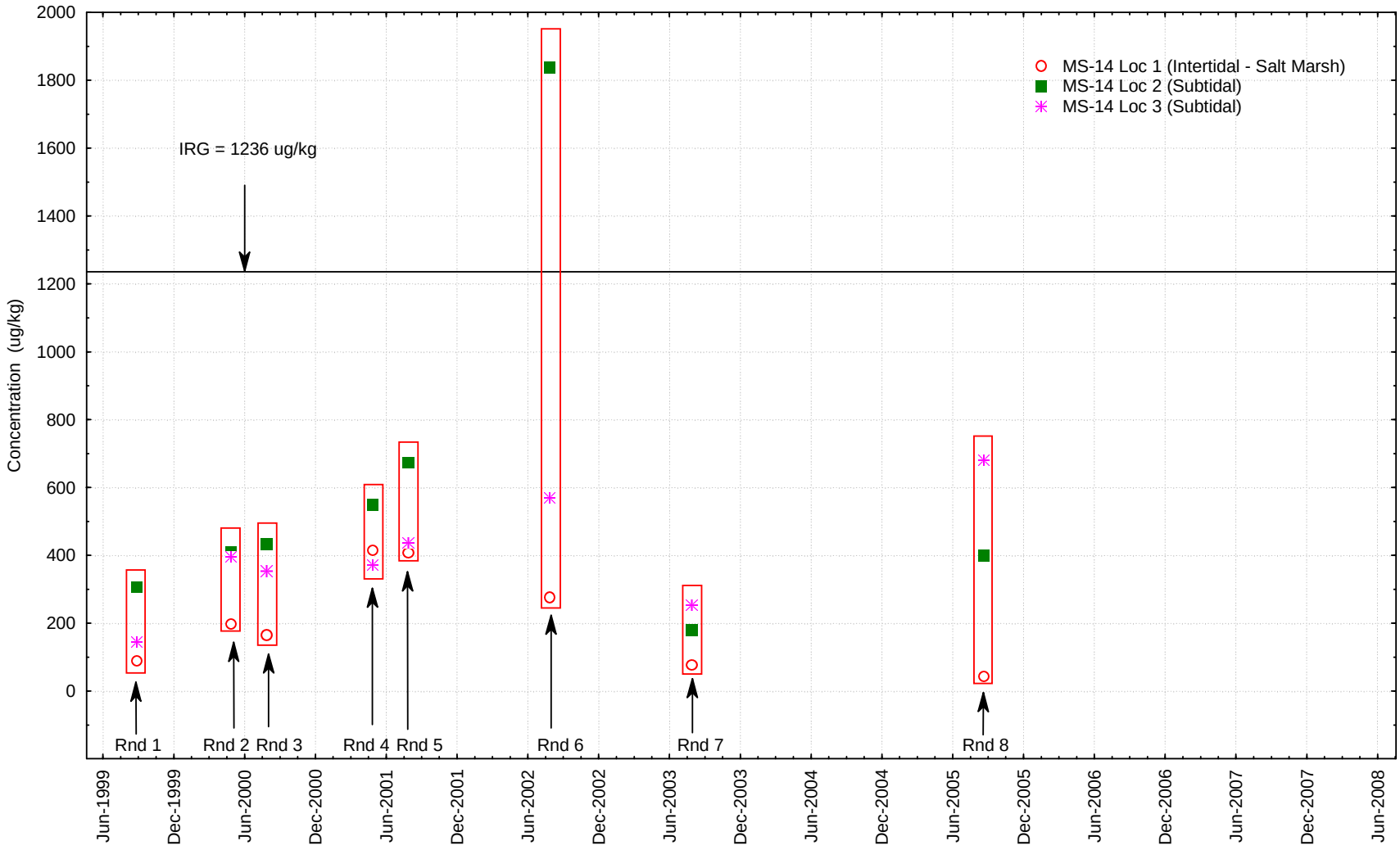
D.9 CONCENTRATION PLOTS AT MS-14

Monitoring Station 14 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



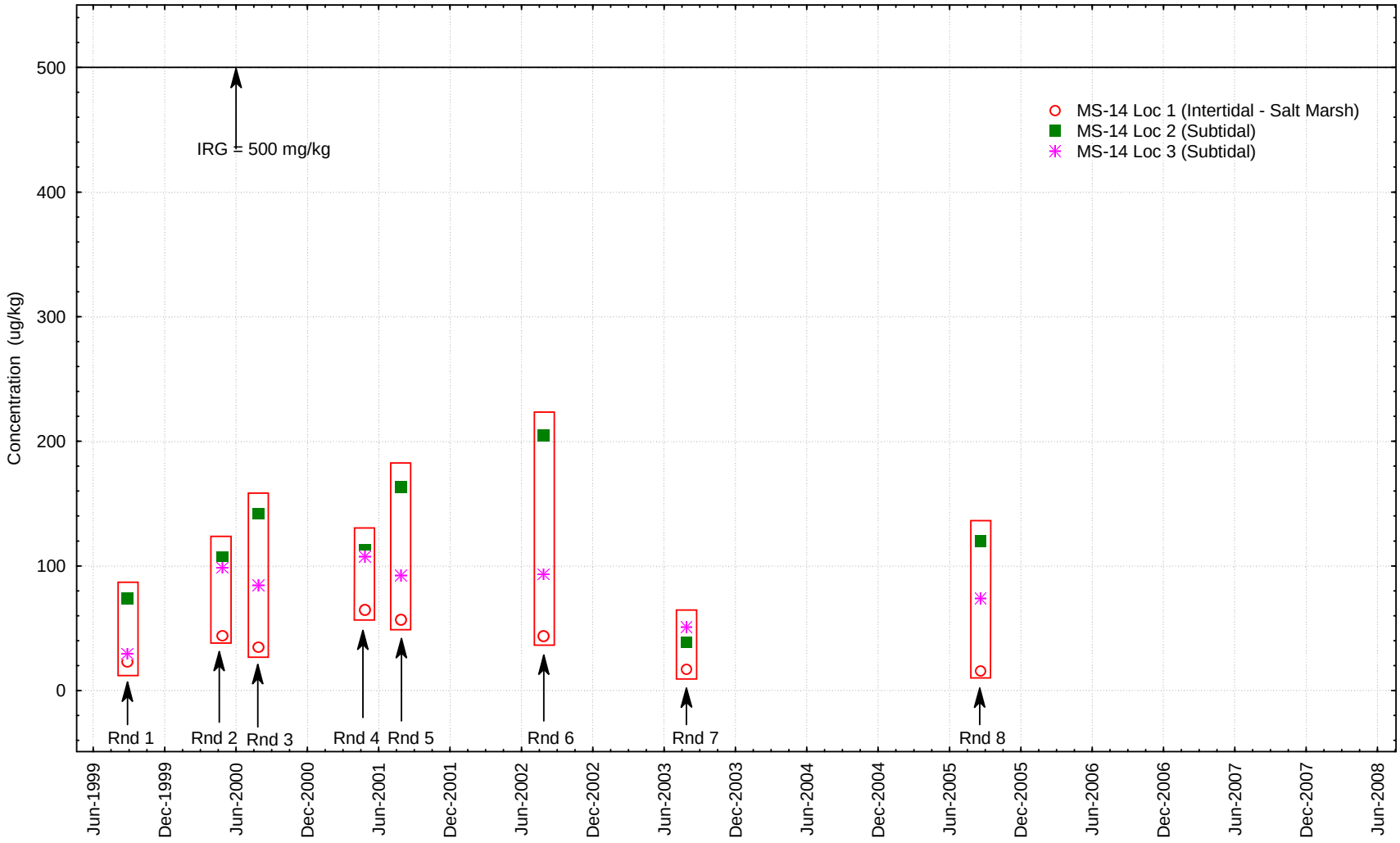
June 10, 2009

Monitoring Station 14 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



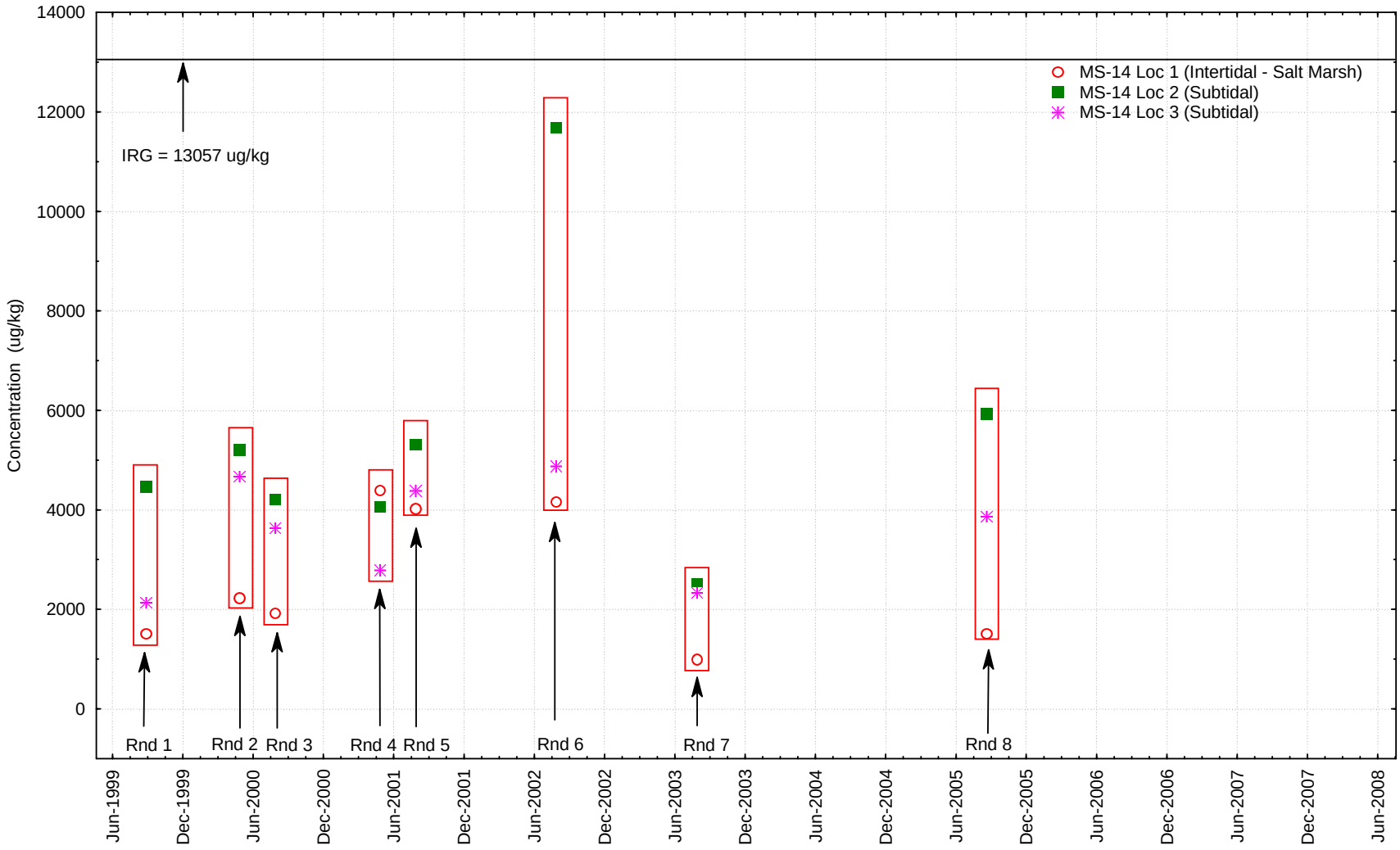
June 10, 2009

Monitoring Station 14 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 10, 2009

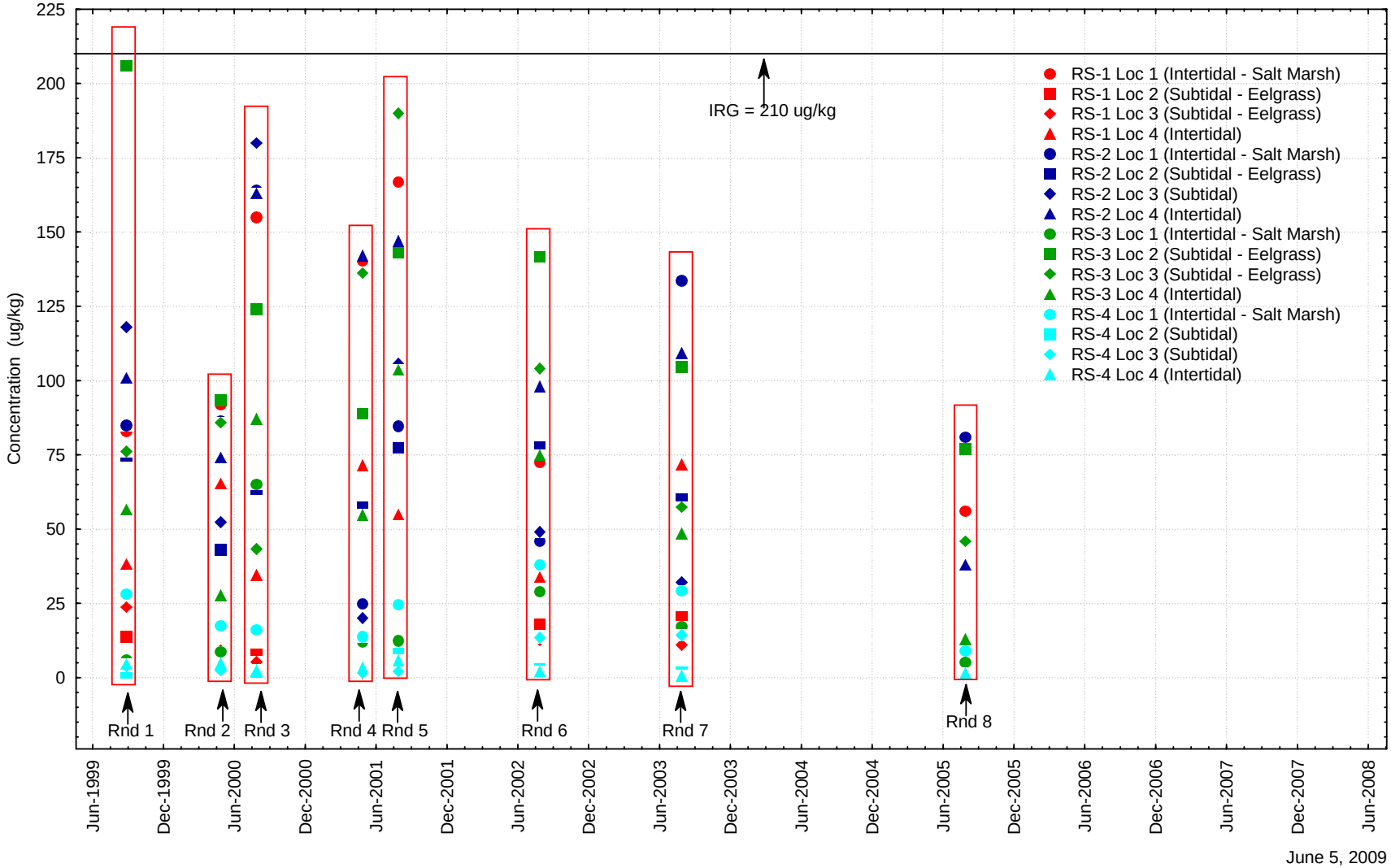
Monitoring Station 14 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 10, 2009

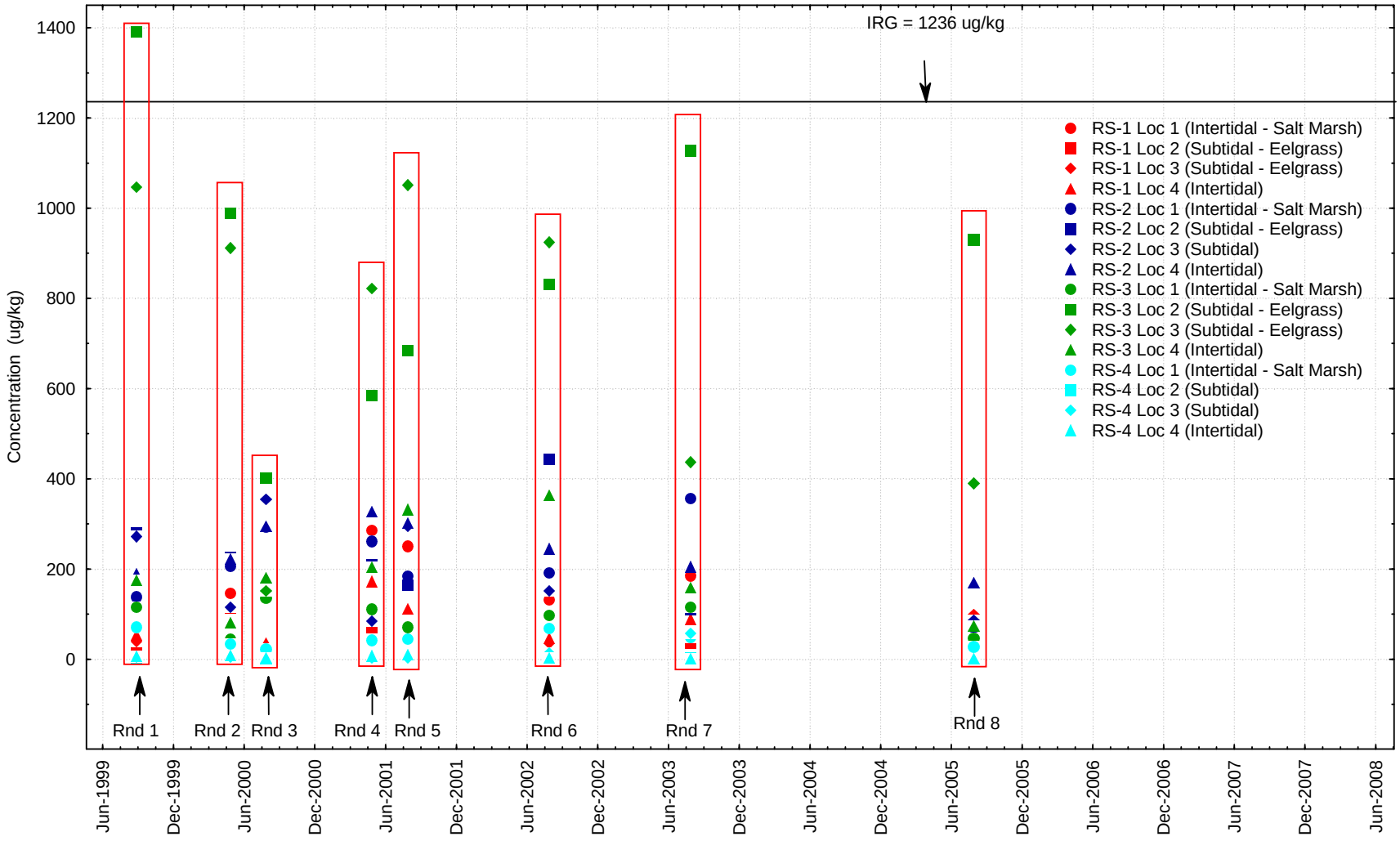
D.10 CONCENTRATION PLOTS AT REFERENCE STATIONS

All Reference Station Samples - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



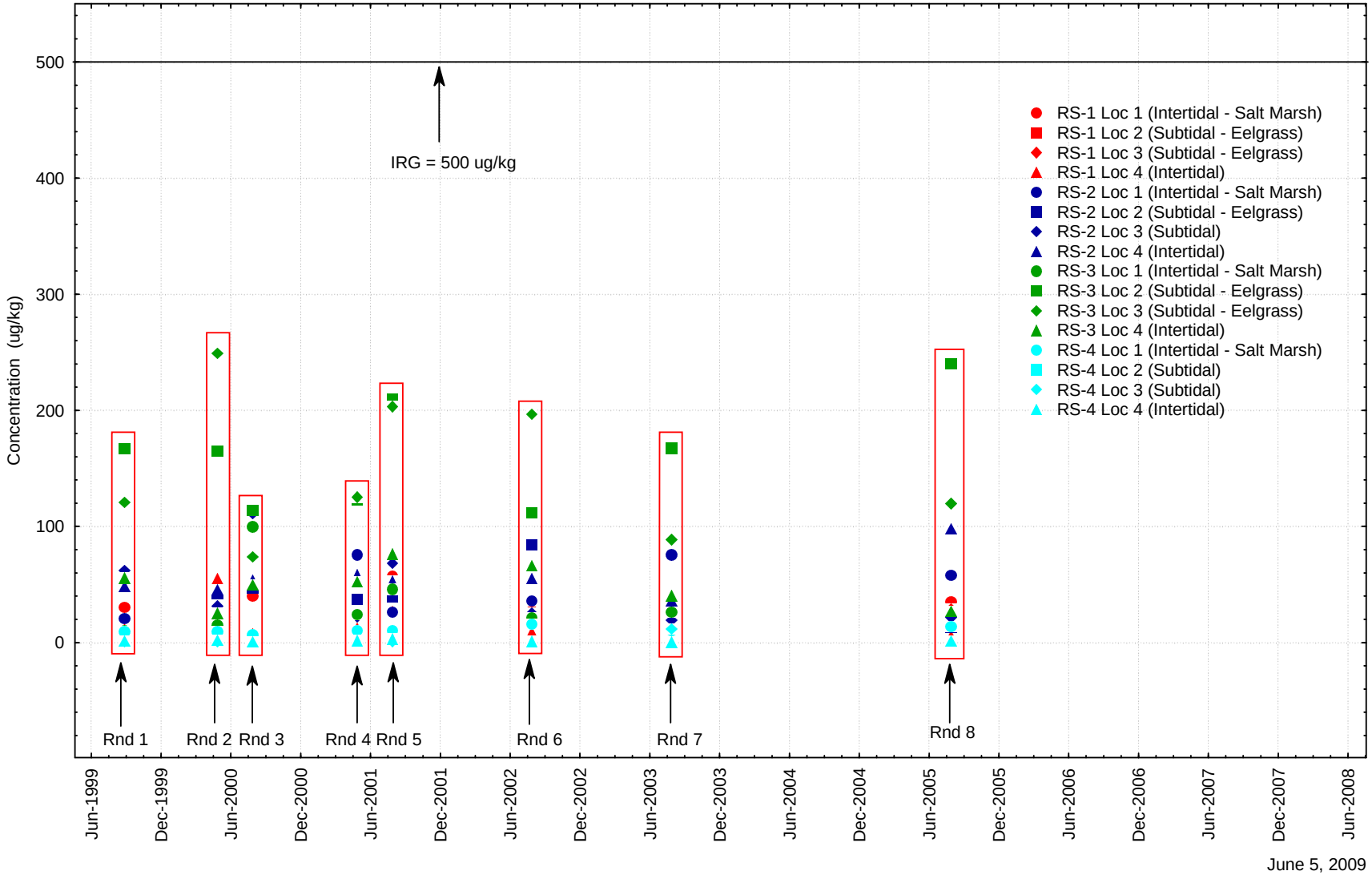
June 5, 2009

All Reference Station Samples - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



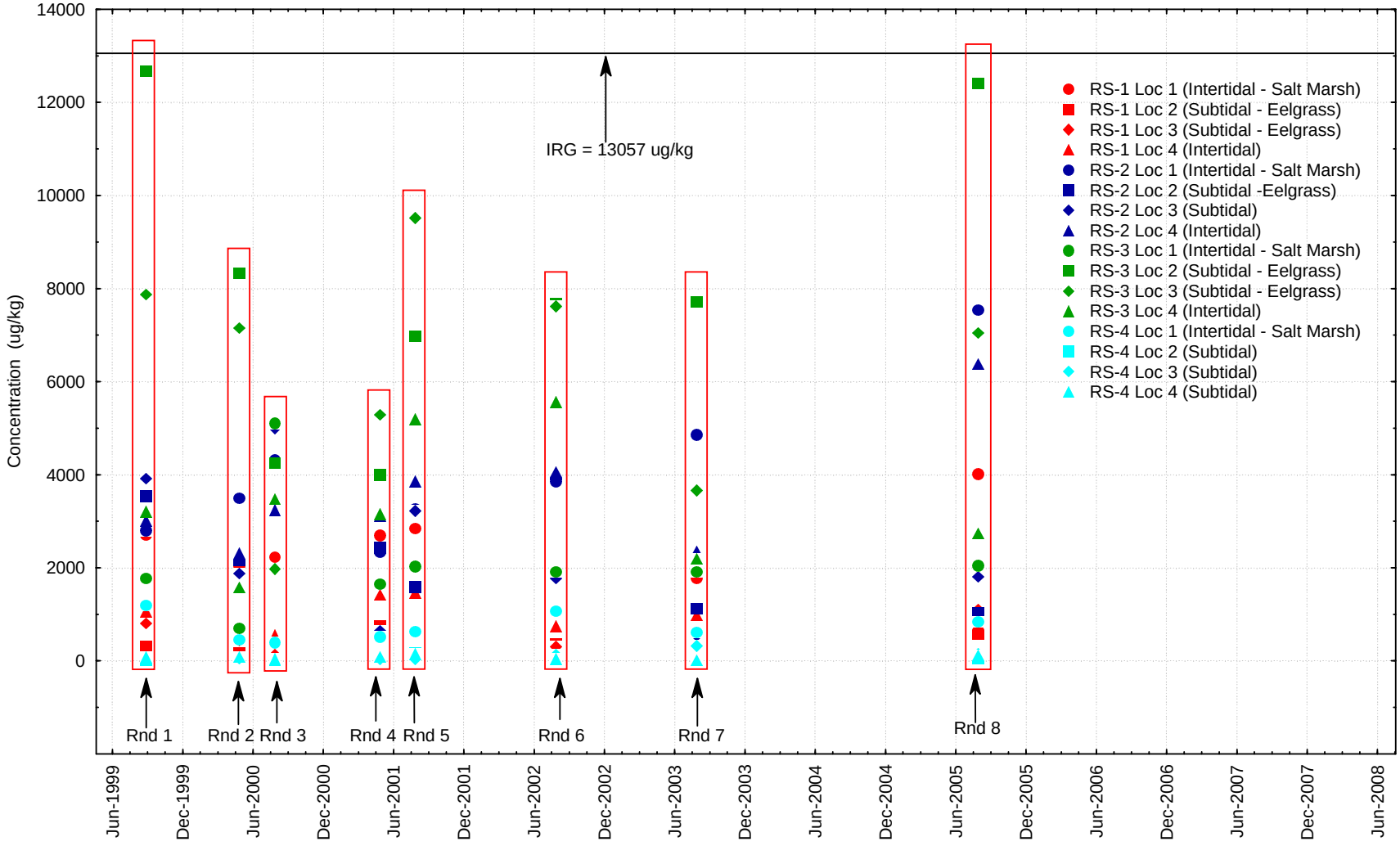
June 5, 2009

All Reference Station Samples - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



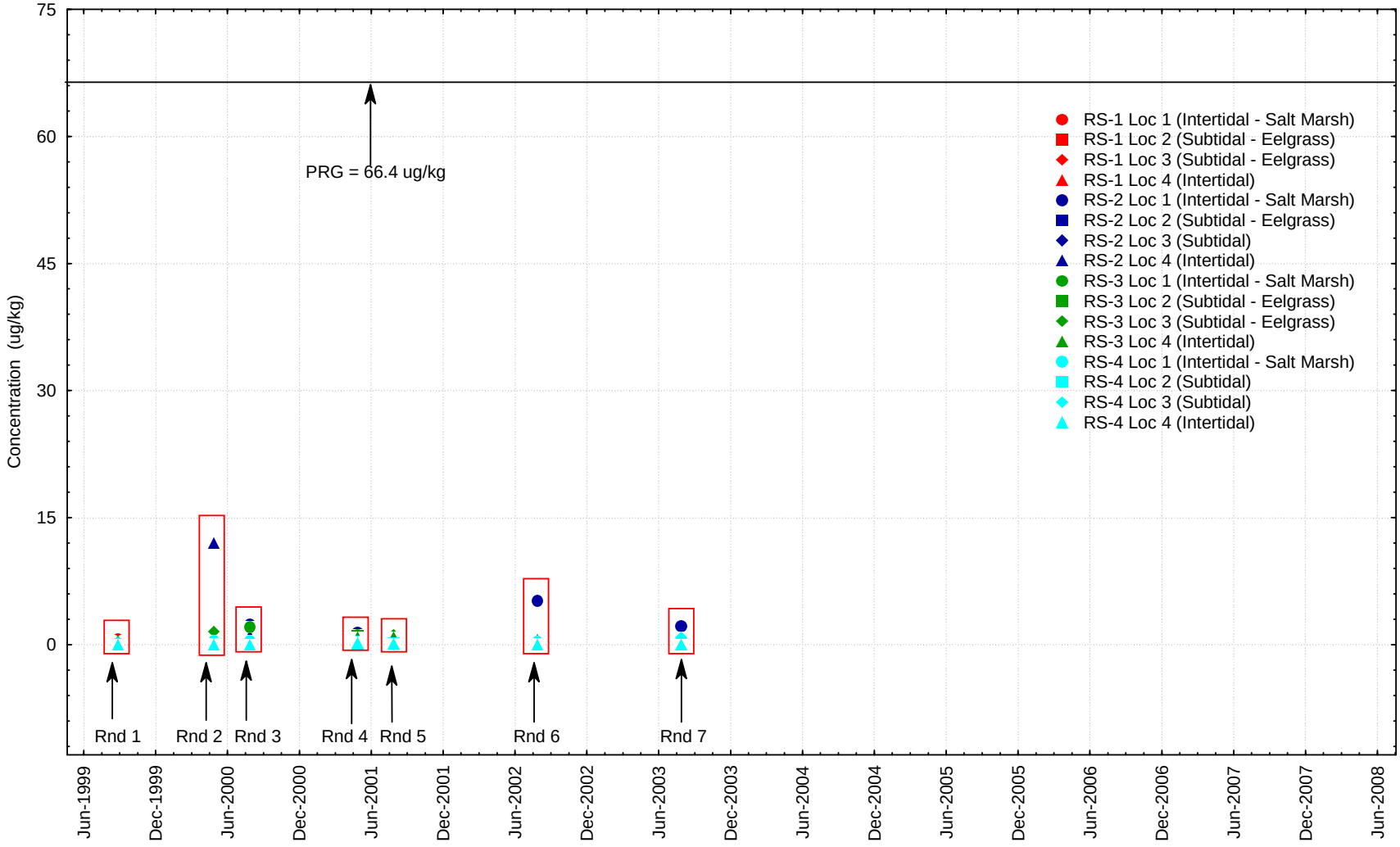
June 5, 2009

All Reference Station Samples - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



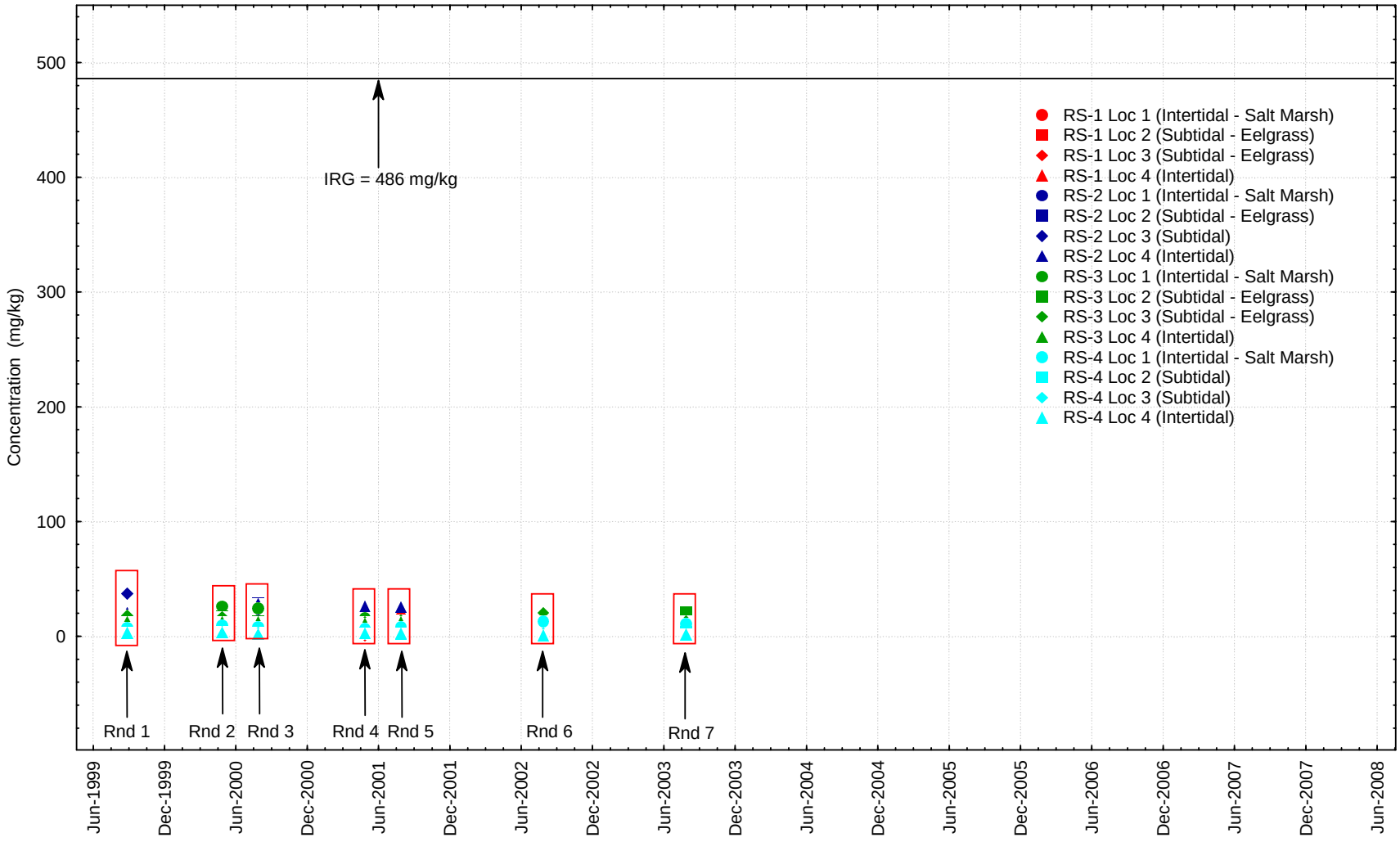
June 5, 2009

All Reference Station Samples - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



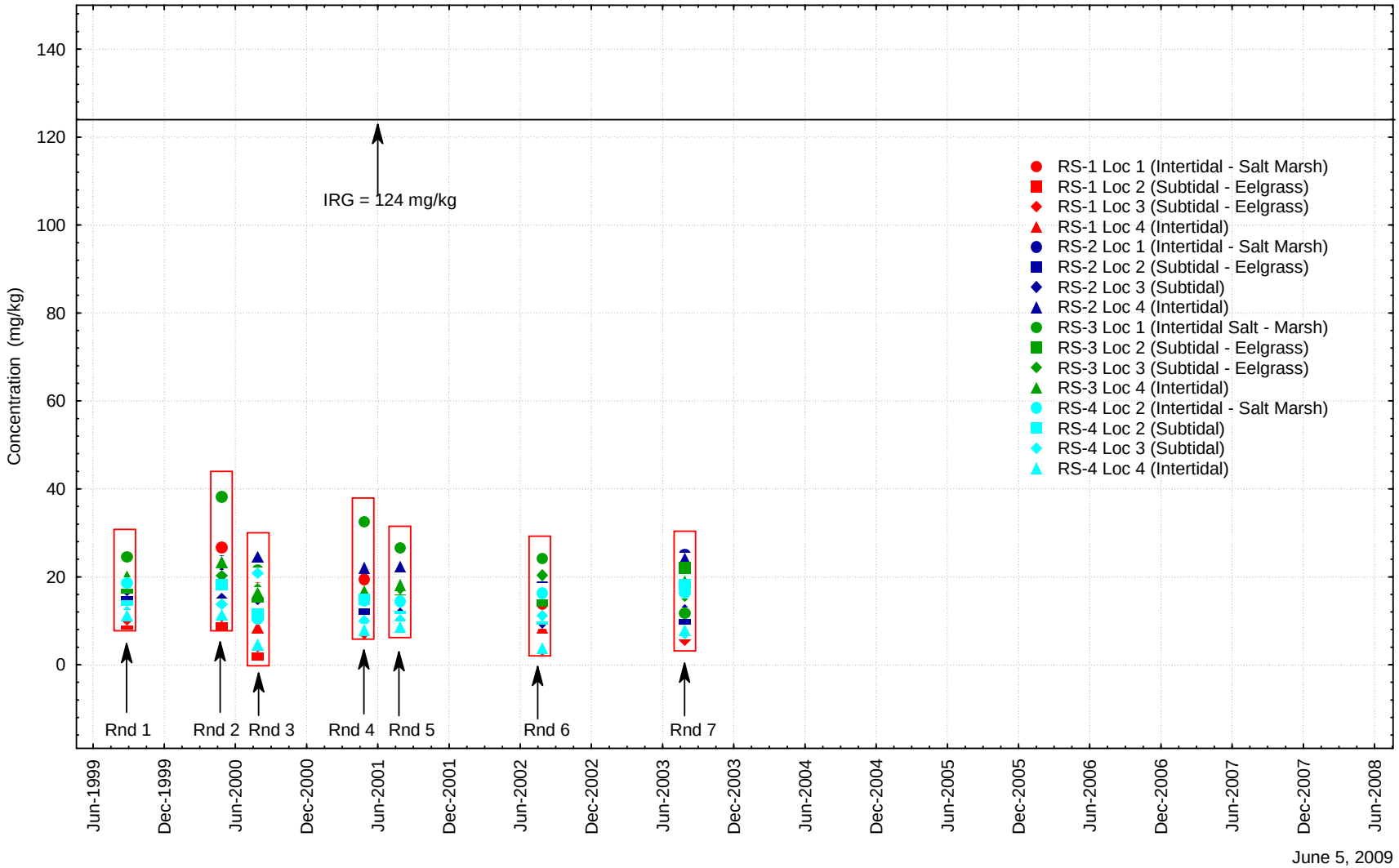
June 5, 2009

All Reference Station Samples - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



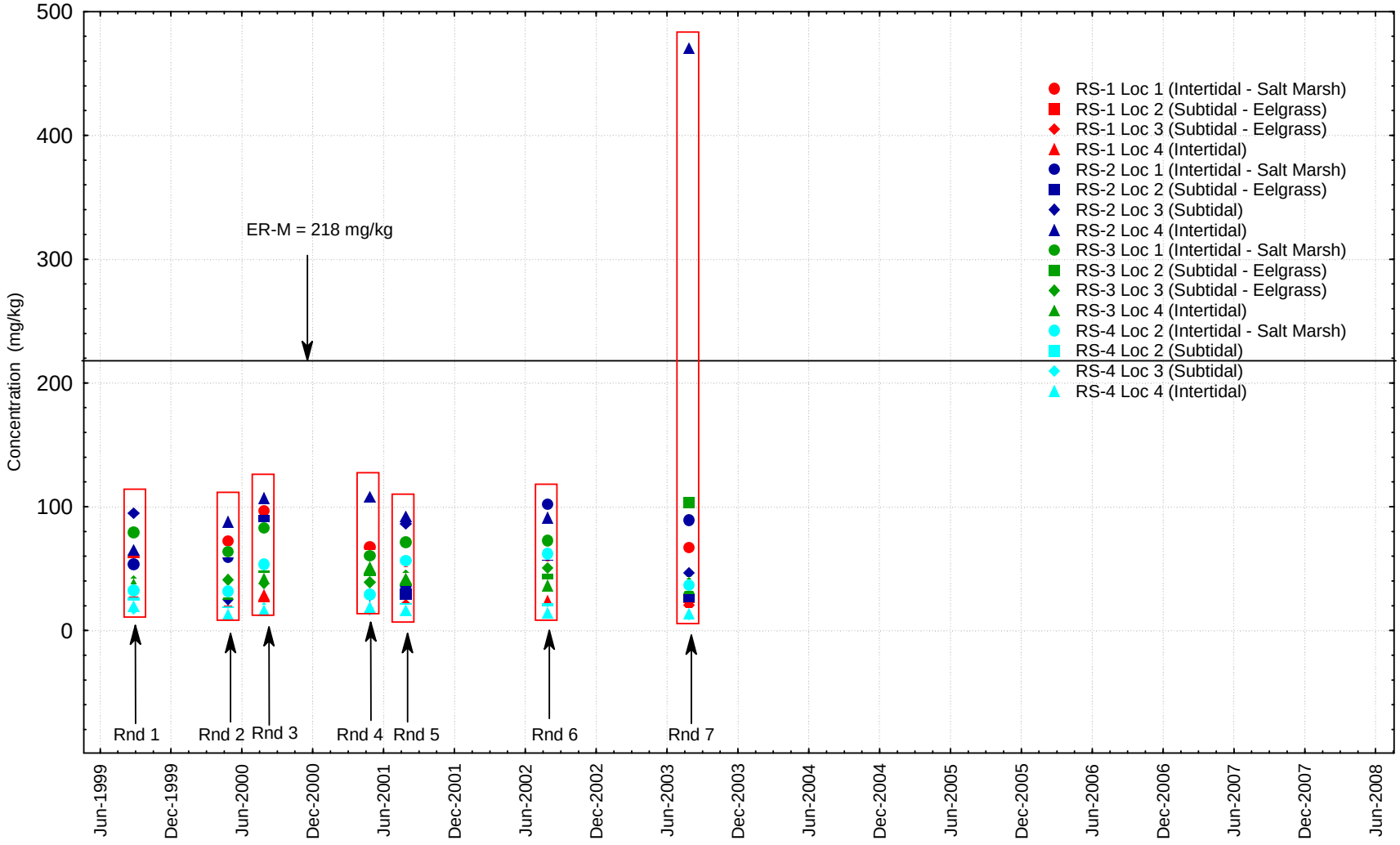
July 15, 2008

All Reference Station Samples - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

All Reference Station Samples - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

APPENDIX E

ANALYTICAL METHODS EVALUATION SUPPORTING DATA

Figure 1
Copper Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

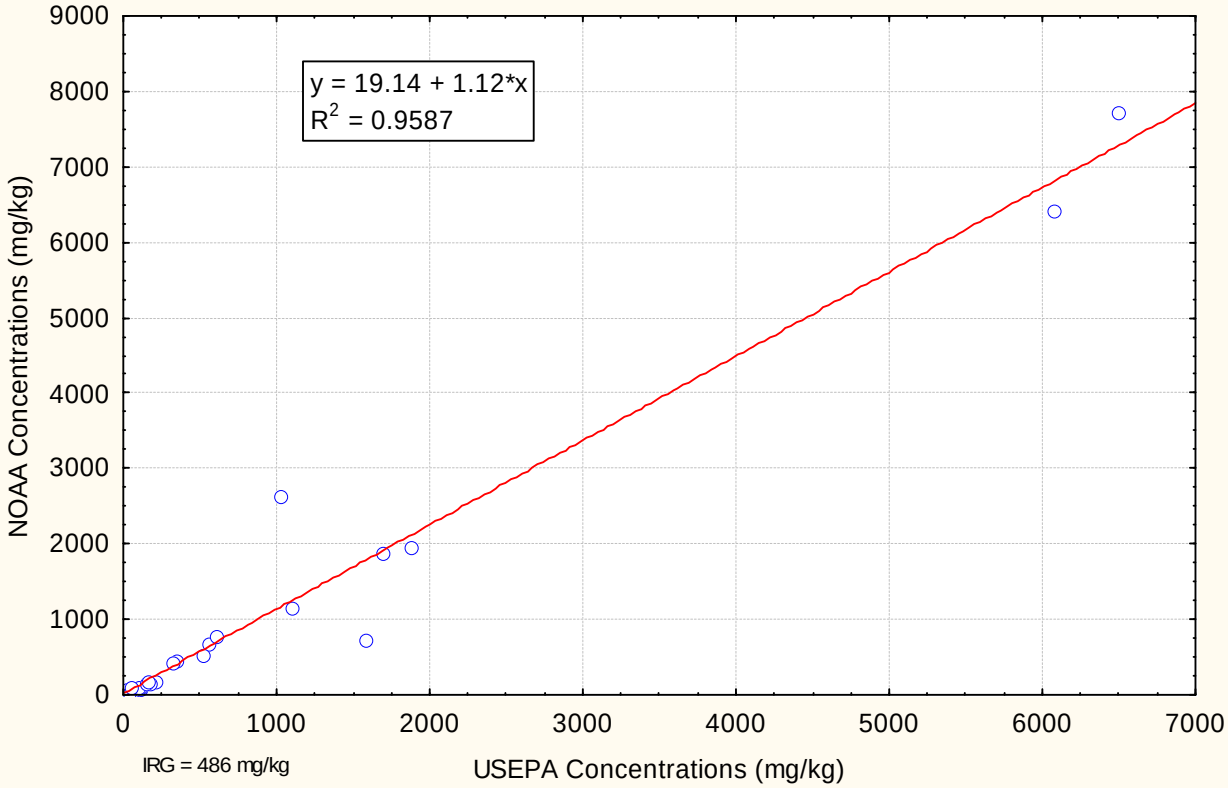


Figure 2
Copper Concentrations for Samples Analyzed Using USEPA and NOAA Methods
(USEPA Concentrations Less 700 mg/kg)
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

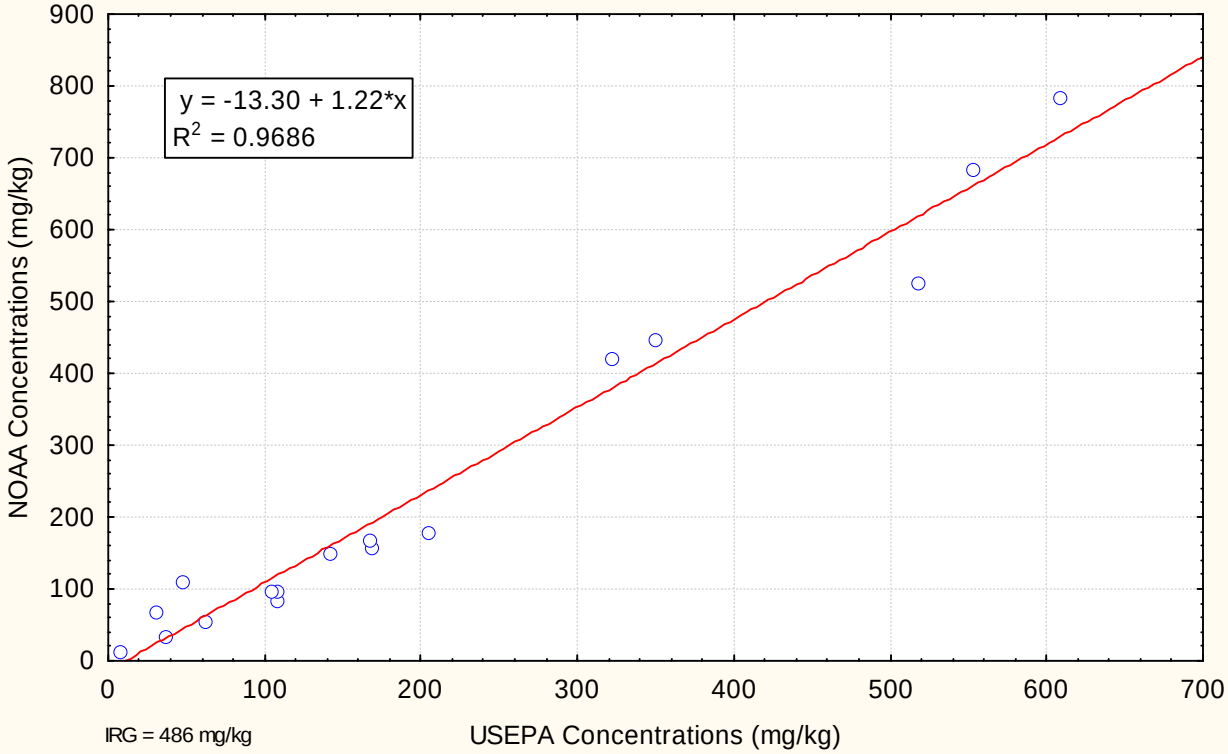


Figure 3
Lead Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

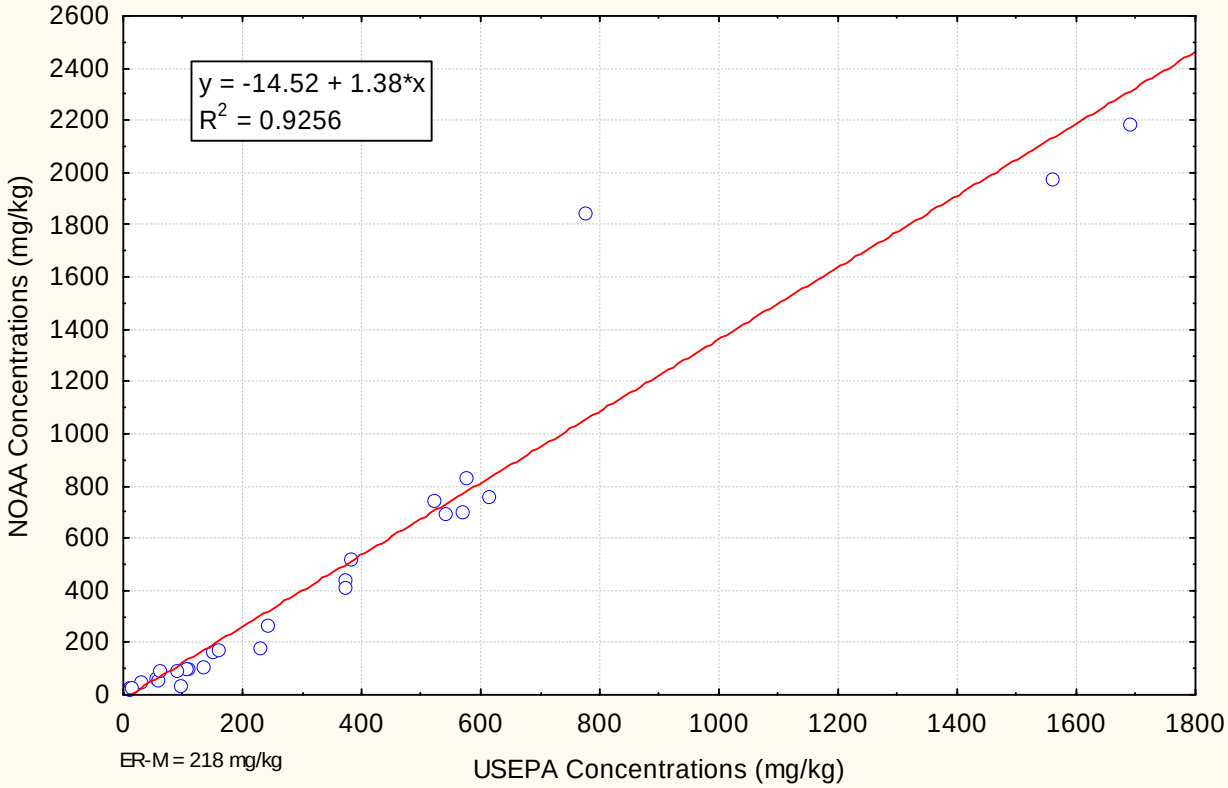


Figure 4
Lead Concentrations for Samples Analyzed Using USEPA and NOAA Methods
(USEPA Concentrations Less 700 mg/kg)
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

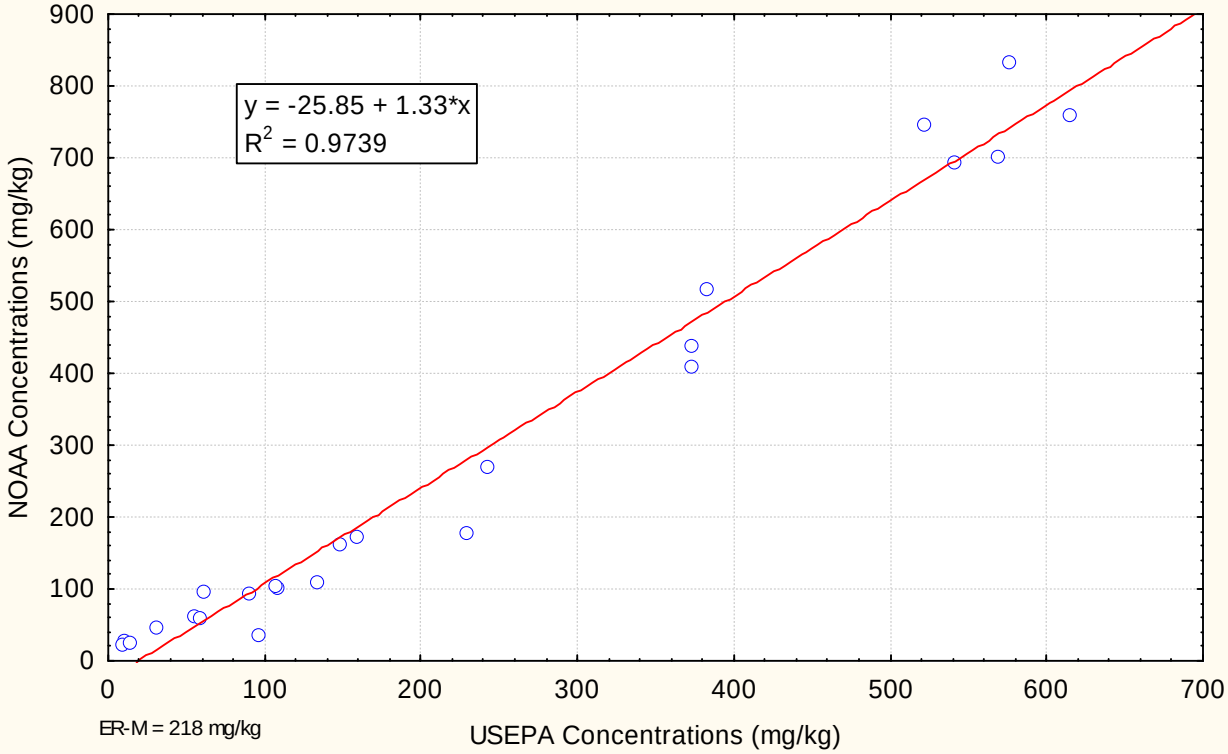


Figure 5
Nickel Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

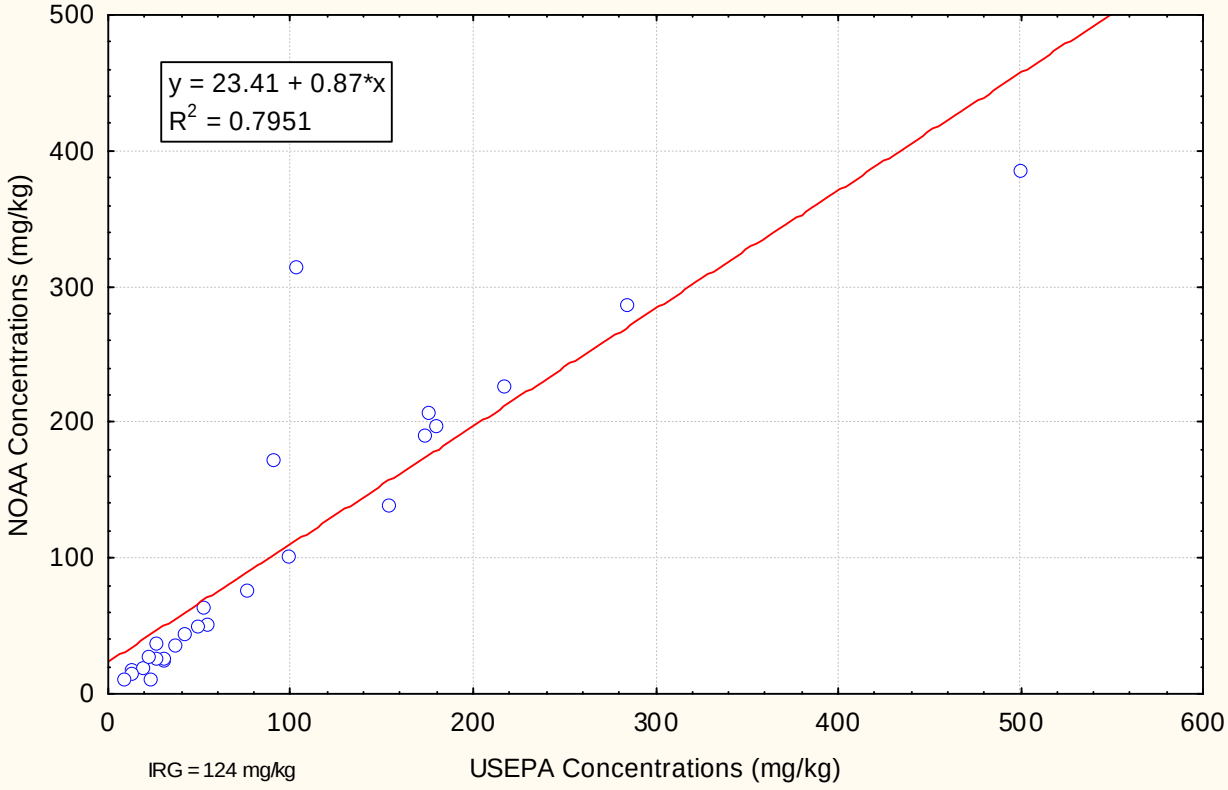


Figure 6
Aluminum Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

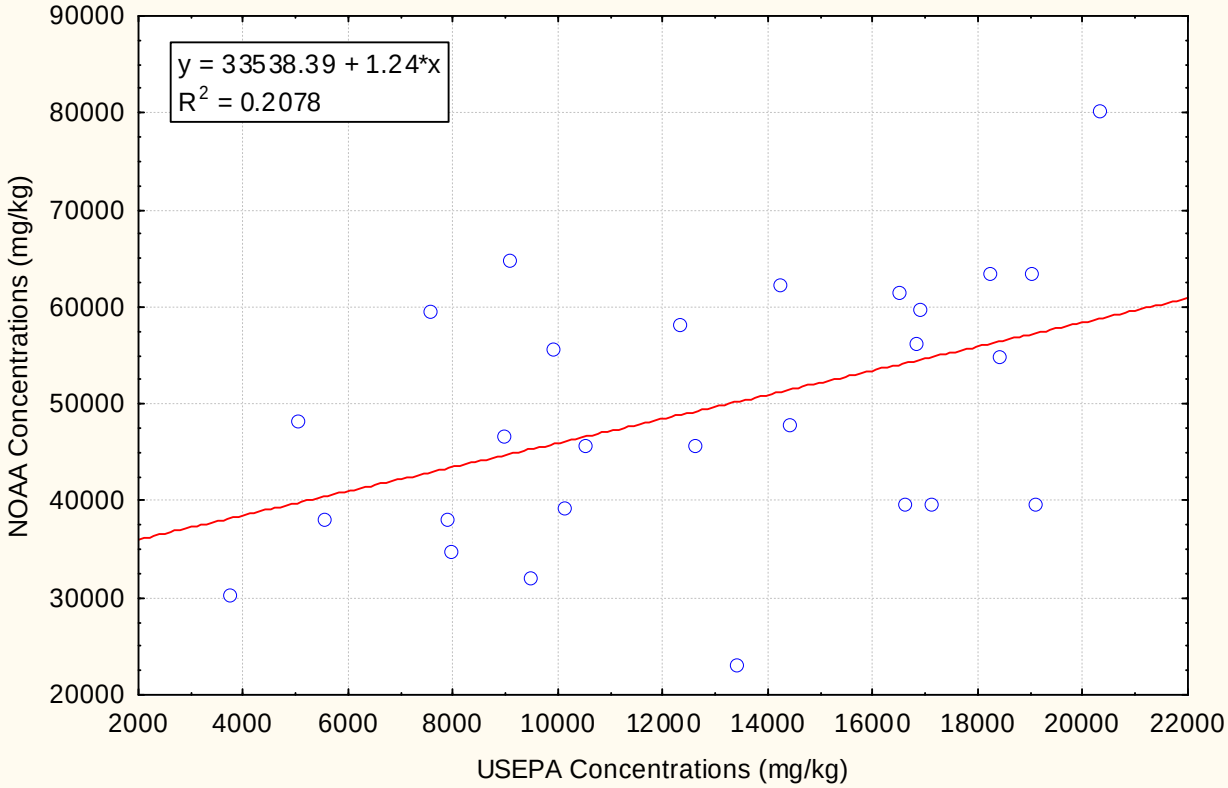


Figure 7
Arsenic Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

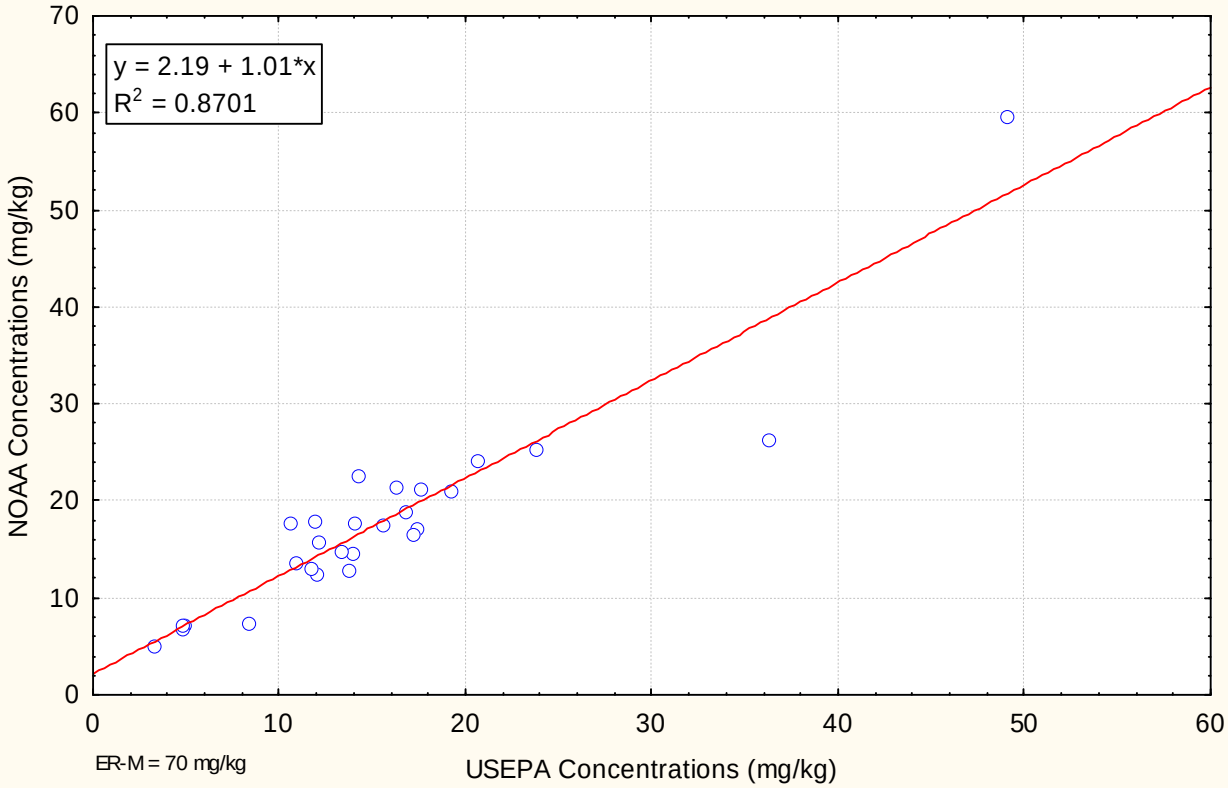


Figure 8
Cadmium Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

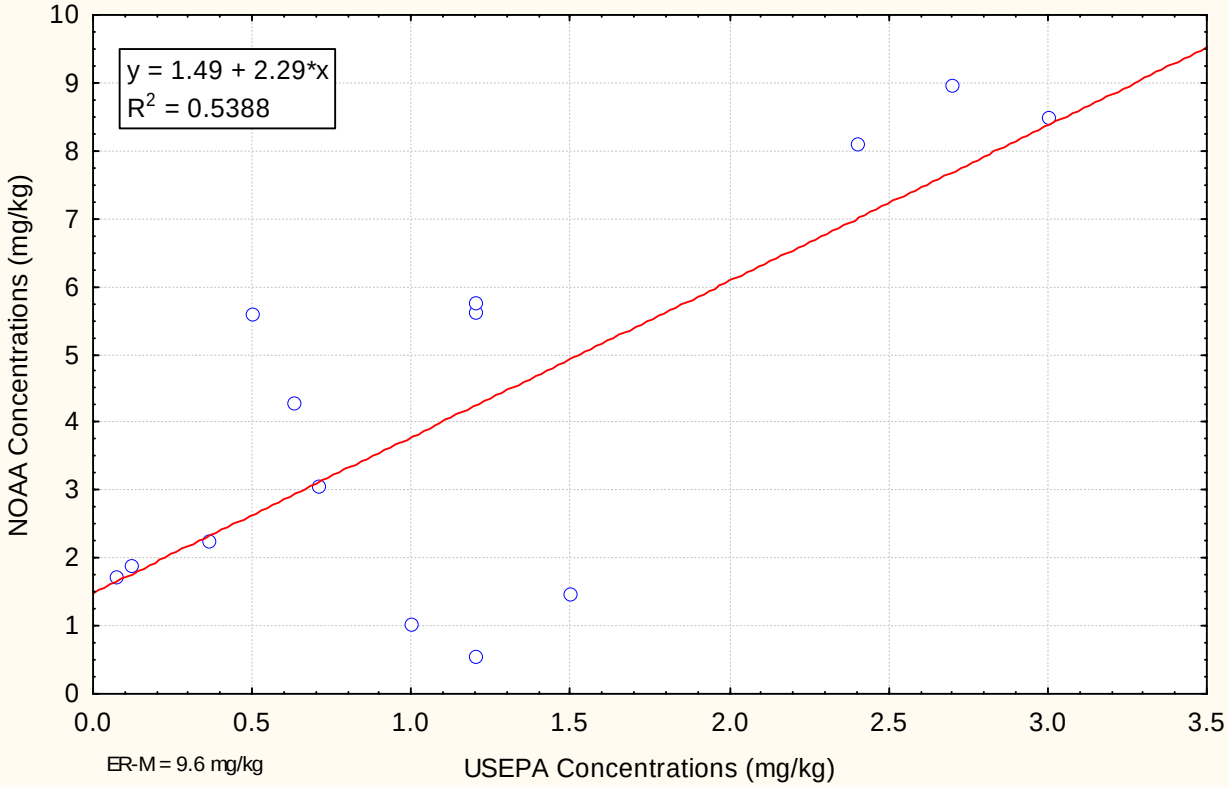


Figure 9
Chromium Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

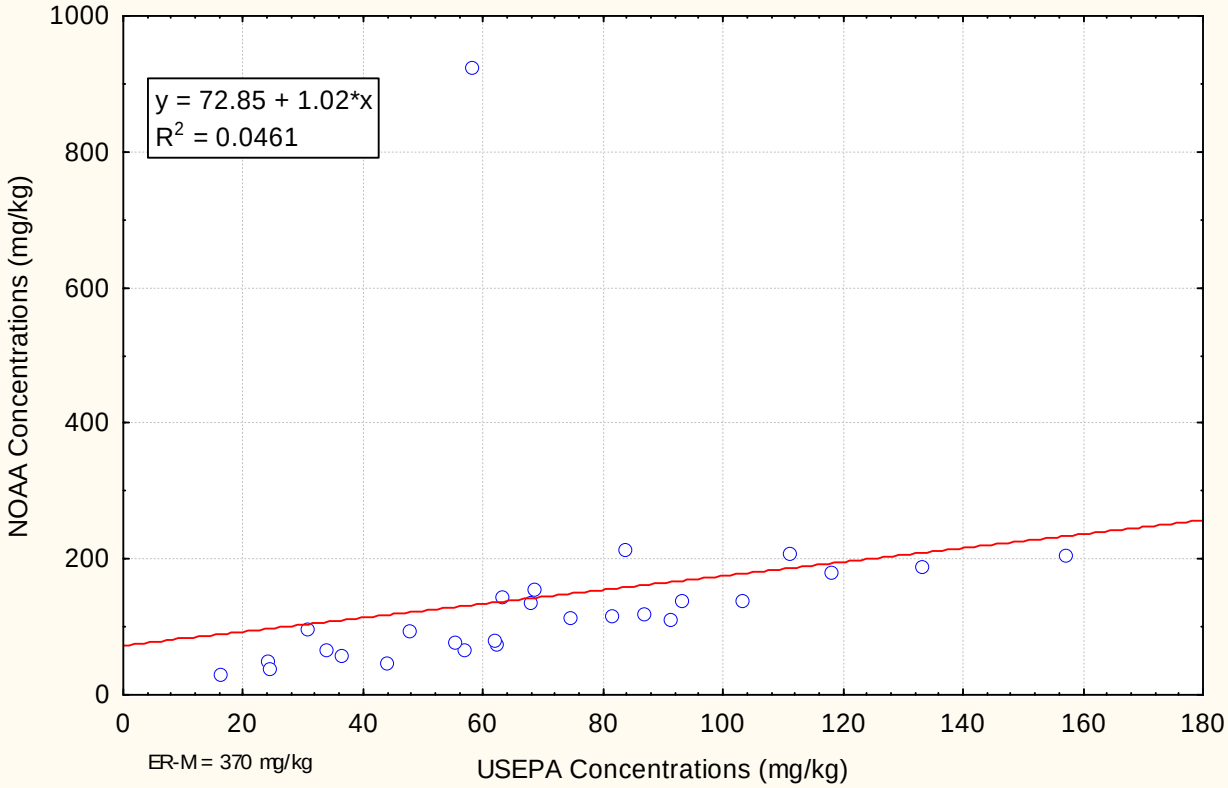


Figure 10
Chromium Concentrations for Samples Analyzed Using USEPA and NOAA Methods
(excluding sample OU4-SD-M03-203A)
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

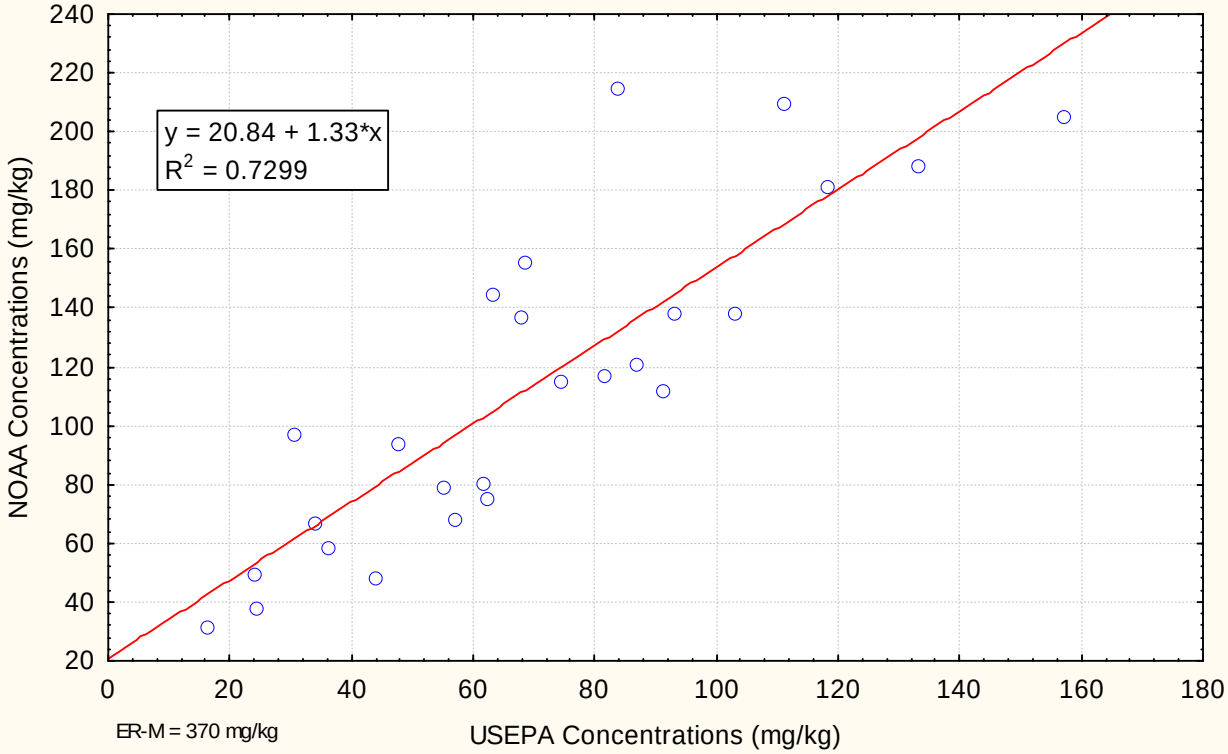


Figure 11
Iron Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

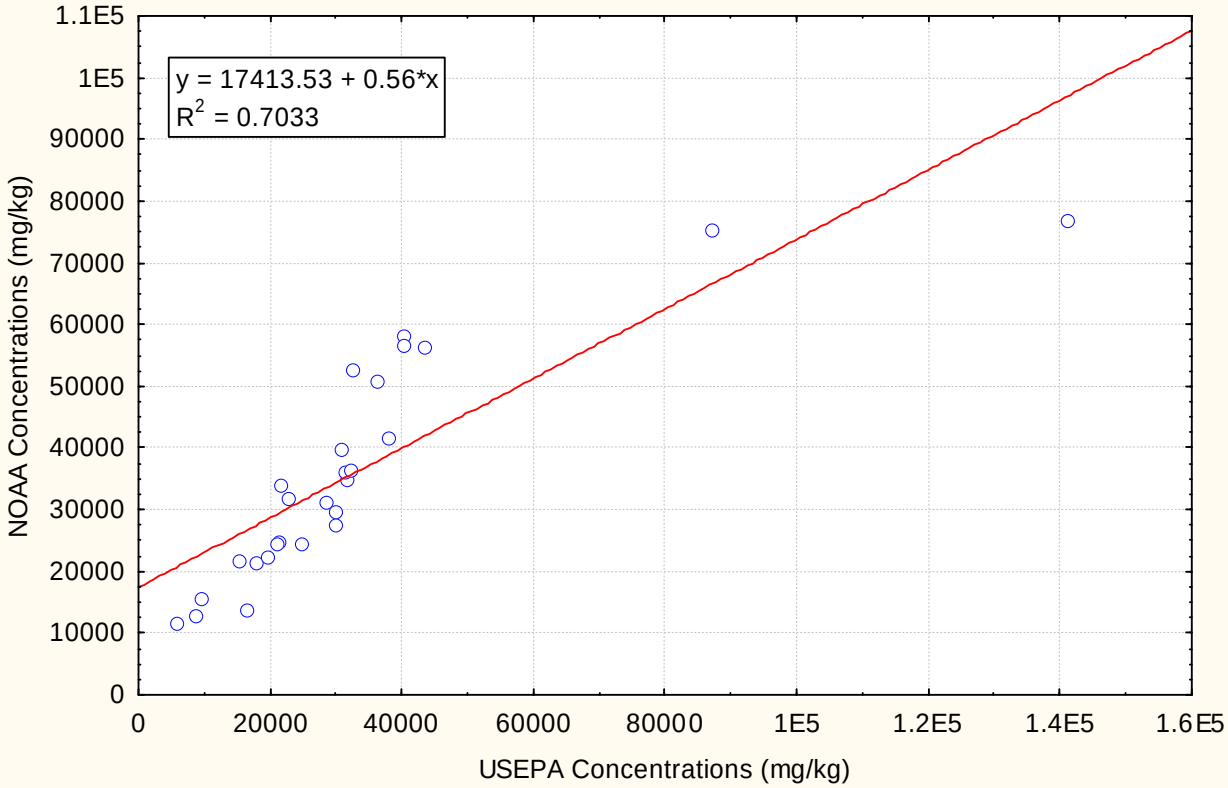


Figure 12
Manganese Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

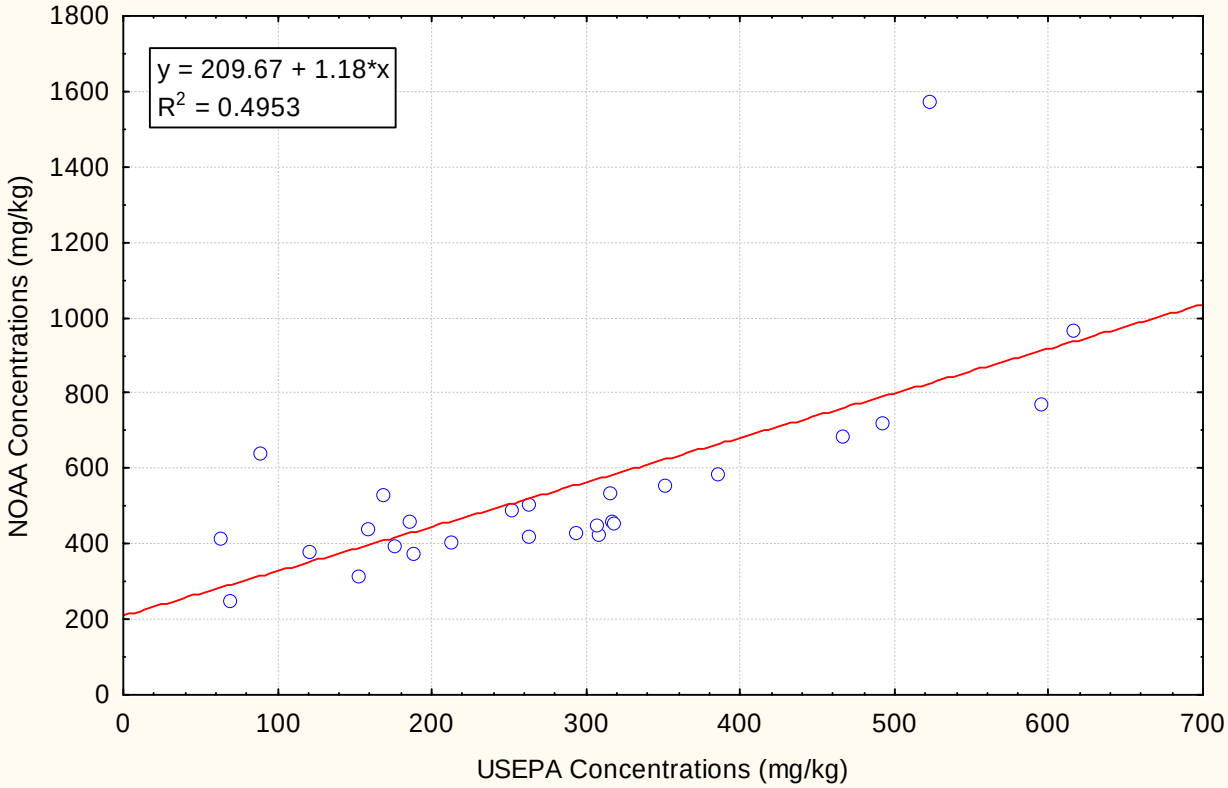


Figure 13
Mercury Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

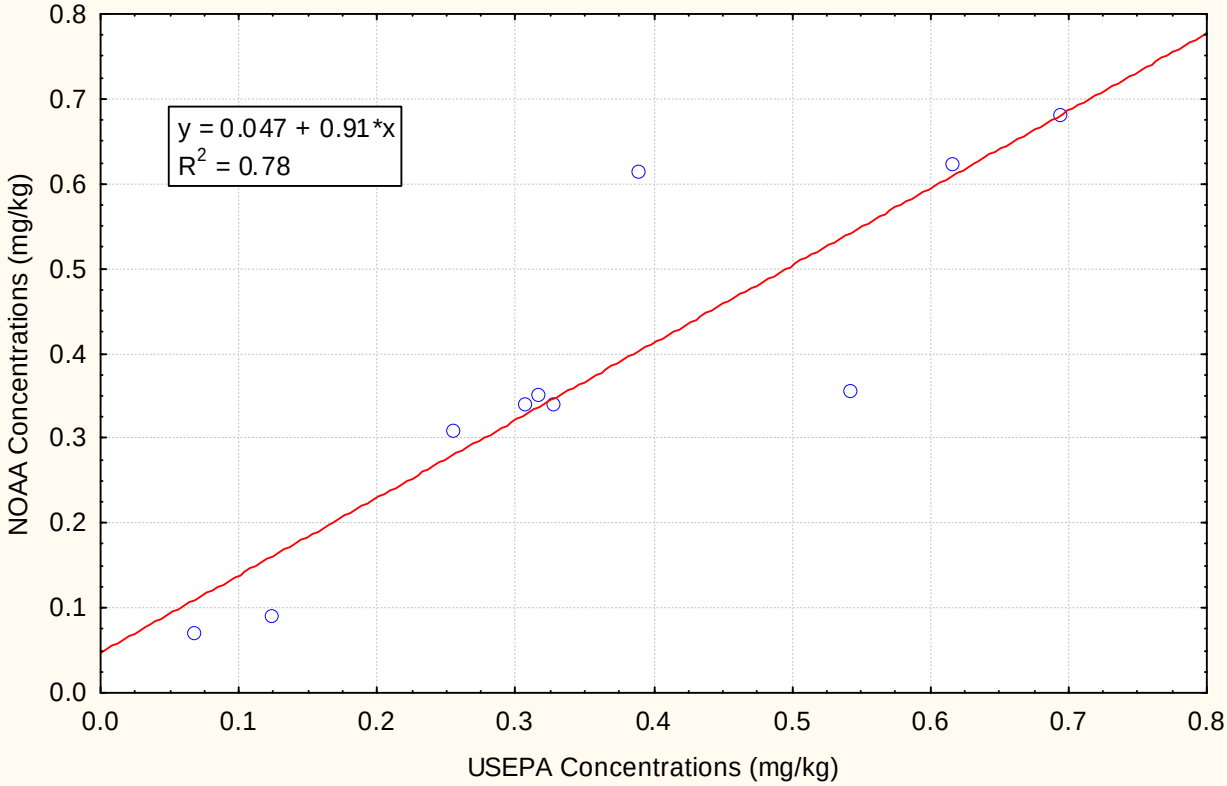


Figure 14
Silver Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

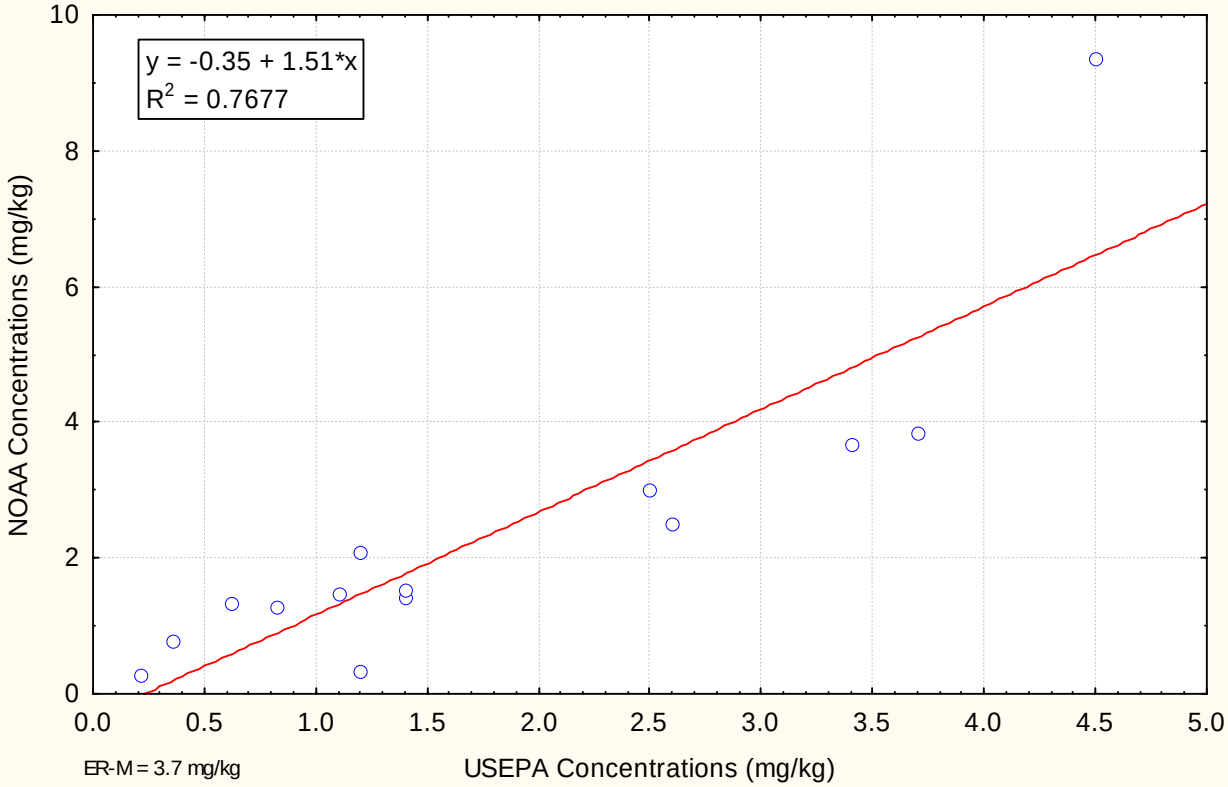


Figure 15
Zinc Concentrations for Samples Analyzed Using USEPA and NOAA Methods
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Station, Kittery, Maine

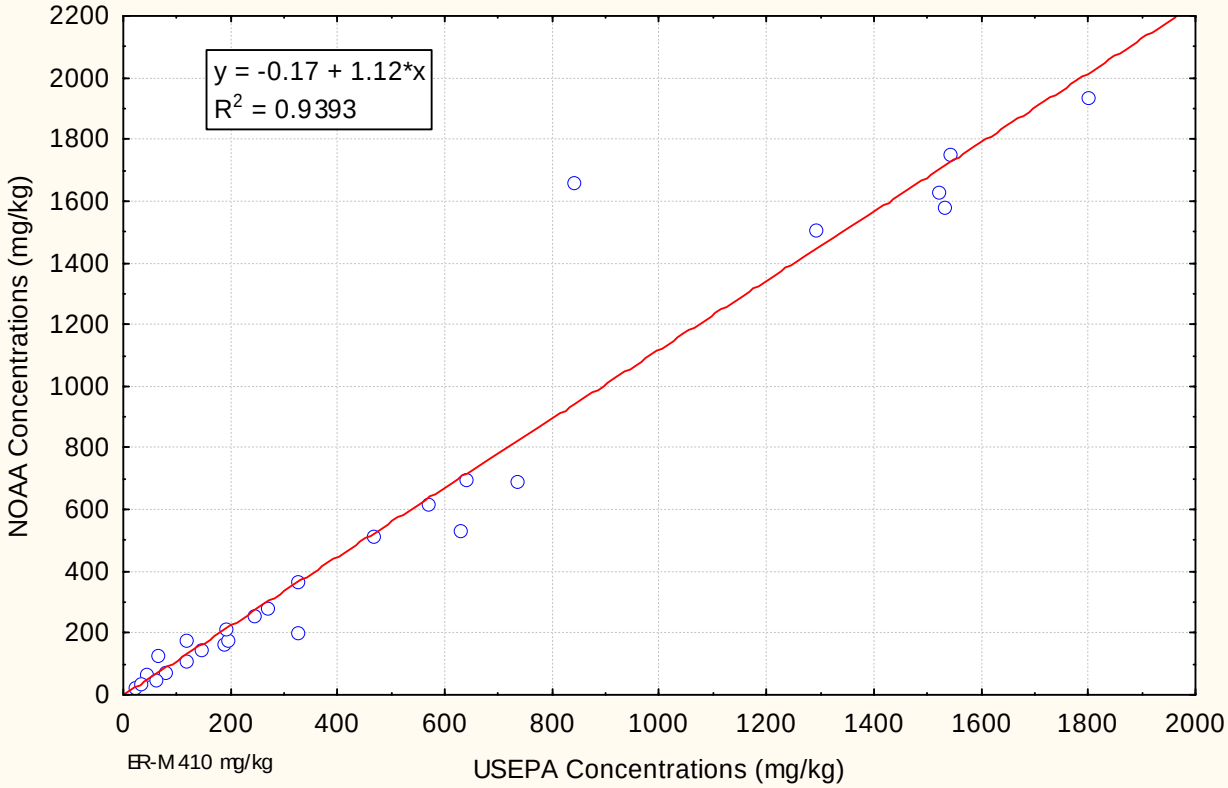


TABLE 1

METALS RESULTS USING NOAA AND USEPA ANALYTICAL METHODS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

			Aluminum			Arsenic			Cadmium			Chromium		
Round	Station/ Location	Sample ID	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio
7	MS-01 Loc. 1	OU4-SD-M01-103A	48335	5040 J	9.6	7.17	4.9 J	1.5	0.45 U	0.08 J	NA	97.4	30.6 J	3.2
7	MS-03 Loc. 2	OU4-SD-M03-203A	64801	9060 J	7.2	17.7	10.6 J	1.7	0.46 U	0.8 J	NA	925	58.1 J	15.9(1)
7	MS-04 Loc. 1	OU4-SD-M04-103A	38231	7870 J	4.9	26.3	36.2 J	0.7	0.57 J	1.2 J	0.5	206	157 J	1.3
7	MS-04 Loc. 1	OU4-SD-M04-103A-D	39400	10100 J	3.9	25.4	23.8 J	1.1	1.02	1 J	1.0	210	111 J	1.9
7	MS-05 Loc. 1	OU4-SD-M05-103A	80242	20300 J	4.0	59.6	49 J	1.2	1.49 J	1.5 J	1.0	155 J	68.4 J	2.3
10	MS-05 Loc. 1	OU4-SD-M05-108A	56300	16800	3.4	17.2	17.4	1.0	0.48	1.4 U	NA	75.2	62.1	1.2
10	MS-05 Loc. 1	OU4-SD-M05-108A-D	59700	16900	3.5	16.6	17.2	1.0	0.51	1.5 U	NA	80.2	61.7	1.3
10	MS-05 Loc. 2	OU4-SD-M05-208A	47900	14400	3.3	12.9	13.7	0.9	0.33	1.5 U	NA	68.2	56.9	1.2
10	MS-05 Loc. 3	OU4-SD-M05-308A	46800	8970	5.2	6.75	4.8	1.4	0.26	0.69 U	NA	66.9	33.8	2.0
7	MS-08 Loc. 1	OU4-SD-M08-103A	39664 J	19100 J	2.1	21.2	17.6 J	1.2	8.49	3 J	2.8	188	133 J	1.4
7	MS-08 Loc. 1	OU4-SD-M08-103A-D	39768 J	17100 J	2.3	21.5	16.2 J	1.3	8.98	2.7 J	3.3	182	118 J	1.5
10	MS-08 Loc. 1	OU4-SD-M08-108A	59500	7560	7.9	17.8	14	1.3	0.14	0.71 U	NA	49.6	24 J	2.1
7	MS-08 Loc. 2	OU4-SD-M08-203A	45646 J	12600 J	3.6	13.6	10.9 J	1.2	3.06	0.71 J	4.3	115	74.3 J	1.5
10	MS-08 Loc. 2	OU4-SD-M08-208A	58200	12300	4.7	12.4	12	1.0	0.39	1 U	NA	79.3	55.1	1.4
10	MS-08 Loc. 3	OU4-SD-M08-308A	55700	9880	5.6	14.7	13.9	1.1	0.40	0.72 U	NA	58.5	36.1	1.6
7	MS-09 Loc. 1	OU4-SD-M09-103A	54927 J	18400 J	3.0	24.2	20.6 J	1.2	5.64	1.2 J	4.7	138	103 J	1.3
10	MS-09 Loc. 1	OU4-SD-M09-108A	63500	18200 J	3.5	18.9	16.8 J	1.1	0.67	1.9 UJ	0.4	112	91 J	1.2
7	MS-09 Loc. 2	OU4-SD-M09-203A	34866 J	7960 J	4.4	13	11.7 J	1.1	4.3	0.63 J	6.8	94.0	47.5 J	2.0
10	MS-09 Loc. 2	OU4-SD-M09-208A	63400	19000	3.3	17.5	15.5	1.1	0.916	1.5 U	NA	121	86.6	1.4
7	MS-09 Loc. 3	OU4-SD-M09-303A	39764 J	16600 J	2.4	21.2	19.2 J	1.1	5.76	1.2 J	4.8	138	93 J	1.5
10	MS-09 Loc. 3	OU4-SD-M09-308A	61500	16500	3.7	14.9	13.3	1.1	0.90	1.4 U	NA	117	81.4	1.4
7	MS-11 Loc. 3	OU4-SD-M11-303A	32113 J	9460 J	3.4	22.6	14.2 J	1.6	8.1	2.4 J	3.4	215	83.7 J	2.6
7	MS-12 Loc. 1	OU4-SD-M12-103A	45717 J	10500 J	4.4	18.0	11.9 J	1.5	5.59	0.5 J	11.2	145	63 J	2.3
7	MS-13 Loc. 1	OU4-SD-M13-103A	62366	14200 J	4.4	15.9	12.1 J	1.3	0.47 U	0.68 J	NA	137 J	67.8 J	2.0
7	RS-01 Loc. 2	OU4-SD-R01-203A	30335 J	3750 J	8.1	4.99	3.3 J	1.5	1.74	0.07 J	24.9	31.52	16.2 J	1.9
7	RS-01 Loc. 4	OU4-SD-R01-403A	38200 J	5540 J	6.9	7.23	4.8 J	1.5	1.88	0.12 J	15.7	38.31	24.4 J	1.6
7	RS-03 Loc. 1	OU4-SD-R03-103A	23119 J	13400 J	1.7	7.42	8.3 J	0.9	2.26	0.36 J	6.3	48.03	43.8 J	1.1

Minimum	23119	3750	1.7	5.0	3.3	0.7	0.1	0.1	0.4	31.5	16.2	1.1
Maximum	80242	20300	9.6	59.6	49.0	1.7	9.0	3.0	24.9	925	157	3.2
Average	49259	12648	4.5	17.6	15.3	1.2	2.4	1.1	6.1	144	69.7	1.7
Median	47900	12600	3.9	17.2	13.9	1.2	0.9	1.0	4.3	115	63.0	1.5

1 - The average and median ratios for chromium do not include the ratio of 15.9 for M03-2.
2 - Samples from Round 7 are not included as the samples were only analyzed by one method.
Nondetected values were included the calculation of minimum, maximum, average, and median values.

NOAA - National Oceanic and Atmospheric Administration (Method referenced in NOS ORCA 130)
USEPA - United States Environmental Protection Agency (Analytical Method SW-846, Method 6010B/6020)
Ratio = [NOAA]/[USEPA]

NA - Ratios were not calculated for samples where one value was not detected
U - Nondetected
J - Estimated value

TABLE 1

METALS RESULTS USING NOAA AND USEPA ANALYTICAL METHODS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

			Copper			Iron			Lead			Manganese			Mercury[2]		
Round	Station/ Location	Sample ID	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio
7	MS-01 Loc. 1	OU4-SD-M01-103A	68.25	29.7 J	2.3	15562	9540 J	1.6	62.97	53.9 J	1.2	641	88.6 J	7.2			
7	MS-03 Loc. 2	OU4-SD-M03-203A	732	1580 J	0.5	34919	31500 J	1.1	180	229 J	0.8	460	185 J	2.5			
7	MS-04 Loc. 1	OU4-SD-M04-103A	6421	6070 J	1.1	76871	141000 J	0.5	747	521 J	1.4	1576	522 J	3.0			
7	MS-04 Loc. 1	OU4-SD-M04-103A-D	7725	6490 J	1.2	75344	87000 J	0.9	834	575 J	1.5	966	615 J	1.6			
7	MS-05 Loc. 1	OU4-SD-M05-103A	685 J	553 J	1.2	41758	37900 J	1.1	694 J	541 J	1.3	589	385 J	1.5			
10	MS-05 Loc. 1	OU4-SD-M05-108A	84.6	108	0.8	27600	29800	0.9	102	108	0.9	427	308	1.4	0.342	0.306	1.1
10	MS-05 Loc. 1	OU4-SD-M05-108A-D	98.5	108	0.9	29600	29900	1.0	104	106	1.0	450	307	1.5	0.34	0.327	1.0
10	MS-05 Loc. 2	OU4-SD-M05-208A	56.5	62.2	0.9	24500	24700	1.0	60.9	58.4	1.0	459	316	1.5	0.309	0.254	1.2
10	MS-05 Loc. 3	OU4-SD-M05-308A	12.3	7	1.8	21500	17900	1.2	30	10.3	2.9	532	168	3.2	0.0717	0.067	1.1
7	MS-08 Loc. 1	OU4-SD-M08-103A	1958	1880 J	1.0	56465	43300 J	1.3	2187	1690 J	1.3	554	350 J	1.6			
7	MS-08 Loc. 1	OU4-SD-M08-103A-D	1878	1690 J	1.1	58158	40200 J	1.4	1976	1560 J	1.3	537	315 J	1.7			
10	MS-08 Loc. 1	OU4-SD-M08-108A	35	36.6	1.0	21900	15300	1.4	47.1	30.2	1.6	380	120	3.2	0.0919	0.123	0.7
7	MS-08 Loc. 2	OU4-SD-M08-203A	446	349 J	1.3	34024	21600 J	1.6	439	372 J	1.2	394	175 J	2.2			
10	MS-08 Loc. 2	OU4-SD-M08-208A	97.3	104	0.9	24800	21200	1.2	95.5	89	1.1	378	187	2.0	0.356	0.541	0.7
10	MS-08 Loc. 3	OU4-SD-M08-308A	179	204	0.9	22500	19600	1.1	163	148	1.1	442	158	2.8	0.615	0.388	1.6
7	MS-09 Loc. 1	OU4-SD-M09-103A	1145	1100 J	1.0	50716	36200 J	1.4	762	614 J	1.2	771	595 J	1.3			
10	MS-09 Loc. 1	OU4-SD-M09-108A	159	168 J	0.9	36200	31300 J	1.2	110	133 J	0.8	433	293 J	1.5	0.353	0.316 J	1.1
7	MS-09 Loc. 2	OU4-SD-M09-203A	526	517 J	1.0	31909	22800 J	1.4	519	382 J	1.4	720	491 J	1.5			
10	MS-09 Loc. 2	OU4-SD-M09-208A	150	142	1.1	36600	32100	1.1	271	242	1.1	457	318	1.4	0.624	0.615	1.0
7	MS-09 Loc. 3	OU4-SD-M09-303A	785	608 J	1.3	39955	30700 J	1.3	704	568 J	1.2	689	466 J	1.5			
10	MS-09 Loc. 3	OU4-SD-M09-308A	169	167	1.0	31300	28400	1.1	174	159	1.1	419	262	1.6	0.683	0.693	1.0
7	MS-11 Loc. 3	OU4-SD-M11-303A	2628	1020 J	2.6	56674	40300 J	1.4	1843	774 J	2.4	509	262 J	1.9			
7	MS-12 Loc. 1	OU4-SD-M12-103A	421	322 J	1.3	52818	32400 J	1.6	410	372 J	1.1	492	251 J	2.0			
7	MS-13 Loc. 1	OU4-SD-M13-103A	111 J	46.8 J	2.4	24602	20900 J	1.2	97.68 J	60.4 J	1.6	408	212 J	1.9			
7	RS-01 Loc. 2	OU4-SD-R01-203A	5.05	5.7 U	NA	11502	5830 J	2.0	23.55	9 J	2.6	417	62.8 J	6.6			
7	RS-01 Loc. 4	OU4-SD-R01-403A	6.26	8.1 U	NA	12855	8680 J	1.5	27.18	13.7 J	2.0	251	68.5 J	3.7			
7	RS-03 Loc. 1	OU4-SD-R03-103A	13.4	21.1 U	NA	13731	16500 J	0.8	37.84	95.4 J	0.4	316	152 J	2.1			

Minimum	5.1	5.7	0.5	11502	5830	0.5	23.6	9.0	0.4	251	62.8	1.3	0.1	0.1	0.7
Maximum	7725	6490	2.6	76871	141000	2.0	2187	1690	2.9	1576	615	7.2	0.7	0.7	1.6
Average	985	867	1.2	35717	32465	1.2	470	352	1.4	543	283	2.4	0.4	0.4	1.1
Median	169	168	1.0	31909	29800	1.2	174	159	1.2	459	262	1.9	0.3	0.3	1.1

1 - The average and median ratios for chromium do not include the ratio of 15.9 for M03-2.
2 - Samples from Round 7 are not included as the samples were only analyzed by one method.
Nondetected values were included the calculation of minimum, maximum, average, and median values.

NOAA - National Oceanic and Atmospheric Administration (Method referenced in NOS ORCA 130)
USEPA - United States Environmental Protection Agency (Analytical Method SW-846, Method 6010B/6020)
Ratio = [NOAA]/[USEPA]

NA - Ratios were not calculated for samples where one value was not detected
U - Nondetected
J - Estimated value

TABLE 1

METALS RESULTS USING NOAA AND USEPA ANALYTICAL METHODS
ROUNDS 1 THROUGH 10 INTERIM OFFSHORE MONITORING PROGRAM REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

			Nickel			Silver			Zinc		
Round	Station/ Location	Sample ID	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio	NOAA (mg/kg)	USEPA (mg/kg)	Ratio
7	MS-01 Loc. 1	OU4-SD-M01-103A	18.8 J	12 J	1.6	0.28	0.21 J	1.3	128.4	64.2 J	2.0
7	MS-03 Loc. 2	OU4-SD-M03-203A	315 J	103 J	3.1	1.41	1.4 J	1.0	534.6	629 J	0.8
7	MS-04 Loc. 1	OU4-SD-M04-103A	385 J	500 J	0.8	1.35	0.62 J	2.2	1629	1520 J	1.1
7	MS-04 Loc. 1	OU4-SD-M04-103A-D	287 J	284 J	1.0	1.29	0.82 J	1.6	1755	1540 J	1.1
7	MS-05 Loc. 1	OU4-SD-M05-103A	76.5	75.3 J	1.0	1.53	1.4 J	1.1	698	638 J	1.1
10	MS-05 Loc. 1	OU4-SD-M05-108A	25.2	30.5	0.8	0.68	1.5 U	NA	166	188	0.9
10	MS-05 Loc. 1	OU4-SD-M05-108A-D	26.3	29.7	0.9	0.67	1.4 U	NA	177	193	0.9
10	MS-05 Loc. 2	OU4-SD-M05-208A	37.2	25.8	1.4	0.60	1.6 U	NA	112	118	0.9
10	MS-05 Loc. 3	OU4-SD-M05-308A	19.1	19.2	1.0	0.32	0.69 U	NA	69.5	43.4	1.6
7	MS-08 Loc. 1	OU4-SD-M08-103A	197	179 J	1.1	3.67	3.4 J	1.1	1581	1530 J	1.0
7	MS-08 Loc. 1	OU4-SD-M08-103A-D	190	173 J	1.1	3.85	3.7 J	1.0	1506	1290 J	1.2
10	MS-08 Loc. 1	OU4-SD-M08-108A	15.4	12.1	1.3	0.28	0.73 U	NA	75.5	77.4	1.0
7	MS-08 Loc. 2	OU4-SD-M08-203A	64.1	51.4 J	1.2	1.47	1.1 J	1.3	365	323 J	1.1
10	MS-08 Loc. 2	OU4-SD-M08-208A	26.3	26.1	1.0	0.64	1.00 U	NA	148	144	1.0
10	MS-08 Loc. 3	OU4-SD-M08-308A	36.9	36.7	1.0	0.67	0.73 U	NA	204	326	0.6
7	MS-09 Loc. 1	OU4-SD-M09-103A	228	217 J	1.0	2.52	2.6 J	1.0	695	733 J	0.9
10	MS-09 Loc. 1	OU4-SD-M09-108A	51.4	54.1 J	1.0	0.76	1.8 UJ	0.4	213	192 J	1.1
7	MS-09 Loc. 2	OU4-SD-M09-203A	140	153 J	0.9	2.09	1.2 J	1.7	515	465 J	1.1
10	MS-09 Loc. 2	OU4-SD-M09-208A	44.5	41.2	1.1	0.94	1.5 U	NA	284	267	1.1
7	MS-09 Loc. 3	OU4-SD-M09-303A	208	175 J	1.2	3.01	2.5 J	1.2	618	569 J	1.1
10	MS-09 Loc. 3	OU4-SD-M09-308A	49.7	48.5	1.0	1.14	1.4 U	NA	256	244	1.0
7	MS-11 Loc. 3	OU4-SD-M11-303A	172	89.8 J	1.9	9.36	4.5 J	2.1	1659	840 J	2.0
7	MS-12 Loc. 1	OU4-SD-M12-103A	101	98.5 J	1.0	0.78	0.36 J	2.2	1937	1800 J	1.1
7	MS-13 Loc. 1	OU4-SD-M13-103A	28.0	22.1 J	1.3	0.33	1.2 J	0.3	180	116 J	1.6
7	RS-01 Loc. 2	OU4-SD-R01-203A	9.02	6 U	NA	0.09 U	0.06 J	1.5	25.89	22.7 J	1.1
7	RS-01 Loc. 4	OU4-SD-R01-403A	11.8	8 J	1.5	0.09 U	0.1 J	0.9	35.71	33.2 J	1.1
7	RS-03 Loc. 1	OU4-SD-R03-103A	11.7	22.9 J	0.5	0.12 J	0.08 U	NA	49.87	59.2 J	0.8

Minimum	9.0	6.0	0.5	0.1	0.1	0.3	25.9	22.7	0.6
Maximum	385	500	3.1	9.4	4.5	2.2	1937	1800	2.0
Average	103	92.4	1.2	1.5	1.4	1.3	578	517	1.1
Median	49.7	48.5	1.0	0.8	1.2	1.2	256	267	1.1

1 - The average and median ratios for chromium do not include the ratio of 15.9 for M03-2.
2 - Samples from Round 7 are not included as the samples were only analyzed by one method.
Nondetected values were included the calculation of minimum, maximum, average, and median values.

NOAA - National Oceanic and Atmospheric Administration (Method referenced in NOS ORCA 130)
USEPA - United States Environmental Protection Agency (Analytical Method SW-846, Method 6010B/6020)
Ratio = [NOAA]/[USEPA]

NA - Ratios were not calculated for samples where one value was not detected
U - Nondetected
J - Estimated value

APPENDIX F

RESPONSES TO COMMENTS

RESPONSES TO MEDEP COMMENTS DATED OCTOBER 8, 2009
DRAFT ROUNDS 1-10 INTERIM OFFSHORE MONITORING PROGRAM REPORT FOR OU4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

During preparation of the Feasibility Study for OU4, it was noticed that a few minor wording changes and corrections to the Draft Rounds 1 through 10 Report were needed in addition to those noted in the comments. These changes and corrections were made and the affected pages (with tracked changes) from the Draft Rounds 1 through 10 Report are attached to the end of this response to comment document. Note that the pages affected only by MEDEP and NOAA comments are not included.

1. **Comment:** Occasional references are made to concentrations less than or greater than "twice the ER-M". I don't recall making that value a benchmark value. Can somebody refresh my memory?

   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." Twice the ER-M was then used in that report to evaluate the data. 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 because 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. For nickel, incidence of effects for samples with concentrations greater than its ER-M values was 16.9 percent (Long et al., 1995). This indicates that the ER-M for nickel is not a very accurate guideline and is probably conservative because only 16.9 percent of the samples with concentrations greater than the ER-M had an adverse effect. Therefore, the IRG for nickel is likely to be conservative as well.

   Twice the ER-M is also used in the decision rules in the Phase II Additional Scrutiny QAPP (Tetra Tech, September 2007). Section 2.3.2 of that QAPP states: "If the concentration of any PAH in any single sample is grater than its respective IRGs, or if the concentration of lead in any single sample is greater than twice the Effects Range-Median (ER-M), then the area will be further evaluated in another phase as part of a feasibility study or removal action. Otherwise, conclude that the sediment does not have elevated concentrations of PAHs and lead and take no further action."

2. **Comment:** MEDEP believes the Navy should perform a non-time critical removal action at MS-12 if the alternative is to wait several more years until a final remedy for OU4. There are high levels of PAHs in sediment that are subjected to constant tidal fluctuations that may be mobilizing the contaminants.

   Response: The Navy is in the process of preparing a Feasibility Study (FS) for OU4, which includes evaluation of remedial actions at MS-12. It is anticipated that the draft FS will be submitted for regulatory review in February 2010 (see attached schedule). Funding is not available for a non-time critical removal action, if warranted, before FY12.

3. **Comment:** Shouldn't MS-01 be included in Table 2-3, page 2 of 2, under Phase II Additional Scrutiny Investigation? Currently it only shows MS-12.

Response: No sediment samples were collected as part of the Phase II Additional Scrutiny Investigation at MS-01. The only Phase II additional scrutiny conducted at MS-01 was the underwater video. Additional sediment sampling at MS-01 was conducted in August 2009 as part of the Remedial Investigation for Site 34. The table header will be changed to: "Summary of **Analytical** Data Collected during Phase I and Phase II Additional Scrutiny Sampling, with the word "analytical" being added"

4. **Comment:** 4.5.3 MS-14, p. 4-24, 1st bullet

- Acenapthene exceeded IRGs at two locations, not one
- No concentrations of acenaphthylene have been greater than IRG since Round 6, not Round Change "anthracene" to "acenaphthylene" in the last item under 1st bullet.

Response: The Navy concurs. The following changes will be made in Section 4.5.3 on page 4-24 to the sub-bullets under the bullet: "PAH concentrations in most samples are less than IRGs":
First sub-bullet: The text will be clarified to read: "Concentrations of acenaphthylene were only greater than its IRG at location 1 during Round 5, whereas concentrations of both acenaphthylene and anthracene were only greater than their IRG at location 2 during Round 6.

Third sub-bullet: Round 2 will be changed to Round 6.

Fourth sub-bullet: Anthracene will be changed to acenaphthylene.

5. **Comment:** P. 5-2 first sentence
- area around shipyard closed for shellfishing
- is the closure just around the immediate vicinity of the shipyard or does it cover a greater area in the harbor/estuary?

Response: The closed area covers a larger part of the harbor/estuary. See map in Attached link: http://des.nh.gov/organization/divisions/water/wmb/shellfish/little_harbor.htm. The following text will be added to the top of page 5-2 to clarify this:

"According to the Maine Department of Marine Resources (DMR) regulations, effective February 2004 and as updated in August 2008, because of pollution, it is unlawful to collect clams, quahogs, oysters, and mussels from the shores, flats, or waters of Kittery, Eliot, and South Berwick northwest of a line across the Piscataqua River at the Memorial Bridge and south of a line across the mouth of Spinney Creek at the Route 103 Causeway, which includes the PNS area. In addition, a special permit is required for a restricted area north of the line across the mouth of Spinney Creek at the Causeway (Maine DMR, August 2008).

The New Hampshire Department of Environmental Services (NHDES) is responsible for the classification of shellfish growing waters to determine whether water quality is acceptable for shellfish harvesting. The NHDES uses the National Shellfish Sanitation Program to establish criteria and methodology to classify the shellfish growing waters. The river waters around PNS are currently closed for shellfish harvesting. These closures are described in more detail in the NHDES Shellfish Program: 2005 Annual Report (NHDES, June 2006). As discussed in this report, the closures are caused by fecal coliform bacterial loading from wastewater treatment plants."

The first sentence on page 5-2 will then be changed to: "Because the area surrounding the shipyard is closed for shellfishing for human consumption, it is not necessary to evaluate risks to humans consuming mussels at this time."

6. **Comment:** 5.2.5.1

- says TEQ values used in evaluation presented in 5.2.4 were calculated using zero for NDs. But Tables 5-2 and 5-3 show values using detected values only. Please clarify.

Response: As the total TEQ value is the sum of individual congeners, when congeners were nondetected a value of zero was used when summing the congeners to calculate the total TEQ using only the positive detections. This is shown in the example calculation in the Rounds 1 through 7 Report, as referenced in the Rounds 1 through 10 report. Section 3.2 describes this calculation of TEQs. In Section 5.2.5.1, the first sentence will be changed as follows: "The TEQ values used in the evaluation presented in Section 5.2.4 were calculated using only detected results."

7. **Comment:**
"...few differences in the TEQ values calculated using a value of zero for non-detects (Table 5-1)...
Table 5-1 indicates that its for detected concentrations only, i.e. you wouldn't use values of 0 in any of the calculations - please clarify.

   Response: Please see the Navy's response to Comment No. 6.

8. **Comment:** As stated previously, MEDEP agrees with the recommendations presented in Section 6.

   Response: Comment noted.

9. **Comment:** App. A Tech Memo, p. 1 - Under 1.1, 2nd paragraph change 2009 to 2008.

   Response: The date will be corrected.

RESPONSES TO NOAA COMMENTS DATED JULY 16, 2009
ROUND 10 DATA PACKAGE AND DRAFT ROUNDS 1-10 INTERIM OFFSHORE MONITORING PROGRAM REPORT FOR OU4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

The Interim Offshore Monitoring Program Round 10 Data Package for OU4 was finalized 15 Jun 2009. However, the Navy would like to address your concerns with data contained in the package recognizing that the package does not contain any interpretation of the data. Interpretation of the data contained in the Round 10 package, as well as, the Rounds 1 through 9 packages is contained in the draft Rounds 1 through 10 Interim Offshore Monitoring Program Report for OU4.

Comments on Round 10 Data Package

1. **Comment:** Section 2.2 - Sampling Plan Deviations/Significant Notes.

   The observation of a sheen at Additional Scrutiny Location 109 east of MS-12 is of much interest. But it begs the questions why the Navy did not include PAH analysis from this sample and the two neighboring ones.

   Response: The sediment sampling at MS-12 during Round 10 was conducted in accordance with the Phase II Additional Scrutiny Quality Assurance Project Plan (QAPP) (TtNUS, September 2007) to better characterize the nature and extent of contamination at this monitoring station. The sediment sample from location AS12-SD109, as well as the samples collected from locations AS12-SD107 and AS12-SD108, was collected because the sample from location AS12-SD12 had an elevated lead concentration. Figure 4-10 in the Rounds 1 through 10 Report shows the HMW PAH concentrations in the two samples collected adjacent to MS-12 in the main channel of the Piscataqua River (AS12-SD49 and AS12-SD50) were less than the IRG for HMW PAHs. This indicates that PAHs are not migrating from MS-12, which is the reason the sediment sample from AS12-SD109 was not analyzed for PAHs. In addition, AS12-SD109 is located further east of these two samples, so it is unlikely that contamination related to MS-12 would be responsible for the sheen observed in the sediment at location. It is more likely that the sheen is from petroleum products released from boats in the area, which would not be considered a CERCLA release.

2. **Comment:** Table 3-1 to 3-6

   The tables did not include the IRG or ERM (for lead). Given that the entire purpose of the sampling is to learn where sediments are above these criteria, its absence is puzzling. In addition, there is no calculation of the HMW PAHs despite a known IRG. Also, I assume that Monitoring Station 09 Locations 108A, 208A, and 308A from Tables 3-3 and 3-5 are the same as Locations 1A, 2B, and 3 respectively from Figure 3; and those locations match the Trend Line Plots from the April 2004

   Response: The objective of the data package is to provide field information and analytical data for the sampling event, not to interpret the data. The interpretation of the data is presented in the Rounds 1 through 10 Interim Offshore Monitoring Program Report. The IRGs, ERM, and HMW PAHs calculation are provided in Section 3 of the Rounds 1 through 10 Report.

   The sample nomenclature for the monitoring program was established to describe the location, year, and season in the sample number. For example, the “1” in 108A is the location, the “08” is the year the sample was collected, and the “A” signifies that the sample was collected in the late summer round. Samples collected in spring round ended with a “B,” but sampling during the spring round was discontinued after Round 5.

On Tables 3-3 and 3-5 in the Round 10 Data Package, the MS09 samples designated with “108A”, “208A”, and “308A” were collected at Locations 1A, 2B, and 3, respectively, on Figure 3. As discussed in Section 2 of the Rounds 1 through 10 Report, locations 1 and 2 were shifted a few times during the monitoring program after the remedial activities onshore at OU3 were completed. Therefore, samples designated as MS-09, Loc. 1 were collected from two different locations [Loc. 1 (Rounds 1 through 6) and Loc. 1A (Rounds 7 through 10)] and samples designated as MS-09, Loc. 2 were collected from three different locations [Loc. 2 (Rounds 1 through 6), Loc. 2A (Rounds 7 and 8), and Loc. 2B (Rounds 9 and 10)]. For that reason, MS-09, Loc. 2 does not match the same location in trend line plot from April 2004.

3. **Comment:** Section 3.0 – Results.

This section provides just that without any calculation of where and how much the chemical concentrations are above the IRG or ERM (for lead). That should be done by the Navy but anyway it’s clear that the three (nearby) Additional Scrutiny MS-12 stations are above the lead ERM and at least one likely has high PAHs. In addition, MS-9 (station 308A) is likely above the HMW IRG but that value is not provided in the text or Tables. I found the value of about 10 ppm in Appendix D of the Rounds 1-10 Interim Offshore Monitoring Program Report but my calculation after adding the HMW constituents from Table 3-5 is higher and above the HMW IRG.

Response: Please see the Navy’s response to NOAA’s Comment No. 2 regarding why the data are not interpreted in the Data Package. The objective of the data package is to provide field information and analytical data for the sampling event, not to interpret the data. The interpretation of the data is presented in the Rounds 1 through 10 Interim Offshore Monitoring Program Report. The three MS-12 Additional Scrutiny samples have lead concentrations greater than its ER-M. The Navy respectfully disagrees that at least one Additional Scrutiny MS-12 station that was sampled during the Round 10 monitoring event has high PAHs. Please see the Navy’s response to NOAA’s Comment No. 1.

As provided on page 33 of 36 in the table titles “Summary of Chemicals detected in Sediment at Monitoring Station 09 in Rounds 1 through 10” in Appendix B.2 of the draft Rounds 1 through 10 Report, the HMW PAH concentration at MS-09, Loc. 3 during Round 10 is 9,190 ug/kg, which is less than its IRG (13,057 ug/kg). The HMW PAH values were calculated by summing the following six PAHs: benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and pyrene (see Section 3 of the Rounds 1 through 10 report). These are the same six PAHs used to develop the HMW PAH IRG.

Comments on the Rounds 1-10 Interim Offshore Monitoring Program Report

1. **Comment:**

Much like the Round 10 Data package, the authors should include a table showing the IRG (and ERM for lead) chemical concentrations.

Response: The Navy agrees that a table showing all of the IRGs and the ER-M for lead should be added to the text of the report but disagrees that it should be added to the data package. The third paragraph in Section 1.3.3 of the Rounds 1 through 10 report will be modified as follows:

> "As part of the monitoring program, Science Applications International Corporation (SAIC) developed the PRGs using the process outlined in the PRG proposal that was presented in the Interim Offshore Monitoring Plan (TtNUS, October 1999; Appendix A), and the results are presented in the document Preliminary Remediation Goals for Operable Unit 4 (TtNUS, November 2001). PRGs were developed for chemicals that were identified as limiting COCs (i.e., chemicals that are responsible for much of the baseline risk). The PRGs developed for OU4 were used as the IRGs for the following chemicals for evaluation of the data:

Parameter	IRG (dry-weight)
Copper	486 mg/kg
Nickel	124 mg/kg
Acenaphthylene	210 µg/kg
Anthracene	1,236 µg/kg
Fluorene	500 µg/kg
HMW PAHs	13,057 µg/kg

> Although pesticides were not identified as COCs for OU4, the PRG development process included pesticide data for OU4; PRGs were developed for endosulfan II (3.95 µg/kg), trans-nonachlor (3.99 µg/kg), and 4,4'-DDT (66.4 µg/kg). The PRGs developed for pesticides were not used as IRGs because they were not identified as COCs for OU4. Because a PRG was not developed for lead, twice the Effects Range-Median (ER-M) for lead (218 mg/kg) from Long et al., (1995) was used to evaluate the data. Two times the value of its ER-M is used, because the IRGs for copper and nickel were approximately twice the ER-M value."

The IRGs for PAHs, and the ER-M for lead are presented on Table 4-2 and the concentration plots in Appendix D.

2. **Comment:**

Of note when reviewing Appendix D, Monitoring Station 5 shows a Round 10 decrease in copper and lead concentrations. Nevertheless, further sampling is required to learn if this most recent sampling showing such a decrease is simply an anomaly. Monitoring Station 9 shows the fourth time of ten sampling rounds where nickel is above the IRG; and lead at some locations elevated above the ERM for the third time. In addition, I believe the HMW is elevated above the IRG at Location 3 (Subtidal). We should discuss a potential remedial action at this locale.

Response: The Navy agrees that additional sampling is warranted at MS-5. As provided in Section 6.1.2 and Table 6-1, the Navy recommended collecting bi-annual samples at MS-05 to determine whether concentrations of metals are decreasing over time. Note that an error was found in the concentration plot for nickel at MS-09 (in Appendix D of the Rounds 1 through 10 Report). The values for copper were inadvertently used as the values for nickel. The nickel concentrations during

round 10 were 51.4 mg/kg, 44.5 mg/kg, and 49.7 mg/kg, for MS-09, Loc. 01, 02, and 03, respectively (see page 33 of 36 in the MS-09 table in Appendix B.2 of the Rounds 1 through 10 Report). Therefore, concentrations of nickel were less than its IRG at MS-09 (with one exception), and concentrations of lead were less than its ER-M until the OU3 remedial activities occurred between Round 6 and 7. Since that occurred, the concentrations have decreased over time. Also, the concentration of lead is less than twice its ER-M, which was the threshold used to determine whether an action needs to be taken at a location at MS-12. Therefore, the Navy is recommending collecting bi-annual samples at MS-09 to determine whether concentrations of metals are decreasing over time. As provided on page 33 of 36 in the table titles "Summary of Chemicals detected in Sediment at Monitoring Station 09 in Rounds 1 through 10" in Appendix B.2 of the draft Rounds 1 through 10 Report, the HMW PAH concentration at MS-09, Loc. 3 during Round 10 was 9,190 ug/kg, which is less than its IRG (13,057 ug/kg). The potential remedial actions for MS-09 will be presented in the draft FS for OU4, which is scheduled to be submitted in 2010.

3. Comment:

Station 12 trend plots are not included given the decision: "It is not recommended that sediment samples be conducted (sp) during Round 10 monitoring event, however, because enough data have been collected at MS-12 to make a decision for the site" (see Page 16-17 Navy Technical Memorandum dated 19 September 2008).

Response: Trend plots were only prepared for monitoring stations where the plots were used as part of the data evaluation at that station. Trend plots were prepared for the reference stations and monitoring stations that were not sampled during Round 10 (e.g., MS-02, MS-06, MS-07, MS-10, MS-13, MS-14, and all four reference stations) using existing data. Trend plots were not needed for the evaluation of MS-12 data in the Rounds 1 through 10 Report because data evaluation of this monitoring station was discussed in the Rounds 1 through 7 Report and the evaluation of the additional scrutiny sampling. The Rounds 1 through 7 Report concluded that concentrations at MS-12 were greater than IRGs and additional scrutiny was needed to determine the extent of contamination. Two phases of additional scrutiny were conducted and the evaluation of extent is provided in the Rounds 1 through 10 Report. Sufficient data from Rounds 1 through 7 and additional scrutiny are available for MS-12 to support evaluation of remedial action in the draft FS for OU4, which is scheduled for to be submitted in 2010.

4. Comment:

Given the above, NOAA rejects the Navy Conclusions, best described in Table 6-1. Concerning Monitoring Station 9, enough data indicates a likely problem. There is room for discussion here concerning where and how much sediment removal is needed but clearly the sediment concentrations above their respective IRG require some remedial action. More disturbing is the delay in removing the contaminated sediment at MS-12. Here, as described on Pages ES - 4-5 (and in the Phase II Additional Scrutiny Package dated September 2008) the sediment in the building and on the ramp is very contaminated yet the Navy puts this off to some future date (the FS for OU-4 that likely is years away given the schedule outlined in Table 6-1). For 10 years the Trustees and Regulators have watched as sampling round after sampling shows this locale as contaminated. NOAA has been very patient but the sampling results warrant an immediate action. The data did so years ago. And with mobilization the Navy should remove the sediment at Stations AS-12-SD107-109 given the high lead and likely PAHs as discussed above.

Response: The Navy respectfully disagrees that sampling results at MS-12 indicate an unacceptable risk to human health of the environment that warrant immediate removal action. Table 6-1 only presents the recommendations for monitoring as part of the Interim Offshore Monitoring

Program as indicated in the first two sentences in Section 6.0. It does not include the other recommendations that are provided in Section 6.0. The header of Table 6-1 will be changed to: ”Summary of Recommendations for Interim Offshore Monitoring.” The date of 2013 in Table 6-1 is the date of the next five-year sampling event, not the date of the FS. The FS for OU4 is scheduled to be submitted in 2010, as per the draft FY10 Amended Site Management Plan for PNS (June 2009). Based on recent discussions among the Navy, USEPA, and MEDEP, the FS for OU4 will address all offshore areas in OU4, not just the MS-12 offshore area; therefore, all the data for the offshore necessary to support the FS needs to be available before the draft FS is submitted. Additional data were collected for MS-12 in November 2007 and April 2008 as presented in the Round 9 and Phase II Additional Scrutiny Data Package (TtNUS, September 2008) and in December 2008 as presented in the Round 10 Data Package (TtNUS, June 2009). Additional data were collected for MS-3 and MS-4 in December 2008 (TtNUS, June 2009). The additional data needed for MS-1 was collected as part of the OU9 (Site 34) RI sampling, during the week of August 24, 2009. The Navy believes remediation at MS-12 is best addressed through the remedial action process for OU4 (FS, PRAP, ROD) and that a removal action for MS-12 is not warranted before preparation of the FS for OU4. The lead results at AS12-SD107 through AS12-SD109 will be evaluated in the FS.

APPENDIX B

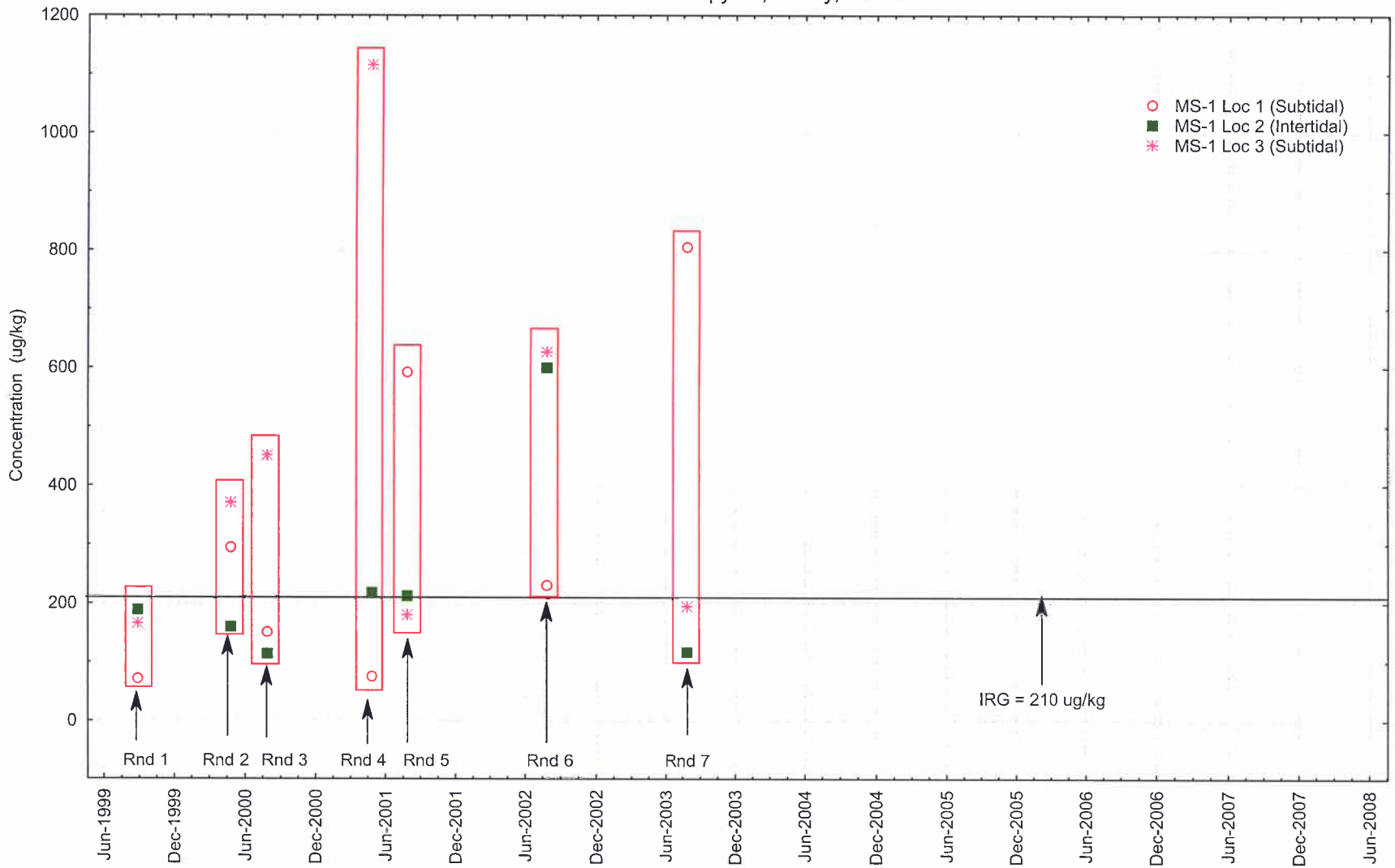
CONCENTRATION TREND PLOTS

B.1 CONCENTRATION TREND PLOTS AT MS-01
B.2 CONCENTRATION TREND PLOTS AT MS-02
B.3 CONCENTRATION TREND PLOTS AT MS-03
B.4 CONCENTRATION TREND PLOTS AT MS-04
B.5 CONCENTRATION TREND PLOTS AT MS-05
B.6 CONCENTRATION TREND PLOTS AT MS-06
B.7 CONCENTRATION TREND PLOTS AT MS-07
B.8 CONCENTRATION TREND PLOTS AT MS-08
B.9 CONCENTRATION TREND PLOTS AT MS-09
B.10 CONCENTRATION TREND PLOTS AT MS-10
B.11 CONCENTRATION TREND PLOTS AT MS-11
B.12 CONCENTRATION TREND PLOTS AT MS-12
B.13 CONCENTRATION TREND PLOTS AT MS-13
B.14 CONCENTRATION TREND PLOTS AT MS-14
B.15 CONCENTRATION TREND PLOTS AT REFERENCE STATIONS

APPENDIX B.1

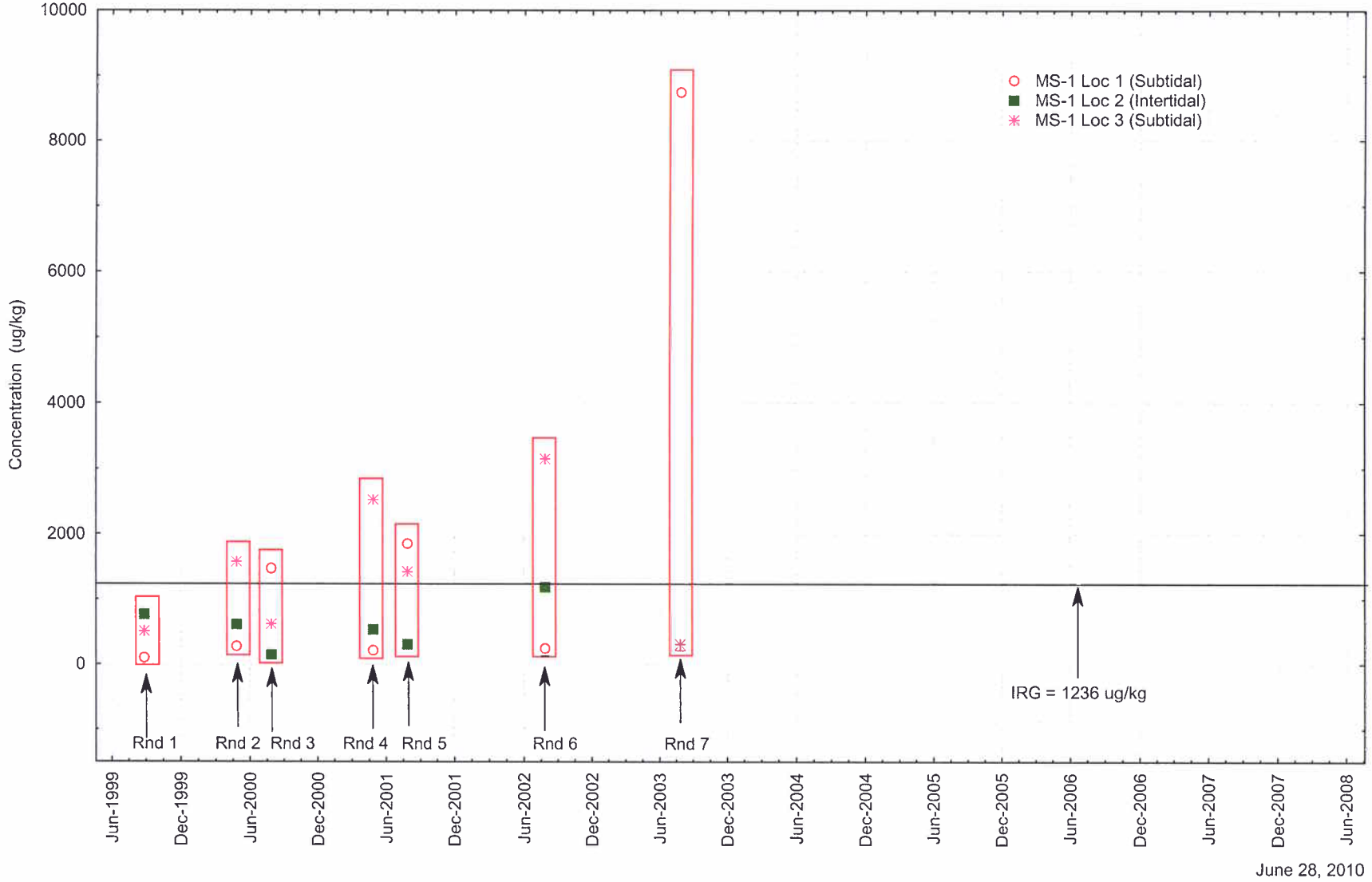
CONCENTRATION TREND PLOTS AT MS-01

Monitoring Station 1 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



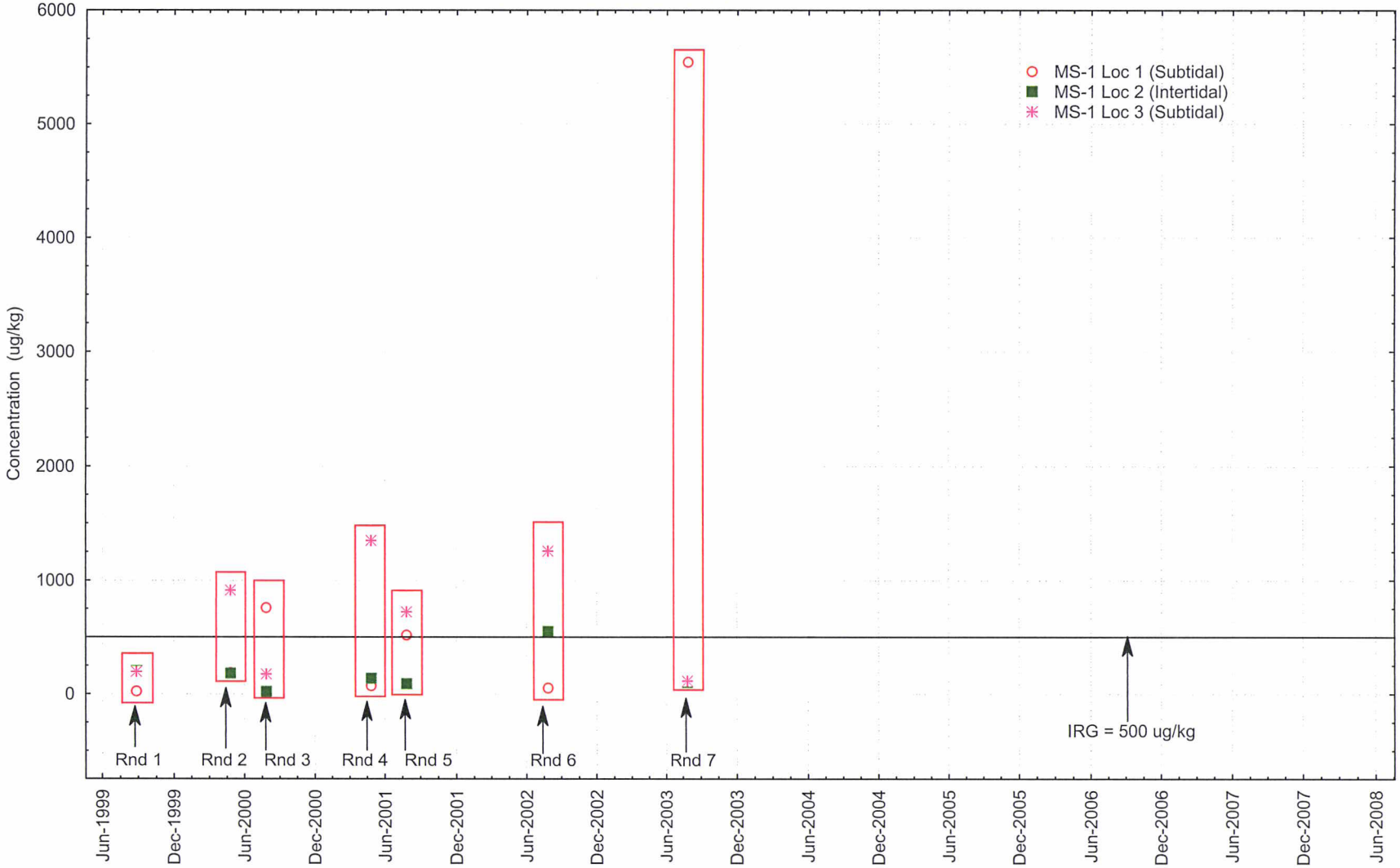
June 28, 2010

Monitoring Station 1 - Sediment
Anthracene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



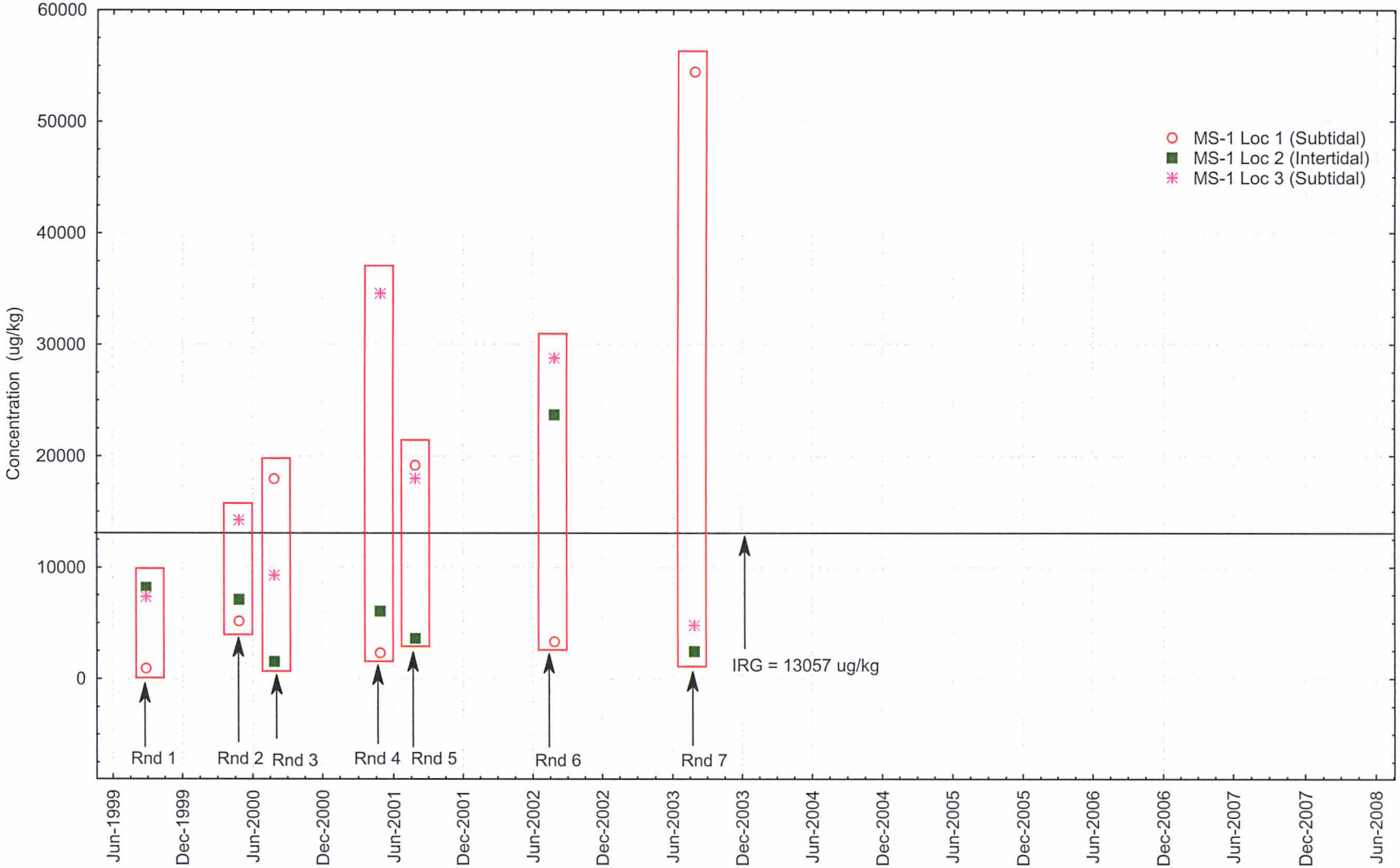
June 28, 2010

Monitoring Station 1 - Sediment
Fluorene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



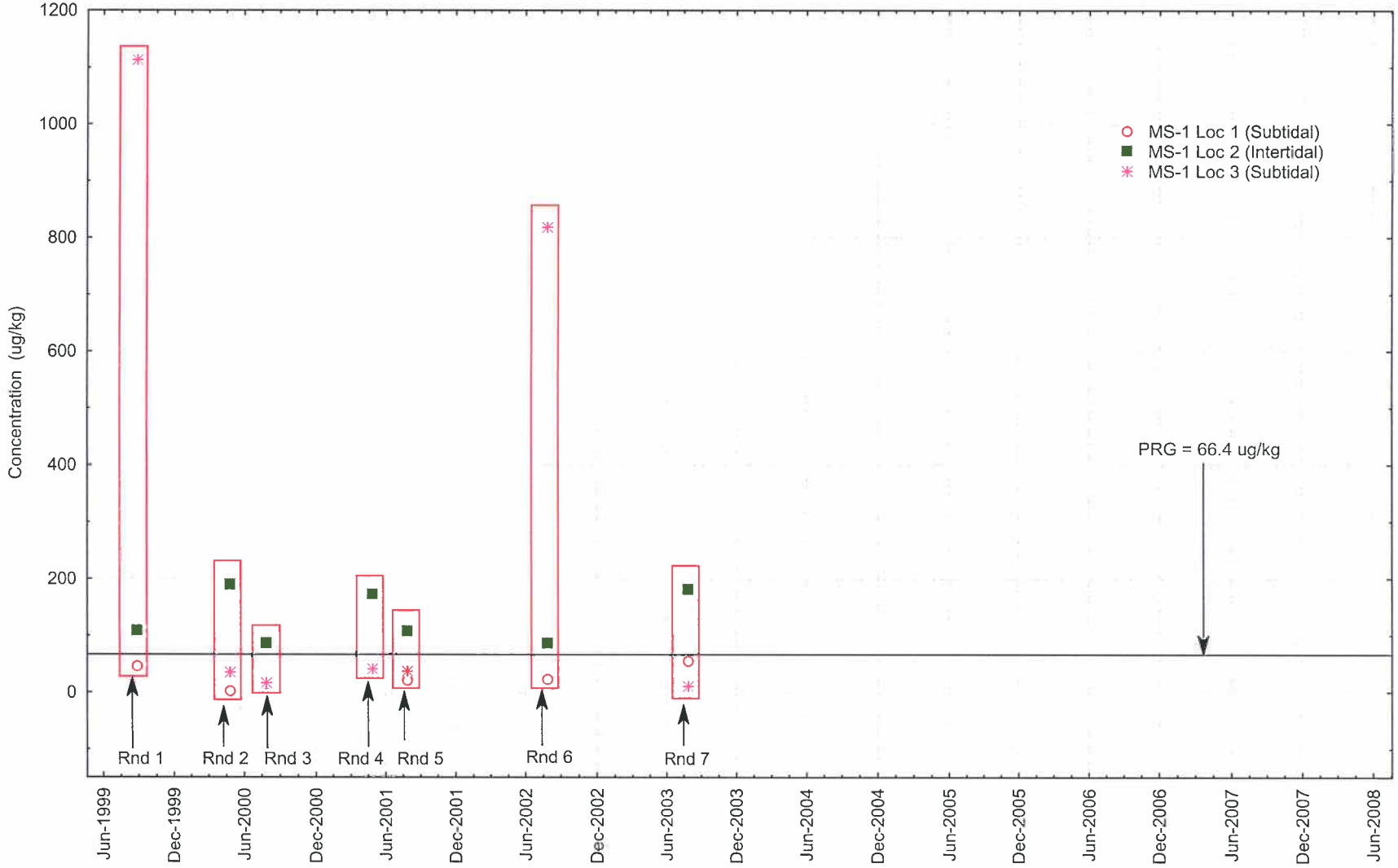
June 28, 2010

Monitoring Station 1 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



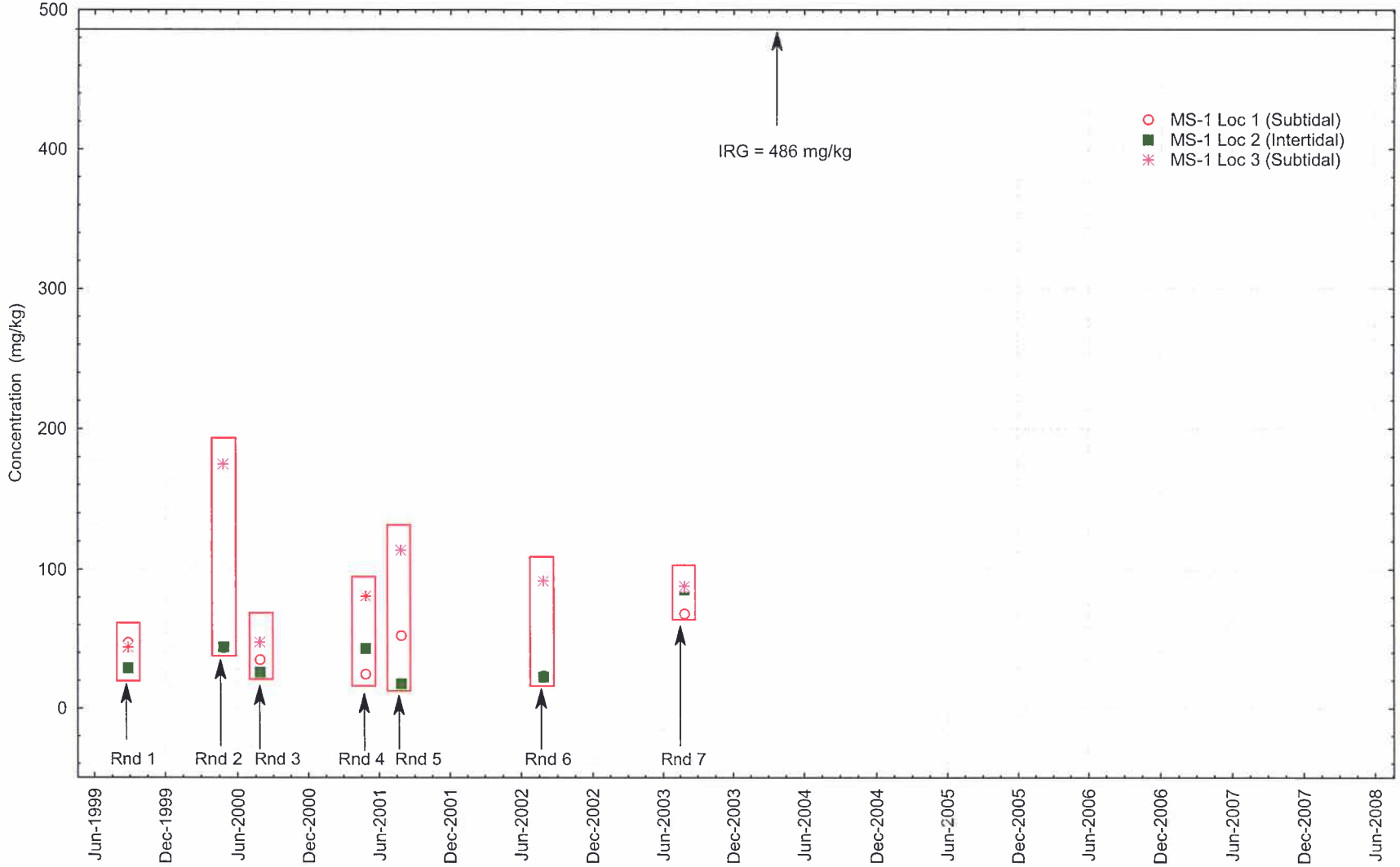
June 28, 2010

Monitoring Station 1 - Sediment
4,4'-DDT Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



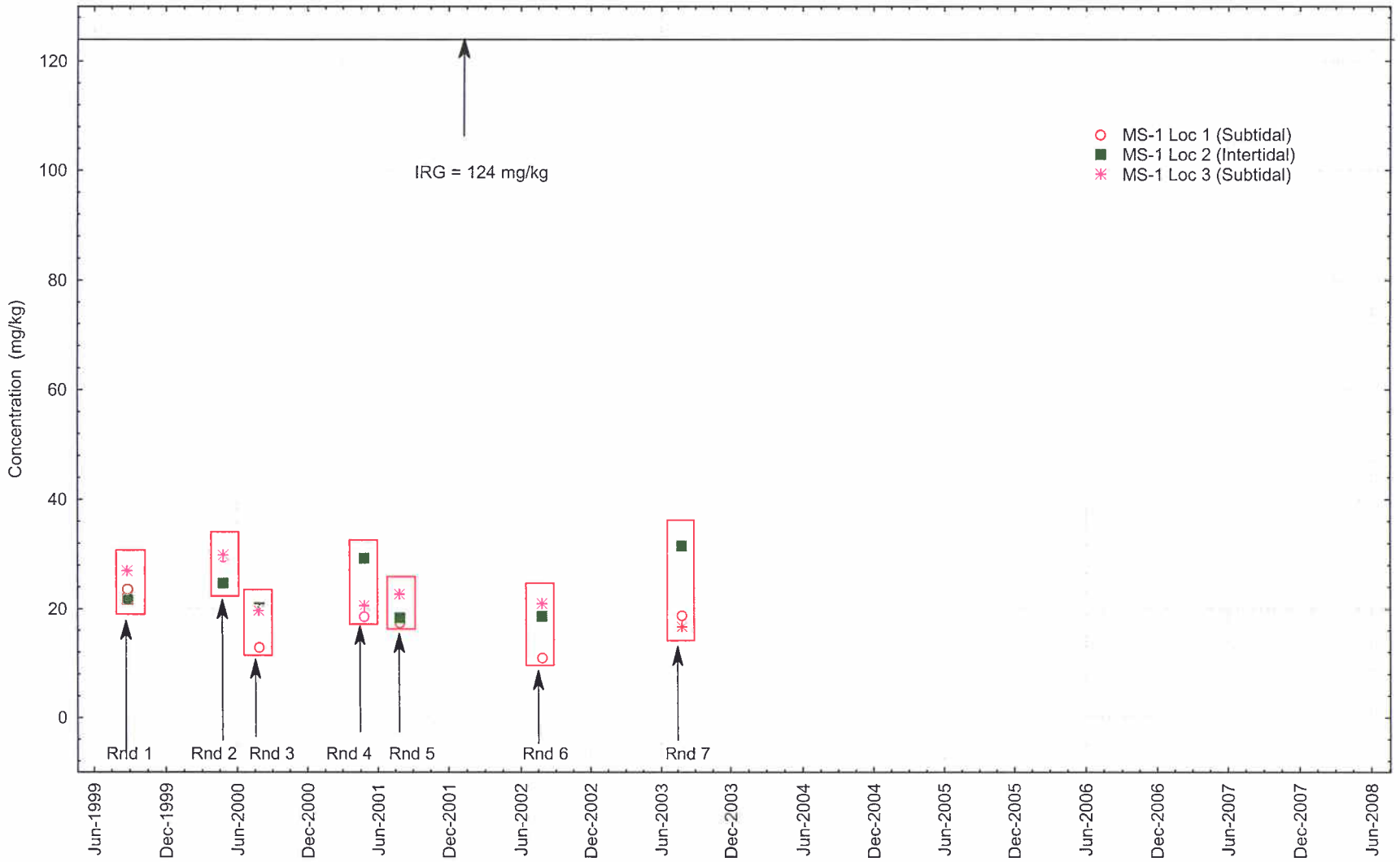
June 28, 2010

Monitoring Station 1 - Sediment
Copper Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



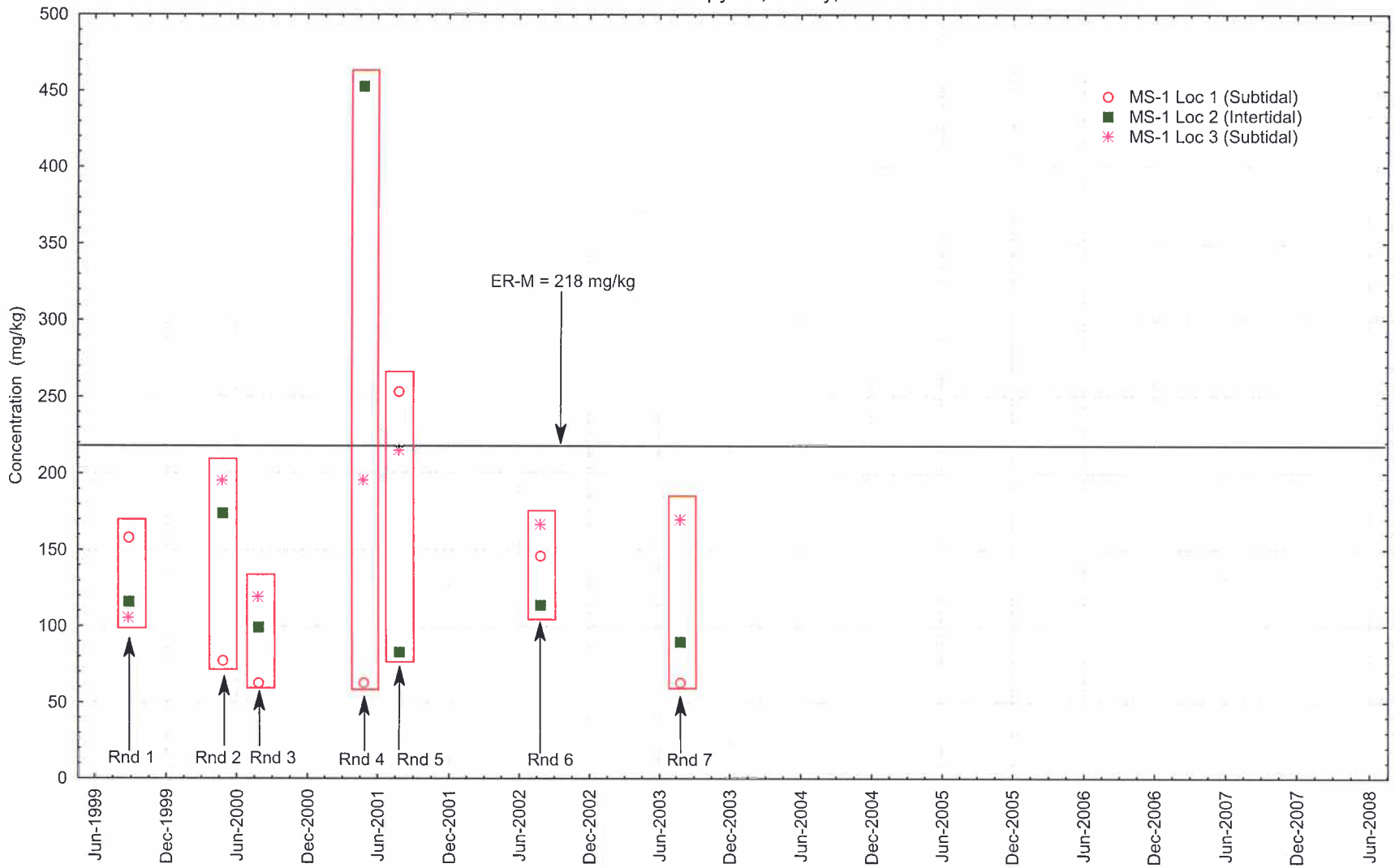
June 28, 2010

Monitoring Station 1 - Sediment
Nickel Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 28, 2010

Monitoring Station 1 - Sediment
Lead Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

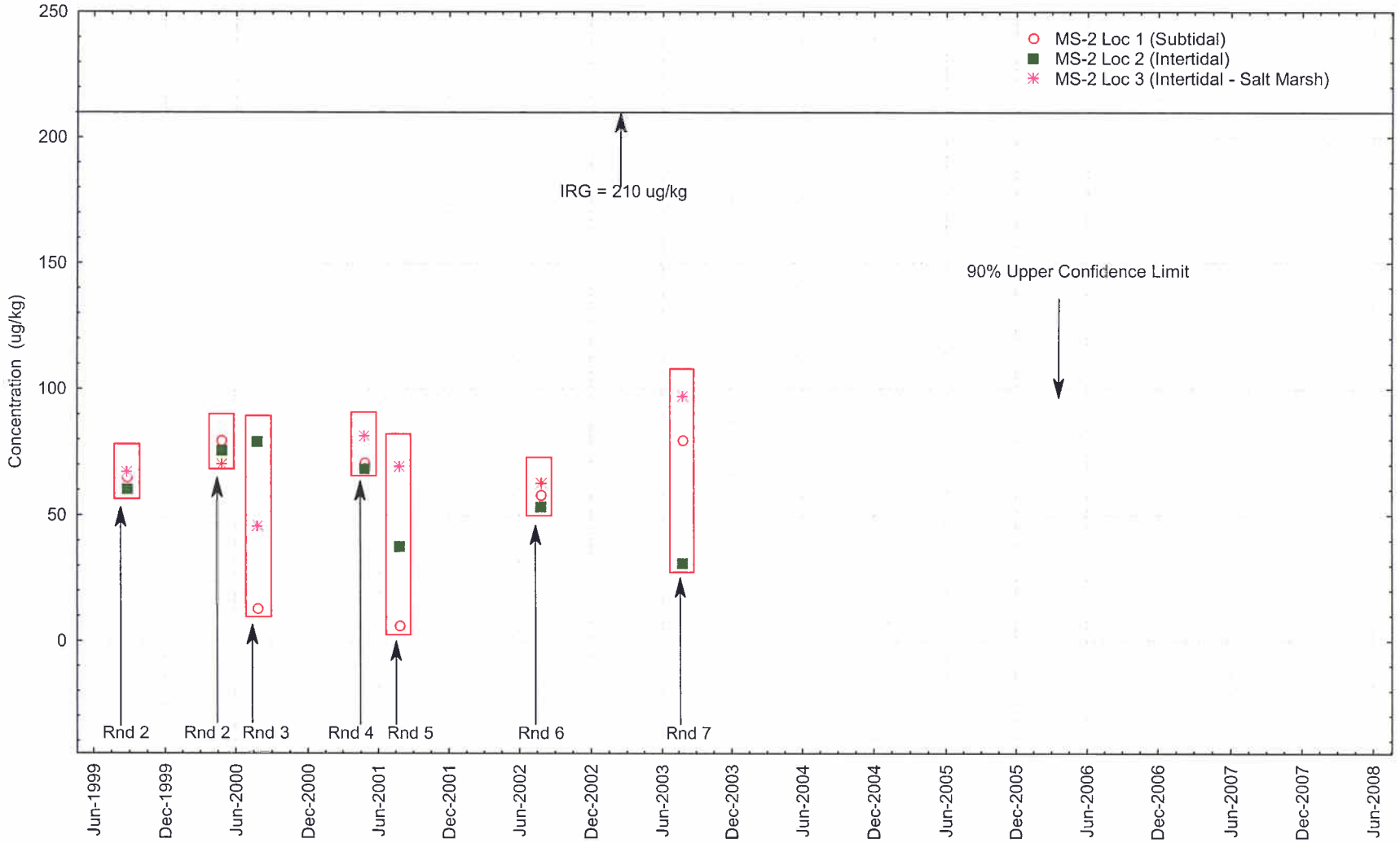


June 28, 2010

APPENDIX B.2

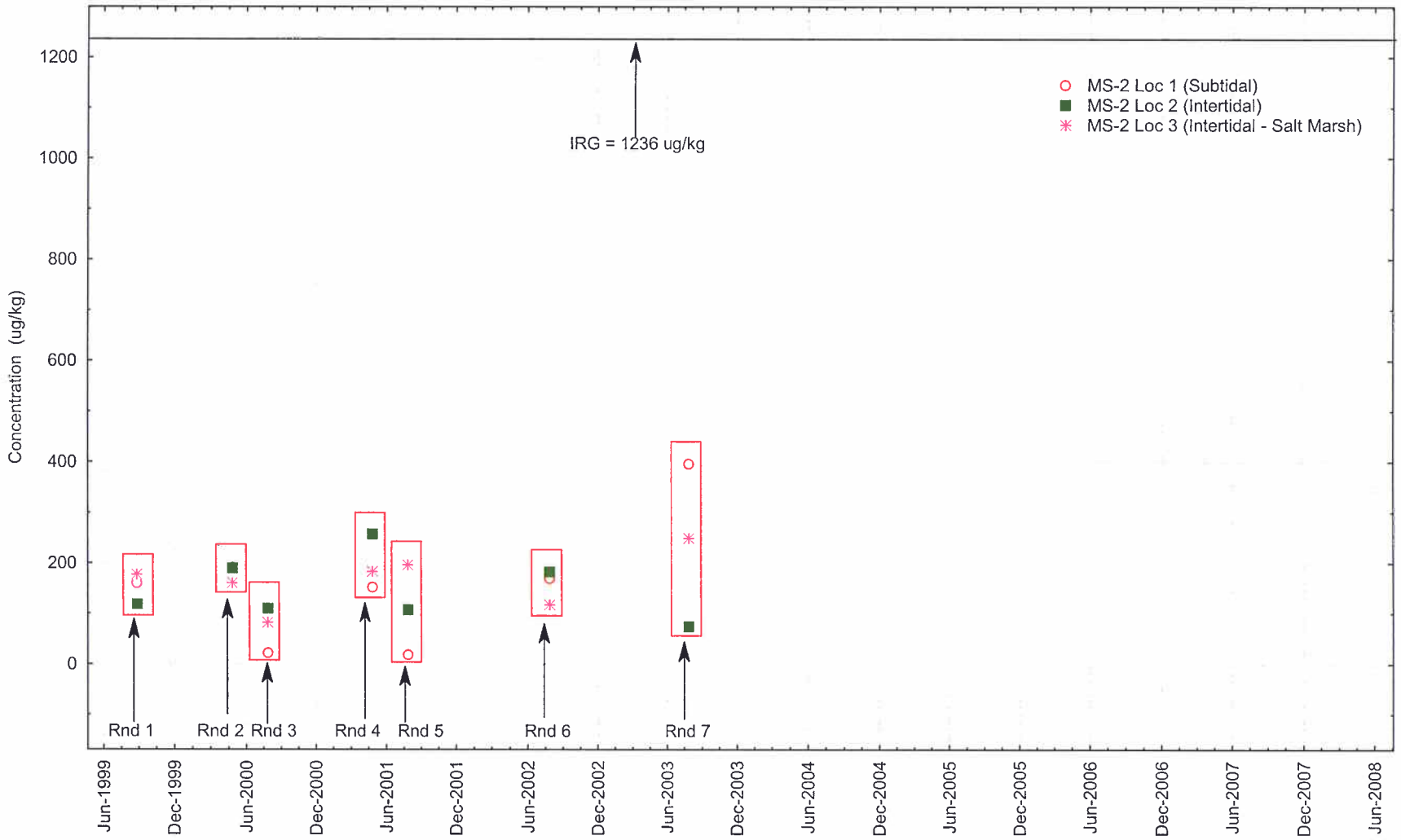
CONCENTRATION TREND PLOTS AT MS-02

Monitoring Station 2 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



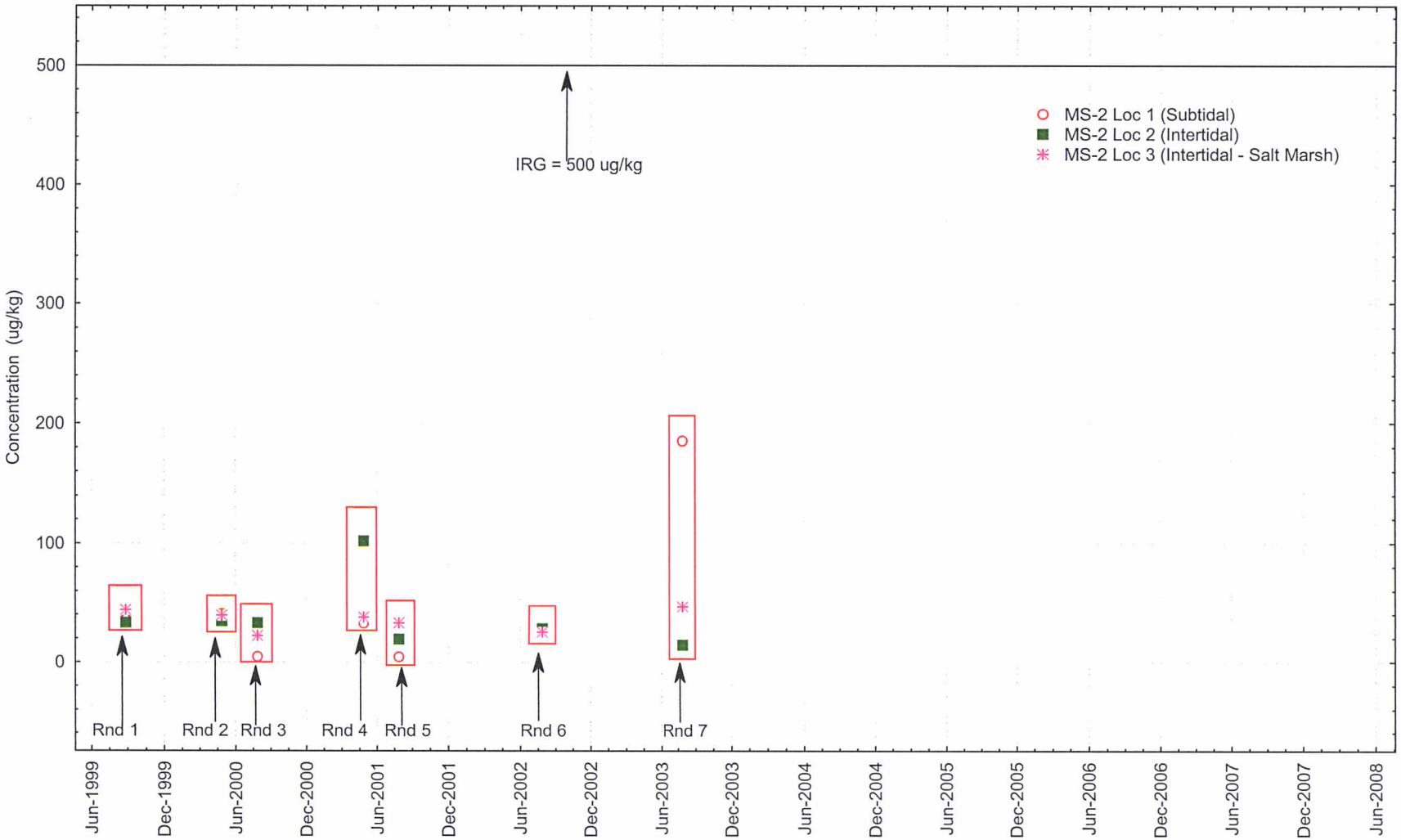
June 28, 2010

Monitoring Station 2 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



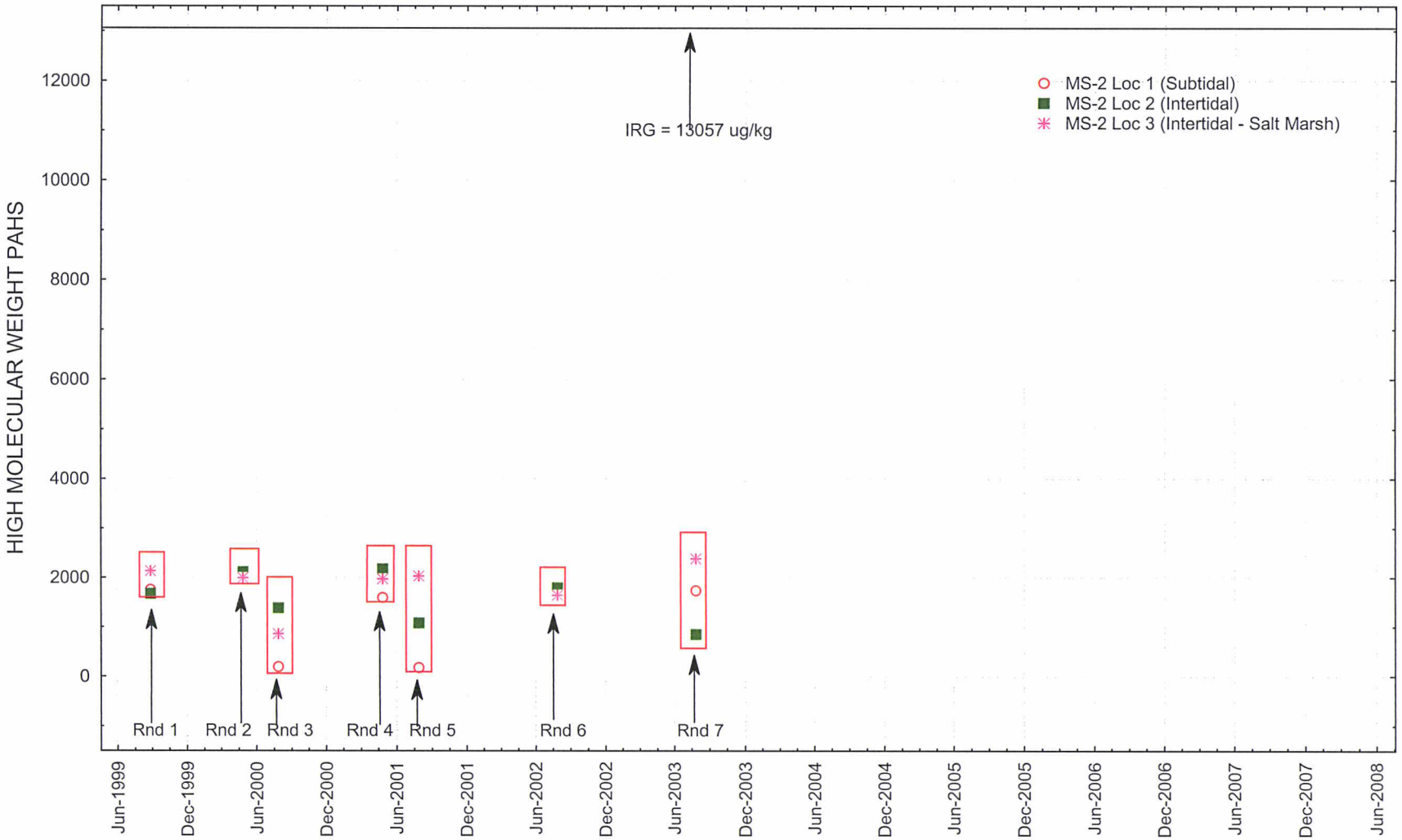
June 28, 2010

Monitoring Station 2 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



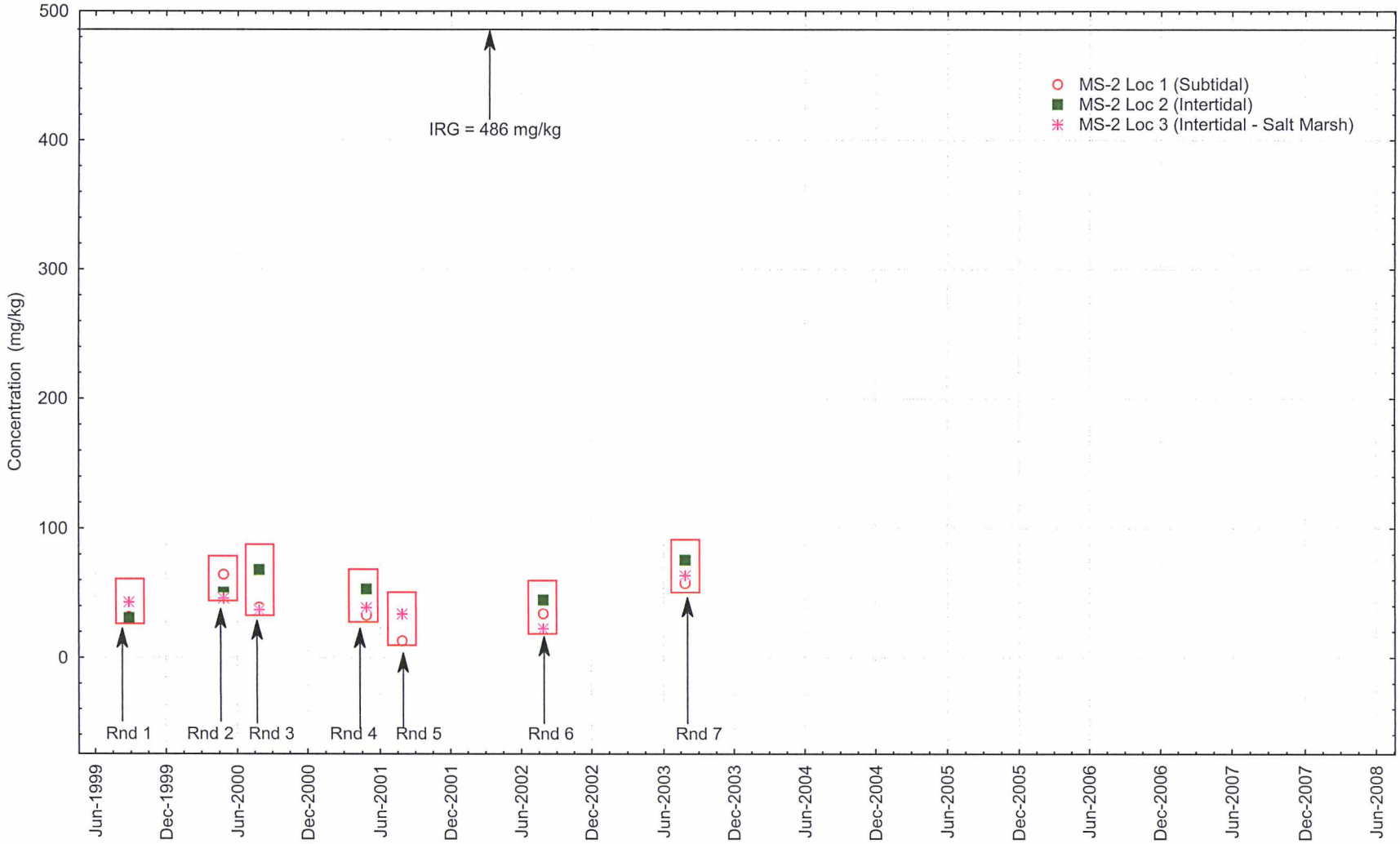
June 28, 2010

Monitoring Station 2 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



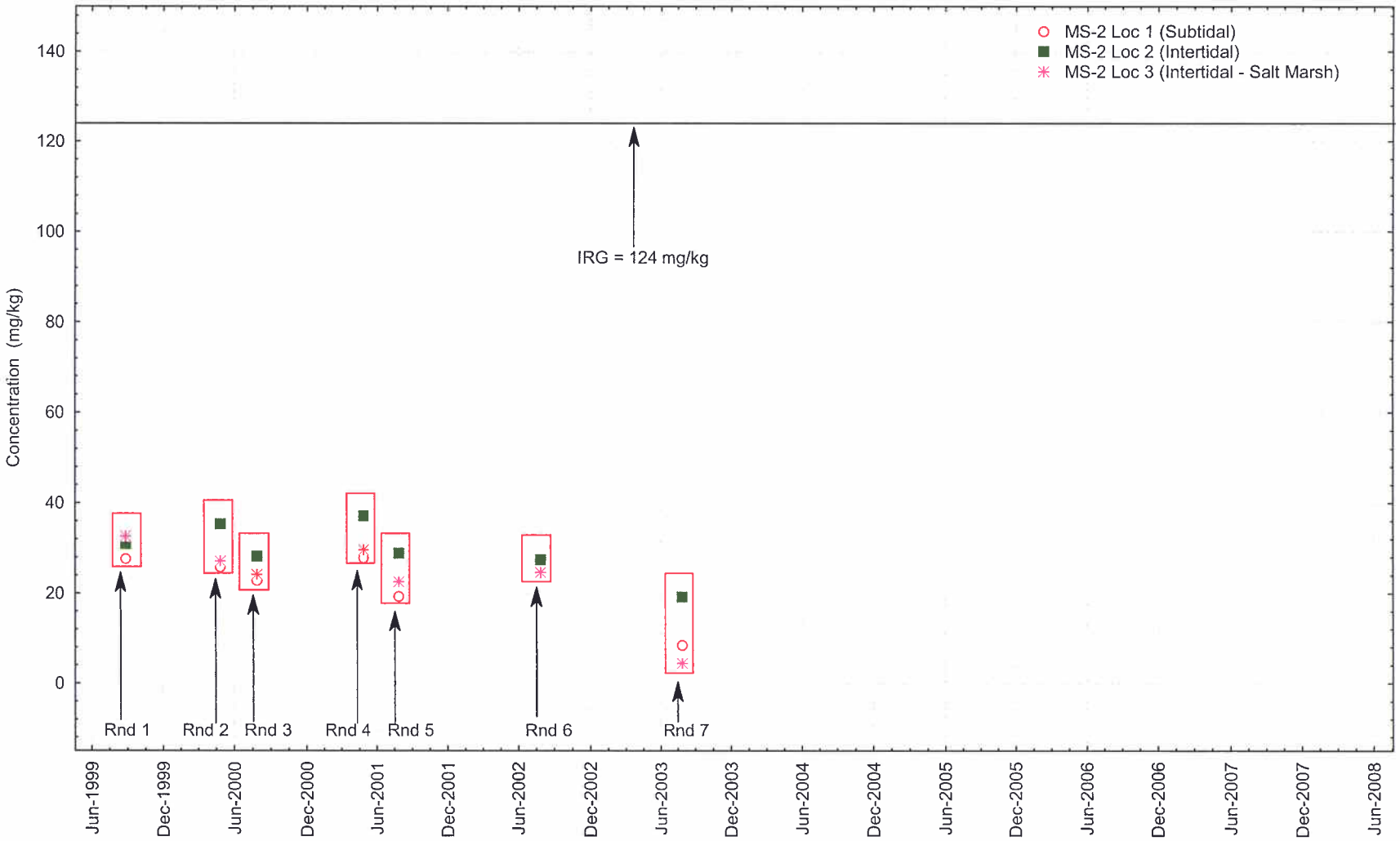
June 28, 2010

Monitoring Station 2 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 28, 2010

Monitoring Station 2 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

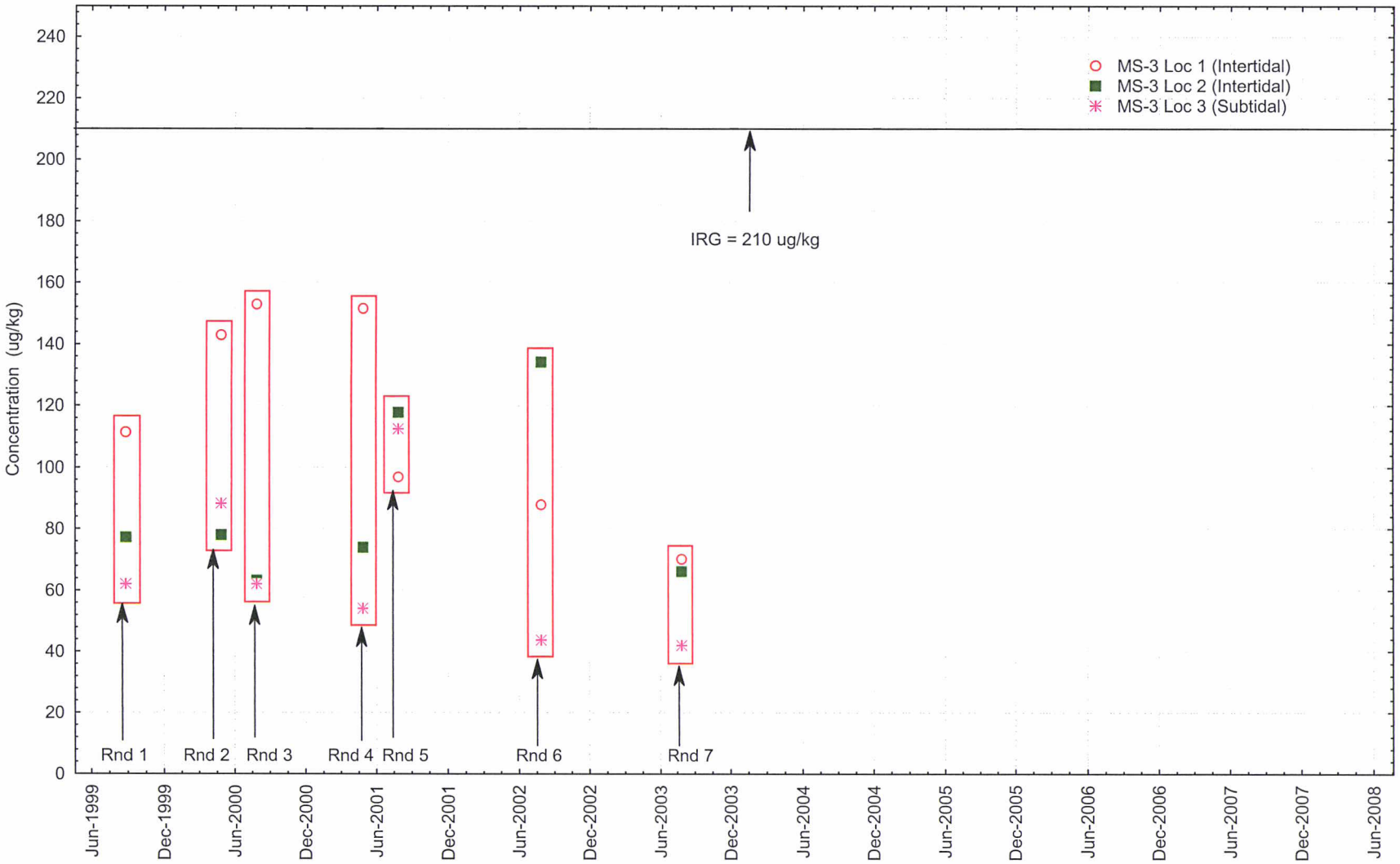


June 28, 2010

APPENDIX B.3

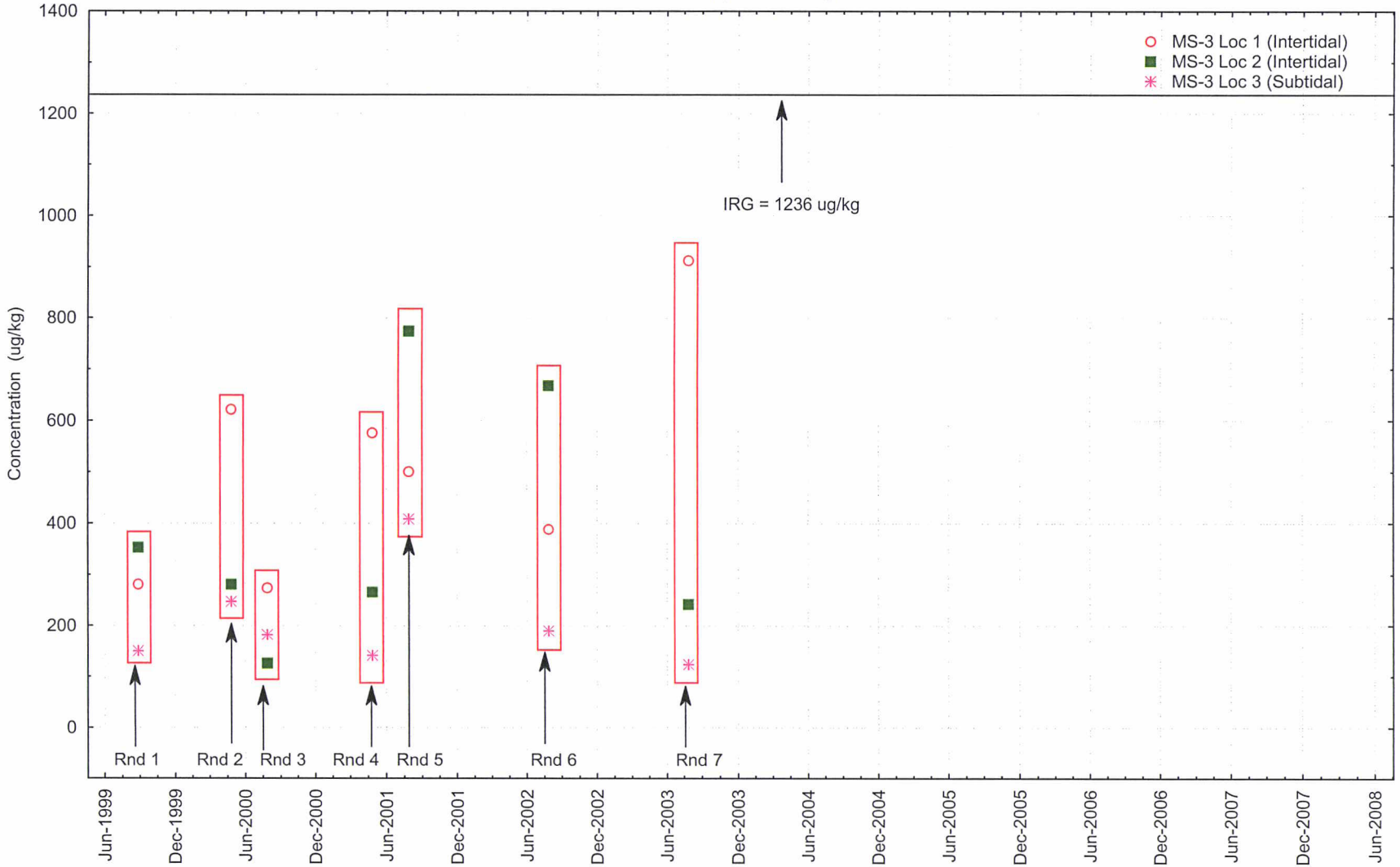
CONCENTRATION TREND PLOTS AT MS-03

Monitoring Station 3 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



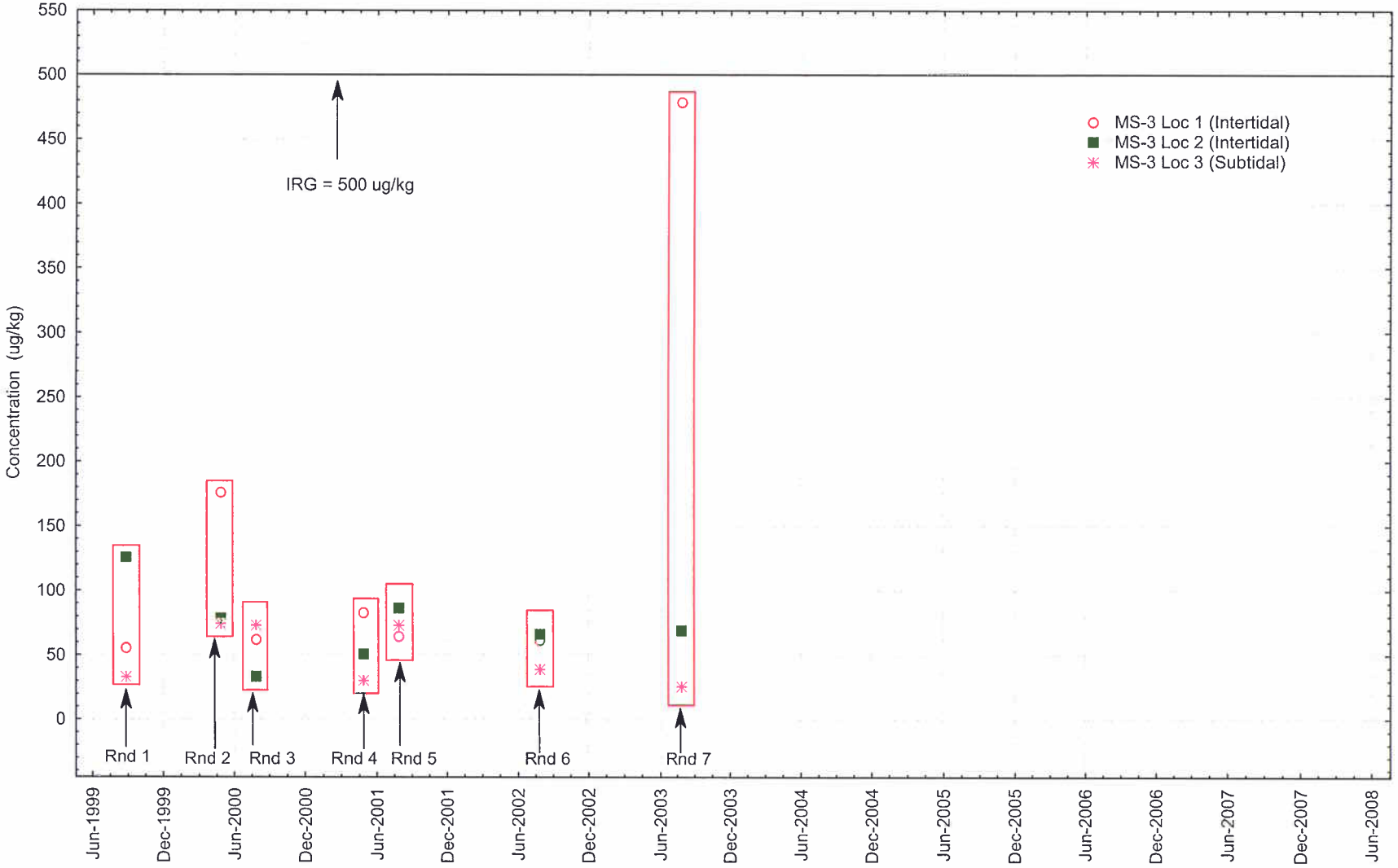
June 28, 2010

Monitoring Station 3 - Sediment
Anthracene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



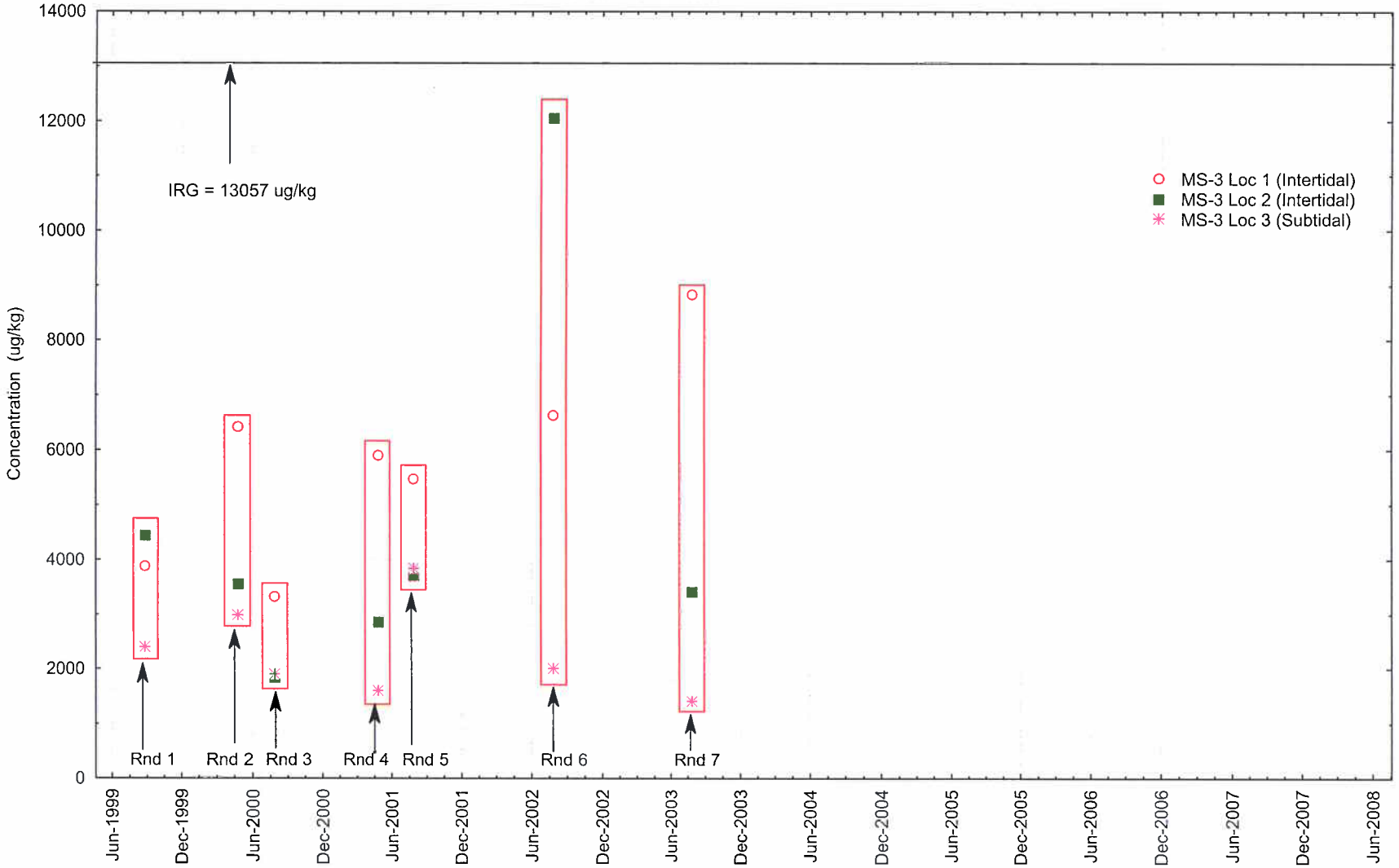
June 28, 2010

Monitoring Station 3 - Sediment
Fluorene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



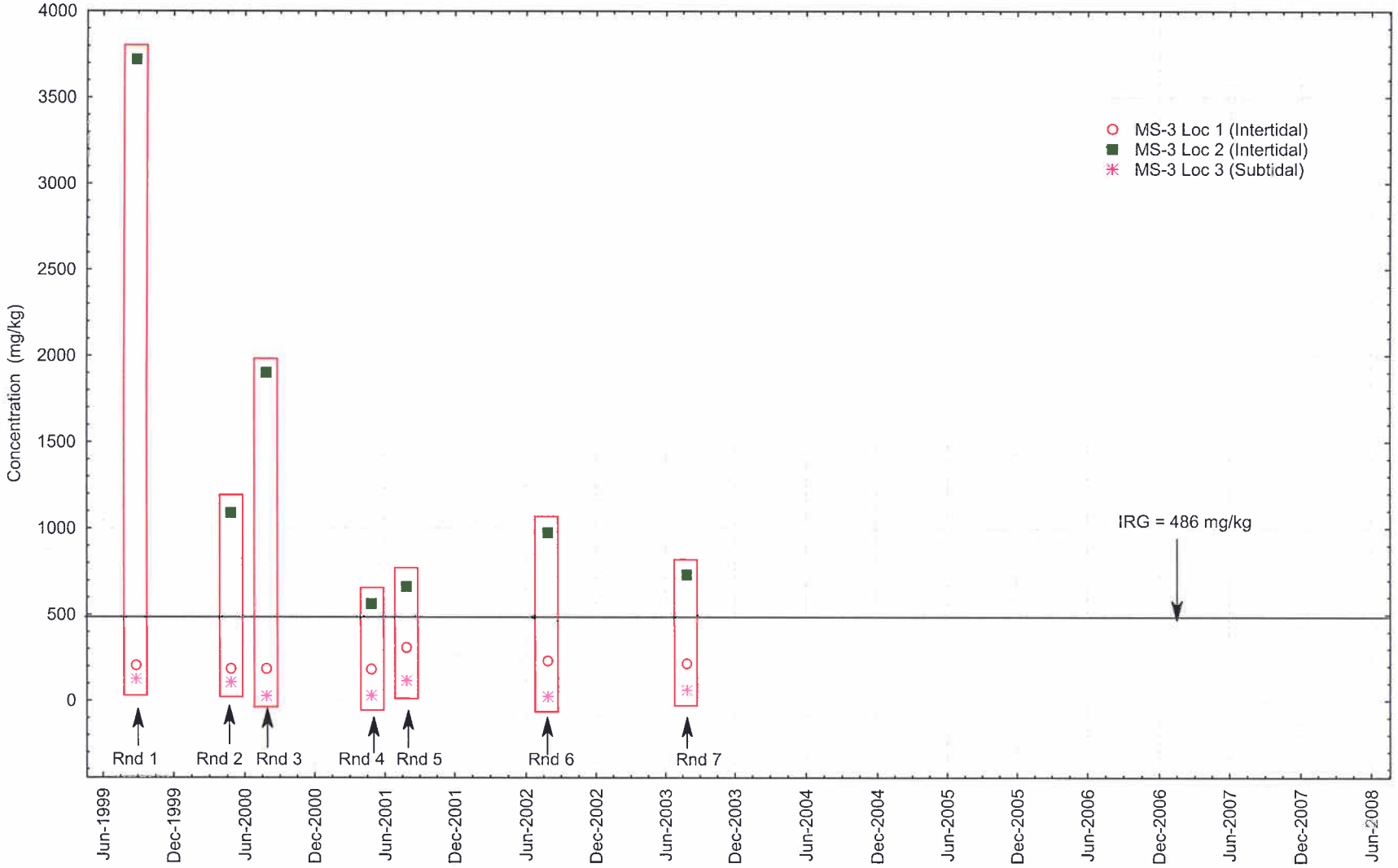
June 28, 2010

Monitoring Station 3 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



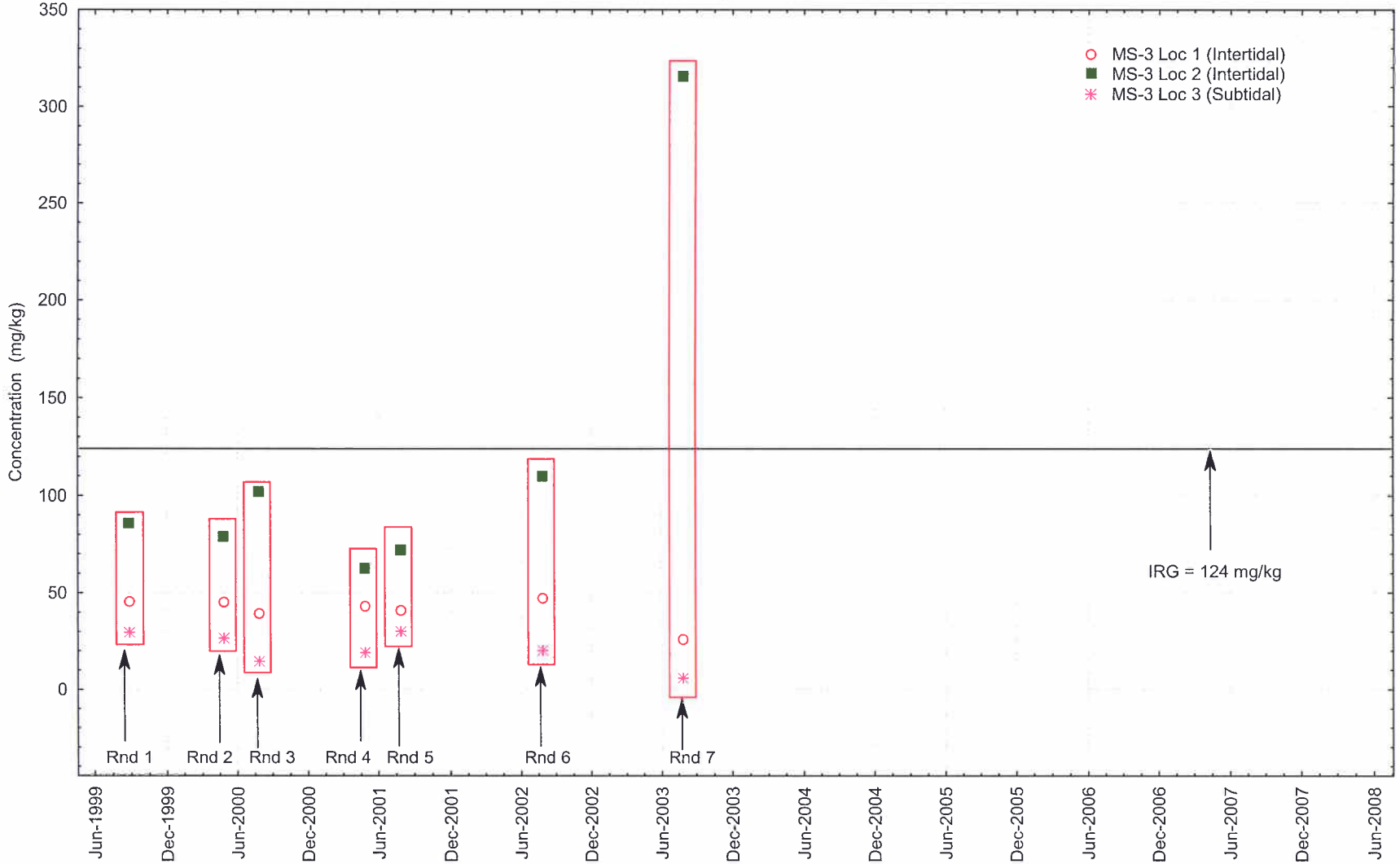
June 28, 2010

Monitoring Station 3 - Sediment
Copper Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 28, 2010

Monitoring Station 3 - Sediment
Nickel Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

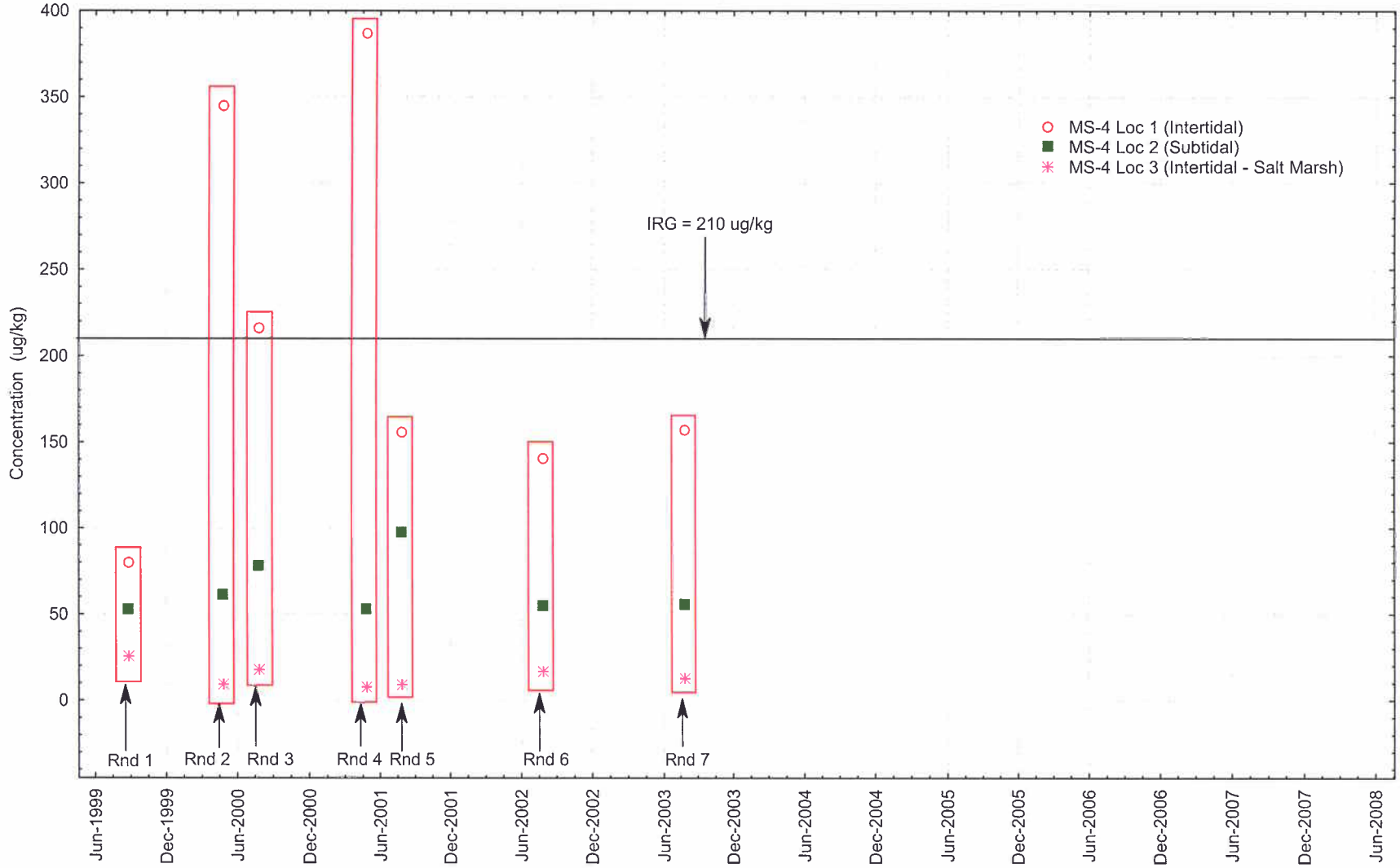


June 28, 2010

APPENDIX B.4

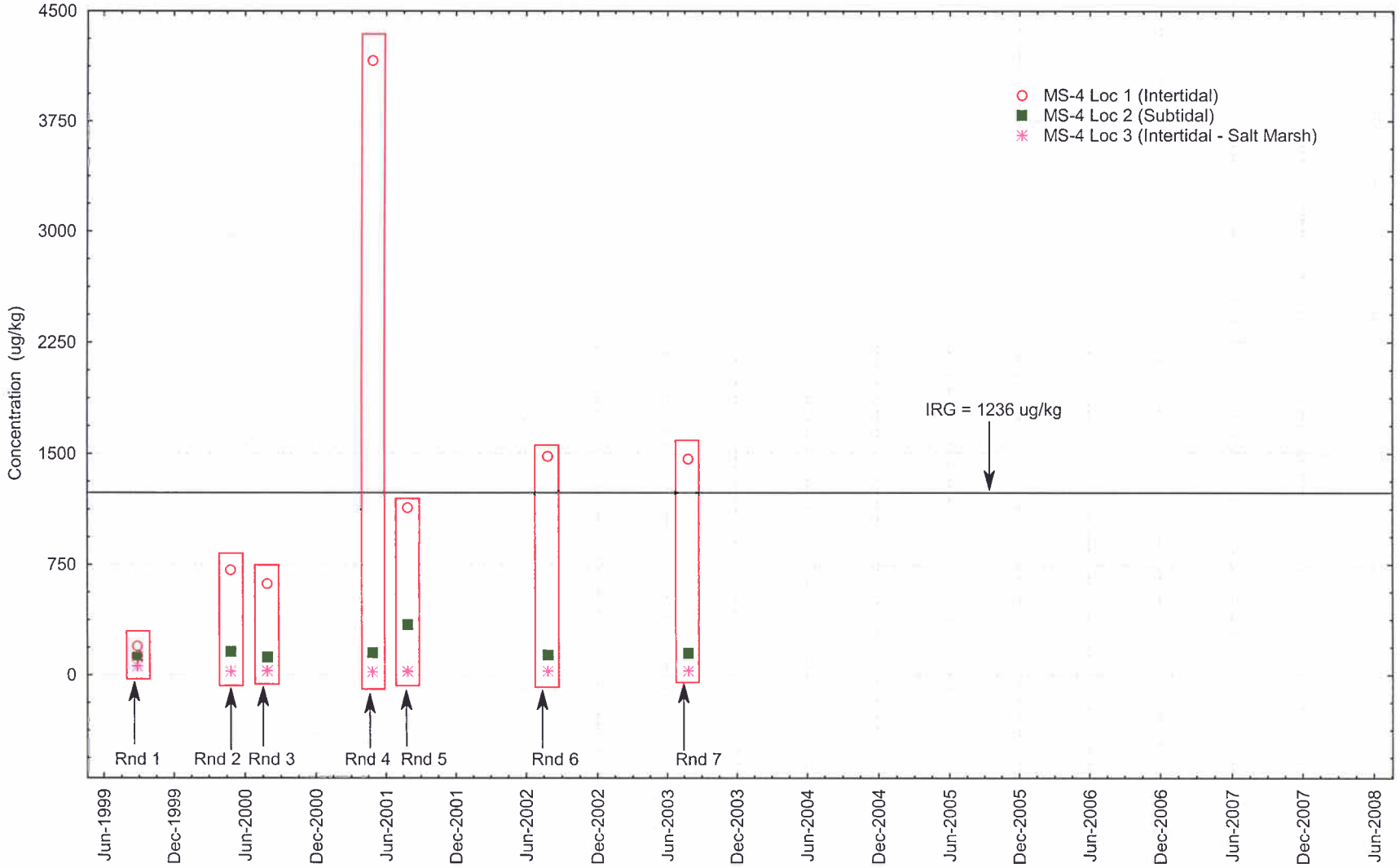
CONCENTRATION TREND PLOTS AT MS-04

Monitoring Station 4 - Sediment
Acenapthylene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



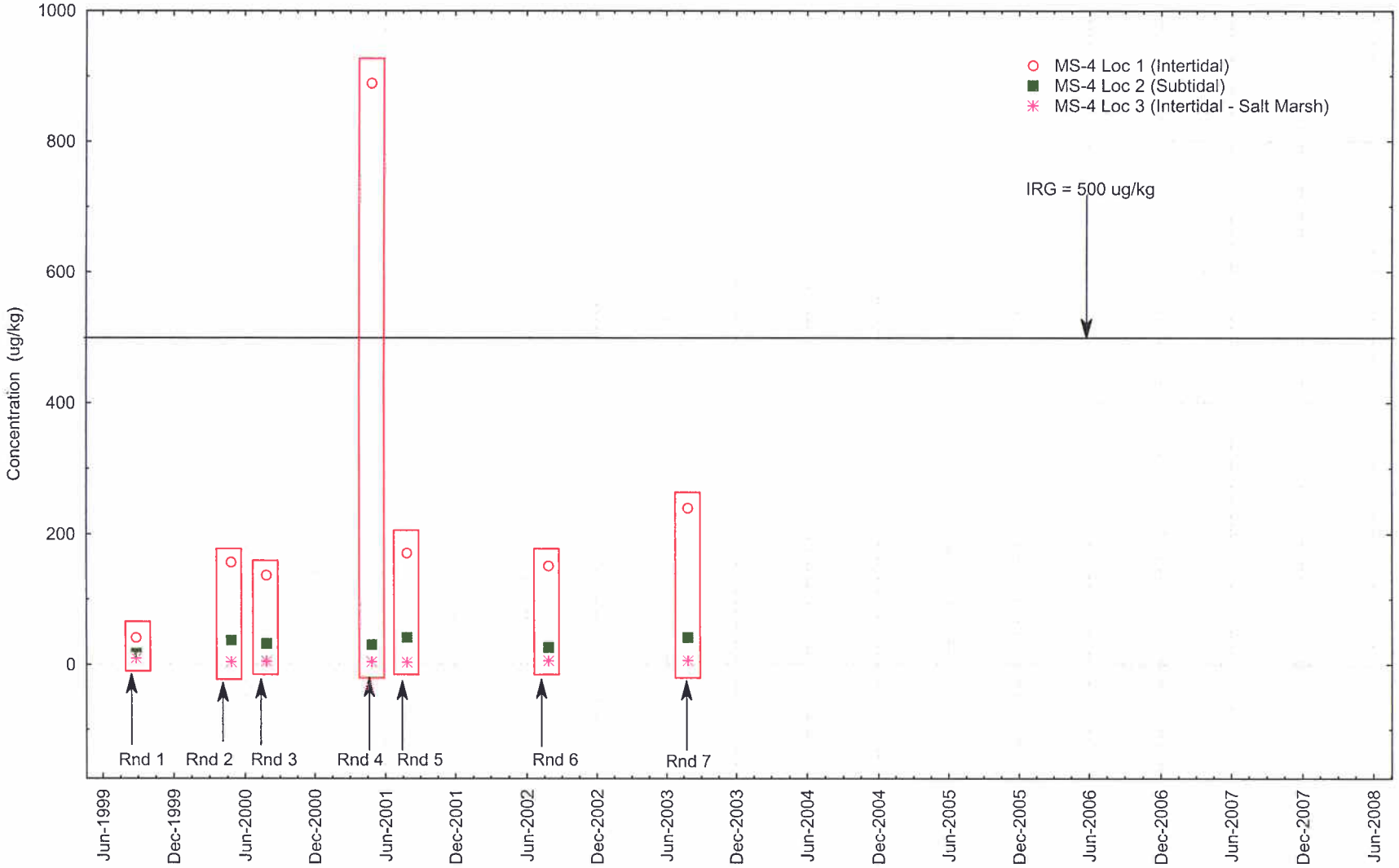
June 28, 2010

Monitoring Station 4 - Sediment
Anthracene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



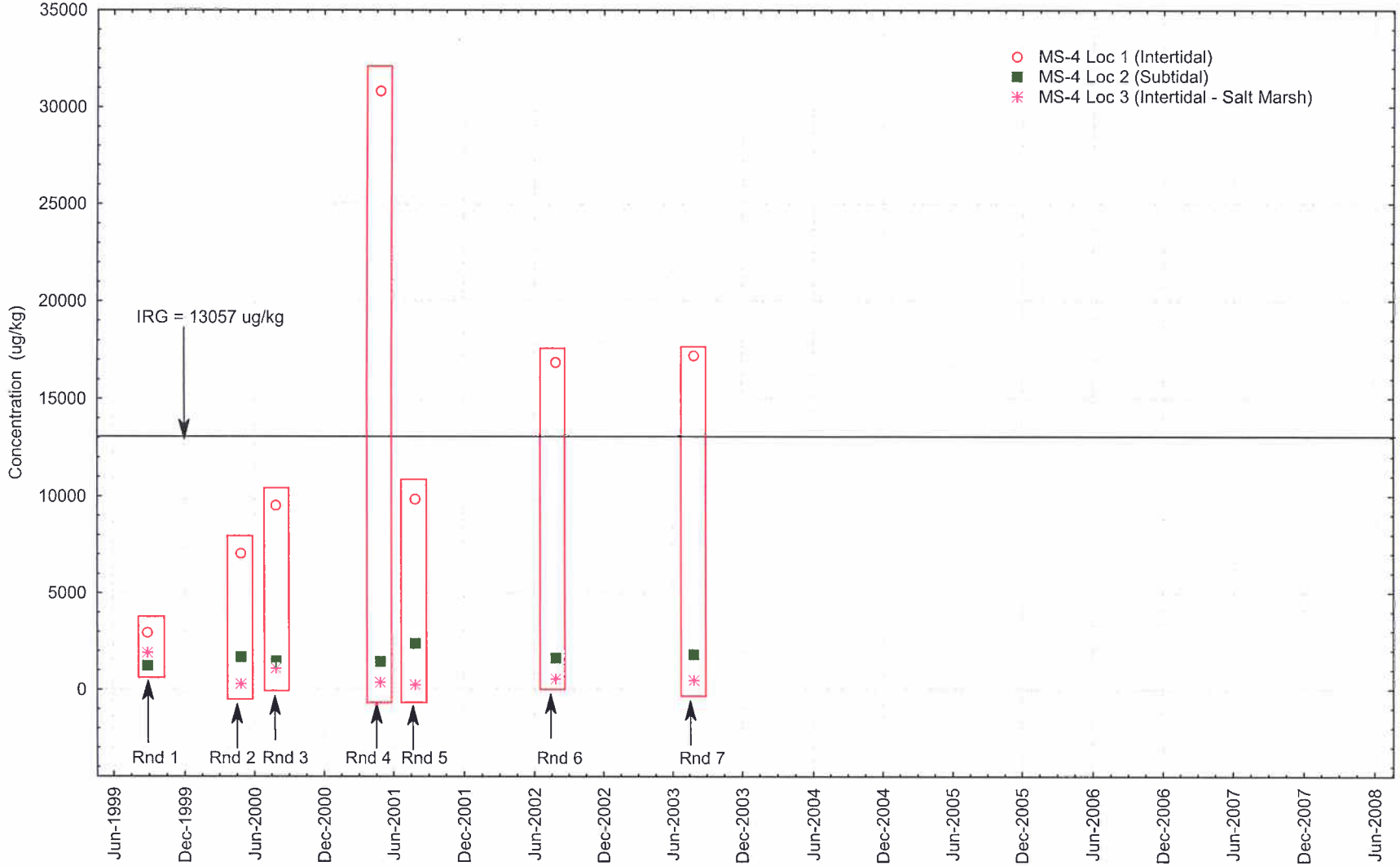
June 28, 2010

Monitoring Station 4 - Sediment
Fluorene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



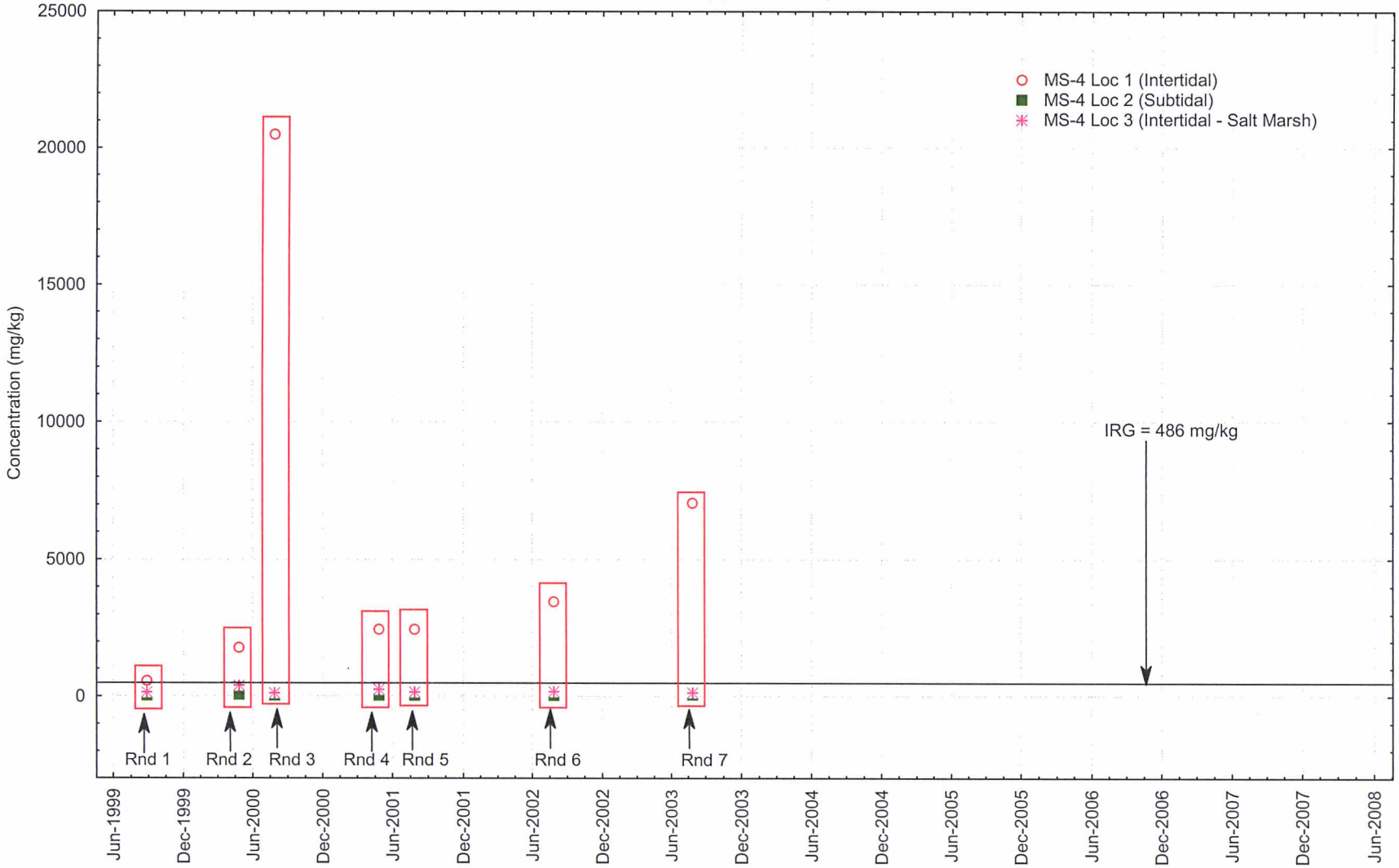
June 28, 2010

Monitoring Station 4 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



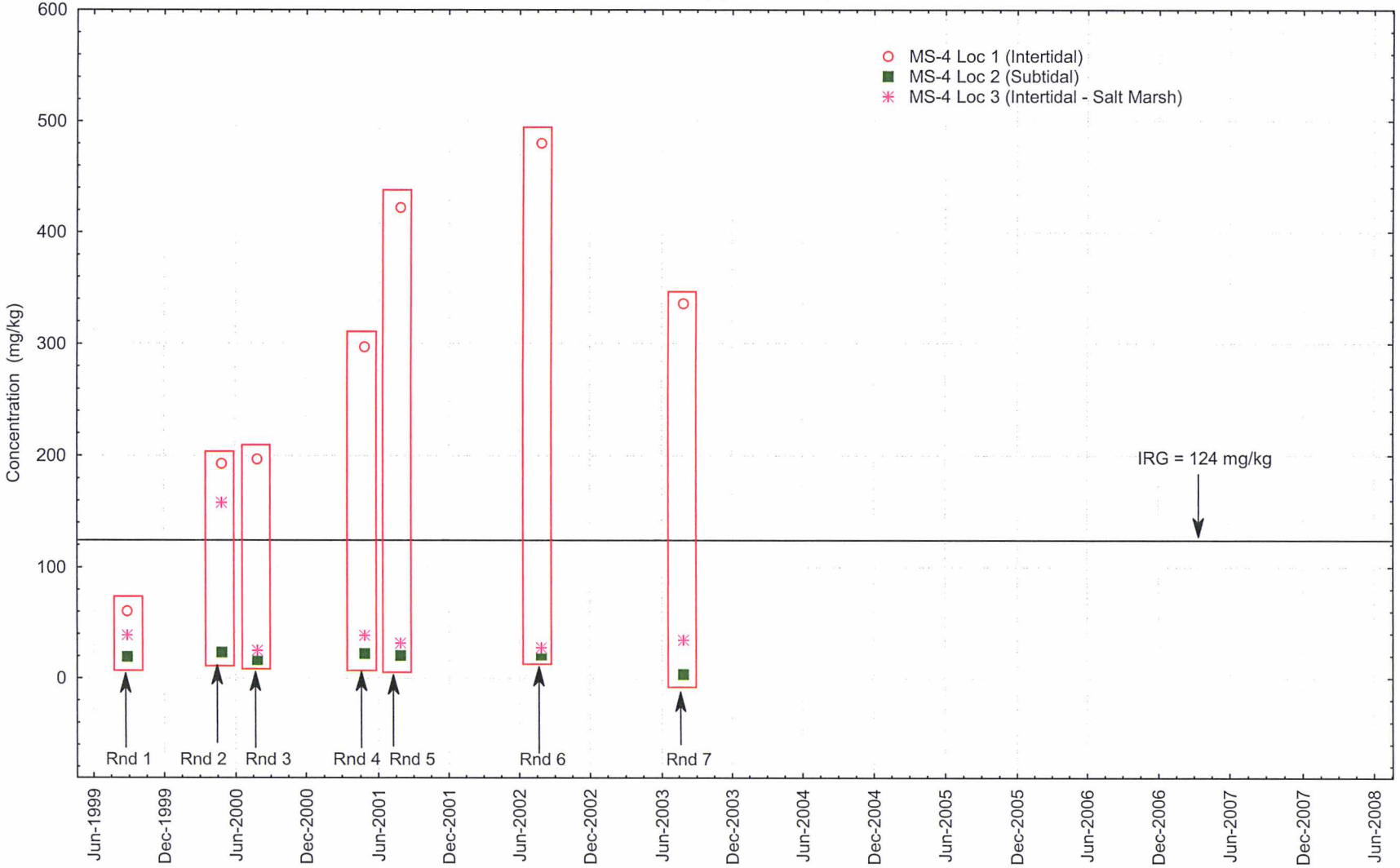
June 28, 2010

Monitoring Station 4 - Sediment
Copper Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 28, 2010

Monitoring Station 4 - Sediment
Nickel Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

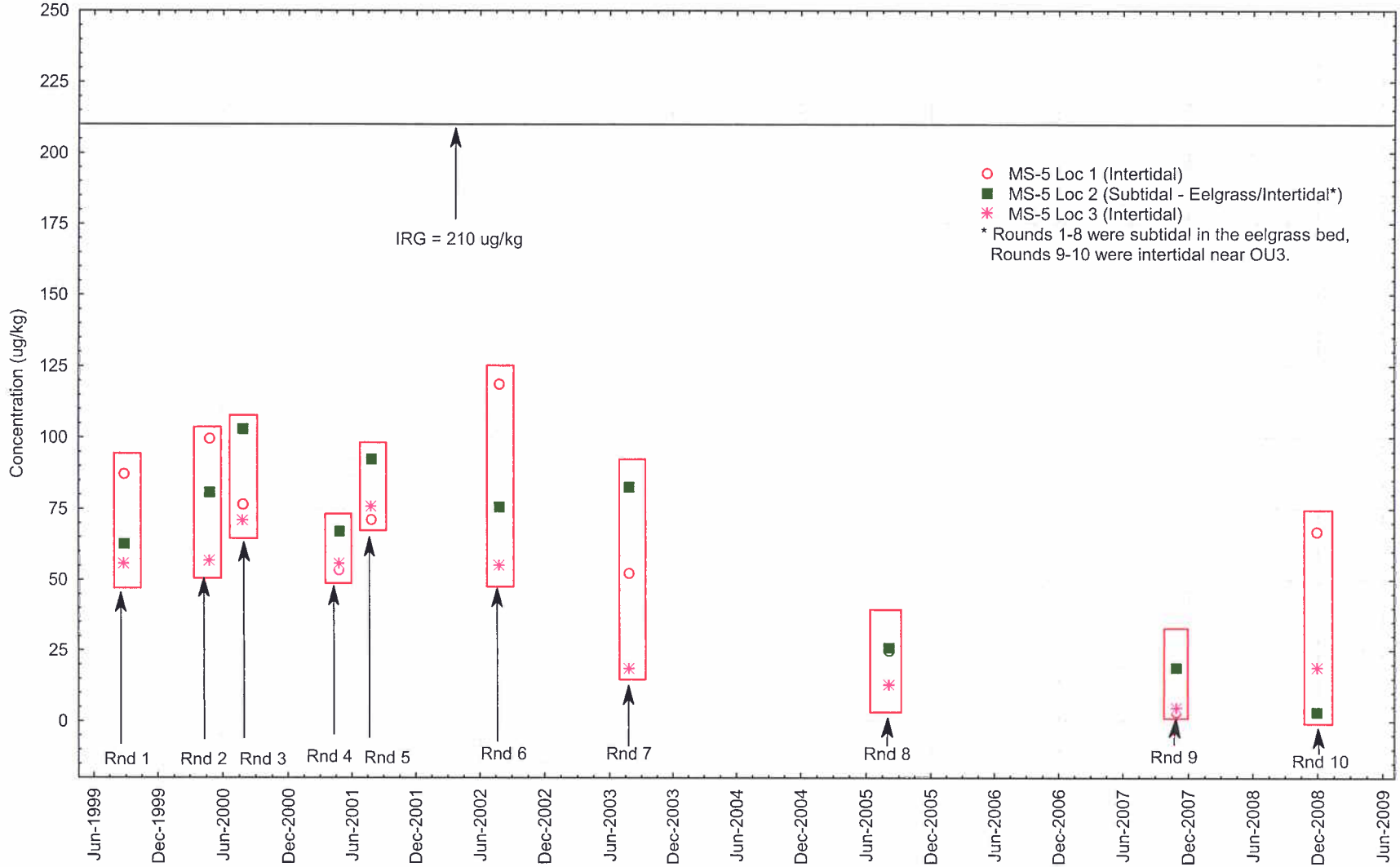


June 28, 2010

APPENDIX B.5

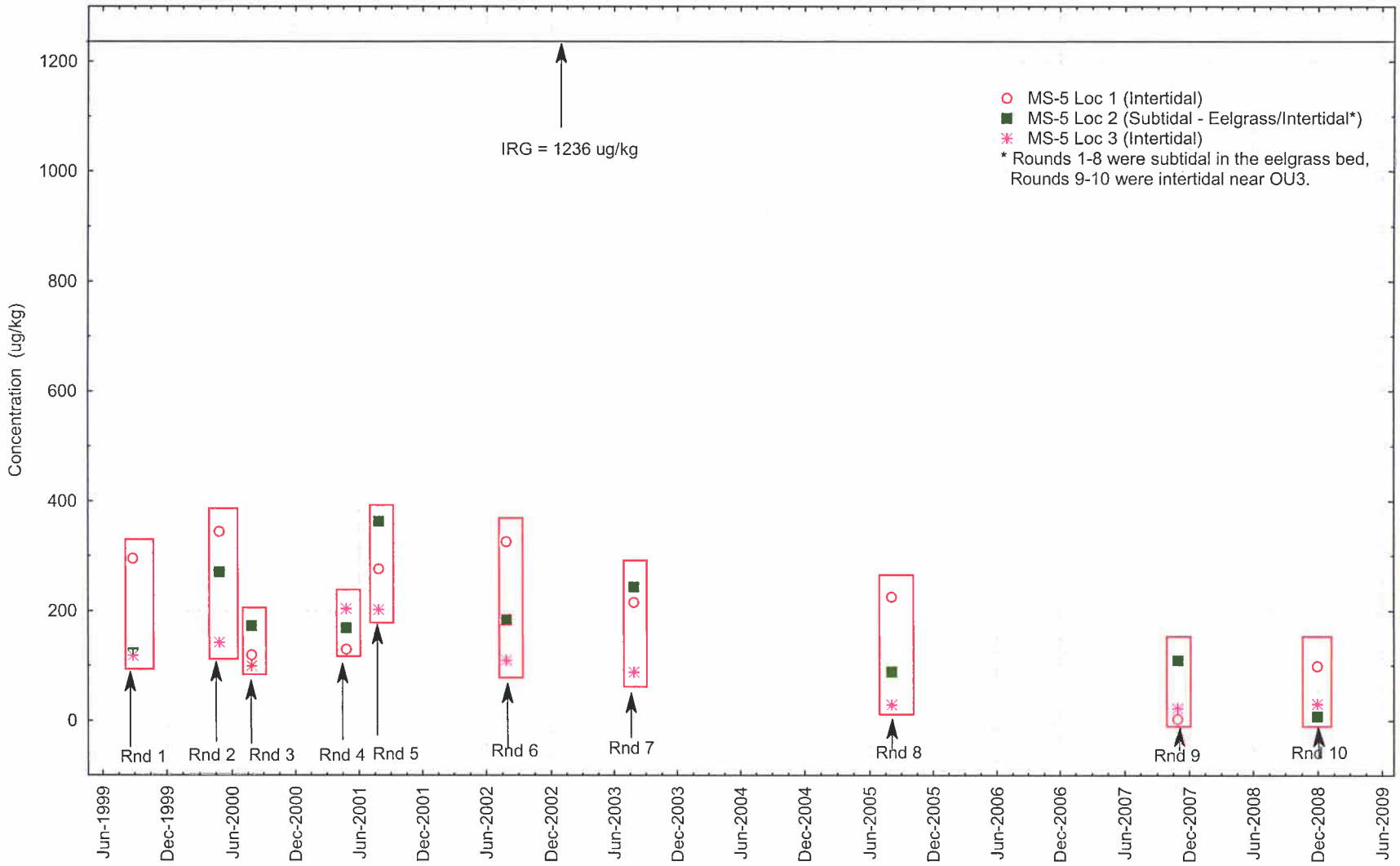
CONCENTRATION TREND PLOTS AT MS-05

Monitoring Station 5 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



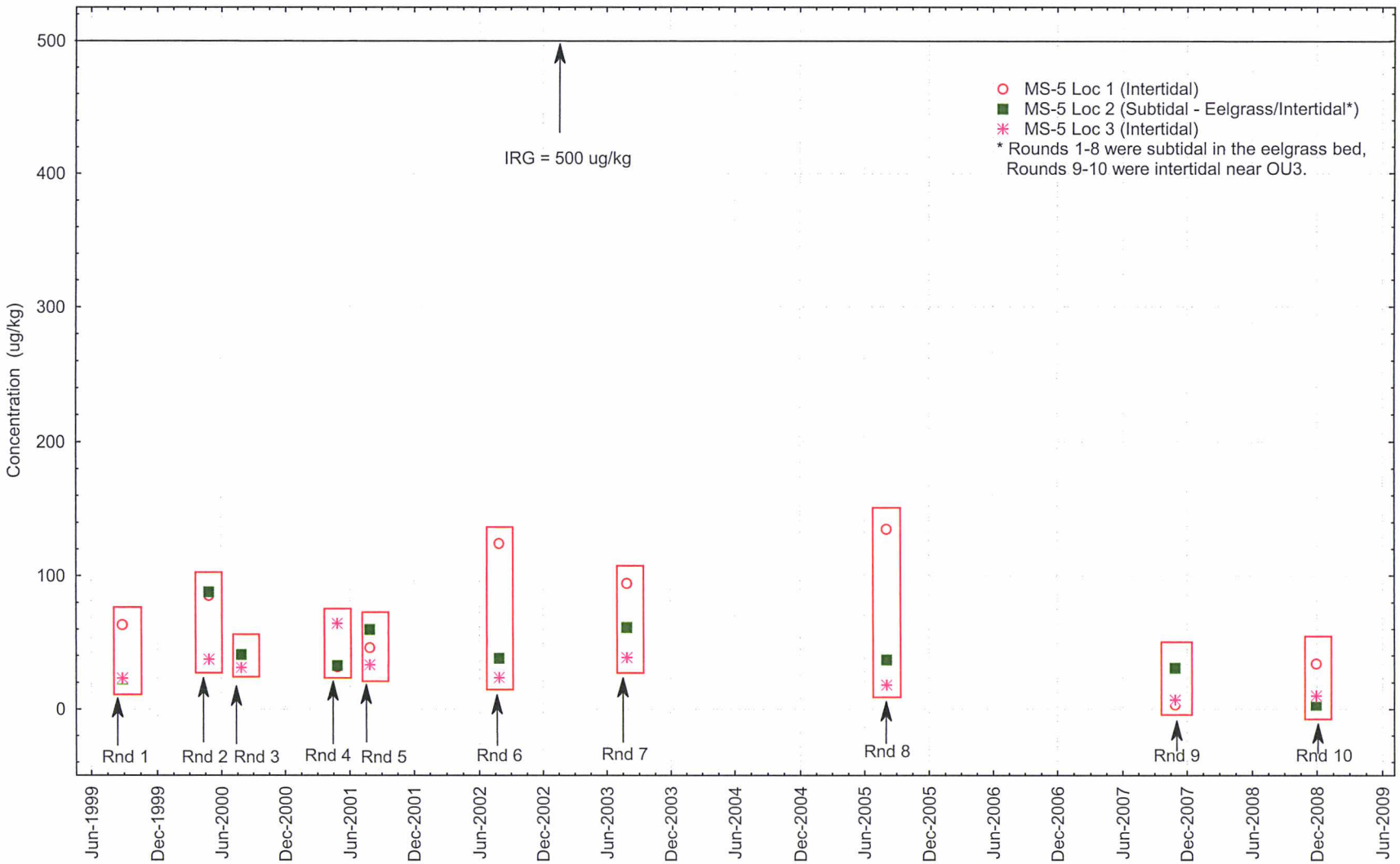
June 5, 2009

Monitoring Station 5 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



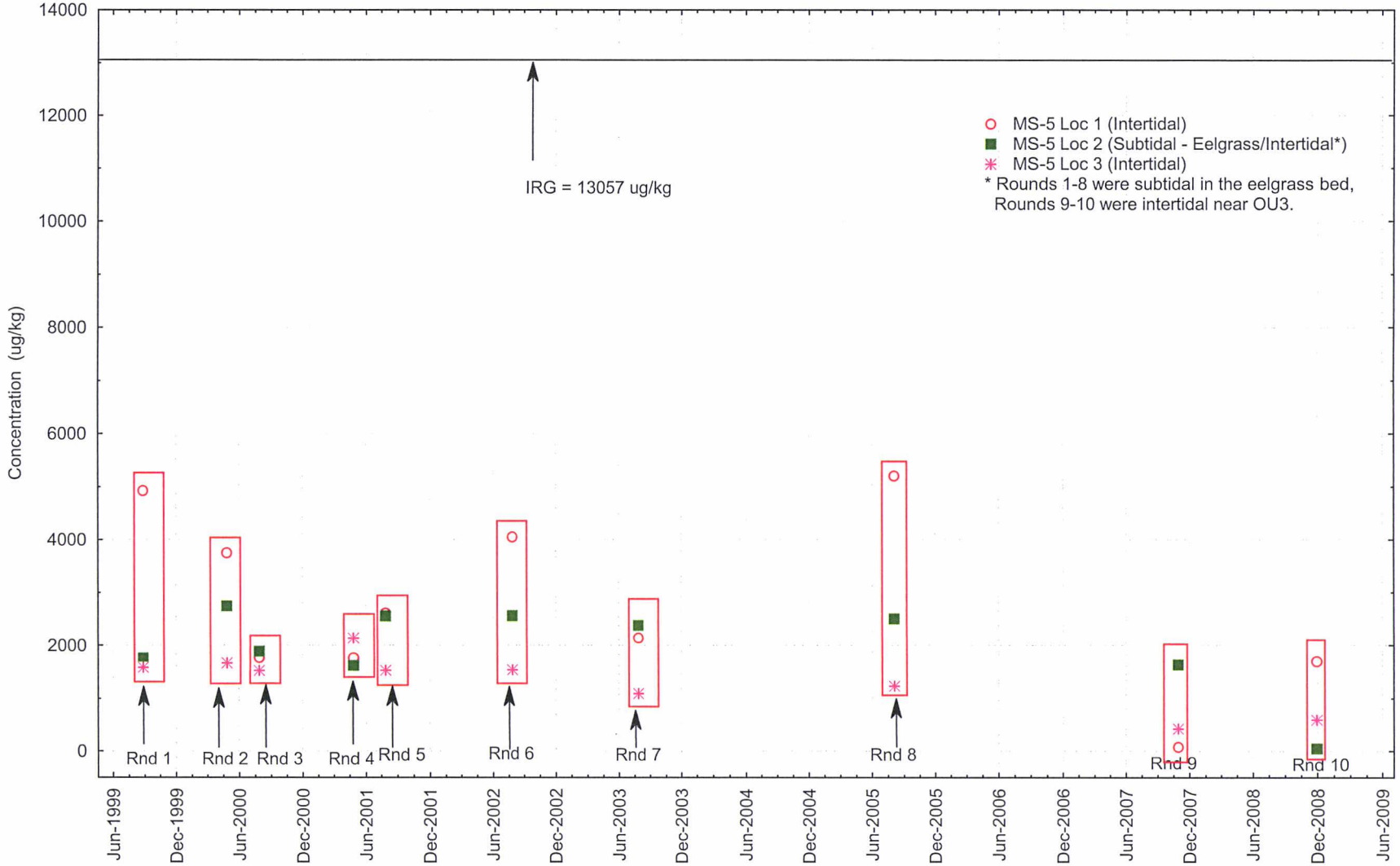
June 5, 2009

Monitoring Station 5 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



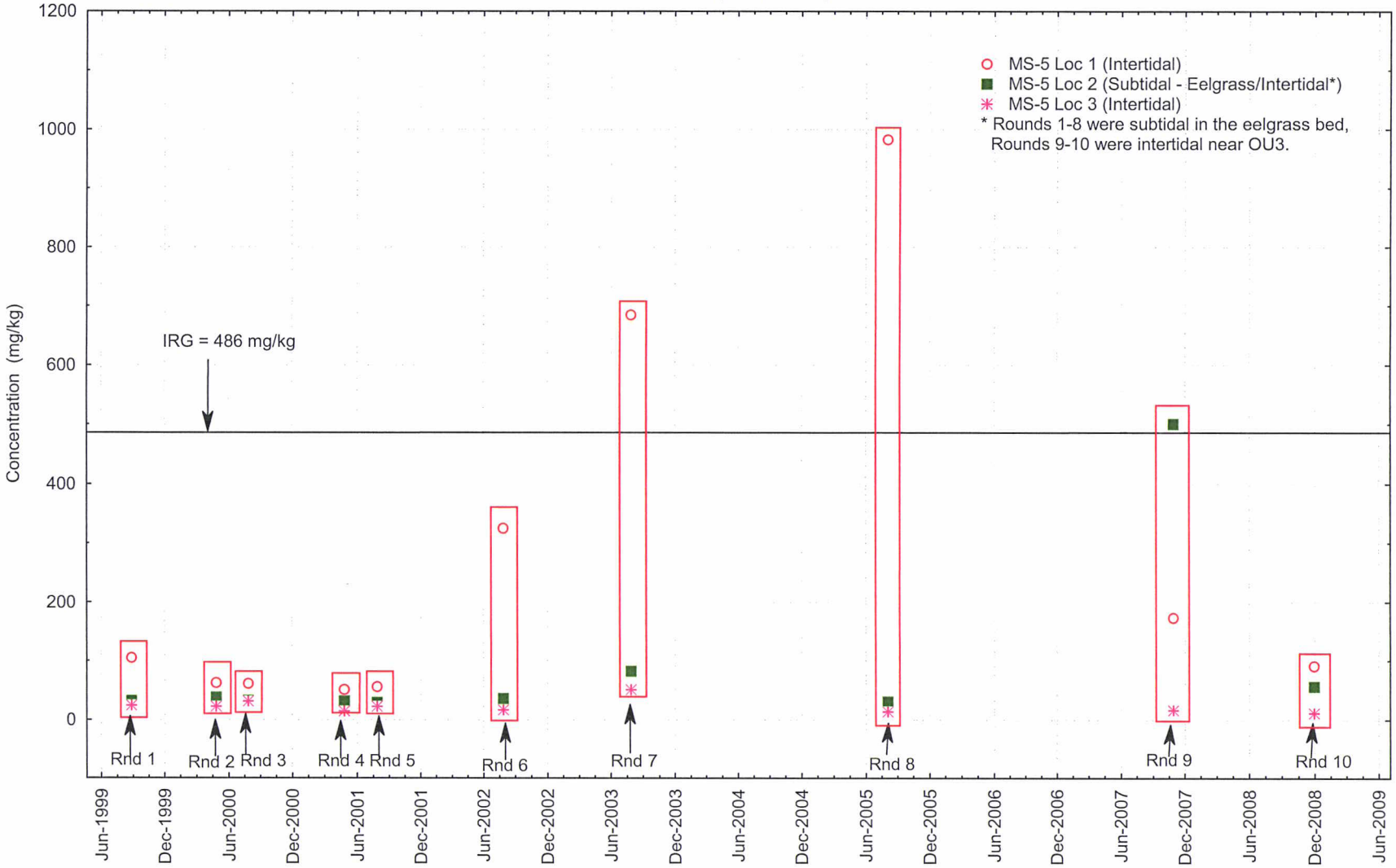
June 5, 2009

Monitoring Station 5 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



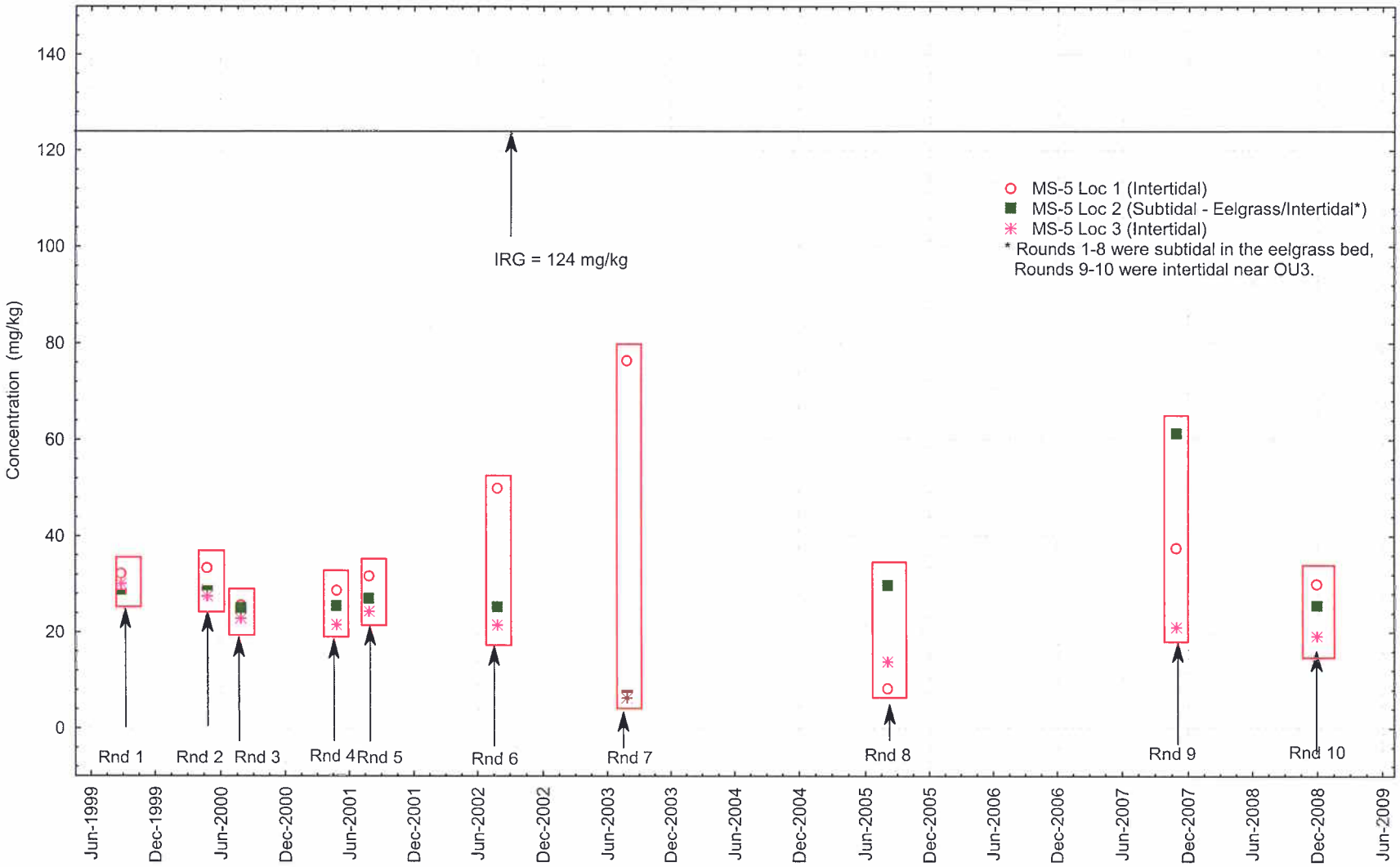
June 5, 2009

Monitoring Station 5 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



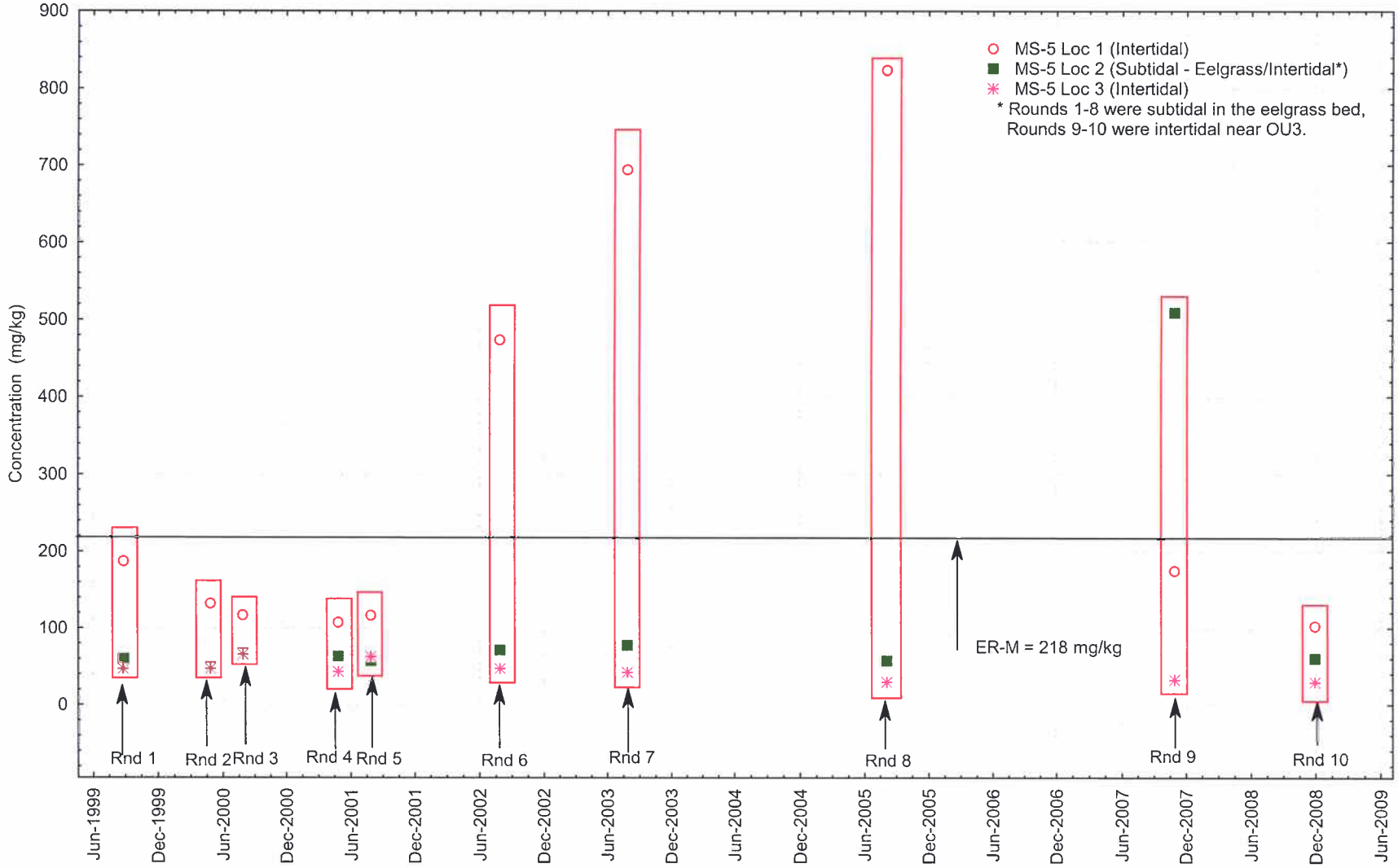
November 30, 2009

Monitoring Station 5 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

Monitoring Station 5 - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

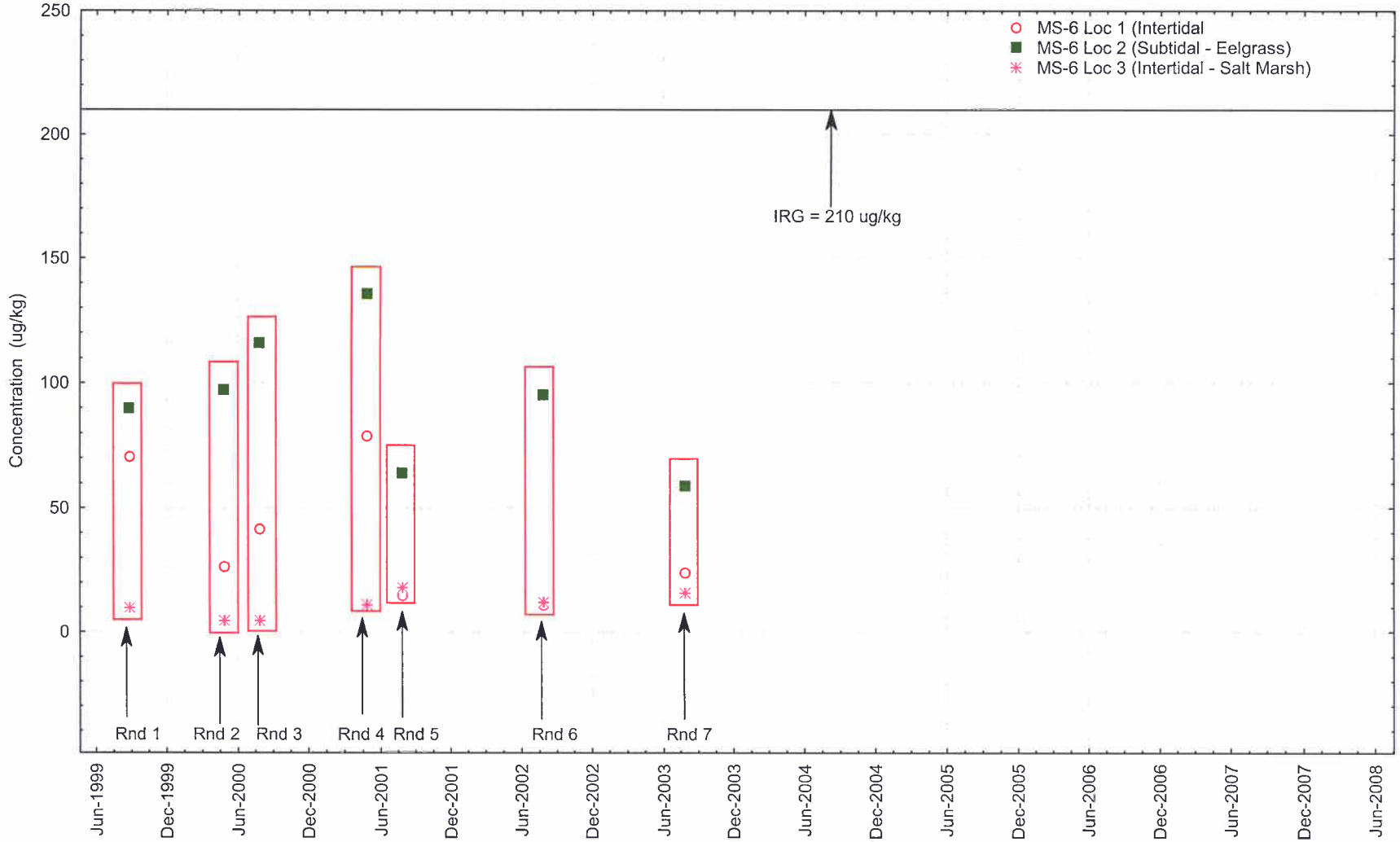


June 5, 2009

APPENDIX B.6

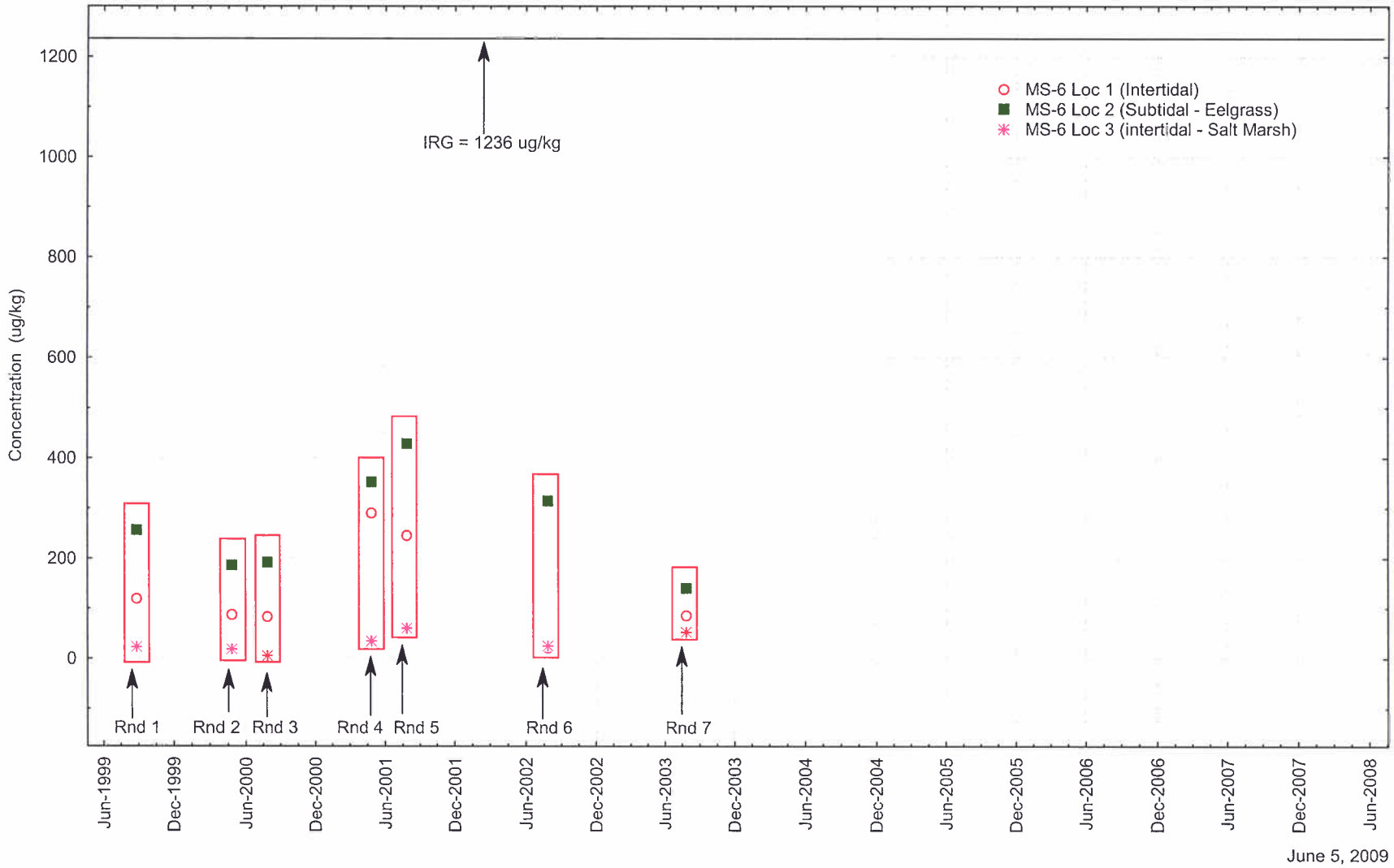
CONCENTRATION TREND PLOTS AT MS-06

Monitoring Station 6 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



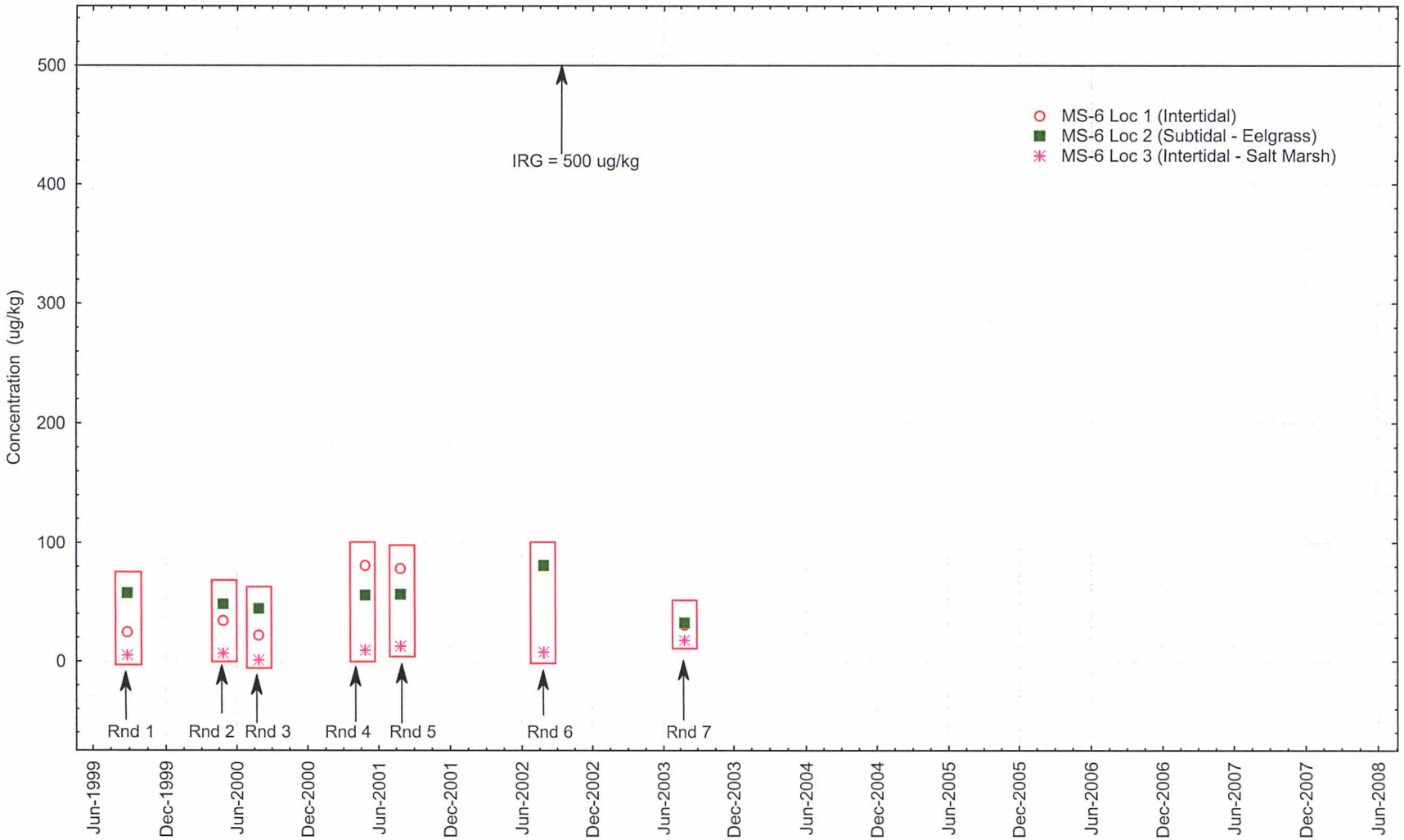
June 5, 2009

Monitoring Station 6 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



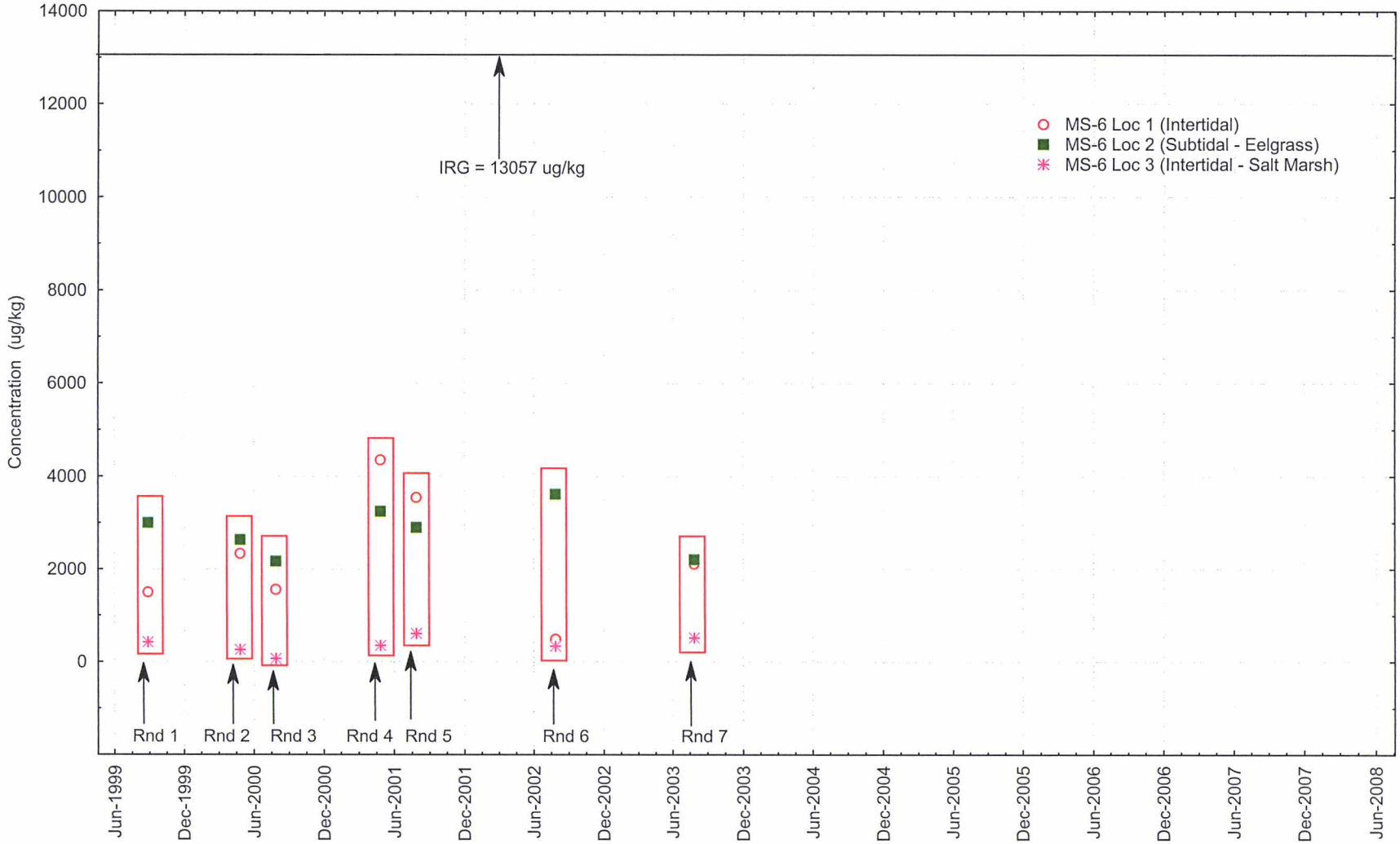
June 5, 2009

Monitoring Station 6 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



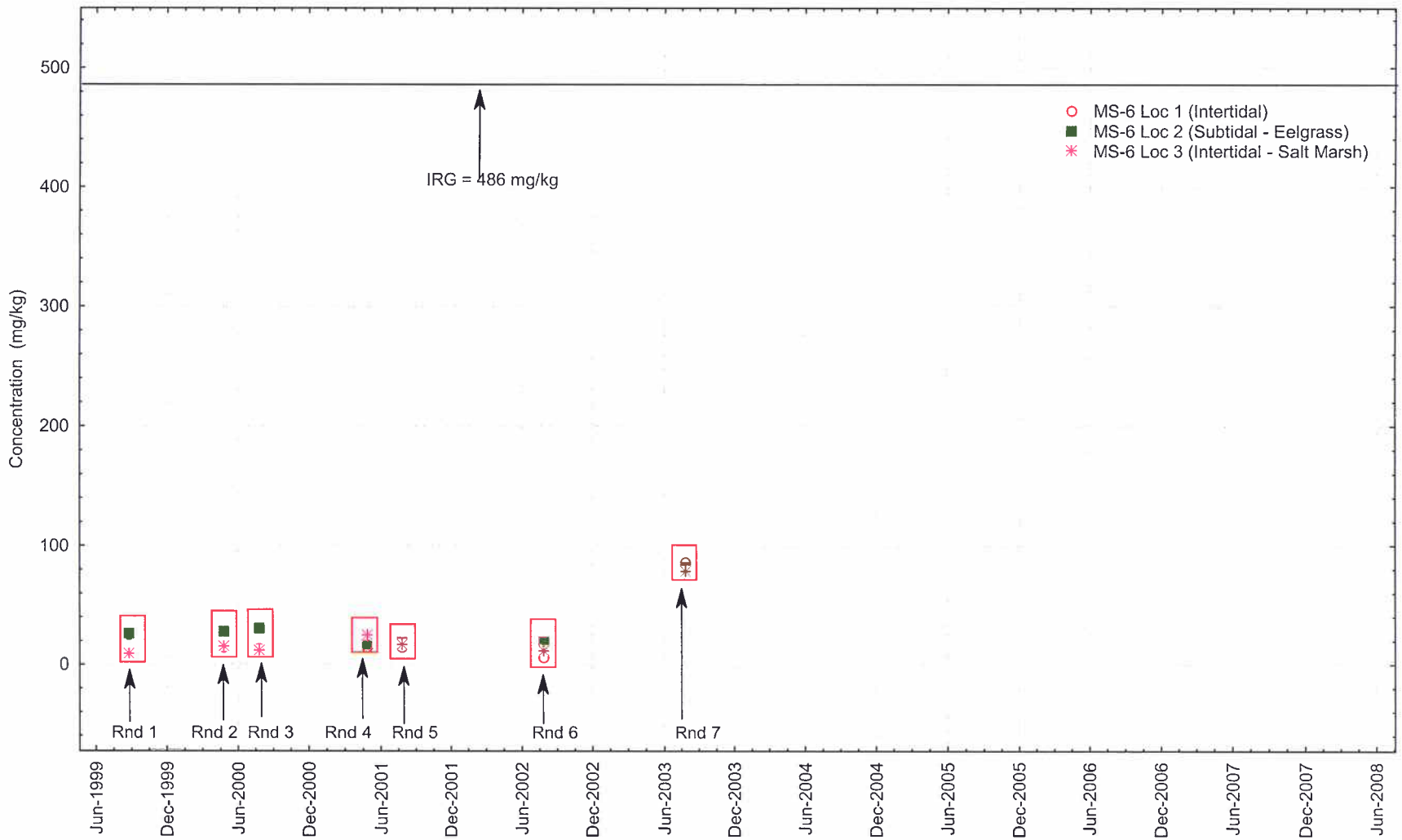
June 5, 2009

Monitoring Station 6 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



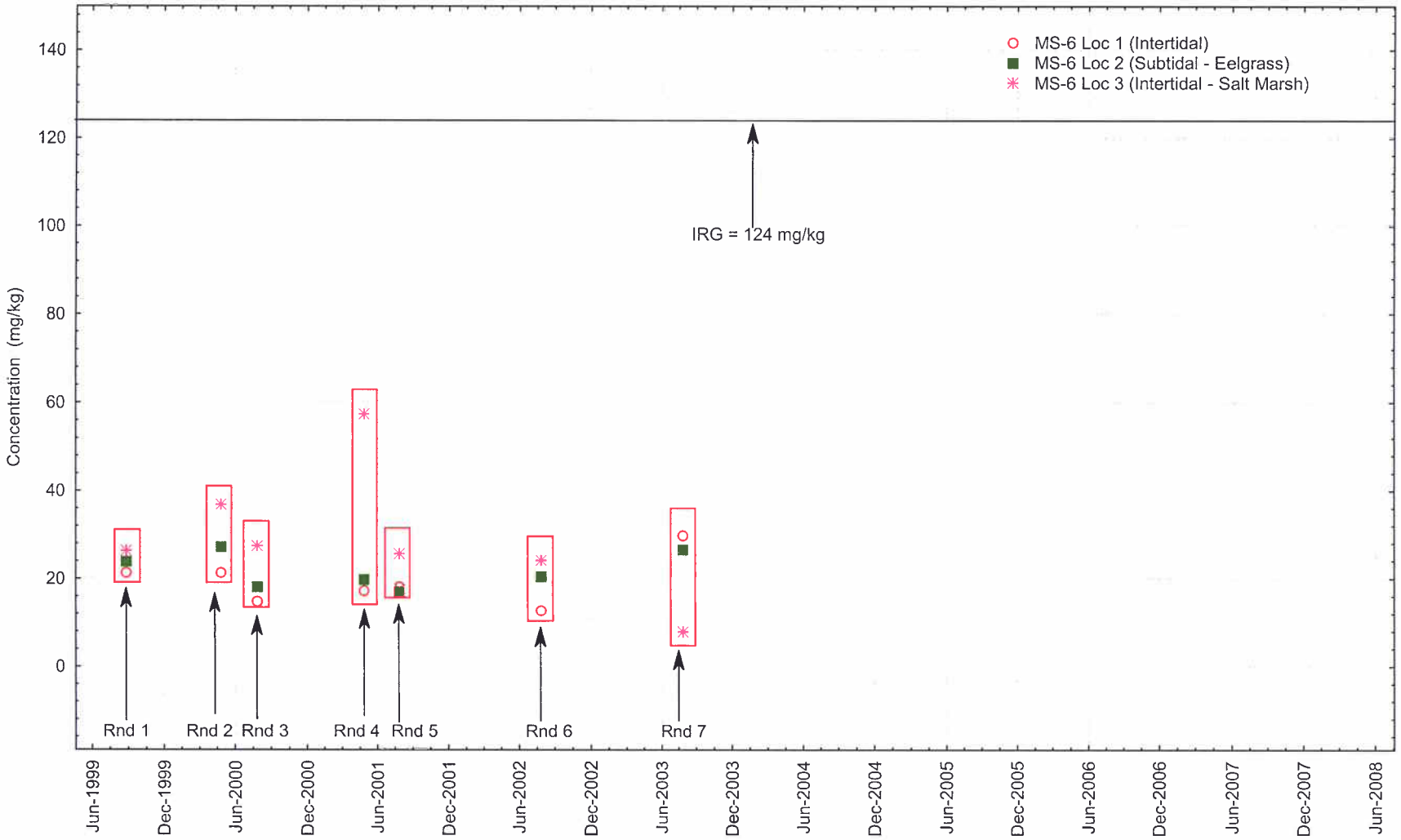
June 5, 2009

Monitoring Station 6 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

Monitoring Station 6 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

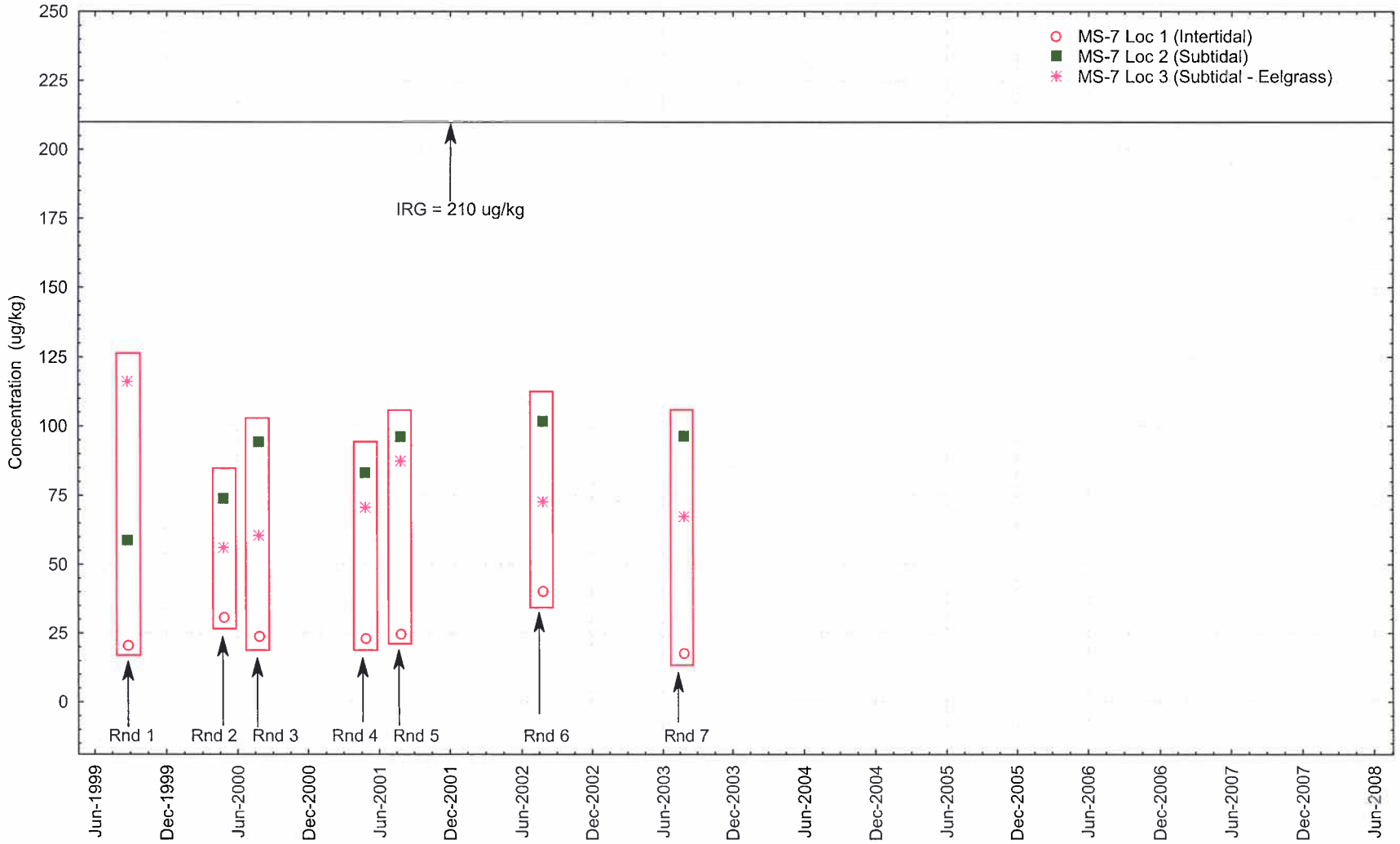


June 5, 2009

APPENDIX B.7

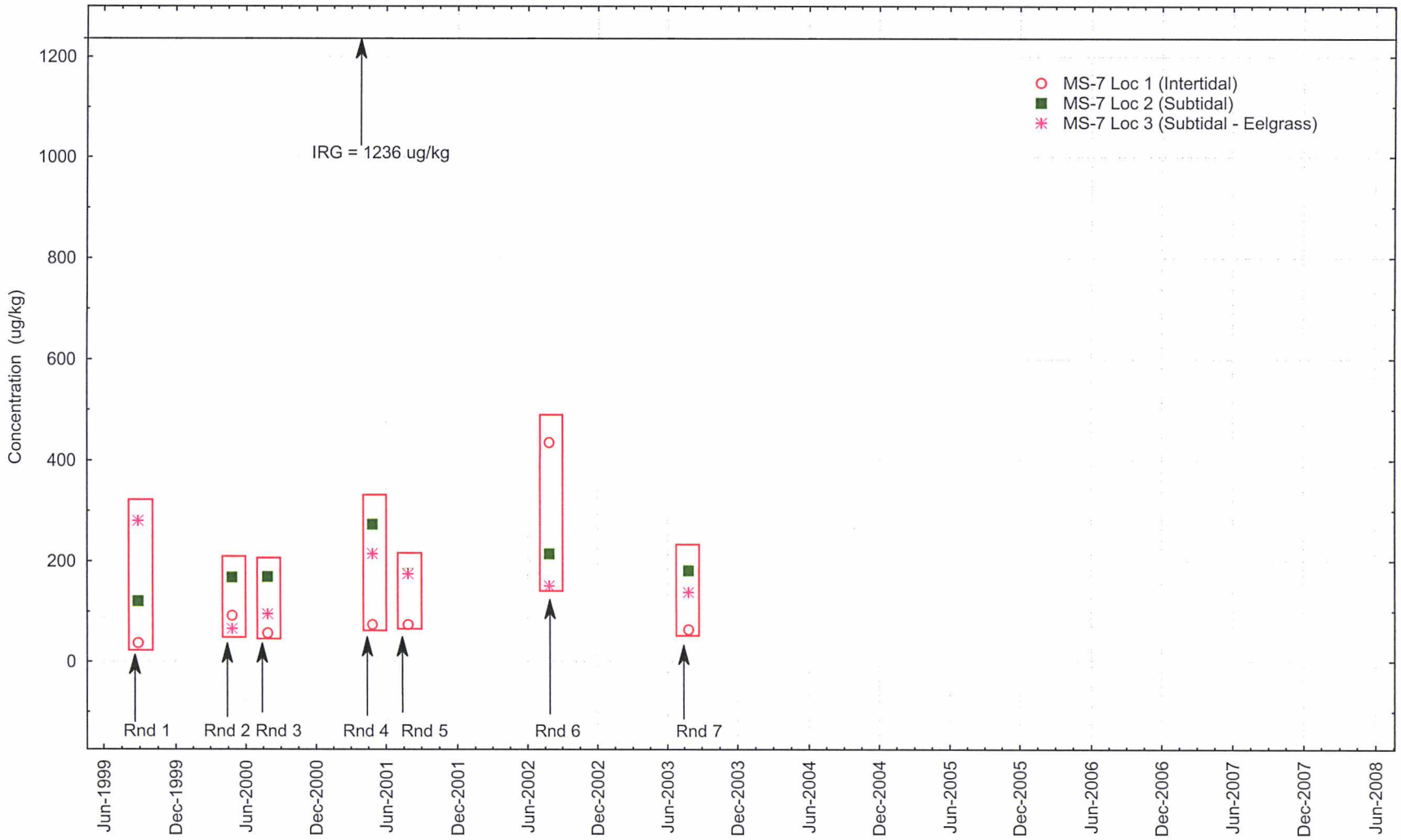
CONCENTRATION TREND PLOTS AT MS-07

Monitoring Station 7 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



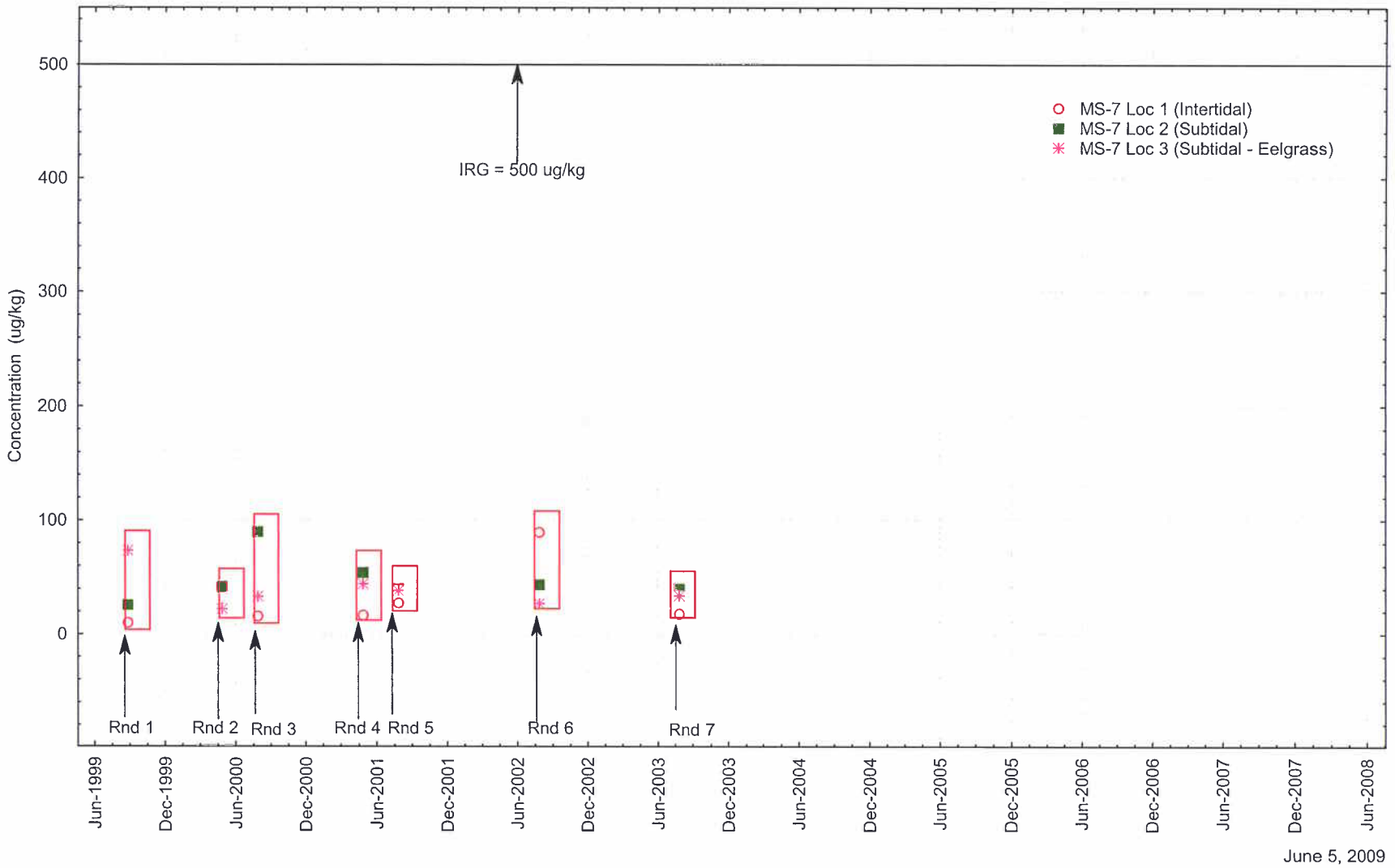
June 5, 2009

Monitoring Station 7 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



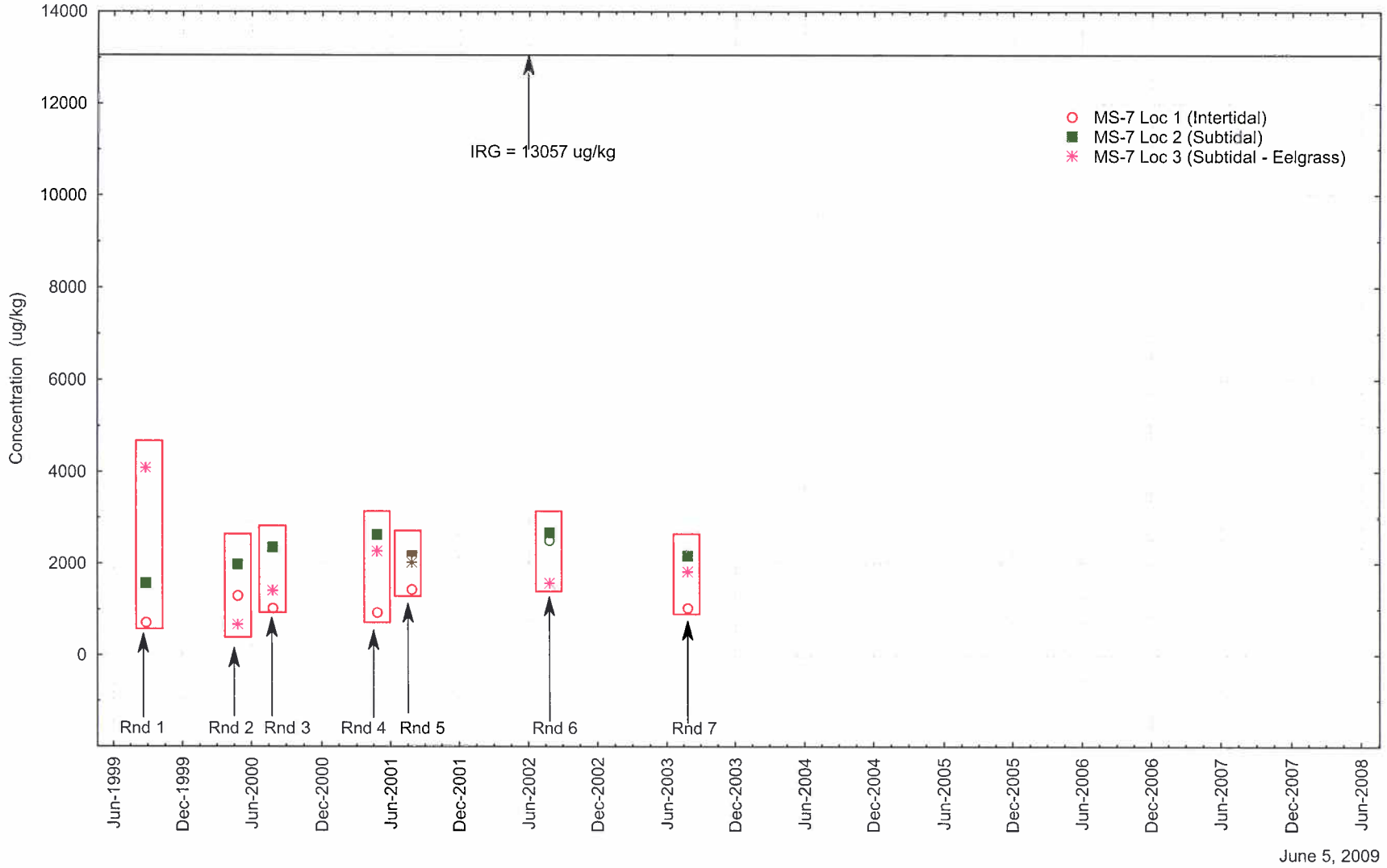
June 5, 2009

Monitoring Station 7 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



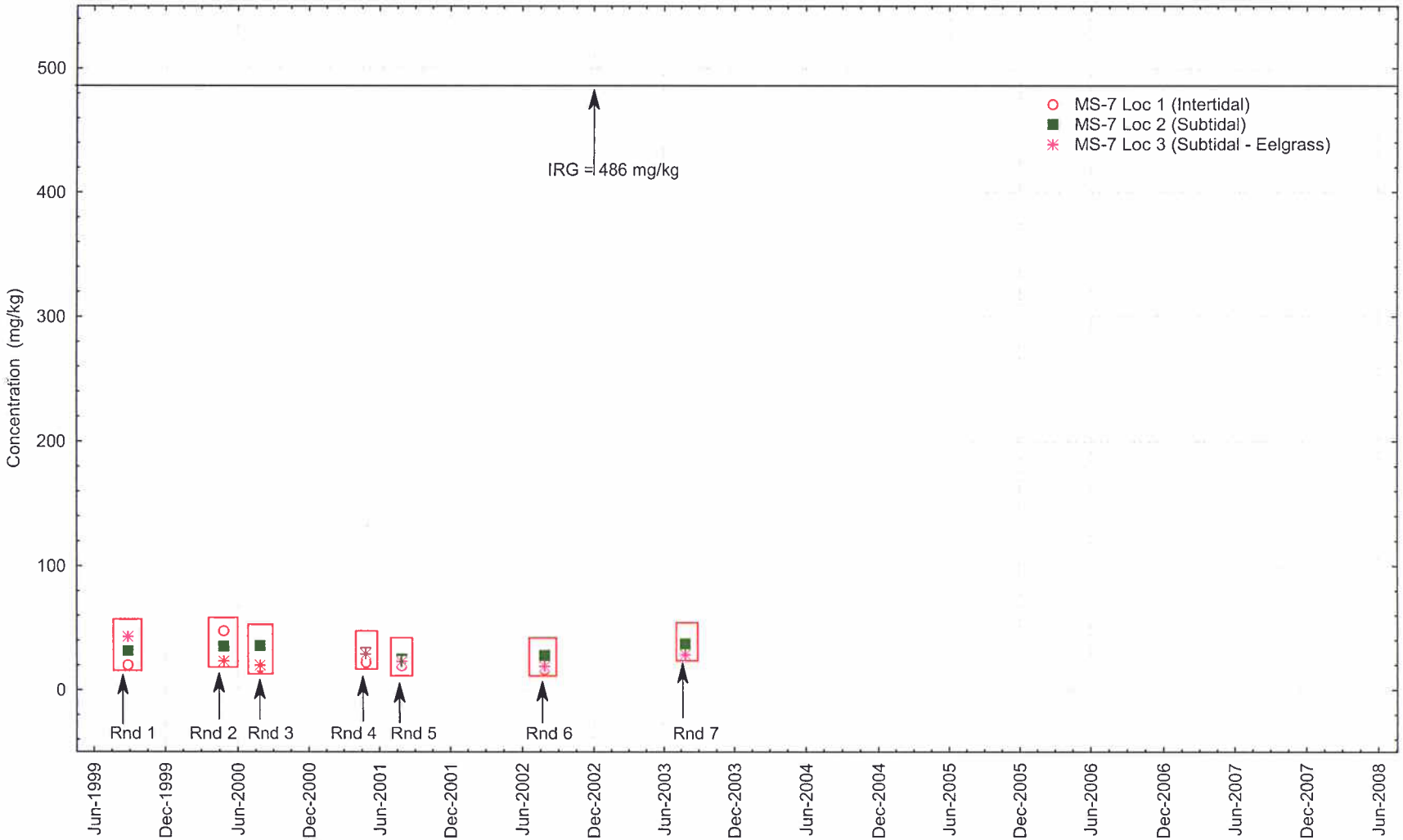
June 5, 2009

Monitoring Station 7 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



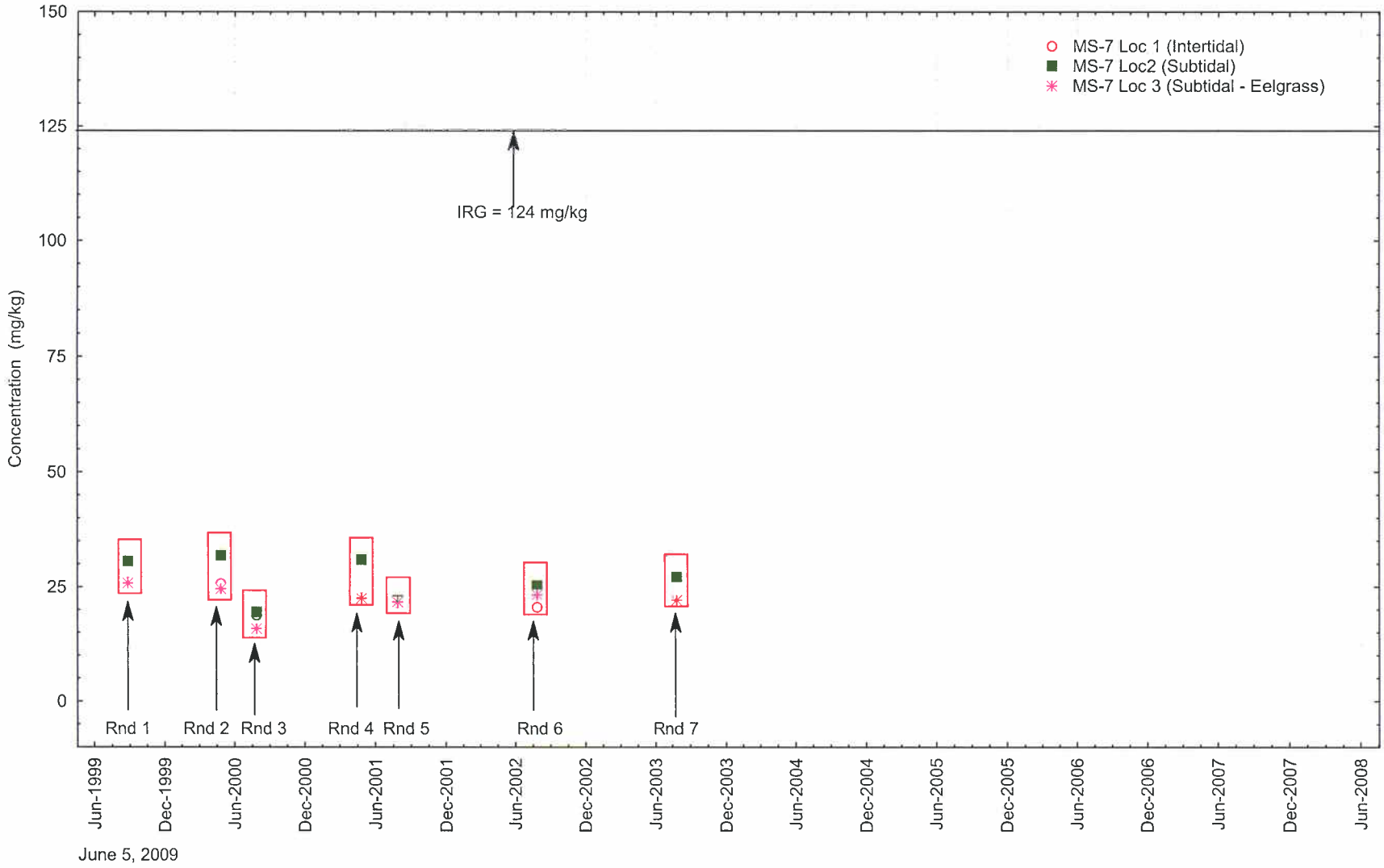
June 5, 2009

Monitoring Station 7 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

Monitoring Station 7 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

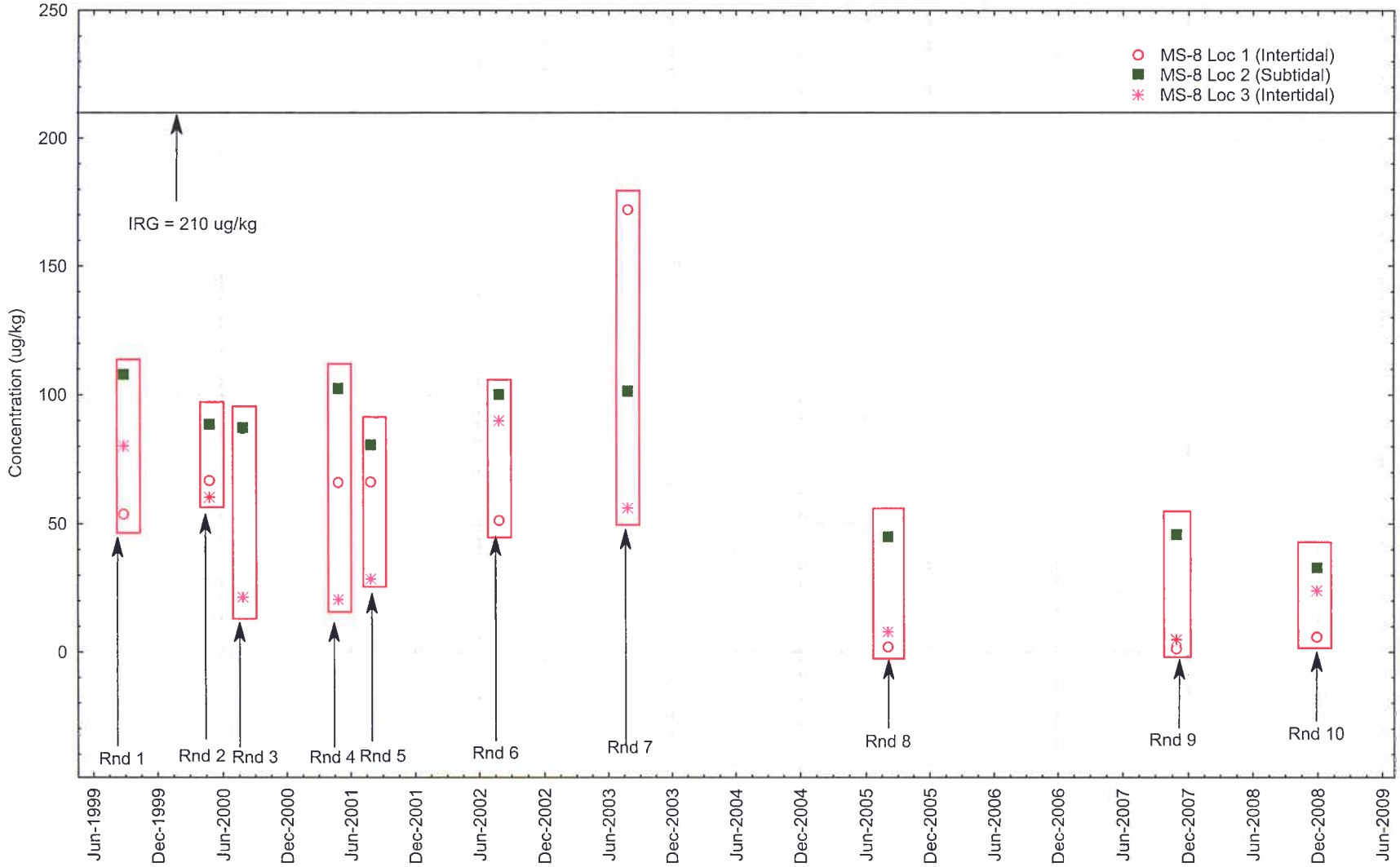


June 5, 2009

APPENDIX B.8

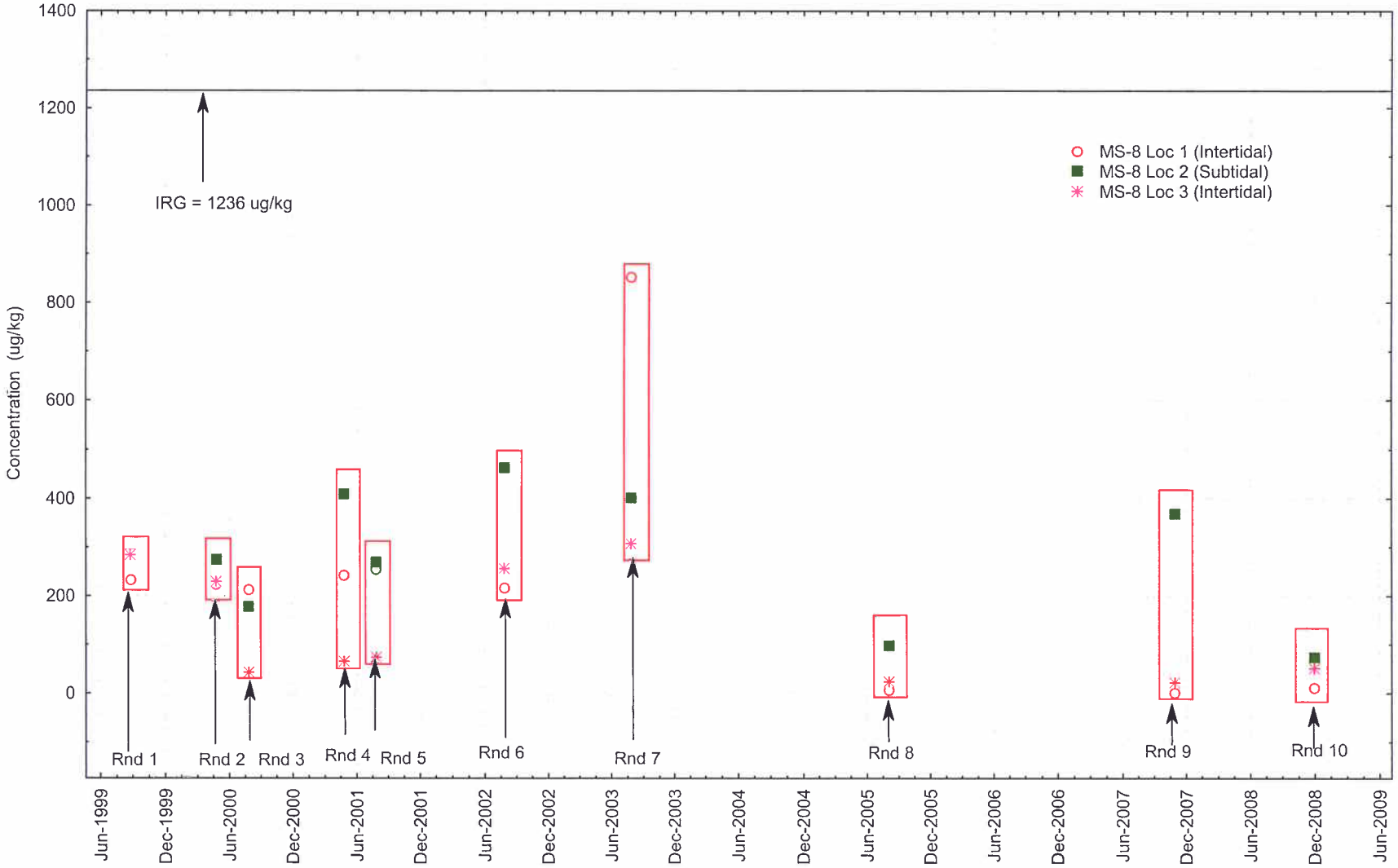
CONCENTRATION TREND PLOTS AT MS-08

Monitoring Station 8 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



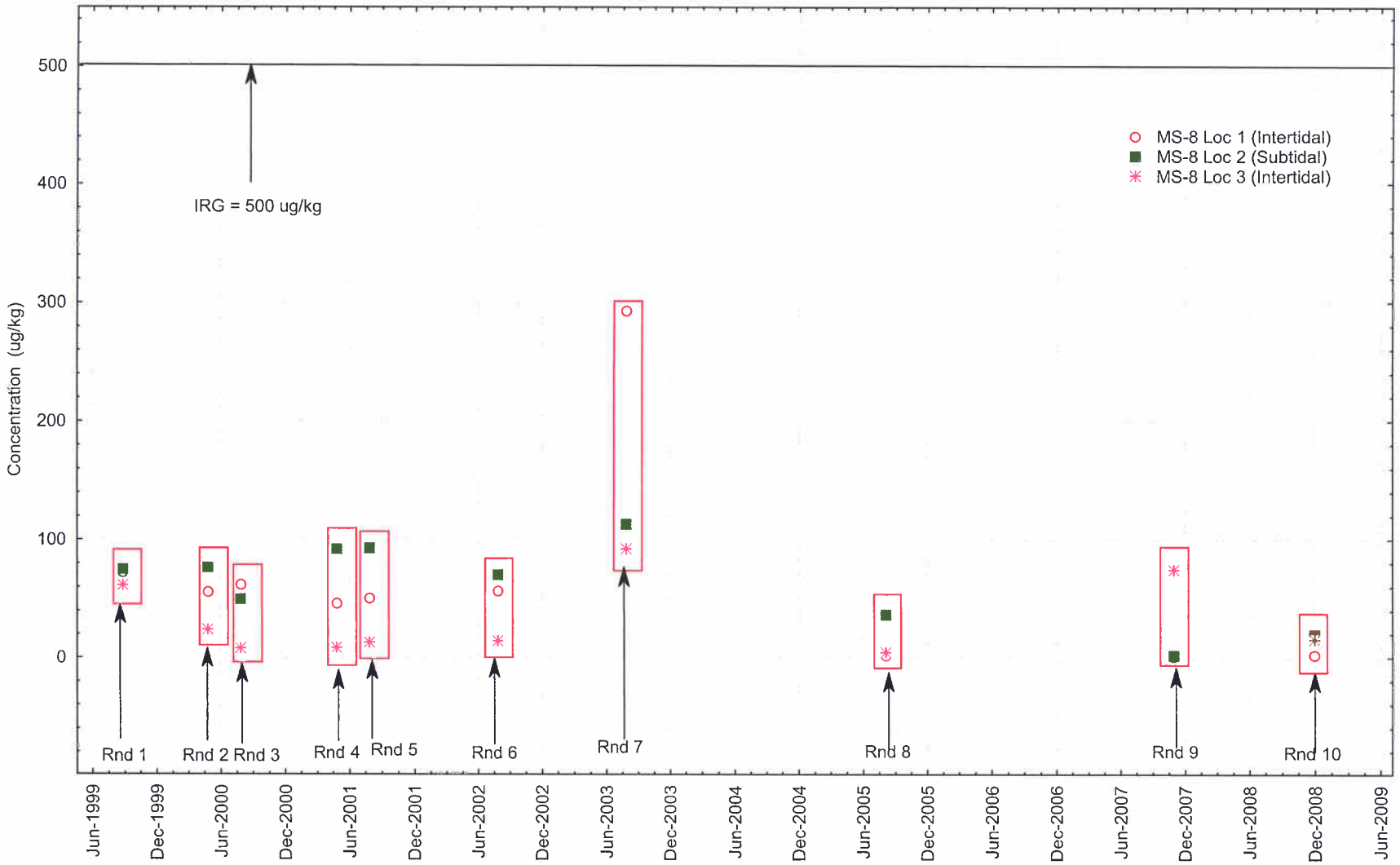
April 20, 2008

Monitoring Station 8 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



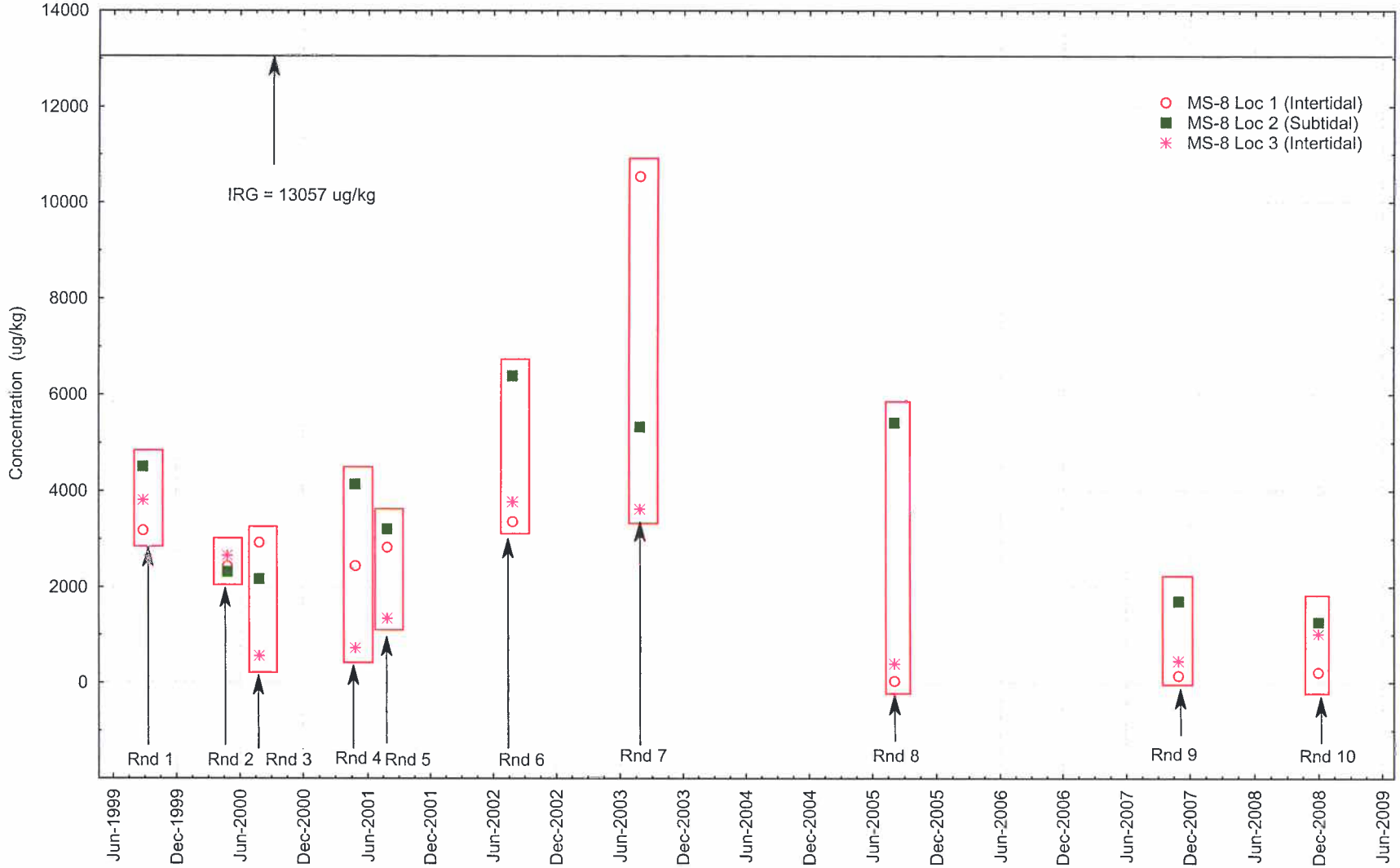
April 20, 2009

Monitoring Station 8 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



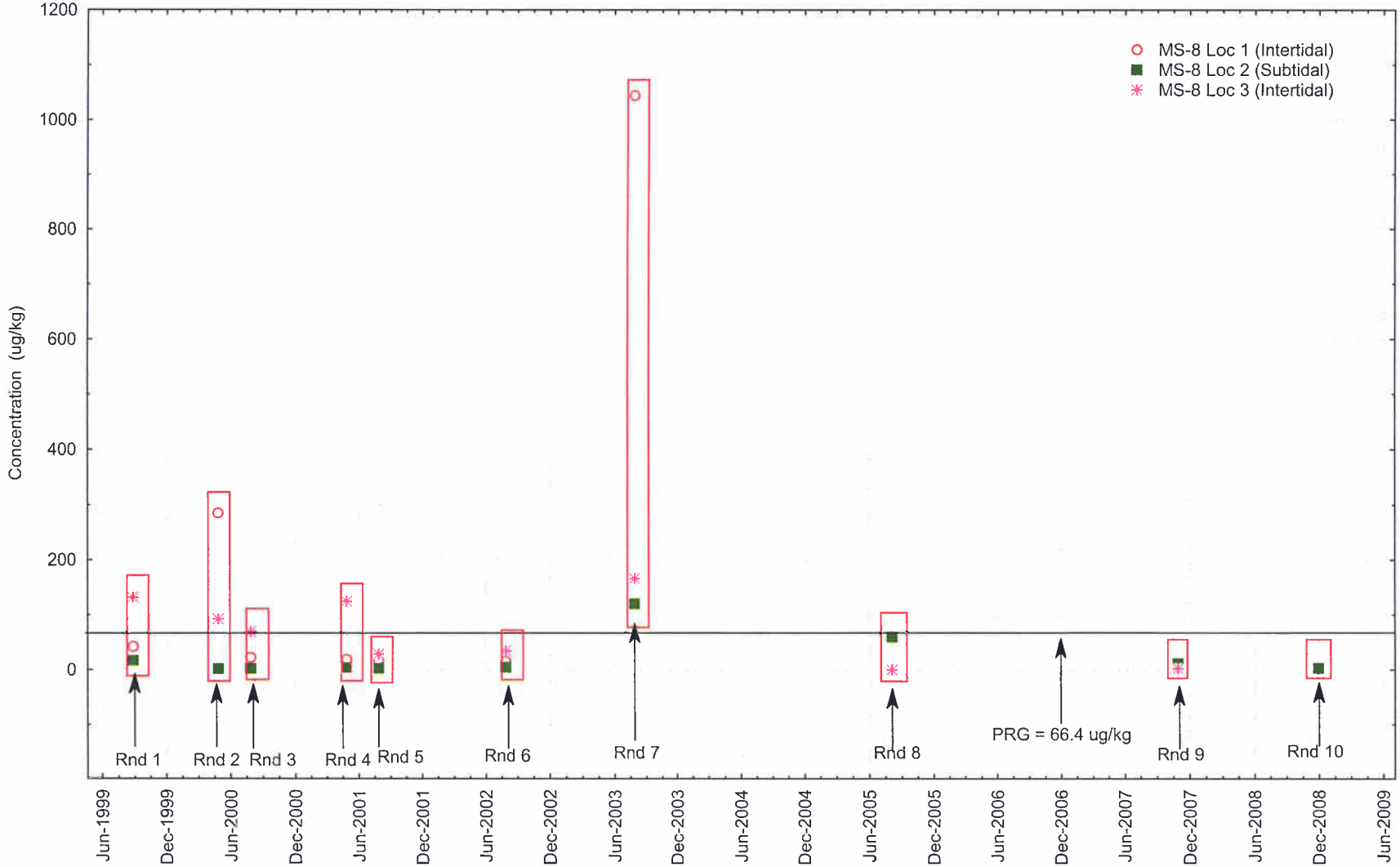
April 20, 2009

Monitoring Station 8 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



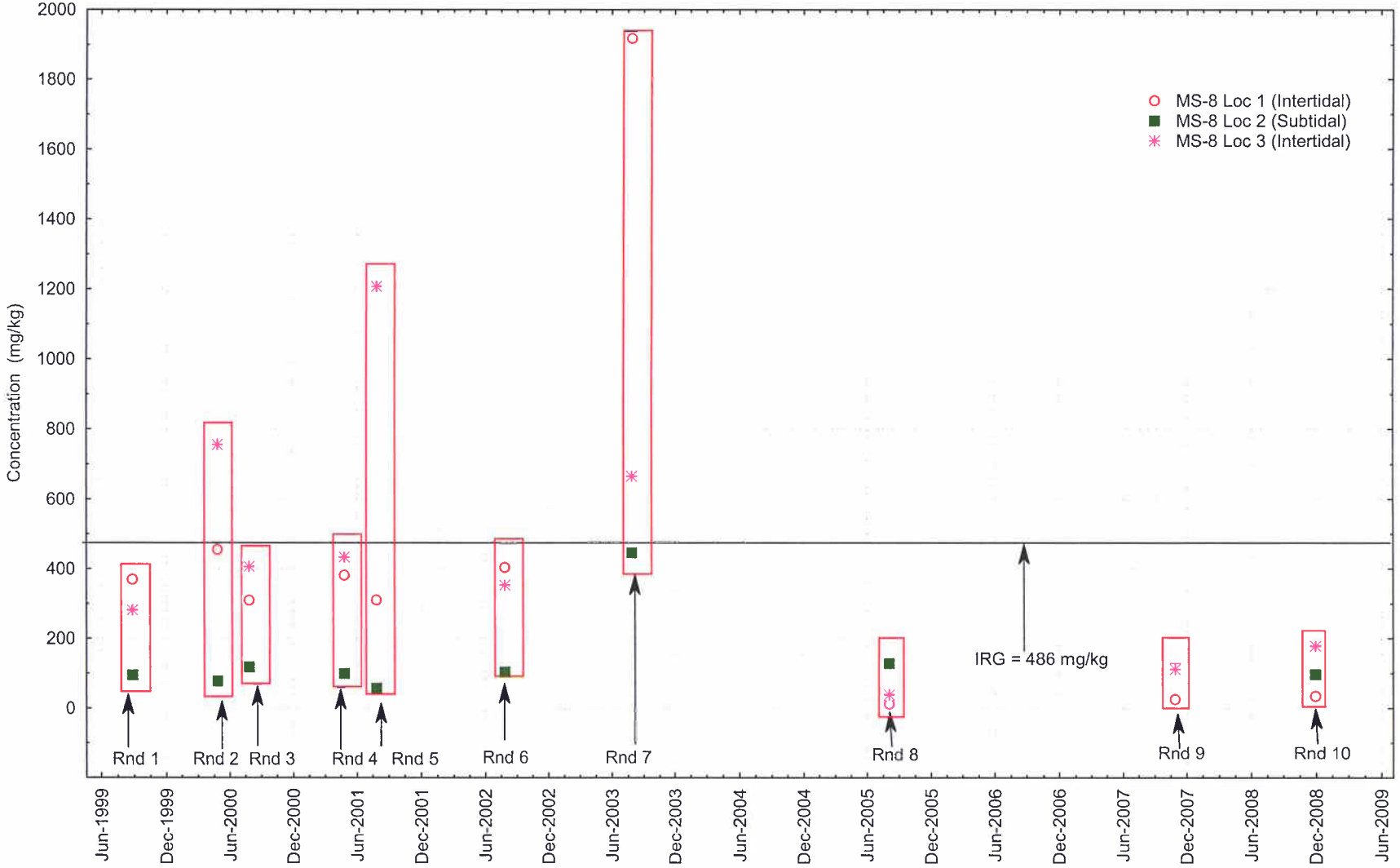
April 27, 2009

Monitoring Station 8 - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



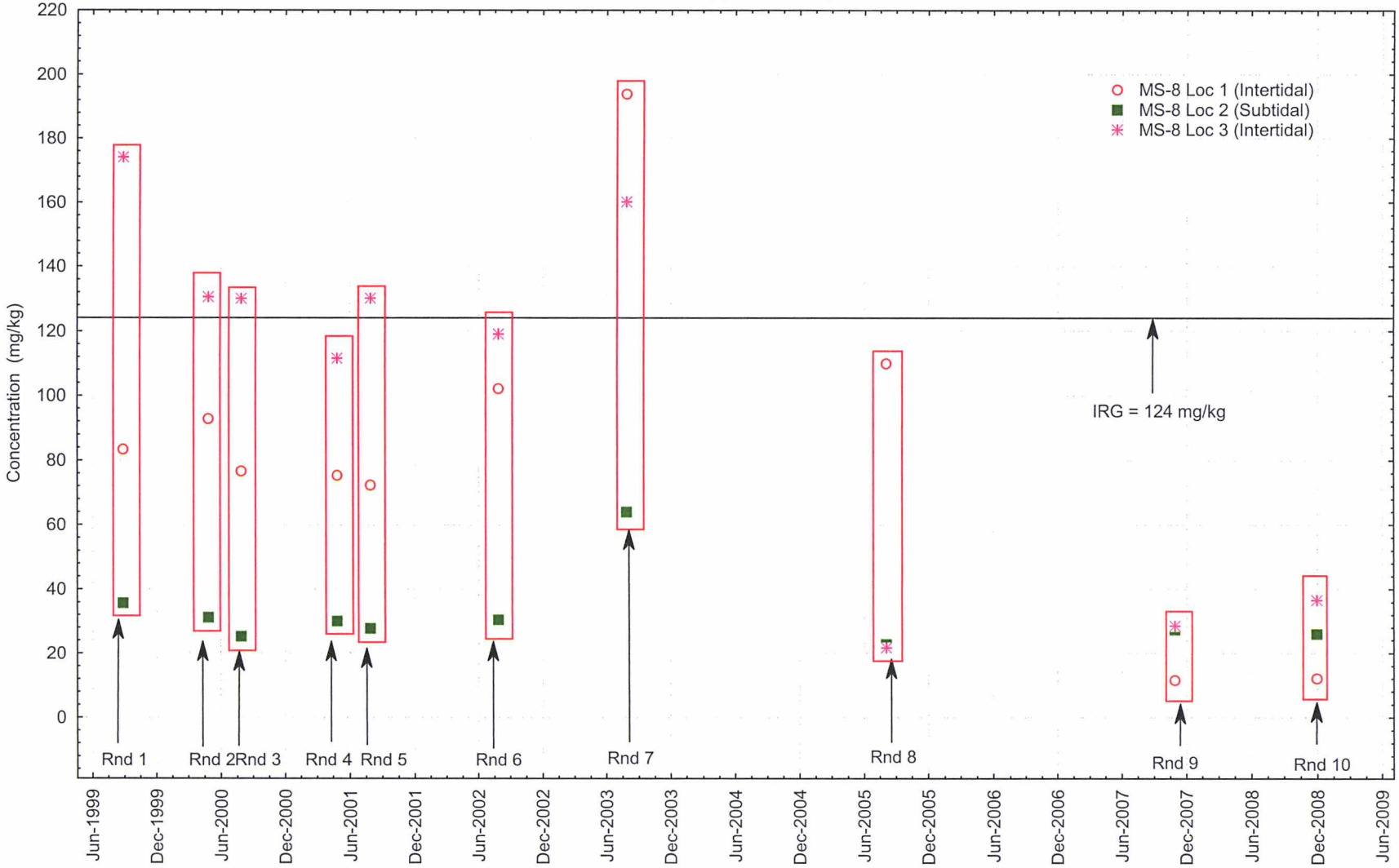
April 20, 2009

Monitoring Station 8 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



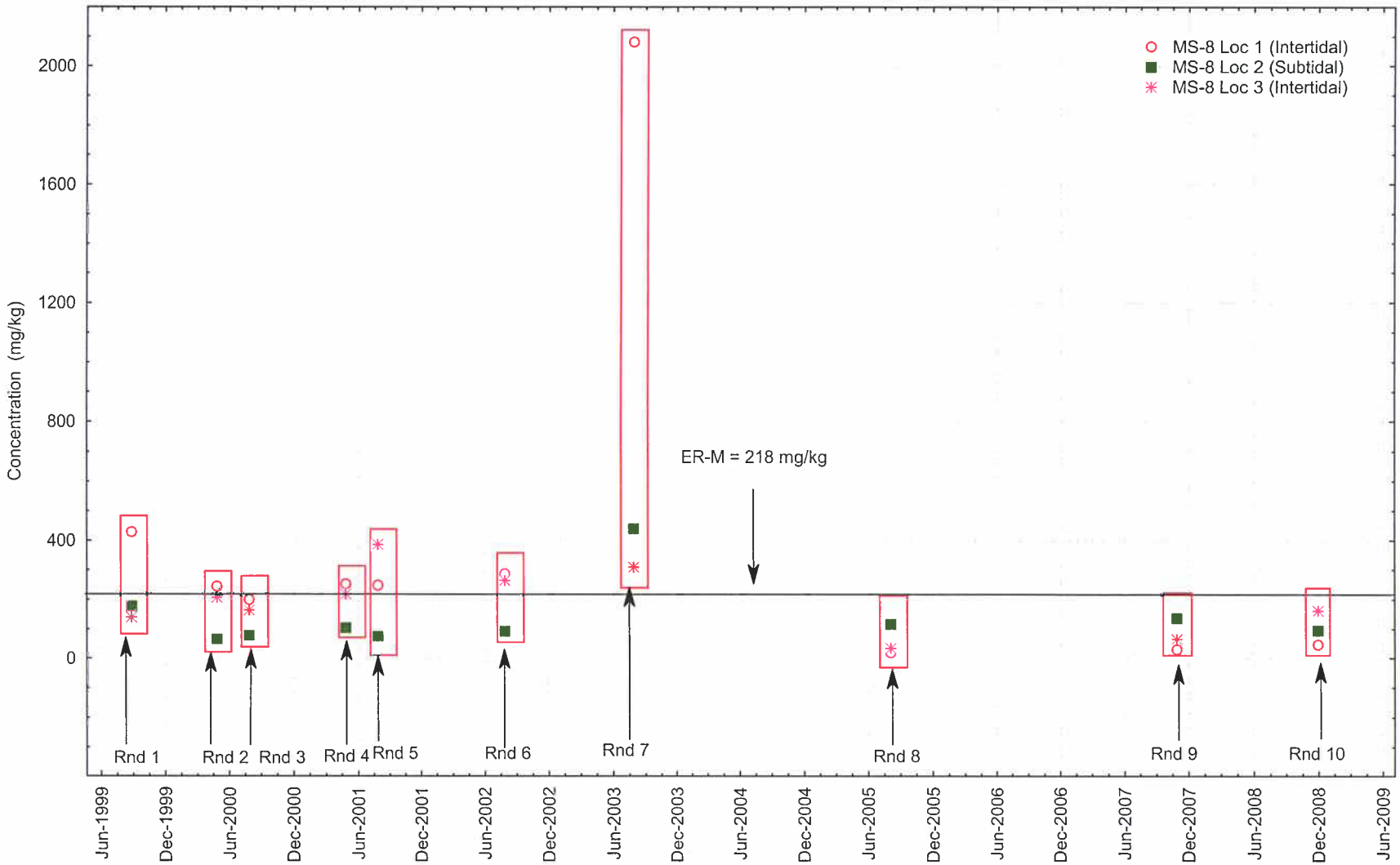
November 30, 2009

Monitoring Station 8 - Sediment
Nickel Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



April 20, 2009

Monitoring Station 8 - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

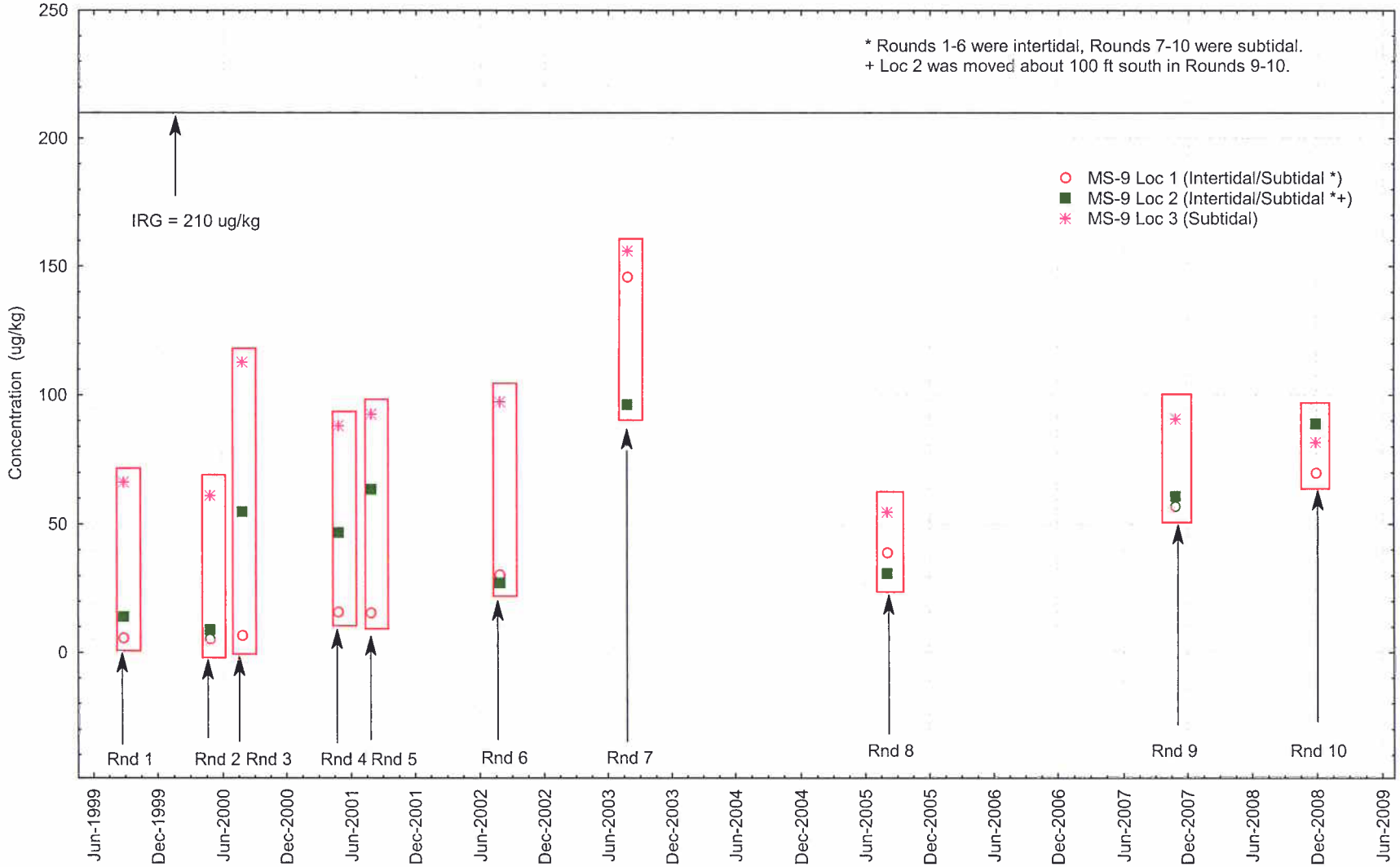


May 11, 2009

APPENDIX B.9

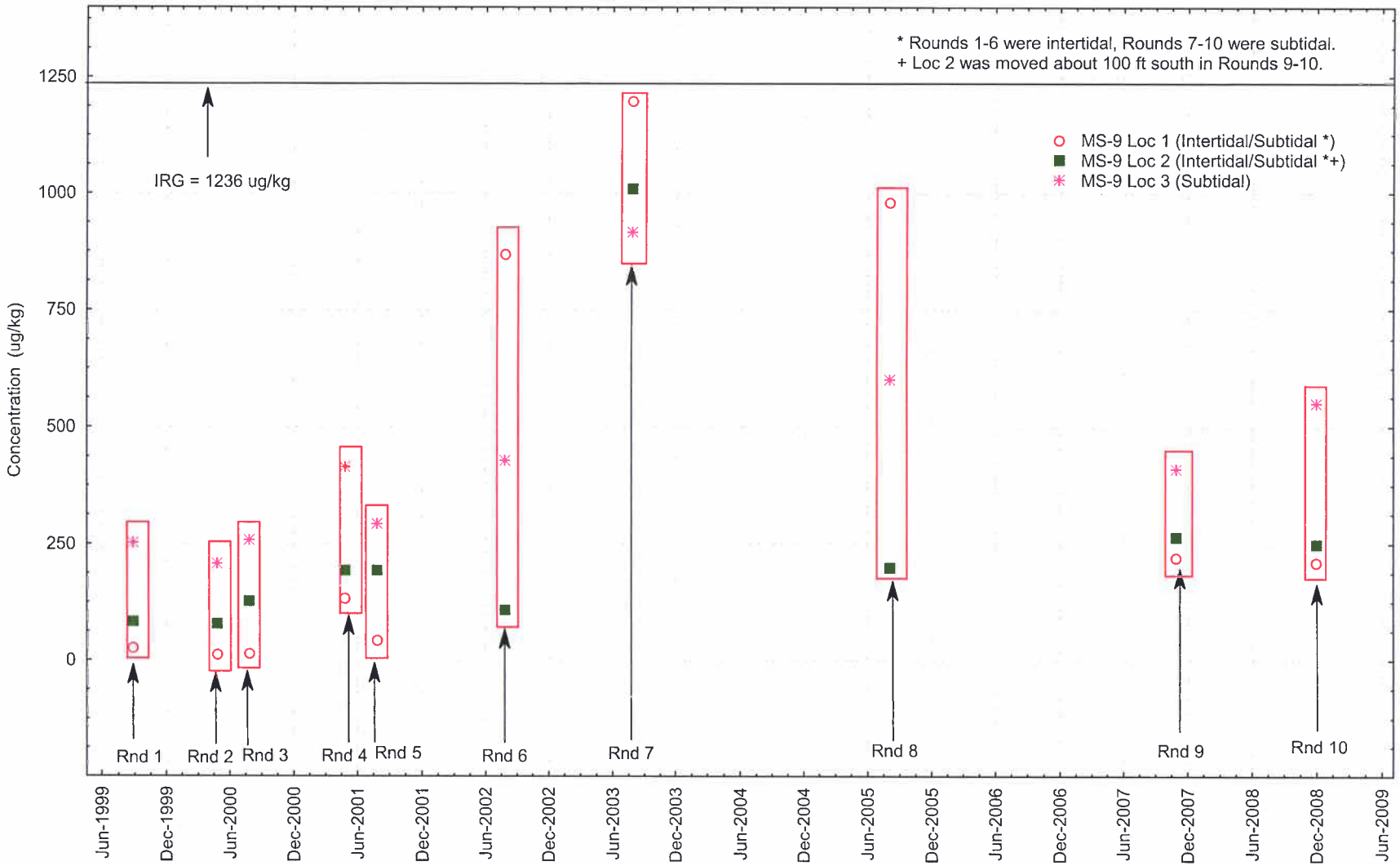
CONCENTRATION TREND PLOTS AT MS-09

Monitoring Station 9 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



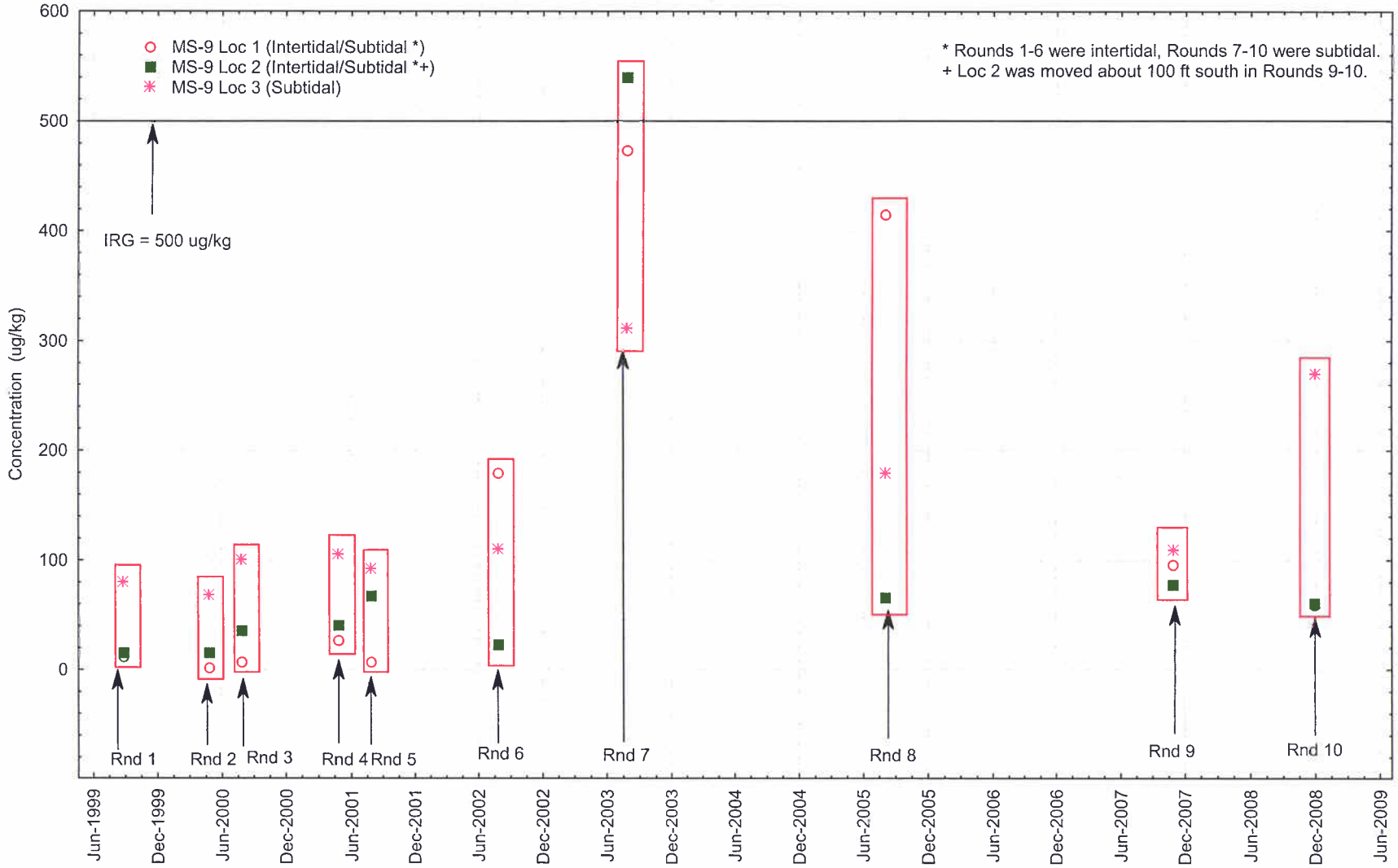
June 5, 2009

Monitoring Station 9 - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



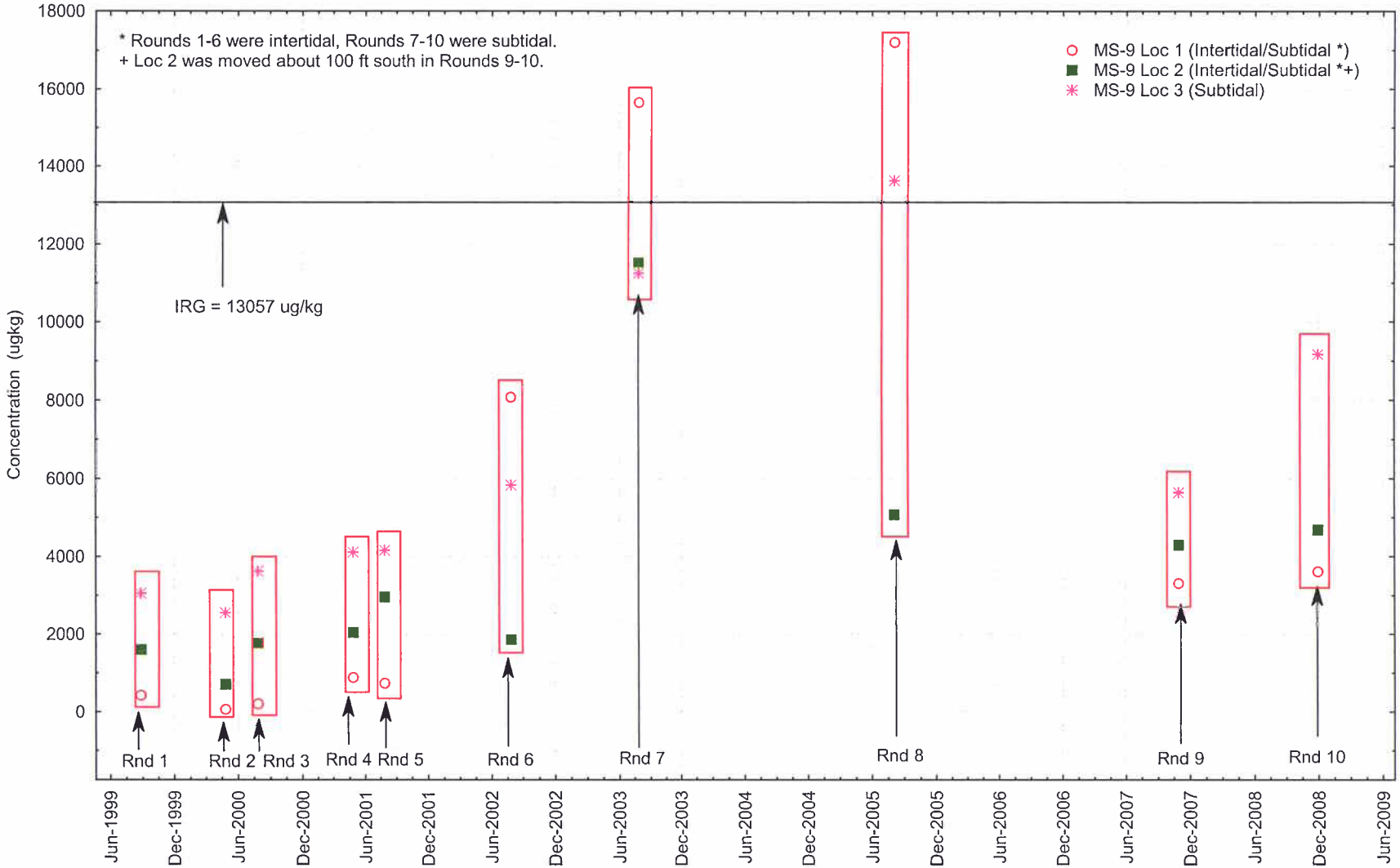
June 5, 2009

Monitoring Station 9 - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



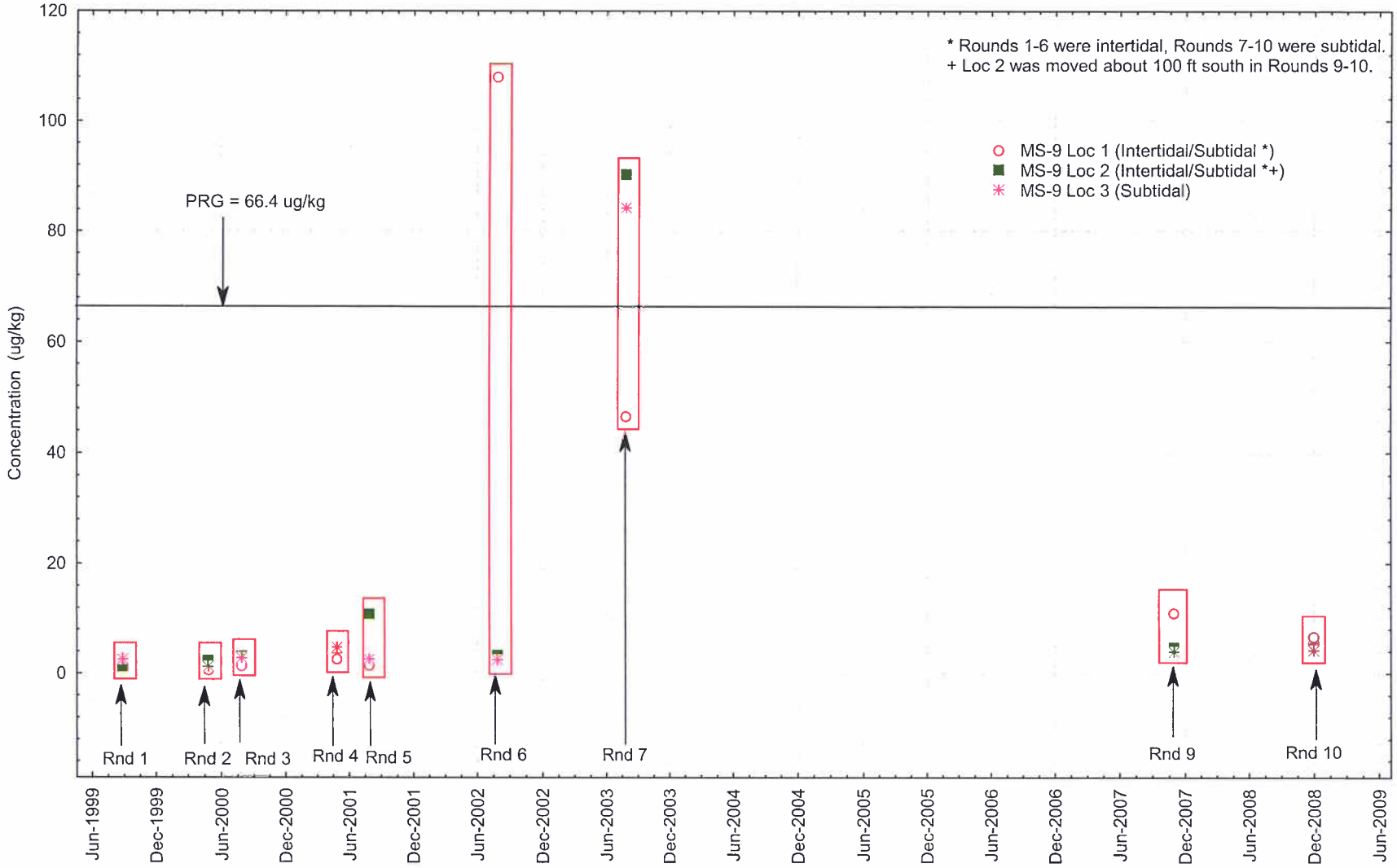
June 5, 2009

Monitoring Station 9 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



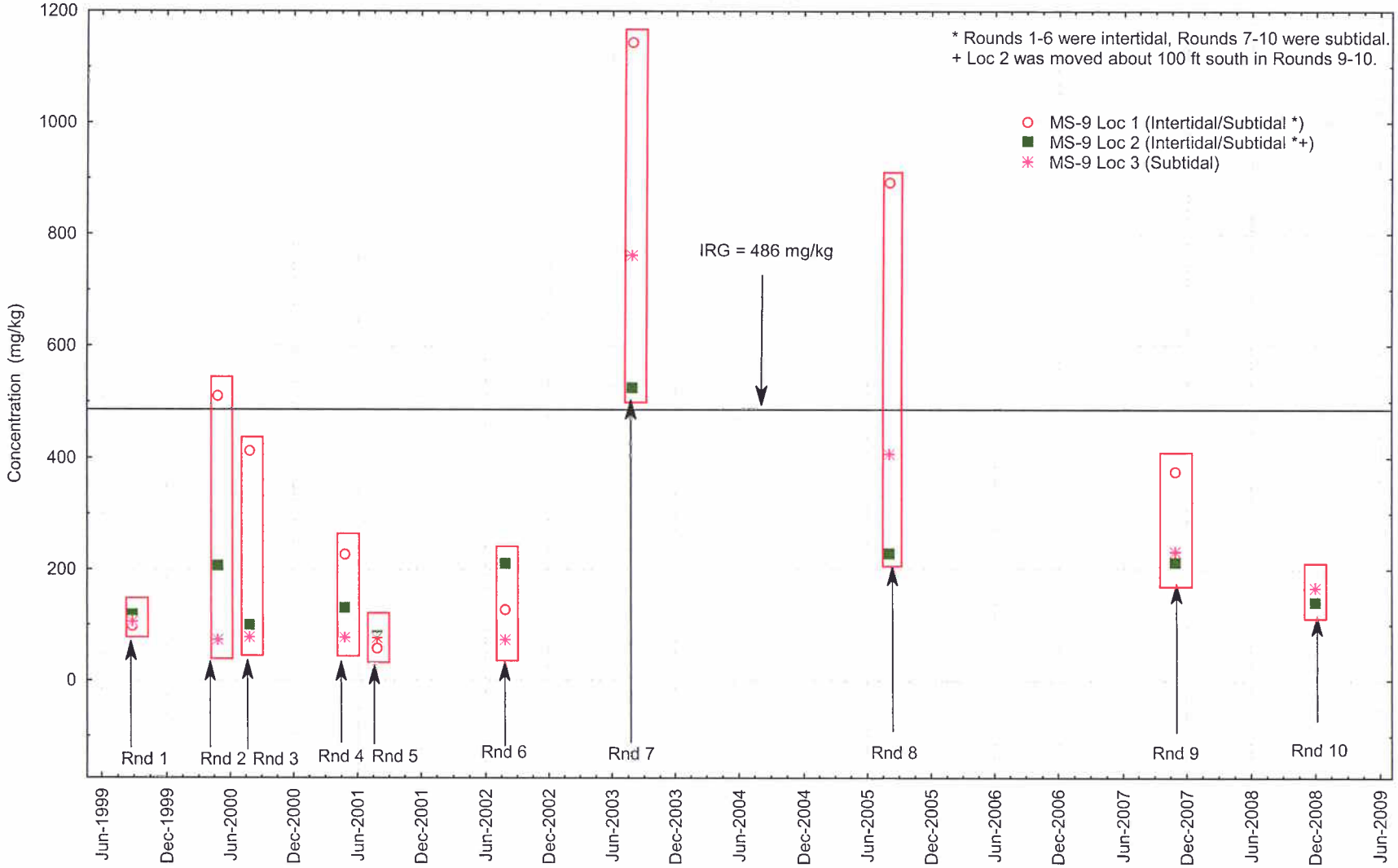
June 5, 2009

Monitoring Station 9 - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



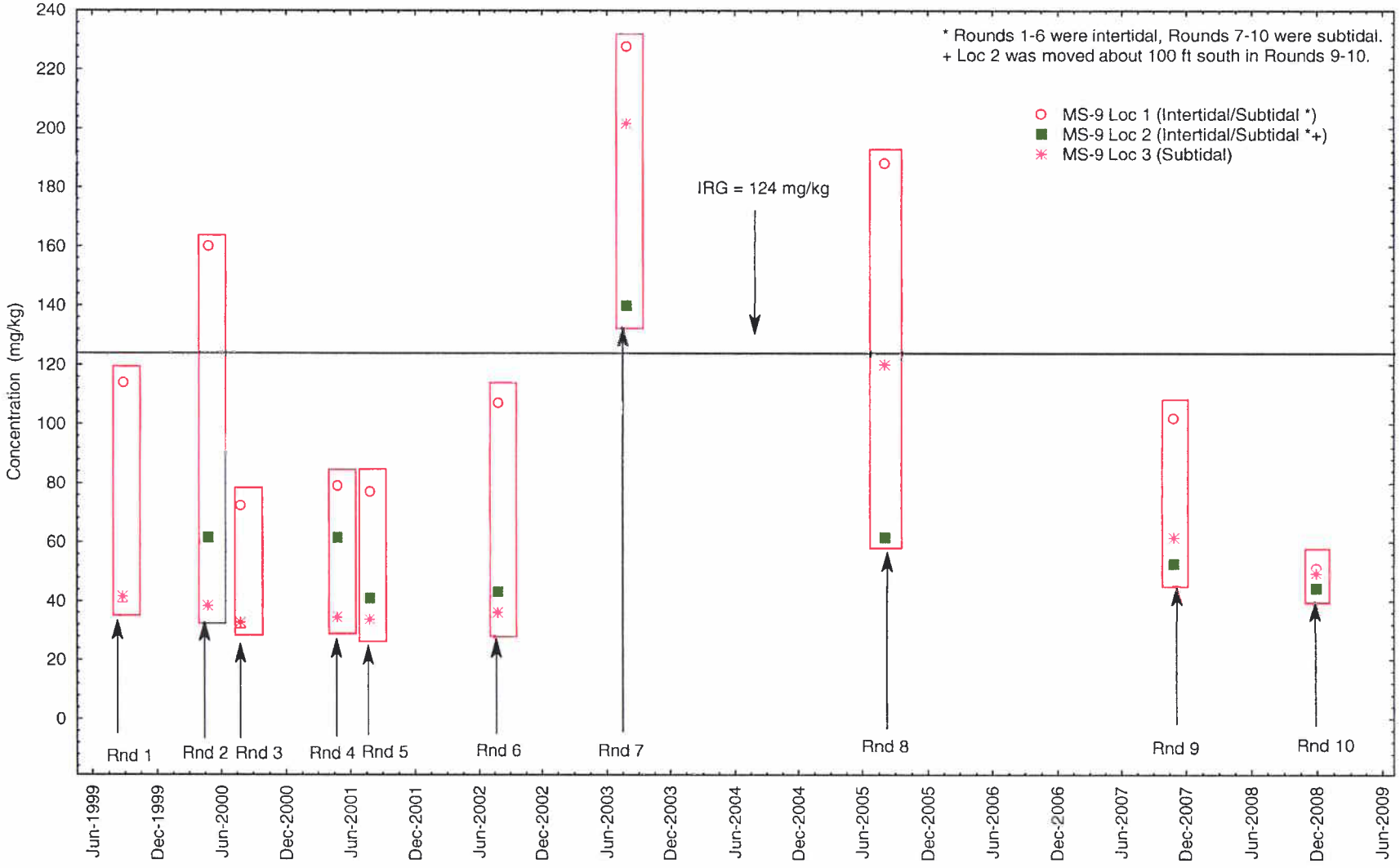
June 5, 2009

Monitoring Station 9 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



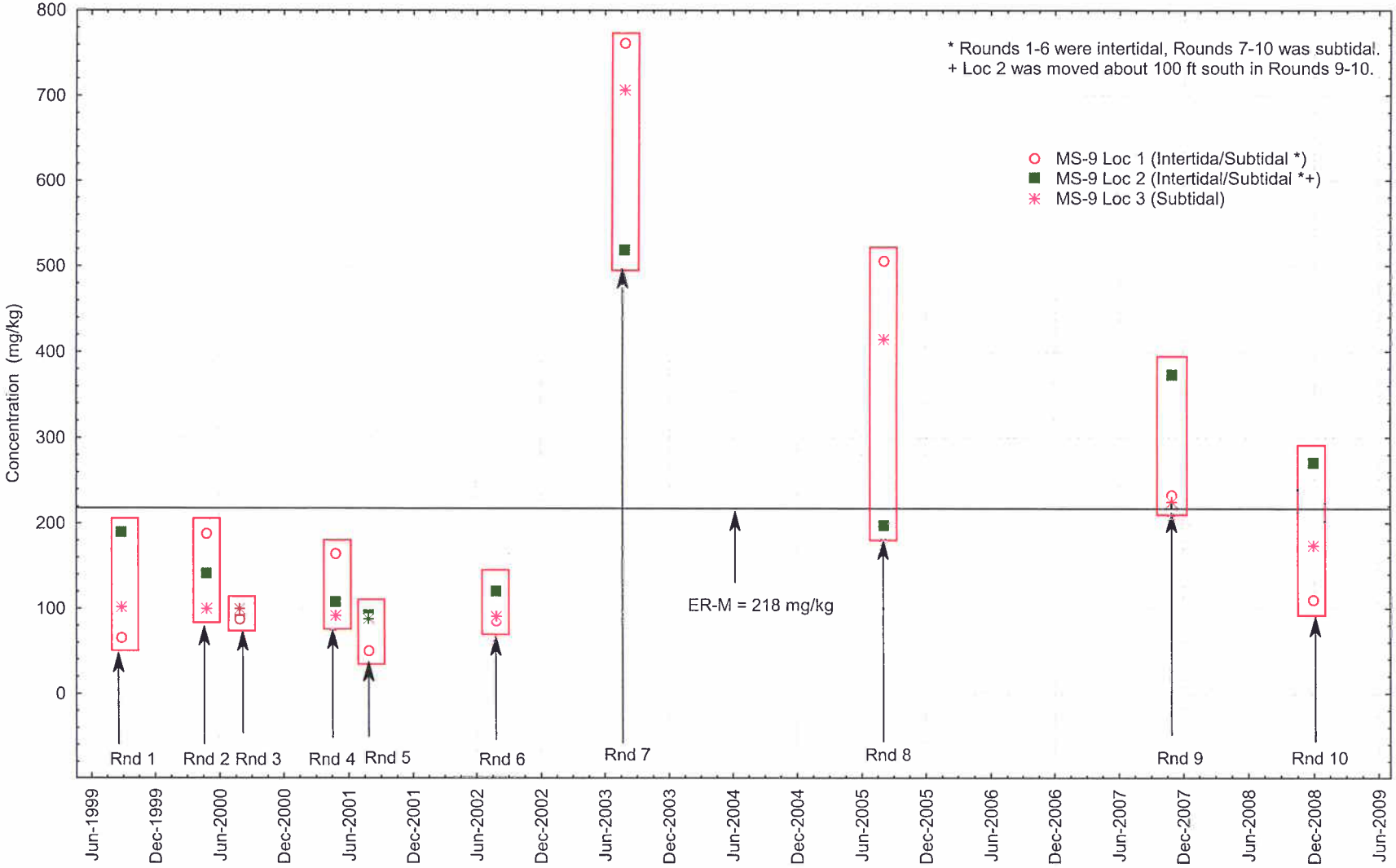
June 5, 2009

Monitoring Station 9 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



November 10, 2009

Monitoring Station 9 - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

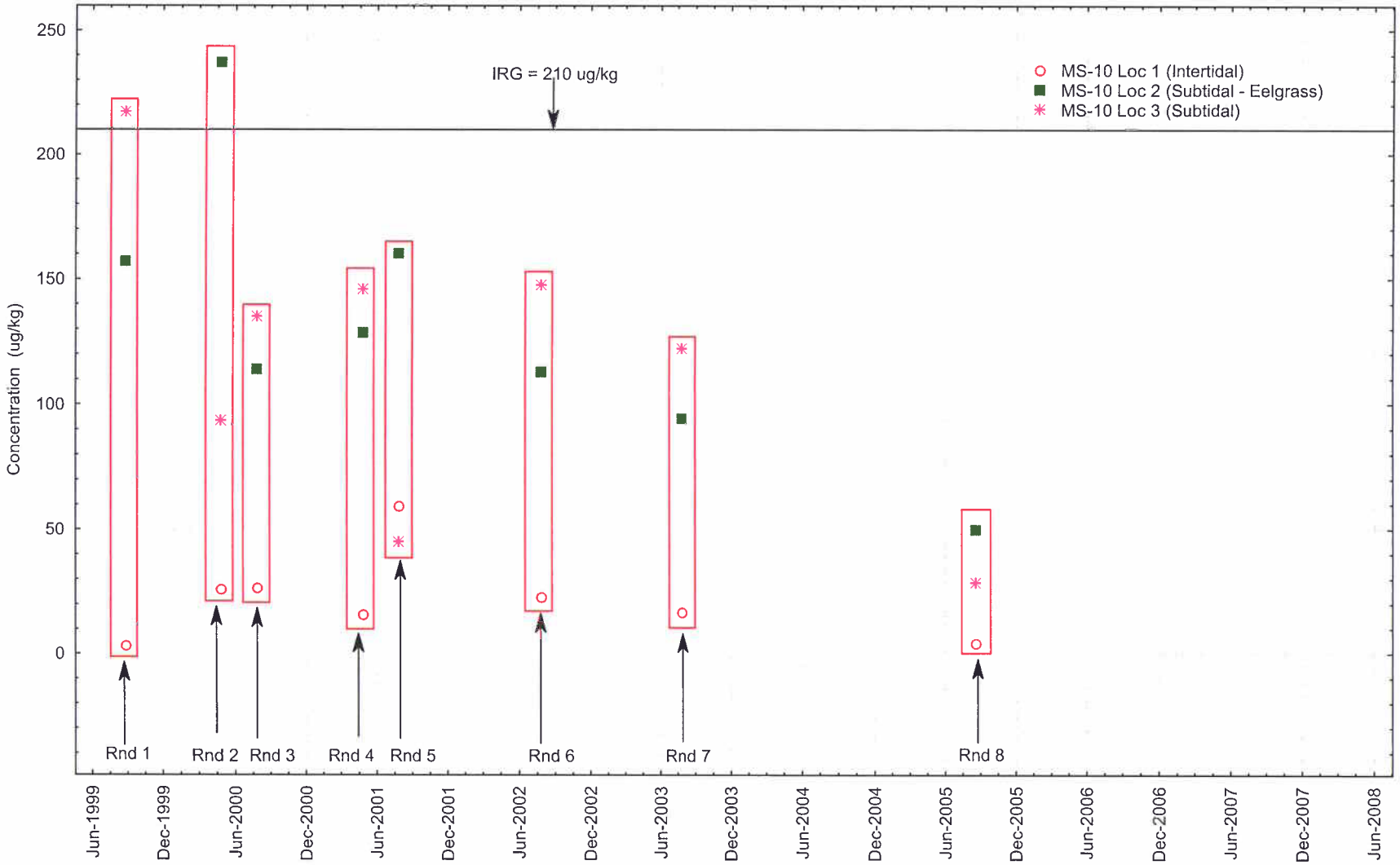


June 5, 2009

APPENDIX B.10

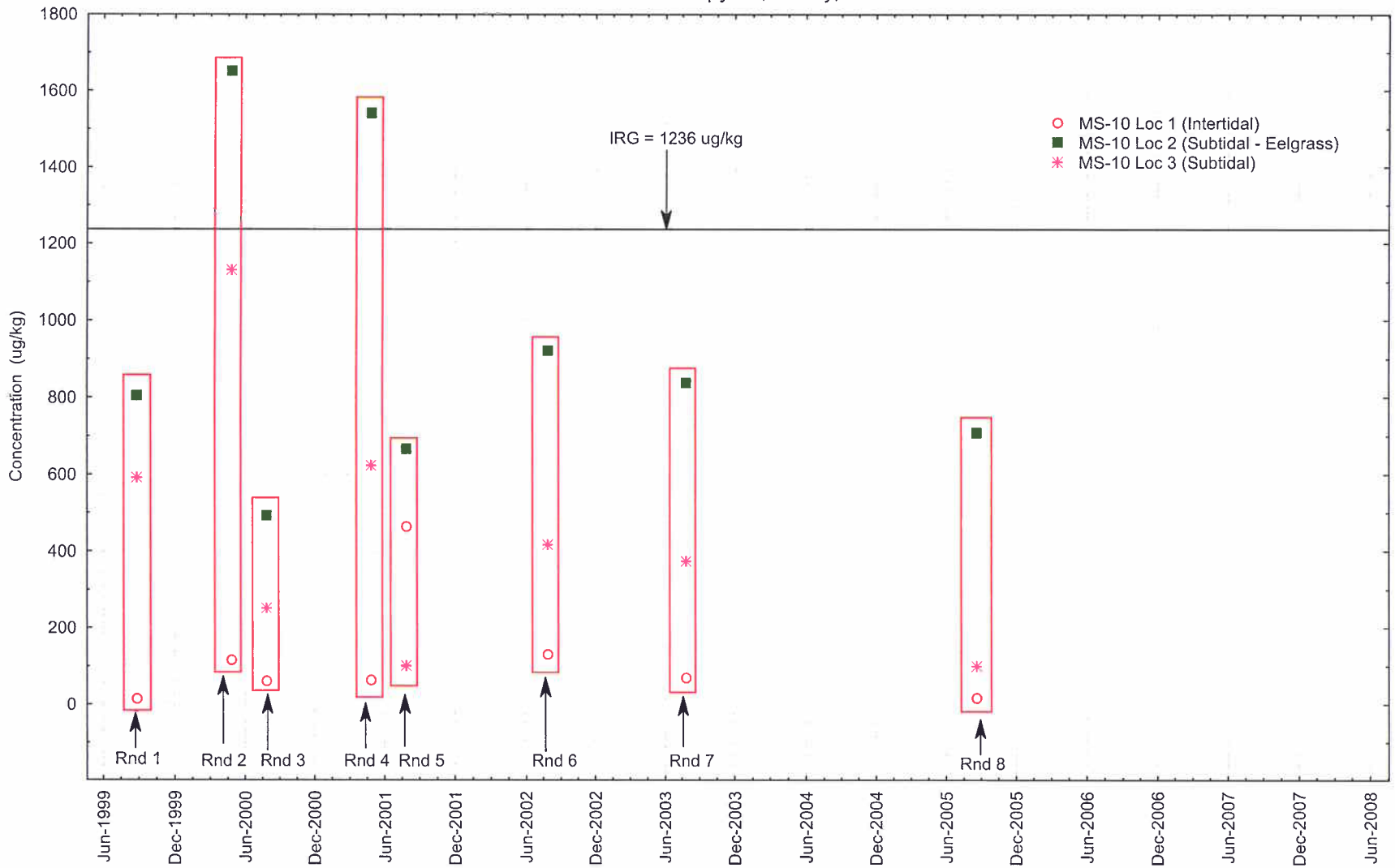
CONCENTRATION TREND PLOTS AT MS-10

Monitoring Station 10 - Sediment
Acenaphthylene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



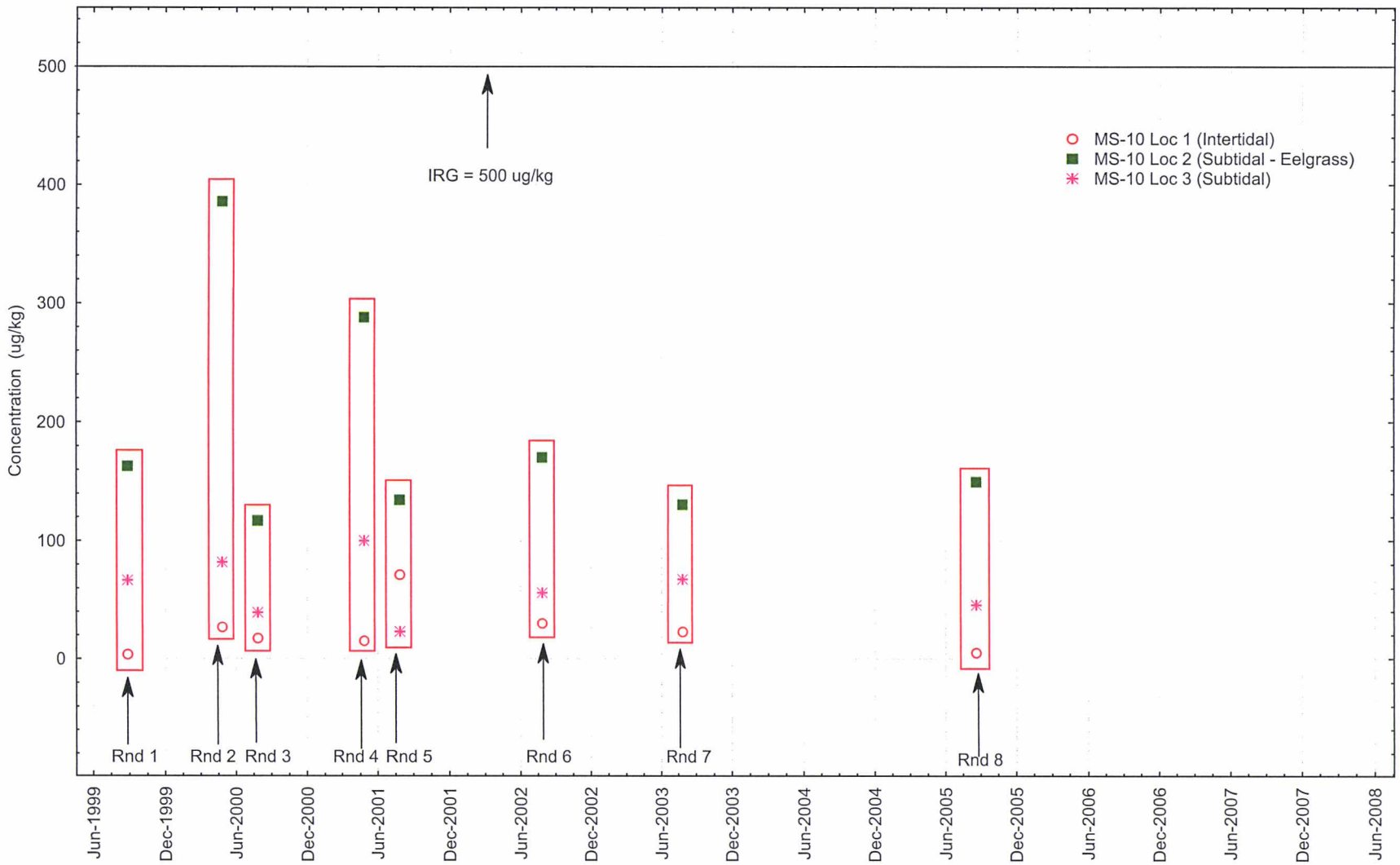
July 23, 2007

Monitoring Station 10 - Sediment
Anthracene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



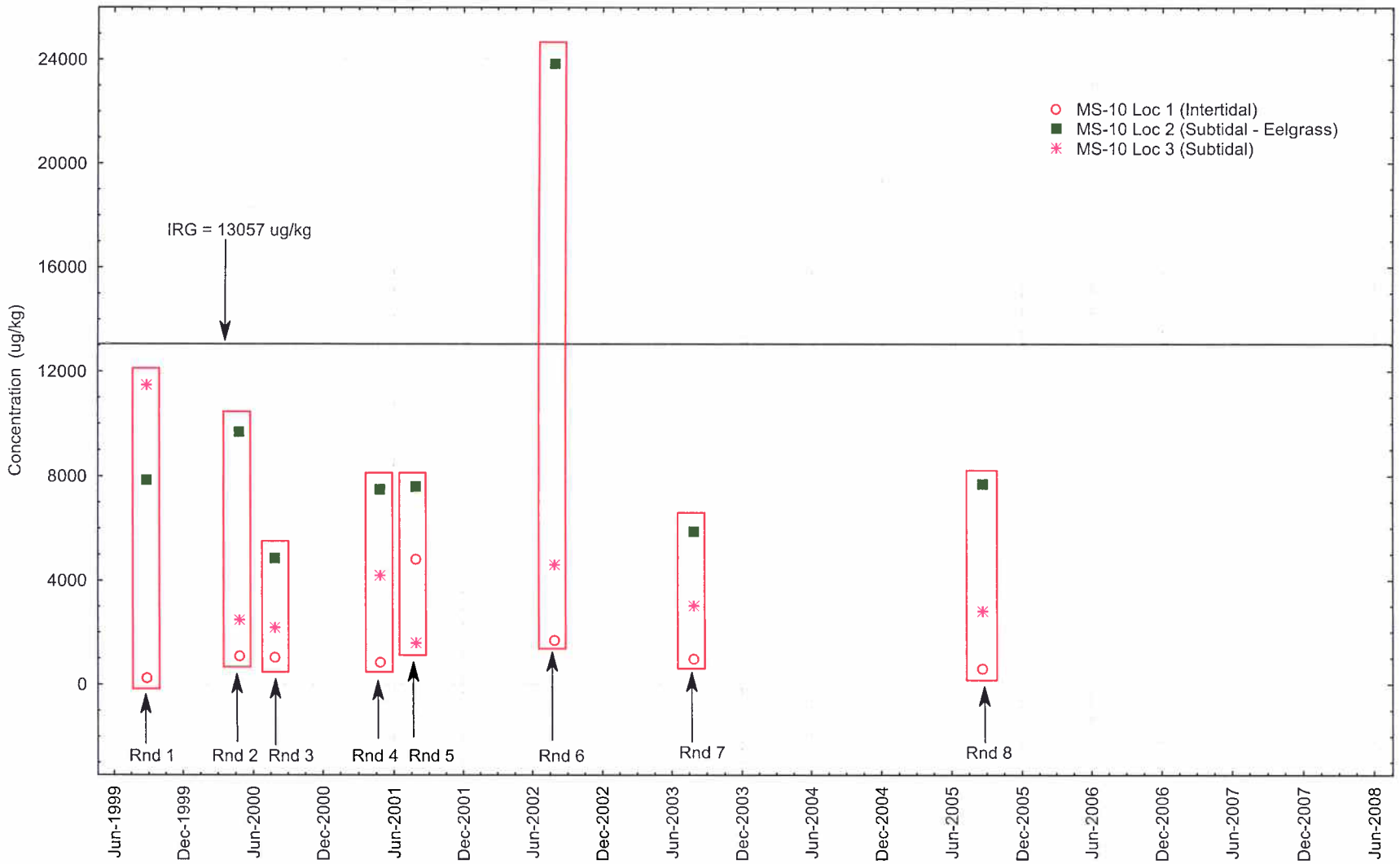
July 23, 2007

Monitoring Station 10 - Sediment
Fluorene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



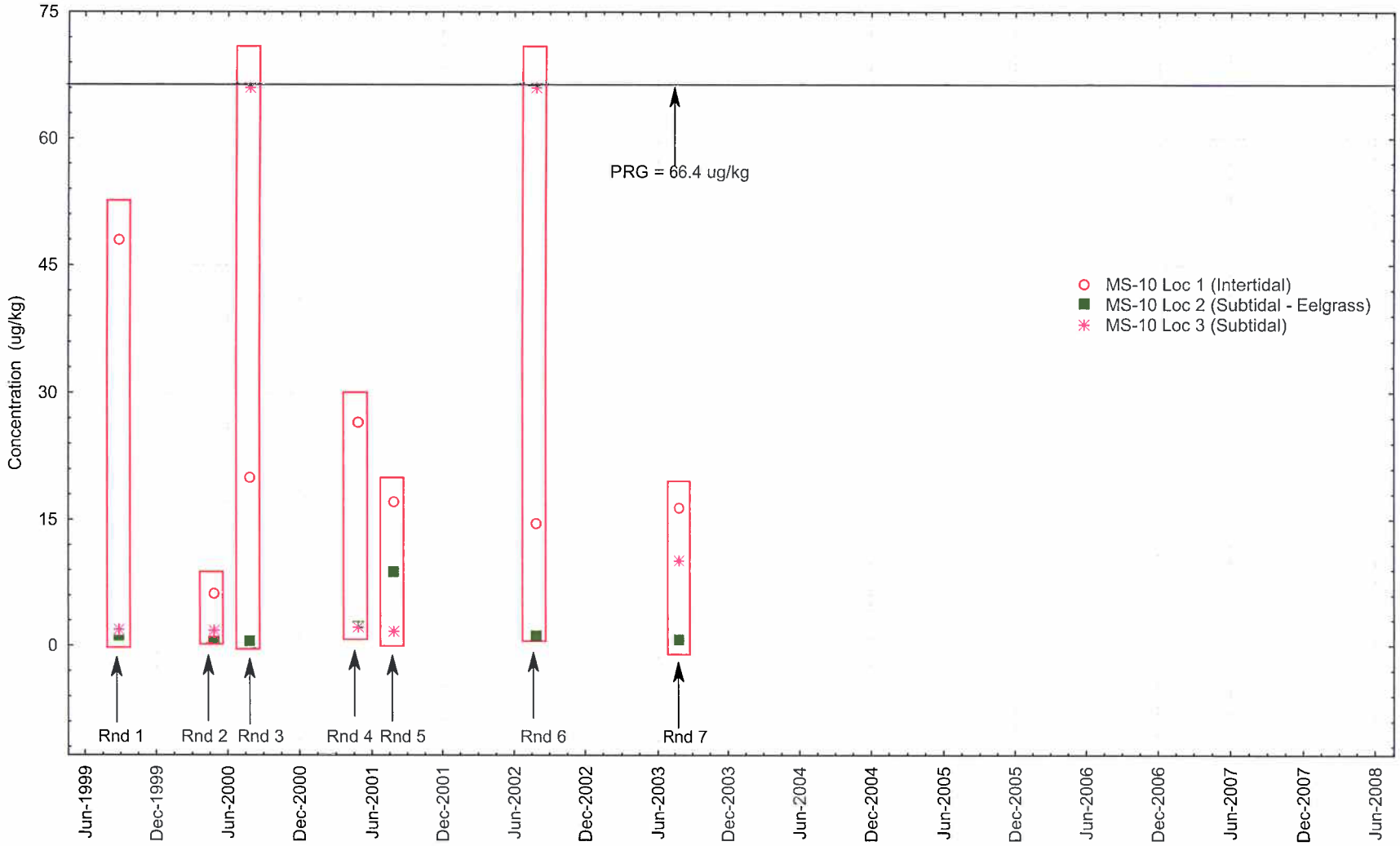
July 23, 2007

Monitoring Station 10 - Sediment
High Molecular Weight PAH Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



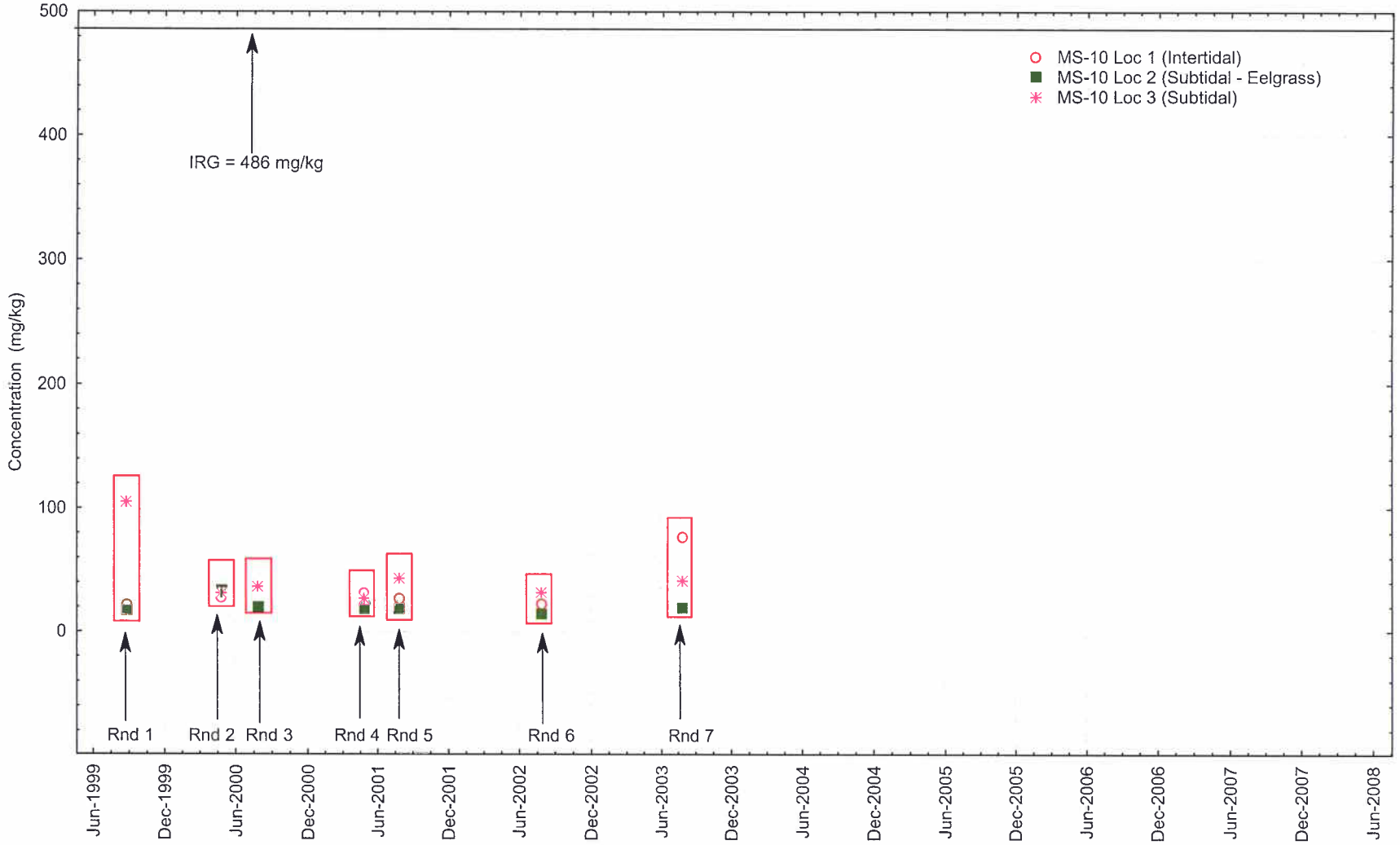
July 23, 2007

Monitoring Station 10 - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



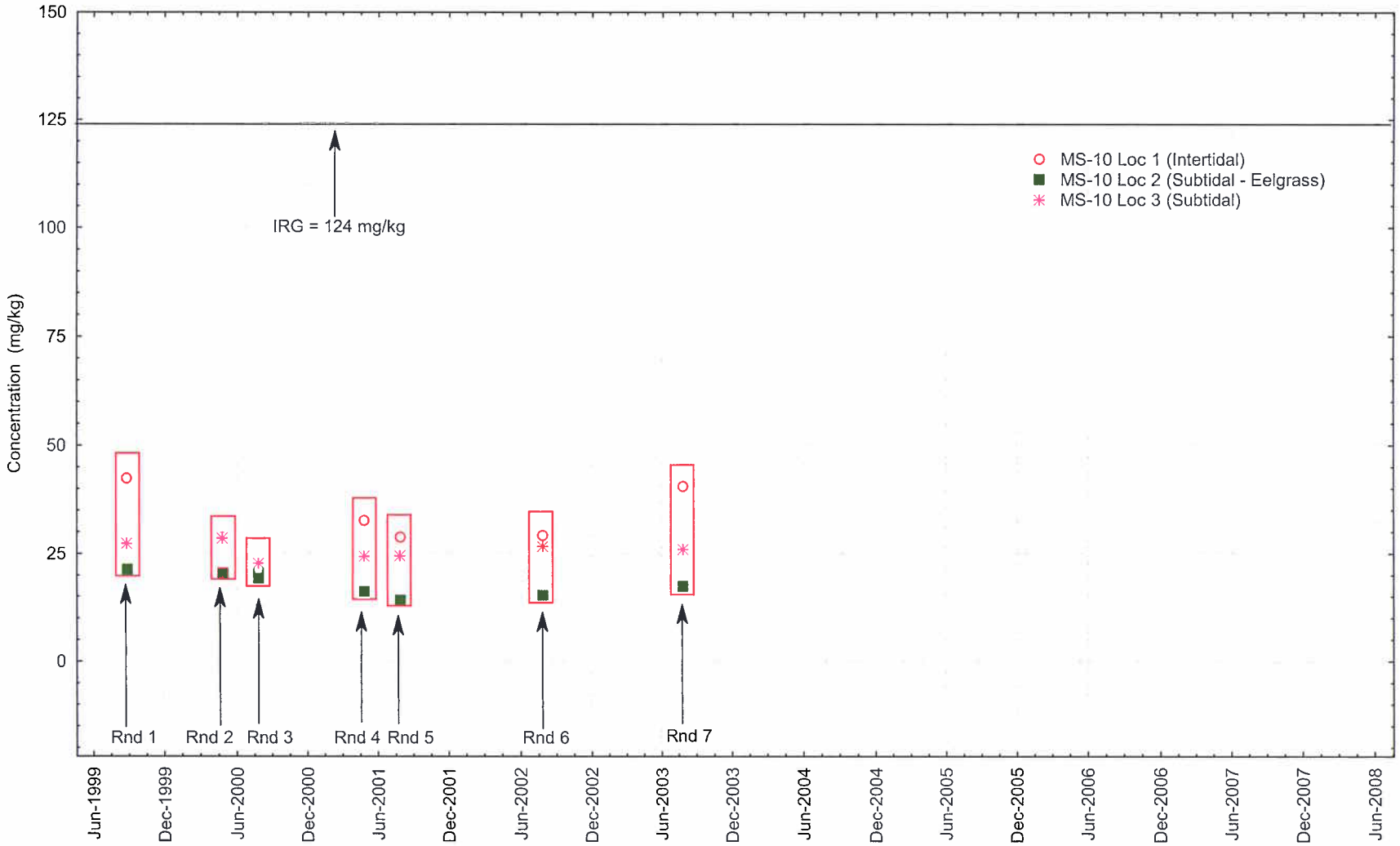
June 5, 2009

Monitoring Station 10 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

Monitoring Station 10 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

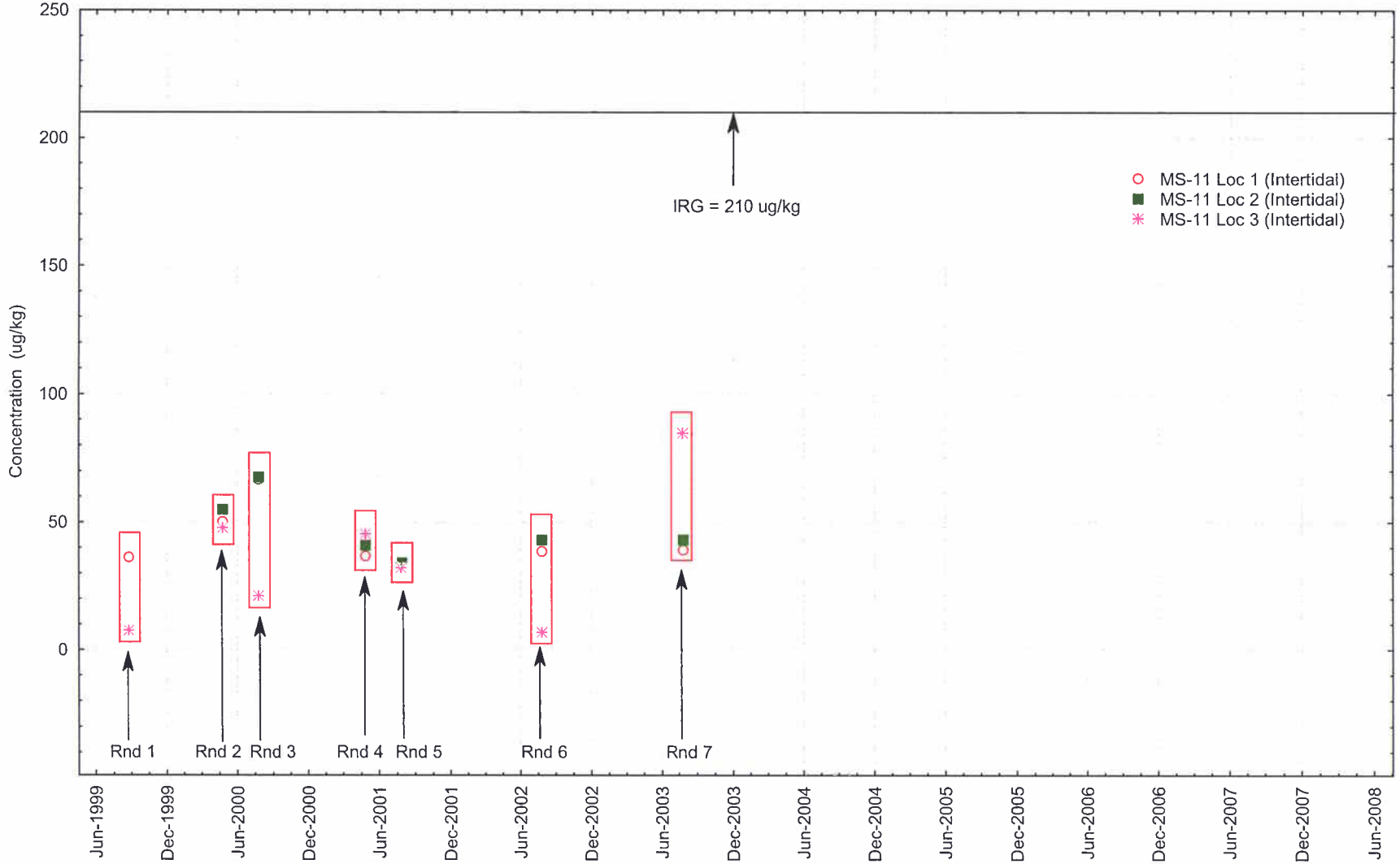


June 5, 2009

APPENDIX B.11

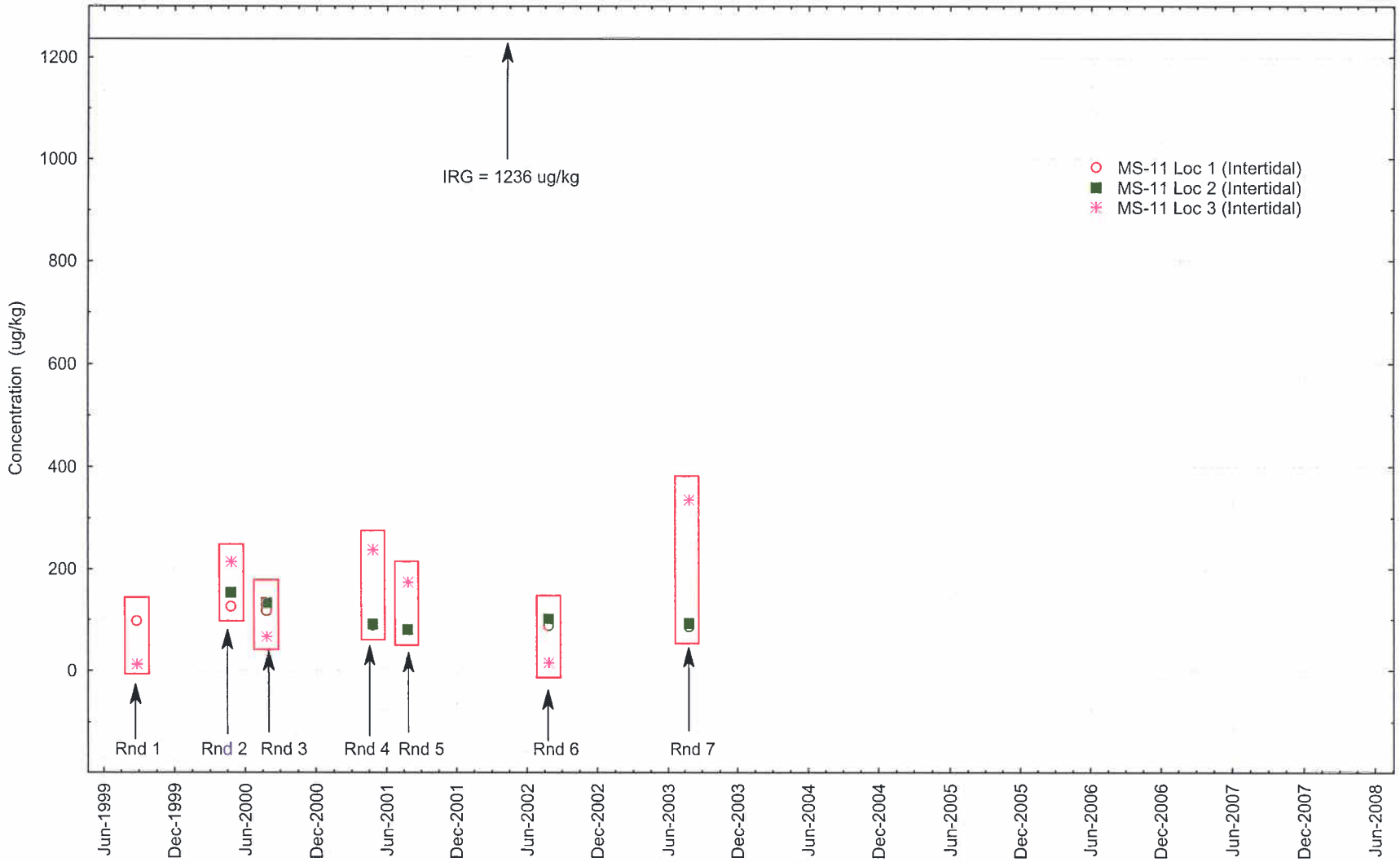
CONCENTRATION TREND PLOTS AT MS-11

Monitoring Station 11 - Sediment
Acenaphthylene Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



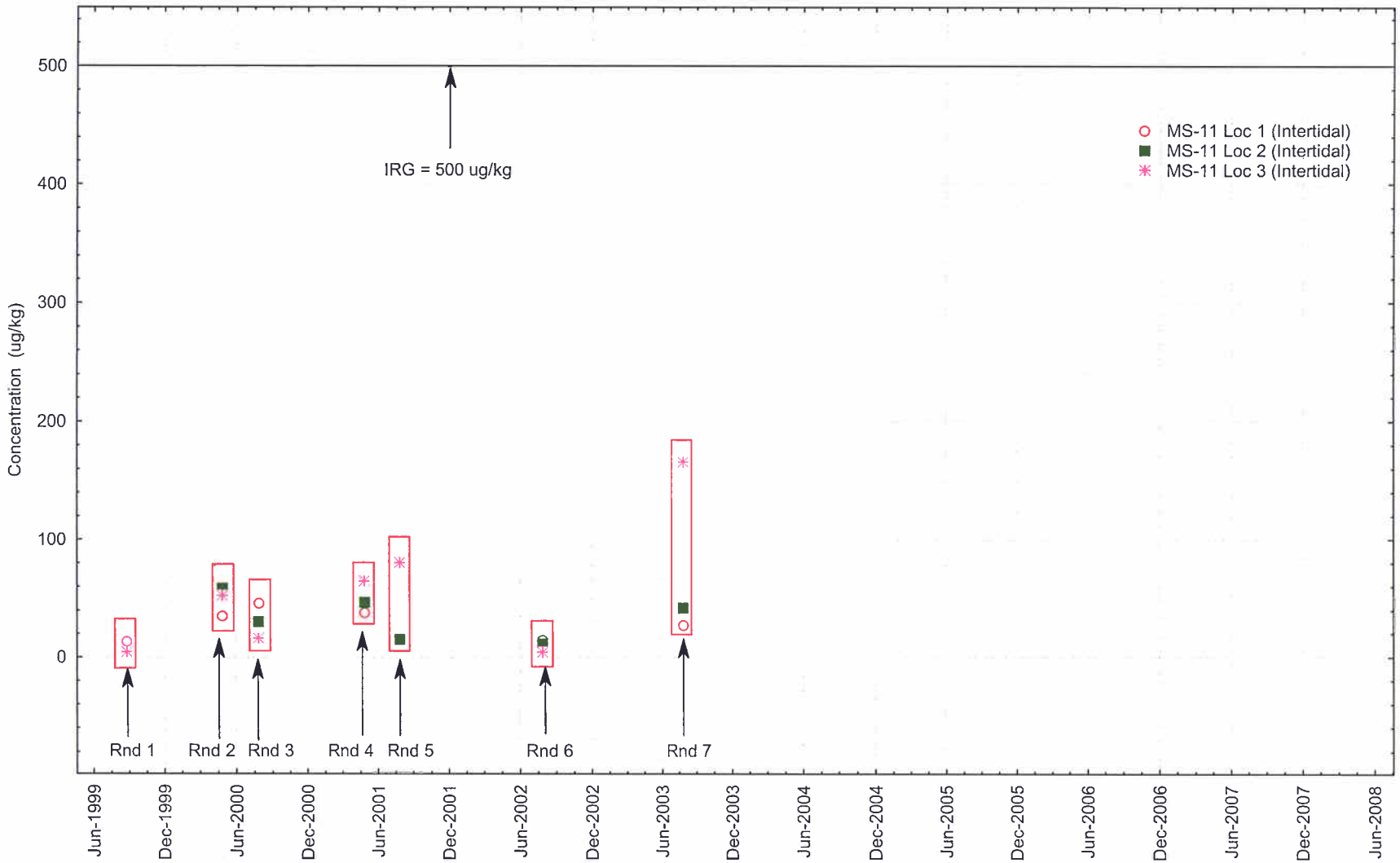
June 28, 3010

Monitoring Station 11 - Sediment
Anthracene Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



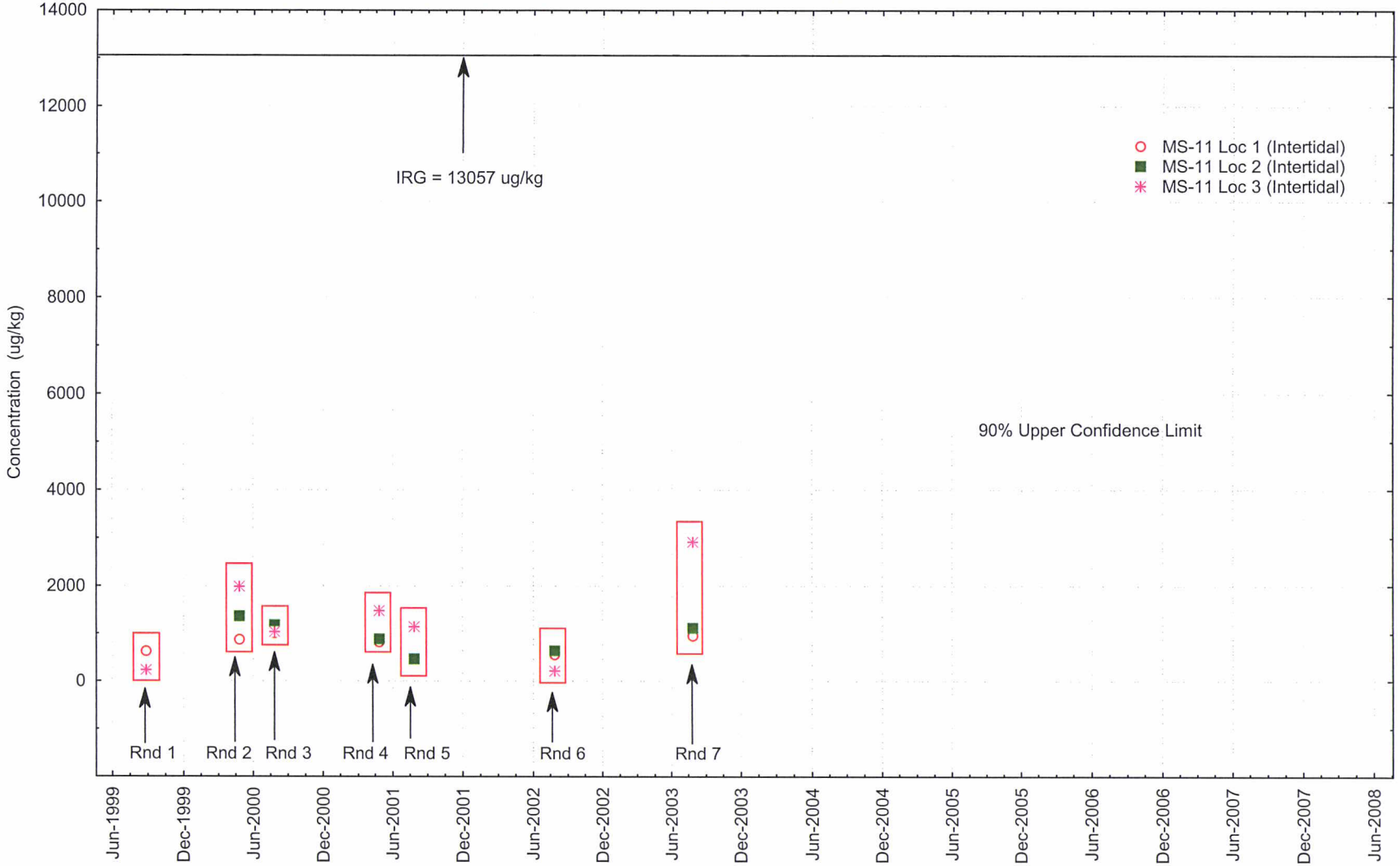
June 28, 2010

Monitoring Station 11 - Sediment
Fluorene Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



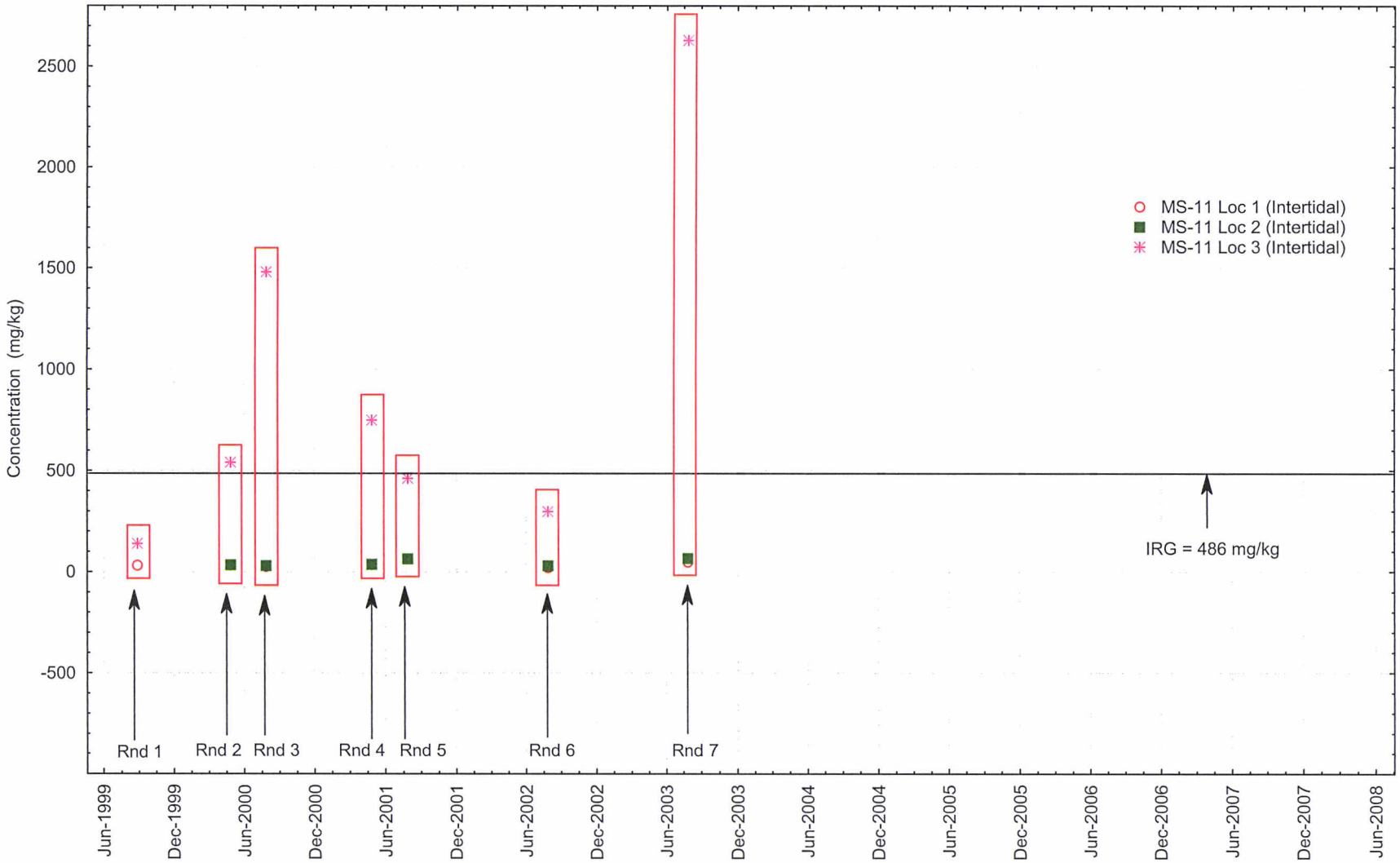
July 28, 2010

Monitoring Station 11 - Sediment
High Molecular Weight PAH Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



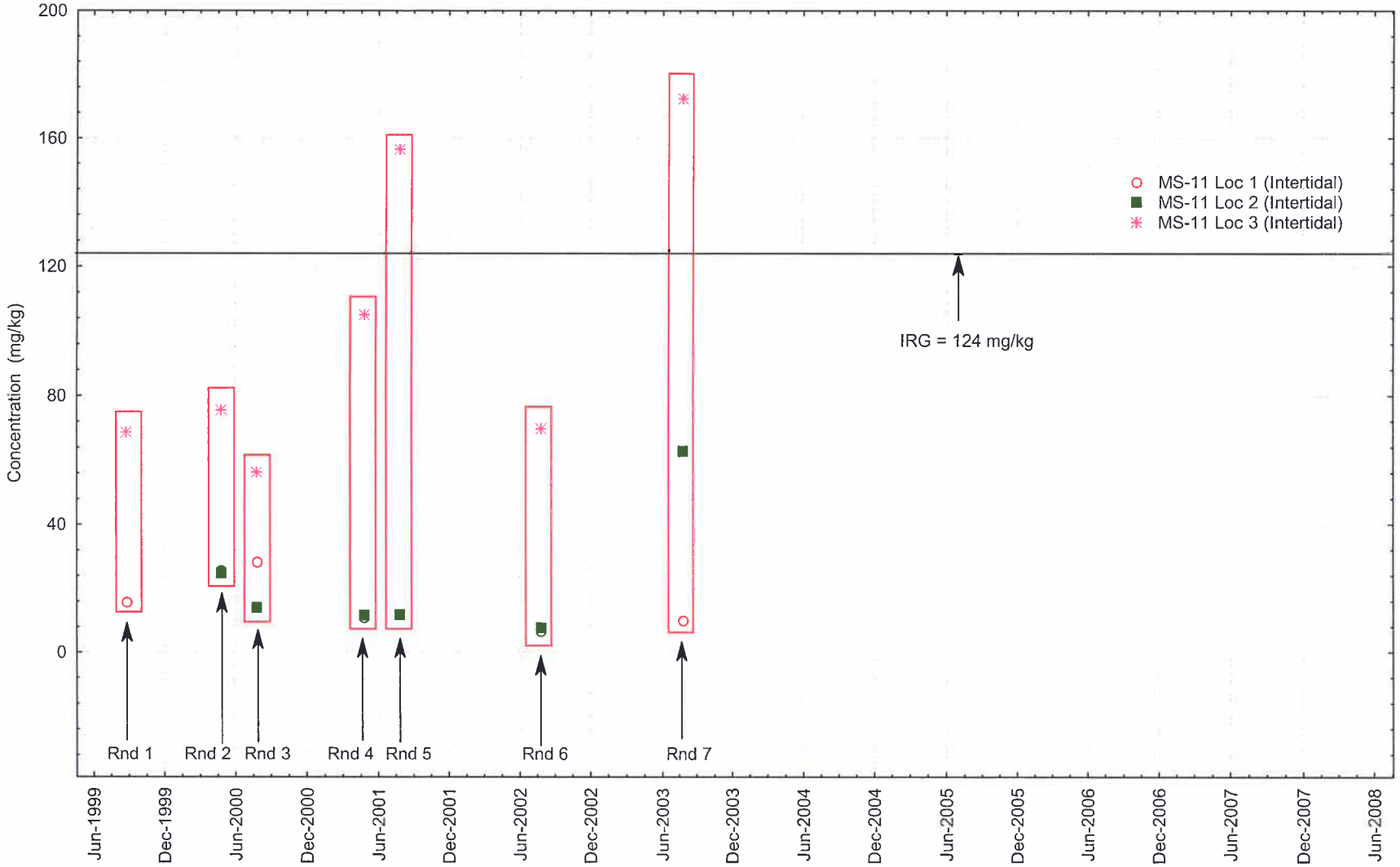
June 28, 2010

Monitoring Station 11 - Sediment
Copper Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



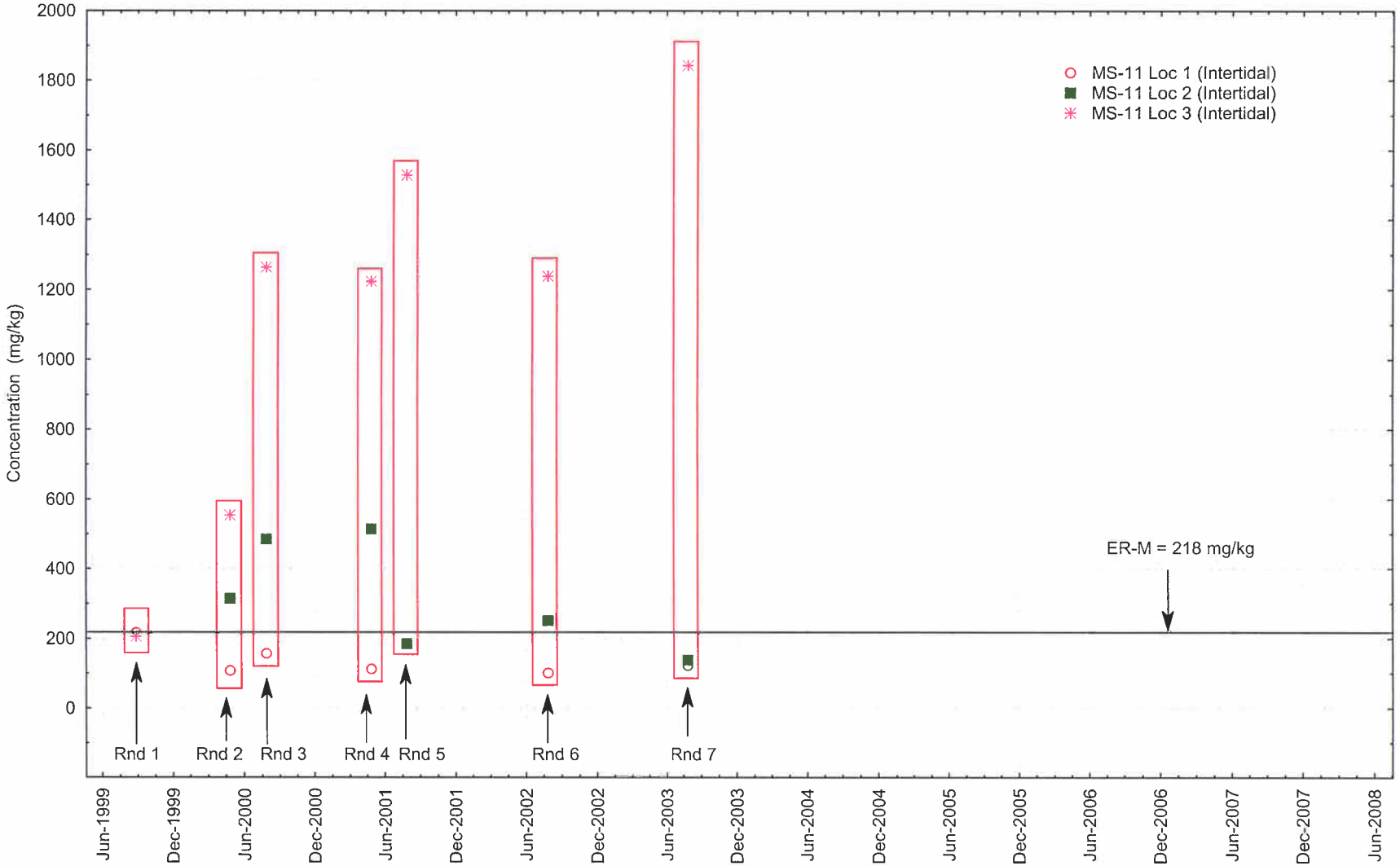
June 28, 2010

Monitoring Station 11 - Sediment
Nickel Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 28, 2010

Monitoring Station 11 - Sediment
Lead Results by Round All Locations (Locs 1 and 2 calculated)
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

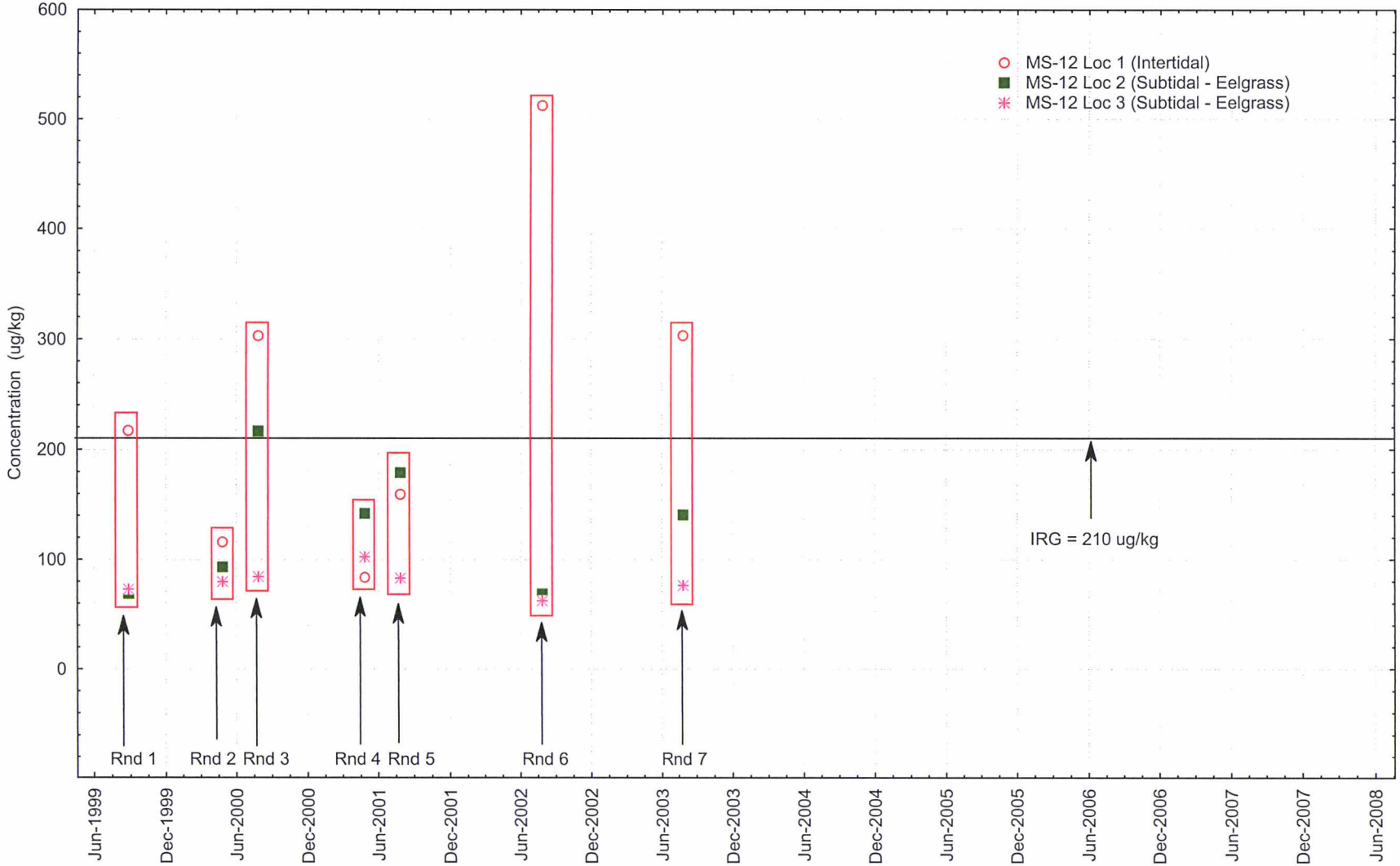


June 28, 2010

APPENDIX B.12

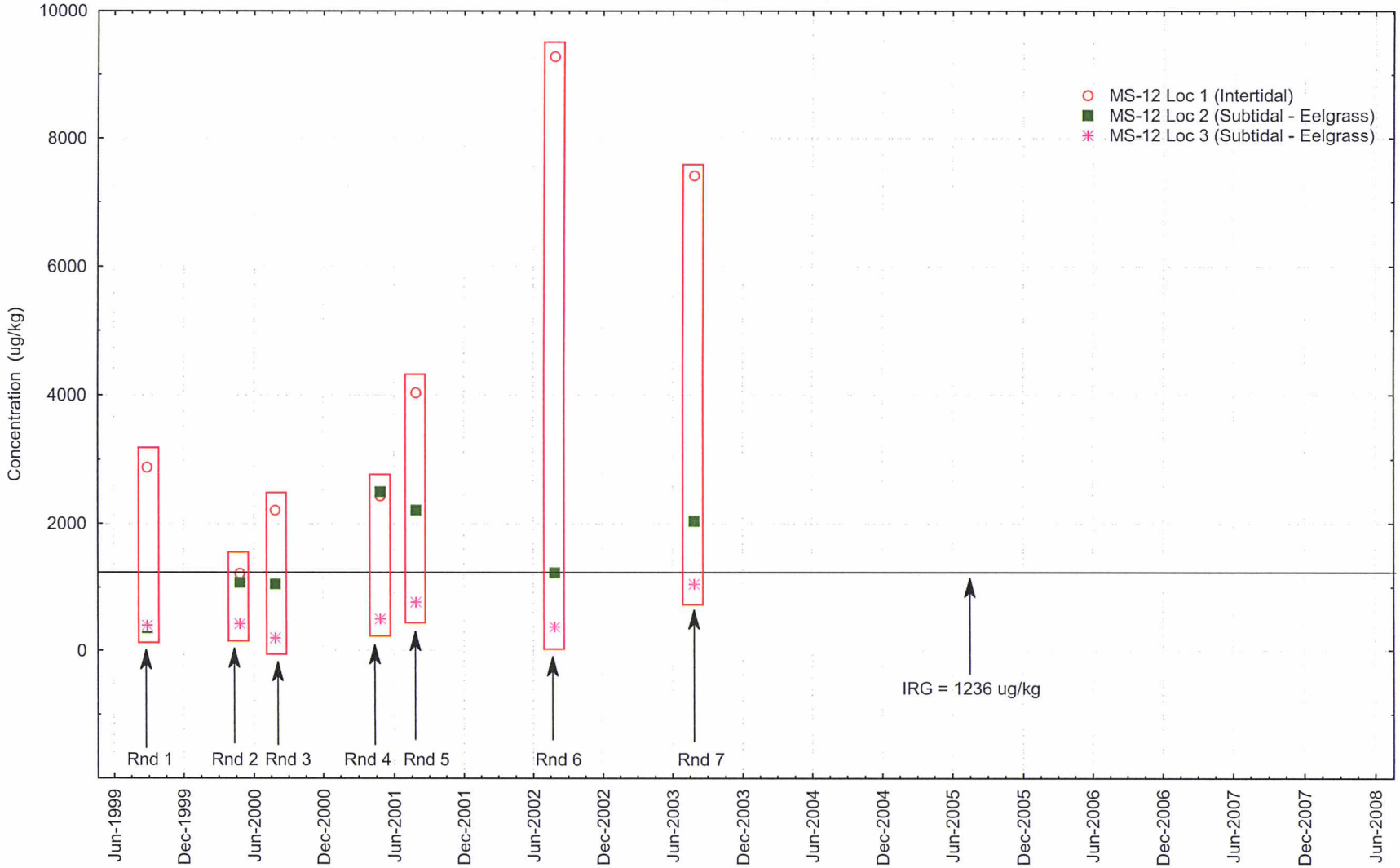
CONCENTRATION TREND PLOTS AT MS-12

Monitoring Station 12 - Sediment
Acenaphthylene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



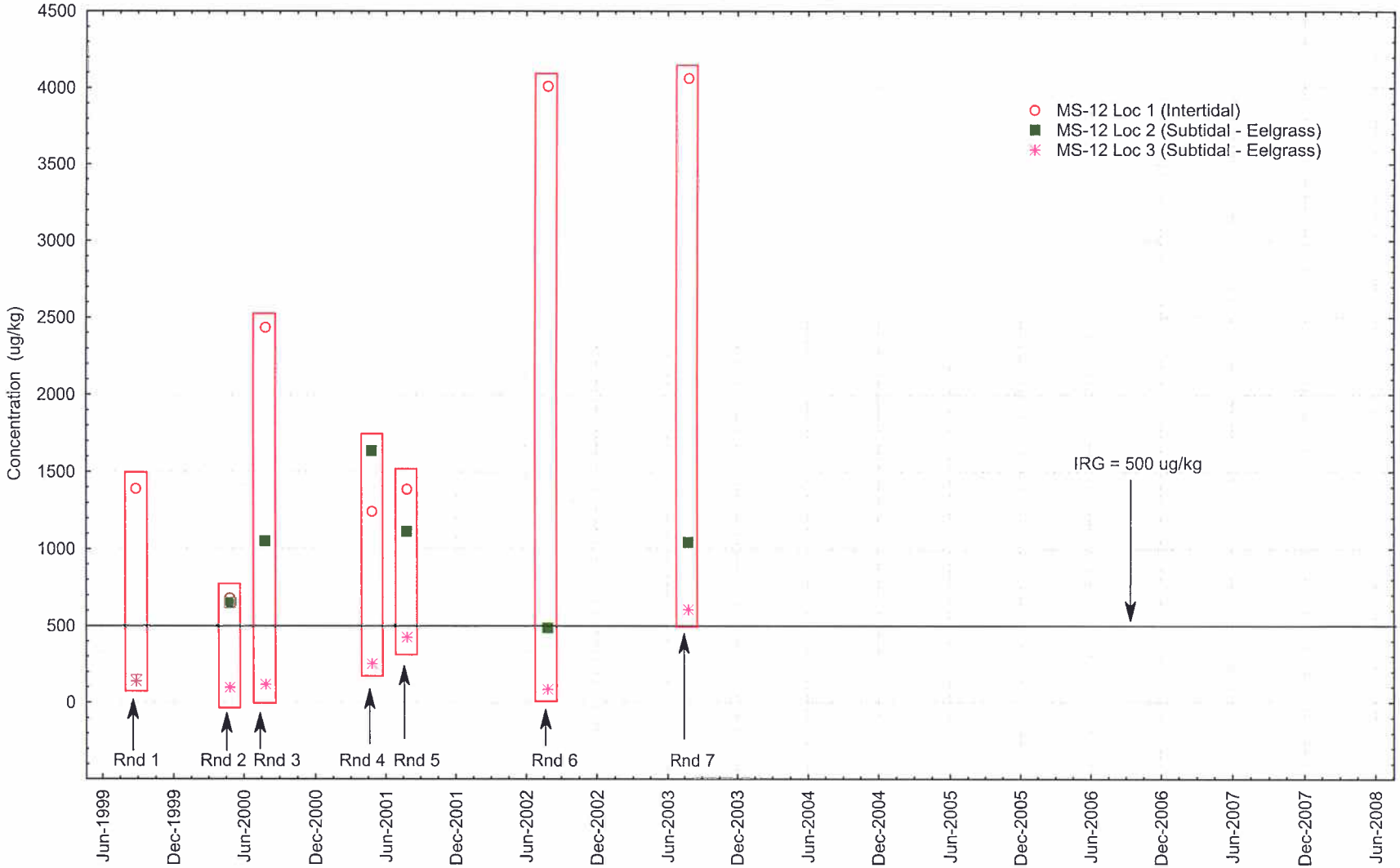
June 28, 2010

Monitoring Station 12 - Sediment
Anthracene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



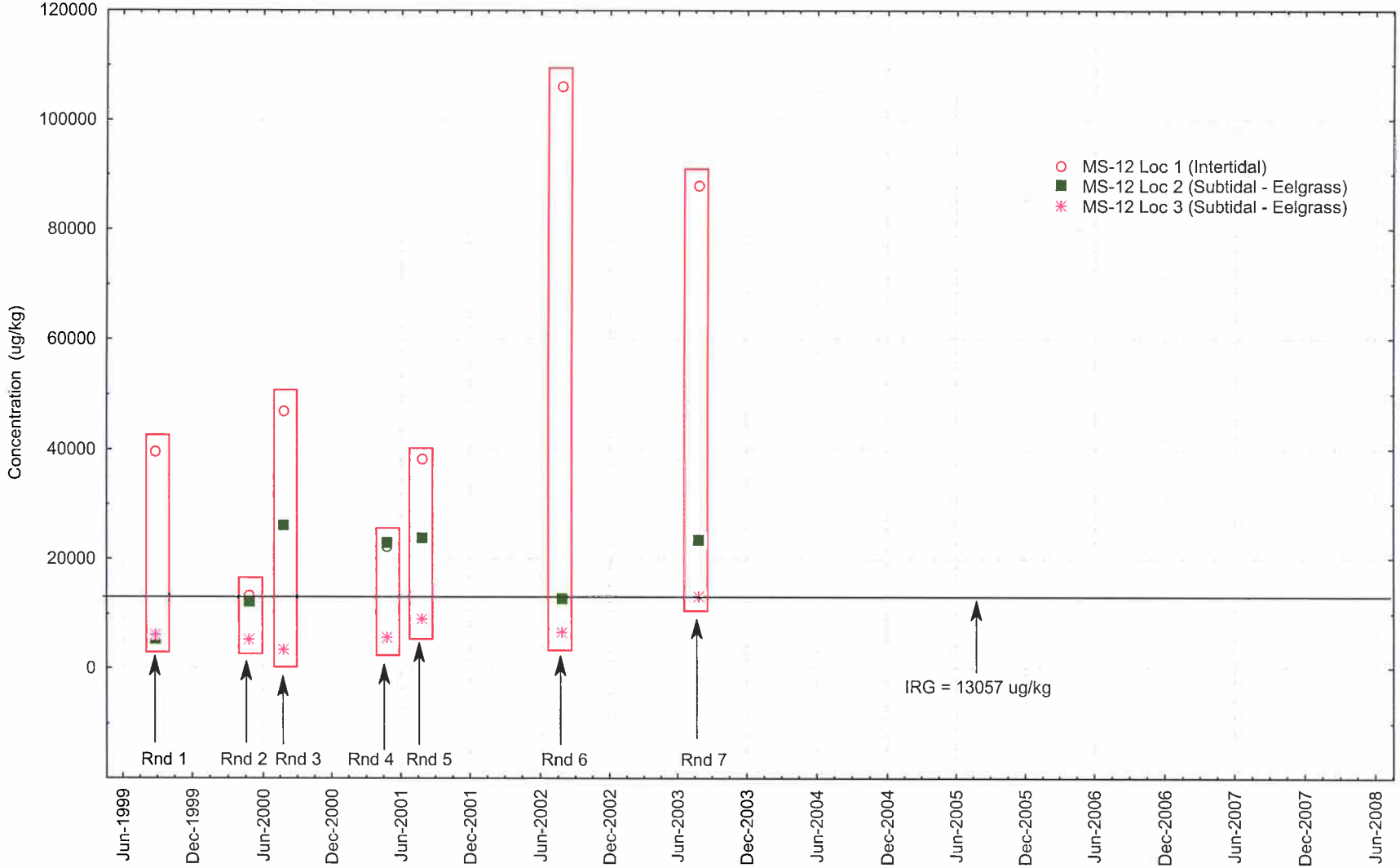
June 28, 2010

Monitoring Station 12 - Sediment
Fluorene Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



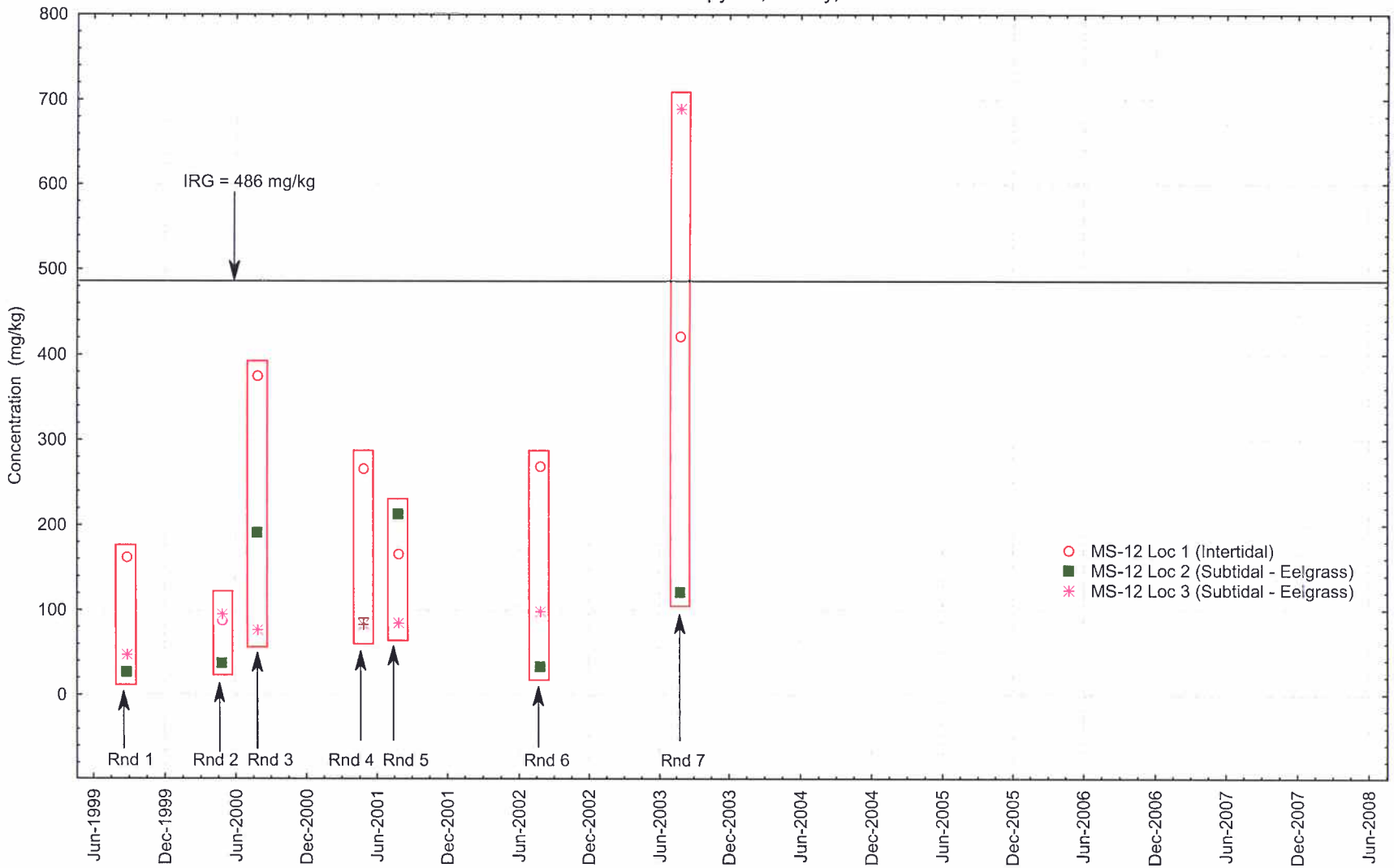
June 28, 2010

Monitoring Station 12 - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



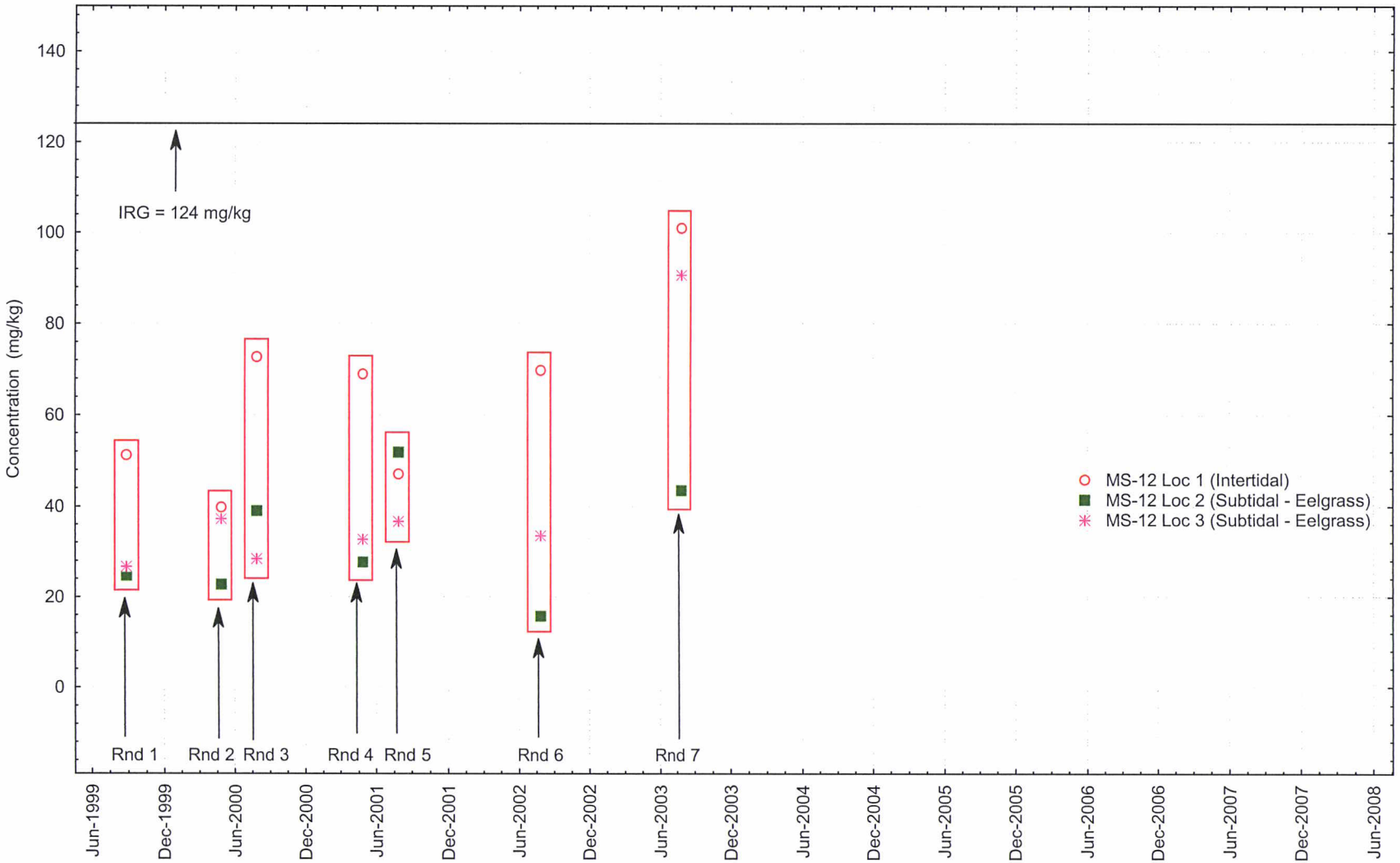
June 28, 2010

Monitoring Station 12 - Sediment
Copper Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



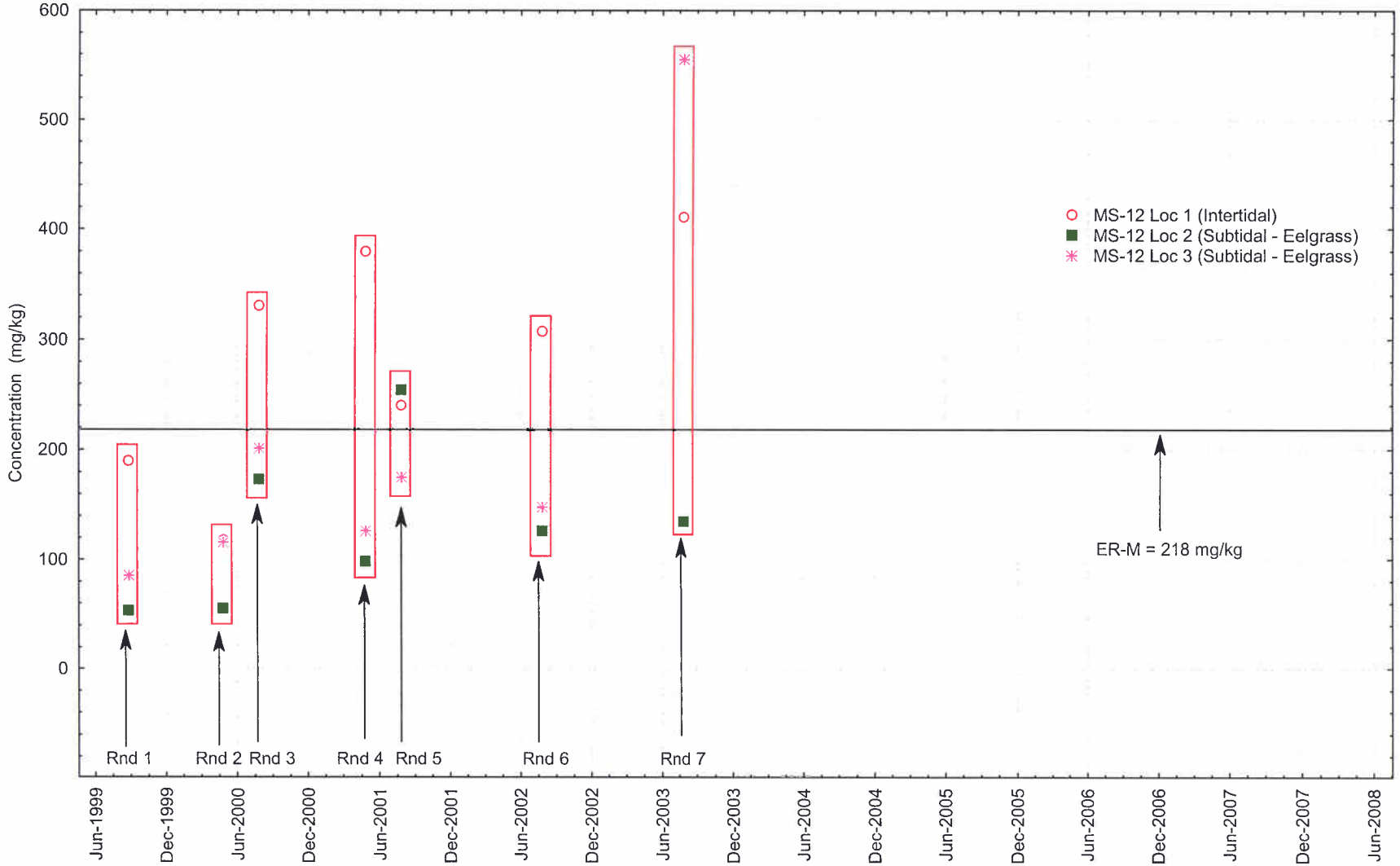
June 28, 2010

Monitoring Station 12 - Sediment
Nickel Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 28, 2010

Monitoring Station 12 - Sediment
Lead Results by Round
Rounds 1 through 7 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

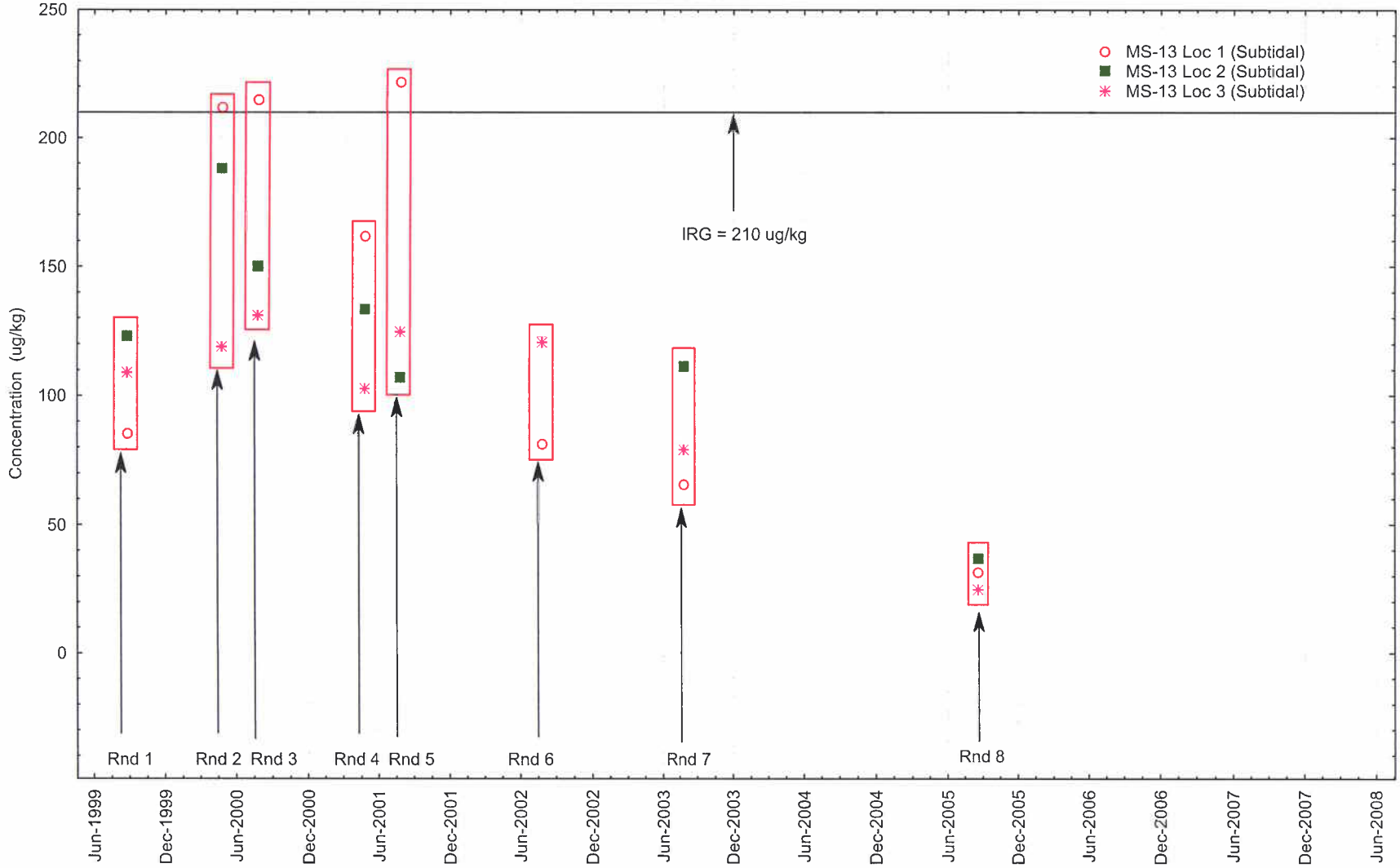


June 28, 2010

APPENDIX B.13

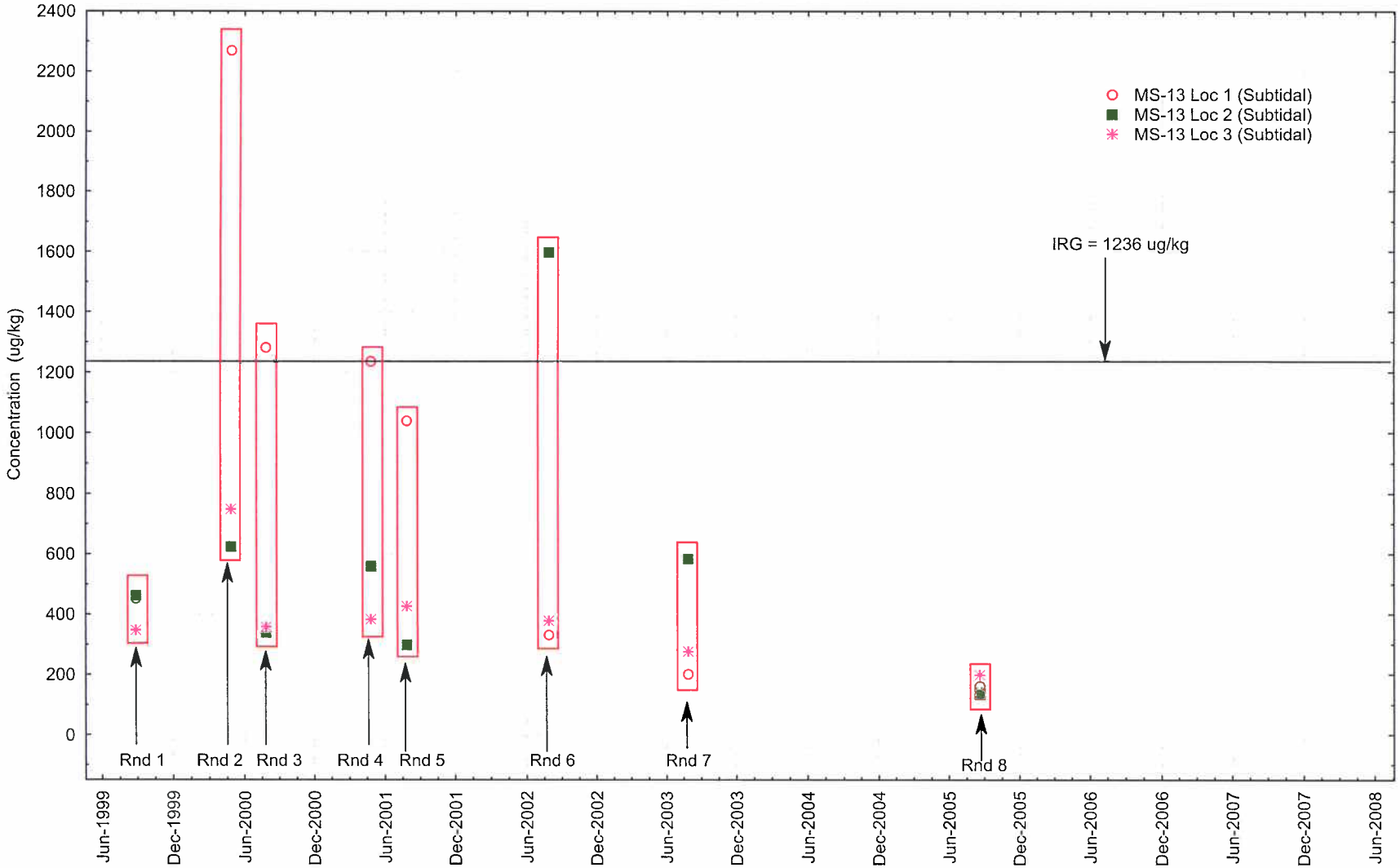
CONCENTRATION TREND PLOTS AT MS-13

Monitoring Station 13 - Sediment
Acenaphthylene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



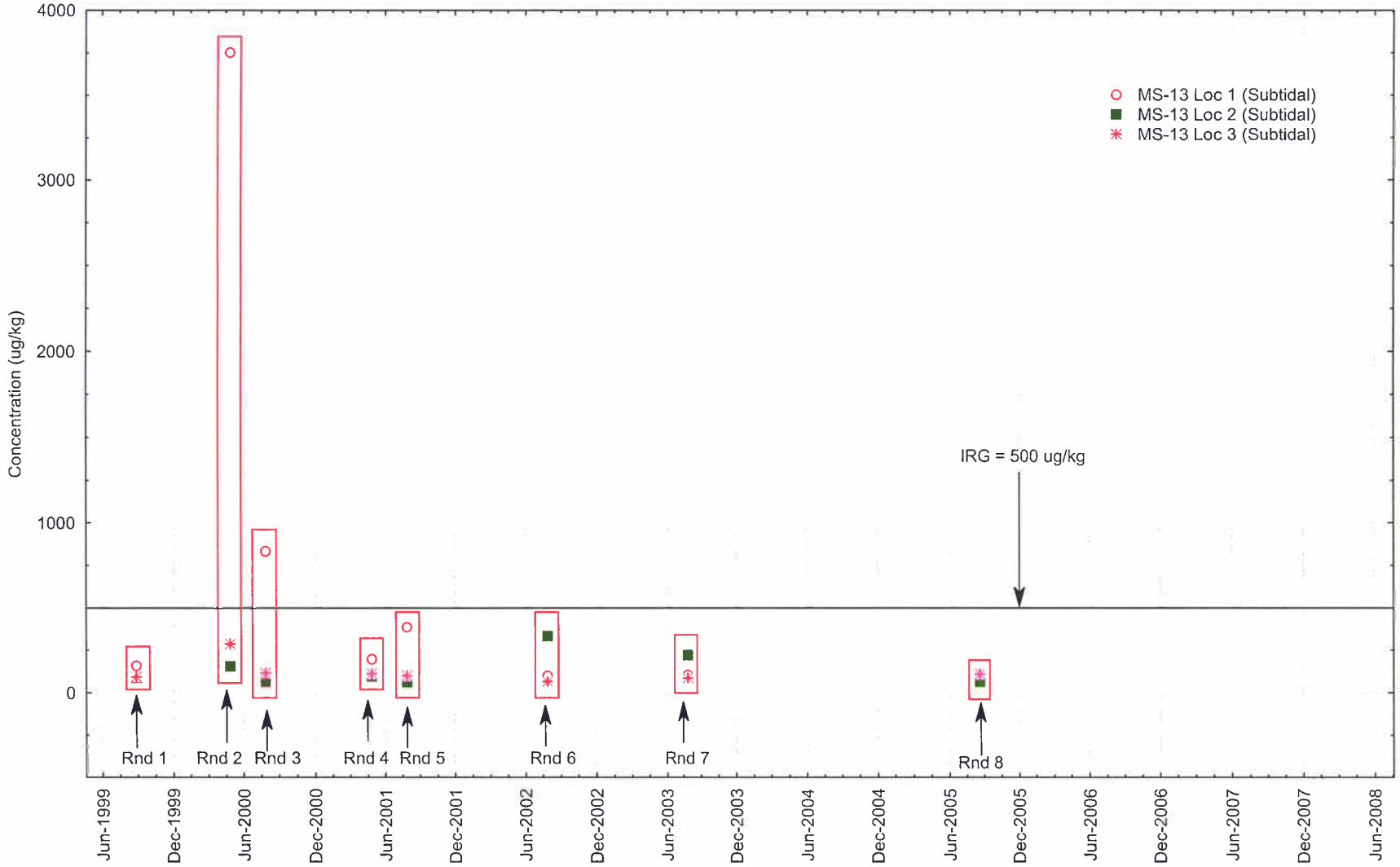
July 23, 2007

Monitoring Station 13 - Sediment
Anthracene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



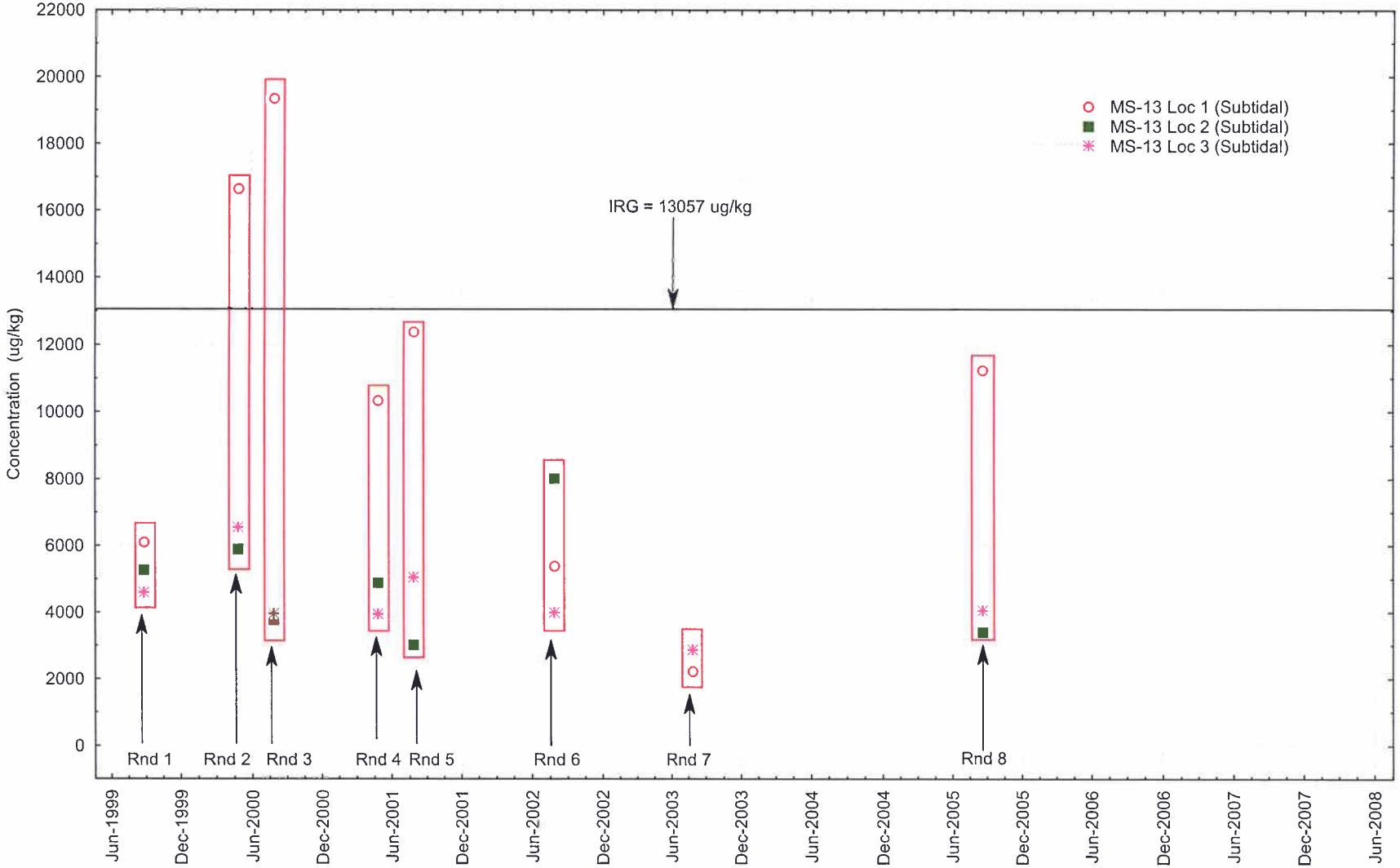
July 23, 2007

Monitoring Station 13 - Sediment
Fluorene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



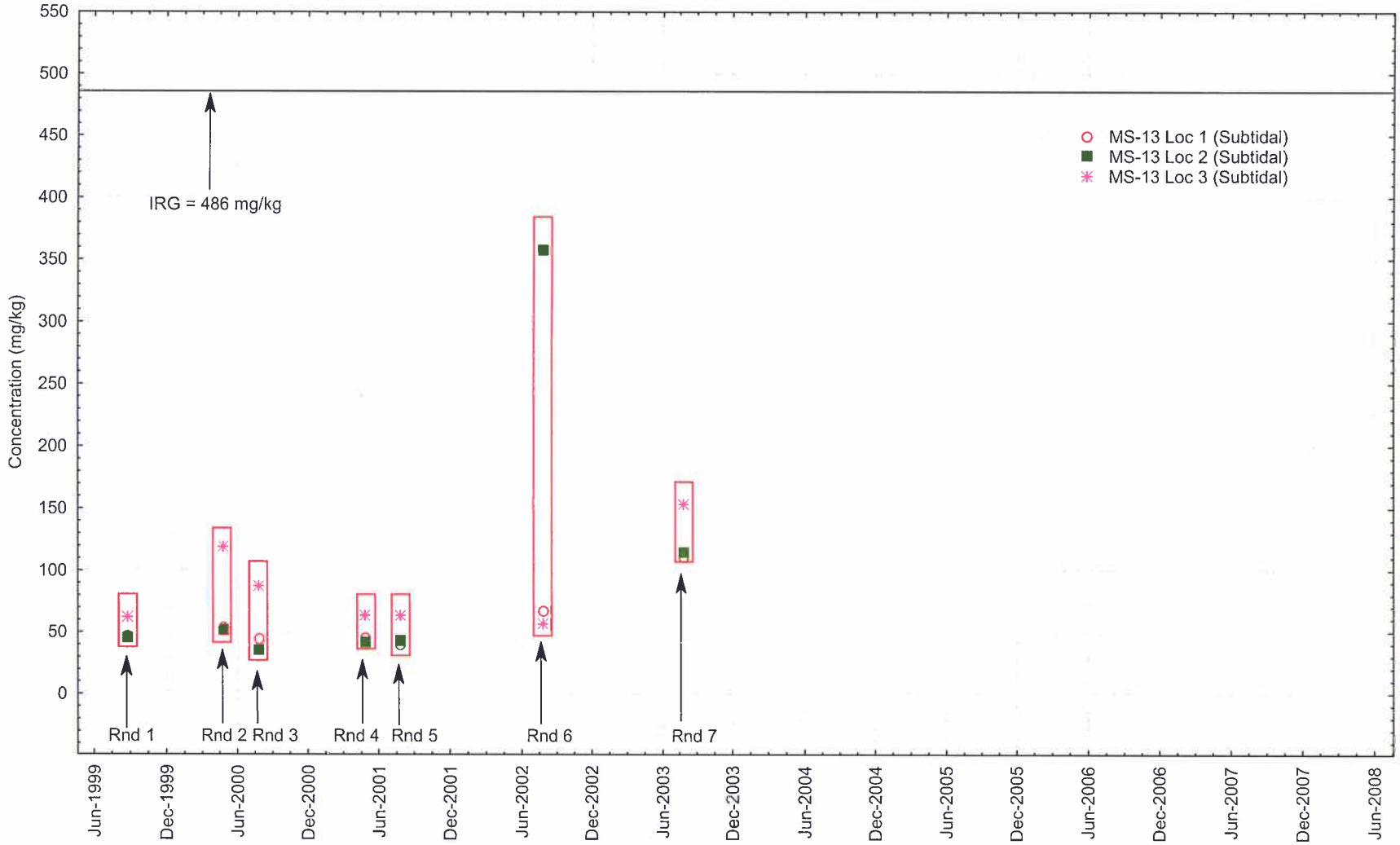
July 23, 2007

Monitoring Station 13 - Sediment
High Molecular Weight PAH Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



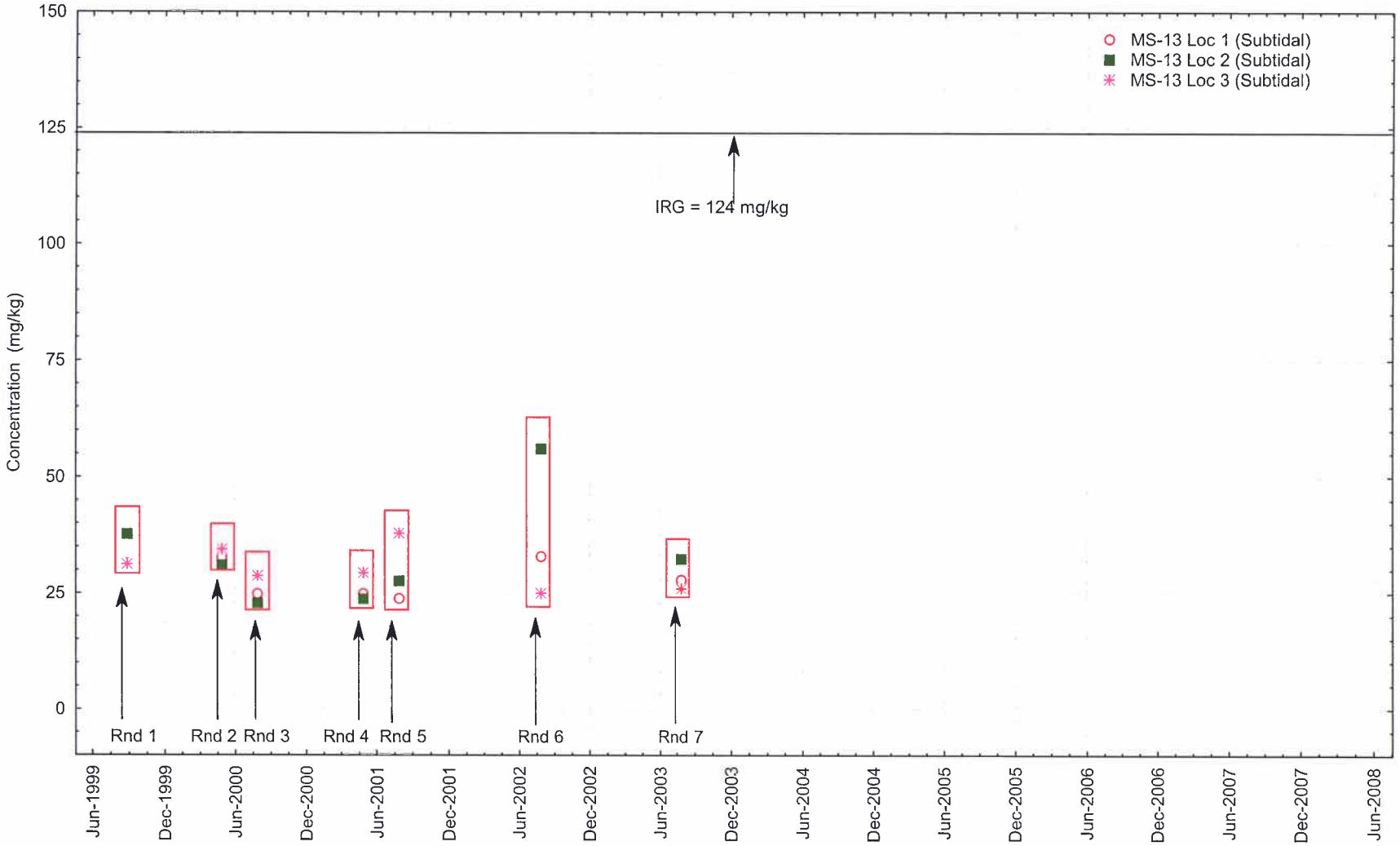
July 23, 2007

Monitoring Station 13 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

Monitoring Station 13 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

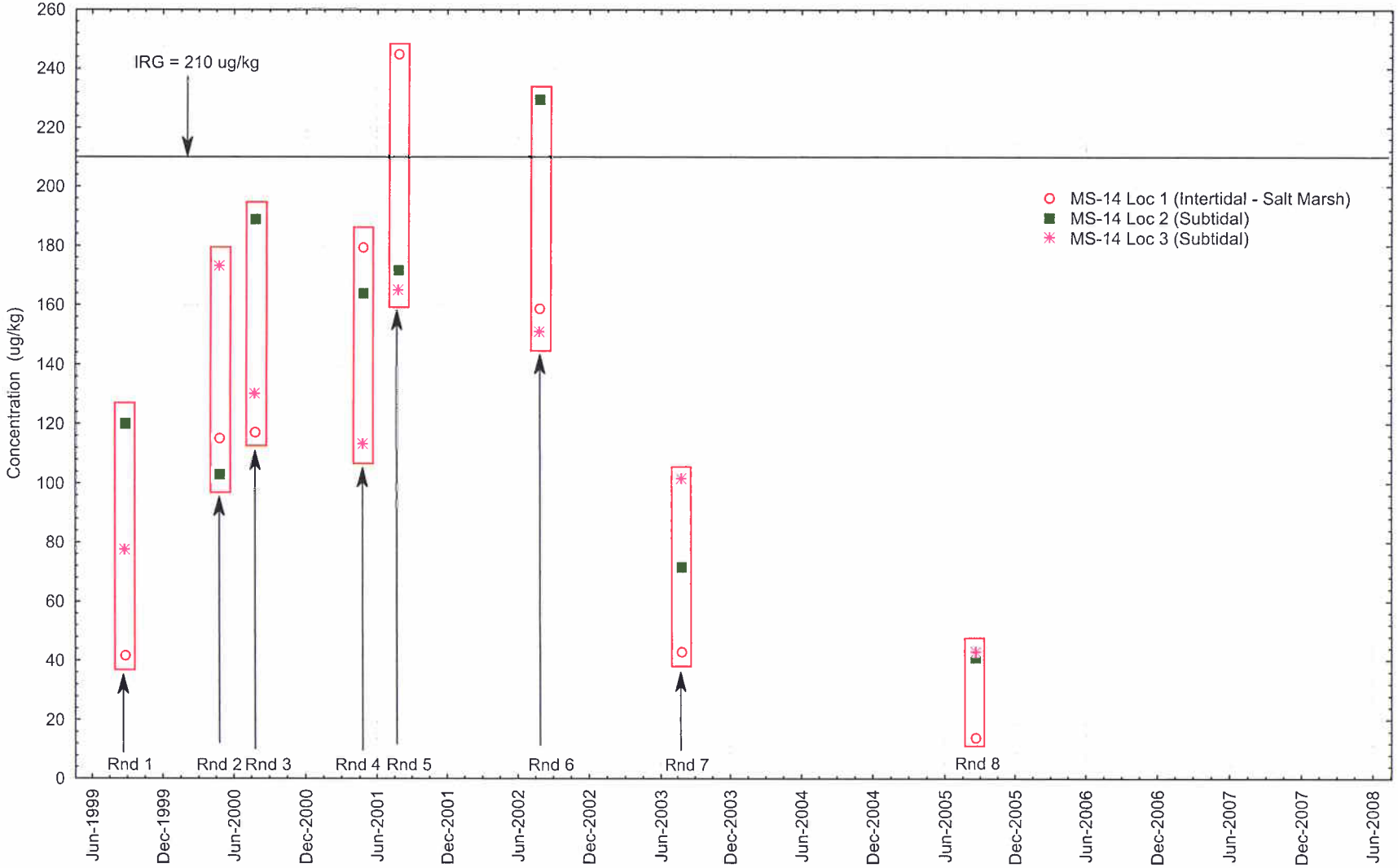


June 5, 2009

APPENDIX B.14

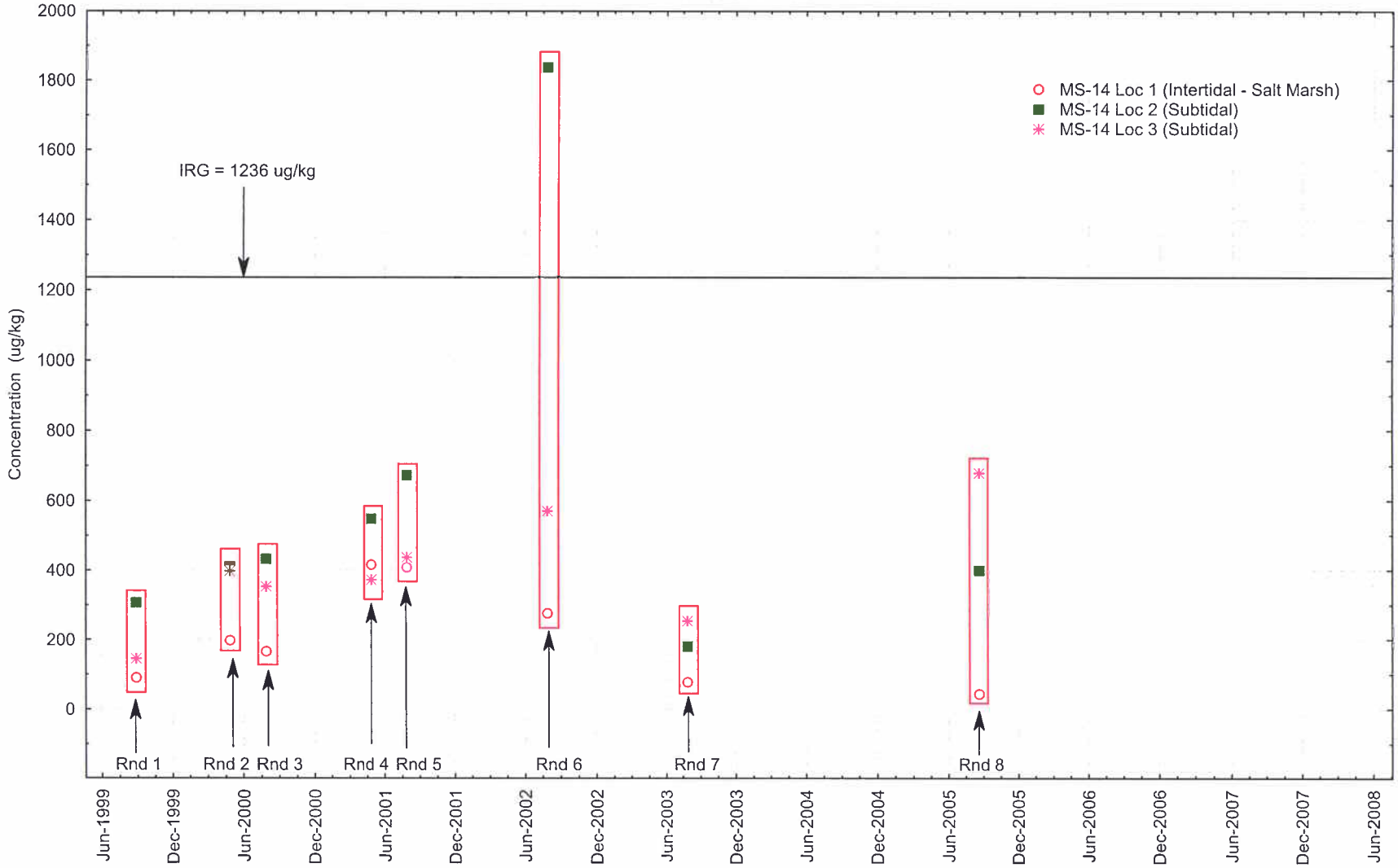
CONCENTRATION TREND PLOTS AT MS-14

Monitoring Station 14 - Sediment
Acenaphthylene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



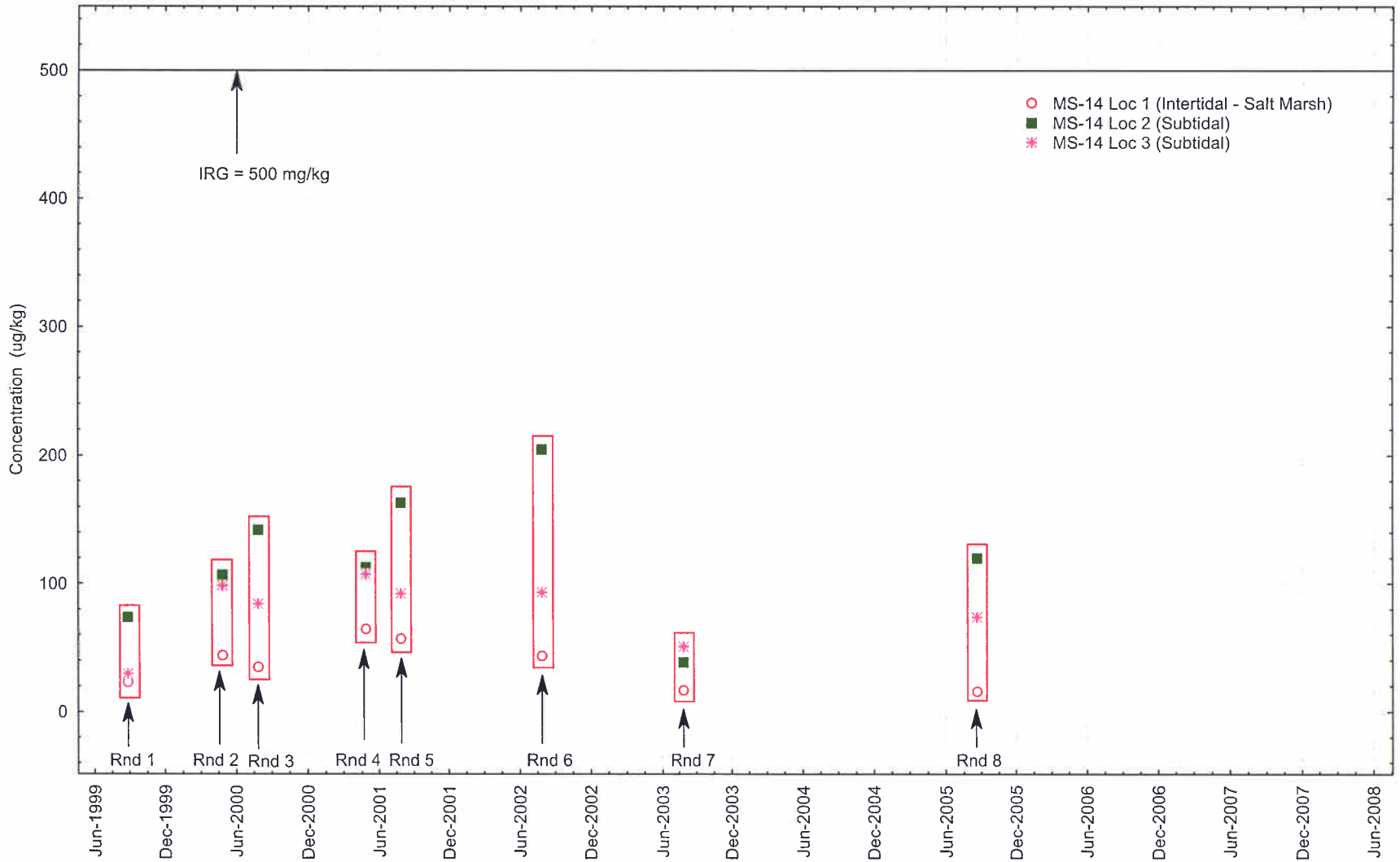
July 23, 2007

Monitoring Station 14 - Sediment
Anthracene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



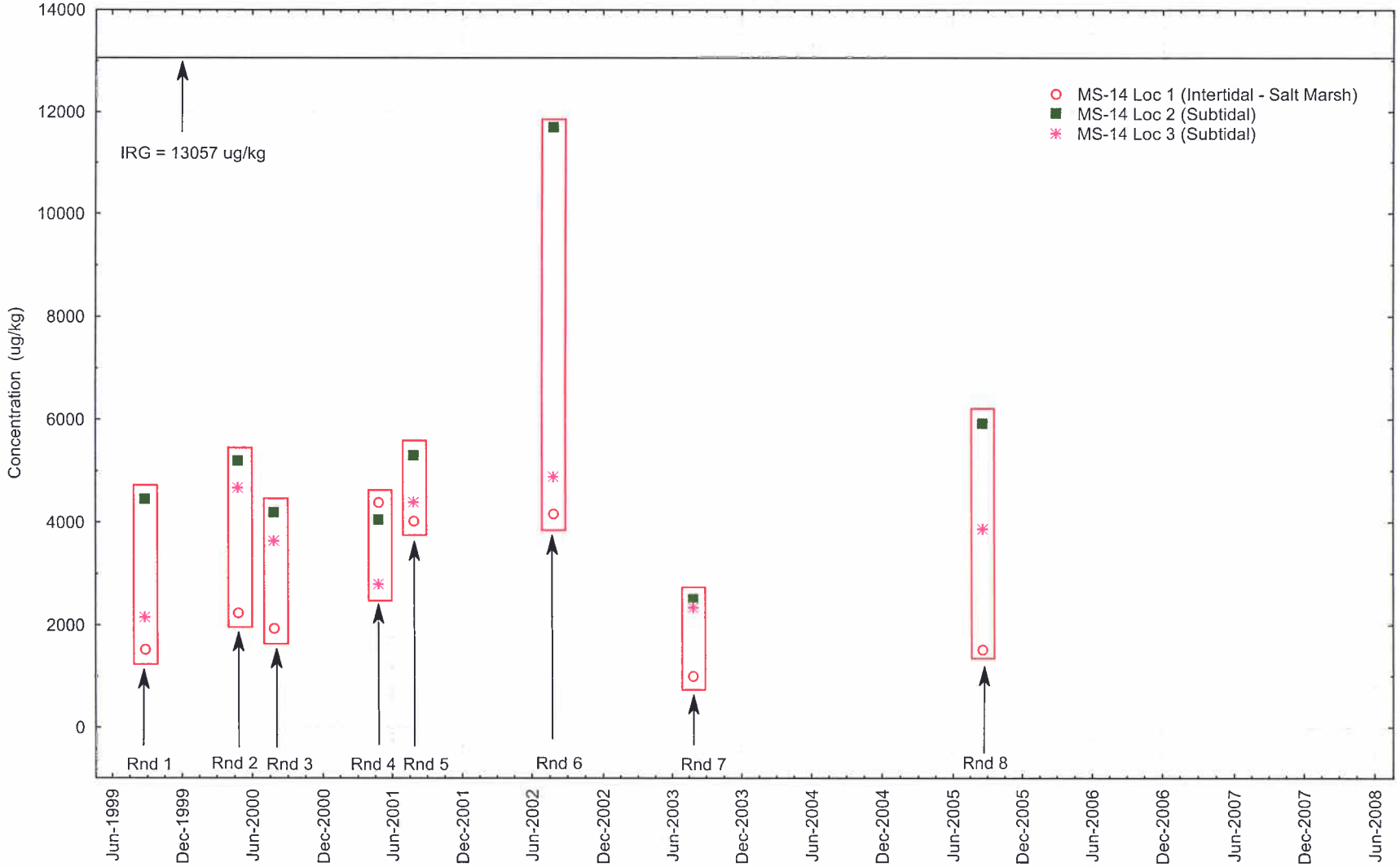
July 23, 2007

Monitoring Station 14 - Sediment
Fluorene Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



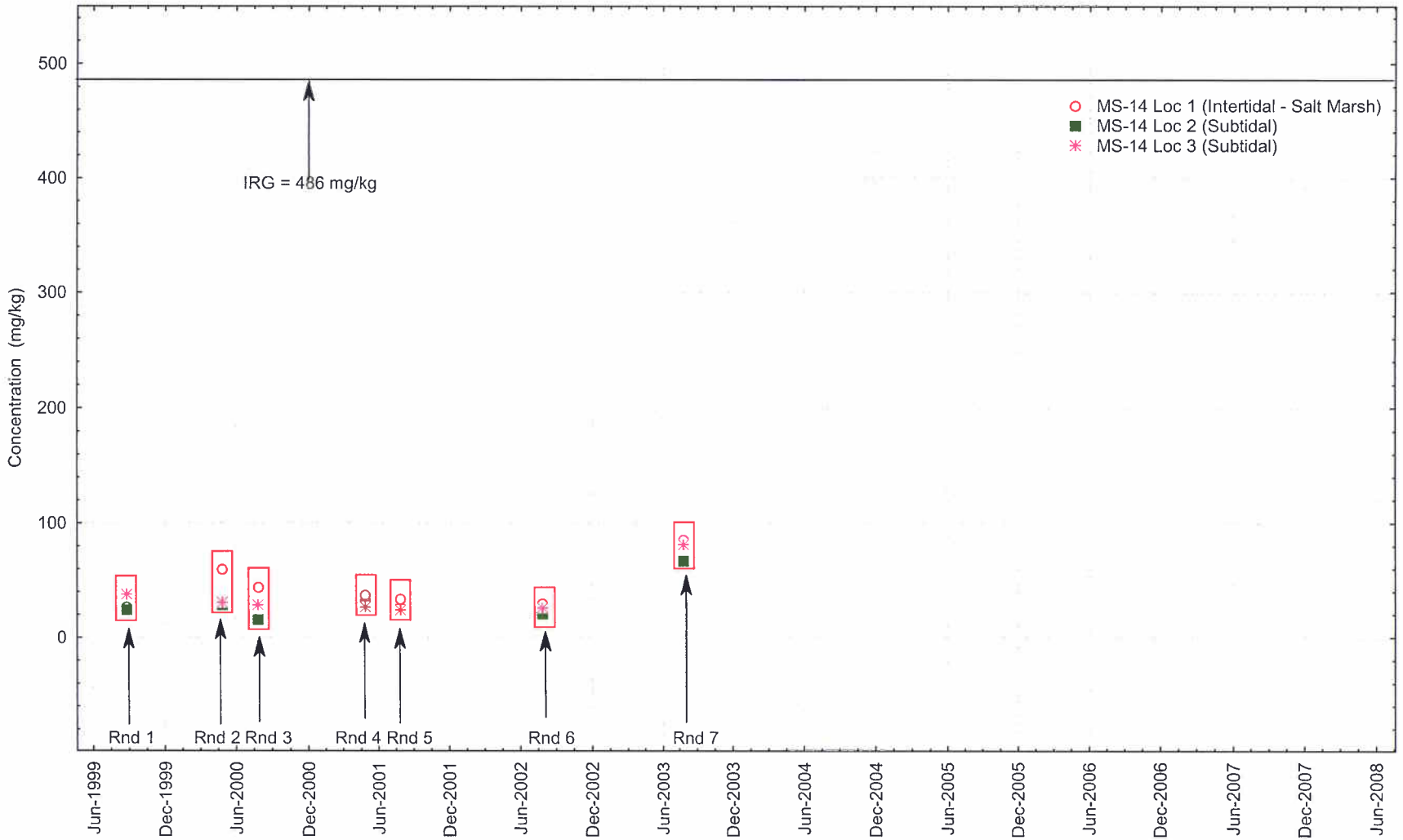
July 23, 2007

Monitoring Station 14 - Sediment
High Molecular Weight PAH Results by Round
Additional Scrutiny Report
Portsmouth Naval Shipyard, Kittery, Maine



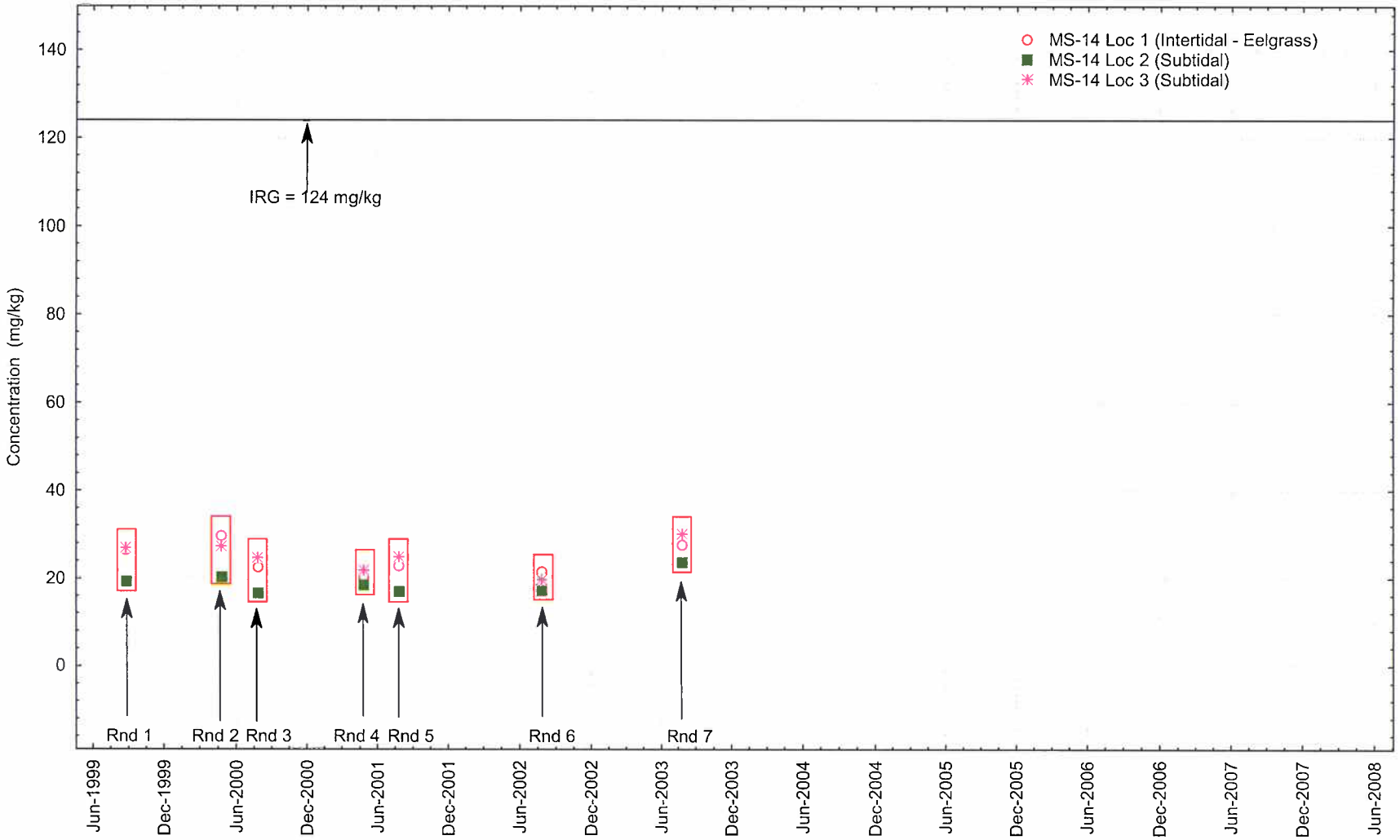
July 23, 2007

Monitoring Station 14 - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

Monitoring Station 14 - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine

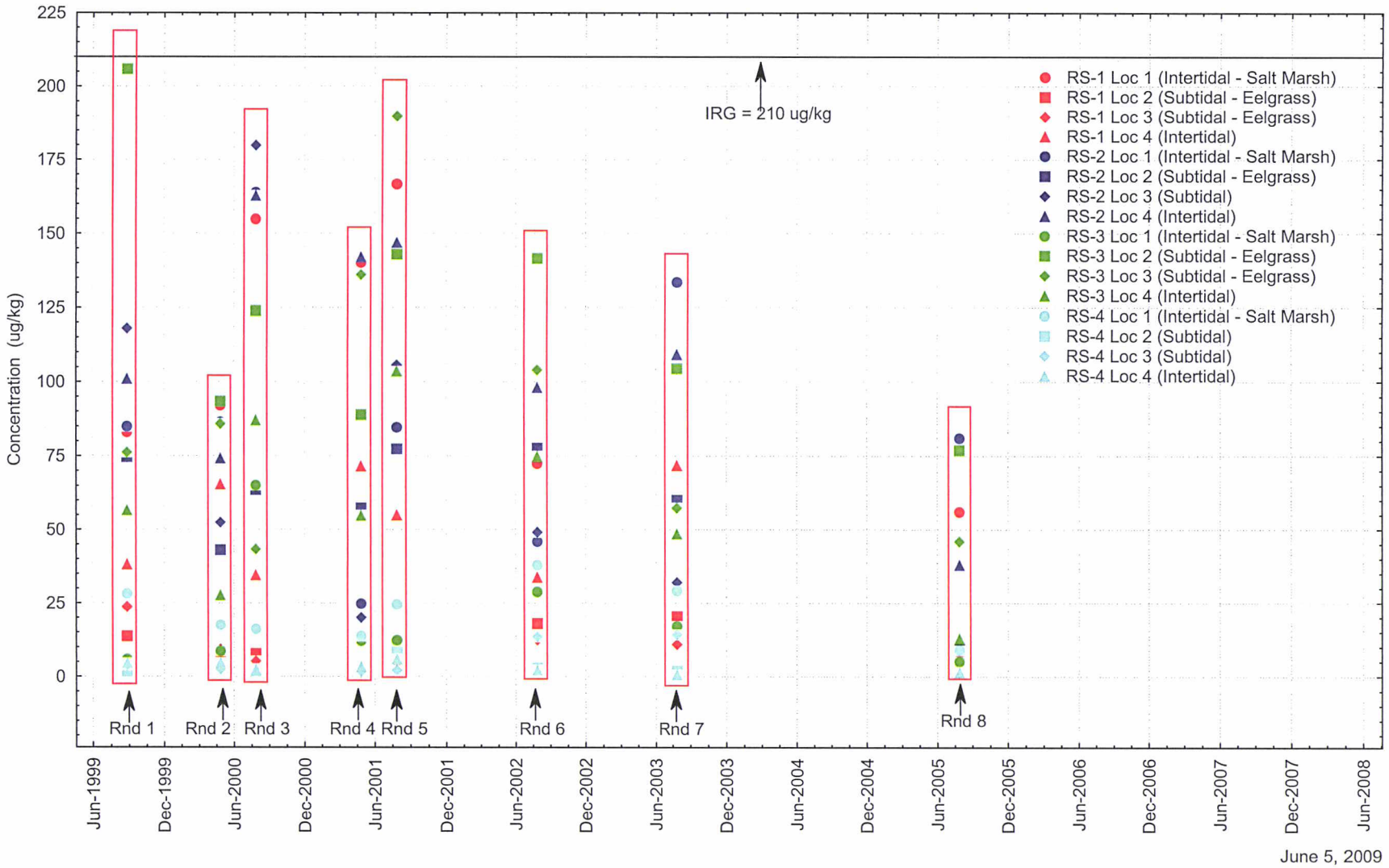


June 5, 2009

APPENDIX B.15

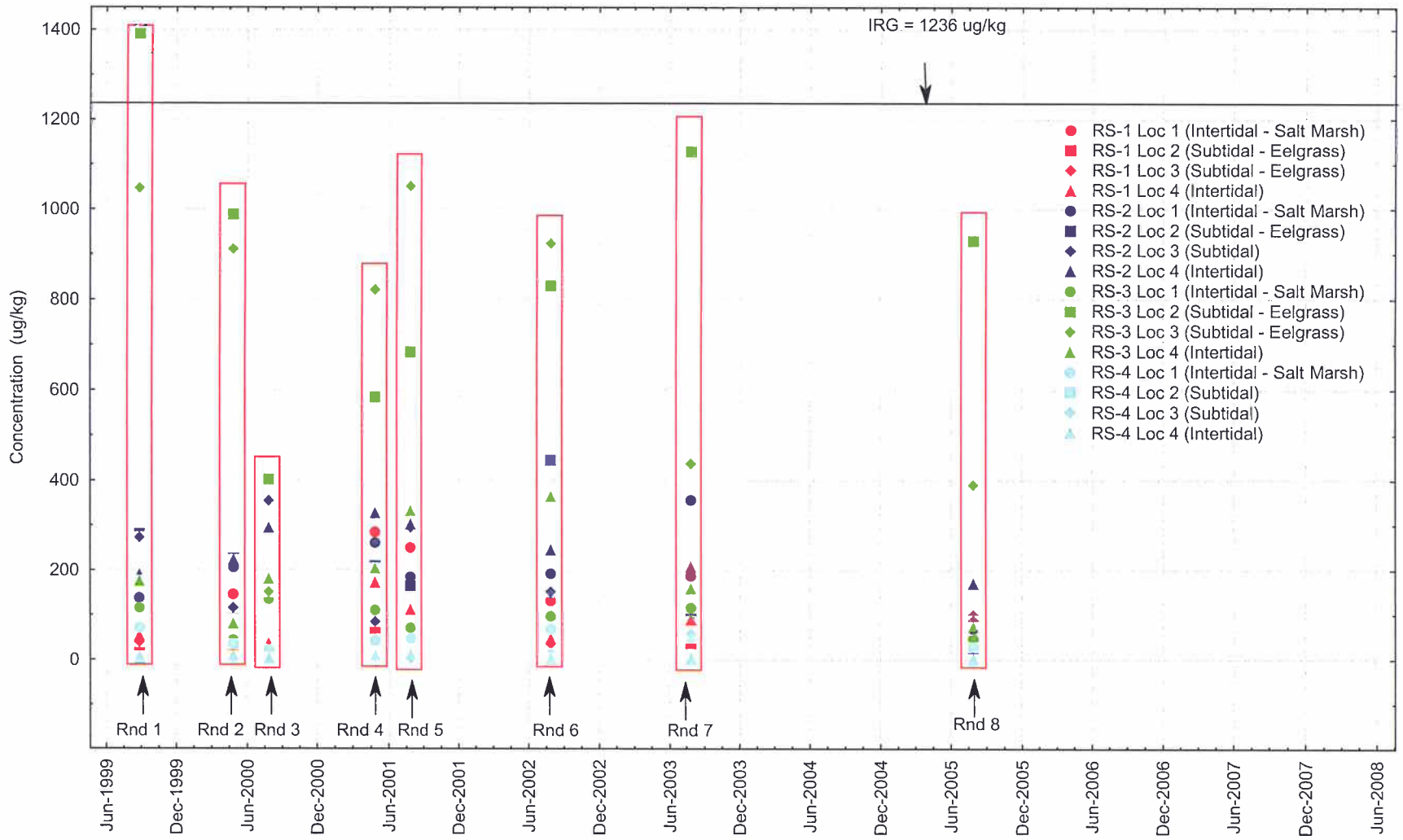
CONCENTRATION TREND PLOTS AT REFERENCE STATIONS

All Reference Station Samples - Sediment
Acenaphthylene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



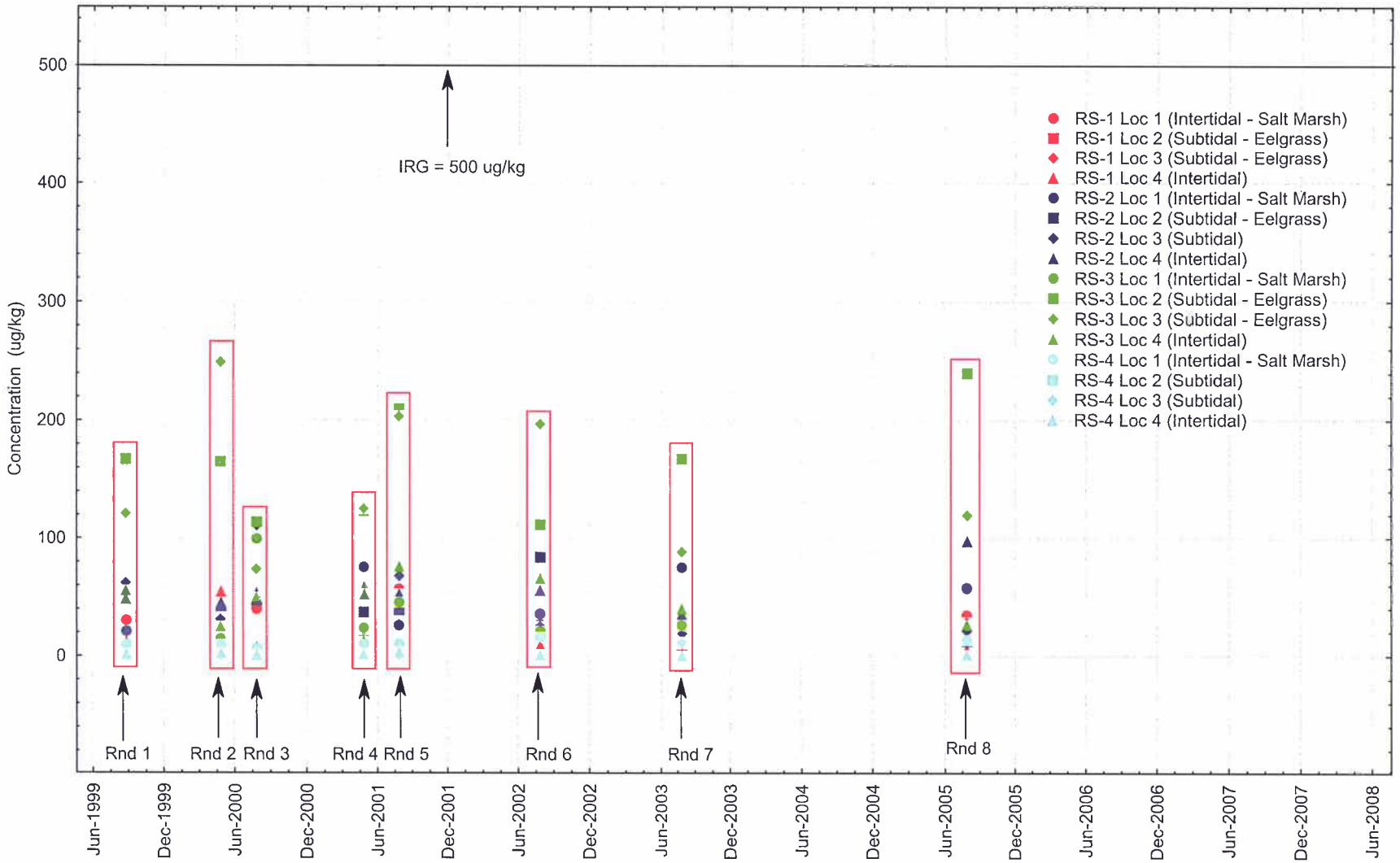
June 5, 2009

All Reference Station Samples - Sediment
Anthracene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



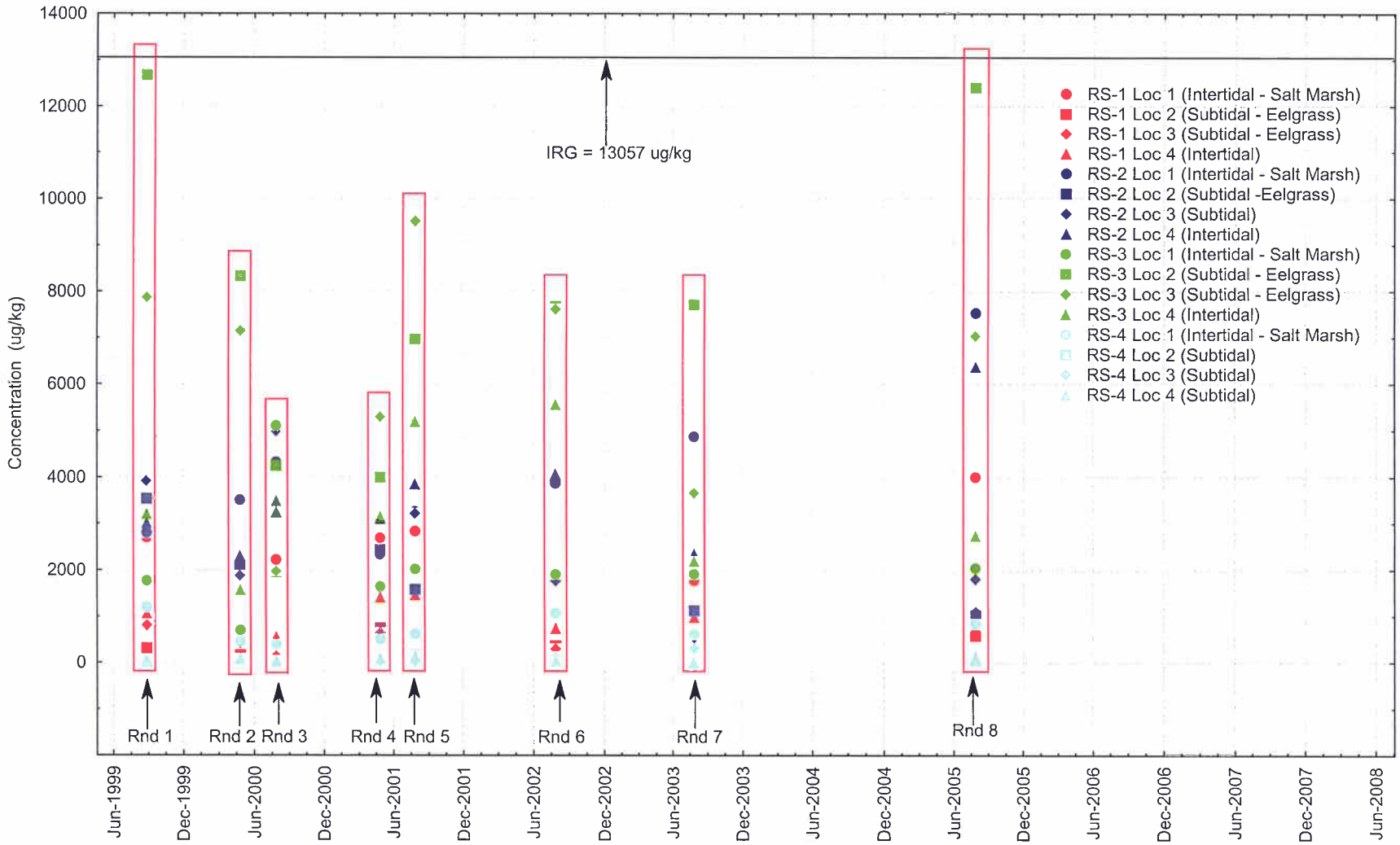
June 5, 2009

All Reference Station Samples - Sediment
Fluorene Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



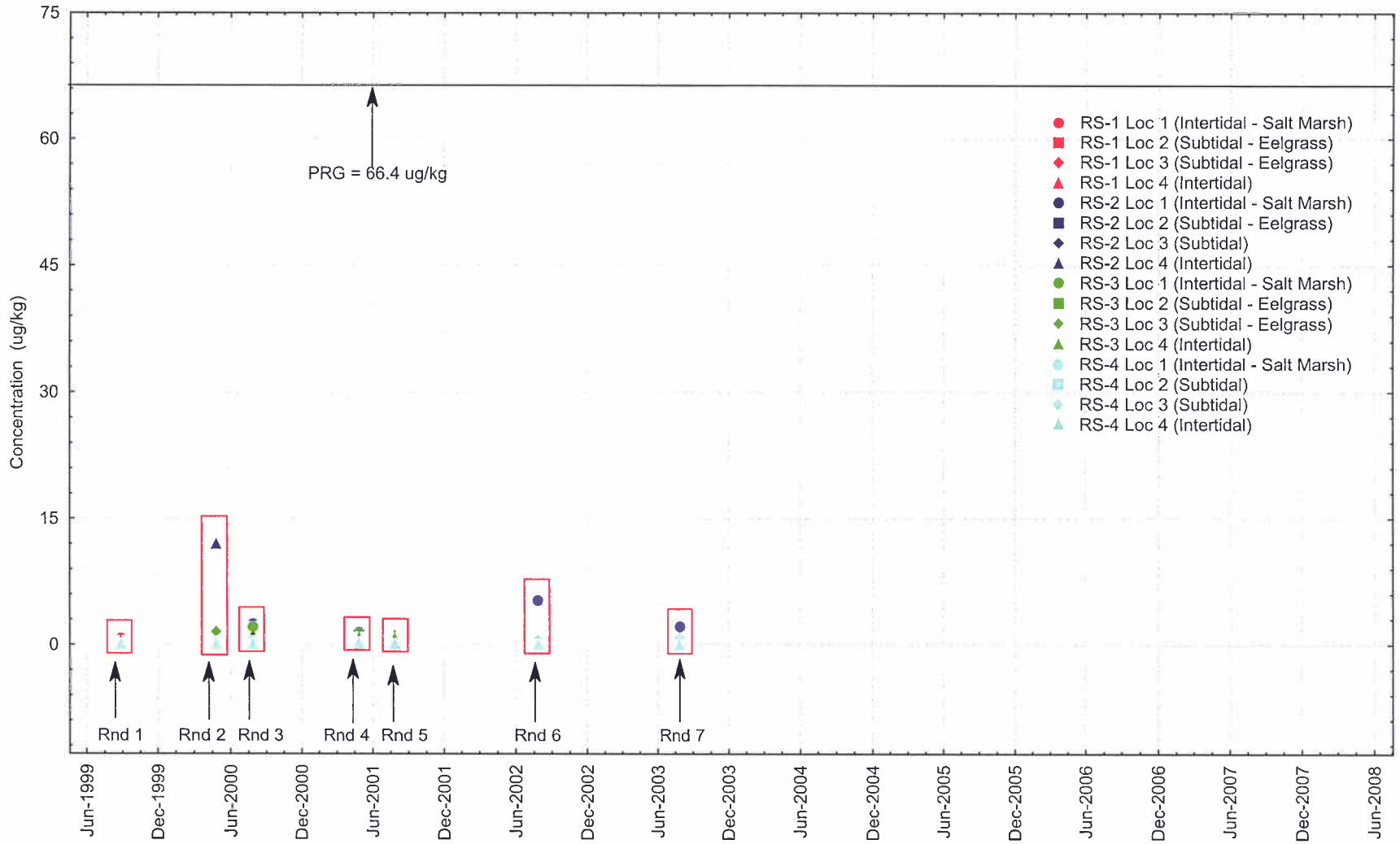
June 5, 2009

All Reference Station Samples - Sediment
High Molecular Weight PAH Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



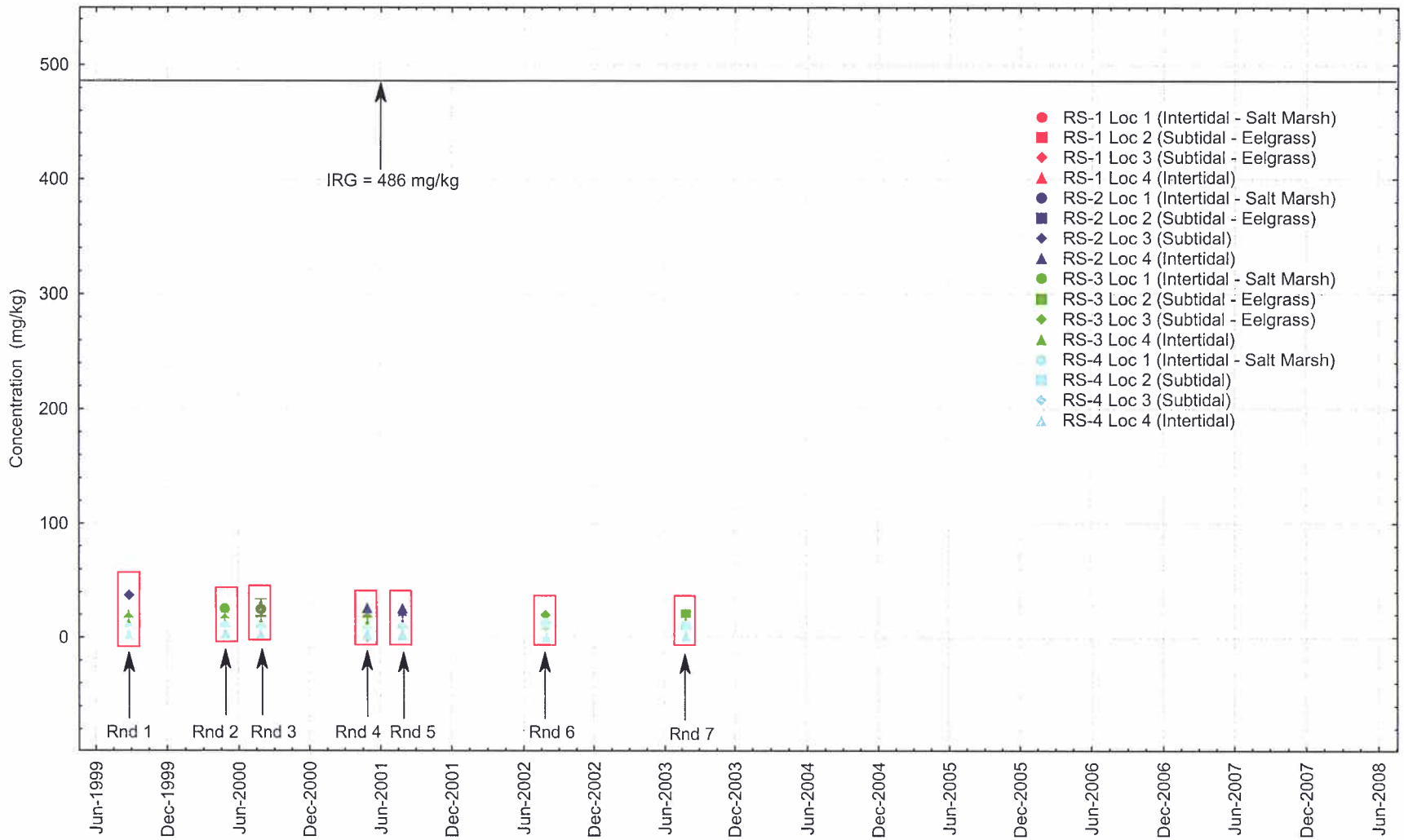
June 5, 2009

All Reference Station Samples - Sediment
4,4'-DDT Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



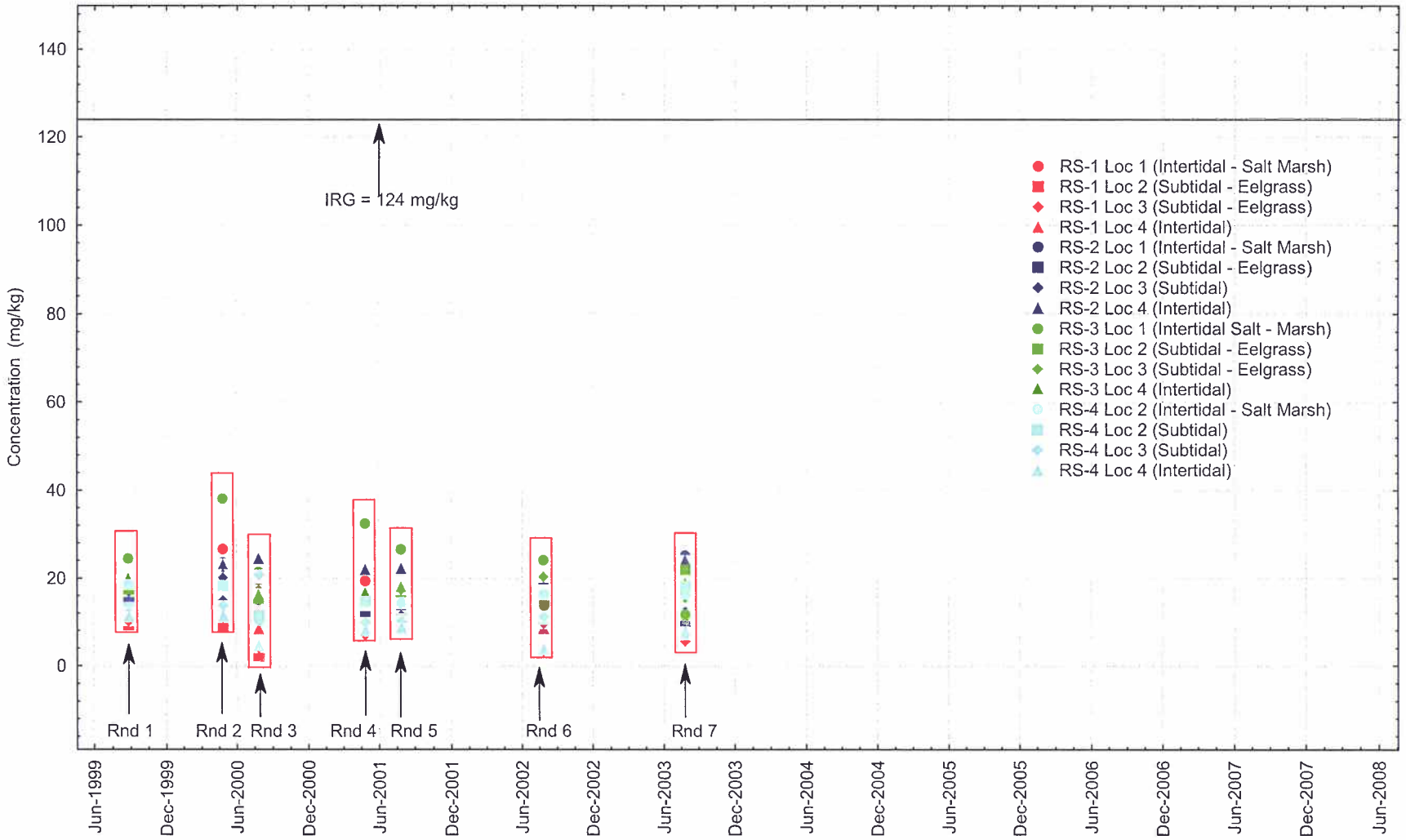
June 5, 2009

All Reference Station Samples - Sediment
Copper Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



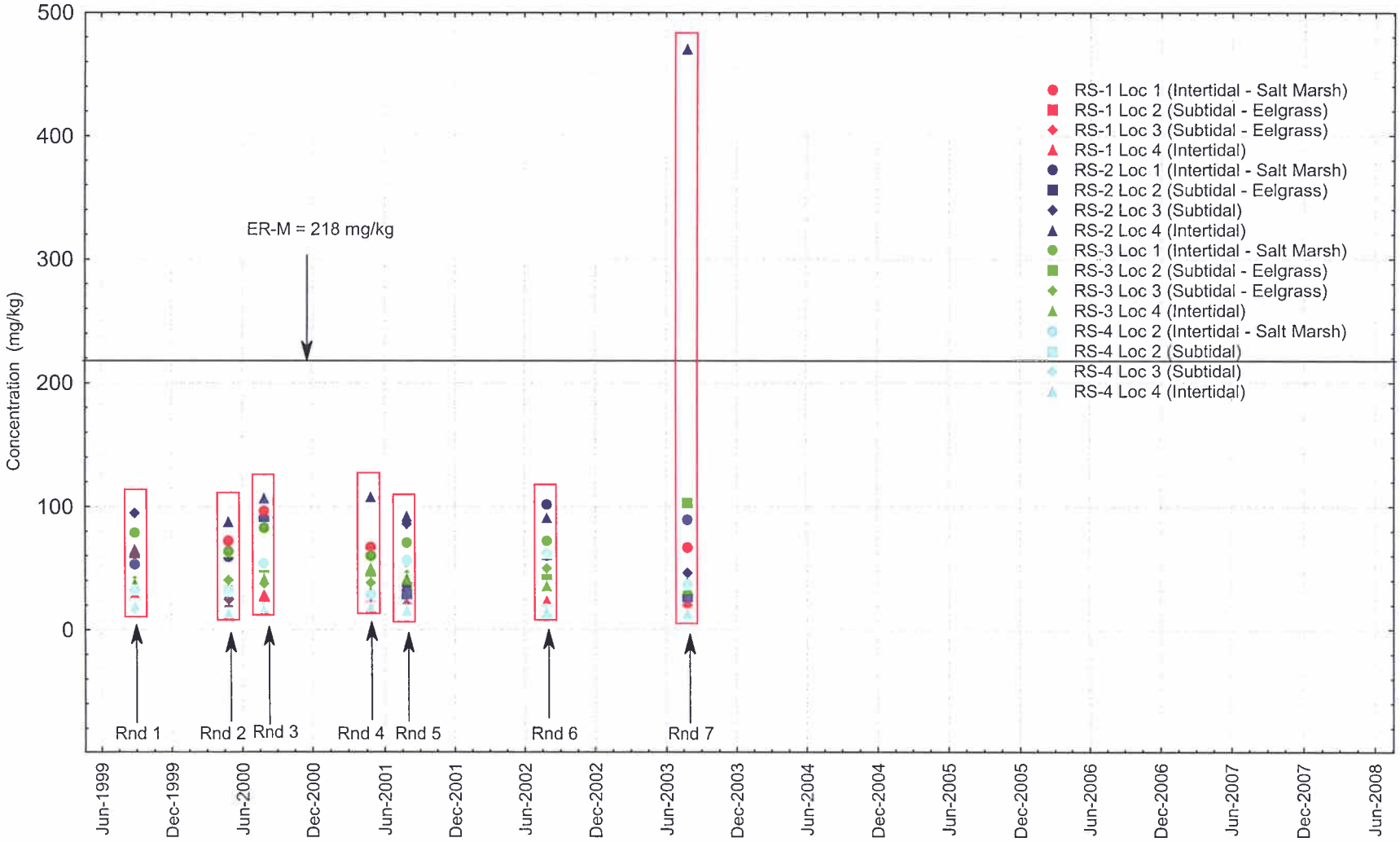
July 15, 2008

All Reference Station Samples - Sediment
Nickel Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

All Reference Station Samples - Sediment
Lead Results by Round
Rounds 1 through 10 Interim Offshore Monitoring Program Report
Portsmouth Naval Shipyard, Kittery, Maine



June 5, 2009

APPENDIX C

MONITORING STATION CALCULATIONS AND COST ESTIMATES

C.1 MS-01 CALCULATIONS AND COST ESTIMATES

C.2 MS-03 AND MS-04 CALCULATIONS AND COST ESTIMATES

C.3 MS-11 CALCULATIONS AND COST ESTIMATES

C.4 MS-12 CALCULATIONS AND COST ESTIMATES

APPENDIX C.1

MS-01 CALCULATIONS AND COST ESTIMATES

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-01		
BASED ON: OU-4 FS SECTION 4		DRAWING NUMBER:
BY: TJR Date: 4-2010	CHECKED BY: TJR Date: 7/6/10	APPROVED BY: DATE:

Alternative MS01-02 - Monitored Natural Recovery

Annual Cost

Yearly Site Inspection/Visit for LUCs Implementation (1 person)

Assume out of town travel to site.

Air	$400	
Car	$100	
Hours	$900	(12 hours * $75/hr)
Misc	$150	
	$1,550	

Report: Document site visit $800

Sampling

Labor, Materials, & Equipment per round (sediment sampling from boat)

Assume 2 days to sample with 3 people (1 TTNUS, 2 subs), local plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 3 days =	$2,100
car for 3 days =	$300
air =	$400
report @ $65.00 per hour for 15 hours =	$975
subcontractor (boat & crew) =	$8,400
Misc supplies, equipment, copying, etc. =	$500
	$12,675

Analytical, per round for 30 years

Collect 5 sediment samples and analyze for PAHs.

type	cost each	number	total
PAHs	$150	5	$750
			$750
40% QA/QC & Data Validation			$300
			$1,050

Sampling report assume $1,500 per round $1,500

5-year review

Site Visit and Report $23,000

CLIENT: Portsmouth Naval Shipyard			JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-01			
BASED ON: OU-4 FS SECTION 4			DRAWING NUMBER:
BY: TJR Date: 4-2010	CHECKED BY: TJR Date: 7/6/10		APPROVED BY: DATE:

Alternative MS01-03 - Hydraulic Dredging with Off-Yard Disposal

Capital Cost

Pre-Construction Sampling

Labor, Materials, & Equipment per round (sediment sampling from boat)

Assume 3 days to sample with 3 people (1 to travel, 2 local), plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 4 days =	$2,800
car for 4 days =	$400
air =	$400
report @ $65.00 per hour for 15 hours =	$975
subcontractor (boat & crew) =	$12,600
Misc supplies, equipment, copying, etc. =	$500
	$17,675

Analytical

Collect 10 sediment samples and analyze for PAHs.

type	cost each	number	total	
PAHs	$150	10	$1,500	
			$1,500	
			2	fast turn
			$3,000	
20% QA/QC & Data Validation			$600	
			$3,600	

Site Work

Dredge contaminated sediment, pumping sediment into geotubes on a dewatering pad. Collect one water sample and 3 soil/sediment samples for confirmation testing.

Analytical Costs - per sample

Parameter	Unit Cost	
PAHs	$ 150.00	
	$ 150.00	
	2	fast turn
	$ 300	

Assume no treatment of the water is required prior to discharge.

Allow tubes to dewater for 30 days. Mix 5% fly ash by volume to complete dewatering.

sediment volume	1,760	cy
percent water	20%	
solid volume	1,408	cy
5% fly ash	70	cy
disposal volume	1,478	cy or
	1,774	tons (at 1.2 tons/cy)

CLIENT:	Portsmouth Naval Shipyard	JOB NUMBER:	112G00932.0000.1101
SUBJECT:	OU-4: MS-01		
BASED ON:	OU-4 FS SECTION 4	DRAWING NUMBER:	
BY: TJR Date: 4-2010	CHECKED BY: 7/6/10 Date:	APPROVED BY:	DATE:

Collect one sediment sample for disposal testing. Assume sediment is nonhazardous for disposal.

Parameter	Unit Cost	
TCLP	$ 850.00	
	$ 850.00	
	2	fast turn
	$ 1,700	

Time to complete work

Mob & Setup	10	days
Hydraulic Dredge	3	days
Geotube Dewatering	30	days
Mix fly ash & load for disposal	5	days
Demob	5	days
	53	days
or	11	Weeks
or	3	Month

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS01-02: Monitored Natural Recovery
Capital Cost

4/29/2010 2:14 PM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.2 Prepare Sampling Documents & Plans	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
Subtotal							$0	$0	$11,100	$0	$11,100
Overhead on Labor Cost @ 30%									$3,330		$3,330
G & A Cost @ 10%							$0	$0	$1,110	$0	$1,110
Tax on Materials and Equipment Cost @ 5%								$0		$0	$0
Total Direct Cost							$0	$0	$15,540	$0	$15,540
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$1,554
Subtotal											$17,094
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$17,094
Contingency on Total Field Costs @ 0%											$0
Engineering on Total Field Cost @ 0%											$0
TOTAL CAPITAL COST											**$17,094**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS01-02: Monitored Natural Recovery
Annual Cost

4/29/2010 2:14 PM

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,350		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Collection	$12,675		Collect 5 sediment samples & measure sediment thickness from boat
Sediment Analysis	$1,050		Analysis samples for PAHs. Collect samples once a year for 30 years.
Sample Report	$1,500		
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$17,575	$23,000	
Contingency @ 10%	$1,758	$2,300	
TOTAL	**$19,333**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS01-02: Monitored Natural Recovery
Present Worth Analysis

4/29/2010 2:14 PM

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$17,094		$17,094	1.000	$17,094
1		$19,333	$19,333	0.935	$18,076
2		$19,333	$19,333	0.873	$16,877
3		$19,333	$19,333	0.816	$15,775
4		$19,333	$19,333	0.763	$14,751
5		$44,633	$44,633	0.713	$31,823
6		$19,333	$19,333	0.666	$12,875
7		$19,333	$19,333	0.623	$12,044
8		$19,333	$19,333	0.582	$11,252
9		$19,333	$19,333	0.544	$10,517
10		$44,633	$44,633	0.508	$22,673
11		$19,333	$19,333	0.475	$9,183
12		$19,333	$19,333	0.444	$8,584
13		$19,333	$19,333	0.415	$8,023
14		$19,333	$19,333	0.388	$7,501
15		$44,633	$44,633	0.362	$16,157
16		$19,333	$19,333	0.339	$6,554
17		$19,333	$19,333	0.317	$6,128
18		$19,333	$19,333	0.296	$5,722
19		$19,333	$19,333	0.277	$5,355
20		$44,633	$44,633	0.258	$11,515
21		$19,333	$19,333	0.242	$4,678
22		$19,333	$19,333	0.226	$4,369
23		$19,333	$19,333	0.211	$4,079
24		$19,333	$19,333	0.197	$3,809
25		$44,633	$44,633	0.184	$8,212
26		$19,333	$19,333	0.172	$3,325
27		$19,333	$19,333	0.161	$3,113
28		$19,333	$19,333	0.150	$2,900
29		$19,333	$19,333	0.141	$2,726
30		$44,633	$44,633	0.131	$5,847
				TOTAL PRESENT WORTH	**$311,538**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS01-03: Hydraulic Dredging with Off-Yard Disposal
Capital Cost

4/29/2010 2:20 PM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Work Plans	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
1.2 Construction Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.3 Pre-Construction Sampling (10 samples)	1	ls	$3,600.00	$8,375.00	$900.00	$8,400.00	$3,600	$8,375	$900	$8,400	$21,275
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	3	ea			$170.00	$522.00	$0	$0	$510	$1,566	$2,076
2.3 Dredge Equipment Mobilization/Demobilization	1	ea	$5,200.00				$5,200	$0	$0	$0	$5,200
3 FIELD SUPPORT											
3.1 Office Trailer	3	mo				$375.00	$0	$0	$0	$1,125	$1,125
3.2 Field Office Equipment, Utilities, & Support	3	mo		$470.00			$0	$1,410	$0	$0	$1,410
3.3 Storage Trailer	3	mo				$99.00	$0	$0	$0	$297	$297
3.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5 Site Superintendent	53	day		$188.00	$384.64		$0	$9,964	$20,386	$0	$30,350
3.6 Site Health & Safety and QA/QC	23	day		$188.00	$307.68		$0	$4,324	$7,077	$0	$11,401
4 DECONTAMINATION											
4.1 Decontamination Services	1	mo		$1,220.00	$2,245.00	$1,550.00	$0	$1,220	$2,245	$1,550	$5,015
4.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
4.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
4.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$781.00	$0	$0	$0	$781	$781
4.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$706.00	$0	$0	$0	$706	$706
4.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
5 SEDIMENT EXCAVATION											
5.1 Bathymetric Survey (pre-removal)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
5.2 Hydraulic Dredging	1,760	cy	$45.00				$79,200	$0	$0	$0	$79,200
5.3 Geotube, 60' by 100'	3	ea		$4,800.00			$0	$14,400	$0	$0	$14,400
5.4 Dewatering Pad	2,900	sy		$6.12	$10.26	$2.97	$0	$17,748	$29,754	$8,613	$56,115
5.5 Turbidity Curtain	1,000	ft		$39.90			$0	$39,900	$0	$0	$39,900
5.6 Turbidity Monitoring Buoy	1	mo				$4,080.00	$0	$0	$0	$4,080	$4,080
5.7 Test Dewatering Fluid	1	ea	$300.00	$50.00	$100.00	$50.00	$300	$50	$100	$50	$500
5.8 Confirmation Sample, Soil/Sediment	3	ea	$300.00	$50.00	$100.00	$50.00	$900	$150	$300	$150	$1,500
5.9 Site Labor, (3 laborers)	39	day			$252.80		$0	$0	$9,859	$0	$9,859
5.10 Bathymetric Survey (post-removal)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
6 DISPOSAL											
6.1 Fly Ash	70	cy		$60.00			$0	$4,200	$0	$0	$4,200
6.2 Loader, 4.5 cy	5	day			$330.80	$854.40	$0	$0	$1,654	$4,272	$5,926
6.3 Excavator, 1.5 cy	5	day			$330.80	$865.80	$0	$0	$1,654	$4,329	$5,983
6.4 Site Labor, (2 laborers)	10	day			$252.80		$0	$0	$2,528	$0	$2,528
6.5 Disposal Sampling, TCLP	1	ea	$1,700.00	$50.00	$100.00	$50.00	$1,700	$50	$100	$50	$1,900
6.6 Transportation & Disposal of Sediment, Subtitle "D"	1,774	ton	$50.00				$88,700	$0	$0	$0	$88,700
Subtotal							$191,800	$104,491	$95,717	$39,769	$431,777
Overhead on Labor Cost @ 30%								$10,449			$10,449
G & A Cost @ 10%							$19,180	$10,449	$9,572	$3,977	$43,178
Tax on Materials and Equipment Cost @ 5%								$5,225		$1,988	$7,213
Total Direct Cost							$210,980	$130,614	$105,288	$45,734	$492,617

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Indirects on Total Direct Cost @ 25%	(excluding transportation and disposal cost)										$100,742
Profit on Total Direct Cost @ 10%											$49,262
Subtotal											$642,620
Health & Safety Monitoring @ 2%											$12,852
Total Field Cost											$655,472
Contingency on Total Field Costs @ 30%											$196,642
Engineering on Total Field Cost @ 10%											$65,547
TOTAL CAPITAL COST											**$917,661**

APPENDIX C.2

MS-03 AND MS-04 CALCULATIONS AND COST ESTIMATES

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-03 and MS-04		
BASED ON: OU-4 FS SECTION 5		DRAWING NUMBER:
BY: TJR Date: 11-09 & 6-12	CHECKED BY: [illegible] 6/8/12 Date:	APPROVED BY: DATE:

Alternative MS0304-02 - Monitored Natural Recovery

Annual Cost

Yearly Site Inspection/Visit for LUCs Implementation (1 person)

Assume out of town travel to site.

Air	$400	
Car	$100	
Hours	$900	(12 hours * $75/hr)
Misc	$150	
	$1,550	

Report: Document site visit $800

Sampling

Labor, Materials, & Equipment per round (sediment sampling from boat)

Assume 2 days to sample with 3 people (1 TTNUS, 2 subs), local plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 3 days =	$2,100
car for 3 days =	$300
air =	$400
report @ $65.00 per hour for 15 hours =	$975
subcontractor (boat & crew) =	$8,400
Misc supplies, equipment, copying, etc. =	$500
	$12,675

Analytical, per round for 30 years

Collect 5 sediment samples and analyze for PAHs and metals.

type	cost each	number	total
PAHs	$150	5	$750
metals	$125	5	$625
			$1,375
40% QA/QC & Data Validation			$550
			$1,925

Sampling report assume $1,500 per round $1,500

5-year review

Site Visit and Report $23,000

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101	
SUBJECT: OU-4: MS-03 and MS-04			
BASED ON: OU-4 FS SECTION 5		DRAWING NUMBER:	
BY: TJR Date: 11-09 & 6-12	CHECKED BY: AGM Date: 6/8/12	APPROVED BY:	DATE:

Alternative MS0304-03 - Hydraulic Dredging with Off-Yard Disposal

Capital Cost

Pre-Construction Sampling

Labor, Materials, & Equipment per round (sediment sampling)

Assume 2 days to sample with 2 people (1 to travel, 1 local), plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 3 days =	$2,100
Sub: 1 person @ $40.00 per hour for 8 hours per for 2 days =	$640
car for 2 days =	$200
air =	$400
report @ $65.00 per hour for 15 hours =	$975
Misc supplies, equipment, copying, etc. =	$500
	$4,815

Analytical

Collect sediment samples and analyze for PAHs & copper.

type	cost each	number	total	
PAHs	$150	6	$900	
copper	$20	20	$400	
			$1,300	
			2	fast turn
			$2,600	
		20% QA/QC & Data Validation	$520	
			$3,120	

Dredge contaminated sediment, pumping sediment into geotubes on a dewatering pad. Collect one water sample and 3 soil/sediment samples for confirmation testing.

Analytical Costs - Dewatering Fluid

Parameter	Unit Cost	
PAHs	$ 150.00	
Metals	$ 125.00	
	$ 275.00	
	2	fast turn
	$ 550.00	

Assume no treatment of the water is required prior to discharge.

Allow tubes to dewater for 30 days. Mix 5% fly ash by volume to complete dewatering.

sediment volume	1,270	cy
percent water	20%	
solid volume	1,016	cy
5% fly ash	51	cy
disposal volume	1,067	cy or
	1,280	tons (at 1.2 tons/cy)

CLIENT:	Portsmouth Naval Shipyard	JOB NUMBER:	112G00932.0000.1101
SUBJECT:	OU-4: MS-03 and MS-04		
BASED ON:	OU-4 FS SECTION 5	DRAWING NUMBER:	
BY: TJR Date: 11-09 & 6-12	CHECKED BY: CJM Date: 6/8/12	APPROVED BY:	DATE:

Collect one sediment sample for disposal testing. Assume sediment is nonhazardous for disposal.

Parameter	Unit Cost	
TCLP	$ 850.00	
	$ 850.00	
	2	fast turn
	$ 1,700	

Time to complete work

Mob & Setup	10	days
Hydraulic Dredge	3	days
Geotube Dewatering	30	days
Mix fly ash & load for disposal	5	days
Demob	5	days
	53	days
or	11	Weeks
or	3	Month

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS0304-02: Monitored Natural Recovery
Capital Cost

11/24/2009 8:58 AM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.2 Prepare Sampling Documents & Plans	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
Subtotal							$0	$0	$11,100	$0	$11,100
Overhead on Labor Cost @ 30%									$3,330		$3,330
G & A Cost @ 10%							$0	$0	$1,110	$0	$1,110
Tax on Materials and Equipment Cost @ 5%								$0		$0	$0
Total Direct Cost							$0	$0	$15,540	$0	$15,540
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$1,554
Subtotal											$17,094
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$17,094
Contingency on Total Field Costs @ 0%											$0
Engineering on Total Field Cost @ 0%											$0
TOTAL CAPITAL COST											**$17,094**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS0304-02: Monitored Natural Recovery
Annual Cost

11/24/2009 8:58 AM

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,350		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Collection	$12,675		Collect 5 sediment samples & measure sediment thickness from boat
Sediment Analysis	$1,925		Analysis samples for metals & PAHs. Collect samples once a year for 30 years.
Sample Report	$1,500		
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$18,450	$23,000	
Contingency @ 10%	$1,845	$2,300	
TOTAL	**$20,295**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS0304-02: Monitored Natural Recovery
Present Worth Analysis

11/24/2009 8:58 AM

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$17,094		$17,094	1.000	$17,094
1		$20,295	$20,295	0.935	$18,976
2		$20,295	$20,295	0.873	$17,718
3		$20,295	$20,295	0.816	$16,561
4		$20,295	$20,295	0.763	$15,485
5		$45,595	$45,595	0.713	$32,509
6		$20,295	$20,295	0.666	$13,516
7		$20,295	$20,295	0.623	$12,644
8		$20,295	$20,295	0.582	$11,812
9		$20,295	$20,295	0.544	$11,040
10		$45,595	$45,595	0.508	$23,162
11		$20,295	$20,295	0.475	$9,640
12		$20,295	$20,295	0.444	$9,011
13		$20,295	$20,295	0.415	$8,422
14		$20,295	$20,295	0.388	$7,874
15		$45,595	$45,595	0.362	$16,505
16		$20,295	$20,295	0.339	$6,880
17		$20,295	$20,295	0.317	$6,434
18		$20,295	$20,295	0.296	$6,007
19		$20,295	$20,295	0.277	$5,622
20		$45,595	$45,595	0.258	$11,764
21		$20,295	$20,295	0.242	$4,911
22		$20,295	$20,295	0.226	$4,587
23		$20,295	$20,295	0.211	$4,282
24		$20,295	$20,295	0.197	$3,998
25		$45,595	$45,595	0.184	$8,389
26		$20,295	$20,295	0.172	$3,491
27		$20,295	$20,295	0.161	$3,267
28		$20,295	$20,295	0.150	$3,044
29		$20,295	$20,295	0.141	$2,862
30		$45,595	$45,595	0.131	$5,973
				TOTAL PRESENT WORTH	**$323,481**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS0304-03: Hydraulic Dredging with Off-Yard Disposal
Capital Cost

6/8/2012 8:53 AM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Work Plans	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
1.2 Construction Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.3 Pre-Construction Sampling (10 samples)	1	ls	$3,120.00	$1,875.00	$2,740.00	$200.00	$3,120	$1,875	$2,740	$200	$7,935
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	3	ea			$170.00	$522.00	$0	$0	$510	$1,566	$2,076
2.3 Dredge Equipment Mobilization/Demobilization	1	ea	$5,200.00				$5,200	$0	$0	$0	$5,200
3 FIELD SUPPORT											
3.1 Office Trailer	3	mo				$375.00	$0	$0	$0	$1,125	$1,125
3.2 Field Office Equipment, Utilities, & Support	3	mo		$470.00			$0	$1,410	$0	$0	$1,410
3.3 Storage Trailer	3	mo				$99.00	$0	$0	$0	$297	$297
3.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5 Site Superintendent	53	day		$188.00	$384.64		$0	$9,964	$20,386	$0	$30,350
3.6 Site Health & Safety and QA/QC	23	day		$188.00	$307.68		$0	$4,324	$7,077	$0	$11,401
4 DECONTAMINATION											
4.1 Decontamination Services	1	mo		$1,220.00	$2,245.00	$1,550.00	$0	$1,220	$2,245	$1,550	$5,015
4.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
4.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
4.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$781.00	$0	$0	$0	$781	$781
4.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$706.00	$0	$0	$0	$706	$706
4.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
5 SEDIMENT EXCAVATION											
5.1 Bathymetric Survey (pre-removal)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
5.2 Hydraulic Dredging	1,270	cy	$45.00				$57,150	$0	$0	$0	$57,150
5.3 Geotube, 60' by 100'	2	ea		$4,800.00			$0	$9,600	$0	$0	$9,600
5.4 Dewatering Pad	2,000	sy		$6.12	$10.26	$2.97	$0	$12,240	$20,520	$5,940	$38,700
5.5 Turbidity Curtain	1,000	ft		$39.90			$0	$39,900	$0	$0	$39,900
5.6 Turbidity Monitoring Buoy	1	mo				$4,080.00	$0	$0	$0	$4,080	$4,080
5.7 Test Dewatering Fluid	1	ea	$550.00	$50.00	$100.00	$50.00	$550	$50	$100	$50	$750
5.8 Confirmation Sample, Soil/Sediment	3	ea	$550.00	$50.00	$100.00	$50.00	$1,650	$150	$300	$150	$2,250
5.9 Site Labor, (3 laborers, 13 days each)	39	day			$252.80		$0	$0	$9,859	$0	$9,859
5.10 Bathymetric Survey (post-removal)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
6 DISPOSAL											
6.1 Fly Ash	51	cy		$60.00			$0	$3,060	$0	$0	$3,060
6.2 Loader, 4.5 cy	5	day			$330.80	$854.40	$0	$0	$1,654	$4,272	$5,926
6.3 Excavator, 1.5 cy	5	day			$330.80	$865.80	$0	$0	$1,654	$4,329	$5,983
6.4 Site Labor, (2 laborers)	10	day			$252.80		$0	$0	$2,528	$0	$2,528
6.5 Disposal Sampling, TCLP	1	ea	$1,700.00	$50.00	$100.00	$50.00	$1,700	$50	$100	$50	$1,900
6.6 Transportation & Disposal of Sediment, Subtitle "D"	1,280	ton	$50.00				$64,000	$0	$0	$0	$64,000
Subtotal							$145,570	$86,543	$88,323	$28,896	$349,332
Overhead on Labor Cost @ 30%								$8,654			$8,654
G & A Cost @ 10%							$14,557	$8,654	$8,832	$2,890	$34,933
Tax on Materials and Equipment Cost @ 5%								$4,327		$1,445	$5,772
Total Direct Cost							$160,127	$108,179	$97,155	$33,230	$398,691
Indirects on Total Direct Cost @ 25%			(excluding transportation and disposal cost)								$83,435
Profit on Total Direct Cost @ 10%											$39,869
Subtotal											$521,996

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Health & Safety Monitoring @ 2%											$10,440
Total Field Cost											$532,436
Contingency on Total Field Costs @ 30%											$159,731
Engineering on Total Field Cost @ 10%											$53,244
TOTAL CAPITAL COST											**$745,410**

APPENDIX C.3

MS-11 CALCULATIONS AND COST ESTIMATES

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101	
SUBJECT: OU-4: MS-11			
BASED ON: OU-4 FS SECTION 9		DRAWING NUMBER:	
BY: TJR Date: 11-2009	CHECKED BY: TJR Date: 11/24/09	APPROVED BY:	DATE:

Alternative MS08-11 - Monitored Natural Recovery

Annual Cost

Yearly Site Inspection/Visit for LUCs Implementation (1 person)

Assume out of town travel to site.

Air	$400	
Car	$100	
Hours	$900	(12 hours * $75/hr)
Misc	$150	
	$1,550	

Report: Document site visit $800

Sampling

Labor, Materials, & Equipment per round (sediment sampling from boat)

Assume 2 days to sample with 3 people (1 TTNUS, 2 subs), local plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 3 days =	$2,100
car for 3 days =	$300
air =	$400
report @ $65.00 per hour for 15 hours =	$975
subcontractor (boat & crew) =	$8,400
Misc supplies, equipment, copying, etc. =	$500
	$12,675

Analytical, per round for 30 years

Collect 3 sediment samples and analyze for metals.

type	cost each	number	total
metals	$125	3	$375
			$375
40% QA/QC & Data Validation			$150
			$525

Sampling report assume $1,500 per round $1,500

5-year review

Site Visit and Report $23,000

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS11-02: Monitored Natural Recovery
Capital Cost

11/23/2009 10:00 AM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.2 Prepare Sampling Documents & Plans	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
Subtotal							$0	$0	$11,100	$0	$11,100
Overhead on Labor Cost @ 30%									$3,330		$3,330
G & A Cost @ 10%							$0	$0	$1,110	$0	$1,110
Tax on Materials and Equipment Cost @ 5%								$0		$0	$0
Total Direct Cost							$0	$0	$15,540	$0	$15,540
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$1,554
Subtotal											$17,094
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$17,094
Contingency on Total Field Costs @ 0%											$0
Engineering on Total Field Cost @ 0%											$0
TOTAL CAPITAL COST											**$17,094**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS11-02: Monitored Natural Recovery
Annual Cost

11/23/2009 10:00 AM

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,350		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Collection	$12,675		Collect 3 sediment samples & measure sediment thickness from boat
Sediment Analysis	$525		Analysis samples for metals. Collect samples once a year for 30 years.
Samlpe Report	$1,500		
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$17,050	$23,000	
Contingency @ 10%	$1,705	$2,300	
TOTAL	**$18,755**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS11-02: Monitored Natural Recovery
Present Worth Analysis

11/23/2009 10:00 AM

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$17,094		$17,094	1.000	$17,094
1		$18,755	$18,755	0.935	$17,536
2		$18,755	$18,755	0.873	$16,373
3		$18,755	$18,755	0.816	$15,304
4		$18,755	$18,755	0.763	$14,310
5		$44,055	$44,055	0.713	$31,411
6		$18,755	$18,755	0.666	$12,491
7		$18,755	$18,755	0.623	$11,684
8		$18,755	$18,755	0.582	$10,915
9		$18,755	$18,755	0.544	$10,203
10		$44,055	$44,055	0.508	$22,380
11		$18,755	$18,755	0.475	$8,909
12		$18,755	$18,755	0.444	$8,327
13		$18,755	$18,755	0.415	$7,783
14		$18,755	$18,755	0.388	$7,277
15		$44,055	$44,055	0.362	$15,948
16		$18,755	$18,755	0.339	$6,358
17		$18,755	$18,755	0.317	$5,945
18		$18,755	$18,755	0.296	$5,551
19		$18,755	$18,755	0.277	$5,195
20		$44,055	$44,055	0.258	$11,366
21		$18,755	$18,755	0.242	$4,539
22		$18,755	$18,755	0.226	$4,239
23		$18,755	$18,755	0.211	$3,957
24		$18,755	$18,755	0.197	$3,695
25		$44,055	$44,055	0.184	$8,106
26		$18,755	$18,755	0.172	$3,226
27		$18,755	$18,755	0.161	$3,020
28		$18,755	$18,755	0.150	$2,813
29		$18,755	$18,755	0.141	$2,644
30		$44,055	$44,055	0.131	$5,771
				TOTAL PRESENT WORTH	**$304,372**

APPENDIX C.4

MS-12 CALCULATIONS AND COST ESTIMATES

CLIENT:	Portsmouth Naval Shipyard	JOB NUMBER:	112G00932.0000.1101
SUBJECT:	OU-4: MS-12A		
BASED ON:	OU-4 FS SECTION 10	DRAWING NUMBER:	
BY: TJR Date: 11-09, 6-10 & 6-12	CHECKED BY: [illegible] Date: 6/4/12	APPROVED BY:	DATE:

Alternative MS12A-02 - Containment, LUCs, and Monitoring

Wall Installation

Install temporary wall to protect installation of new concrete wall.

Time to complete work

Mob & Setup	5 days
Temporary Wall Installation	3 days
Concrete Wall	10 days
Demob	2 days
	20 days
or	4 Weeks
or	1 Month

O & M Cost

Electric Usage

Assume 1.5 hp pump operating for 10 minutes per hour or 4 hours per day.

1.5	hp
0.746	kW/hp
1.119	kW
4	hr/day
4.476	kW-hr/day
365	day/yr
1634	kW-hr/yr

Equipment

Bag Filters - Replace all 6 filters every month.
Systems Operator - assume 14 hours per month.
System Report - one report per year @ $1,500.
Replace pump every 5 years.

Annual Cost

Yearly Site Inspection/Visit for LUCs Implementation (1 person)

Assume out of town travel to site.

Air	$400	
Car	$100	
Hours	$900	(12 hours * $75/hr)
Misc	$150	
	$1,550	

Report: Document site visit $800

Sampling

Labor, Materials, & Equipment per round (sediment sampling)
Assume 1 day to sample with 2 people (1 TTNUS, 1 subs), local plus 1 day of preparations

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-12A		
BASED ON: OU-4 FS SECTION 10		DRAWING NUMBER:
BY: TJR Date: 11-09, 6-10 & 6-12	CHECKED BY: CJM 6/4/12 Date:	APPROVED BY: DATE:

1 person @ $70.00 per hour for 10 hours per for 2 days =	$1,400
Sub: 1 person @ $40.00 per hour for 8 hours per for 1 day =	$320
car for 2 days =	$200
air =	$400
report @ $65.00 per hour for 15 hours =	$975
Misc supplies, equipment, copying, etc. =	$500
	$3,795

Analytical, per round for 30 years
Collect 3 sediment samples and analyze for metals.

type	cost each	number	total
metals	$125	3	$375
PAHs	$150	3	$450
			$825
40% QA/QC & Data Validation			$330
			$1,155

Sampling report assume $1,500 per round $1,500

5-year review

Site Visit and Report $23,000

Alternative MS12A-03 - Partial Removal, Off-Yard Disposal, and LUCs

Capital Cost

Pre-Construction Survey
Conduct ell grass survey by subcontractor for $5,000

Site Work
Dredge contaminated sediment, pumping sediment into geotubes on a dewatering pad. Collect one water sample and 3 soil/sediment samples for confirmation testing.
Analytical Costs - per sample

Parameter	Unit Cost	
Metals	$ 125.00	
PAHs	$ 150.00	
	$ 275.00	
	2	fast turn
	$ 550	

Assume no treatment of the water is required prior to discharge.

Allow tubes to dewater for 30 days. Mix 5% fly ash by volume to complete dewatering.

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-12A		
BASED ON: OU-4 FS SECTION 10		DRAWING NUMBER:
BY: TJR Date: 11-09, 6-10 & 6-12	CHECKED BY: [illegible] Date: 6/4/12	APPROVED BY: DATE:

sediment volume	1,585	cy
percent water	20%	
solid volume	1,268	cy
5% fly ash	63	cy
disposal volume	1,331	cy or
	1,598	tons (at 1.2 tons/cy)

Collect one sediment sample for disposal testing. Assume sediment is nonhazardous for disposal.

Parameter	Unit Cost	
TCLP	$ 850.00	
	$ 850.00	
	2	fast turn
	$ 1,700	

Time to complete work

Mob & Setup	5	days
Wall Installation	15	days
Hydraulic Dredge	5	days
Geotube Dewatering	30	days
Mix fly ash & load for disposal	5	days
Demob	5	days
	65	days
or	13	Weeks
or	3	Month

O & M Cost

Same as Alternative MS12A-02

Annual Cost

Yearly Site Inspection/Visit for LUCs Implementation (1 person)

Same as Alternative MS12A-02

Sampling

Labor, Materials, & Equipment per round (sediment sampling)

Assume 1 day to sample with 2 people (1 TTNUS, 1 subs), local plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 2 days =	$1,400
Sub: 1 person @ $40.00 per hour for 8 hours per for 1 day =	$320
car for 2 days =	$200
air =	$400
report @ $65.00 per hour for 15 hours =	$975
Misc supplies, equipment, copying, etc. =	$500
	$3,795

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-12A		
BASED ON: OU-4 FS SECTION 10		DRAWING NUMBER:
BY: TJR Date: 11-09, 6-10 & 6-12	CHECKED BY: GJR Date: 6/4/12	APPROVED BY: DATE:

Analytical, per round for 30 years
Collect 1 sediment samples and analyze for metals.

type	cost each	number	total
metals	$125	1	$125
PAHs	$150	1	$150
			$275
40% QA/QC & Data Validation			$110
			$385

Sampling report assume $1,500 per round $1,500

5-year review
Site Visit and Report $23,000

Alternative MS12A-04 - Removal and Off-Yard Disposal

Capital Cost

Pre-Construction Survey
Same as Alternative MS12A-03

Site Work
Dredge contaminated sediment from outside building, pumping sediment into geotubes on a dewatering pad. Power wash contaminated sediments from inside building, pumping sediments into geotubes on a dewatering pad. Collect one water sample and 3 soil/sediment samples for confirmation testing.

Analytical Costs - per sample

Parameter	Unit Cost	
PAHs	$ 150.00	
Metals	$ 125.00	
	$ 275.00	
	2	fast turn
	$ 550	

Assume no treatment of the water is required prior to discharge.

Allow tubes to dewater for 30 days. Mix 5% fly ash by volume to complete dewatering.

outside sediment volume	1,585	cy
percent water	20%	
solid volume	1,268	cy
5% fly ash	63	cy
disposal volume	1,331	cy or
	1,598	tons (at 1.2 tons/cy)

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-12A		
BASED ON: OU-4 FS SECTION 10		DRAWING NUMBER:
BY: TJR Date: 11-09, 6-10 & 6-12	CHECKED BY: MJM Date: 6/4/12	APPROVED BY: DATE:

inside sediment volume	150	cy
percent water	0%	
solid volume	150	cy
5% fly ash	8	cy
disposal volume	158	cy or
	189	tons (at 1.2 tons/cy)
total disposal volume	1,787	tons

Collect one sediment sample for disposal testing. Assume sediment is nonhazardous for disposal.

Parameter	Unit Cost	
TCLP	$ 850.00	
	$ 850.00	
	2	fast turn
	$ 1,700	

Time to complete work

Mob & Setup	5	days
Temporary Wall Installation & Net	3	days
Hydraulic Dredge	5	days
Inside Sediment Removal	5	days
Geotube Dewatering	30	days
Mix fly ash & load for disposal	5	days
Demob	5	days
	58	days
or	12	Weeks
or	3	Month

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-02: Containment, LUCs, and Monitoring
Capital Cost

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	Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1	**PROJECT PLANNING & DOCUMENTS**											
1.1	Prepare LUC Documents	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.2	Prepare Sampling Documents & Plans	100	hr			$37.00		$0	$0	$3,700	$0	$3,700
1.3	Prepare Work Plans	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
1.4	Construction Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
2	**MOBILIZATION AND DEMOBILIZATION**											
2.1	Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2	Equipment Mobilization/Demobilization	3	ea			$170.00	$522.00	$0	$0	$510	$1,566	$2,076
2.3	Crane Mobilization/Demobilization	35	mile				$64.50	$0	$0	$0	$2,258	$2,258
3	**FIELD SUPPORT**											
3.1	Office Trailer	1	mo				$375.00	$0	$0	$0	$375	$375
3.2	Field Office Equipment, Utilities, & Support	1	mo		$470.00			$0	$470	$0	$0	$470
3.3	Storage Trailer	1	mo				$99.00	$0	$0	$0	$99	$99
3.4	Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5	Site Superintendent	20	day		$188.00	$384.64		$0	$3,760	$7,693	$0	$11,453
3.6	Site Health & Safety and QA/QC	20	day		$188.00	$307.68		$0	$3,760	$6,154	$0	$9,914
4	**WALL & PUMP**											
4.1	Temporary Wall (barrier & liner for 1 month)	250	lf		$10.00			$0	$2,500	$0	$0	$2,500
4.2	Install/Remove Temporary Wall, Crane	2	day			$635.00	$2,525.00	$0	$0	$1,270	$5,050	$6,320
4.3	Concrete Wall, 6' high	250	lf		$33.50	$46.20	$25.80	$0	$8,375	$11,550	$6,450	$26,375
4.4	Sump, 50 gal tank w/ pump	1	ea		$3,100.00	$3,720.00		$0	$3,100	$3,720	$0	$6,820
4.5	Bag Filter, 6 bags	1	ea		$9,480.00	$320.00		$0	$9,480	$320	$0	$9,800
4.6	Electric Service/Equipment	1	ea		$1,850.00	$2,280.00		$0	$1,850	$2,280	$0	$4,130
4.7	Piping, Valves, etc.	1	ls		$1,258.00	$1,423.00		$0	$1,258	$1,423	$0	$2,681
4.8	Heating and Insulation	1	ls		$1,400.00	$450.00		$0	$1,400	$450	$0	$1,850
4.9	Trash Pumps, 2 each	30	day				$117.00	$0	$0	$0	$3,510	$3,510
4.10	Concrete Saw	3	day				$141.00	$0	$0	$0	$423	$423
4.11	Jackhammer/Air Compressor	5	day				$192.00	$0	$0	$0	$960	$960
4.12	Site Labor, (3 laborers @ 20 days each)	60	day			$252.80		$0	$0	$15,168	$0	$15,168
	Subtotal							$1,250	$36,953	$76,437	$24,191	$138,831
	Overhead on Labor Cost @ 30%									$22,931		$22,931
	G & A Cost @ 10%							$375	$3,695	$7,644	$2,419	$14,133
	Tax on Materials and Equipment Cost @ 5%								$1,848		$1,210	$3,057
	Total Direct Cost							$1,625	$42,496	$107,012	$27,819	$178,952
	Indirects on Total Direct Cost @ 25%											$44,738
	Profit on Total Direct Cost @ 10%											$17,895
	Subtotal											$241,586
	Health & Safety Monitoring @ 2%											$4,832
	Total Field Cost											$246,417
	Contingency on Total Field Costs @ 40%											$98,567
	Engineering on Total Field Cost @ 10%											$24,642
	TOTAL CAPITAL COST											**$369,626**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-02: Containment, LUCs, and Monitoring
Operation and Maintenance Costs per Year

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	Item	Qty	Unit	Unit Cost	Subtotal Cost	Notes
1	Energy - Electric	1,634	kWh	$0.18	$294	
2	Replace Filter Bags	60	ea	$5.00	$300	6 bags, monthly
3	Operating Labor	168	hr	$50.00	$8,400	4 hours per week
4	System Report	1	ea	$1,500.00	$1,500	
					$10,494	
	Replace Pump every 5 years				$600	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-02: Containment, LUCs, and Monitoring
Annual Cost

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Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,350		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Collection	$3,795		Collect 3 sediment samples.
Sediment Analysis	$1,155		Analysis samples for PAHs and metals. Collect samples once a year for 30 years.
Sample Report	$1,500		
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$8,800	$23,000	
Contingency @ 10%	$880	$2,300	
TOTAL	**$9,680**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-02: Containment, LUCs, and Monitoring
Present Worth Analysis

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Year	Capital Cost	O and M Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$369,626			$369,626	1.000	$369,626
1		$10,494	$9,680	$20,174	0.935	$18,863
2		$10,494	$9,680	$20,174	0.873	$17,612
3		$10,494	$9,680	$20,174	0.816	$16,462
4		$10,494	$9,680	$20,174	0.763	$15,393
5		$11,094	$34,980	$46,074	0.713	$32,851
6		$10,494	$9,680	$20,174	0.666	$13,436
7		$10,494	$9,680	$20,174	0.623	$12,568
8		$10,494	$9,680	$20,174	0.582	$11,741
9		$10,494	$9,680	$20,174	0.544	$10,975
10		$11,094	$34,980	$46,074	0.508	$23,406
11		$10,494	$9,680	$20,174	0.475	$9,583
12		$10,494	$9,680	$20,174	0.444	$8,957
13		$10,494	$9,680	$20,174	0.415	$8,372
14		$10,494	$9,680	$20,174	0.388	$7,828
15		$11,094	$34,980	$46,074	0.362	$16,679
16		$10,494	$9,680	$20,174	0.339	$6,839
17		$10,494	$9,680	$20,174	0.317	$6,395
18		$10,494	$9,680	$20,174	0.296	$5,972
19		$10,494	$9,680	$20,174	0.277	$5,588
20		$11,094	$34,980	$46,074	0.258	$11,887
21		$10,494	$9,680	$20,174	0.242	$4,882
22		$10,494	$9,680	$20,174	0.226	$4,559
23		$10,494	$9,680	$20,174	0.211	$4,257
24		$10,494	$9,680	$20,174	0.197	$3,974
25		$11,094	$34,980	$46,074	0.184	$8,478
26		$10,494	$9,680	$20,174	0.172	$3,470
27		$10,494	$9,680	$20,174	0.161	$3,248
28		$10,494	$9,680	$20,174	0.150	$3,026
29		$10,494	$9,680	$20,174	0.141	$2,845
30		$11,094	$34,980	$46,074	0.131	$6,036
					TOTAL PRESENT WORTH	**$675,807**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-03: Partial Removal, Off-Yard Disposal, and LUCs
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.2 Prepare Sampling Documents & Plans	100	hr			$37.00		$0	$0	$3,700	$0	$3,700
1.3 Prepare Work Plans	400	hr			$37.00		$0	$0	$14,800	$0	$14,800
1.4 Construction Completion Report	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
1.5 Pre-Construction Survey (ell grass)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	3	ea			$170.00	$522.00	$0	$0	$510	$1,566	$2,076
2.3 Crane Mobilization/Demobilization	35	mile				$64.50	$0	$0	$0	$2,258	$2,258
2.4 Dredge Equipment Mobilization/Demobilization	1	ea	$5,200.00				$5,200	$0	$0	$0	$5,200
3 FIELD SUPPORT											
3.1 Office Trailer	3	mo				$375.00	$0	$0	$0	$1,125	$1,125
3.2 Field Office Equipment, Utilities, & Support	3	mo		$470.00			$0	$1,410	$0	$0	$1,410
3.3 Storage Trailer	3	mo				$99.00	$0	$0	$0	$297	$297
3.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5 Site Superintendent	65	day		$188.00	$384.64		$0	$12,220	$25,002	$0	$37,222
3.6 Site Health & Safety and QA/QC	35	day		$188.00	$307.68		$0	$6,580	$10,769	$0	$17,349
4 DECONTAMINATION											
4.1 Decontamination Services	1	mo		$1,220.00	$2,245.00	$1,550.00	$0	$1,220	$2,245	$1,550	$5,015
4.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
4.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
4.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$781.00	$0	$0	$0	$781	$781
4.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$706.00	$0	$0	$0	$706	$706
4.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
5 WALL & PUMP											
5.1 Temporary Wall (barrier & liner for 1 month)	250	lf		$10.00			$0	$2,500	$0	$0	$2,500
5.2 Install/Remove Temporary Wall, Crane	2	day			$635.00	$2,525.00	$0	$0	$1,270	$5,050	$6,320
5.3 Concrete Wall, 6' high	250	lf		$33.50	$46.20	$25.80	$0	$8,375	$11,550	$6,450	$26,375
5.4 Sump, 50 gal tank w/ pump	1	ea		$3,100.00	$3,720.00		$0	$3,100	$3,720	$0	$6,820
5.5 Bag Filter, 6 bags	1	ea		$9,480.00	$320.00		$0	$9,480	$320	$0	$9,800
5.6 Electric Service/Equipment	1	ea		$1,850.00	$2,280.00		$0	$1,850	$2,280	$0	$4,130
5.7 Piping, Valves, etc.	1	ls		$1,258.00	$1,423.00		$0	$1,258	$1,423	$0	$2,681
5.8 Heating and Insulation	1	ls		$1,400.00	$450.00		$0	$1,400	$450	$0	$1,850
5.9 Trash Pumps, 2 each	30	day				$117.00	$0	$0	$0	$3,510	$3,510
5.10 Concrete Saw	3	day				$141.00	$0	$0	$0	$423	$423
5.11 Jackhammer/Air Compressor	5	day				$192.00	$0	$0	$0	$960	$960
5.12 Site Labor, (3 laborers @ 20 days each)	60	day			$252.80		$0	$0	$15,168	$0	$15,168
6 SEDIMENT EXCAVATION											
6.1 Hydraulic Dredging	1,585	cy	$45.00				$71,325	$0	$0	$0	$71,325
6.2 Geotube, 60' by 100'	4	ea		$4,800.00			$0	$19,200	$0	$0	$19,200
6.3 Dewatering Pad	4,000	sy		$6.12	$10.26	$2.97	$0	$24,480	$41,040	$11,880	$77,400
6.4 Turbidity Curtain	500	ft		$39.90			$0	$19,950	$0	$0	$19,950
6.5 Turbidity Monitoring Buoy	1	mo				$4,080.00	$0	$0	$0	$4,080	$4,080
6.6 Test Dewatering Fluid	1	ea	$550.00	$50.00	$100.00	$50.00	$550	$50	$100	$50	$750
6.7 Confirmation Sample, Soil/Sediment	3	ea	$550.00	$50.00	$100.00	$50.00	$1,650	$150	$300	$150	$2,250
6.8 Site Labor, (3 laborers @ 14 days each)	42	day			$252.80		$0	$0	$10,618	$0	$10,618

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
7 DISPOSAL											
7.1 Fly Ash	30	cy		$60.00			$0	$1,800	$0	$0	$1,800
7.2 Loader, 4.5 cy	5	day			$330.80	$854.40	$0	$0	$1,654	$4,272	$5,926
7.3 Excavator, 1.5 cy	5	day			$330.80	$865.80	$0	$0	$1,654	$4,329	$5,983
7.4 Site Labor, (2 laborers @ 5 days each)	10	day			$252.80		$0	$0	$2,528	$0	$2,528
7.5 Disposal Sampling, TCLP	1	ea	$1,700.00	$50.00	$100.00	$50.00	$1,700	$50	$100	$50	$1,900
7.6 Transportation & Disposal of Sediment, Subtitle "D"	1,598	ton	$50.00				$79,900	$0	$0	$0	$79,900
Subtotal							$167,525	$117,773	$166,150	$53,287	$504,735
Overhead on Labor Cost @ 30%									$49,845		$49,845
G & A Cost @ 10%							$50,258	$11,777	$16,615	$5,329	$83,978
Tax on Materials and Equipment Cost @ 5%								$5,889		$2,664	$8,553
Total Direct Cost							$217,783	$135,439	$232,610	$61,279	$647,111
Indirects on Total Direct Cost @ 25%			(excluding transportation and disposal cost)								$141,565
Profit on Total Direct Cost @ 10%											$64,711
Subtotal											$853,387
Health & Safety Monitoring @ 2%											$17,068
Total Field Cost											$870,455
Contingency on Total Field Costs @ 40%											$348,182
Engineering on Total Field Cost @ 10%											$87,045
TOTAL CAPITAL COST											**$1,305,682**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-03: Partial Removal, Off-Yard Disposal, and LUCs
Operation and Maintenance Costs per Year

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	Item	Qty	Unit	Unit Cost	Subtotal Cost	Notes
1	Energy - Electric	1,634	kWh	$0.18	$294	
2	Replace Filter Bags	60	ea	$5.00	$300	6 bags, monthly
3	Operating Labor	168	hr	$50.00	$8,400	4 hours per week
4	System Report	1	ea	$1,500.00	$1,500	
					$10,494	
	Replace Pump every 5 years				$600	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-03: Partial Removal, Off-Yard Disposal, and LUCs
Annual Cost

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Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,350		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Collection	$3,795		Collect 1 sediment samples.
Sediment Analysis	$385		Analysis samples for PAHS and metals. Collect samples once a year for 30 years.
Sample Report	$1,500		
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$8,030	$23,000	
Contingency @ 10%	$803	$2,300	
TOTAL	**$8,833**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-03: Partial Removal, Off-Yard Disposal, and LUCs
Present Worth Analysis

Year	Capital Cost	O and M Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$1,305,682			$1,305,682	1.000	$1,305,682
1		$10,494	$8,833	$19,327	0.935	$18,071
2		$10,494	$8,833	$19,327	0.873	$16,873
3		$10,494	$8,833	$19,327	0.816	$15,771
4		$10,494	$8,833	$19,327	0.763	$14,747
5		$11,094	$34,133	$45,227	0.713	$32,247
6		$10,494	$8,833	$19,327	0.666	$12,872
7		$10,494	$8,833	$19,327	0.623	$12,041
8		$10,494	$8,833	$19,327	0.582	$11,248
9		$10,494	$8,833	$19,327	0.544	$10,514
10		$11,094	$34,133	$45,227	0.508	$22,975
11		$10,494	$8,833	$19,327	0.475	$9,180
12		$10,494	$8,833	$19,327	0.444	$8,581
13		$10,494	$8,833	$19,327	0.415	$8,021
14		$10,494	$8,833	$19,327	0.388	$7,499
15		$11,094	$34,133	$45,227	0.362	$16,372
16		$10,494	$8,833	$19,327	0.339	$6,552
17		$10,494	$8,833	$19,327	0.317	$6,127
18		$10,494	$8,833	$19,327	0.296	$5,721
19		$10,494	$8,833	$19,327	0.277	$5,354
20		$11,094	$34,133	$45,227	0.258	$11,669
21		$10,494	$8,833	$19,327	0.242	$4,677
22		$10,494	$8,833	$19,327	0.226	$4,368
23		$10,494	$8,833	$19,327	0.211	$4,078
24		$10,494	$8,833	$19,327	0.197	$3,807
25		$11,094	$34,133	$45,227	0.184	$8,322
26		$10,494	$8,833	$19,327	0.172	$3,324
27		$10,494	$8,833	$19,327	0.161	$3,112
28		$10,494	$8,833	$19,327	0.150	$2,899
29		$10,494	$8,833	$19,327	0.141	$2,725
30		$11,094	$34,133	$45,227	0.131	$5,925
					TOTAL PRESENT WORTH	**$1,601,353**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-04: Removal and Off-Yard Disposal
Capital Cost

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Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Work Plans	400	hr			$37.00		$0	$0	$14,800	$0	$14,800
1.2 Construction Completion Report	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
1.3 Pre-Construction Survey (ell grass)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	4	ea			$170.00	$522.00	$0	$0	$680	$2,088	$2,768
2.3 Crane Mobilization/Demobilization	35	mile				$64.50	$0	$0	$0	$2,258	$2,258
2.4 Dredge Equipment Mobilization/Demobilization	1	ea	$5,200.00				$5,200	$0	$0	$0	$5,200
3 FIELD SUPPORT											
3.1 Office Trailer	3	mo				$375.00	$0	$0	$0	$1,125	$1,125
3.2 Field Office Equipment, Utilities, & Support	3	mo		$470.00			$0	$1,410	$0	$0	$1,410
3.3 Storage Trailer	3	mo				$99.00	$0	$0	$0	$297	$297
3.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5 Site Superintendent	58	day		$188.00	$384.64		$0	$10,904	$22,309	$0	$33,213
3.6 Site Health & Safety and QA/QC	28	day		$188.00	$307.68		$0	$5,264	$8,615	$0	$13,879
4 DECONTAMINATION											
4.1 Decontamination Services	1	mo		$1,220.00	$2,245.00	$1,550.00	$0	$1,220	$2,245	$1,550	$5,015
4.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
4.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
4.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$781.00	$0	$0	$0	$781	$781
4.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$706.00	$0	$0	$0	$706	$706
4.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
5 TEMPORARY WALL, NET, & SEDIMENT REMOVAL (inside)											
5.1 Temporary Wall (barrier & liner for 1 month)	250	lf		$10.00			$0	$2,500	$0	$0	$2,500
5.2 Install/Remove Temporary Wall, Crane	2	day			$635.00	$2,525.00	$0	$0	$1,270	$5,050	$6,320
5.3 Pressure Washers, 2 each	10	day				$117.00	$0	$0	$0	$1,170	$1,170
5.4 Safety Net	9,000	sf				$0.50	$0	$0	$0	$4,500	$4,500
5.5 Sediment Pumps, 2 each	10	day				$117.00	$0	$0	$0	$1,170	$1,170
5.6 Skid Steer w/ attachments	5	day				$335.60	$0	$0	$0	$1,678	$1,678
5.7 Site Labor, (4 laborers @ 5 days each)	20	day			$252.80		$0	$0	$5,056	$0	$5,056
6 SEDIMENT EXCAVATION											
6.1 Hydraulic Dredging	1,585	cy	$45.00				$71,325	$0	$0	$0	$71,325
6.2 Geotube, 60' by 100'	4	ea		$4,800.00			$0	$19,200	$0	$0	$19,200
6.3 Dewatering Pad	4,000	sy		$6.12	$10.26	$2.97	$0	$24,480	$41,040	$11,880	$77,400
6.4 Turbidity Curtain	500	ft		$39.90			$0	$19,950	$0	$0	$19,950
6.5 Turbidity Monitoring Buoy	1	mo				$4,080.00	$0	$0	$0	$4,080	$4,080
6.6 Test Dewatering Fluid	1	ea	$550.00	$50.00	$100.00	$50.00	$550	$50	$100	$50	$750
6.7 Confirmation Sample, Soil/Sediment	3	ea	$550.00	$50.00	$100.00	$50.00	$1,650	$150	$300	$150	$2,250
6.8 Site Labor, (3 laborers @ 14 days each)	42	day			$252.80		$0	$0	$10,618	$0	$10,618
7 DISPOSAL											
7.1 Fly Ash	71	cy		$60.00			$0	$4,260	$0	$0	$4,260
7.2 Loader, 4.5 cy	5	day			$330.80	$854.40	$0	$0	$1,654	$4,272	$5,926
7.3 Excavator, 1.5 cy	5	day			$330.80	$865.80	$0	$0	$1,654	$4,329	$5,983
7.4 Site Labor, (2 laborers @ 5 days each)	10	day			$252.80		$0	$0	$2,528	$0	$2,528
7.5 Disposal Sampling, TCLP	1	ea	$1,700.00	$50.00	$100.00	$50.00	$1,700	$50	$100	$50	$1,900
7.6 Transportation & Disposal of Sediment, Subtitle "D"	1,787	ton	$50.00				$89,350	$0	$0	$0	$89,350
Subtotal							$176,975	$92,138	$122,369	$50,984	$442,465

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12A-04: Removal and Off-Yard Disposal
Capital Cost

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Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Overhead on Labor Cost @ 30%									$36,711		$36,711
G & A Cost @ 10%							$53,093	$9,214	$12,237	$5,098	$79,642
Tax on Materials and Equipment Cost @ 5%								$4,607		$2,549	$7,156
Total Direct Cost							$230,068	$105,959	$171,316	$58,631	$565,973
Indirects on Total Direct Cost @ 25%		(excluding transportation and disposal cost)									$118,918
Profit on Total Direct Cost @ 10%											$56,597
Subtotal											$741,489
Health & Safety Monitoring @ 2%											$14,830
Total Field Cost											$756,319
Contingency on Total Field Costs @ 40%											$302,528
Engineering on Total Field Cost @ 10%											$75,632
TOTAL CAPITAL COST											**$1,134,478**

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101	
SUBJECT: OU-4: MS-12B			
BASED ON: OU-4 FS SECTION 10		DRAWING NUMBER:	
BY: TJR Date: 11-09 & 7-10	CHECKED BY: [illegible] Date: 7/6/10	APPROVED BY:	DATE:

Alternative MS12B-02 - Monitored Natural Recovery

Annual Cost

Yearly Site Inspection/Visit for LUCs Implementation (1 person)

Assume out of town travel to site.

Air	$400	
Car	$100	
Hours	$900	(12 hours * $75/hr)
Misc	$150	
	$1,550	

Report: Document site visit $800

Sampling

Labor, Materials, & Equipment per round (sediment sampling from boat)

Assume 2 days to sample with 3 people (1 TTNUS, 2 subs), local plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 3 days =	$2,100
car for 3 days =	$300
air =	$400
report @ $65.00 per hour for 15 hours =	$975
subcontractor (boat & crew) =	$8,400
Misc supplies, equipment, copying, etc. =	$500
	$12,675

Analytical, per round for 30 years

Collect 5 sediment samples and analyze for metals.

type	cost each	number	total
metals	$125	5	$625
			$625
40% QA/QC & Data Validation			$250
			$875

Sampling report assume $1,500 per round $1,500

5-year review

Site Visit and Report $23,000

CLIENT: Portsmouth Naval Shipyard		JOB NUMBER: 112G00932.0000.1101
SUBJECT: OU-4: MS-12B		
BASED ON: OU-4 FS SECTION 10		DRAWING NUMBER:
BY: TJR Date: 11-09 & 7-10	CHECKED BY: Date: 7/6/10	APPROVED BY: DATE:

Alternative MS12B-03 - Hydraulic Dredging with Off-Yard Disposal

Capital Cost

Pre-Construction Sampling

Labor, Materials, & Equipment per round (sediment sampling from boat)

Assume 3 days to sample with 3 people (1 to travel, 2 local), plus 1 day of preparations

1 person @ $70.00 per hour for 10 hours per for 4 days =	$2,800
car for 4 days =	$400
air =	$400
report @ $65.00 per hour for 15 hours =	$975
subcontractor (boat & crew) =	$12,600
Misc supplies, equipment, copying, etc. =	$500
	$17,675

Analytical

Collect 10 sediment samples and analyze for PAHs.

type	cost each	number	total	
PAHs	$150	10	$1,500	
			$1,500	
			2	fast turn
			$3,000	
20% QA/QC & Data Validation			$600	
			$3,600	

Site Work

Dredge contaminated sediment, pumping sediment into geotubes on a dewatering pad. Collect one water sample and 3 soil/sediment samples for confirmation testing.

Analytical Costs - per sample

Parameter	Unit Cost	
Metals	$ 125.00	
	$ 125.00	
	2	fast turn
	$ 250	

Assume no treatment of the water is required prior to discharge.

Allow tubes to dewater for 30 days. Mix 5% fly ash by volume to complete dewatering.

sediment volume	335	cy
percent water	50%	
solid volume	168	cy
5% fly ash	8	cy
disposal volume	176	cy or
	211	tons (at 1.2 tons/cy)

CLIENT:	Portsmouth Naval Shipyard	JOB NUMBER:	112G00932.0000.1101
SUBJECT:	OU-4: MS-12B		
BASED ON:	OU-4 FS SECTION 10	DRAWING NUMBER:	
BY: TJR Date: 11-09 & 7-10	CHECKED BY: TWS Date: 7/6/10	APPROVED BY:	DATE:

Collect one sediment sample for disposal testing. Assume sediment is nonhazardous for disposal.

Parameter	Unit Cost	
TCLP	$ 850.00	
	$ 850.00	
	2	fast turn
	$ 1,700	

Time to complete work

Mob & Setup	10	days
Hydraulic Dredge	2	days
Geotube Dewatering	30	days
Mix fly ash & load for disposal	2	days
Demob	5	days
	49	days
or	10	Weeks
or	2	Month

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12B-02: Monitored Natural Recovery
Capital Cost

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Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.2 Prepare Sampling Documents & Plans	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
Subtotal							$0	$0	$11,100	$0	$11,100
Overhead on Labor Cost @ 30%									$3,330		$3,330
G & A Cost @ 10%							$0	$0	$1,110	$0	$1,110
Tax on Materials and Equipment Cost @ 5%								$0		$0	$0
Total Direct Cost							$0	$0	$15,540	$0	$15,540
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$1,554
Subtotal											$17,094
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$17,094
Contingency on Total Field Costs @ 0%											$0
Engineering on Total Field Cost @ 0%											$0
TOTAL CAPITAL COST											**$17,094**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12B-02: Monitored Natural Recovery
Annual Cost

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Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,350		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Collection	$12,675		Collect 5 sediment samples & measure sediment thickness from boat
Sediment Analysis	$875		Analysis samples for metals. Collect samples once a year for 30 years.
Samlpe Report	$1,500		
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$17,400	$23,000	
Contingency @ 10%	$1,740	$2,300	
TOTAL	**$19,140**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12B-02: Monitored Natural Recovery
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$17,094		$17,094	1.000	$17,094
1		$19,140	$19,140	0.935	$17,896
2		$19,140	$19,140	0.873	$16,709
3		$19,140	$19,140	0.816	$15,618
4		$19,140	$19,140	0.763	$14,604
5		$44,440	$44,440	0.713	$31,686
6		$19,140	$19,140	0.666	$12,747
7		$19,140	$19,140	0.623	$11,924
8		$19,140	$19,140	0.582	$11,139
9		$19,140	$19,140	0.544	$10,412
10		$44,440	$44,440	0.508	$22,576
11		$19,140	$19,140	0.475	$9,092
12		$19,140	$19,140	0.444	$8,498
13		$19,140	$19,140	0.415	$7,943
14		$19,140	$19,140	0.388	$7,426
15		$44,440	$44,440	0.362	$16,087
16		$19,140	$19,140	0.339	$6,488
17		$19,140	$19,140	0.317	$6,067
18		$19,140	$19,140	0.296	$5,665
19		$19,140	$19,140	0.277	$5,302
20		$44,440	$44,440	0.258	$11,466
21		$19,140	$19,140	0.242	$4,632
22		$19,140	$19,140	0.226	$4,326
23		$19,140	$19,140	0.211	$4,039
24		$19,140	$19,140	0.197	$3,771
25		$44,440	$44,440	0.184	$8,177
26		$19,140	$19,140	0.172	$3,292
27		$19,140	$19,140	0.161	$3,082
28		$19,140	$19,140	0.150	$2,871
29		$19,140	$19,140	0.141	$2,699
30		$44,440	$44,440	0.131	$5,822
				TOTAL PRESENT WORTH	**$309,149**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-4
Alternative MS12B-03: Hydraulic Dredging with Off-Yard Disposal
Capital Cost

7/1/2010 10:10 AM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Work Plans	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
1.2 Construction Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
1.3 Pre-Construction Sampling (10 samples)	1	ls	$3,600.00	$8,375.00	$900.00	$8,400.00	$3,600	$8,375	$900	$8,400	$21,275
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	3	ea			$170.00	$522.00	$0	$0	$510	$1,566	$2,076
2.3 Dredge Equipment Mobilization/Demobilization	1	ea	$5,200.00				$5,200	$0	$0	$0	$5,200
3 FIELD SUPPORT											
3.1 Office Trailer	2	mo				$375.00	$0	$0	$0	$750	$750
3.2 Field Office Equipment, Utilities, & Support	2	mo		$470.00			$0	$940	$0	$0	$940
3.3 Storage Trailer	2	mo				$99.00	$0	$0	$0	$198	$198
3.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,250.00				$1,250	$0	$0	$0	$1,250
3.5 Site Superintendent	49	day		$188.00	$384.64		$0	$9,212	$18,847	$0	$28,059
3.6 Site Health & Safety and QA/QC	19	day		$188.00	$307.68		$0	$3,572	$5,846	$0	$9,418
4 DECONTAMINATION											
4.1 Decontamination Services	1	mo		$1,220.00	$2,245.00	$1,550.00	$0	$1,220	$2,245	$1,550	$5,015
4.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
4.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
4.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$781.00	$0	$0	$0	$781	$781
4.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$706.00	$0	$0	$0	$706	$706
4.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
5 SEDIMENT EXCAVATION											
5.1 Bathymetric Survey (pre-removal)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
5.2 Hydraulic Dredging	335	cy	$45.00				$15,075	$0	$0	$0	$15,075
5.3 Geotube, 45' by 100'	1	ea		$3,840.00			$0	$3,840	$0	$0	$3,840
5.4 Dewatering Pad	580	sy		$6.12	$10.26	$2.97	$0	$3,550	$5,951	$1,723	$11,223
5.5 Turbidity Curtain	500	ft		$39.90			$0	$19,950	$0	$0	$19,950
5.6 Turbidity Monitoring Buoy	1	mo				$4,080.00	$0	$0	$0	$4,080	$4,080
5.7 Test Dewatering Fluid	1	ea	$250.00	$50.00	$100.00	$50.00	$250	$50	$100	$50	$450
5.8 Confirmation Sample, Soil/Sediment	3	ea	$250.00	$50.00	$100.00	$50.00	$750	$150	$300	$150	$1,350
5.9 Site Labor, (3 laborers)	36	day			$252.80		$0	$0	$9,101	$0	$9,101
5.10 Bathymetric Survey (post-removal)	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000
6 DISPOSAL											
6.1 Fly Ash	8	cy		$60.00			$0	$480	$0	$0	$480
6.2 Loader, 4.5 cy	2	day			$330.80	$854.40	$0	$0	$662	$1,709	$2,370
6.3 Excavator, 1.5 cy	2	day			$330.80	$865.80	$0	$0	$662	$1,732	$2,393
6.4 Site Labor, (2 laborers)	4	day			$252.80		$0	$0	$1,011	$0	$1,011
6.5 Disposal Sampling, TCLP	1	ea	$1,700.00	$50.00	$100.00	$50.00	$1,700	$50	$100	$50	$1,900
6.6 Transportation & Disposal of Sediment, Subtitle "D"	211	ton	$50.00				$10,550	$0	$0	$0	$10,550
Subtotal							$49,325	$54,089	$64,884	$27,244	$195,542
Overhead on Labor Cost @ 30%								$5,409			$5,409
G & A Cost @ 10%							$4,933	$5,409	$6,488	$2,724	$19,554
Tax on Materials and Equipment Cost @ 5%								$2,704		$1,362	$4,067
Total Direct Cost							$54,258	$67,611	$71,373	$31,331	$224,572
Indirects on Total Direct Cost @ 25%			(excluding transportation and disposal cost)								$53,268
Profit on Total Direct Cost @ 10%											$22,457

APPENDIX D
RESPONSES TO COMMENTS ON THE FEASIBILITY STUDY REPORT FOR OU4

D.1 RESPONSES TO COMMENTS ON THE DRAFT FS REPORT FOR OU4

D.2 RESPONSES TO FOLLOW-UP COMMENTS ON THE DRAFT FS REPORT FOR OU4

APPENDIX D.1

RESPONSES TO COMMENTS ON THE DRAFT FS REPORT FOR OU4

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

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

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

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

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

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

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

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.

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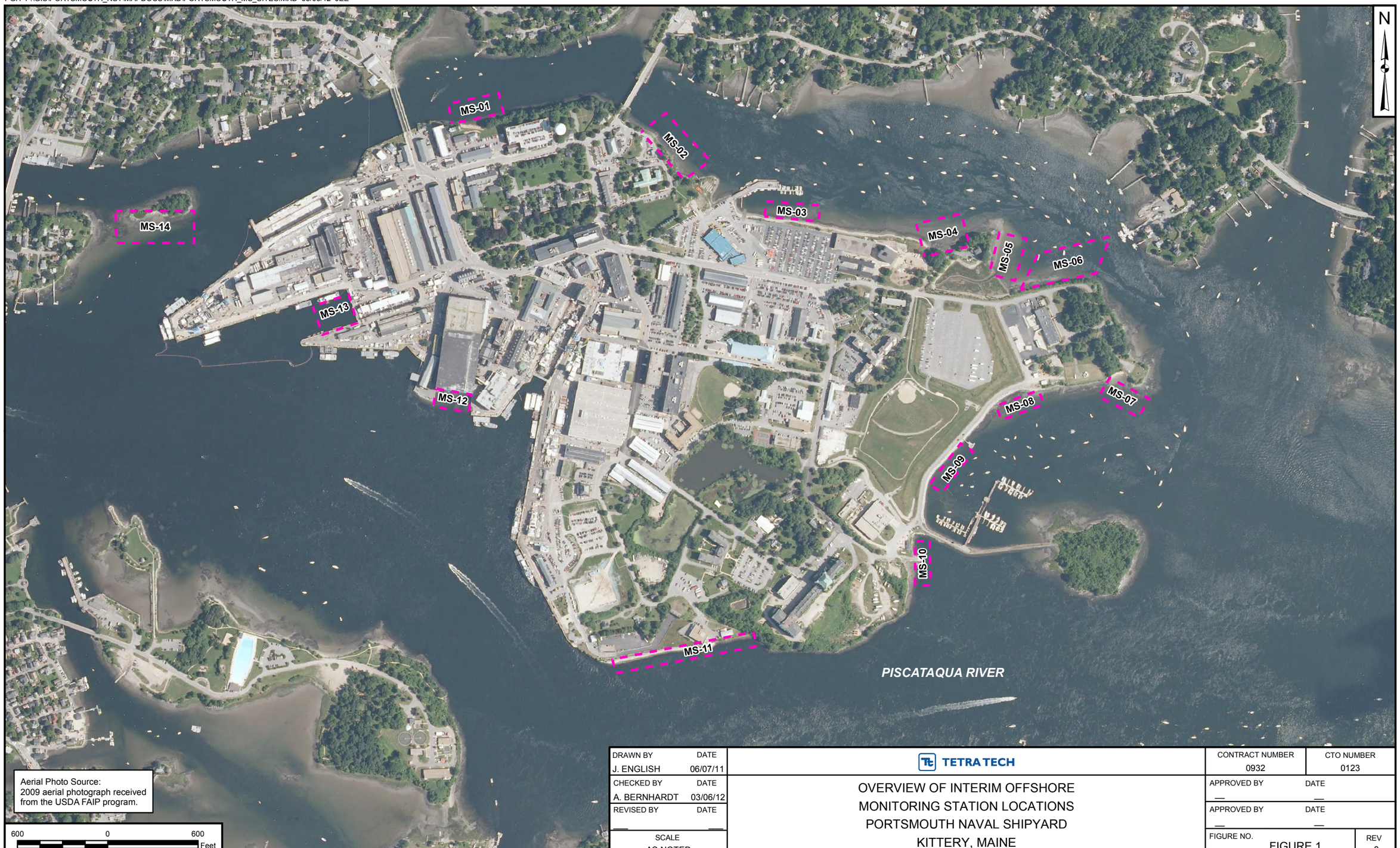

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	06/07/11		0932	0123
CHECKED BY	DATE	OVERVIEW OF INTERIM OFFSHORE MONITORING STATION LOCATIONS PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
A. BERNHARDT	03/06/12		—	—
REVISED BY	DATE		APPROVED BY	DATE
—	—		—	—
SCALE			FIGURE NO.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

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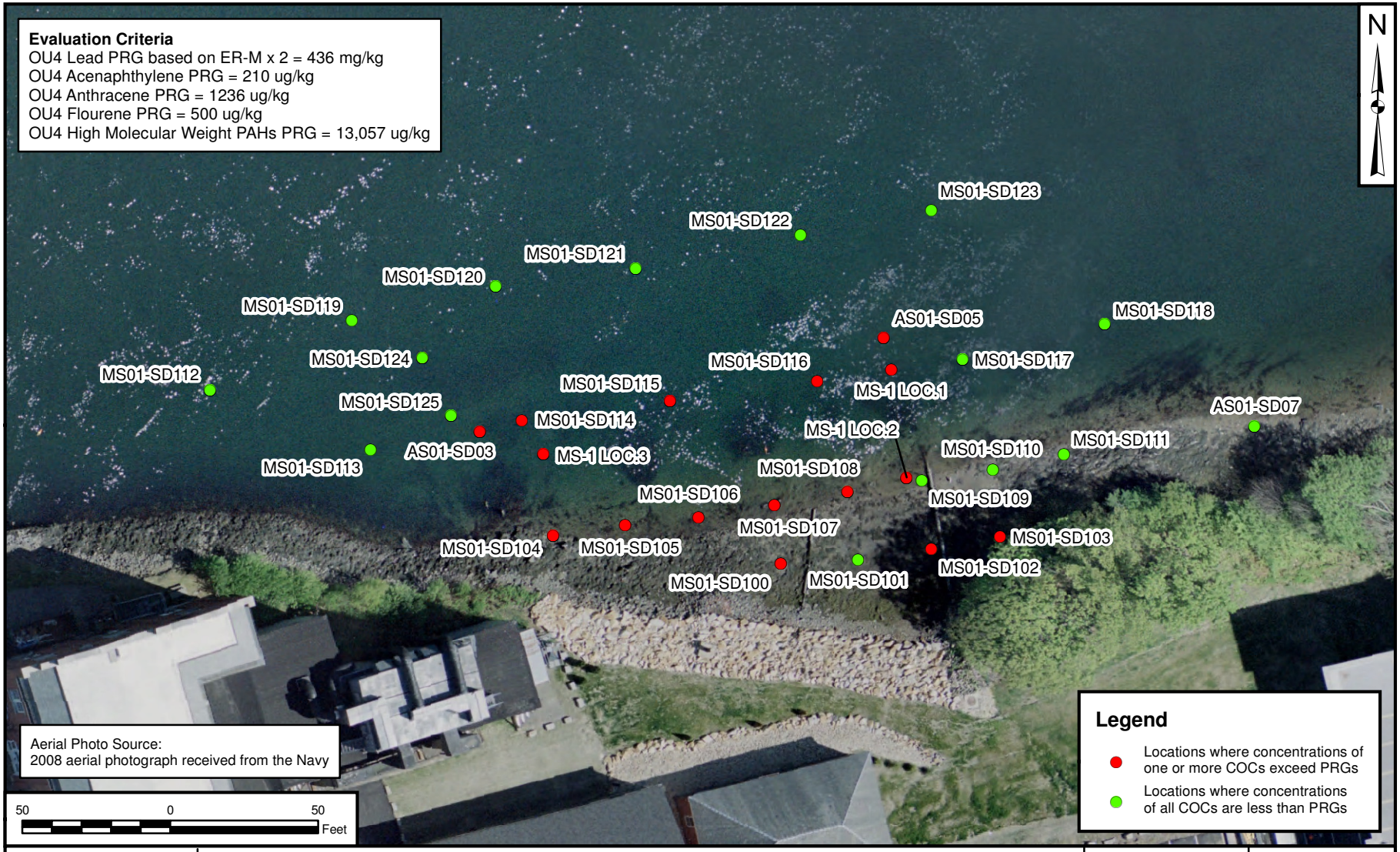

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	03/06/12		0932	0123
CHECKED BY	DATE	SEDIMENT SAMPLES AT MS-01	APPROVED BY	DATE
A. BERNHARDT	03/14/12	PORTSMOUTH NAVAL SHIPYARD	—	—
REVISED BY	DATE	KITTERY, MAINE	APPROVED BY	DATE
—	—		—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 2	0

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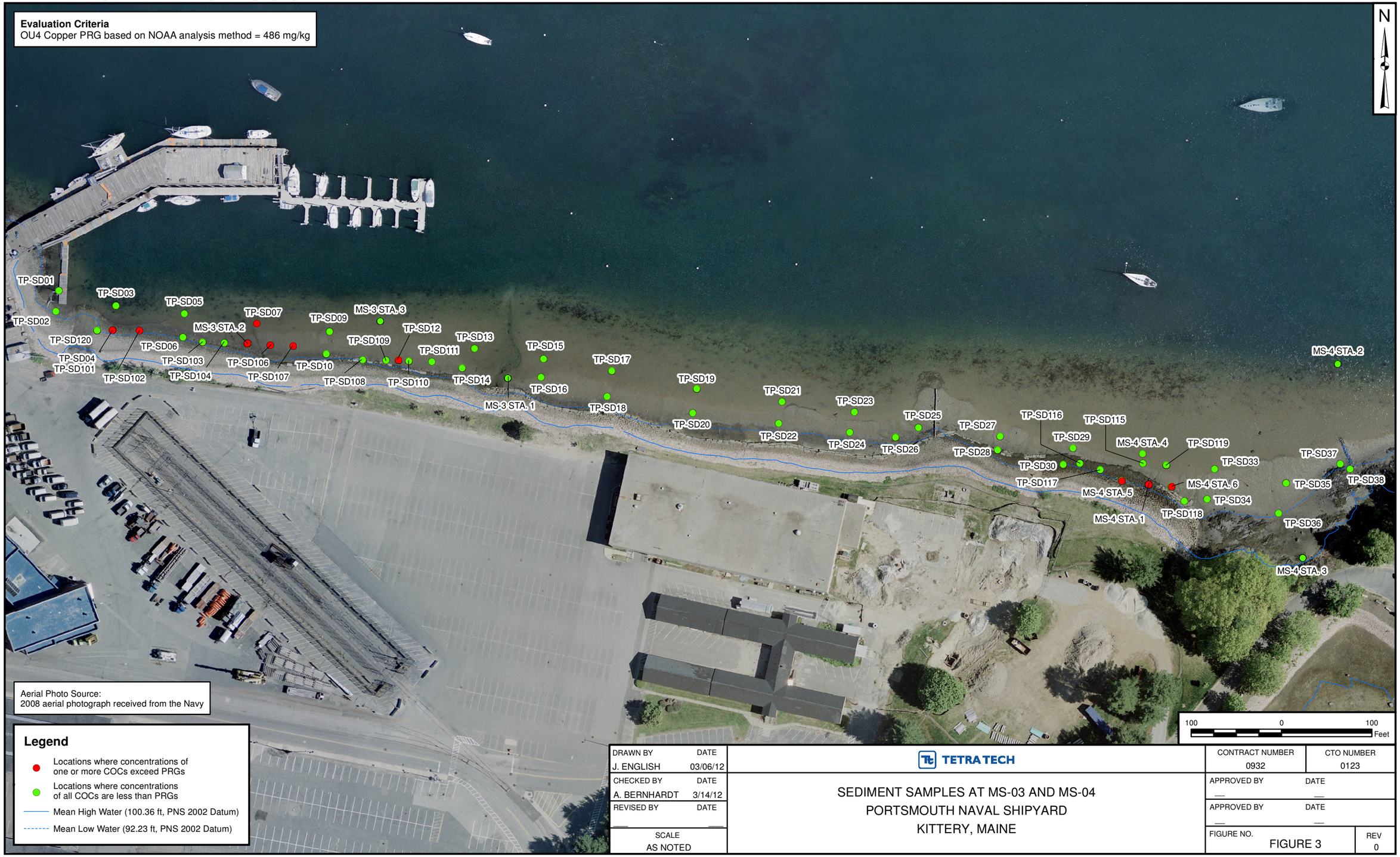

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	03/06/12		0932	0123
CHECKED BY	DATE	SEDIMENT SAMPLES AT MS-03 AND MS-04	APPROVED BY	DATE
A. BERNHARDT	3/14/12	PORTSMOUTH NAVAL SHIPYARD	—	—
REVISED BY	DATE	KITTERY, MAINE	APPROVED BY	DATE
—	—		—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 3	0

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

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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

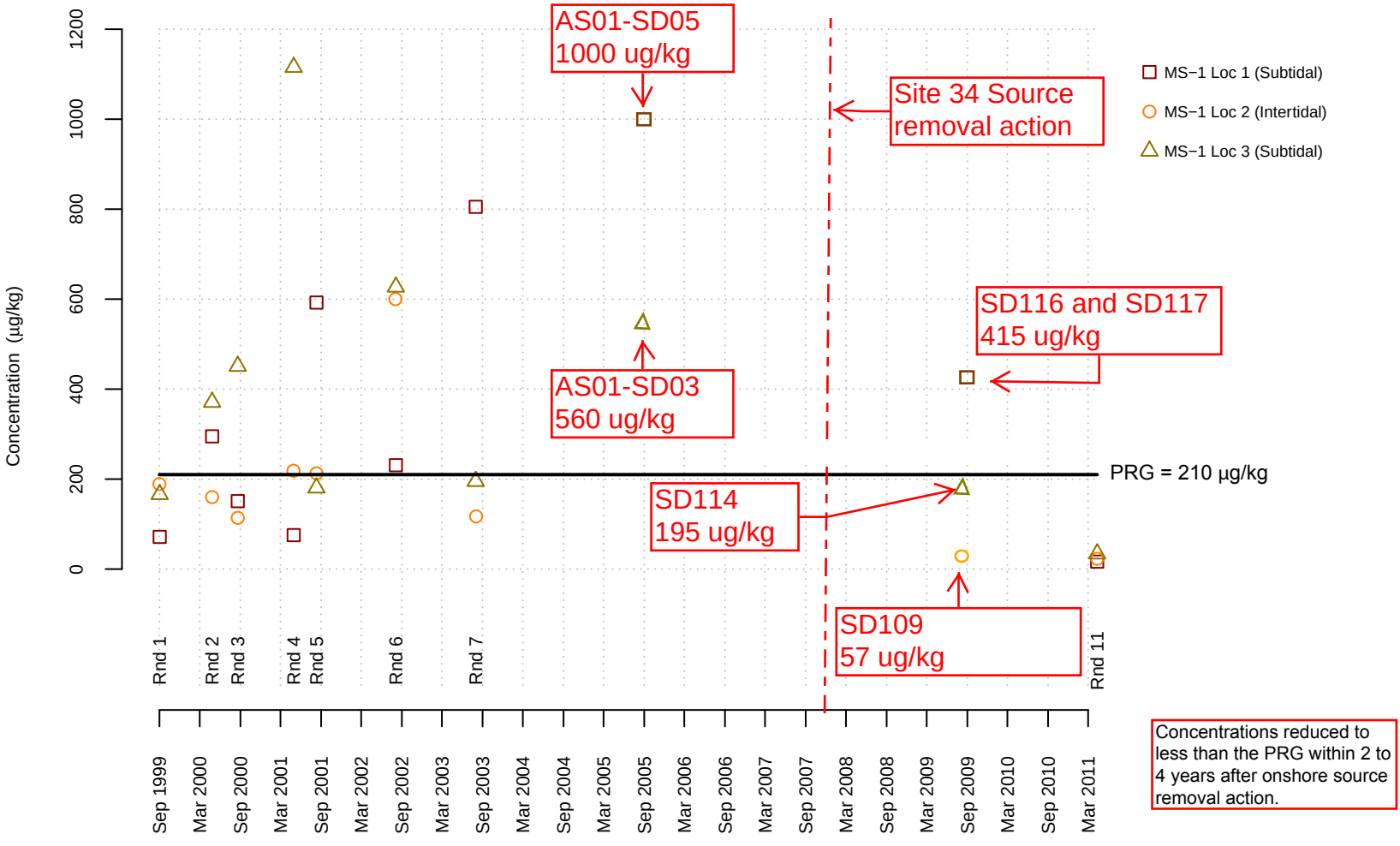
SEDIMENT SAMPLES AT MS-12A AND MS-12B
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

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

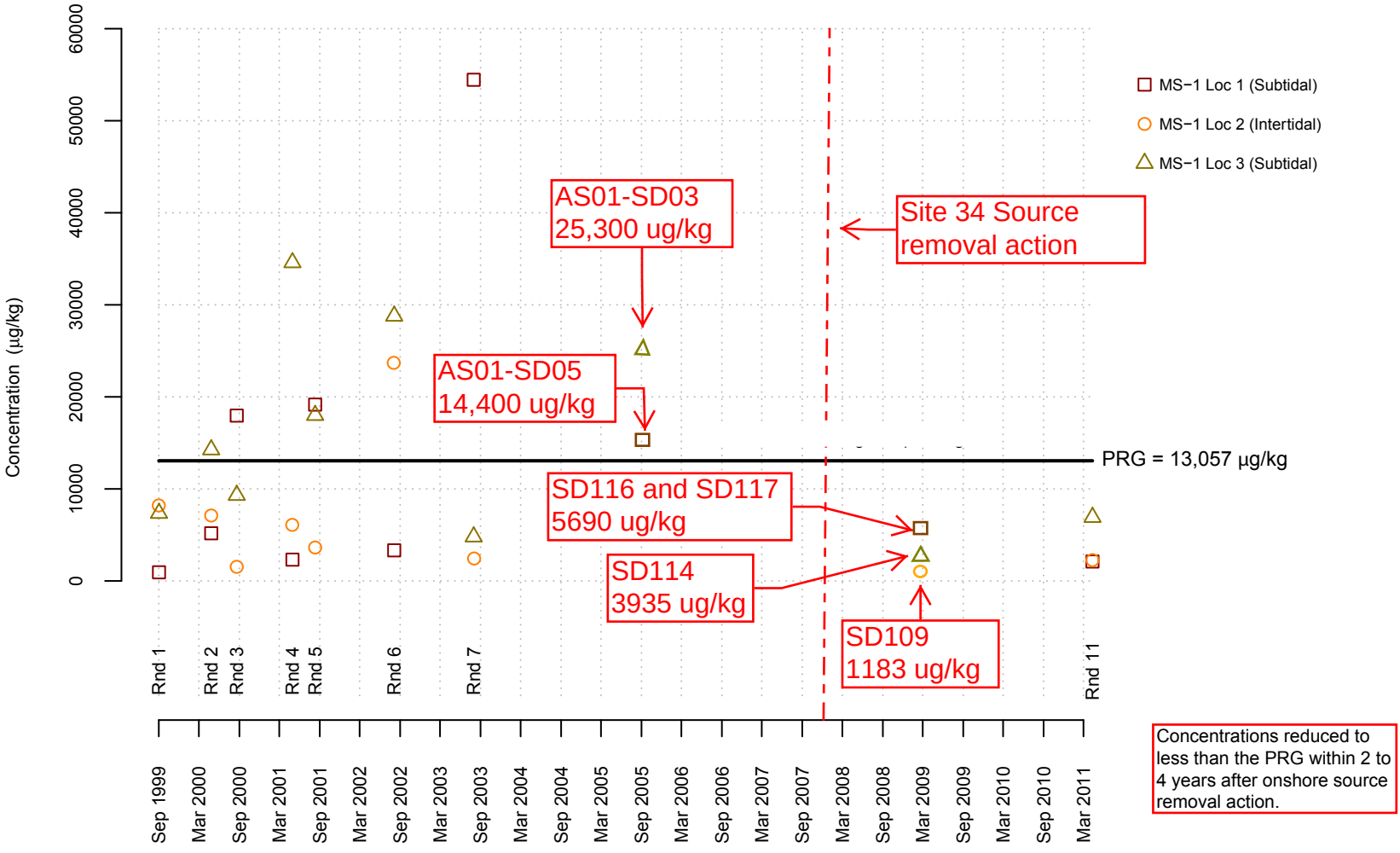
ATTACHMENT A

CONCENTRATION TREND PLOTS

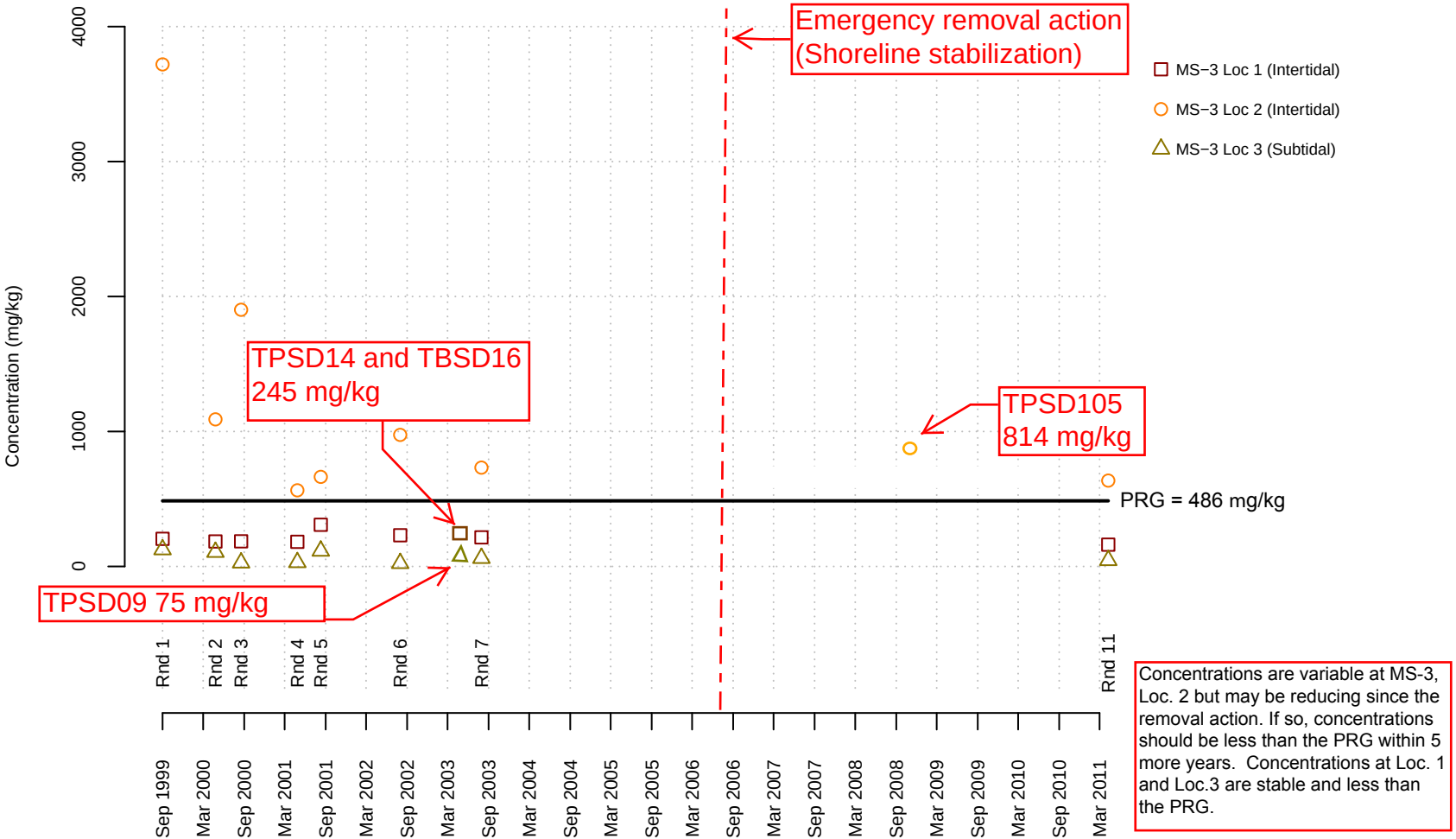
ATTACHMENT FIGURE A.1
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR ACENAPHTHYLENE AT MS−01
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



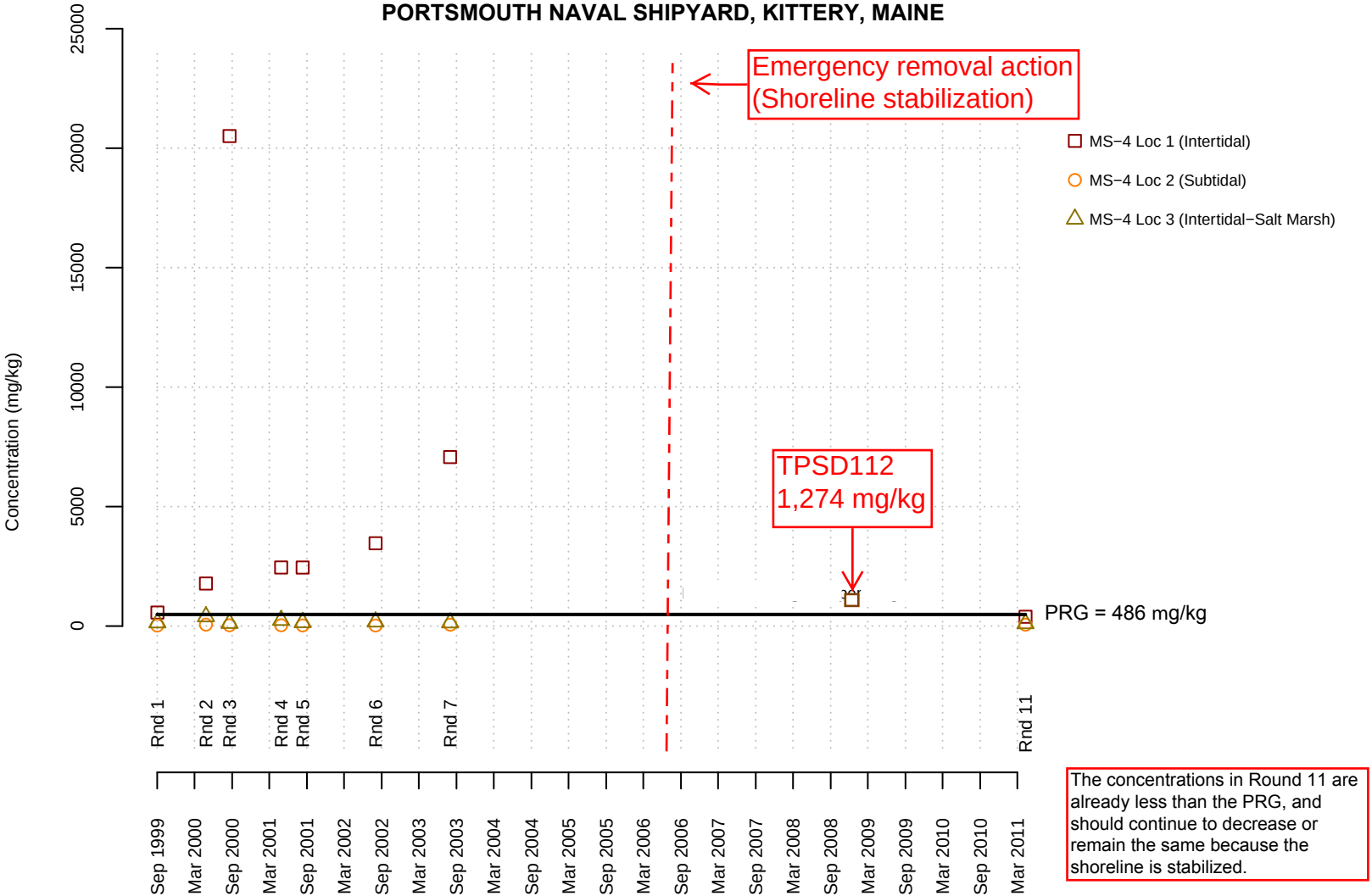
ATTACHMENT FIGURE A.2
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR HIGH MOLECULAR WEIGHT PAHS AT MS−01
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



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

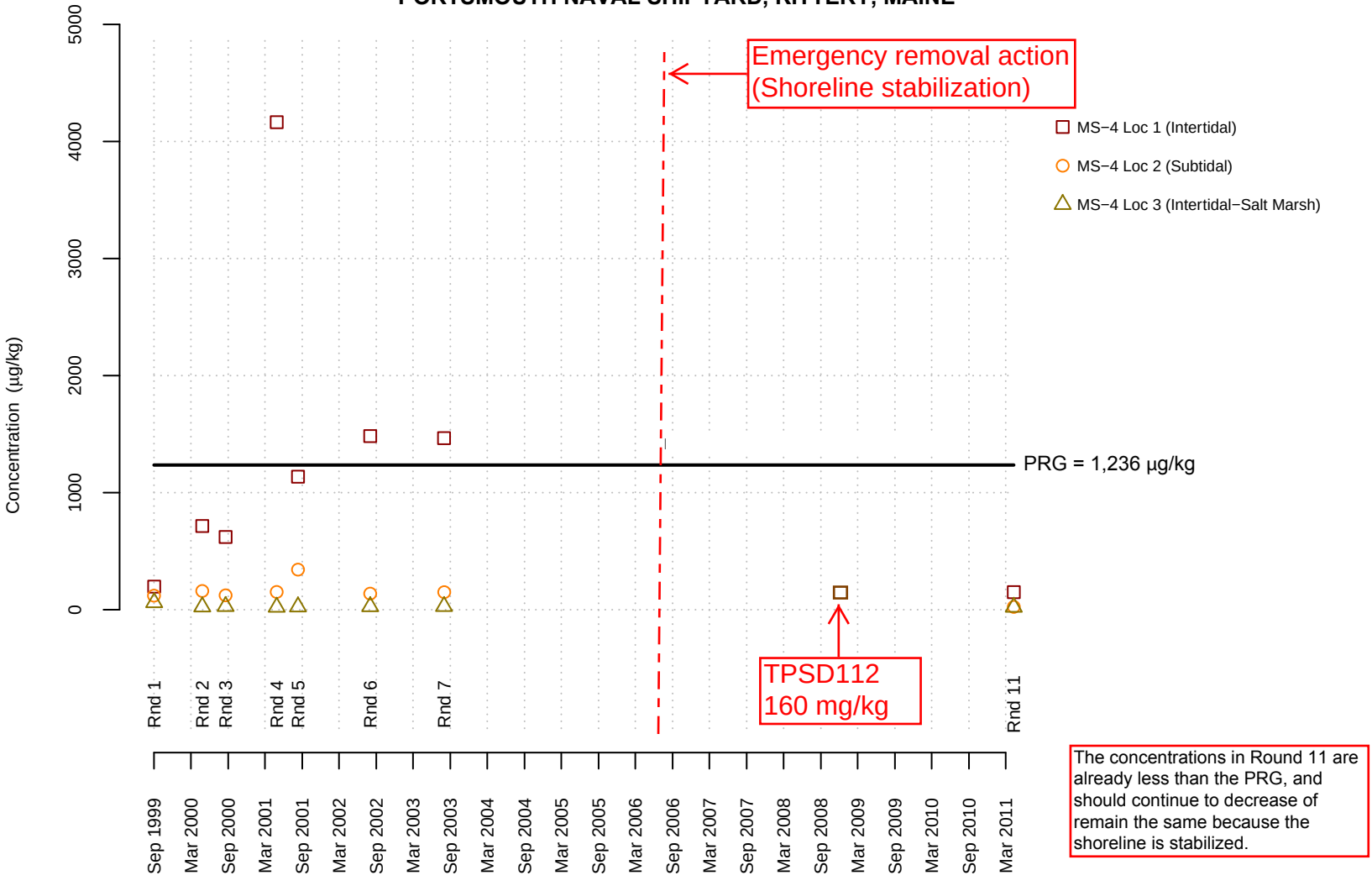


ATTACHMENT FIGURE A.4
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR COPPER AT MS−04
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



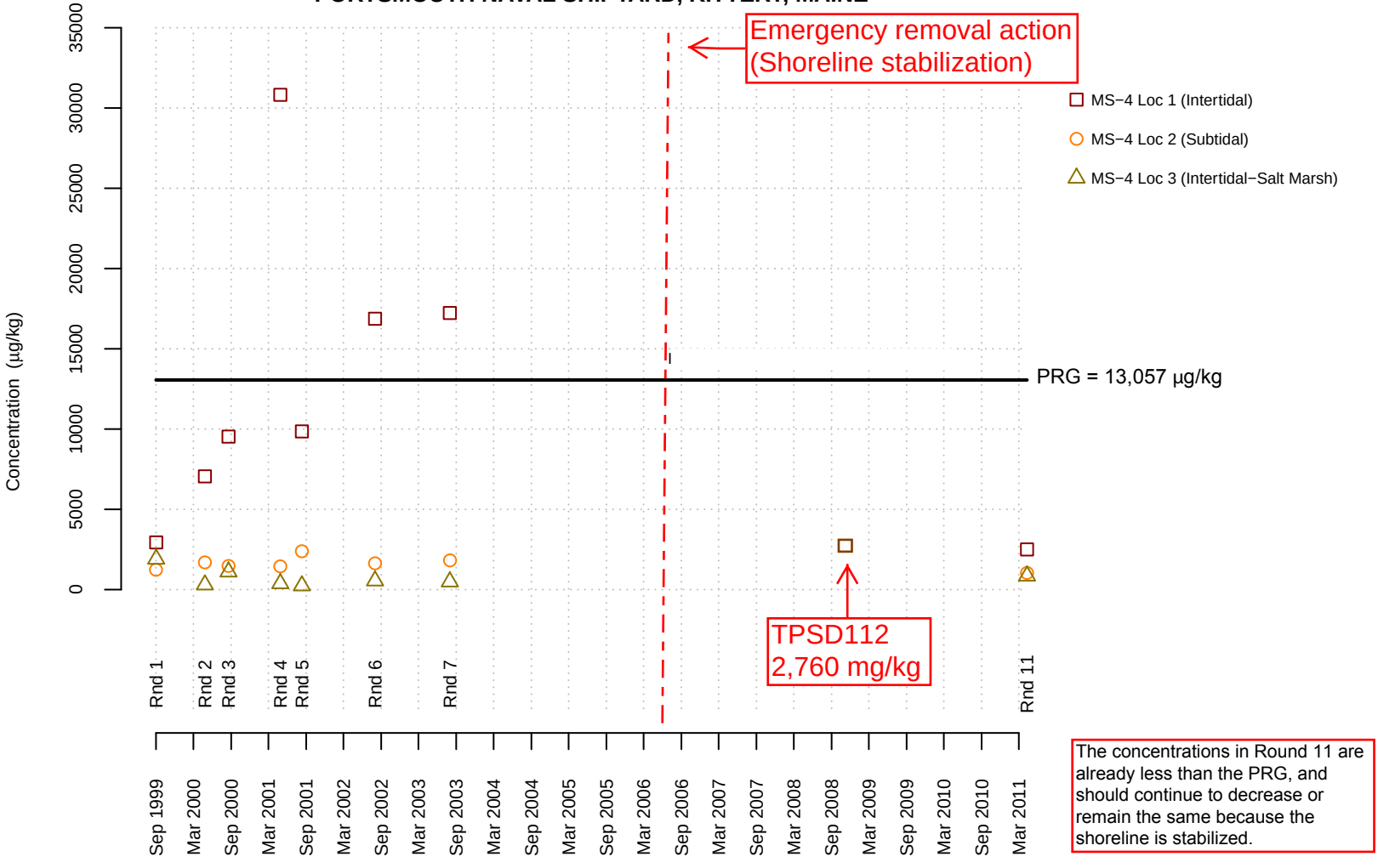
The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

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



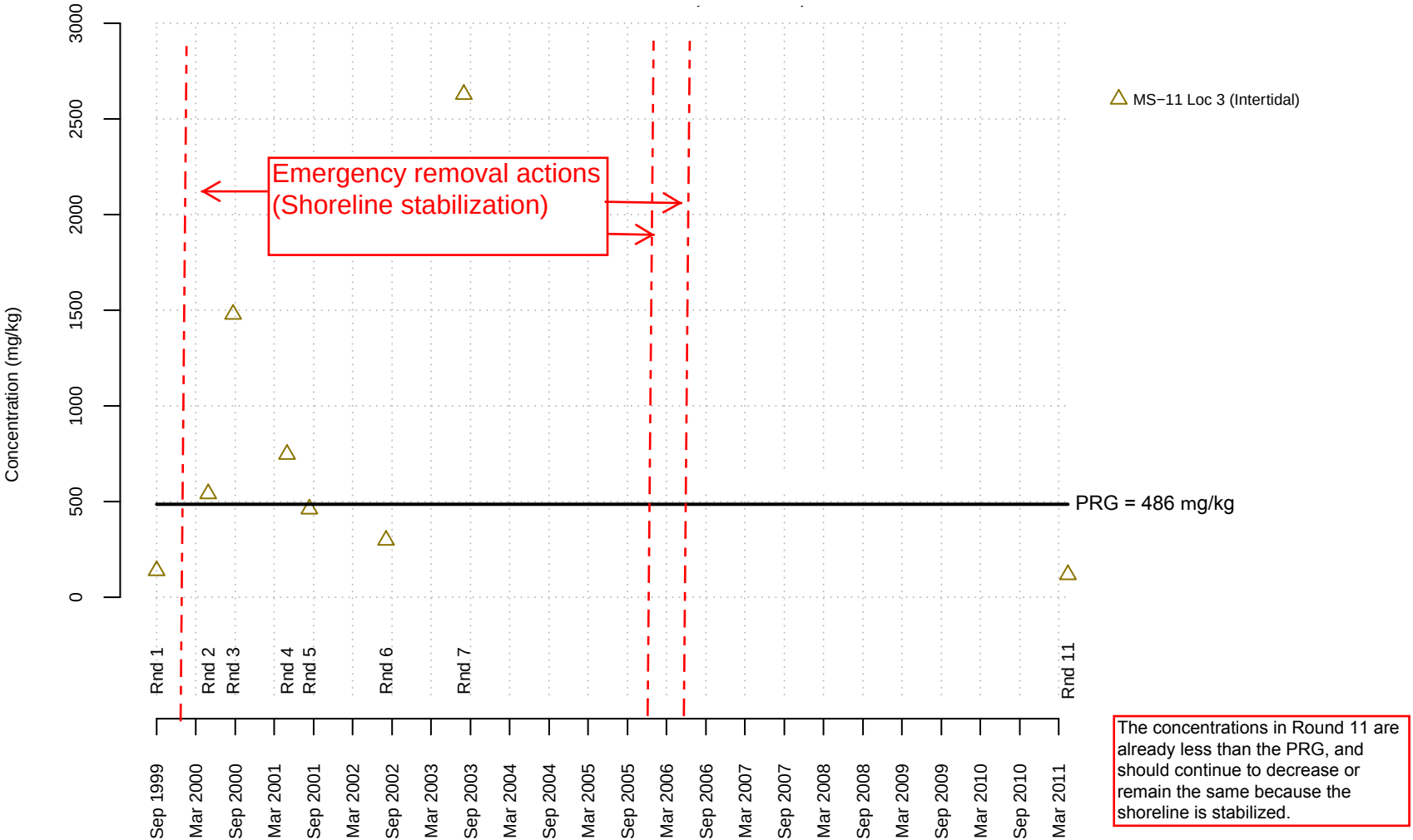
The concentrations in Round 11 are already less than the PRG, and should continue to decrease of remain the same because the shoreline is stabilized.

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



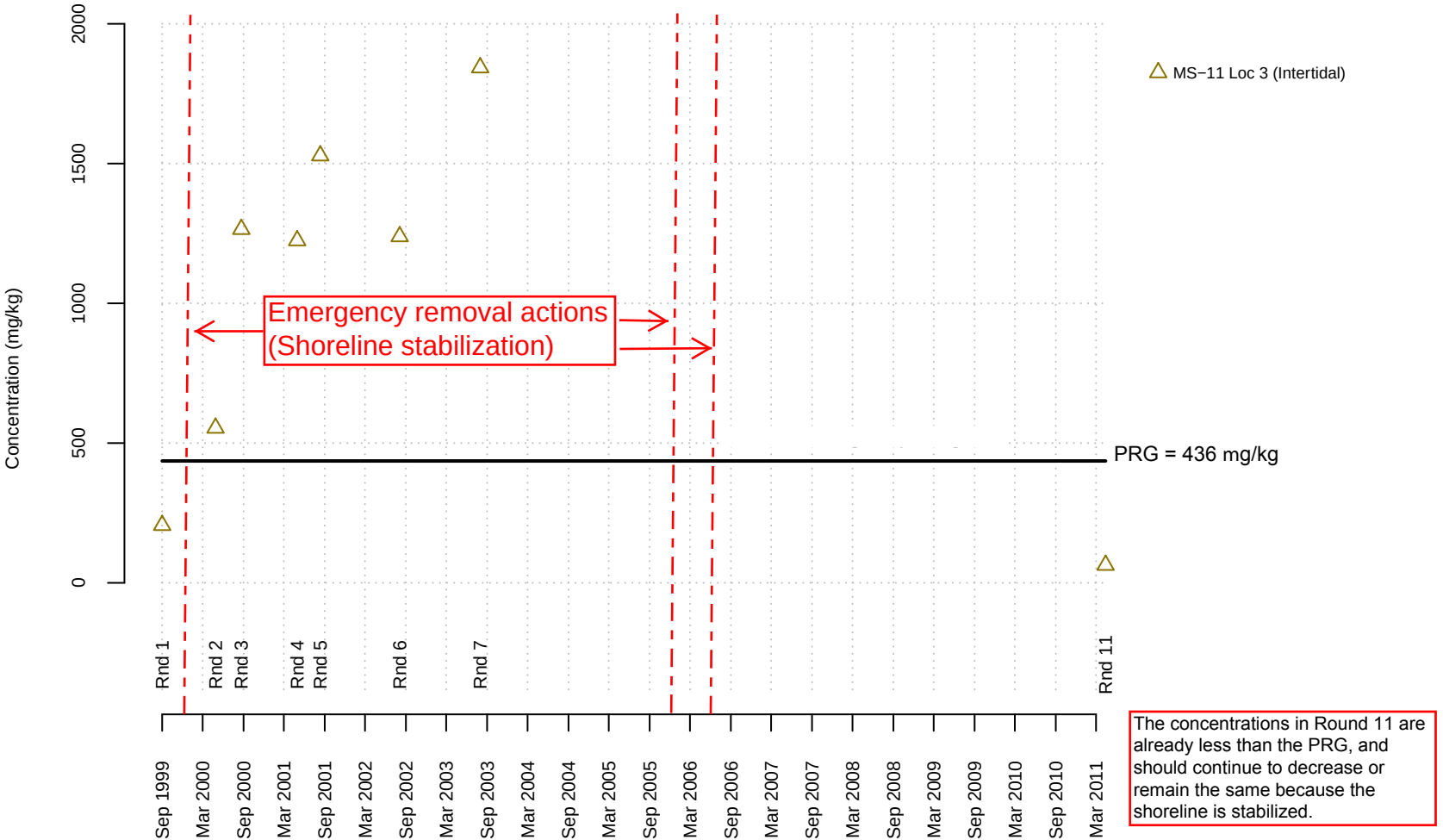
The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

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



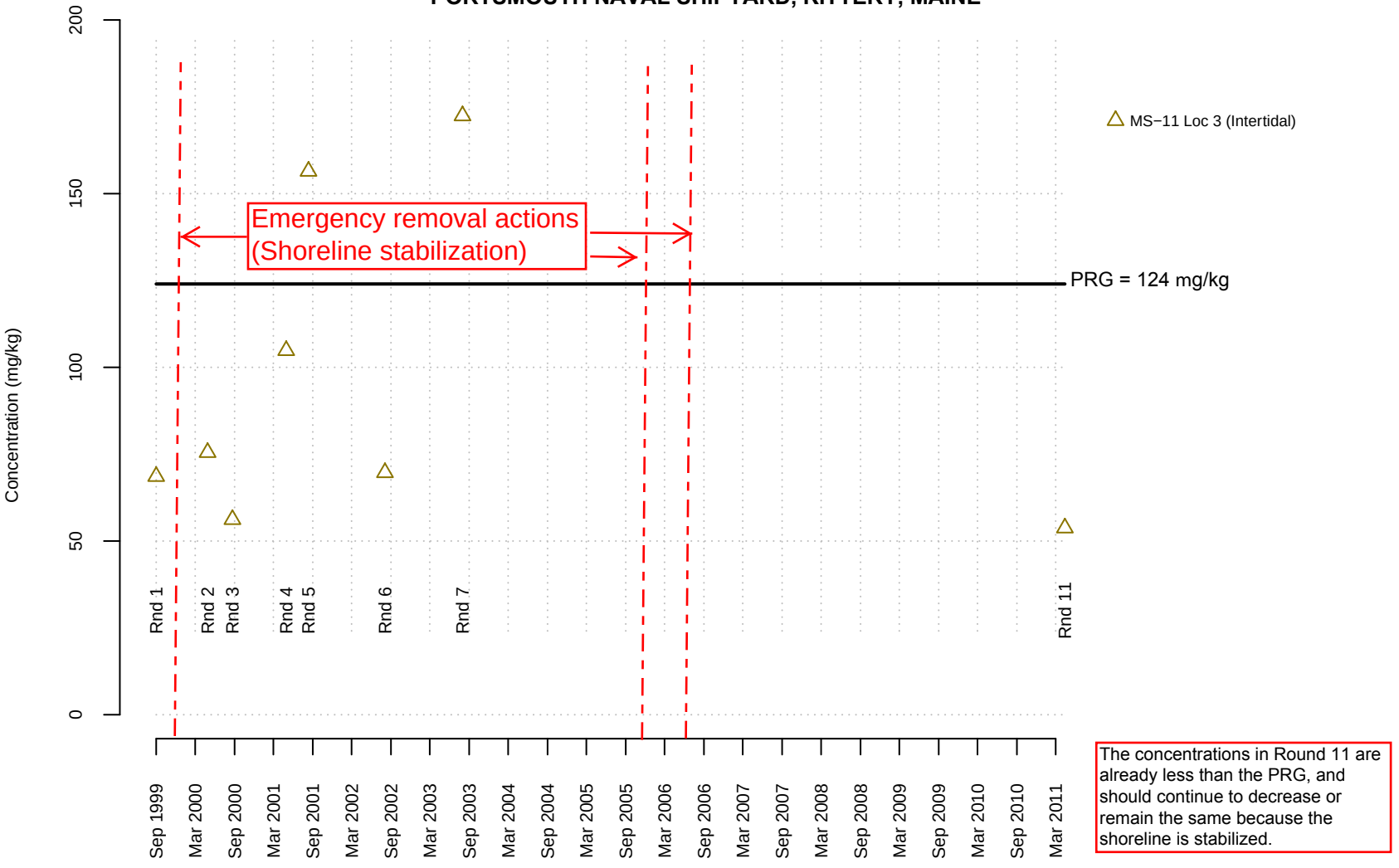
The concentrations in Round 11 are already less than the PRG, and should continue to decrease or remain the same because the shoreline is stabilized.

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



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.9
OU4 SEDIMENT CONCENTRATION TREND PLOT FOR NICKEL AT MS−11
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



APPENDIX D.2

RESPONSES TO FOLLOW-UP COMMENTS ON THE DRAFT FS REPORT FOR OU4

RESPONSES TO MEDEP COMMENTS DATED MAY 18, 2012
DRAFT FEASIBILITY STUDY FOR OU4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

GENERAL COMMENTS

1. **Comment:** The Navy has informed MEDEP that the Shipyard will begin renovating Building 178 this year. As part of this renovation the Shipyard planned to remove sediment from the MS-12 area outside of the IR program. For the record, as we discussed during our May 15, 2012 conference call the sediment removal must meet CERCLA standards. The Navy and regulators should meet to discuss exactly what procedures and documentation are required. It may be possible for the Navy to submit documentation that meets the intent of the CERCLA guidance without following the letter of the guidance.

   Response: The Navy agrees.

2. **Comment:** Please use a red-line strikeout format to indicate text changes in the Draft Final FS.

   Response: The Draft Final FS report was submitted without a red-line strikeout format. MEDEP was provided with a separate electronic version (i.e., PDF) of text and ARAR tables showing the changes based on the responses to comments in red-line strikeout format. Minor editorial changes not based on the comments were not indicated to allow the reader to focus on the more significant changes.

SPECIFIC COMMENTS

3. **Comment:** RTC 19. Our comment was poorly worded. We meant that the MNA remedy could only be considered effective if it met the RAO within some specific time frame. However, in contrast to our original comment, a time frame for meeting the RAO is more appropriate to include as a decision rule in the monitoring program, rather than in the RAO.

   Response: The RAOs were not changed based on MEDEP Comment No. 19 dated September 20, 2010. However, text discussing the estimated timeframes based on the monitored natural recovery (MNR) evaluations was added to the descriptions of the alternatives. These timeframes would be considered during development of a monitoring program if MNR is selected as the remedy at any of the monitoring stations.

4. **Comment:** RTC 21. In Table 1-1 change the source of sediment depth data for MS-1 from “OU9 PI” to “OU9 RI”.

   Response: Table 1-1 is now Table 1-2 with the addition of the new Table 1-1 based on the response to MEDEP Comment No. 7. The word “OU9PI” has been corrected to “OU9RI” in Table 1-2.

5. **Comment:** RTC 34. The primary point of MEDEP’s comment was that the Navy should consider the potential cost advantage of mechanical removal over monitored natural attenuation. This could be an informal “back of the envelope” comparison. If there appears to be a significant cost savings for a one-time removal versus potentially years of monitoring it may then be necessary to do a full evaluation of sediment removal.

   Response: The Navy agrees that generally, the potential cost advantage of removal versus the cost of MNR should be considered in a Feasibility Study. This was done for the alternatives for MS-01, MS-0304, MS-12A, and MS-12B. Removal was not evaluated for MS-11, however, because there is not a sufficient amount of sediment at this monitoring station to cause an ecological risk. In addition, contaminant concentrations are less than PRGs based on the most recent sediment data (Round 11).

The Round 11 monitoring data (2011) were not yet available when the draft FS was prepared. Therefore, alternatives for MS-11 were developed in the 2010 draft FS because there were future potential risks if contaminates remained above acceptable levels (PRGS) and the amount of sediment increased in the area. The Round 11 data were reviewed as part of the MNR evaluation, and based on those results, concentrations of copper, lead, and nickel at MS-11, Loc. 3 were less than PRGs. Had the Round 11 data been available before the FS was prepared, MS-11 would have been excluded from the FS similar to how other monitoring stations (such as MS-05, MS-08, and MS-09) were excluded from the FS because the most recent chemicals concentrations were less than PRGs.

The MNR alternative for MS-11 was initially proposed (before the Round 11 data were available) to determine whether sediment was accumulating in the area to a size that would provide significant habitat for benthic invertebrates and whether concentrations were above PRGs. Based on the Round 11 results, if sediment does accumulate in the area, risks would be acceptable because concentrations would be less than PRGs. Therefore, although MS-11 is still retained for evaluation in the FS, a discussion of the Round 11 data was added to Section 6.1.2.1 of the FS report.

RESPONSES TO USEPA COMMENTS DATED JUNE 6, 2012
DRAFT FEASIBILITY STUDY FOR OU4
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1. **Comment:** EPA concurs with the Navy's responses. I would like to note, however, that EPA disagrees that completion of a Public Health Assessment (PHA) by ATSDR is sufficient by itself to eliminate the need for a revision to the human health risk assessment. (comment 1.2, Scope and Objectives, p.1-1) Among other differences between a PHA and a baseline risk assessment, PHAs do not quantify cancer risks. Since there is a new reference dose for dioxin/furan, EPA reviewed the PHA and concurs with the conclusion because the comparison value used by ATSDR is sufficiently protective for dioxin cancer and noncancer risk.

   Response: The Navy agrees that the human health risks are acceptable for OU4. The PHA was used to provide more recent evidence that risks are still acceptable and USEPA agrees in their comment that the comparison value used by ATSDR for dioxins was sufficiently protective. The PHA did evaluate cancer risks from PCBs, as noted on Table 8 in Appendix C of the PHA.