TETRA TECH

C-NAVY-06-14-5357W

June 20, 2014

Ms. Kymberlee Keckler
United States Environmental Protection Agency, Region 1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Ms. Pamela Crump
Office of Waste Management
Rhode Island Department of Environmental Management
235 Promenade Street
Providence, Rhode Island 02908-5767

REFERENCE: CLEAN Contract No. N62470-08-D-1001
Contract Task Order No. WE76

SUBJECT: Transmittal of the Final Record of Decision for Signature
Site 17: Former Building 32 at Gould Island
Naval Station Newport, Newport, Rhode Island

Dear Ms. Keckler and Ms. Crump:

On behalf of Ms. Maritza Montegross, U.S. Navy NAVFAC, I am providing for signature the Final Record of Decision (ROD) for Site 17 at Naval Station Newport, which is also known as Operable Unit (OU) 6 for the NETC Superfund Site, Newport, Rhode Island. This final ROD is based on the Draft Final Record of Decision (June 2014), the U.S. Environmental Protection Agency (EPA) comments on that document dated June 12, 2014, and the follow-up discussions held on June 18, 2014 with EPA and the Rhode Island Department of Environmental Protection (RIDEM). As requested, one hard copy of the unsigned final ROD is enclosed for EPA and two hard copies are enclosed for RIDEM. The electronic version of the final ROD has been distributed by email.

After the declaration sheets are signed by EPA and the Navy and returned to Tetra Tech, and following receipt of RIDEM's concurrence letter, the signed ROD will be distributed and a newspaper notice announcing its availability will be published.

If you have any questions regarding this material, please do not hesitate to contact me at 978-474-8412.

Very truly yours,

James R. Forrelli

James Forrelli, PE
Project Manager

Enclosures

c: D. Barclift, NAVFAC (w/encl.)
S. Bird, NAVFAC (w/encl.)
G. Glenn, Tetra Tech (w/o encl.)
W. Johnson, NAVFAC (w/encl.)
L. McIntosh, Woodward & Curran (w/encl.)
M. Montegross, NAVFAC (w/encl.)

S. Parker, Tetra Tech (w/encl.)
P. Steinberg, Mabbett Associates (2- w/encl.)
D. Moore, NAVSTA (w/encl.)
Site File (c/o RDM Data Manager, Tetra Tech) (w/encl.)
File 112G04295-8.0 (w/encl.), 3.1 (w/o encl.)

RECORD OF DECISION

SITE 17 –
FORMER BUILDING 32
GOULD ISLAND
JAMESTOWN, RHODE ISLAND

OPERABLE UNIT 06
NAVAL STATION NEWPORT, RHODE ISLAND
June 20, 2014

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REFERENCES

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APPENDICES

ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BERA	Baseline ecological risk assessment
bgs	Below ground surface
CDI	Chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	Centimeters per second
COC	Contaminant of concern
COPC	Contaminant of potential concern
CS	Confirmation study
CSF	Cancer slope factor
CSGWPP	Comprehensive State Groundwater Protection Program
CSM	Conceptual site model
CTE	Central tendency exposure
CTL	cytotoxic T-lymphocyte
CWA	Clean Water Act
Cy	Cubic yards
DEC	Direct Exposure Criterion
DO	Dissolved oxygen
EPA	United States Environmental Protection Agency
EPC	Exposure point concentration
ERA	Ecological risk assessment
ERM-Q	Effects Range-Median Quotient
ER, N	Environmental Restoration, Navy
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
GRAs	General Response Actions
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMW	High molecular weight
HQ	Hazard Quotient
IAS	Initial Assessment Study
ID	Identification

ILCR	Incremental lifetime cancer risk
IR	Installation Restoration
IRIS	Integrated Risk Information System
IUR	Inhalation unit risk
LEDPA	Least Environmentally Damaging Practicable Alternative
LMW	Low molecular weight
LOECs	Lowest-observed-effects-concentrations
LTM	Long-term monitoring
LUC	Land use control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
MNA	Monitored natural attenuation
NAVSTA	Naval Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NETC	Naval Education and Training Center
NOECs	No-observed-effects-concentrations
NPL	National Priorities List
NPW	Net present worth
NRCS	Natural Resources Conservation Service
NTCRA	Non-time critical removal action
NUSC	Naval Undersea Systems Center
NUWC	Naval Undersea Warfare Center
OFFTA	Old Fire Fighting Training Area
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
O&M	Operation and maintenance
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
PCP	Pentachlorophenol
PDI	pre-design investigation
PRG	Preliminary remediation goal
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	risk-based concentrations

RD	Remedial Design
RfC	Reference concentration
RfD	Reference dose
RG	Remediation Goal
RI	Remedial Investigation
RIDEM	Rhode Island Department of Environmental Management
RME	Reasonable maximum exposure
ROD	Record of Decision
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SASE	Study Area Screening Evaluation
SF	Slope factor
SWOS	Surface Warfare Officers School
SVOC	Semi-volatile organic compound
TBC	To be considered
TCE	Trichloroethene
Tetra Tech	Tetra Tech, Inc.
TPH	Total petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TSDF	Treatment, storage, and disposal facility
UCL	Upper confidence limit
UPL	Upper predictive limit
UST	Underground storage tank
VDEQ	Virginia Department of Environmental Quality
VOC	Volatile organic compound
µg/L	Microgram per liter

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Site 17 - Former Building 32, Gould Island (Site 17), which is also known as Operable Unit (OU) 6, is located in Jamestown, Rhode Island and is an outlying Navy property that is part of the Naval Station (NAVSTA) Newport facility. NAVSTA Newport was formerly identified as the Naval Education and Training Center (NETC) and has been assigned United States Environmental Protection Agency (EPA) Identification (ID) Number RI6170085470. The location of Site 17 is shown on Figure 1-1.

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for Site 17, as chosen by the Navy and EPA in accordance with provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record for Site 17, as described in the Detailed Administrative Record Reference Table included prior to the appendices of this ROD. The Rhode Island Department of Environmental Management (RIDEM) concurs with the Navy and EPA on the Selected Remedy for Site 17, as shown in Appendix A.

1.3 ASSESSMENT OF SITE

The response action selected in this ROD is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances into the environment at Site 17. A CERCLA action is required at the site to address unacceptable risk to human and ecological receptors. Unacceptable risk to human health (defined as a cancer risk greater than 1×10^{-4} or a non-cancer hazard index [HI] greater than 1) was identified for the following receptors:

- Future construction workers by exposure from direct contact/incidental ingestion of shallow groundwater, and from inhalation of associated trench air, primarily due to concentrations of semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP), and polychlorinated biphenyls (PCBs).

- Adults and children consuming shellfish at a subsistence or recreational level, primarily due to concentrations of PCBs and PAHs in shellfish (mussels and clams).

- Exceedances of regulatory criteria in the screening assessment indicated a potential risk to hypothetical future residents from soil and groundwater; because the risk was not quantified in a risk assessment, the risk is presumed for the receptor and is addressed in the Selected Remedy.

Concentrations of PAHs, cadmium, lead, and manganese in soil, and PCP, tetrachloroethene (PCE), and manganese in groundwater that exceed industrial and residential federal and/or state standards are also being addressed by the Selected Remedy.

Also present are PAHs, arsenic, and lead in building demolition debris which contribute to contamination in shallow groundwater. This material is identified as solid waste, confined within concrete sumps and equipment trenches set within the former Building 32 foundation slab. This material will be addressed during the remedial action.

The baseline Ecological Risk Assessment (BERA) identified unacceptable ecological risks to benthic invertebrate receptors due to PCBs and total PAHs in Stillwater Area sediments. Additionally, there is unacceptable risk to ecological receptors based on a calculated prediction for toxic effects to benthic organisms, identified as the Effects Range-Median Quotient (ERM-Q) (the risk posed by the combination of arsenic, cadmium, chromium, copper, lead, nickel, zinc, PAHs, and PCBs) in sediment in the Stillwater Area.

1.4 DESCRIPTION OF SELECTED REMEDY

The major components of the Selected Remedy for Site 17 include the following:

- Excavation and off-site disposal of soil from areas where industrial cleanup levels or leachability criteria are exceeded.
- Removal via dredging and off-site disposal of marine sediment with contaminant concentrations that exceed cleanup levels in the Stillwater Area (a small boat basin at the northern end of Gould Island) Post-dredge sampling will be conducted within the dredge area to ensure that cleanup levels have been met.
- Limited sediment monitoring (two sampling events) at four specific areas at the Northeast Shoreline of the island.
- Monitored natural attenuation (MNA) of manganese, PCP, and PCE in groundwater until groundwater cleanup levels are achieved.
- Implementation of land use controls (LUCs) to ensure that future use of the property is limited to industrial activities (residential and unrestricted recreational site use will be prohibited) and to prohibit groundwater use until groundwater cleanup levels are achieved.

Additionally, debris located in sumps and trenches within the foundation of the former Building 32 and which has been identified as a source of contamination will be removed from the site and disposed of in accordance with state, local and federal regulations.

The Selected Remedy eliminates potential unacceptable human exposure to contaminated soil, groundwater, sediment, and shellfish through removal and off-site disposal of soil, debris, and sediment, and through the use of MNA for groundwater and LUCs for soil and groundwater. The Selected Remedy eliminates potential unacceptable ecological receptor exposure to contaminated sediment through removal and off-site disposal of sediment. These actions will be supported by monitoring, inspections and 5-year reviews. Remedial actions at Former Building 32 at Gould Island are not expected to adversely impact the current and reasonably anticipated future land use (industrial). The Selected Remedy is expected to achieve substantial long-term risk reduction and allow the property to be used for the reasonably anticipated future land use. This ROD documents the final remedial action decision for Former Building 32 at Gould Island and does not include or affect any other sites at NAVSTA Newport. Implementation of this remedy will allow for future industrial use of the site, which is consistent with past use and the overall cleanup strategy for NAVSTA Newport of restoring sites to support operations.

1.5 STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years of initiation of the remedial action and every 5 years thereafter to ensure that the Selected Remedy is protective of human health and the environment.

Federal regulations that pertain to the cleanup require a determination that there is no practicable alternative to taking federal actions affecting federal jurisdictional wetlands, aquatic habitats and floodplains, per Section 404 of the Clean Water Act (CWA) and Executive Orders 11990 (Protection of Wetlands) and 11988 (Protection of Floodplains), as incorporated under Federal Emergency Management Agency (FEMA) regulations. In accordance with the CWA, the Navy has determined that the Selected Remedy is the "Least Environmentally Damaging Practicable Alternative" (LEDPA) to protect wetland and aquatic resources because it provides the best balance of addressing contaminated media at the site, within and adjacent to wetlands and waterways, while minimizing both temporary and permanent alteration of wetlands and aquatic habitats on site. Although the Selected Remedy involves disturbance (excavation) of sediment, the removal of the contaminants through excavation will have long-term positive impacts on the marine environment. In addition, this ROD includes a finding by EPA Region 1's Director of the Office of Site Remediation and Restoration that the remedy selected in this ROD will address PCB-contaminated media in order to control risk of injury to health or the environment, in compliance with 40 CFR Section 761.61(c), through the removal and off-site disposal of all PCB-contaminated sump debris, removal and off-site disposal of all PCB-contaminated sediment exceeding RGs, the removal and off-site disposal of all PCB-contaminated soil exceeding industrial RGs, the implementation of LUCs to prevent exposure to PCB-contaminated soil exceeding residential RGs, and MNA and LUCs to address groundwater exceeding industrial RGs and drinking water criteria.

1.6 ROD DATA CERTIFICATION CHECKLIST

Table 1-1 lists the locations in this ROD where the information required to be in the decision document is presented. Additional information can be found in the Administrative Record file for NAVSTA Newport, available online at http://go.usa.gov/DyNw.

TABLE 1 1. ROD DATA CERTIFICATION CHECKLIST

DATA	LOCATION IN ROD
Contaminants of concern (COCs) and their respective concentrations	Sections 2.5 and 2.7
Baseline risk represented by the COCs	Section 2.7
Cleanup levels established for COCs and the basis for these levels	Section 2.7 and 2.8
How source materials constituting principal threats are addressed	Section 2.11
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk assessment	Section 2.6
Potential land and groundwater uses that will be available at the site as a result of the Selected Remedy	Section 2.12.3
Estimated capital, operation and maintenance (O&M), and total net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Appendix B
Key factors that led to the selection of the remedy	Section 2.12.1

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this ROD and is shown to be the result of Navy activities, the Navy will undertake the necessary actions to ensure continued protection of human health and the environment.

1.7 (1 OF 2) AUTHORIZING SIGNATURES

The signature provided below validates the Selected Remedy for Site 17 - Former Building 32, Gould Island, at NAVSTA Newport in Jamestown, Rhode Island, by the Navy and EPA. RIDEM concurs with the Selected Remedy, as indicated in Appendix A of this ROD.

Human health and ecological risk assessments were conducted using CERCLA risk assessment methods and guidance. Accordingly, and based on the provisions of 40 CFR § 761.61 (c), EPA has determined that the risk-based RGs for PCBs in sediment, soil and groundwater will meet the no unreasonable risk standard in accordance with § 761.61 (c) through the removal and off-site disposal of all PCB-contaminated sediment exceeding RGs, the removal and off-site disposal of all sump debris, PCB-contaminated soil exceeding industrial RGs, the implementation of LUCs to prevent exposure to PCB-contaminated soil exceeding residential RGs, and MNA and LUCs to address groundwater exceeding industrial RGs and drinking water criteria.

Concur and recommend for implementation:

CAPT D.W. Mikatarian
Commanding Officer
Naval Station Newport, Rhode Island
U.S. Navy

6/27/14
Date

1.7 (2 OF 2) AUTHORIZING SIGNATURES

The signature provided below validates the Selected Remedy for Site 17 - Former Building 32, Gould Island, at NAVSTA Newport in Jamestown, Rhode Island, by the Navy and EPA. RIDEM concurs with the Selected Remedy, as indicated in Appendix A of this ROD.

Human health and ecological risk assessments were conducted using CERCLA risk assessment methods and guidance. Accordingly, and based on the provisions of 40 CFR § 761.61 (c), EPA has determined that the risk-based RGs for PCBs in sediment, soil and groundwater will meet the no unreasonable risk standard in accordance with § 761.61 (c) through the removal and off-site disposal of all PCB-contaminated sediment exceeding RGs, the removal and off-site disposal of all sump debris, PCB-contaminated soil exceeding industrial RGs, the implementation of LUCs to prevent exposure to PCB-contaminated soil exceeding residential RGs, and MNA and LUCs to address groundwater exceeding industrial RGs and drinking water criteria.

Concur and recommend for implementation:

Nancy Barmakian for 06/30/14

James T. Owens, III
Director, Office of Site Remediation and Restoration
Region 1 – New England
U.S. EPA

Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

NAVSTA Newport is located approximately 25 miles south of Providence, Rhode Island, primarily on Aquidneck Island. The facility occupies approximately 1,000 acres, with portions of the facility located in the City of Newport and the Towns of Middletown, Portsmouth, and Jamestown, Rhode Island. With the exception of Site 17 on Gould Island, which is located in Narragansett Bay, the western boundary of NAVSTA Newport follows the western shoreline of Aquidneck Island for nearly 6 miles, facing the eastern passage of the bay (Figure 1-1). The major commands currently located at NAVSTA Newport include the Surface Warfare Officers School (SWOS) Command, Naval Undersea Warfare Center (NUWC), and Naval War College. Research, development, and training are the primary activities at NAVSTA Newport, formerly identified as the NETC, and assigned EPA ID Number RI6170085470.

Gould Island is located in the East Passage of Narragansett Bay, approximately 1.5 miles west of Newport, Rhode Island, between Aquidneck and Conanicut Islands, as illustrated on Figure 1-1. Former Building 32, located on the northeastern end of Gould Island, occupied approximately 6 acres of land, not including the firing pier and Building 35 to the north (Figure 2-1). Site 17 encompasses this 6-acre area around former Building 32, including the soil and groundwater and approximately 1 acre of marine sediment adjacent to the northern shoreline where contaminants from the former Building 32 and its operation have come to reside. Building 35, outside the site boundary, is currently the only operational facility at Gould Island. Building 35 is an active test facility operated by NUWC and occupied part time by Navy staff. The Navy retains approximately 9 acres at this northern end of Gould Island, most of which was investigated as a part of Site 17. The southern part of the island (reportedly 46 acres) is owned by the State of Rhode Island.

Building 32 was a Navy torpedo overhaul shop from the 1940s until it ceased major operations in the 1950s. During that time, torpedoes were brought to the overhaul shop for dismantling, cleaning, and reassembly. Operations within Building 32 included degreasing, parts washing, electroplating, sandblasting, mechanical and electrical testing, etc. Peripheral to Building 32, but featuring in the environmental investigations were Building 33, a steam plant, Building 34, a small building for generating acetylene, Building 44, a fuel pump house and associated underground fuel tanks, Building 41, a storage shed, and a series of five small transformer buildings – Buildings 53, 54, 56, 58, and 60. All these former buildings are within the footprint of the Site 17 boundary. Minor structures that featured in the environmental releases were an acid storage shed and dust storage equipment associated with indoor sandblasting operations. Other storage sheds and structures (administration building, guard shacks, etc.) were also present within the Site 17 boundary, though are also since removed, and are not pertinent to the environmental conditions at the site.

Gould Island is generally unoccupied, with the exception of Building 35. However, the surrounding waters are used for electronic equipment testing by NUWC, and the grounds of Site 17 are intended for similar use. The site is occasionally accessed by trespassers via recreational boating. The former buildings at the site have been demolished to existing grade, with the at-grade slab foundations left in place, as shown on Figure 2-1.

At the northern end of Gould Island where Site 17 is located, the island consists of a constructed shoreline that is a combination of filled land, man-made structures, and natural island formations. These include the Firing Pier, a rigging platform (a timber dock), a partial breakwater feature made of wood piles, and constructed shoreline (filled land behind bulkhead walls). The northeastern and northwestern intertidal shorelines of the site are exposed and subject to wave action. The northeastern shoreline consists of a deteriorated sheet-piling bulkhead wall and a stony beach face. The northwestern shoreline is composed of rip-rap.

The Firing Pier dominates the northern tip of Gould Island. This pier extends north from the northern end of the island and supports Building 35. The pier, Building 35, and the sediment under the pier are outside the Site 17 boundary and therefore outside the area identified for the remedial action.

A small boat basin referred to as the Stillwater Area is located north of the former Building 32 area. This area is bounded to the west by the Firing Pier and associated Building 35, and to the north by a row of pilings that forms a wave break. These features provide protection for small boats from prevailing west-northwest and northeast winds. During Building 32 operations, equipment and materials were brought by barges which accessed the island via the Stillwater Area. Cranes then lifted materials from barges onto the rigging platform which forms the southern boundary of the Stillwater Area.

NAVSTA Newport is an active facility, with environmental investigations and remedial efforts funded under the Environmental Restoration, Navy (ER, N) program. The Navy is conducting its Installation Restoration (IR) Program (i.e., environmental investigation and remediation program) at NAVSTA Newport in accordance with a Federal Facility Agreement (FFA) between the Navy, EPA, and RIDEM. The FFA established the Navy as the lead agency for the investigation and specified cleanup of designated sites within the NAVSTA Newport property, with EPA and RIDEM providing oversight.

2.2 Site History and Enforcement Activities

Previous environmental investigations designed to evaluate environmental quality at Site 17 are summarized in Table 2-1. Results of these investigations indicated that concentrations of chemicals (as noted above) exceed acceptable risk levels or state or EPA regulatory or advisory standards and background concentrations. The nature and extent of contamination identified in soil, groundwater, and marine sediment are discussed further in Section 2.5.

Table 2 1. Previous Investigations and Site Documentation

Investigation	Date	Activities
Initial Assessment Study (IAS)	1983	The IAS was completed for NAVSTA Newport and identified the Gould Island electroplating shop (a portion of Building 32) as an area for further study.
Confirmation Study (CS)	1984 and 1986	A Verification Study and CS were completed for six sites at NAVSTA Newport, including Gould Island. Sediment, surface water, soil, groundwater, and tank water samples were collected. Results indicated that historical uses of the site had potentially impacted site media. It was concluded that further investigations at the site were needed to determine the extent of the impacts and that there was still work to be done to officially decommission the tanks.
National Priorities List (NPL) listing	1989	NAVSTA Newport was listed on EPA's NPL as the NETC Superfund Site.
Waste Inventory and Removal	1992	A waste inventory was performed to determine the contents of miscellaneous drums and other containers present in Building 32. Hazardous materials identified in the waste inventory were removed, including electroplating fluids, acids, and stored chemicals for electroplating and metals cleaning. Elevated levels of cadmium and organic chemicals were detected in liquid samples collected from the Electroplating Shop.
Underground Storage Tank (UST) Closure Assessment – Building 44	1994 - 1996	The Building 44 UST Closure Assessment was completed in accordance with RIDEM UST regulations.
Building 33 USTs	1995 to 1996	Three USTs were removed from an underground vault to the west of Building 33. The Building 44 Phase I Environmental Assessment was completed.

TABLE 2 1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION (CONT.)		
INVESTIGATION	**DATE**	**ACTIVITIES**
Building 44 USTs - Corrective Action	2000	A Building 44 Corrective Action was implemented to close in place five concrete USTs (No. 5 and No. 2 fuel oil) under Rhode Island's Tank Closure Rules. Approximately 9,000 cubic yards (cy) of contaminated soil were removed from this UST area and from the former location of two steel USTs (ethyl alcohol and No. 2 fuel) associated with Building 32.
Building 32 - Study Area Screening Evaluation (SASE)	2000	During the SASE for Building 32, chlorinated solvents and PAHs were detected in soil gas, and elevated levels of metals were detected in sludge and soil samples.
Building 32 UST	2000	A 500-gallon diesel UST and associated contaminated soil were removed adjacent to the southern end of Building 32.
Building 44 USTs - Corrective Action Groundwater Monitoring	2001 to 2005	A Corrective Action Groundwater Monitoring program was implemented in the Building 44 UST area and continued for a period of 4 years.
Building 32 - Demolition	2001 to 2002	Building 32 was demolished to the slab elevation and removed from the site. Asbestos-containing materials were removed prior to demolition, in accordance with local, state, and federal regulations.
PCB Remediation	2002	Remedial activities were conducted to remove PCB-contaminated concrete and soil from the areas of former PCB electrical transformer buildings. PCB contamination detected in some of the concrete floors and soils of the transformer vaults and switch house was removed. Concrete roadways and building foundations were removed from the site, and soil contaminated with PCBs was excavated and disposed of under the Toxic Substances Control Act (TSCA).
Phase I RI	2005	The **Phase I RI** (Tetra Tech, 2006) was performed, including the baseline Human Health Risk Assessment (HHRA), on-shore hydrogeological investigation, and **screening-level Ecological Risk Assessment (ERA)**. The **baseline HHRA** indicated unacceptable risk to construction workers, primarily from potential exposure to contaminants in sumps and water trapped within test pits ("shallow groundwater") and from ingestion of shellfish impacted by contaminants in sediment. The screening-level ERA indicated that a baseline ERA was necessary because of potential for ecological risks.
Background Soil Investigation	2006	The basewide **Background Soil Investigation** (Tetra Tech, 2008) was conducted to provide a background data set for comparisons to soil and sediment data collected from CERCLA sites at NAVSTA Newport. The objective of the investigation was to identify levels of inorganics expected to be present had the various Navy activities not occurred. Both naturally occurring and possible anthropogenic metals were included. Surface and subsurface soil samples were collected at off-site locations representative of NAVSTA Newport soil types mapped by the United States Department of Agriculture Natural Resources Conservation Service (NRCS).
Phase 2 RI	2010	The **Phase 2 RI** (Tetra Tech, 2012) included a **baseline ERA (BERA)** and data gaps evaluation for soil. The BERA confirmed unacceptable risk to marine ecological receptors (benthic invertebrates only) as a result of PCBs, PAHs, and metals in sediment.
Feasibility Study (FS)	2014	The FS (Tetra Tech, 2014) identified preliminary cleanup goals, screened potential remedial technologies, and developed and evaluated **remedial alternatives** for soil, sump debris, groundwater, and marine sediment based on information from previous investigations. The final FS presented four remedial alternatives to address contamination in site soil three remedial alternatives to address contamination in site groundwater, and three remedial alternatives to address contamination in marine sediment.

Additional information about terms in ***blue text*** *is provided in the Administrative Record Reference Table included at the end of this ROD.*

There have been no cited violations under federal or state environmental law or any past or pending enforcement actions pertaining to the cleanup of Site 17.

2.3 COMMUNITY PARTICIPATION

The Navy performs public participation activities as part of the site cleanup process at NAVSTA Newport in accordance with CERCLA and the NCP. Through this process, the Navy developed a comprehensive community relations program, known as the NAVSTA Newport Community Involvement Plan, to foster effective communication with the public on the status and progress of designated sites at the facility. The community involvement plan includes regular technical and Restoration Advisory Board (RAB) meetings with local officials and the public, and the establishment of an online Information Repository for dissemination of information to the community (available at http://go.usa.gov/DyNw then click Administrative Records).

The Navy organized the RAB in 1990 to review and discuss NAVSTA Newport environmental issues with local community officials and concerned citizens. The RAB consists of representatives of the Navy, EPA, and RIDEM and members of the local community. The RAB has met frequently since its inception and now meets bi-monthly. Site 17 investigation activities, results, have been discussed at RAB meetings as they became available. Documents and other relevant information relied on in the remedy selection process are available for public review as part of the Administrative Record. For additional information about the IR Program at NAVSTA Newport, contact Ms. Lisa Rama, Public Affairs Office, 690 Peary Street, Naval Station Newport, Newport, Rhode Island, 02841 (lisa.rama@navy.mil).

In accordance with Sections 113 and 117 of CERCLA, the Navy provided a public comment period from March 13 to April 12, 2014, for the proposed remedial action described in the Proposed Plan for Site 17 - Former Building 32, Gould Island. A public meeting to present the Proposed Plan was held on March 19, 2014, at the Courtyard Marriott Hotel, 9 Commerce Drive, in Middletown, Rhode Island. A **public notice** of the meeting and availability of documents was published in the *Newport Daily News* and the *Jamestown Press* on March 13, 2014. Immediately following the public informational meeting, the Navy held a public hearing to solicit public comments for the record. A transcript of the oral comments received during the public hearing was prepared and is available for review as part of the Site 17 Administrative Record (see Appendix F). One written comment was received by mail during the 30-day comment period. One additional written comment and one oral comment were received during the public hearing. The comments are summarized in the Navy's Responsiveness Summary, presented in Section 3 of this ROD, and presented in full in Appendix F.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

Site 17, also referred to as Operable Unit 6, is part of a comprehensive environmental investigation and cleanup program currently being performed at NAVSTA Newport under CERCLA authority pursuant to the FFA dated March 23, 1992. Fifteen IR sites have been identified at NAVSTA Newport. An IAS completed in 1983 identified 18 sites where contamination was suspected to pose a potential threat to human health and the environment. Six of the 18 sites, including Site 17, were investigated further in a CS completed in 1986. A multi-site RI was completed in 1992 and included McAllister Point Landfill (Site 1), Melville North Landfill (Site 2), Old Fire Fighting Training Area (OFFTA) (Site 9), Tank Farm 4 (Site 12), and Tank Farm 5 (Site 13). The McAllister Point Landfill, Melville North Landfill, and Tank Farm 4 had been previously investigated during both the IAS and CS, and Tank Farm 5 was investigated during the IAS. Site 17 was not included in the 1992 RI, but was evaluated in the IAS and CS.

Investigations at the IR sites continued under the Department of Defense IR Program following the listing of NAVSTA Newport (then NETC) on the NPL in 1989. RODs have been signed for five sites, including McAllister Point Landfill, OFFTA (combined with the SWOS), Tank Farm 4, Tank Farm 5, and the Naval Undersea Systems Center (NUSC) Disposal Site. The Melville Water Tower was addressed through a Non-Time-Critical Removal Action (NTCRA). Six additional sites (Tank Farm 1, Tank Farm 2, Tank Farm 3, Coddington Cove Rubble Fill Area, Former Derecktor Shipyard, and Carr Point) are also being investigated under the IR Program. The Melville North Landfill was investigated and remediated under RIDEM regulations.

Investigations at Site 17 indicated the presence of sediment, groundwater, and shellfish contamination from past operating practices that poses potential unacceptable risk to current and potential future human and/or ecological receptors. In addition, concentrations of PAHs, PCBs, arsenic, cadmium, lead, and manganese in soil and PCE, PCP, and manganese in groundwater exceed state or federal regulatory standards or health advisories and background levels (where available).

Previous actions taken in response to the contamination at Gould Island are summarized in Table 2-1. The remedy documented in this ROD will achieve the Remedial Action Objectives (RAOs) for Gould Island, as listed in Section 2.8. Implementation of this remedy will allow industrial use of the site, which is consistent with current and reasonably anticipated future use and the overall cleanup strategy for NAVSTA Newport of restoring sites to support Navy operations.

2.5 SITE CHARACTERISTICS

Figure 2-2 presents the Site 17 conceptual site model (CSM), a graphical interpretation of contaminant sources, release mechanisms and transport routes, as well as receptors under current and future land use scenarios. Historical activities at Site 17 have resulted in PAHs, PCBs, and metals in soil; PCP, PCE, and manganese in groundwater in monitoring wells; PAHs, PCBs and metals in shallow groundwater trapped in test pit excavations, and PCBs, PAHs, and metals in marine sediment. Additionally, debris is present in sumps within the building 32 foundation and has been identified as solid waste. The nature and extent of contamination at the site is described in Section 2.5.2. The evaluated contaminant exposure pathways and potential human and ecological receptors under current and potential future land use scenarios are presented in Sections 2.7.1 (human) and 2.7.2 (ecological).

2.5.1 Physical Characteristics

The Site 17 CSM and geologic and hydrogeologic conditions are summarized in this section, based on a combination of information from published maps and site data collected during the RI.

2.5.1.1 Setting and Conceptual Site Model

The CSM developed during the RI shows that marine sediment in the Stillwater Area has become contaminated with PCBs and PAHs, likely through overland runoff from material spills at and adjacent to the rigging platform. PCBs were released from transformers at the site, possibly when they were in the process of being removed from the island. PCBs were also released from the transformer buildings in this area, and although removal actions have addressed them where concrete and soil were contaminated on the land portion of the island, residual concentrations of PCBs have intermingled with other contaminants in soil, and have impacted sediment near the shoreline. Northeast Shoreline sediments in the vicinity of outfall pipes from former Building 32 have lower concentrations of PCBs and metals, compared to Stillwater Area sediments. These contaminants are, in part, a likely result of discharges from pipes that drained waste associated with past building operations. Metals used and produced through electroplating and sandblasting operations in the southwestern corner of the former Building 32 were likely released to sediments via building and roadway drainage systems.

PAHs and metals exceed cleanup levels in soils within six discontinuous and fragmented areas of the site. PAHs, metals, and PCBs exceed cleanup levels in debris present within the sumps and equipment trenches within the former Building 32 foundation slab. These contaminants are presumably the result of releases from various industrial processes related to the former torpedo overhaul operations at the site.

Groundwater has been affected by previous industrial operations as well, and residual contaminants including trace concentrations of PCP and PCE, as well as manganese are present in groundwater at the site as identified in groundwater monitoring wells.

In addition to groundwater collected from monitoring wells, water in test pit excavations and trapped within sumps and equipment trenches constructed within the former Building 32 slab foundation was also evaluated and termed as “shallow groundwater”. PCP, PAHs, PCBs, benzene, and metals were all detected in this medium.

Debris is present in the sumps and equipment trenches constructed within the former Building 32 slab foundation. This debris, characterized as solid waste, has been qualitatively evaluated and determined to consist partially of building rubble and debris from past demolition activities.

With respect to manganese, industrial releases may have created or contributed to oxygen-reducing conditions in the subsurface, and/or natural biological degradation of organic material may be creating such conditions that favor the dissolution of metals (particularly manganese) from soil and rock which cause the metals to be in solution and migrate in groundwater in the dissolved state. While such organic material was not found in quantity, the oxygen-reducing condition could be a legacy geochemical situation resulting from prior releases that have since attenuated.

2.5.1.2 Geology

During development in the 1940s, the site was altered by cut-and-fill operations, cutting the natural soil from the hillside at the southern end of the site and filling the sub-tidal waters to the north to create a level area large enough to construct Building 32 and its support systems. As a result, the northern portion of the site is underlain by fill comprised primarily of disturbed native soils from the area, consisting of a mix of silty sand and gravel. The thickness of the fill ranges from about 6 to 12 feet, with greater thicknesses at the northern end of the site.

Portions of the site are underlain by glacial till consisting of silt, sand, and gravel. The till unit was not present at the southern end of the site but was encountered during drilling at thicknesses of up to 74 feet at the northern end of the site beneath fill.

Bedrock underlying the site is characterized as metamorphosed sedimentary rock, predominantly phyllite. This rock was found to be weathered in the upper 3 to 18 feet. As a result of the softness of the weathered zone, the transition from overburden to bedrock was not clearly defined at the northwestern end of the site where the depth to rock is greater than 30 feet.

At the eastern shoreline of the island (and south of the site), the overburden is very thin or nonexistent; the bedrock is exposed in places and is eroding due to wave action, forming a shingle-style beach face. Bedrock is undulating, brittle, and highly fractured, allowing water to seep through the fractures. There is no pervasive dip or strike to the exposed bedrock on the eastern shore, due to the extreme undulations.

2.5.1.3 Hydrogeology

Depths to groundwater at Site 17 range from approximately 3 to 7 feet below ground surface (bgs). Groundwater elevations indicate that the overall **groundwater flow** pattern in the vicinity of the site is radially outward toward the shorelines from the southern and center portions of the site.

Both the overburden and bedrock aquifers are influenced by tidal fluctuations, based on the results of the tidal study conducted as part of the RI. The vertical gradient measured at most well clusters is generally upward from bedrock to overburden but can also be impacted by significant precipitation events, resulting in a downward vertical gradient. At higher elevations, upgradient (south) of the site, groundwater elevations indicate a downward vertical gradient from overburden to bedrock; however, the actual exchange of groundwater between shallow overburden and bedrock is likely to be hindered in areas where dense till is present (i.e., where it was not excavated for site development). In the area south of Building 32 where till is not present, groundwater was observed discharging along the base of the hillside; the interaction of the overburden and bedrock aquifers in this area is not known.

Packer-testing results indicated that the bedrock aquifer did not yield appreciable amounts of water. The average hydraulic conductivities measured during the packer tests ranged from "negligible" to 3.1 x 10^{-5} centimeters per second.

2.5.2 Nature, Extent, Fate, and Transport of Contamination

The Navy's investigations have indicated that presumed releases from various industrial processes related to the site's former torpedo overhaul operations have resulted in the presence of contaminants in soil and groundwater in specific areas of the site and in nearby marine sediments, primarily Stillwater Area sediments in the vicinity of the rigging platform. COCs were determined in the Remedial Investigation (RI) and the associated risk assessments, as further discussed in Section 2.7 of this document. A summary of sample results for the COCs at Site 17 is presented in Table 2-2. These COCs include both contaminants that contribute to risk in excess of target thresholds and contaminants detected at concentrations exceeding regulatory criteria. The extents of COCs exceeding cleanup levels in soil, groundwater, and marine sediment are presented on Figures 2-3 through 2-5, respectively, and are discussed below.

As a matter of clarification, COCs at concentrations exceeding cleanup levels in water sampled from test pits, and trapped within sumps and equipment trenches (shallow groundwater) are present near the southwest corner of the former Building 32 foundation as shown on Figure 2-4. Elevated concentrations of contaminants in shallow groundwater are present in this area as a result of similar contaminants in soil in these areas.

Surface water samples were not collected as part of the investigations because of the tidal nature of the bay and the extremely large mixing zone associated with tidal waters. As a conservative measure, the groundwater data were evaluated in the Baseline ERA to determine potential risks to marine organisms after groundwater discharges to surface water.

TABLE 2 2. SUMMARY OF RESULTS FOR COCS

COC	FREQUENCY OF DETECTION	CONCENTRATION RANGE
SURFACE SOIL (0 to 2 feet below ground surface)		
Semivolatile Organic Compounds (SVOCs) (µg/kg)		
Benzo(a)anthracene	38 / 43	34 - 8400
Benzo(a)pyrene	34 / 43	28.5 - 6700
Benzo(b)fluoranthene	35 / 43	26 - 8200
Benzo(g,h,i)perylene	33 / 43	14 - 4700
Benzo(k)fluoranthene	35 / 43	16.5 - 4600
Chrysene	38 / 43	34.5 - 8100
Dibenzo(a,h)anthracene	26 / 43	3.4 - 2000
Indeno(1,2,3-cd)pyrene	32 / 43	11.8 - 4600
Naphthalene	22 / 43	5.4 - 860
Pyrene	40 / 43	48 - 15000
PCBs (µg/kg)		
Total Aroclor	7 / 25	51 - 1840
Metals (mg/kg)		
Arsenic	43 / 43	0.87 - 11.4
Cadmium	32 / 43	0.071 - 5670
Lead	43 / 43	5.8 - 2700
Manganese	43 / 43	92 - 473

TABLE 2 2. SUMMARY OF RESULTS FOR COCs		
COC	**FREQUENCY OF DETECTION**	**CONCENTRATION RANGE**
SUBSURFACE SOIL (soil below a depth of two feet or below foundation)		
SVOCs (µg/kg)		
Benzo(a)anthracene	32 / 61	3.6 - 3600
Benzo(a)pyrene	23 / 61	3.0 - 2300
Benzo(b)fluoranthene	29 / 61	2.8 - 2900
Benzo(g,h,i)perylene	19 / 61	4.5 - 940
Benzo(k)fluoranthene	19 / 61	2.78 - 1300
Chrysene	29 / 61	4.2 - 3300
Dibenzo(a,h)anthracene	13 / 61	9.7 - 220
Indeno(1,2,3-cd)pyrene	20 / 61	2.78 - 920
Naphthalene	16 / 61	3.6 - 1200
Pyrene	37 / 61	4.3 - 7800
PCBs (µg/kg)		
Total Aroclor	2 / 43	82 - 140
Metals (mg/kg)		
Arsenic	62 / 62	0.57 – 10.1
Cadmium	20 / 62	0.038 – 22.6
Lead	62 / 62	3.6 - 111
Manganese	62 / 62	74.3 - 411
MARINE SEDIMENT - STILLWATER AREA AND NORTHEAST SHORELINE		
Total PAHs (µg/kg)	143 / 147	3.02 - 88100
Total PCBs (µg/kg)	104 / 147	3.2 - 55000
Mean ERM-Q(1)	147 / 147	0.0337 - 31.05
Chromium	147 / 147	6 - 3910
GROUNDWATER FROM MONITORING WELLS AND "SHALLOW GROUNDWATER" FROM TEST PITS AND SUMPS		
SVOCs (µg/kg)		
2-Methylnaphthalene	4 / 20	0.12 - 160
Benzo(a)anthracene	6 / 20	0.2 - 53
Benzo(a)pyrene	6 / 20	0.15 - 24
Benzo(b)fluoranthene	7 / 20	0.11 - 43
Chrysene	6 / 20	0.26 - 61
Dibenzo(a,h)anthracene	2 / 20	0.17 - 2.5
Fluoranthene	10 / 20	0.12 - 290
Indeno(1,2,3-cd)pyrene	6 / 20	0.15 - 19
Phenanthrene	10 / 20	0.14 - 320
Pentachlorophenol (PCP)	2 / 20	7 - 25
Volatile Organic Compounds (VOCs) (µg/kg)		
Benzene	2 / 20	1 - 3
PCE	1 / 20	6 - 6
Trichloroethene (TCE)	1 / 20	1 - 1
Total PCB Aroclors (µg/kg)	1 / 20	8 - 8

TABLE 2 2. SUMMARY OF RESULTS FOR COCs		
COC	FREQUENCY OF DETECTION	CONCENTRATION RANGE
Metals (mg/kg)		
Arsenic	10 / 20	1.7 - 44.9
Manganese	19 / 20	21.1 - 4210

1 ERM-Q = Effects Range-Median Quotient, is not a COC per se, but is a unitless value indicating combined exposure to levels of PAHs, PCBs, arsenic, cadmium, chromium, copper, lead, nickel, and zinc in sediment. Individual cleanup levels are not established for all the constituents that contribute to the ERM-Q because the risk is based on a combined exposure.

PCBs were released from previous transformer areas, and although removal actions have addressed PCBs released to the soil and former concrete roadways, residual concentrations of PCBs appear to have intermingled with other contaminants in sump debris and in marine sediment. PAHs were found in sump debris and soil within and around the former Building 32 footprint, where drains and/or overland runoff also carried them to nearby marine sediments. Sediments in limited areas at the Northeast Shoreline, generally near some of the outfall pipes, have been found to contain PCBs, PAHs, and metals at lower concentrations than those detected in Stillwater Area sediments. These chemicals at the Northeast Shoreline are most likely a result of discharges from pipes that drained waste from specific building operations when the site was active.

The SVOC, PCP, was found in building sump debris as well as groundwater. The Maximum Contaminant Level (MCL) for PCP was exceeded at one groundwater sample location, only. PCE was also detected in groundwater at a concentration exceeding the MCL at only one location, near a former parts shop in former Building 32, indicating possible use and release of cleaning solvents.

Metals used and produced through electroplating and sandblasting operations in the southwestern corner of the former Building 32 appear to have been released to nearby sediments via building and roadway drainage systems. Manganese, a naturally occurring element in soil and rock, is present at elevated concentrations in the groundwater across the site.

Contaminants such as PCBs and PAHs are highly persistent and when released to the environment are likely to remain adsorbed to the soil or sediment matrix, bound to particulate matter. As a result, these contaminants tend to migrate from source areas via bulk movement processes (e.g., transported as particles in surface water runoff or in wind erosion of soil). If leaching from soil to groundwater occurs, any migration that may take place is usually over relatively short distances. For these compounds, biodegradation is possible but is likely to be slow.

Metals are also considered to be persistent in the environment and tend to adsorb to soil particles or colloids, especially when the soil is of high organic content, and become more soluble under reducing conditions. Soluble metals may be leached from soil to groundwater by infiltration of precipitation and through the seasonal rise and fall of the water table. Once dissolved in groundwater, metals will travel with groundwater flow. As groundwater migrates, some of the metals will undergo transformation processes that result in their return to an insoluble state. Reduction-oxidation reactions, precipitation, and adsorption reactions can cause the dissolved phase ions to leave the aqueous phase.

PCE and PCP are present in water-table overburden groundwater near the shoreline and were not found in deep overburden or bedrock at the site. Given their location and concentration, it is likely that these COCs would flow with groundwater to discharge into the ocean water to the east.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Gould Island is designated an upland area; published maps do not indicate the presence of wetlands on the island other than the shoreline intertidal zone (USDOI, 1975). The near-shore portions of the site are within the coastal flood zone (FEMA). Other than the part time testing operation at Building 35, the Navy-owned portion of Gould Island is not currently being used, though NUWC plans to retain the land for potential additional equipment testing operations. Based on this information, the future land use is anticipated to be industrial. There is no current or planned residential use of the site; due to its remote location on an island without active utilities, residential use is not feasible.

Groundwater underlying NAVSTA Newport, including Gould Island, is not used for drinking water. Drinking water for NAVSTA Newport and for most of the residents of Newport and Middletown is supplied and managed by the Newport Water Department, which receives its water supply from a series of seven surface water reservoirs located on Aquidneck Island and two surface water reservoirs on the mainland. Water supply wells were installed at Gould Island during development in the 1940s, but these did not produce enough water for the planned purposes. Domestic water was later piped to the island from the City of Newport. The water supply wells on Gould island are reportedly present but inactive.

RIDEM has established a state groundwater classification system to protect its groundwater resources. Under this system, the majority of the groundwater beneath Site 17 is within **RIDEM's GA groundwater classification area,** which designates it as presumed suitable for public or private drinking water use without treatment, and groundwater beneath the remainder of Site 17 is designated GA-NA (RIDEM, 2010). The designation of GA-NA is defined as "groundwater suitable for water supply but not attainable" and designated for the specific areas at Gould Island where CERCLA releases have occurred, due to the presumption or presence of disposal of oil or hazardous materials.

However, per EPA groundwater remediation guidance, in states without an EPA-approved Comprehensive State Groundwater Protection Program (CSGWPP), such as Rhode Island, CERCLA groundwater remediation must meet federal drinking water standards (i.e., MCLs and non-zero Maximum Contaminant Level Goals ([MCLGs]) or risk-based standards or more stringent state groundwater standards, unless the water is non-potable. Groundwater identified by EPA as suitable for potable use is present within the site that requires remediation under CERCLA.

2.7 SUMMARY OF SITE RISKS

This section of the ROD summarizes the results of the risk assessments conducted for Site 17. The risks summarized in this section are those for **potential receptors** indicated in Table 2-3.

The baseline risk assessments estimate the risks that a site poses if no action were to be taken. The risk assessment results provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action (additional contaminants and exposure pathways may be identified based on regulatory criteria exceedances of chemicals). An HHRA and a BERA were conducted as part of the Phase 1 and Phase 2 RIs, respectively (Tetra Tech, 2006 and 2012).

2.7.1 Human Health Risk

The quantitative HHRA was conducted using chemical concentrations detected in surface and subsurface soil, groundwater sampled from test pits/sumps ("shallow groundwater") and groundwater from monitoring wells, marine sediment, and shellfish (mussels and clams). Key steps in the risk assessment process include identification of Contaminants of Potential Concern (COPCs), **exposure assessment**, toxicity assessment, and risk characterization. Tables summarizing data used in the HHRA are presented in Appendix C.

2.7.1.1 Identification of COPCs

The available validated data collected during the field investigations were used to identify COPCs for Site 17. Both federal and RIDEM criteria were used for COPC selection. Criteria include EPA Region 9 residential preliminary remediation goals (PRGs), EPA Region 9 tap water PRGs, EPA lead guidance, MCLs, EPA's Office of Solid Waste and Emergency Response (OSWER) draft subsurface vapor intrusion guidance Table 2c target groundwater concentrations, EPA Region 3 risk-based concentrations (RBCs) for fish ingestion, and RIDEM direct exposure criteria (DECs) and Rhode Island GA groundwater objectives. **COPCs were identified** for soil, groundwater, sediment, and shellfish during the HHRA.

Details of the HHRA, including exposure point concentrations (EPCs) for the COPCs identified during the HHRA for surface soil (0 to 2 feet), subsurface (all) soil (0 to 10 feet), groundwater, sediment, and shellfish are provided in the RI (Tetra Tech 2006). EPCs are the concentrations used in the risk assessment to estimate exposure and risk from each COPC. The following guidelines were used to calculate EPCs for Site 17 COPCs during the HHRA:

- For soil and sediment, the 95-percent upper confidence limits (UCLs) on the arithmetic mean, which are based on the distribution of each data set, were selected as EPCs. EPCs were calculated using EPA's Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (2002) and by following a Tetra-Tech-modified version of EPA's ProUCL software Version 3.00.02 (2004). Contaminant concentrations in debris contained within sumps in the former Building 32 foundation were much greater than those associated with soil outside and under the building foundations.

- For groundwater, in accordance with the EPA New England Risk Updates (EPA 1995), maximum groundwater concentrations were used as EPCs for the reasonable maximum exposure (RME) scenario, and average groundwater concentrations were used as EPCs for the central tendency exposure (CTE) scenario.

- For exposure of construction workers to air in excavated trenches, EPCs were estimated from contaminant concentrations in water pooled within test pit excavations (termed "shallow groundwater"). To estimate EPCs for air in a construction trench, an approach suggested by the Virginia Department of Environmental Quality (VDEQ, 2004) was used, which is based on a combination of a vadose zone model and a box model. This methodology is described in the HHRA section of the Phase 1 RI (Tetra Tech, 2006).

- Non-detected values were evaluated in accordance with the ProUCL guidance. The results of duplicate samples were averaged for purposes of calculating EPCs for COPCs in environmental media at Site 17. In calculating averages, if a chemical was detected in only one sample of a duplicate pair, the average was calculated using the detected value and one-half of the detection limit.

2.7.1.2 Exposure Assessment

During the **exposure assessment** step of the HHRA, current and potential future exposure pathways through which humans might come into contact with the COPCs identified in the previous step were evaluated. The results of the exposure assessment for Site 17 were used to refine the CSM. Surface soil (0 to 2 feet depth), subsurface soil (0 to 10 feet depth), shallow groundwater associated with test pits/sumps, groundwater from monitoring wells, marine sediment, and shellfish (mussels and clams) were identified as the media for evaluation. The evaluated potential exposure routes include incidental ingestion of and dermal contact with contaminated soils and inhalation of dust; incidental ingestion of and dermal contact with contaminated sediment; inhalation of volatile organic contaminants in groundwater from monitoring wells that may volatilize into future indoor air spaces; incidental ingestion of and dermal contact with contaminated shallow groundwater, inhalation of volatile contaminants in "shallow groundwater" that may volatilize into construction trenches; and ingestion of contaminated shellfish.

The HHRA considered receptor exposure under non-residential land use including recreational use, construction and industrial uses, visitation by trespassers, and recreational and subsistence-level consumption of shellfish. There is no current or anticipated future residential use of the site; therefore, the HHRA did not evaluate risks to residential receptors.

Table 2-3 summarizes current and potential future complete exposure pathways that were quantitatively evaluated at Site 17. The pathways included in the table were quantitatively evaluated in the HHRA; other pathways (e.g. dust inhalation) were only qualitatively evaluated. Exposure assumptions and other supporting information used in the HHRA are presented in the RI (Tetra Tech, 2006).

Table 2 3. Receptors and Exposure Routes Evaluated in HHRA

Receptor	Exposure Route
Construction Workers (future)	Soil incidental ingestion Soil dermal contact Inhalation of air/dust emissions Groundwater incidental ingestion (during excavation) Groundwater dermal contact (during excavation) Groundwater inhalation of volatile organics (during excavation)
Industrial Workers (current)	Soil incidental ingestion (surface soil) Soil dermal contact (surface soil)
Industrial Workers (future)	Soil incidental ingestion (soil to 10 feet) Soil dermal contact (soil to 10 feet) Inhalation of air/dust emissions (soil to 10 feet)
Adolescent Trespassers (current and future)	Soil incidental ingestion Soil dermal contact Sediment incidental ingestion Sediment dermal contact
Recreational Users (Adults/Children) (current and future)	Soil incidental ingestion Soil dermal contact Sediment incidental ingestion Sediment dermal contact
Fishermen (Adults/Children) (current and future)	Shellfish ingestion (mussels, clams)

2.7.1.3 Toxicity Assessment

The objective of the toxicity assessment is to identify the potential adverse health effects in exposed populations. Quantitative estimates of the relationship between the magnitude and type of exposures and the severity or probability of human health effects are defined for the identified COPCs. Quantitative toxicity values determined during this component of the risk assessment are integrated with outputs of the exposure assessment to characterize the potential for the occurrence of adverse health effects for each receptor group.

The toxicity values used to evaluate non-carcinogenic health effects for ingestion and dermal exposures are called reference doses (RfDs) and reference concentrations (RfCs), and these are used to evaluate non-carcinogenic health effects for inhalation exposures. RfDs and RfCs are estimates of daily exposure levels for the human population that are likely to be without appreciable risk during a portion or all of a lifetime. RfDs and RfCs are based on a review of available animal and/or human toxicity data, with adjustments for various uncertainties associated with the data. Carcinogenic effects are quantified using the cancer slope factor (CSF) for ingestion and dermal exposures and inhalation unit risk (IUR) for inhalation exposures, which is a plausible upper-bound estimate of the probability of development of cancer per unit intake of chemical over a lifetime. Potential carcinogenic effects are calculated using available dose-response data from human and/or animal studies.

Although toxicity criteria can be found in several toxicological sources, EPA's Integrated Risk Information System (IRIS) online database is the preferred source of toxicity values. This database is continuously updated, and the presented values have been verified by EPA. The toxicity criteria for the constituents selected as COPCs during the HHRA are presented in the RI (Tetra Tech, 2006).

2.7.1.4 Risk Characterization

During the risk characterization, the outputs of the exposure and toxicity assessments are combined to characterize the baseline risk (cancer risks and non-cancer hazards) at the site if no action was taken to address the contamination. Potential **cancer risks and non-cancer hazards** were calculated based on RME assumptions. The RME scenario assumes the maximum level of human exposure that could reasonably be expected to occur.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Cancer Risk} = \text{CDI} \times \text{SF}$$

where: Cancer Risk = a unitless probability (e.g., 2×10^{-5}) of an individual developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor ($[\text{mg/kg-day}]^{-1}$)

These calculated risks are probabilities that are usually expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk or incremental lifetime cancer risk (ILCR) of 1×10^{-6} under an RME scenario indicates that an individual experiencing the reasonable maximum exposure estimate has an "excess lifetime cancer risk" because it would be in addition to the risks of contracting cancer that individuals face from other causes. EPA's generally acceptable risk range for site-related exposures is 1×10^{-4} (1 in 10,000) to 1×10^{-6} (1 in 1 million).

Table 2-4 provides the RME cancer risk estimates for the significant receptors and routes of exposure based on the HHRA completed for Site 17. These risk estimates were developed considering various conservative assumptions about the toxicity of the contaminants detected and the frequency and duration of exposure for each receptor. Site 17 COCs associated with carcinogenic risk include PCBs, PAHs, PCP, and arsenic. Total risk estimates calculated for all applicable exposure routes range from 3×10^{-6} for adult recreational visitors to 2×10^{-3} for construction worker exposure to shallow groundwater from test pits and associated trench air, and 1×10^{-3} for adults consuming shellfish at a subsistence or recreational level (children consuming shellfish also exceeded the acceptable risk range). These risk levels indicate that if no cleanup action was taken, the increased probabilities of developing cancer as a result of site-related exposure would range from approximately 3 in one million to 2 in 1,000. No unacceptable cancer risks were estimated for exposures to soil. Cancer risks to human receptors from exposure to sediment at Site 17 are indirect, via consumption of contaminated shellfish.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) to an RfD derived for a similar exposure period. An RfD represents a level to which an individual may be exposed that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a Hazard Quotient (HQ). An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD and that toxic non-carcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all chemicals that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may be reasonably exposed. An HI of 1 or less indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI} / \text{RfD}$$

where: CDI = chronic daily intake (mg/kg-day)
RfD = reference dose (mg/kg-day)

CDIs and RFDs are expressed in the same units and represent the same exposure period (i.e., chronic, sub-chronic, or short-term).

Table 2-4 also provides RME non-cancer HQs for each receptor and route of exposure, and provides total HIs for all routes of exposure. Total HIs for all applicable exposure routes range from 0.02, for dermal contact with and/or incidental ingestion of shallow soil by current industrial workers, to 561, for construction worker inhalation of trench air (as modeled from concentrations in shallow groundwater [test pits]).

HIs for all receptors exposed to site-related COPCs in surface and subsurface soil, sediment, and shallow groundwater under the RME scenario were less than or equal to unity (1), with three exceptions: the exception of construction workers exposed to trench air (as modeled from shallow groundwater), the recreational child visitors exposed to chromium in sediment, and ingestion of shellfish by adults and children. The major contributors to the HI for construction worker exposure to trench air are PAHs, naphthalene and PCBs. The major contributors to the HI for shellfish ingestion are arsenic and PCBs. No unacceptable non-cancer hazards were estimated for soil at Site 17.

2.7.1.5 Summary of Human Health Risk

The HHRA evaluated receptor exposure under non-residential land use scenarios (industrial, construction worker, trespasser, recreational, and fisherman). Quantitative estimates of non-carcinogenic hazards and carcinogenic risks were developed for potential human receptors.

Adolescent trespassers, recreational visitors, and industrial workers were evaluated for exposures to surface soil (0 to 2 feet bgs). Adolescent trespassers and recreational visitors were also evaluated for exposures to sediment. Construction and industrial workers were evaluated for exposures to all soil (0 to 10 feet), and construction workers were also evaluated for exposure to all soil, shallow groundwater in test pits air within confined trenches affected by shallow groundwater. Fishermen were evaluated for exposure to contaminants in shellfish.

The HHRA for Site 17 indicates there are potentially unacceptable risks to some receptors from exposure to trench air (modeled from shallow groundwater in test pits), and from shellfish ingestion. No unacceptable risks were calculated for any evaluated receptors for exposure to soil.

The following potentially unacceptable risks were identified for Site 17:

- Construction workers could be affected by exposure to PAHs and PCP from direct contact/incidental ingestion of shallow groundwater, and to PAHs and PCBs from inhalation of associated trench air;
- Child and adult fishermen could be affected by consumption of shellfish collected from the surrounding seabed due to concentrations of arsenic, PCBs, and PAHs in clam and/or mussel tissue.
- The potential for risk to residents was determined based on a screening assessment consisting of a comparison of contaminants in soil to RIDEM residential DECs and contaminants in groundwater to drinking water standards (MCLs). These comparisons indicated risks to hypothetical future residents would be unacceptable.

Table 2-4 below presents the calculated risks for the non-residential receptors evaluated in the HHRA.

TABLE 2 4. RECEPTORS AND CALCULATED RME RISKS AND HAZARDS			
RECEPTOR	MEDIUM	TOTAL CANCER RISK(3)	TOTAL NON CANCER HAZARD INDEX(3)
Construction Worker	Shallow Groundwater(4)	$2x10^{-3}$	1
	Trench Air (modeled from shallow groundwater)	$4x10^{-4}$	561
	Soil (0 to 10 feet in depth)	$< 1x10^{-4}$	1
	Subsurface Soil Dust	$< 1x10^{-4}$	< 1
Recreational Visitor (Child)	Intertidal Sediment	$< 1x10^{-4}$	2(1)
	Surface Soil – 0 to 2 feet	$< 1x10^{-4}$	< 1
Recreational Visitor (Adult)	Intertidal Sediment	$< 1x10^{-4}$	< 1
	Surface Soil – 0 to 2 feet	$< 1x10^{-4}$	< 1
Trespasser Adolescent	Intertidal Sediment	$< 1x10^{-4}$	< 1
	Surface Soil – 0 to 2 feet	$< 1x10^{-4}$	< 1
Industrial Worker	Surface Soil – 0 to 2 feet	$< 1x10^{-4}$	< 1
	All Soil – 0 to 10 feet	$< 1x10^{-4}$	1
	Subsurface Soil Dust	$< 1x10^{-4}$	< 1
Shellfish Ingestion (Child [2])	Mussels	$5x10^{-4}$	34
	Clams	$5x10^{-4}$	18
Shellfish Ingestion (Adult [2])	Mussels	$1x10^{-3}$	23
	Clams	$1x10^{-3}$	13

1 Risk identified is associated with exposure to chromium, and assumes this metal is present in its most toxic form, which was deemed unlikely in marine environments.
2 Risks cited for shellfish ingestion are based on subsistence-level consumption, though recreational-level ingestion is also above target risk level.
3 Yellow highlighted values indicate exceedance of EPA's target risk range or target hazard value.
4 Shallow groundwater is defined as water collected from within test pit excavations, not water from shallow wells.

Soil Risks

RME cancer risk estimates and non-cancer risk HIs for all non-residential receptors exposed to site-related COPCs in surface and subsurface soil were less than the target cancer risk range or were less than or equal to the target HI of 1. Although residential land use is not anticipated, unacceptable human health risk is assumed under a potential future residential exposure scenario, based on chemical concentrations present in soil, as noted above.

Groundwater and Associated Trench Air Risks

The cancer risk estimates for construction workers exposed to site-related COPCs by direct contact to shallow groundwater (as measured in water sampled from test pits/sumps) or inhaling trench air impacted by shallow groundwater COPCs exceeded the EPA target risk range. The major contributors to the risk were PAHs and PCP for the direct contact scenario and PAH and PCBs for the inhalation scenario. The non-cancer HI for direct contact exposure to COPCs by construction workers was less than 1, but the HI for construction workers inhaling trench air far exceeded 1 (see the Risk Uncertainties subsection below).

For groundwater, residential use is not anticipated, but unacceptable human health risk is assumed under a potential future residential exposure scenario, based on PCP and PCE concentrations exceeding MCLs and manganese concentrations exceeding the tap water Health Advisory.

Sediment Risks

The HI for child recreational visitors exposed to intertidal sediment slightly exceeded 1. This risk was driven by chromium (assuming presence as Cr^{+6}) in sediment. The total cancer risk estimate for this receptor was less than the EPA target risk range.

Shellfish Ingestion Risks

Both the cancer risk and non-cancer hazard estimates for children and adults consuming shellfish (clams and/or mussels impacted by site-related COPCs) at both subsistence and recreational levels exceeded the EPA target cancer risk range and non-cancer target HI of 1. Arsenic, PCBs, and PAHs were the major contributors to these risks.

Risk Uncertainties

Predicted human health risk from chromium in marine sediment is uncertain. Sediment samples were analyzed for total chromium, whereas the HHRA conservatively assumed that it is present in the form of hexavalent chromium rather than the less toxic trivalent form. Hexavalent chromium is unstable and based on the history of the releases, is unlikely to be present in marine sediment. If chromium is present predominantly in the trivalent form, the calculated risks associated with exposure to sediment would be significantly less than the threshold.

Predicted risk for construction worker exposure to air confined in excavated trenches is also uncertain. To calculate this risk, the EPCs were estimated from shallow groundwater concentrations in aqueous samples collected from test pits. There are no well-established models available for estimating migration of volatiles from groundwater into a construction/utility trench. Uncertainty arises in the use of models to predict trench air concentrations based on shallow groundwater (test pit water) data. The accuracy of these models can be affected by the size of the trench and ambient air conditions as well as the accuracy of the groundwater data set. The main uncertainties associated with the model are the dimensions of the trench and the air exchange rate. The model assumes that if the ratio of the trench width to the trench depth is less than or equal to 1, the air exchange rate is 2 per hour. If the ratio is greater than 1, the air exchange rate is 360 per hour, a significantly higher rate. Consequently, the dimensions of the trench have a great impact on the resulting air concentrations.

No other major sources of uncertainty other than those typically associated with risk assessment estimates were identified for the Site 17 HHRA.

2.7.2 Summary of Ecological Risk

The screening ERA and the BERA were performed to assess ecological risks to aquatic receptors and piscivorous mammals and birds exposed to contaminants at the site. Based on the results of the screening-level ERA performed during the Phase 1 RI, chemicals were retained as COPCs for risk to sediment invertebrates, which were then further evaluated in the BERA performed during the Phase 2 RI. No chemicals were retained as COPCs for plants, soil invertebrates, or terrestrial receptors. Ecological COPCs identified during the ERA are summarized in Appendix D. A food-chain model was used to estimate chemical uptake into piscivorous wildlife such as herring gulls and raccoons. Site-specific sediment toxicity tests were conducted, and shellfish tissue samples were collected to better evaluate risks to ecological receptors and to aid in the development of site-specific no-observed-effects concentrations (NOECs) and lowest-observed-effects concentrations (LOECs) for the associated COPCs. These data, in combination with sediment chemistry data, were used to evaluate potential risks to the following three ecological endpoints:

- Benthic invertebrates that serve as a food source for higher trophic level organisms as early life stage (planktonic forms) or as adult stage. These invertebrates can accumulate chemicals which are transferred through the food chain.

- Marine Biota (clams, mussels, and crabs) which feed on invertebrates and are exposed to and can accumulate chemicals from the food items they consume or from the sediment in which they reside.

- Piscivorous birds and mammals, which consume shellfish and benthic invertebrates. They are present in the area and can accumulate chemicals present in their food source.

The following sections summarize the potential risk to these receptors.

Risks to Benthic Invertebrates

Risks to benthic invertebrates were determined using chemistry and toxicity test data from 29 marine sediment samples collected from various locations around Gould Island and from three reference sediment locations in areas presumed not to be affected by site releases. Three potential effects were evaluated through this testing process, including 1) mortality as measured by survival of the amphipods, 2) growth as measured by weight and biomass, and 3) reproduction as measured by overall juvenile production and juvenile production per surviving female. Samples from 10 of the site locations were determined to have lower survival, reproduction, or growth compared to that found in at least two of the three reference samples.

The results of the toxicity testing combined with the sediment chemistry data were used to determine NOECs and LOECs for high molecular weight (HMW) PAHs, low molecular weight (LMW) PAHs, total PAHs, total PCB homologs, average ERM-Q, when possible, and for the metals antimony, copper, lead, mercury, nickel, and silver.

The ERM-Q is a unitless value calculated as the mean (average) quotients of detected concentrations divided by a selected literature based toxicity value. The toxicity value selected by the team was the Effects-Range-Median, or ERM (Long et. al. 1995). The ERM-Q is calculated for each sample result, and accommodates all the constituents selected, and thus can account for combined effects to the receptors from those constituents with lesser toxicity.

In the Stillwater Area, eight sample locations had total PCB concentrations exceeding the associated NOEC and LOEC, and one location had total PAHs exceeding the associated NOEC and LOEC. Along the Northeast Shoreline, one location had a total PCB concentration greater than the total PCB NOEC and LOEC. Eight locations in the Stillwater Area had average ERM-Q values greater than the NOEC, including six locations that exceeded the LOEC. Three locations along the Northeast Shoreline had average ERM-Q values greater than the NOEC, including two locations that exceeded the LOEC.

At several locations, two samples were collected during different sampling events. The chemical concentrations varied between the two events, which may have been a result of slightly different sampling depths during the different events. In some cases, chemical concentrations in one sample were greater than the NOECs and LOECs, while concentrations in the other sample were not.

Although NOECs and LOECs were developed for several metals, there is considerable uncertainty in the LOECs, so they were not used to evaluate the data. Elevated metals levels were not found to be widespread in sediment, and the areas with high metals concentrations were not verified in subsequent sampling results; therefore, metals are not likely to present a significant concern for ecological receptors, with the possible exception of a few small areas. Also, many of the metals were included in the ERM-Q calculation, so they are accounted for in the NOECs and LOECs.

Risks to Marine Biota

Risks to biota were evaluated using tissue residue values, such as the cytotoxic T-lymphocyte (CTL) (ORDEQ, 2007) or other values from the literature. Cadmium levels in clams/mussels and crabs from the Northeast Shoreline and Northwest Shoreline areas exceeded the CTL and the site shellfish reference concentration, respectively. Lead levels in clams/mussels from the Stillwater Area slightly exceeded the CTL and reference concentration. CTLs were not available for other constituents detected.

Risks to Birds and Mammals

Risks to birds and mammals were evaluated using food-chain models. Based on the refined food-chain model step, potential adverse risks to piscivorous birds and mammals are insignificant.

Conclusion

The results of the BERA indicate that there is unacceptable risk to benthic invertebrate organisms from the following contaminants in sediment: PCBs, PAHs, and the combined exposure to arsenic, cadmium, chromium, copper, lead, nickel, zinc, PAHs, and PCBs (ERM-Q).

2.7.3 Basis for Action

Unacceptable risks to human health and the environment were identified for current and potential future site exposure scenarios. Residential exposure risks are assumed to be unacceptable and the results of the HHRA indicated that potential unacceptable risks were associated with (1) exposure to shallow groundwater and associated trench air by future construction workers; and (2) both subsistence- and recreational-level consumption of contaminated shellfish by children and adults. While the potential for risk from exposure to chromium in marine sediment by child-visitors (a potential future recreational scenario) is notable, there is no basis for action given the uncertainty in this risk estimation.

The results of the ERA indicated that there are potential unacceptable risks to benthic invertebrate organisms from exposure to PCBs and PAHs and from the combined effects from PCBs, PAHs and metals in the marine sediment in the Stillwater Area and possibly along the Northeast Shoreline.

Because unacceptable risks were identified under current and potential future land use scenarios, a response action is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment that may present an imminent and substantial endangerment to public health or welfare.

In addition, although concentrations of PAHs, PCBs, and several metals in soil and in sump debris, and PCE and manganese in groundwater did not contribute to calculated risk levels greater than the EPA target risk range, levels of these chemicals in these media exceed EPA or state regulatory criteria and so will also be addressed by the Selected Remedy.

2.8 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs specify the potential exposure routes and receptors for a site for the affected media, and provide a general description of what the cleanup will accomplish. RAOs typically serve as the design basis for the remedial alternatives, described in Section 2.9.

The **RAOs for Site 17** are as follows:

- Reduce risk to benthic invertebrates by preventing exposure to sediment COCs that contribute to toxic effects in these organisms.

- Prevent exposure of recreational and subsistence fishermen to COCs in shellfish (mussels and clams) by reducing the exposure of those shellfish to the contaminants in sediment until shellfish contamination no longer poses a human health risk.

- Remove sump debris, which is a source of contamination.
- Prevent the incidental ingestion of and direct contact with surface and subsurface soil containing COCs at concentrations exceeding human health cleanup levels.
- Prevent future migration of soil contaminants either to groundwater or adjacent sediments at concentrations that cause unacceptable risk.
- Prevent residential exposure to site soil in which concentrations of COCs pose unacceptable risk.
- Restore groundwater quality to its beneficial use.
- Prevent residential exposure to site groundwater until the groundwater cleanup levels have been achieved.
- Prevent construction worker exposure to COCs exceeding cleanup levels in trapped water in former building sumps, in contact with the sump debris, and in test pits (shallow groundwater).

These RAOs are based on current and reasonably anticipated future site use, which is industrial. The site is not currently used for residential purposes and there are no plans for such use of the property in the future. However, cleanup levels for residential exposures have been identified to evaluate cleanup options that would allow for unrestricted use of the site, and to determine whether institutional controls are needed to control this hypothetical future site use.

It is recognized that the debris present in the sumps and equipment trenches is likely contributing to contamination in the water within those sumps (shallow groundwater).

Chemicals associated with unacceptable human health risk (ILCRs greater than 1 x 10^{-4} or HIs greater than 1) and/or with unacceptable ecological risk (based on toxicity test results) were identified as **COCs** that require remediation. An ERM-Q cleanup level was also established for site-specific effects contributed to by the COCs in sediment at the site. **Preliminary Remediation Goals (PRGs)** were developed in the FS as target cleanup levels for remedial actions that would reduce COC concentrations in Site 17 media of concern and thereby mitigate risks to human health and the environment. **Cleanup levels** are established for the COCs. These cleanup levels also take into consideration RIDEM soil DECs and leachability criteria, as well as federal MCLs, non-zero MCLGs, federal risk-based standards, and more stringent state standards which have been determined to be applicable or relevant and appropriate requirement (ARARs).

Appendix C, Tables C-13, C-14, and C-15 summarize the COPCs, COCs, and the basis of the PRGs developed in the FS. The process of developing PRGs and selecting cleanup levels from these PRGs is summarized below for soil, groundwater and sediment. Accordingly, Tables 2-5, 2-6, and 2-7 summarize the COCs and cleanup levels selected for remediation at the site.

For each soil COC, the RIDEM DEC, RIDEM leachability criterion, EPA residential RSL (total Aroclors only), and background values were compared. The lesser of the DEC, leachability criterion, and RSL was selected and compared to applicable facility-specific background concentrations, if available (Tetra Tech, 2008). If the selected value was greater than the background value, the selected value was used as the cleanup level. If the selected value was less than the background value, the background value was used as the cleanup level. Although the objective of the action is to clean up to industrial land use, residential cleanup levels are identified to determine the extent of LUCs.

TABLE 2 5. CLEANUP LEVELS FOR SOIL			
CHEMICAL OF CONCERN	CLEANUP LEVEL (mg/kg)		BASIS FOR SELECTION
	Residential	Industrial	
PAHs			
Benzo(a)anthracene	0.9	7.8	RIDEM DEC(1)
Benzo(a)pyrene	0.4	0.8	RIDEM DEC (1)
Benzo(b)fluoranthene	0.9	7.8	RIDEM DEC (1)
Benzo(g,h,i)perylene	0.8	- NS -	RIDEM DEC (1)
Benzo(k)fluoranthene	0.9	- NS -	RIDEM DEC (1)
Chrysene	0.4	- NS -	RIDEM DEC (1)
Dibenzo(a,h)anthracene	0.4	0.8	RIDEM DEC (1)
Indeno(1,2,3-cd)pyrene	0.9	- NS -	RIDEM DEC (1)
Naphthalene	0.8	0.8	RIDEM Leachability Criterion
Pyrene	13	- NS -	RIDEM DEC (1)
PCBs			
Total Aroclors	1	- NS -	EPA Residential Guidance Value (2)
Metals			
Arsenic	7.99	7.99	Background
Cadmium	39	1000	RIDEM DEC (1)
Lead	150	500	RIDEM DEC (1)
Manganese	390	- NS -	RIDEM DEC (1)

1 - RIDEM DEC for both residential and industrial exposures are cited, if available.
2 - USEPA, 1990.
mg/kg - milligram per kilogram
NS - Not selected. An industrial cleanup level was not selected because the maximum concentration does not exceed the applicable standard.

The cleanup levels for site groundwater are established based on promulgated standards - federal or state MCLs or non-zero MCLGs or other standards found to be ARARs / To-Be-Considered (TBC) (manganese) - or are risk-based (e.g. when there are no standards that define protectiveness), as summarized in Table 2-6.

TABLE 2 6. CLEANUP LEVELS FOR GROUNDWATER		
CHEMICAL OF CONCERN	CLEANUP LEVEL (µg/L)	BASIS FOR SELECTION
PAHs		
2-Methylnaphthalene	350	Risk-Based Criteria(1)
Benzo(a)anthracene	380	Risk-Based Criteria (1)
Benzo(a)pyrene	0.2	Drinking Water Criteria(2)
Benzo(b)fluoranthene	380	Risk-Based Criteria (1)
Chrysene	37,700	Risk-Based Criteria (1)
Dibenzo(a,h)anthracene	38	Risk-Based Criteria (1)
Fluoranthene	157,200	Risk-Based Criteria (1)
Indeno(1,2,3-cd)pyrene	375	Risk-Based Criteria (1)

TABLE 2 6. CLEANUP LEVELS FOR GROUNDWATER (CONT.)		
CHEMICAL OF CONCERN	CLEANUP LEVEL (µg/L)	BASIS FOR SELECTION
Phenanthrene	118,000	Risk-Based Criteria(1)
Naphthalene	100	Drinking Water Criteria(2)
SVOCs		
PCP	1	Drinking Water Criteria(2)
VOCs		
Benzene	5	Drinking Water Criteria(2)
PCE	5	Drinking Water Criteria(2)
TCE	5	Drinking Water Criteria(2)
PCBs		
Total Aroclors	0.5	Drinking Water Criteria(2)
Metals		
Arsenic	10	Drinking Water Criteria(2)
Manganese	300	EPA Health Advisory(3)

1 - Risk-based criteria developed for construction worker exposure through dermal contact, incidental ingestion, and inhalation of vapors from shallow groundwater. Risk-based criteria are based on EPA's target cancer risk of no greater than 1 x 10^{-4}, and non-cancer risk (HI) no greater than 1.
2 - Drinking water criteria were used where available: the current EPA MCL or RIDEM GA groundwater objective was selected as the cleanup level to provide the basis for the LUCs preventing residential use of groundwater.
3 - EPA has requested that their Drinking Water Health Advisory (lifetime) guidance value be used for manganese.
µg/L - microgram per liter

The cleanup levels for site sediment were selected based on ecological risk and human health risk from ingestion of shellfish. The cleanup level for PAHs in sediment was developed based on dose-responses observed in toxicity tests for benthic organisms. The cleanup level for PCBs in sediment is based on human consumption of shellfish: candidate PRGs for PCBs in sediment were calculated based on both dose responses in toxicity tests and on human consumption of shellfish, and the lesser of the two values was selected as the cleanup level. An additional sediment cleanup level was calculated for a combination of chemicals based on their individual benchmarks (Effects Range Median or ERM values) and observed toxicity (ERM-Q). The sediment cleanup levels are summarized in Table 2-7.

TABLE 2 7. CLEANUP LEVELS FOR SEDIMENT			
CHEMICAL OF CONCERN	UNITS	CLEANUP LEVEL	BASIS FOR SELECTION
Total PAHs	µg/kg	46,178	Ecological Effects
Total PCBs (1)	µg/kg	1,500	Human Health Exposure to Contaminants in Shellfish(2)
Average ERM-Q (3)	---	0.71	Ecological Effects

1 - PCBs measured as homologues.
2 - Human health risks are based on EPA's target cancer risk of no greater than 1 x 10^{-4}, and non-cancer risk (HI) no greater than 1.
3 - ERM-Q - contributed to by PAHs, PCBs, arsenic, cadmium, chromium, copper, lead, nickel, and zinc.

2.9 DESCRIPTION OF ALTERNATIVES

To address potentially unacceptable CERCLA risks and exceedances of RIDEM criteria associated with soil, groundwater, and sediment at Site 17, a **preliminary technology screening** evaluation was conducted in the FS. A number of treatment technologies and process options for these three media were initially screened based on their potential effectiveness, implementability, and cost, but many were

eliminated, primarily due to their impracticality with respect to site-specific circumstances or due to ineffectiveness to address the low levels or distributions of contaminants at the site.
The technologies and process options retained after the initial screening were assembled into various alternatives for soil, groundwater, and sediment. Consistent with the NCP, the no action alternative was evaluated for each medium as a baseline for comparison with other alternatives during the comparative analysis. The remedial alternatives developed in the FS for soil, groundwater, and sediment are presented in Sections 2.9.1, 2.9.2, and 2.9.3, respectively.

2.9.1 Soil Alternatives

To address COCs in soil, a screening of general response actions (GRAs), remedial technologies, and process options was conducted as part of the FS. The technologies and process options retained from the detailed screening were assembled into four remedial alternatives for soil at Site 17. Table 2-8 summarizes the major components and provides estimated costs for each of the remedial alternatives developed for site soil.

As part of all the soil alternatives, the sump debris, which has been identified as a source of contamination, will be removed from the site and disposed of in accordance with all state, local and federal regulations. Approximately 178 cy of this material is estimated to be present within a series of sumps in the foundation of Building 32. These sumps are collectively identified as Area 1. Addressing the sump debris, as well as the soil contaminants in the southwest corner of Building 32 (Area 5) will in turn, address the risk from shallow groundwater (by removing the contaminant source).

Target soil areas are presented in Figure 2-3.

TABLE 2 8. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR SOIL

Alternative	Components	Details	Cost
No Action (Alternative SO1)	None	No further actions would be taken.	**Capital**: $0 **O&M**: $0 **Total 30-Year NPW**: $0
Limited Excavation, Off-Site Disposal, LUCs and Inspections, and Monitoring (Alternative SO2)	LUCs and Inspections	LUCs would ensure that land use (industrial) does not change and ensure that contact with COCs at concentrations that would cause an unacceptable risk under more intensive uses is prevented for the life of the remedy. LUCs would also provide controls for adequate protection to workers who may conduct excavations at the site. LUCs would cover the area where COCs remain in soil at levels exceeding cleanup levels. Periodic inspections of the site would be conducted to verify continued compliance with and effectiveness of the LUCs.	**Capital**: $852,077 **O&M**: $18,471* **Five-Year Reviews**: $25,300 every 5 years **Total 30-Year NPW**: $1,374,649
	Groundwater Monitoring	Groundwater monitoring would be conducted to document that subsurface soil contaminants exceeding residential cleanup goals do not migrate to groundwater or marine sediment.	
	Limited Soil Excavation	Soil in the upper 2 feet of exposed soil at Areas 3, 4, and 5, and subsurface soil at Area 2 (sample location SB306B), where the Leachability Criterion for naphthalene and industrial cleanup levels were exceeded would be excavated. Approximately 695 cy of soil would be removed.	
	Off-Site Landfill Disposal	Contaminated soil excavated would be transported and disposed of at an off-base licensed landfill facility. As noted above, approximately 695 cy of soil would require off-site disposal.	
	Five-Year Reviews	Five-year reviews would be conducted by the Navy, EPA, and RIDEM until site conditions were restored to allow for unrestricted use and unlimited exposure.	

TABLE 2 8. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR SOIL (CONT.)			
ALTERNATIVE	**COMPONENTS**	**DETAILS**	**COST**
Combination Excavation (and Off-site Disposal) and Solidification/Stabilization, LUCs and Inspections (Alternative SO3)	Excavation	Subsurface soil at Area 2 (sample location SB306B) to a depth of 12 feet, where the Leachability Criterion for naphthalene and industrial cleanup levels were exceeded would be excavated. Approximately 140 cy of soil would be removed and disposed.	**Capital**: $847,718 **O&M**: $3,245* **Five-Year Reviews**: $25,300 every 5 years **Total 30-Year NPW**: $1,029,277
	Excavation and Ex-Situ Solidification / Stabilization	In area 3, where soil is at risk for erosion into the Stillwater Area, soil would be excavated and mechanically mixed with a cement-based, stabilizing agent and additives, in proportions as determined by a pre-remedial action bench-scale/treatability study. The treated material would then be allowed to cure and then would be tested for waste disposal parameters, after which it would be sent for off-site disposal. An estimated volume of material for Area 3 is 111 cy.	
	In-Situ Solidification / Stabilization	Soil from areas 4, 5, and 6 would be treated in situ within the upper 2 feet of soil, while the soil at Area 6 would be treated to a depth of 8 feet, where naphthalene exceeded the PRG. It is assumed a total volume of 537 cy of soil would be stabilized / solidified in place.	
	Offsite Landfill Disposal	Contaminated soil excavated would be transported and disposed of at an off-base licensed landfill facility. As noted above, approximately 251 cy of soil would be excavated and will require off-site disposal.	
	LUCs and Inspections	Same as Alternative SO2.	
	Groundwater Monitoring	Same as Alternative SO2.	
	Five-Year Reviews	Same as Alternative SO2.	
Complete Excavation of Soils Exceeding Industrial Cleanup Levels (including Leachability Criteria), Off-site Disposal, LUCs, and Inspections (Alternative SO4)	Excavation	Soil containing COCs at concentrations exceeding industrial and leachability criteria would be excavated to the lowest depth at which the PRG exceedance was detected. At Areas 4 and 5, soil would be excavated to 2 feet bgs, and at Area 2, soil would be excavated to a depth of 12 feet, similar to Alternative SO2. Soil at Area 3 would be excavated to a depth of 6 feet and soil at Area 6 would be excavated to a depth of 8 feet. Approximately 1,188 cy of soil would be removed.	**Capital**: $1,075,331 **O&M**: $3,245* **Five-Year Reviews**: $25,300 every 5 years **Total 30-Year NPW**: $1,256,890
	Offsite Landfill Disposal	Contaminated soil excavated would be transported and disposed of at an off-base licensed landfill facility. As noted above, approximately 1,188 cy of soil would require off-site disposal.	
	LUCs and Inspections	Same as Alternative SO2.	
	Groundwater Monitoring	Same as Alternative SO2.	
	Five-Year Reviews	Same as Alternative SO2.	

* For purposes of cost estimation, all O&M costs represent 30-year time frames, only. Actual total costs may be higher.
** Cost for groundwater monitoring is included in the groundwater alternatives for the site.

Alternatives SO2, SO3, and SO4 could be implemented within approximately 1 year of startup, but would be somewhat dependent upon weather and access limitations. These three alternatives would achieve the soil RAOs upon implementation.

2.9.2 Groundwater Alternatives

To address COCs in groundwater, a screening of GRAs, remedial technologies, and process options was conducted as part of the FS. The technologies and process options retained from the detailed screening were assembled into three remedial alternatives for groundwater at the site. Table 2-9 summarizes the major components and provides estimated costs for each of the remedial alternatives developed for Site 17 groundwater.

Addressing the sump debris, as well as the soil contaminants in the southwest corner of Building 32 (Area 5) will in turn, address the risk from shallow groundwater (by removing the contaminant source).

TABLE 2 9. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR GROUNDWATER

ALTERNATIVE	COMPONENTS	DETAILS	COST
No Action (Alternative GW1)	None	No further actions would be taken.	**Capital**: $0 **O&M**: $0 **Total 30-Year NPW**: $0
MNA, LUCs, and Inspections (Alternative GW2)	MNA for Manganese, PCE, and PCP	Natural attenuation would rely on naturally occurring processes in the aquifer to reduce the toxicity and mobility of COCs in groundwater. To demonstrate the effectiveness and provide documentation of such attenuation, a quarterly groundwater quality monitoring program would be implemented for the first 2 years to define seasonal trends, if any. After a trend in groundwater quality has been established, the Navy would request a change in monitoring frequency to an annual program. This program would allow confirmation of continued reduction in concentrations of COCs. MNA planning documents would be prepared with regulatory input to support implementation of the MNA program. Modeling has estimated the timeframe for MNA for manganese in overburden to be 18-54 years and in bedrock to be 29-87 years. Other COCs (PCP and PCE) are expected to meet RGs within 2 years. Shallow groundwater will be addressed through removal of soil as described in the soil alternatives.	**Capital**: $44,566 **O&M**: $211,512 (Annual, Yrs 1&2) $52,878 (Annual, Yrs 3-30) **Annual Costs (Inspections):** $3,245 **Five-Year Reviews:** $25,300 every 5 years **Total 30-Year NPW**: $1,718,405
	LUCs and Inspections	LUCs would be implemented to control exposure to COCs in groundwater and to protect human health during the interim period until cleanup levels have been achieved in groundwater. Groundwater LUCs would prohibit installation of groundwater supply wells, including public and private drinking water wells and residential irrigation wells, and would prohibit any use of groundwater for drinking water purposes. LUCs would include a requirement to evaluate vapor intrusion risk, should site development involving the construction of buildings occur before groundwater cleanup goals for organic compounds are met. Regular site inspections would be performed to verify continued implementation of LUCs until groundwater RGs have been achieved.	
	Five-Year Reviews	Five-year reviews would be conducted by the Navy, EPA, and RIDEM until site conditions were restored to allow for unrestricted use and unlimited exposure.	

TABLE 2 9. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR GROUNDWATER (CON'T).

ALTERNATIVE	COMPONENTS	DETAILS	COST
In-Situ Treatment, MNA, Long-Term Monitoring, and LUCs and Inspections (Alternative GW3)	In-Situ Treatment for Manganese	In situ treatment for manganese would be achieved through delivery of nutrients to the aquifer to encourage sulfate-reducing bacteria to grow and transform sulfates in groundwater into sulfides, which would, in turn, precipitate the dissolved manganese present as insoluble manganese sulfide. A solution containing sulfate-reducing bacteria and appropriate nutrients would be injected into the subsurface through injection wells in selected target treatment zones. Treatment zones will be established based on a pilot study and monitoring program conducted as part of the design step prior to implementation of the remedy.	**Capital**: $1,290,895 **O&M**: $115,392 (Yrs 1-3)* $115,392 (Yrs 4 and after) **Five-Year Reviews**: $23,000 every 5 years **Total 30-Year NPW**: $2,911,706
	MNA for PCE and PCP	Natural attenuation would rely on naturally occurring processes in the aquifer to reduce the toxicity, and mobility of organic COCs in groundwater. To demonstrate the effectiveness and provide documentation of such attenuation, a quarterly groundwater quality monitoring program would be implemented for the first 2 years to define seasonal trends, if any. After a trend in groundwater quality has been established, the Navy would request a change in monitoring frequency to an annual program. Modeling has estimated the timeframe for MNA to achieve RGs for organic COCs to be within 2 years.	
	Long-Term Monitoring	Same as Alternative GW2	
	LUCs and Inspections	Same as Alternative GW2.	
	Five-Year Reviews	Same as Alternative GW2.	

* LTM during years 0-3 is currently assumed to be the same effort, however, this may change after Design and Pilot Study.

Under Alternatives GW2 and GW3, the RAO to prevent residential exposure to Site groundwater would be achieved immediately upon implementation of LUCs. Both alternatives would attain the RAO of restoring groundwater quality to its beneficial use after COC concentrations reach cleanup levels through treatment or natural attenuation. Groundwater currently is not used as a drinking water source, and there are no plans for such a use in the foreseeable future.

2.9.3 Sediment Alternatives

To address COCs in marine sediment, a screening of GRAs, remedial technologies, and process options was conducted as part of the FS. The technologies and process options retained from the detailed screening were assembled into three remedial alternatives for sediment at Site 17. Table 2-10 summarizes the major components and provides estimated costs for each of the remedial alternatives developed for Site 17 sediment.

TABLE 2-10. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR SEDIMENT

ALTERNATIVE	COMPONENTS	DETAILS	COST
No Action (Alternative SD1)	None	No further actions would be taken.	**Capital**: $0 **O&M**: $0 **Total 30-Year NPW**: $0
Subaqueous Cover, LUCs and Monitoring (Stillwater Area), Limited Monitoring (Northeast Shoreline) (Alternative SD2)	Site Preparation	To access contaminated sediment in the Stillwater Area, the Rigging Platform at the north shoreline of Gould Island would be demolished and removed.	**Capital**: $3,721,484 **Annual Costs** **O&M/LTM** : $40,753 (annual) **Five-Year Reviews:** $25,300 every 5 years **Total 30-Year NPW**: $4,755,519
	Subaqueous Cover	A 2-foot-thick cover system would be placed within the Stillwater Area to act as a barrier to prevent aquatic receptors from coming into direct contact with the contaminated sediment. A pre-design step would be required to map the bottom contours, and geotechnical testing may be conducted to select cover material. To ensure proper placement of the cover, a pre- and post-cover survey would be needed. The barrier would be created by placing several layers of material (fine-grained sand, gravel- and cobble-sized stone, and coarse-grained sand). It is estimated that approximately 5,371 cy of sand and gravel would be required to establish the 2-foot-thick cover system in the Stillwater Area, over an approximately 48,505 square foot area.	
	LUCs and Inspections	LUCs would be established to prevent disturbance of the cap by restriction of large and deep draft vessels (water depths in the Stillwater Area are between 12 and 24 feet), and signage at the entrance of the Stillwater Area would be used to dissuade recreational and other small vessels from anchoring and dragging of the cover system by recreational boaters and fisherman. LUC inspections would be required to ensure the land use is not changed, that large ships are not utilizing the area, and that the signage is maintained.	
	Monitoring the Cap Area	Periodic sampling and analysis of sediment at the capped area would be conducted to ensure the continued effectiveness of the cap. The disturbed area would be visually monitored to ensure recovery of the natural benthic community. Cap inspections would also be conducted annually and repairs made as necessary, for as long as the underlying sediment exceeds cleanup levels. An underwater visual inspection by diver would be conducted annually, and mapping of the cover system would be conducted using multi-beam sonar survey every five years to ensure the cover remains intact and to confirm continued minimum thickness. Additional inspection would be conducted after significant storms events that could potentially damage the cap.	
	Limited Sediment Monitoring (Northeast Shoreline)	A limited monitoring effort would be conducted to ensure the sediment conditions at the Northeast Shoreline continue to improve. Sampling for presence and concentration of COCs in the surface sediment along the Northeast Shoreline would be conducted during two separate events. Each of the two monitoring events would include the collection of 20 surface sediment samples at specific areas for analysis of PCBs, PAHs, and metals. The analytical results would be compared to RI results and used to evaluate post-ROD conditions at the Northeast Shoreline.	
	Five-Year Reviews	Five-year reviews would be conducted by the Navy, EPA, and RIDEM.	

TABLE 2-10. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR SEDIMENT (CONT).			
ALTERNATIVE	COMPONENTS	DETAILS	COST
Sediment Removal and Off-Site Disposal (Stillwater Area), Limited Monitoring (Northeast Shoreline) (Alternative SD3)	Pre-Design Investigation	A limited pre-design investigation (PDI) would be conducted in the dredge areas of the Stillwater Area, and would include bathymetric surveying (pre-dredge) to better identify bottom conditions (including debris) on the seafloor. Dredge elutriate tests and column settling tests would also be conducted to evaluate sediment characteristics and contaminant mobility. Up to three sediment cores would be collected to confirm the target dredging depth of four feet below sediment surface.	**Capital**: $11,964,568 **O&M**: $0 **Limited Monitoring at Northeast Shoreline**: $72,616 **Total 30-Year NPW**: $12,033,208
	Stillwater Area Sediment Excavation and Staging	Sediment would be excavated from the Stillwater Area to a depth of approximately four feet below sediment surface within the Stillwater Area. All dredging and demolition is anticipated to be conducted from barges moored within or near the Stillwater Area. The Rigging Platform would be demolished as described in Alternative SD2. Sediments would be dredged using mechanical means and would be conducted behind a silt curtain to minimize sediment transport outside the work area. Silt curtains would be set and fixed to land-based points and anchored as needed to limit potential failure. It is estimated that with typical over-dredge, and to allow sidewall sloughing, a total of 7,186 cy of sediment would be excavated from the Stillwater Area. It is estimated that approximately 300 cy of timber and 300 cy of concrete and steel debris would be generated from the demolition of the Rigging Platform and from clearing of debris from the sea bottom prior to dredging. Post-dredging sampling would be conducted to ensure that cleanup goals have been met within the dredge area, using an approach that provides statistical assurance that cleanup goals are met, and accommodates variability and heterogeneity inherent with sediment chemical data. The disturbed area would be visually monitored to ensure recovery of the natural benthic community. If necessary, the exposed bulkhead may require bracing and a residuals management layer of sand (approximately 6 inches in thickness) may be applied to the dredged area to control silts prior to removal of silt control barriers.	
	Dewatering	Excavated sediment initially would be partially dewatered on dewatering barges or scows, then transported to a constructed dewatering pad on the island using lined dump trucks. The excavated sediment would then undergo further passive dewatering on the pad and then be characterized for transportation and disposal.	
	Transportation and Off-Site Disposal	Dewatered sediment and debris would be characterized and loaded into covered, roll-off containers at the island. Material staging areas will be identified in the design. Containers would be transported over water by barge from the island to a mainland industrial pier that is suitable for the containers and barge configuration. The containers would then be transported by truck to an approved, permitted, TSDF, or other appropriately licensed landfill.	
	Limited Sediment Monitoring (Northeast Shoreline)	Same as Alternative SD2.	

Alternatives SD2 and SD3 could be implemented within 1 year and 2 years of startup, respectively, and completion of both would be somewhat dependent upon weather and access limitations. Both Alternatives SD2 and SD3 would attain the RAOs pertaining to sediment upon implementation. Alternative SD3 would achieve a higher degree of long-term effectiveness and permanence than SD2 because in SD3 contaminated sediment would be removed, rather than covered, and SD2 would require LUCs implementation and long-term monitoring, whereas SD3 would not.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Tables 2-11, 2-12, and 2-13 and subsequent text in this section summarize the comparison of the remedial alternatives with respect to the **nine CERCLA evaluation criteria** outlined in the NCP at 40 Code of Federal Regulations (CFR) 300.430(e)(9)(iii) and categorized as threshold, primary balancing, and modifying criteria. Further information on the detailed comparison of remedial alternatives is presented in the FS.

2.10.1 Comparative Analysis of Soil Alternatives

Table 2-11 and subsequent text in this section summarize the comparison of the soil remedial alternatives with respect to the nine CERCLA evaluation criteria.

TABLE 2.11. SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES

CERCLA Criteria	Alternative SO1	Alternative SO2	Alternative SO3	Alternative SO4
ALTERNATIVE DESCRIPTION/COMPONENTS				
CERCLA Evaluation Criteria	No Action	Limited Excavation, Off-site Disposal, LUCs, and Monitoring	Combination Excavation (and Off-site Disposal) and Solidification/ Stabilization, and LUCs	Complete Excavation, Off-site Disposal, and LUCs
ESTIMATED TIME FRAME FOR CLEANUP (YEARS)				
Time to achieve cleanup levels	Not Applicable	1 year	1 year	1 year
***CRITERIA ANALYSIS:* Threshold Criteria – Selected alternative must meet these criteria**				
Protects Human Health and the Environment	⊘	●	●	●
Compliance with ARARs	⊘	●	●	●
Primary Balancing Criteria – Used to differentiate between alternatives meeting threshold criteria				
Provides Long-Term Effectiveness and Permanence	⊘	○	○	●
Reduces Mobility, Toxicity, and Volume Through Treatment	⊘	⊘	○	⊘
Provides Short-Term Protection	⊘	●	●	●
Implementability	●	●	●	●
Capital Costs O&M Costs [a] Total Present Worth Cost	$0 $0 $0	$852,077 $522,572 $1,374,649	$847,718 $181,559 $1,029,277	$1,075,331 $181,559 $1,256,890

TABLE 2.11. SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES (CONT.)				
CERCLA CRITERIA	ALTERNATIVE SO1	ALTERNATIVE SO2	ALTERNATIVE SO3	ALTERNATIVE SO4
Modifying Criteria – May be used to modify recommended cleanup				
State Agency Acceptance	⃠	⃠	⃠	●
Community Acceptance	Not Applicable	Not Applicable	Not Applicable	●

Notes:
a) For purposes of cost estimation, all O&M costs represent 30-year timeframes, only. Actual total costs may be higher.

ARARs: Applicable or relevant and appropriate requirements
LUCs: Land Use Controls
MNA: Monitored Natural Attenuation
O&M: Operation and Maintenance

● Meets
○ Partially Meets
⃠ Does Not Meet

2.10.1.1 Threshold Criteria

Overall Protection of Human Health and the Environment. Alternative SO4 would be the most effective at protecting human health and the environment because all of the contaminated debris, and all of the contaminated soil with COCs greater than industrial cleanup levels and Leachability Criteria would be removed and transported off-site for disposal (to reduce PAH and metals contamination on site), thereby reducing identified and/or potential site risks to future construction workers or industrial workers. Alternatives SO2 and SO3 both offer slightly lower long-term protectiveness, addressing arsenic in deep soil at Area 3 with LUCs only, and naphthalene in deep soil at Area 4 with LUCs and monitoring. All alternatives except SO1 would remove debris within the former Building 32 sumps and trenches, and all alternatives except SO1 also rely on LUCs and inspections to limit and control future use of the site.

Compliance with ARARs. ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. Alternatives SO2, SO3 and SO4 all meet chemical-specific, location-specific, and action-specific ARARs. Any of these alternatives could be implemented in accordance with regulations. Alternative SO1 would not comply with ARARs because it does not prevent exposure to contaminated soil containing COCs at concentrations greater than PRGs. The removal and off-site disposal of all PCB-contaminated soil exceeding industrial cleanup goals, the implementation of LUCs to prevent exposure to PCB–contaminated soil exceeding residential cleanup goals, and the excavation and off-site disposal of sump debris and the removal of associated PCB-contaminated shallow groundwater under soil alternatives SO2, SO3, and SO4 will achieve risk-based soil/debris cleanup standards for PCBs under TSCA.

2.10.1.2 Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternatives SO3 and SO4 would have higher long-term effectiveness than SO2, due to the treatment or removal of a higher volume of contaminated soil at the site, although SO4 is considered to have the highest long-term effectiveness due to the uncertainty of solidification/stabilization used in SO3. Alternative SO2 provides some protection from contaminants but only as long as the LUCs are implemented and properly enforced. Alternatives SO2, SO3, and SO4 all require LUCs to be maintained in perpetuity, to preclude residential or unrestricted recreational use of the site. Alternative SO1 would not be effective nor would it provide permanent protection from elevated COCs.

Reduction in Toxicity, Mobility, or Volume through Treatment. Alternative SO3 is the only alternative that includes treatment (solidification/stabilization) and therefore, the only alternative that would reduce the toxicity and mobility of site COCs. Most of the soil treatment would occur in situ if treatability testing determined that this treatment process is effective for site soils, and developed effective treatment parameters to address the metals and PAHs in the soil. Under Alternative SO3, the volume of material that would be sent off site for disposal would be reduced; however, the addition of solidification/stabilization reagents and additives would increase the in-place volume of the treated material. Alternatives SO1, SO2, and SO4 do not include treatment.

Short-Term Effectiveness. Alternative SO1 would not be effective in the short term as no action is taken to manage site risk. Alternative SO1 would not meet RAOs. Alternative SO2 offers a slightly higher level of short-term effectiveness than Alternatives SO3 and SO4. Alternatives SO2 and SO3 involve removal and transportation of less material than Alternative SO4, and Alternatives SO3 and SO4 provide the least short-term effectiveness, due to the volume of treatment chemicals (SO3) and contaminated soil/debris (SO4); however, use of personal protective equipment by site workers would reduce risks associated with excavation of the soil and debris, and associated with dust from excavation and mixing of the materials for solidification/stabilization.

Implementability. Alternative SO1 would be the easiest to implement since no action is required; however, it is not implementable in an administrative sense because it does not achieve the threshold criteria for the protection of human health and the environment and achieving ARARs. The other three alternatives are all implementable, but require significant coordination and planning due to logistical issues with mobilizing excavation equipment to the site, and significant effort and cost associated with transporting excavated material off-site by barge. Of the three, Alternative SO2 would be more easily implemented than Alternatives SO3 and SO4 because it requires the least amount of equipment, treatment materials, and/or waste for disposal, to be transported over water and over the road. Alternative SO3 may be more difficult to implement due to general difficulties (including homogeneity and various particle sizes of soil matrix) in conducting effective in situ treatment of soil.

Cost. The estimated, 30-year, present worth cost for Alternative SO2 is $1,374,649, for Alternative SO4 is $1,256,890, and the estimated, 30-year, present worth for Alternative SO3 is $1,029,277. The higher cost for Alternative SO2 is associated with a larger monitoring effort over time.

2.10.1.3 Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. RIDEM, as the designated state support agency in Rhode Island, concurs with the Selected Remedy. RIDEM's concurrence letter is presented in Appendix A.

Community Acceptance. The public was notified of a formal public comment period, as described in Section 2.3, and was encouraged to participate in the process. One written comment was received by mail during the formal public comment period (March 13 to April 12, 2014) for the Proposed Plan. The questions posed at the public meeting (informal session) on March 19, 2014 were general inquiries for informational purposes and were addressed at the public meeting. The formal public hearing, at which attendees were asked to state their comments for the record, took place immediately after the public meeting on March 19, 2014. These formal comments/questions and the Navy responses are summarized in Section 3.0. One written comment was received and one oral comment was made during the public hearing and both were generally in support of the Selected Remedy. No objections to the proposed remedial alternative were voiced or received by mail, facsimile, or by electronic mail. The transcript of the public hearing is provided in Appendix F of this ROD.

2.10.2 Comparative Analysis of Groundwater Alternatives

Table 2-12 and subsequent text in this section summarize the comparison of the groundwater remedial alternatives with respect to the nine CERCLA evaluation criteria and categorized as threshold, primary balancing, and modifying criteria. Further information on the detailed comparison of remedial alternatives is presented in the FS.

TABLE 2.12. SUMMARY OF COMPARATIVE ANALYSIS OF GROUNDWATER ALTERNATIVES

CERCLA CRITERIA	ALTERNATIVE GW1	ALTERNATIVE GW2	ALTERNATIVE GW3
ALTERNATIVE DESCRIPTION/COMPONENTS			
CERCLA Evaluation Criteria	No Action	MNA and LUCs	In-Situ Treatment, MNA, Monitoring, and LUCs
ESTIMATED TIME FRAME FOR CLEANUP (YEARS)			
Time to achieve cleanup levels	Not Applicable	29 – 87 years	4 years
***CRITERIA ANALYSIS:* Threshold Criteria – Selected alternative must meet these criteria**			
Protects Human Health and the Environment	⊘	●	●
Compliance with ARARs	⊘	●	●
Primary Balancing Criteria – Used to differentiate between alternatives meeting threshold criteria			
Provides Long-Term Effectiveness and Permanence	⊘	○	○
Reduces Mobility, Toxicity, and Volume Through Treatment	⊘	⊘	●
Provides Short-Term Protection	⊘	○	○
Implementability	●	●	○
Capital Costs O&M Costs [a] Total Present Worth Cost	$0 $0 $0	$44,566 $1,673,839 $1,718,405	$1,290,895 $1,620,811 $2,911,706
Modifying Criteria – May be used to modify recommended cleanup			
State Agency Acceptance	⊘	●	○
Community Acceptance	Not Applicable	●	Not Applicable

Notes:

a) For purposes of cost estimation, all O&M costs represent 30-year timeframes, only. Actual total costs may be higher.

ARARs: Applicable or relevant and appropriate requirements
LUCs: Land Use Controls
O&M: Operation and Maintenance

● Meets
○ Partially Meets
⊘ Does Not Meet

2.10.2.1 Threshold Criteria

Overall Protection of Human Health and the Environment. Alternative GW2 would be protective of human health and the environment. Under this alternative, the levels of PCP and PCE in the aquifer are expected to attenuate as the contaminated areas of groundwater move downgradient and discharge to the bay (if this has not already occurred). Until that time, no exposure would be occurring, due to the implementation and enforcement of LUCs. The levels of dissolved manganese are expected to lessen as the attenuation of subsurface organics at the site concludes and the natural geochemistry of the aquifer is stabilized. Until that time, no exposure would be occurring, due to the implementation and enforcement of LUCs. Contaminants in the shallow groundwater are expected to meet RGs after the source control measures to remove contaminated soil and sump debris. Confirmation sampling of the shallow groundwater contaminants will confirm that RGs are achieved.

Alternative GW3 would be protective of human health and the environment through active treatment of manganese in groundwater as it moves through the site and through discharge of localized organic groundwater contaminants to the bay, where they would be diluted and dispersed. Treatment would also reduce the concentrations of manganese during the treatment period until the oxidation–reduction conditions at the site return to natural steady-state conditions, presumably after the increased bacterial action addresses concentrations of any organic contaminants in the subsurface. Until that time, no exposure would be occurring, due to the implementation and enforcement of LUCs. Contaminants in the shallow groundwater are expected to meet RGs after the source control measures to remove contaminated soil and sump debris. Confirmation sampling of the shallow groundwater contaminants will confirm that RGs are achieved.

Alternative GW1 is not protective of human health and the environment although some natural attenuation could potentially take place in both shallow and deeper groundwater; however, there would be no monitoring conducted to verify any improved condition over time. Additionally, there would be no controls in place in the short term to prevent residential use of groundwater or industrial exposure to shallow groundwater prior to attenuation possibly reaching the cleanup levels.

Compliance with ARARs. ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. Alternative GW1 does not meet chemical-specific ARARs because MCLs are exceeded. The EPA health advisory for manganese, which is identified as a TBC EPA guidance criterion, is also not met under GW1. Although alternative GW1 does not achieve chemical-specific ARARs, there might be natural attenuation and discharge to the bay that reduce contaminants levels. Under Alternative GW1, there would be no monitoring to confirm this. Alternatives GW2 and GW3 would both comply with chemical-specific ARARs and TBCs through use of MNA, in the case of GW2, and groundwater treatment and MNA, in the case of GW3; paired with source removal in the shallow groundwater, long-term monitoring, and LUCs.

Under both GW2 and GW3, the MCLs, if not already achieved through groundwater discharge to the bay, will eventually be achieved in this way; groundwater monitoring will be conducted to confirm this. The EPA Health Advisory for manganese will eventually be achieved under both GW2 and GW3, based on predicted geochemical changes and/or treatment. It is assumed that the treatment system used in GW3 will achieve the manganese cleanup level within a significantly shorter period of time (4 years is speculated, though this would need to be confirmed as a part of a pilot study, and the reduction might not be permanent). RGs for the shallow groundwater are expected to be achieved shortly after the source control measures to remove contaminated soil and sump debris. Confirmation sampling will confirm whether the source control measures are effective in achieving RGs in the shallow groundwater. The source control measures to address shallow groundwater under Alternatives GW2 and GW3 will achieve risk-based cleanup standards for PCBs under TSCA.

Alternatives GW2 and GW3 would both comply with location- and action-specific ARARs and TBCs. There are no location- or action-specific ARARs for alternative GW-1.

2.10.2.2 Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternative GW2 would provide effectiveness through LUCs and source control in the shallow groundwater. Permanence would be achieved through source control measures in the shallow groundwater and through natural attenuation. LUCs would be effective for preventing exposure to groundwater COCs as long as the LUCs remain in place.

Alternative GW1 would not be effective, since it does not provide protection from exposure to contaminated groundwater. This is because LUCs would not be present to prevent use of groundwater, no source control measures would take place in the shallow groundwater, and natural attenuation may occur, but it would not be identified because no monitoring would take place. There is potential industrial exposure to contaminants in the shallow groundwater. Although COC concentrations might eventually decrease to RG levels through natural attenuation, no monitoring or inspections would be conducted to verify this possibility.

Alternatives GW2 and GW3 would achieve the groundwater RAOs immediately upon implementation of LUCs and the implementation of the source control measures in the shallow groundwater. Groundwater RGs would be achieved after a maximum estimate of 87 years under Alternative GW2 and after 4 years under Alternative GW3, although there is uncertainty in the permanence of Alternative GW3, and additional treatment beyond that already identified in this FS may be required under this alternative.

Reduction in Toxicity, Mobility, or Volume Through Treatment. Neither alternative GW1 nor GW2 provides reduction of toxicity, mobility, or volume of waste through treatment, as no active treatment is proposed. Alternative GW3 will reduce toxicity, mobility, and volume of the COC, manganese, through in situ bioprecipitation.

Short-Term Effectiveness. Implementation of Alternative GW1 would not result in risks to site workers or adversely impact the surrounding community or environment because no remedial activities would be performed, although there would be an ongoing risk to workers from exposure to contaminated shallow groundwater.

Alternatives GW2 and GW3 would achieve the first groundwater RAO immediately upon implementation of LUCs. The second RAO for groundwater would be achieved after a maximum estimate of 87 years under Alternative GW2 and after an estimated 4 years under Alternative GW3, although there is uncertainty in the permanence of Alternative GW3, and additional treatment beyond that identified may be required under this alternative, based on actual behavior of the site geochemistry over time.

Implementability. Alternative GW1 would be easiest to implement in a technical sense because no action is required.

Alternative GW2 would be easily implemented because it would include only minimal, if any, construction effort (if new monitoring wells were required) and because of the relative simplicity and ease of conducting a monitoring program under monitored natural attenuation requirements. Administrative, management, and operational issues and coordination with other agencies or acquiring permits under this alternative are easily achievable, as well. It should be noted that a design step will be needed to determine appropriate MNA monitoring points and parameters. Future remedial actions would not be hindered by this alternative.

Alternative GW3 would be difficult to implement as there is no documented groundwater plume that can be targeted for treatment. It is assumed that further study would be required to map groundwater flow and geochemical conditions at the site so that the treatment system can be properly designed and constructed for optimum operation.

Any active remedy for Gould Island has the added complexity of moving any necessary equipment, labor, and material to the island by barge or boat.

Cost. The estimated 30-year present worth cost for Alternative GW3 is $2,911,706, and the estimated 30-year present worth cost for Alternative GW2 is $1,718,405.

2.10.2.3 Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. RIDEM, as the designated state support agency in Rhode Island, concurs with the Selected Remedy. RIDEM's concurrence letter is presented in Appendix A.

Community Acceptance. As discussed in Section 2.10.1.3, the public was notified of a formal public comment period, as described in Section 2.3, and was encouraged to participate in the process. One written comment was received during the formal public comment period (March 13 to April 12, 2014) for the Proposed Plan. The questions posed at the public meeting (informal session) on March 19, 2014, were general inquiries for informational purposes and were addressed at the public meeting. The formal public hearing, at which attendees were asked to state their comments for the record, took place immediately after the public meeting on March 19, 2014. One written comment and one oral comment was received and the Navy responses are summarized in Section 3.0. No objections to the proposed remedy were voiced or received by mail, facsimile, or by electronic mail. The transcript of the public hearing is provided in Appendix F of this ROD.

2.10.3 Comparative Analysis of Sediment Alternatives

Table 2-13 and subsequent text in this section summarize the comparison of the three sediment remedial alternatives with respect to the nine CERCLA evaluation criteria and categorized as threshold, primary balancing, and modifying criteria. Further information on the detailed comparison of remedial alternatives is presented in the FS.

TABLE 2.13. SUMMARY OF COMPARATIVE ANALYSIS OF SEDIMENT ALTERNATIVES

CERCLA Criteria	Alternative SD1	Alternative SD2	Alternative SD3
ALTERNATIVE DESCRIPTION/COMPONENTS			
CERCLA Evaluation Criteria	No Action	Subaqueous Cover, LUCs and Monitoring (Stillwater Area), Limited Monitoring (Northeast Shoreline)	Sediment Removal and Off-site Disposal (Stillwater Area), Limited Monitoring (Northeast Shoreline)
ESTIMATED TIME FRAME FOR CLEANUP (YEARS)			
Time to achieve cleanup levels	Not Applicable	1 year	2 years
***CRITERIA ANALYSIS:* Threshold Criteria – Selected alternative must meet these criteria**			
Protects Human Health and the Environment	⃠	●	●
Compliance with ARARs	⃠	●	●
Primary Balancing Criteria – Used to differentiate between alternatives meeting threshold criteria			
Provides Long-Term Effectiveness and Permanence	⃠	○	●
Reduces Mobility, Toxicity, and Volume Through Treatment	⃠	⃠	⃠ (b)
Provides Short-Term Protection	⃠	○	○
Implementability	●	●	●
Capital Costs O&M Costs [a] Total Present Worth Cost	\$0 \$0 \$0	\$3,721,484 \$1,034,035 \$4,755,519	\$11,964,568 \$72,616 \$12,033,208
Modifying Criteria – May be used to modify recommended cleanup			
State Agency Acceptance	⃠	⃠	●
Community Acceptance	Not Applicable	Not Applicable	●

Notes:

a) For purposes of cost estimation, all O&M costs represent 30-year timeframes, only. Actual total costs may be higher.

b) Some treatment of water from dewatering process is possible, as is potential stabilization of the sediment before it is shipped off-site.

ARARs: Applicable or relevant and appropriate requirements
LUCs: Land Use Controls
O&M: Operation and Maintenance

● Meets
○ Partially Meets
⃠ Does Not Meet

2.10.3.1 Threshold Criteria

Overall Protection of Human Health and the Environment. Alternative SD3 would provide the greatest protection of human health and the environment by removing sediments with COCs in excess of the recommended RGs. This alternative would be the most effective in the long term in protecting potential human and ecological receptors from the COCs present in sediment, because the contaminated sediment would be removed and transported off-site for disposal. Implementation of Alternatives SD2 and SD3 would damage some of the existing ecosystem for the purpose of addressing COCs, and could result in some re-suspension and migration of sediment contamination during dredging and/or capping operations. However, the impact area is considered to be a degraded habitat and use of appropriate engineering controls will reduce the effects of these actions to surrounding areas. Repopulation of the ecological community in the area would occur naturally and without difficulty once the equipment is removed and remedial activities cease, and to ensure this recovery the disturbed area will be visually monitored and reported as needed.

Monitoring which will be conducted at the Northeast Shoreline as part of SD2 and SD3 will document protectiveness in this area.

In the short term, during remedy implementation, Alternatives SD2 and SD3 would cause comparable damage to the existing ecosystem since the impacted areas would be the same. In the long term, Alternative SD3 is more protective than Alternative SD2 because contaminants remain in place with SD2, although they are covered.

Alternative SD2 would require LUCs and long-term monitoring in areas where capping is conducted, while Alternative SD3 would not. Alternative SD1 would not be protective of human health and the environment because there would be no mitigation of the identified risks to human and ecological receptors, since no action would occur.

Compliance with ARARs. ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. Alternatives SD2 and SD3 meet chemical-specific, location-specific, and action-specific ARARs. Implementation of either of these alternatives would be in accordance with regulations. Alternative SD1 would not comply with ARARs because it does not prevent exposure to sediment associated with excess risks to human and ecological receptors.

In accordance with the Clean Water Act, the Navy has determined that Alternative SD3 is the Least Environmentally Damaging Practicable Alternative (LEDPA) because it provides the best overall balance of addressing contamination in sediment (permanently removing elevated concentrations of COCs) and minimizing alteration of the aquatic habitat. While the activities of sediment removal under Alternative SD3, and adding a sediment cover system under Alternative SD2, both temporarily impact the surrounding aquatic habitat during implementation of the remedial action, Alternative SD3 would permanently remove elevated concentrations of COCs in sediment, which would be of long-term benefit to the restored marine environment. EPA has also issued a finding under TSCA that the removal and off-site disposal of PCB-contaminated sediment that exceeds the risk-based RG under Alternative SD3 will not pose a risk to public health or the environment.

2.10.3.2 Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternative SD3 would have the highest long-term effectiveness due to the removal of contaminated sediment from the Stillwater Area. Alternative SD2 would require LUC implementation and long-term monitoring over the entire affected area, and those activities would need to be permanent for the alternative to be effective in the long term. Alternative SD1 would not be effective in the long term nor would it provide permanent protection from risks associated with sediment.

Reduction in Toxicity, Mobility, or Volume Through Treatment. None of the alternatives include treatment of sediment, with the exception of any treatment (stabilization) that could be conducted at the final disposal location for Alternative SD3. Therefore, none of the alternatives would aid in reduction in toxicity, mobility, or volume through treatment, except there might be some limited treatment of water that results from dewatering of the excavated sediment under Alternative SD3.

Short-Term Effectiveness. Alternative SD1 would offer the highest short-term effectiveness because the alternative does not involve any activities that would expose construction workers, the surrounding community, or the environment to COC exposure; however, Alternative SD1 would not meet RAOs. Alternative SD3 would offer the least short-term effectiveness because this alternative involves the greatest potential exposure to COCs in sediments during remediation, causes the most sediment re-suspension within the Stillwater Area, involves the transport of contaminated sediment via barge and truck through the surrounding area which represents potential risk to the public and site workers, and requires a somewhat longer timeframe to implement, and therefore to achieve RAOs.

Implementability. Alternative SD1 is the most readily implementable because no action is required. Alternative SD2 is implementable with current technologies and local marine service companies. Additionally, LUCs, long-term monitoring, and 5-year reviews are implementable to support Alternative SD2. Alternative SD3 would be the most difficult to implement due to additional complexities beyond those associated with Alternative SD2, including the dewatering, transportation, and disposal of the contaminated sediment. Alternative SD2 would be easier to implement than Alternative SD3, owing to the simpler components of the sediment cover layer, and the lack of dewatering, transportation, and disposal issues related to dredged contaminated sediment.

Cost. The estimated 30-year present worth cost for Alternative SD3 is $12,033,208, and the estimated 30-year present worth cost for Alternative SD2 is $4,755,519. The cost difference is associated with the transport and disposal of sediment.

2.10.3.3 Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. RIDEM, as the designated state support agency in Rhode Island, concurs with the Selected Remedy. RIDEM's concurrence letter is presented in Appendix A.

Community Acceptance. As discussed in Section 2.10.1.3, the public was notified of a formal public comment period, as described in Section 2.3, and was encouraged to participate in the process. One written comment was received during the formal public comment period (March 13 to April 12, 2014) for the Proposed Plan. The questions posed at the public meeting (informal session) on March 19, 2014 were general inquiries for informational purposes and were addressed at the public meeting. The formal public hearing, at which attendees were asked to state their comments for the record, took place immediately after the public meeting on March 19, 2014. These formal comments/questions and the Navy responses are summarized in Section 3.0. No objections to the proposed remedial alternative were voiced or received by mail, facsimile, or by electronic mail. The transcript of the public hearing is provided in Appendix F of this ROD.

2.11 PRINCIPAL THREAT WASTE

The NCP at 40 CFR Section 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site, wherever practicable. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or that would present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. At Site 17, the contaminant concentrations are not highly toxic or highly mobile; therefore, principal threat wastes are not present at the site.

2.12 SELECTED REMEDY

2.12.1 Rationale for Selected Remedy

The Selected Remedy for Site 17 is a combination of soil Alternative SO4, groundwater Alternative GW2, and sediment Alternative SD3 and includes:

- excavation with off-site disposal for all areas of site soil exceeding industrial cleanup levels and leachability criteria,
- removal and off-site disposal of sump debris,
- MNA of COCs in groundwater,
- long-term monitoring of groundwater,
- Confirmation sampling of shallow groundwater to confirm groundwater RGs are achieved after the completion of source control measures,
- dredging of sediment in the Stillwater Area with off-site disposal,
- limited monitoring of sediment along the Northeast Shoreline, and
- LUCs to prevent unrestricted use of the property and use of groundwater.

This combination of alternatives was selected because it provides the best balance with respect to the nine evaluation criteria and will allow for continued industrial use of the property.

The principal factors in the selection of this remedy include the following:

- Alternative SO3 includes removal of all soil from areas where industrial cleanup goals and leachability criteria are exceeded in the vadose zone. This is the preferred alternative because it will remove contaminants which exceed industrial cleanup goals and leachability criteria, provide adequate protection for the current use, prevent migration of soil contaminants into groundwater and the adjacent bay, and leave the site unencumbered for planned industrial purposes. LUCs will remain to prevent residential and unrestricted recreational use, supported by inspections and long-term monitoring, though these are not anticipated uses for this site.

- Alternative GW2 relies on source control measures to remove contaminated soil and sump debris to achieve RGs in shallow groundwater, and MNA, which includes a long-term groundwater monitoring and evaluation program to verify that natural attenuation processes are effectively reducing VOCs and reducing manganese concentrations to the natural steady-state conditions in the deeper groundwater. This is the preferred alternative because there is no current receptor that could be affected by the groundwater COCs present and because there is no plan for future use of the groundwater. LUCs will remain in place to prevent the use of site groundwater until groundwater RGs are achieved.

- The 5-year review will assess if adequate reductions in concentrations of COCs are evident in the monitoring data. After an appropriate amount of data has been collected to allow a determination, if either the source control measures were insufficient to achieve groundwater RGs in the shallow groundwater or MNA is determined to be an ineffective remedy for the deeper groundwater, the Navy will seek a change to the remedial action with approval by EPA and RIDEM, in accordance with CERCLA and the FFA, using an additional public notification and ROD revision, or Explanation of Significant Differences, as appropriate. If reductions in manganese and VOC concentrations in groundwater are adequate, the Navy would continue the MNA program until cleanup levels in groundwater are achieved. In the meantime, implementing LUCs will ensure continued protection of human health by preventing the use of groundwater until cleanup levels are achieved and will ensure the components of the remedy (monitoring wells) are not disturbed.

- Alternative SD3 includes sediment removal from an area that is open for shell-fishing and may be needed for ship traffic in the future. This is the preferred alternative because it will permanently remove sediment contamination from the site, leaving the commercial and natural resources of this portion of Narragansett Bay unencumbered.

In accordance with Section 404 of the CWA, the Navy has determined that Alternative SD3 is the Least Environmentally Damaging Practicable Alternative to protect wetland and aquatic resources because it provides the best balance of addressing contaminated media at the site while minimizing both temporary and permanent alteration of wetlands and aquatic habitats on site.

2.12.2 Description of Selected Remedy

The following sections provide a detailed description of the Selected Remedy for soil, groundwater, and sediment.

2.12.2.1 Description of Selected Soil Remedy

The Selected Soil Remedy includes the following components, described below:

- Soil and sump debris excavation
- Verification sampling
- Transportation and off-site disposal
- Implementation of LUCs and inspections
- Five-year reviews

Sump Debris Excavation

All debris located within the sumps in the concrete foundation that remains onsite (Area 1, Figure 2-6) would be excavated from the sumps and sent for off-site disposal. Based on the estimated sump dimensions (listed in Section 2.4), a volume of 170 cubic yards (cy) of debris was estimated at sump locations where samples were collected and analyzed. Additional sumps (including pits and trenches) that were not sampled are assumed to contain a total estimated volume of 8 cy of debris, similar in nature to that at the sampled locations. Therefore, a total of 178 cy (in-place volume) of debris would be removed from all sumps in which it is observed.

If standing water is present in any sump, it would be pumped into containers, characterized, and sent for off-site disposal to the appropriate, licensed disposal facility. All debris (estimated to be 178 cy) would be removed from the bottom and sides of the sumps to expose the concrete walls and bottoms, which are located at various depths as indicated in Section 2.4. The sumps would then be steam-cleaned, after which they would be backfilled with clean fill. Any condensate generated during steam-cleaning of the sumps would be placed in containers along with other liquid waste, prior to characterization for off-site disposal. During the RI all sumps inspected were found to have competent bottoms and sidewalls, so it is unlikely that further removal would be required; but if remedial action activities indicate that sump bottoms or side walls have been compromised, soils beneath and adjacent to the sump will be addressed in the same manner as other soils being addressed under this alternative: soil will be excavated to a depth of two feet from the top of the foundation or to meet RGs, transported for off-site disposal, and the excavation will be backfilled.

TPH results for sump debris samples from four sump locations exceeded RIDEM's industrial DEC of 2500 mg/kg, at sumps SB313 (1400 mg/kg), SB334 (11000 mg/kg), SB336 (5500 mg/kg), and TP06 (4800 mg/kg). Although not part of the CERCLA remedial action, these locations would be addressed through excavation of the debris in the sumps. Excavation would be followed by steam cleaning of the vacant sumps, to meet state regulatory standards as described above. Confirmatory sampling would not be conducted after cleaning at these locations because the sumps have concrete walls and bottoms.

Soil Excavation

Contaminated soil would be excavated to the lowest depth at which the cleanup goal exceedance was detected. Soil excavation areas are depicted on Figure 2-6. At Areas 4 and 5, soil would be excavated to 2 feet bgs, and at Area 2, soil would be excavated to a depth of 12 feet. Soil at Area 3 would be excavated to a 6-foot depth (333 cy in place volume) and soil at Area 6 would be excavated to an 8-ft depth (93 cy in-place volume). Because of the anticipated depths of excavation at Areas 2 and 6, pre-excavation sampling is anticipated to better determine the extent of the removals (approximately 10 borings at each of the two areas). The total volume of soil that would be excavated under this alternative is approximately 1188 cy (in-place volume).

Soil and debris would be removed using conventional excavation equipment and would be staged on site, pending waste characterization results for off-site disposal. In the excavated areas, (except for Area 3 adjacent to the bulkhead shoreline where sediment remediation would occur) clean soil would be placed as backfill to the pre-excavation grade, after which the soil would be seeded to prevent erosion. Any wetland resource areas impacted by the remedy would also be restored.

The only soil sample location where the TPH concentration exceeds RIDEM's Industrial DEC of 2,500 mg/kg is test pit TP10B, where TPH was detected at a concentration of 3,500 mg/kg in the surface soil sample (0 to 2 feet bgs). Although TPH is not a CERCLA-regulated contaminant, the remedial alternatives (at this location within Area 5) would address RIDEM's regulations. Compliance with the RIDEM TPH criterion would be demonstrated through confirmatory (verification) sampling at Area 5. Any remaining site locations containing TPH above RIDEM's Residential DEC of 500 mg/kg would be addressed by the LUCs that would prohibit residential/recreational site use (see below). As part of a separate agreement with the State of Rhode Island regarding the Navy's achieving State compliance standards, the Navy will conduct concurrent TPH sampling during the CERCLA cleanup if requested by the State of Rhode Island. Such sampling in this case is not being conducted as part of the CERCLA remedial action; it would simply be conducted at the same time. Any TPH remediation done as a result of this sampling will occur outside of CERCLA if there is no comingled CERCLA contamination.

Addressing the sump debris, as well as the soil contaminants in the southwest corner of Building 32 (Area 5) will in turn, address the risk from shallow groundwater (by removing the contaminant source). In addition, groundwater monitoring would be conducted to document that subsurface soil contaminants exceeding residential cleanup goals do not migrate to groundwater or marine sediment.

Verification samples for laboratory analysis will be collected from the bottoms and sidewalls of the excavation areas, and results will be compared to industrial cleanup levels to verify that the proper extent of contaminated soil has been removed. If the results exceed the cleanup levels, the excavation will continue in the direction of the exceedance until subsequent verification samples meet cleanup levels or a limiting site feature is reached. The Navy will develop a Sampling and Analysis Plan (SAP) for the verification sampling; the SAP will identify the frequency of verification sample collection.

Excavated soil and debris would be characterized and loaded into lined and covered roll-off steel containers at the island. Containers would be transported over water by barge from the island to a mainland industrial pier that is suitable for the containers and barge configuration. The containers would then be transported by truck to an approved, permitted, TSDF or other appropriately licensed landfill. This route would best utilize high capacity roadways and avoid traffic over local bridges and secondary roads.

The tentative location of mainland/onshore off-loading is the off-load facility at the Port of Providence, which is located 30 miles north of Gould Island and is accessible from the site by barge. One option is to utilize a ramp-style barge and constructed landings to drive containers from the island onto a barge and then off at the mainland port. Another option is to utilize cranes both at the island and the mainland to lift the filled roll-off containers onto the barge and then off-load them at the mainland transfer point, respectively, for collection by truck. The final selection of the transportation system will be made at the design stage based on availability and condition of ramps at the transfer points.

It is assumed that a total of 1426 tons of soil and debris would be excavated, characterized, and transported off site for disposal.

LUCs and Inspections

LUCs would be implemented to prevent both residential and recreational future use of the site, limiting future use to industrial, only. LUCs will be augmented by periodic inspections. The LUC will also prevent industrial exposure to subsurface soil present at concentrations above industrial RGs (SB336 6-8 feet under the former Building 32 slab foundation). A full description of LUCs is provided in Section 2.12.2.4, below.

5-Year Reviews

Five-year reviews are required for the site because COCs will remain after the remedy is complete. A full description of the Five-Year Review process and requirements is provided in Section 2.12.2.5, below.

2.12.2.2 Description of Selected Groundwater Remedy

The Selected Groundwater Remedy includes the following components, described below:

- MNA
- Confirmation sampling for the shallow groundwater after the source control measures are completed, to confirm the shallow groundwater RGs are achieved.
- LUCs to prevent residential uses of the groundwater and protect monitoring wells, and inspections to confirm LUCs are in place and effective (Figure 2-7).
- Five-Year Reviews until groundwater RGs are achieved.

Monitored Natural Attenuation

Under this remedial alternative, MNA would be implemented in accordance with the OSWER Directive, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, and other MNA guidance documents (USEPA, 1999).

Natural attenuation would rely on naturally-occurring processes within the aquifer to reduce the mass, toxicity, volume, or concentration of the COCs in groundwater, and monitoring would document trends associated with MNA parameters that may be influencing (directly or indirectly) the concentrations of PCP, PCE and manganese.

With respect to the low levels of the organic COCs, PCP and PCE, attenuation is expected to occur (or to have already occurred) through dispersion and dilution, as these dissolved groundwater contaminants in the overburden aquifer (exceeding RGs at only one location each) discharge(d) with groundwater to Narragansett Bay. Based on the trend analysis of PCP conducted in the FS, and considering the previous locations and concentrations of these COCs, they have likely already discharged to the bay, where they have been harmlessly diluted and no longer represent a risk to human health or the environment at the site. It is expected that the results from any future groundwater monitoring events will identify that the RGs for the organic COCs, PCP and PCE, have already been met.

With respect to manganese, the single inorganic COC in groundwater, exceedances of the associated Drinking Water Health Advisory for tap water (300 µg/L) were observed to be widespread across the site, in both overburden and bedrock groundwater, with concentrations generally higher in bedrock groundwater. The source of the elevated concentrations of manganese is uncertain, though past releases of organic materials may have affected subsurface geochemistry and may have caused reducing conditions which can result in elevated levels of metals dissolved in groundwater. The detected concentrations of manganese could be naturally occurring levels that are related to the natural mineralogical composition of the local bedrock matrix, and the soils derived from bedrock. This assessment is made based on a lack of findings for other sources causing the manganese to be elevated at the site, either through direct release or as a secondary condition (reducing condition) resulting from degradation of organics formerly present (but not found) from other releases at the site. In any case, manganese is being addressed as a COC, the source of which is presumed to be former organics, and manganese concentrations will be analyzed and recorded as a MNA parameter.

The higher manganese levels in bedrock groundwater could be due to naturally occurring reducing conditions that are likely generally present in the bedrock aquifer (based on limited available data to evaluate these conditions). The vertical gradient measured at most well clusters was upward, from bedrock to overburden, which would likely impact the levels of manganese detected in overburden groundwater (influenced by the elevated levels of manganese in bedrock groundwater).

The only on-site bedrock well where manganese did not exceed the cleanup goal is MW304B, where dissolved oxygen (DO) is elevated (>4 milligrams per liter [mg/L]). At upgradient bedrock well MW301B, manganese was detected only slightly below the cleanup goal, at a concentration of 291 µg/L.

In overburden groundwater, manganese exceeded the cleanup goal at all locations, with the exception of upgradient well MW301S and on-site well MW306S; available measurements indicate that reducing conditions were not likely present in any of the overburden wells. On-site well MW306S is located immediately downgradient of the backfilled former tank area, and had an associated groundwater pH of 9.7, the highest measured at the site, and a pH which does not favor metals being present in the dissolved state.

Based on predictive flushing models, under favorable geochemical conditions, manganese is expected to be sequestered, by precipitation or adsorption, to immobilized and/or occluded forms that are rendered harmless to receptors, assuming that the organics that were present in groundwater at the site have already degraded. The required timeframe for this process is currently estimated at between 18 and 54 years for overburden, and between 29 and 87 years for bedrock, based on a predicted rate for three volumes of groundwater to fully flow through the site saturated zone. However, a trend analysis should be conducted and updated at the 5-year review cycles using data collected, which will help to refine the required period of time for levels of COCs in groundwater to be reduced to levels less than cleanup goals.

In order to provide documentation of the attenuation of organic COCs, and in order to document presence of or changes in manganese concentrations relative to the cleanup goals, an annual monitoring schedule is appropriate following an initial baseline sampling event. If, after several rounds of monitoring, COCs are still present at levels exceeding cleanup goals, and if a trend of reducing COC concentrations is not evident, then the Navy will contact the regulatory agencies to determine whether active remediation is required or whether additional monitoring is appropriate. However, it is anticipated that the organic COCs are decreasing or are already reduced to below the cleanup goals, and the manganese levels are likely to be stable or decreasing, given the lack of a source. As such, after the first five years of monitoring, the Navy, in consultation with EPA and RIDEM, may reduce the monitoring schedule sufficient to support the 5-year reviews. The 5-year review would evaluate the data collected over time to determine: 1) if natural attenuation is continuing, 2) if cleanup goals continue to be exceeded, and 3) if continuation of the LUCs solely for the purpose of documenting the continued presence of manganese in groundwater and subsequently the continuation of the LUC and monitoring program is appropriate, based on the geochemical conditions measured.

A long-term monitoring plan would be prepared as part of the Remedial Design (RD) to identify the wells to be sampled, the analyses to be performed, and the need for any new monitoring wells. For costing purposes, this FS assumes that the existing network of 14 wells will be sufficient for long-term monitoring (Figure 2-7), and that each monitoring event will include the analysis of the groundwater COCs and soil COCs, as well as the measurement of natural attenuation parameters such as oxidation-reduction potential (ORP), DO, conductivity, pH, alkalinity, total organic carbon (TOC), ferrous iron, sulfate, sulfide, nitrate, nitrite, chloride, and metabolic gases (methane, ethane, ethene, and carbon dioxide). The long-term monitoring plan would also specify that hydraulic conductivity testing will be conducted during the initial rounds of monitoring in order to obtain data to further refine the estimated time for groundwater manganese levels to attenuate to the cleanup level, based on natural flushing rates in the aquifer. It is also recognized that well MW306S will need to be replaced, and that there is a possibility that additional wells will have to be installed if the existing wells prove to be insufficient. These details will be discussed during development of the long-term monitoring plan.

Confirmation Sampling - Shallow Groundwater after Source Control Measures

Confirmation Sampling for COCs in shallow groundwater will be conducted after the source control measures have been conducted to confirm that shallow groundwater RGs have been achieved. If monitoring shows that shallow groundwater RGs have not been achieved, then additional remedial measures may be required that would be addressed in a future CERCLA decision document.

LUCs and Inspections

LUCs will be established to assure that the site and the site groundwater are not used for residential purposes. LUCs will be augmented by periodic inspections. A full description of LUCs is provided in Section 2.12.2.4 below.

Five-Year Reviews

Five-year reviews are required for groundwater until all groundwater RGs are achieved. A full description of the Five Year Review process and requirements is provided in Section 2.12.2.5, below.

2.12.2.3 Description of Selected Sediment Remedy

The Selected Sediment Remedy, Alternative SD3, includes the following components, depicted on Figure 2-8 and described below:

- Removal of the Rigging Platform and repair of bulkhead, if necessary.
- Dredging in affected portions of the Stillwater Area to achieve cleanup levels.
- Establishing a dewatering area on the island and treating water from the dewatering process.
- Off-site disposal of the dewatered sediment.
- Limited monitoring at the Northeast Shoreline to ensure sediment conditions continue to improve.

Pre-Design Investigation

A limited pre-design investigation would be conducted in the dredge areas of the Stillwater Area, and would include bathymetric surveying (pre-dredge) to better identify bottom conditions (including debris) on the seafloor surrounding the site. This effort would also include dredge elutriate tests and column settling tests to evaluate sediment characteristics and contaminant mobility. Finally, up to three sediment cores would be collected to confirm the target dredging depth of four feet below sediment surface.

Stillwater Area Sediment Excavation and Staging

Sediment would be excavated from the Stillwater Area to a depth of approximately four feet below sediment surface. All demolition and dredging work is anticipated to be conducted from barges moored within or near the Stillwater Area.

It is anticipated that, initially, ruins of the Rigging Platform will be removed to allow better access to the seafloor within the Stillwater Area. The debris will be removed using mechanical means, set on the former Building 32 foundation, and sorted for disposal. The sediments will then be dredged using mechanical means, likely using clamshell or similar excavation equipment. Some hydraulic dredging may be necessary. All work in the Stillwater Area is anticipated to be conducted behind a silt curtain to minimize sediment transport outside the work area. Silt curtains would be set and fixed to land-based points and anchored as needed to limit potential failure.

It is estimated that with typical over-dredge, and to allow sidewall sloughing, a total of 7186 cy (in-place volume) of sediment would be excavated from the Stillwater Area. It is further estimated that approximately 300 cy of timber and 300 cy of concrete and steel debris will be generated through demolition of the Rigging Platform and from clearing of debris from the seafloor prior to dredging.

Because the dredging operation is anticipated to remove up to four feet of substrate from the base of the vertical face of the bulkhead, it is expected that some bracing made up of rip rap stone will be placed at the newly exposed toe of the bulkhead. This support material will assist in maintaining the integrity of the bulkhead wall and shoreline.

Post-dredging sampling would be conducted to ensure that cleanup goals have been met within the dredge area, using an approach that provides statistical assurance that cleanup goals are met, and accommodates variability and heterogeneity inherent with sediment chemical data. If the conditions indicate it is appropriate (i.e. if significant silts are present that threaten downstream receptors, if post-dredging sampling indicates presence of *deminimus* quantities of sediment in excess of cleanup goals, or if deemed necessary for habitat enhancements and restoration assistance), a residuals management layer of sand (approximately 6 inches in thickness) may be applied to the dredged area prior to removal of silt control structures. Placement of clean material over dredged sediment is common practice for environmental dredging projects and where deepening is not the primary objective for the dredging operation (NRC, 2007; Patmont, 2006). Following the completion of the remedy, the Navy will conduct visual inspections to ensure that a natural productive benthic community is reestablished.

<u>Dewatering</u>

Excavated sediment would initially be partially dewatered on dewatering barges or scows and then transported to a constructed dewatering pad on the island using lined dump trucks. The excavated sediment would then undergo further dewatering on the pad and then be characterized for transportation and disposal (see Transportation below).

Water that initially separates and gravity-drains from the sediment while on the barge will pass through filter media prior to draining back to the dredge area. At the dewatering pad on the island, additives (e.g. Portland cement, kiln dust, or lime) may be mechanically mixed with the sediment to help absorb additional free water. Residual water from dewatering at the pad will be captured, temporarily stored, and treated on the island using a mobile package treatment plant, prior to discharge back to Narragansett Bay.

Other passive sediment dewatering techniques may be better suited to the material and such details will be addressed in the design documentation. Considerations as to the use of the island for dewatering and the elevation of the dewatering pads relative to the 100-year flood zone will also be addressed during the design effort.

<u>Transportation and Off-site Disposal</u>

Dewatered sediment and debris would be characterized and loaded into covered, roll-off containers at the island. Containers would be transported over water by barge from the island to a mainland industrial pier that is suitable for the containers and barge configuration. The containers would then be transported by truck to an approved, permitted, TSDF or other appropriately licensed landfill. This route would best utilize high capacity roadways and avoid traffic over local bridges and secondary roads.

The tentative location of mainland/onshore off-loading is the off-load facility at the Port of Providence, which is located 30 miles north of Gould Island and is accessible from the site by barge. One option is to utilize a ramp-style barge and constructed landings to drive containers from the island onto a barge and then off at the mainland port. Another option is to utilize cranes both at the island and the mainland to lift the filled roll-off containers onto the barge and then off-load them at the mainland transfer point, respectively, for collection by truck. The final selection of the transportation system will be made at the design stage based on availability and condition of ramps at the transfer points.

The generation of waste manifests or bills of lading will be required, as appropriate for each waste stream. These documents will accompany the containers/transport vehicles from the island to the final disposal location (noted above). Careful traffic control will be necessary to ensure that waste is not stored at the mainland transfer point, which could require TSDF permitting and compliance with CERCLA Off-Site Rule requirements.

Limited Sediment Monitoring at the Northeast Shoreline

A limited monitoring effort would be conducted to ensure that sediment conditions at the Northeast Shoreline continue to improve. Sampling for the presence and concentrations of COCs in the surface sediment along the Northeast Shoreline would be conducted during two separate events. Each event would include the collection of 20 surface sediment samples along the Northeast Shoreline (five samples from each of the four areas identified in the FS) for analysis of PCBs, PAHs, and metals. The sample results will be used with previous data (2005 and 2009-2010) to evaluate post-ROD conditions at the Northeast Shoreline. The data will be reported to the project team, and will be summarized in the 5-year review.

Five-Year Reviews

Sediment RAOs will be met by the dredging effort entailed in this remedy, but it is anticipated that soil and groundwater media for this site will require a 5-year review cycle. The data from the limited sediment monitoring effort at the Northeast Shoreline will be documented in the first of these 5-year reviews; however, further 5-year review evaluations for sediment are not anticipated, based on the most recent sediment data from the Northeast Shoreline.

2.12.2.4 Description of Land Use Controls

As part of the Selected Remedy, the Navy will implement LUCs to prevent exposure to COCs in soil and groundwater and to protect human health. LUCs for groundwater will be maintained during the interim time period until remedial actions have achieved RAOs across the site. LUCs to prevent residential use will be maintained for as long as soil contaminant levels do not allow for unlimited exposure and unrestricted use of the site. Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs are as follows:

- Prevent use of the groundwater at the property for any consumptive purpose, including for household use, drinking water supply, or residential irrigation until groundwater RGs are achieved.
- Post signs on Navy property to notify persons in the waters of the Stillwater Area that shellfish should not be taken from this area until the sediment remedy is completed.
- Prevent removal of monitoring wells and any other components of the remedy without proper engineering controls to prevent uncontrolled exposure to COCs that are present.
- Prevent residential or unrestricted recreational use of the site.
- Evaluate vapor intrusion risk, should site development involving the construction of buildings occur before groundwater RGs for organic compounds are met.
- Establish inspection requirements and conduct LUC compliance inspections described elsewhere in this section.

The LUC implementation actions including monitoring and enforcement requirements will be provided in a LUC RD that will be prepared by the Navy as the LUC component of the overall RD. Regular site inspections will be performed to verify the continued maintenance of LUCs until the cleanup levels have been achieved.

The LUCs will be established and implemented in accordance with the post-ROD LUC RD that will be prepared by the Navy as the LUC component of the remedy. Within 90 days of ROD signature, the Navy shall prepare and submit for EPA and RIDEM review and approval a LUC RD that shall contain LUC implementation actions, including maintenance, monitoring, and enforcement requirements that are consistent with the requirements under this ROD. LUCs will be developed in accordance with the Principles and Procedures for Specifying, Monitoring, and Enforcement of Land Use Controls and Other Post-ROD Actions, per letter dated January 16, 2004, from Alex A. Beehler, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), and the requirements of the NAVSTA Newport FFA. If the property is transferred from the Navy to another federal owner, upon meeting the requirements for transfers under the site's FFA, Navy would ensure as part of the transfer process that the gaining agency is made aware of the existing controls and would take appropriate action to ensure that such controls remain in place. If the property is ever transferred to non-federal ownership, deed restrictions, meeting state property law standards, would be recorded that would incorporate the land use restrictions called for under this ROD. Although the Navy may transfer the procedural LUC responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for remedy integrity. LUCs will be maintained until the concentrations of hazardous substances in soil and groundwater meet levels that allow for unrestricted use and unlimited exposure.

2.12.2.5 Five-Year Reviews

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that allow for unlimited use and unrestricted exposure, in accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of the initiation of remedial action, and every 5 years thereafter, to ensure that the Selected Remedy continues to be protective of human health and the environment. During such reviews, the Navy, EPA, and state will review site conditions and the LUC compliance inspection information and monitoring data to determine whether continued implementation of the Selected Remedy is appropriate. Five-year reviews will be conducted until Site 17 conditions are restored such that the site is suitable for unrestricted use and unlimited exposure in accordance with CERCLA. When groundwater and sediment RGs are achieved, the 5-year review will no longer include those media. Soil will continue to be assessed since contaminated soil exceeding unrestricted use standards will be left in place.

2.12.3 Expected Outcomes of Selected Remedy

The current industrial land use, which will be supported by the Selected Remedy, is expected to continue at Site 17, and there are no other planned land uses in the foreseeable future. Alternative SO4 would render the site suitable for the planned industrial use. Groundwater at the site is not used and is not expected to be used in the future, and the Selected Remedy will have no impact on current or future groundwater uses available at the site. However, as per EPA groundwater remediation guidance, in states without an EPA-approved CSGWPP such as Rhode Island, CERCLA groundwater remediation must meet federal MCLs or, where they are not available, risk-based standards unless the water is non-potable. There are no socio-economic, community revitalization, or economic impacts or benefits associated with implementation of the Selected Remedy. RAOs for the site are anticipated to be achieved within approximately 1 year for soil, 2 years for sediment, and between approximately 54 and 87 years for groundwater.

The primary expected outcome of the Selected Remedy is that the groundwater will be restored to its permissible, beneficial use and will no longer present an unacceptable risk to human health. The effectiveness of the groundwater remedy will be determined based upon attainment of the cleanup levels outlined in Table 2-6, as well as any additional site-related COCs added through subsequent decision documents. A monitoring program will be implemented to evaluate remedy performance and progress toward attainment. The details of the monitoring program will be established during the remedial design phase and will include the preparation of a long-term monitoring plan. The monitoring scope and frequency would change over time based on technical analysis of the remedy, optimization studies, revised CSM, or other information, as determined by the Navy with approval from EPA and RIDEM. The determination that all cleanup levels have been met should consider historical and current monitoring data, contaminant distribution, trend analysis, and the appropriateness of the compliance monitoring program (i.e., locations, frequency of monitoring, and sampling parameters).

Table 2-14 describes how the Selected Remedy mitigates risk and achieves RAOs for Site 17.

TABLE 2 14. HOW SELECTED REMEDY MITIGATES RISK AND ACHIEVES RAOS

RISK	RAO	COMMENTS
Direct exposure of benthic invertebrates to contaminated sediment	Reduce risk to benthic invertebrates by preventing exposure to COCs in sediment that contribute to toxic effects in these organisms.	Excavation and off-site disposal of sediments exceeding cleanup levels will prevent benthic invertebrate exposure to COCs in these sediments.
Ingestion of contaminated shellfish by recreational and subsistence fishermen	Prevent exposure of recreational and subsistence fishermen to COCs in shellfish (mussels and clams) by reducing the exposure of those shellfish to the contaminants in sediment, until shellfish contamination no longer poses a human health risk.	Post temporary signs on existing structures (on Navy property) in the Stillwater Area to indicate shellfish should not be taken. These signs should remain until the remedy is completed. Excavation and off-site disposal of sediments exceeding cleanup levels will reduce the level of COCs in shellfish.
Direct exposure to and ingestion of contaminated soil	Prevent the incidental ingestion of and direct contact with surface and subsurface soil containing COCs that exceed human health cleanup levels.	Excavation and off-site disposal of the most contaminated soil and of sump debris will prevent exposure to surface soil with COC concentrations exceeding industrial cleanup levels. Implementing, enforcing, and inspecting LUCs will prevent exposure to COCs at concentrations exceeding industrial cleanup levels in subsurface soil (SB336 under Building 32 slab) and exceeding residential cleanup levels in surface and subsurface soil.
Migration of contaminants to groundwater or sediments	Prevent future migration of soil contaminants either to groundwater or adjacent sediments at concentrations that cause unacceptable risk.	Excavation and off-site disposal of the most contaminated soil and of sump debris will reduce the potential for contaminants to migrate to groundwater or adjacent marine sediments. LUCs and inspections will be implemented to ensure that land use (industrial) does not change and to ensure that contact with COCs at concentrations that would cause an unacceptable risk under more intensive uses is prevented for the life of the remedy. LUCs will also provide controls for adequate protection to workers who may conduct excavations at the site. Periodic inspections of the site would be conducted to verify that surface soil is not disturbed where industrial cleanup levels are exceeded in subsurface soil and to ensure continued compliance with and effectiveness of the LUCs.

TABLE 2 14. HOW SELECTED REMEDY MITIGATES RISK AND ACHIEVES RAOS (CON'T)		
RISK	**RAO**	**COMMENTS**
Use of groundwater for residential purposes	Restore groundwater quality to its beneficial use.	MNA will monitor the decrease of COC concentrations to natural steady-state conditions over time, as the area geochemistry rebalances, and will document when steady-state conditions are achieved. Shallow groundwater quality will be established through source control measures and confirmatory sampling.
	Prevent residential exposure to site groundwater until the groundwater cleanup levels have been achieved.	LUCs will restrict the use of site groundwater until cleanup levels are achieved. LUCs will also include a requirement to evaluate vapor intrusion risk, should site development involving the construction of buildings occur before groundwater cleanup goals for organic compounds are met.
Direct exposure to and ingestion of "shallow groundwater" by construction workers	Prevent construction worker exposure to COCs exceeding cleanup goals in trapped water in former building sumps, in contact with the sump debris and in test pits ("shallow groundwater").	Excavation and off-site disposal of sump debris and removal of associated trapped water and sealing of sumps will remove these contaminants. Enforcing LUCs for construction workers at the site will ensure that they are informed and adopt adequate protection for any potential excavation work at the site. Confirmation sampling will confirm the shallow groundwater no longer poses a risk to construction workers once the source control measures are implemented.

The current industrial use of the site is expected to continue for the foreseeable future and it is not expected that modification or removal of the LUCs will be required. However, if proposed land use changes in the future and uses other than industrial are anticipated, additional remedial approaches may be required. Any modifications to LUCs will be conducted in accordance with provisions in the Site 17 LUC RD, CERCLA, and the NCP.

2.13 STATUTORY DETERMINATIONS

In accordance with the NCP, the Selected Remedy meets the following statutory determinations:

- **Protection of Human Health and the Environment** – The Selected Remedy is needed to prevent unacceptable risks to human health and the environment associated with potential exposure to COCs in site soil, groundwater, marine sediment, and shellfish, under current and anticipated future land use scenarios. The Selected Remedy for soil and sump debris will be protective of human health and the environment through complete removal and off-site disposal of soil that exceeds industrial cleanup goals and leachability criteria, as well as all sump debris that is a contaminant source present within the site. The Selected Remedy for groundwater will be protective of human health and the environment through the reduction of COC concentrations in site groundwater to achieve cleanup levels, monitoring to confirm contaminant levels achieve groundwater RGs, and the maintenance of LUCs until all groundwater RGs are met. The Selected Remedy for sediment will be protective of human health by dredging and removing contaminated sediment (as well as contaminated shellfish living in the sediment) that creates the shellfish consumption risk, and by placing temporary signs in the Stillwater Area to indicate "No Shellfishing" until the sediment remedy is completed. The Selected Remedy includes LUCs which will ensure the long-term effectiveness of the soil and groundwater remedy, will prevent unrestricted use of the property and uncontrolled excavation, and will prevent exposure to contaminated groundwater until conditions are suitable for unlimited use and unrestricted exposure.

- **Compliance with ARARs** – The Navy has determined that the Selected Remedy is the Least Environmentally Damaging Practicable Alternative in compliance with the federal CWA, providing the best balance of addressing contaminated media at the site while minimizing both temporary and permanent alteration of wetlands/aquatic habitats on site. The Selected Remedy will attain all identified federal and state ARARs, as presented in Appendix E. Incorporated into this ROD is an EPA finding that the remedy selected will address PCB-contaminated media in order to control risk of injury to health or the environment, in compliance with 40 CFR Section 761.61(c).

- **Cost-Effectiveness** – The Selected Remedy is a cost-effective alternative that allows for continued use of the property as industrial. The costs are proportional to overall effectiveness by achieving adequate long-term effectiveness and permanence within a reasonable time frame. Detailed costs for the Selected Remedy are presented in Appendix B [(1)].

- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable** – The Selected Remedy does not include treatment, except for limited treatment of water from the sediment dewatering process.

- **Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility, or Volume of the Hazardous Substances as a Principal Element** – There are no source materials at this site that constitute a principal threat. As such, the Selected Remedy is not required to satisfy the statutory preference for remedies employing treatment that reduces the toxicity, mobility, or volume as a principal element. The Selected Remedy for soil and sediment includes excavation and off-site disposal of the most contaminated portions of these media and provides the best balance of cost versus benefit to achieve the remedial goals.

- **Five-Year Review Requirement** – Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action and every 5 years thereafter to ensure that the Selected Remedy is or will be protective of human health and the environment.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of significant changes from the Selected Remedy presented in the Proposed Plan that was published for public comment. No significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate. Formal comments received during the public comment period and the associated responses are provided in Section 3.0, Responsiveness Summary.

[(1)] Cost estimates presented in Appendix B are based on the conceptual designs evaluated during the FS. Line item quantities and costs may vary based on the engineering designs developed during the RD phase.

3.0 RESPONSIVENESS SUMMARY

3.1 STAKEHOLDER COMMENTS AND LEAD AGENCY RESPONSES

Participants in the public meeting (informal session) held on March 19, 2014 included RAB members and representatives of the Navy, EPA, and RIDEM. The questions raised at the public meeting were general inquiries for informational purposes and were addressed at the public meeting. A formal public hearing was held immediately following the public meeting. Oral comments received during the public hearing and written comments received during the public comment period are summarized in Table 3-1. The complete transcript of the public hearing is included in the Administrative Record for Site 17.

TABLE 3 1. SUMMARY OF QUESTIONS FROM PUBLIC COMMENT PERIOD

QUESTION/COMMENT	RESPONSE
Dr. Kathy Abass (Newport) noted that the Navy should take caution of the potential for submerged materials, particularly any potential ordnance that may be present in the sediment that you are removing.	The Navy appreciates the concern expressed, and while there is no expectation to find ordnance in the potential dredge area, it is always a possibility during sediment dredging programs near naval facilities. Debris surveys are anticipated prior to dredging, and mitigation plans and processes will be in place for potential encounter of ordnance.
Michael O'Connor of Weeks Marine Inc. expressed interest in being able to take part in the work to be conducted to clean up the site, and asked when the Navy is planning to conduct the excavations.	The Navy will contract the cleanup work using a task order to prequalified contractors under the Navy's Response Action Contract procured by NAVFAC Mid-Atlantic. The prime contractor, who has not yet been identified, has the option to subcontract portions of the work to local businesses and labor organizations. Interested parties should continue to seek updates through FedBizOps or similar Navy contracting outreach efforts. The excavation work is currently in design and is being programmed to begin in 2015 and continue in phases through 2016.
David Brown (Newport) commented that after reading the proposal and attending the briefing, he felt satisfied that the a good assessment of the hazards and cleanup options was made, also felt satisfied with the preferred option.	The comment is noted.

3.2 TECHNICAL AND LEGAL ISSUES

No additional technical or legal issues associated with the Site 17 ROD were identified.

References

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
1	**Remedial Investigation (RI) (Phase 1)**	Table 2-1	Tetra Tech, 2006. Remedial Investigation for Site 17: Building 32, Gould Island, Naval Station Newport, Newport, Rhode Island. For Naval Facilities Engineering Command Mid-Atlantic, Contract Number N62472-03-D-0057, Contract Task Order 35. December.
2	**Background Soil Investigation**	Table 2-1	Tetra Tech, 2008. Basewide Background Study Report for Naval Station Newport, Newport, Rhode Island. Tetra Tech, Inc., King of Prussia, Pennsylvania. July.
3	**Human Health Risk Assessment (HHRA)**	Table 2-1	Tetra Tech, 2006.
4	**Screening-Level Ecological Risk Assessment (ERA)**	Table 2-1	Tetra Tech, 2006.
5	**Phase 2 Remedial Investigation**	Table 2-1	Tetra Tech, 2012. Phase 2 Remedial Investigation and Baseline Ecological Risk Assessment, Site 17: Building 32, Gould Island, Naval Station Newport, Newport, Rhode Island; for Naval Facilities Engineering Command Mid-Atlantic, Contract Number N62467-04-D-0055, Contract Task Order 458. May.
6	**Baseline Ecological Risk Assessment (BERA)**	Table 2-1	Tetra Tech, 2012.
7	**remedial alternatives**	Table 2-1	Tetra Tech, 2014. Feasibility Study For Site 17 – Former Building 32, Gould Island, Naval Station Newport, Newport, Rhode Island. Final – February.
8	**public notice**	Section 2.3	*Newport Daily News* and the *Jamestown Press* on March 13, 2014.
9	**groundwater flow**	Section 2.5	Tetra Tech, 2012; Tetra Tech, 2014.
10	**RIDEM's GA groundwater classification area and designation of GA-NA**	Section 2.6	RIDEM, 2010. Groundwater Quality Rules. State of Rhode Island and Providence Plantations Department of Environmental Management, Office of Water Resources. June.
11	**potential receptors**	Section 2.7	Tetra Tech, 2006.
12	**COPCs were identified**	Section 2.7	Tetra Tech, 2006.
13	**exposure assessment**	Section 2.7	Tetra Tech, 2006.
14	**cancer risks and non-cancer hazards**	Section 2.7	Tetra Tech, 2006.
15	**RAOs for Site 17**	Section 2.8	Tetra Tech, 2014.
16	**COCs**	Section 2.8	Tetra Tech, 2014.
17	**PRGs**	Section 2.8	Tetra Tech, 2014.
18	**cleanup levels**	Section 2.8	Tetra Tech, 2014.
19	**preliminary technology screening**	Section 2.9	Tetra Tech, 2014.
20	**nine CERCLA evaluation criteria**	Section 2.10	Tetra Tech, 2014.

ADDITIONAL REFERENCES

NRC (National Research Council), 2007. Sediment Dredging at Superfund Megasites: Assessing the Effectiveness. National Research Council. National Academies Press, Washington, DC.

ORDEQ (Oregon Department of Environmental Policy), 2007. Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment. Oregon Department of Environmental Quality. April 3.

Patmont, C., 2006. Contaminated Sediment Dredging Residuals: Recent Monitoring Data and Management Implications. Presentation at the Second Meeting on Sediment Dredging at Superfund Megasites, Irvine, CA. June 7.

Tetra Tech, 2004. Five-Year Review for Naval Station Newport, Newport, Rhode Island. Tetra Tech NUS, Inc., King of Prussia, Pennsylvania. December.

USEPA (U.S. Environmental Protection Agency), 1990. Guidance on Remedial Actions for Superfund Sites with PCB Contamination. Office of Emergency and Remedial Response, EPA/540/G-90/007. August.

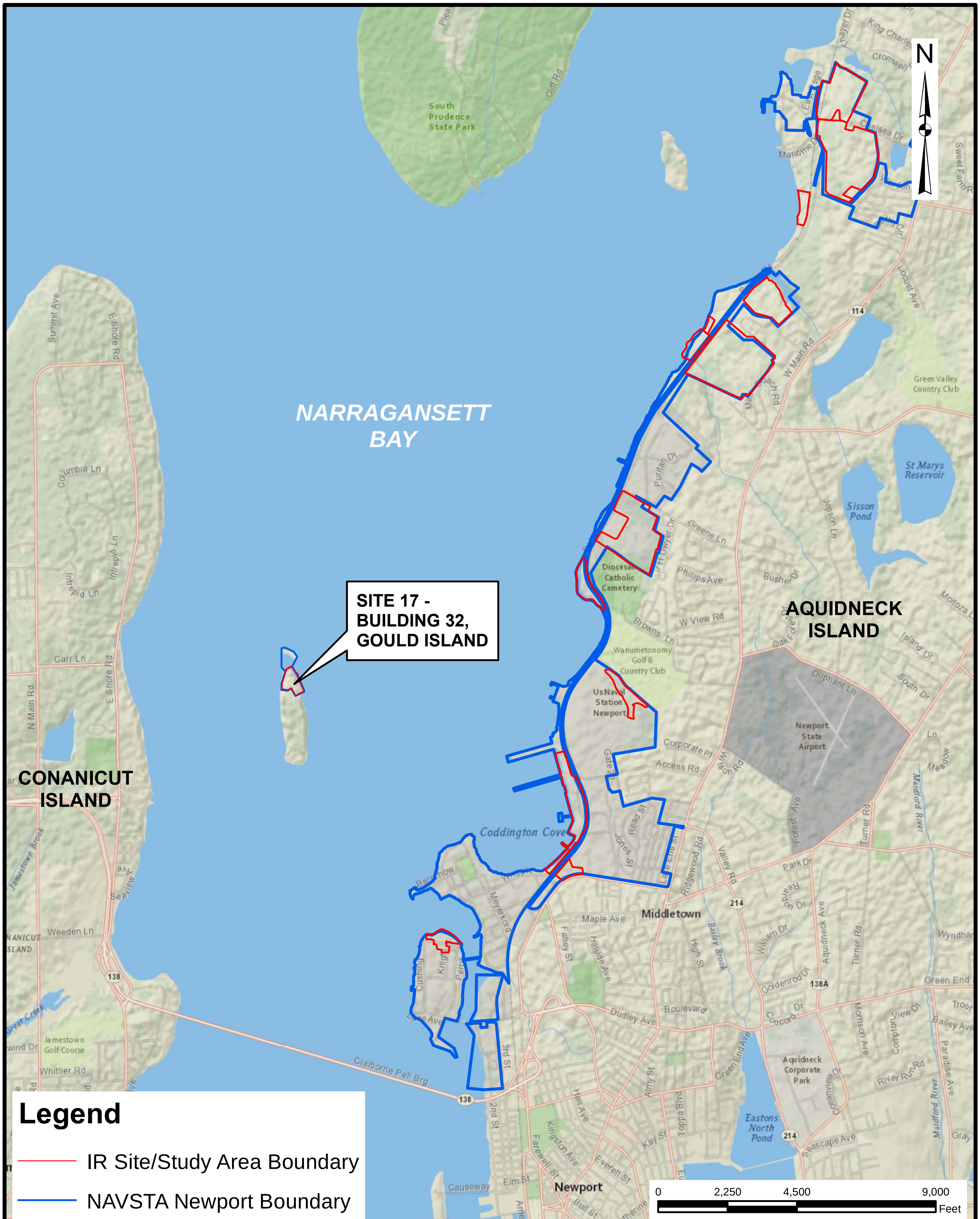
USEPA, 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Office of Solid Waste and Emergency Response. OSWER Directive 9200.4-17P. April 21.

USEPA. 2002. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10. December.

VDEQ (Virginia Department of Environmental Quality), 2004. Voluntary Remediation Program Risk Assessment Guidance. www.deq.virginia.gov/vrprisk/raguide.html

Figures

I:\04295\DD.DRG\I_SITE_LOCATION.MXD NEC 03/26/14



TETRA TECH

NAVAL STATION NEWPORT
JAMESTOWN, RHODE ISLAND

SITE LOCATION

SITE 17 - BUILDING 32, GOULD ISLAND
RECORD OF DECISION

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REV 0	DATE 03/26/14
FIGURE NUMBER	1-1

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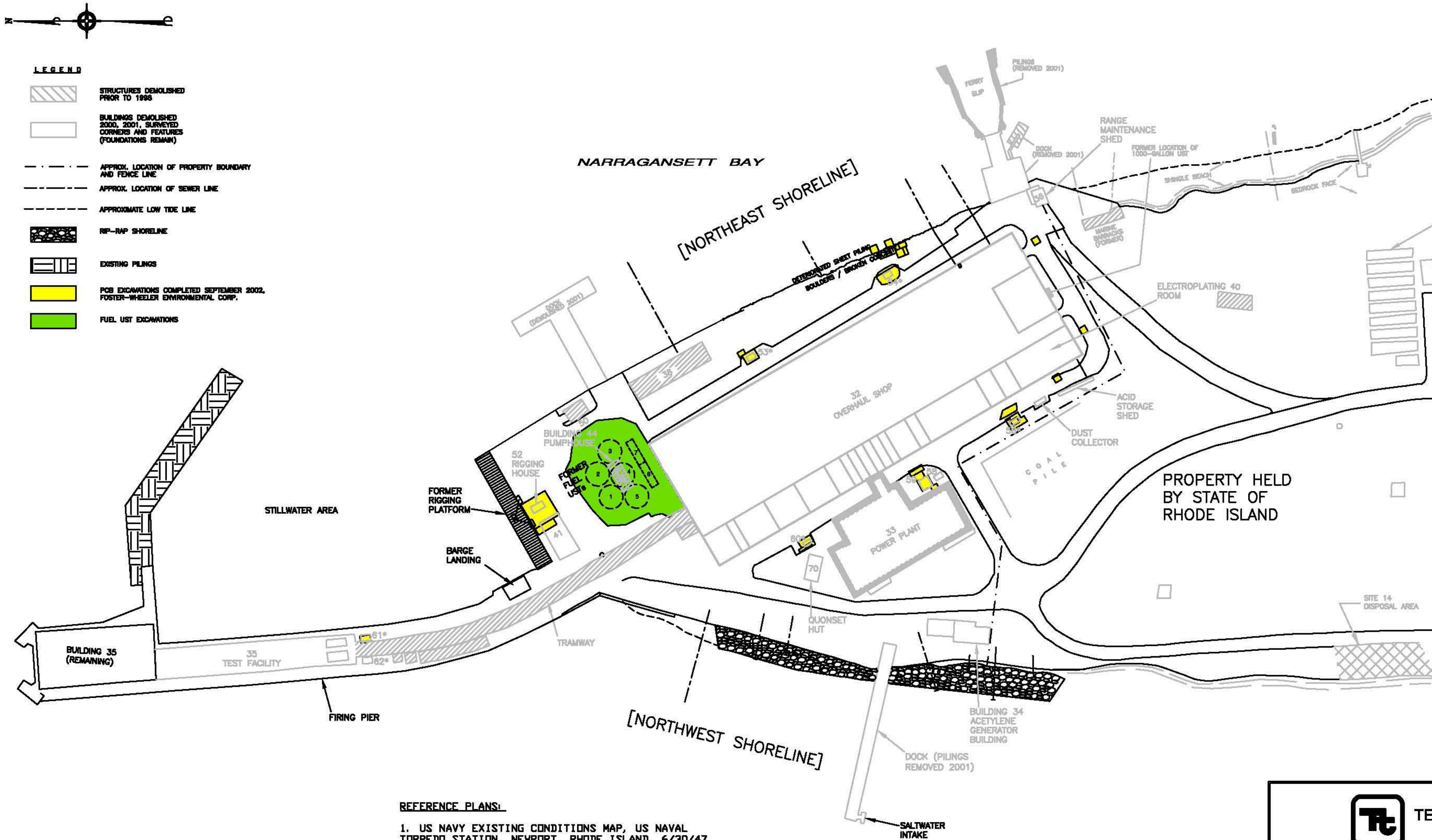

REFERENCE PLANS:

1. US NAVY EXISTING CONDITIONS MAP, US NAVAL TORPEDO STATION, NEWPORT, RHODE ISLAND, 6/30/47

2. DRAINS, TRENCHES, ETC. GOULD ISLAND BUILDING 32 SITE, LOUIS FEDERICI & ASSOCIATES FOR TETRA TECH, NUS INC. CTO 286, LFA#970706, 4/25/00

3. GEOTECHNICAL SURVEY PLAN AT FORMER BUILDING 44 AND 32, US NAVAL BASE ON GOULD ISLAND, LOUIS FEDERICI & ASSOCIATES FOR BROWN & ROOT ENVIRONMENTAL, 9/8/97, DWG#970706-03

NOTES:

1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. PHYSICAL FEATURES SHOWN MAY NOT DEPICT CURRENT CONDITIONS

TETRA TECH

NAVAL STATION NEWPORT
JAMESTOWN, RHODE ISLAND

SITE MAP

SITE 17: BUILDING 32, GOULD ISLAND
RECORD OF DECISION

FILE	SCALE
I:\...\GI_BASE_MAP.DWG	PER SCALE BAR

FIGURE NUMBER	REV	DATE
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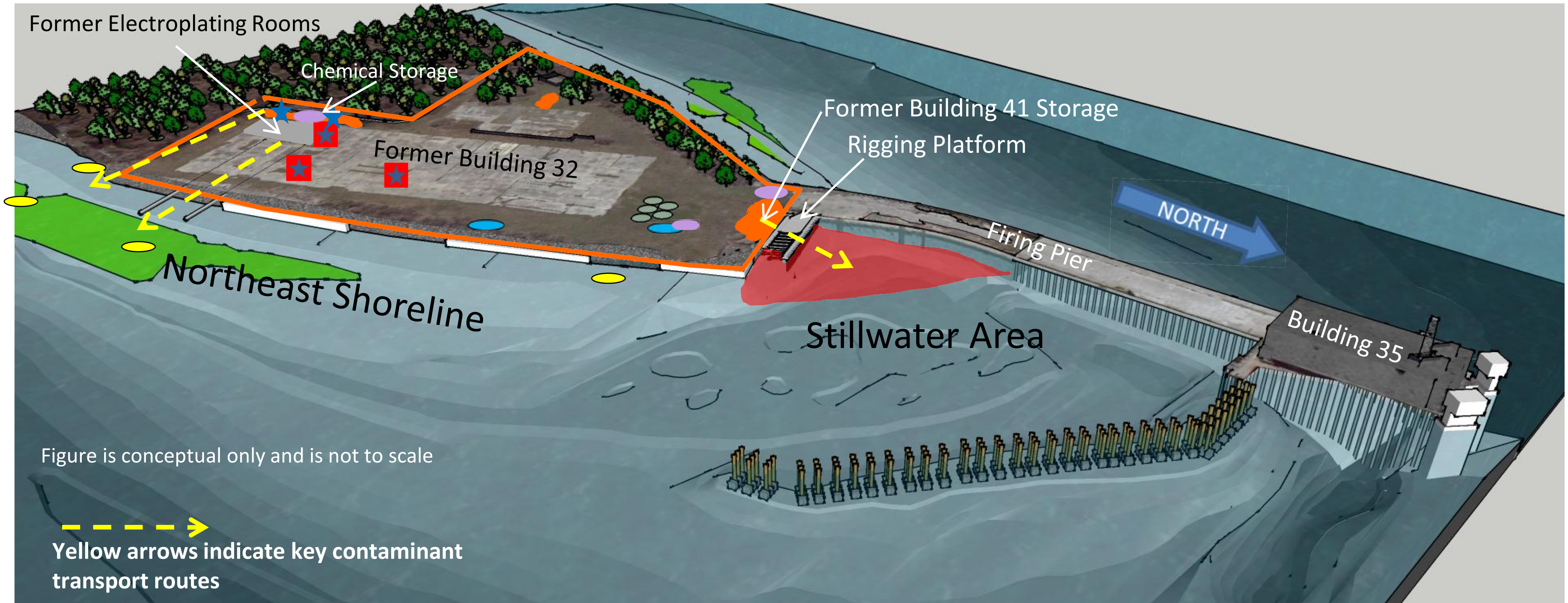
FIGURE 2-2

Summary Conceptual Site Model

Site 17 - Former Building 32, Gould Island
NAVSTA Newport, Newport RI



Sediment

Sediment exceeding PRGs
- Contaminants – PCBs and PAHs
- Risk - Ecological and Human (shellfishing)
- Action – Dredge and dispose

Sediment which exceeded PRGs in 2005, but not in 2010
- Contaminants – lead, cadmium, PCBs
- Risk – ecological receptors
- Action – Limited Monitoring

Sub-tidal eelgrass, protected habitat

Debris

Sump Debris and associated water
- Contaminants – PCBs, SVOCs, Metals
- Risk – Construction worker / trench – air
- Action: excavate and dispose

Test Pit Water exceeding PRGs
- Contaminants – PAHs
- Risk – Construction worker exposure
- Action: Remove and dispose

Soil

Soil exceeding Industrial PRGs
- Contaminants – PCBs, PAHs, metals
- Risk – Construction worker
- Action – Excavate, dispose

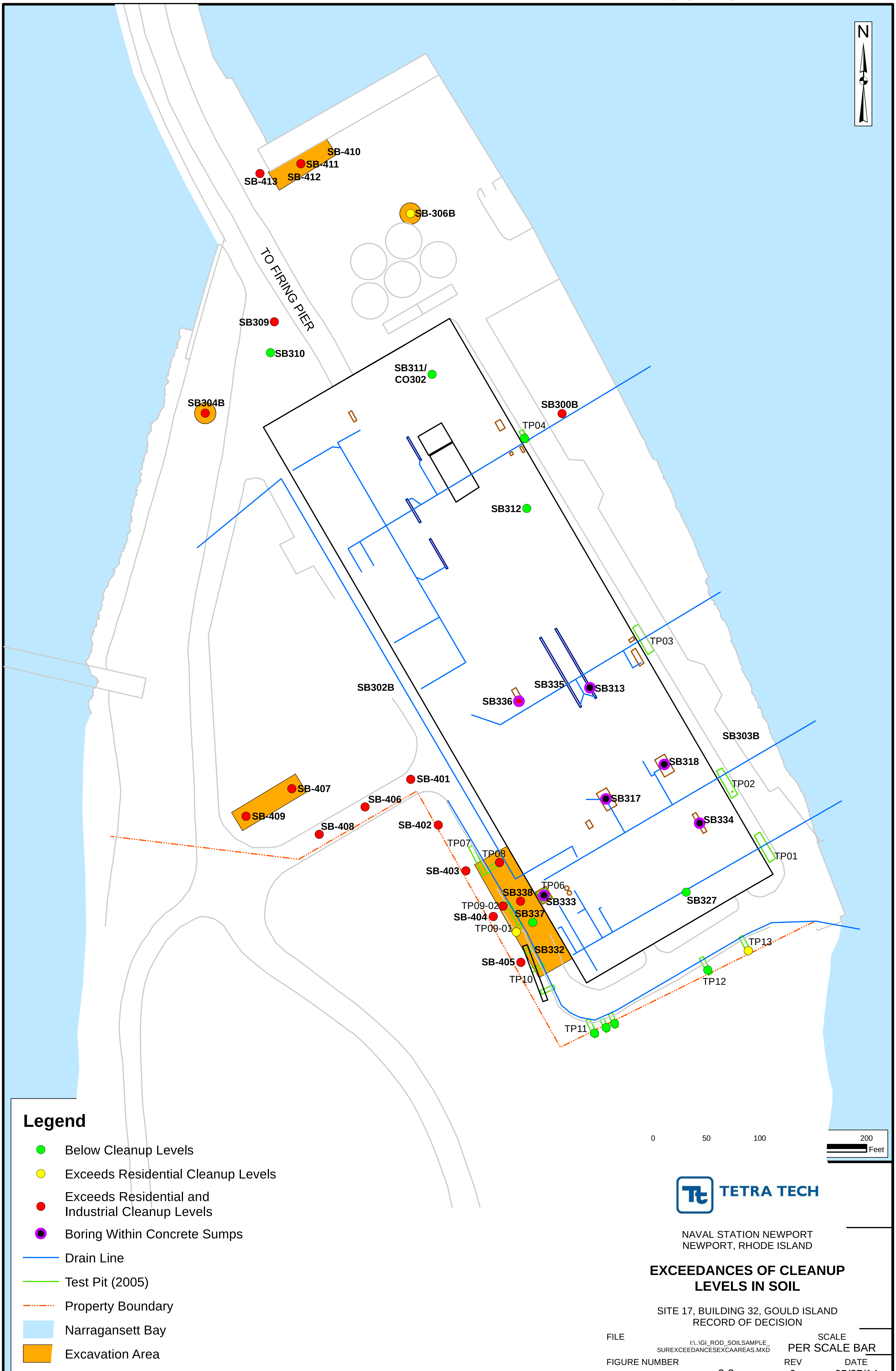
Soil exceeding residential PRGs
- Contaminants – PAHs and cadmium
- Risk – Presumed risk to residents (concentrations > RDECs)
- Action – Land use controls, inspections

Soils exceeding Leachability Criteria
- Risk - potential effect to groundwater
- Action – Excavate, dispose

Groundwater

Groundwater exceeding MCLs
- Contaminants – PCP, PCE
- Assumed risk from ingestion of groundwater.
- Action – MNA, Land Use Controls

Groundwater exceeding health advisory for manganese.
- Assumed risk from ingestion of groundwater (same boundary as for soil > residential PRGs).
- Action – MNA, Land Use Controls



TETRA TECH

NAVAL STATION NEWPORT
NEWPORT, RHODE ISLAND

EXCEEDANCES OF CLEANUP LEVELS IN SOIL

SITE 17, BUILDING 32, GOULD ISLAND
RECORD OF DECISION

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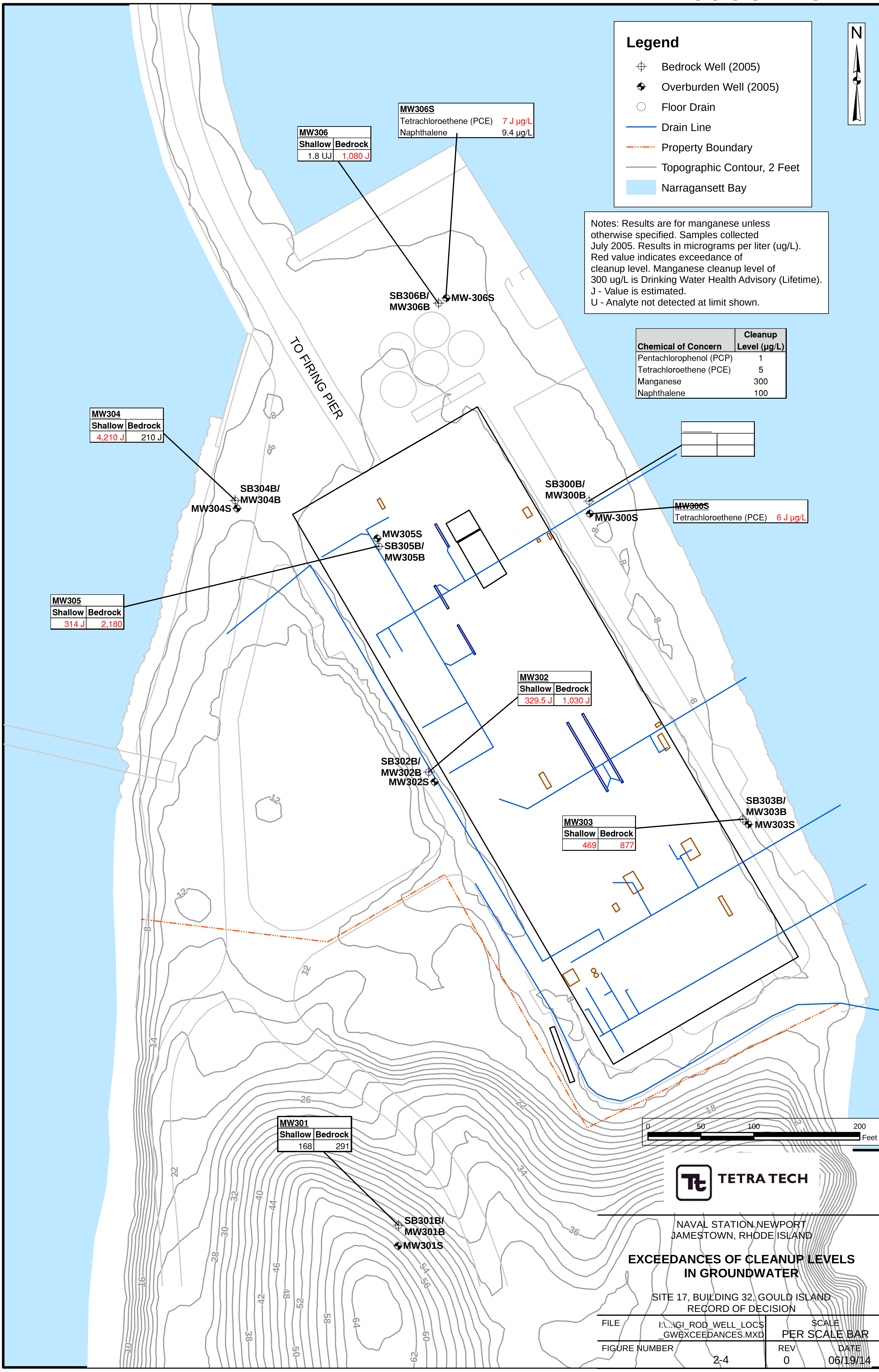

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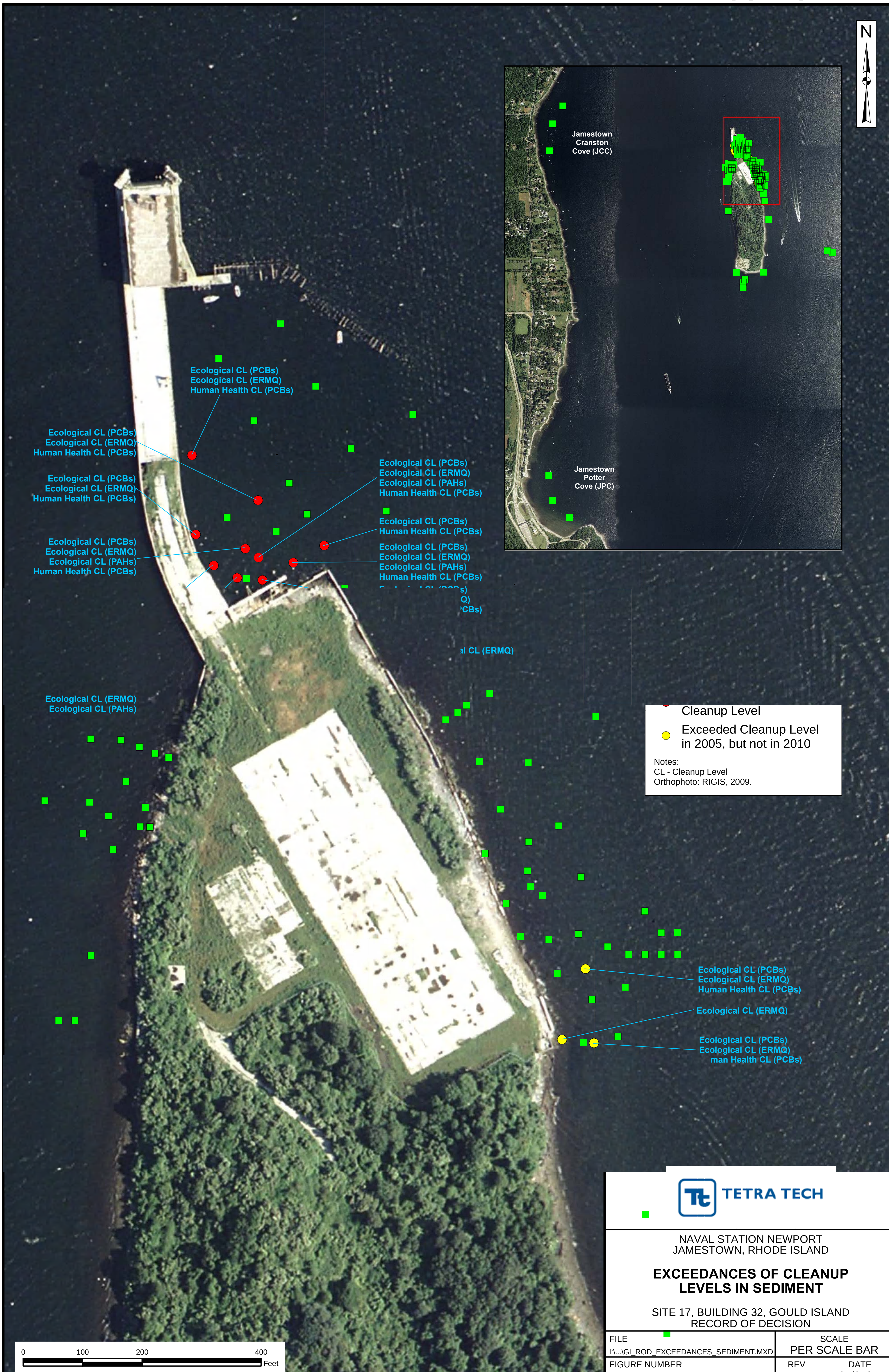

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TETRA TECH

NAVAL STATION NEWPORT
JAMESTOWN, RHODE ISLAND

SOIL REMEDY (SO4)

SITE 17, BUILDING 32, GOULD ISLAND
RECORD OF DECISION

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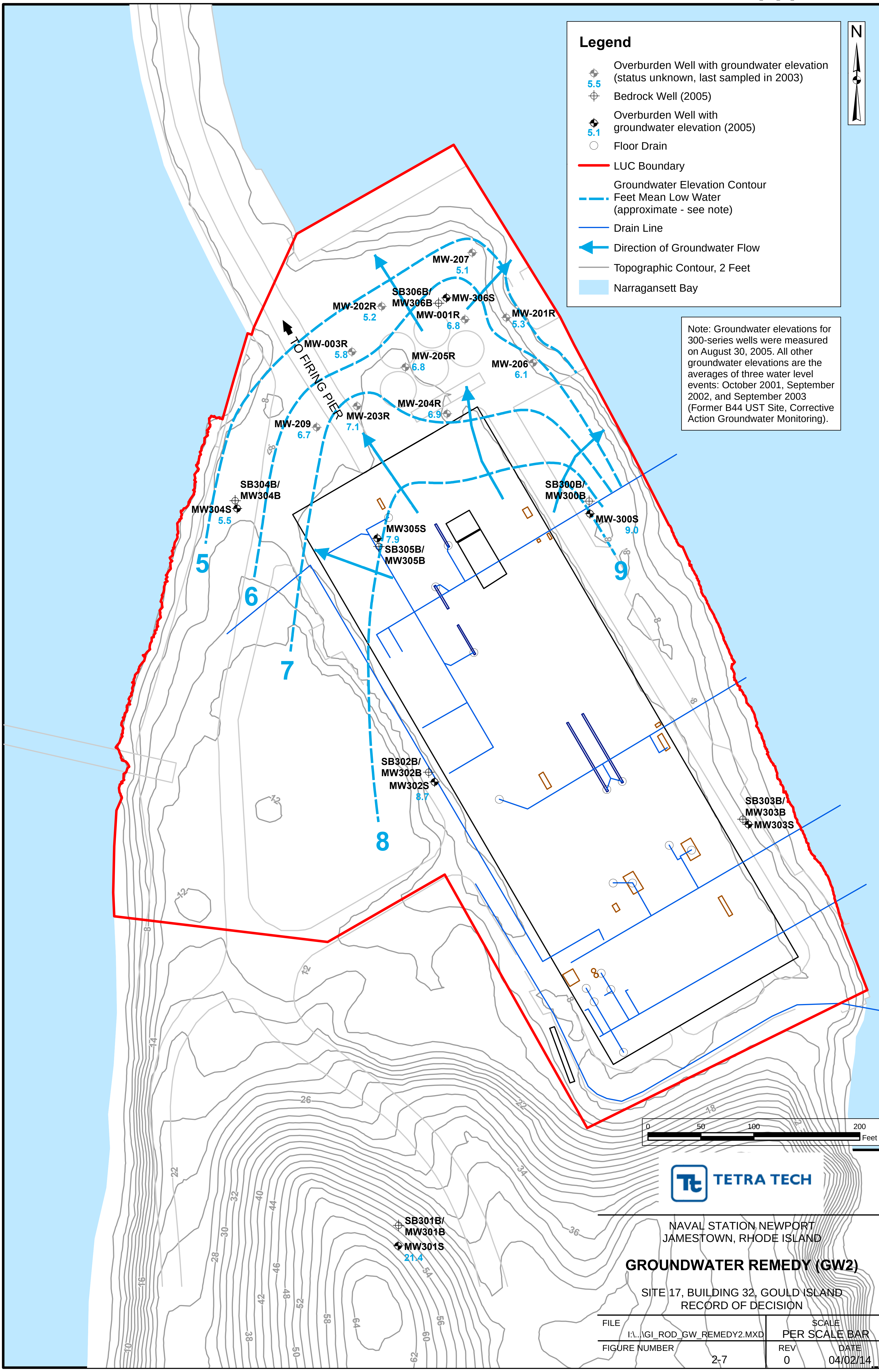

FIGURE 2-8

Sediment Remedy (SD3)

Site 17 - Former Building 32, Gould Island
NAVSTA Newport, Newport RI

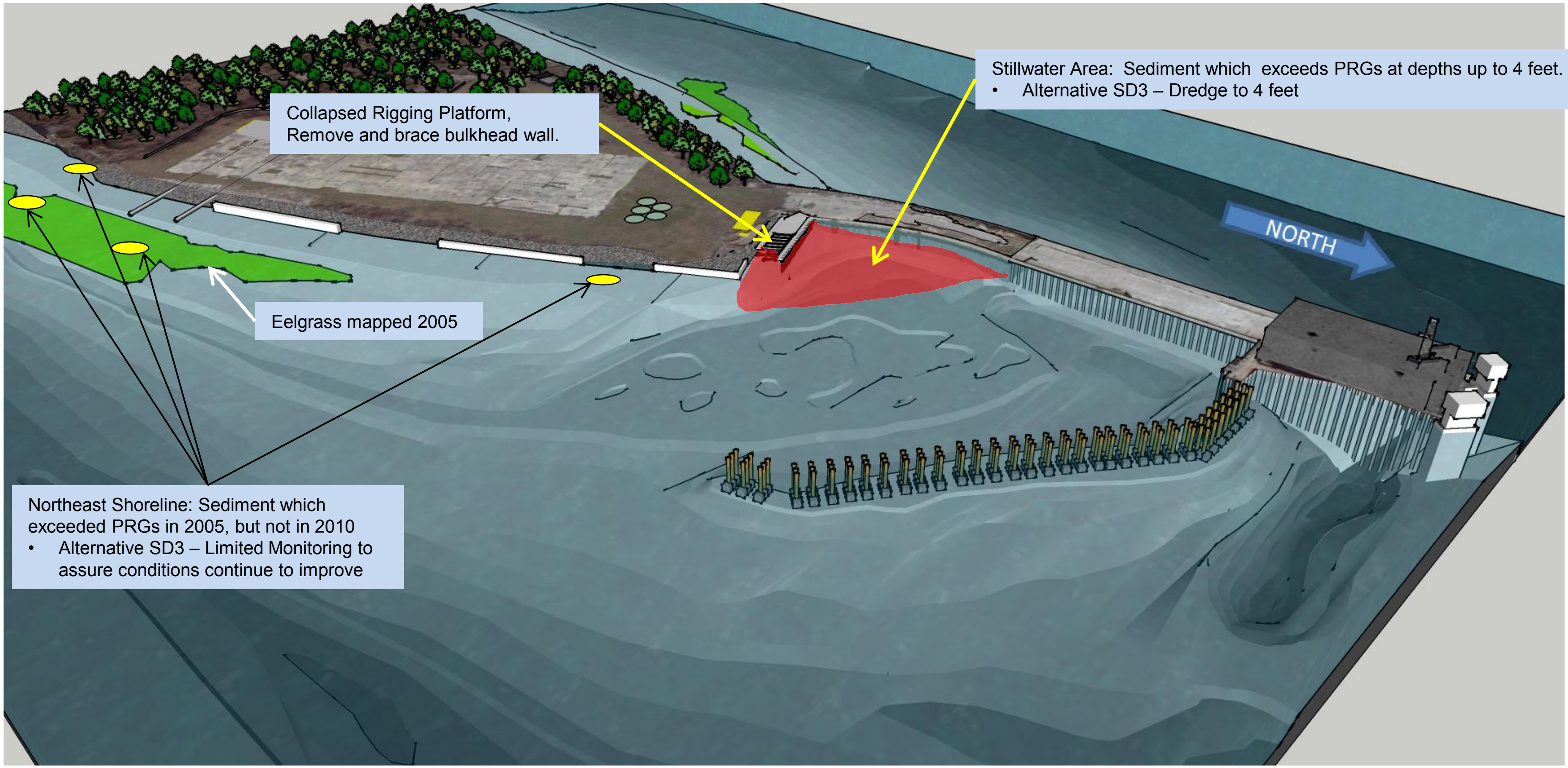

Figure is conceptual only and is not to scale

Appendix A
Rhode Island Department of Environmental Management Concurrence Letter

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 Rhode Island Relay 711
Office of the Director

June 30, 2014

Mr. James T. Owens, III, Director
U.S. EPA – New England Region
Office of Site Remediation and Restoration
5 Post Office Square
Suite 100 (OSRR 07-3)
Boston, MA 02109-3912

RE: Record of Decision for Site 17 – Former Building 32, Gould Island
Naval Station Newport, RI

Dear Mr. Owens:

On March 23, 1992 the State of Rhode Island entered into a Federal Facilities Agreement (FFA) with the Department of the Navy and the Environmental Protection Agency. One of the primary goals of the FFA is to ensure that the environmental impacts associated with past activities at Naval Station Newport located in Newport, Rhode Island are thoroughly investigated and that appropriate actions are taken to protect human health and the environment.

In accordance with the FFA, the Department of Environmental Management (Department) has completed its review of the Record of Decision (ROD) for Site 17 – Former Building 32, Gould Island dated June 2014 at Naval Station Newport, RI. The Department of the Navy's selected alternative for the Site, as presented in the ROD, is the following: excavation and off-site disposal of soil from all areas where industrial cleanup levels or leachability criteria are exceeded; monitored natural attenuation (MNA) of manganese, pentachlorophenol (PCP) and tetrachloroethene (PCE) in groundwater until groundwater cleanup levels are achieved; excavation and off-site disposal of sediment in the Stillwater Area; limited sediment monitoring along the Northeast Shoreline; and implementation of land use controls (LUCs) to ensure that future use of the property is limited to industrial activities and to prohibit groundwater use until groundwater cleanup goals are achieved.

The Department has worked on this Site with the Department of the Navy and the Environmental Protection Agency from the early stages up through this important decision milestone. Based upon this Department's review of this ROD and the results of the remedial investigation activities conducted to date, we offer our concurrence on the decision. This concurrence is contingent upon all aspects of the aforementioned ROD being implemented during design, construction, and operation of the remedy in a timely manner.

The Department wishes to emphasize the following aspects of the ROD:

- As part of this remedy, the Navy will remove the debris which has been identified as solid waste from the sumps and trenches within the foundation of former Building 32 from the site and dispose of the debris off-site in accordance with state, local and federal regulations;

- The Navy will conduct a pre-design investigation of the marine sediment in the Stillwater Area to further characterize the vertical extent of contamination and to determine the sediment characteristics to support the sediment dredging design;

- The Navy will conduct post-dredge sampling in the Stillwater Area to ensure that cleanup levels within the dredged area have been met;

- If, after an appropriate amount of data has been collected, MNA is determined to be an ineffective remedy for addressing organics (PCP and PCE) and/or manganese in groundwater, the Navy will seek a change to the remedial action for groundwater, using an additional public notification and ROD amendment or Explanation of Significant Differences (ESD);

- The Navy will implement groundwater use restrictions and a long-term monitoring plan for the Site;

- The Navy will implement land use controls (LUCs) to prevent residential and unrestricted recreational uses of the Site;

- The Navy will conduct five-year reviews to ensure that the remedial actions for the Site continue to provide adequate protection of human health and the environment; and

- Finally, we urge the Navy to make every effort to assure that this remedy is implemented in a manner that allows the local community maximum participation in this process.

RIDEM would like to thank the Navy for their diligence in investigating this site and working with the affected stakeholders by considering their concerns in the decision-making process. RIDEM concurs with this ROD and looks forward to working with the Navy and the USEPA on the remaining concerns at Naval Station Newport.

Sincerely,

Janet Coit
Director

cc: Terrence Gray, RIDEM
Leo Hellested, RIDEM
Matthew DeStefano, RIDEM
Richard Gottlieb, RIDEM
Pamela Crump, RIDEM
Lynne Jennings, USEPA
Kymberlee Keckler, USEPA
Maritza Montegross, Navy

Appendix B
Cost Estimates

Cost Backup - Capital Costs
Soil Alternative SO4: Complete Excavation of Soils Exceeding Industrial PRGs (Including Leachability Criteria), Off-site Disposal, LUCs and Inspections
Site 17, Gould Island
NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI

			Unit Cost				Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 DOCUMENTS AND CONSTRUCTION PLANNING											
1.1 Prepare RAWP, HASP, Specs,	1	ls		$1,000.00	$30,240.00		$0	$1,000	$30,240	$0	$31,240
1.2 LUC RD	1	LS	$9,100.00				$9,100	$0	$0	$0	$9,100
2 PRE-EXCAVATION SAMPLING (AREAS 2 & 4)											
2.1 SAP preparation	1	ls		$500.00	$16,640.00		$0	$500	$16,640	$0	$17,140
2.2 Drilling Subcontractor	7	day	$5,500.00				$38,500	$0	$0	$0	$38,500
2.3 Sampling labor and materials	1	ls		$450.00	$5,250.00		$0	$450	$5,250	$0	$5,700
2.4 Sample analysis	1	ls	$9,800.00				$9,800	$0	$0	$0	$9,800
2.5 Marine Transport (mob / demob)	2	day	$5,200.00				$10,400	$0	$0	$0	$10,400
2.6 Marine Transport (daily)	7	day	$600.00				$4,200	$0	$0	$0	$4,200
2.7 Reporting	1	ls		$4,000.00	$6,550.00			$4,000	$6,550	$0	$10,550
3 RA MOBILIZATION AND DEMOBILIZATION											
3.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
3.2 Equipment Mobilization/Demobilization	4	ea			$177.00	$610.00	$0	$0	$708	$2,440	$3,148
3.3 Marine Transport (mob / demob)	2	day	$5,200.00				$10,400	$0	$0	$0	$10,400
4 RA FIELD SUPPORT AND SITE ACCESS											
4.1 Office Trailer	2	mo				$360.00	$0	$0	$0	$720	$720
4.2 Field Office Equipment, Utilities, & Support	2	mo		$470.00			$0	$940	$0	$0	$940
4.3 Storage Trailer	2	mo				$92.50	$0	$0	$0	$185	$185
4.4 Site Superintendent	30	day		$206.00	$384.64		$0	$6,180	$11,539	$0	$17,719
4.5 Site Health & Safety and QA/QC	30	day		$206.00	$307.68		$0	$6,180	$9,230	$0	$15,410
4.6 Marine Transport (daily)	30	day	$600.00				$18,000	$0	$0	$0	$18,000
4.7 Barge Landing Repair	1	ls	$50,000.00				$50,000	$0	$0	$0	$50,000
5 RA DECONTAMINATION											
5.1 Equipment Decon Pad	1	ls		$400.00	$1,000.00	$725.00	$0	$400	$1,000	$725	$2,125
5.2 Decon Water	500	gal		$0.20			$0	$100	$0	$0	$100
5.3 Decon Water Storage Tank, 1000 gallon	1	mo				$771.00	$0	$0	$0	$771	$771
5.4 Clean Water Storage Tank, 1000 gallon	1	mo				$771.00	$0	$0	$0	$771	$771
5.5 Disposal of Decon Waste, sump water (liquid & solid)	1	ls	$5,200.00				$5,200	$0	$0	$0	$5,200
6 RA EXCAVATION AND DISPOSAL											
5.1 Excavator, 2.5 cy	13	day			$355.20	$1,784.00	$0	$0	$4,618	$23,192	$27,810
6.2 Skid-Steer	13	day			$333.40	$291.00	$0	$0	$4,334	$3,783	$8,117
6.3 Site Labor, (1 laborer)	14	day			$264.80		$0	$0	$3,707	$0	$3,707
6.4 Marine Transport of Soil / Debris, non-hazardous	9	day	$5,200.00				$46,800	$0	$0	$0	$46,800
6.5 T&D of Soil / Debris, non-hazardous	1,426	ton	$48.00				$68,448	$0	$0	$0	$68,448
6.6 Waste Disposal Characterization / Analytical	24	ls	$600.00				$14,400	$0	$0	$0	$14,400
6.7 Post Excavation Confirmation Sampling	1	ls	$7,500.00				$7,500	$0	$0	$0	$7,500
6.8 Pump water from sumps, steam-clean sumps	2	day	$1,250.00				$2,500	$0	$0	$0	$2,500
7 RA SITE RESTORATION											
7.1 Excavator, 2.5 cy	9	day			$355.20	$1,784.00	$0	$0	$3,197	$16,056	$19,253
7.2 Skid-Steer	9	day			$333.40	$291.00	$0	$0	$3,001	$2,619	$5,620
7.3 Site Labor, (1 laborer)	9	day			$264.80		$0	$0	$2,383	$0	$2,383
7.4 Backfill, common fill	855	cy		$17.96			$0	$15,356	$0	$0	$15,356
7.5 Backfill, slab sumps, (stone)	178	cy		$27.67			$0	$4,925	$0	$0	$4,925
7.7 Marine Transport of Backfill Material	7	day	$5,200.00				$36,400	$0	$0	$0	$36,400
8 RA POST CONSTRUCTION COST											
8.1 Contractor Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
8.2 Remedial Action Closeout Report	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
Subtotal							$331,648	$41,031	$115,347	$54,762	$542,788

Cost Backup - Capital Costs
Soil Alternative SO4: Complete Excavation of Soils Exceeding Industrial PRGs (Including Leachability Criteria), Off-site Disposal, LUCs and Inspections
Site 17, Gould Island
NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI

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%									$34,604		$34,604
G & A on Labor, Material, Equipment, & Subs Cost @ 10%							$33,165	$4,103	$11,535	$5,476	$54,279
Tax on Materials and Equipment Cost @ 7.0%								$2,872		$3,833	$6,706
Total Direct Cost							$364,813	$48,006	$161,486	$64,072	$638,377
Indirects on Total Direct Cost @ 25%		(excluding transportation and disposal cost)									$141,182
Profit on Total Direct Cost @ 10%											$63,838
Subtotal											$843,397
Health & Safety Monitoring @ 2%											$16,868
Total Field Cost											$860,265
Engineering on Total Field Cost @ 5%											$43,013
Contingency on Total Field Cost @ 20%											$172,053
TOTAL CAPITAL COST											**$1,075,331**

Cost Backup - Annual and Five-Year Costs
Soil Alternative SO4: Complete Excavation of Soils Exceeding Industrial PRGs (Including Leachability Criteria), Off-site Disposal, LUCs and Inspections
Site 17, Gould Island
NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
LUCs Inspection & Report	$2,950		One-day visit to verify LUCs with Report
Five -Year Review		$23,000	Assumes that this is a component of the NAVSTA Newport IRP Five-Year Review
Subtotal	$2,950	$23,000	
Contingency @ 10%	$295	$2,300	Cost with contingency is used for Present Worth Analysis.
TOTAL	**$3,245**	**$25,300**	

Cost Backup - Present Worth Analysis
Soil Alternative SO4: Complete Excavation of Soils Exceeding Industrial PRGs (Including Leachability Criteria), Off-site Disposal, LUCs and Inspections
Site 17, Gould Island
NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$1,075,331		$1,075,331	1.000	$1,075,331
1		$3,245	$3,245	0.980	$3,181
2		$3,245	$3,245	0.961	$3,119
3		$3,245	$3,245	0.942	$3,058
4		$3,245	$3,245	0.924	$2,998
5		$28,545	$28,545	0.906	$25,854
6		$3,245	$3,245	0.888	$2,881
7		$3,245	$3,245	0.871	$2,825
8		$3,245	$3,245	0.853	$2,770
9		$3,245	$3,245	0.837	$2,715
10		$28,545	$28,545	0.820	$23,417
11		$3,245	$3,245	0.804	$2,610
12		$3,245	$3,245	0.788	$2,559
13		$3,245	$3,245	0.773	$2,508
14		$3,245	$3,245	0.758	$2,459
15		$28,545	$28,545	0.743	$21,209
16		$3,245	$3,245	0.728	$2,364
17		$3,245	$3,245	0.714	$2,317
18		$3,245	$3,245	0.700	$2,272
19		$3,245	$3,245	0.686	$2,227
20		$28,545	$28,545	0.673	$19,210
21		$3,245	$3,245	0.660	$2,141
22		$3,245	$3,245	0.647	$2,099
23		$3,245	$3,245	0.634	$2,058
24		$3,245	$3,245	0.622	$2,017
25		$28,545	$28,545	0.610	$17,399
26		$3,245	$3,245	0.598	$1,939
27		$3,245	$3,245	0.586	$1,901
28		$3,245	$3,245	0.574	$1,864
29		$3,245	$3,245	0.563	$1,827
30		$28,545	$28,545	0.552	$15,759
				TOTAL PRESENT WORTH	**$1,256,890**

NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI
Site 17 - Gould Island
Groundwater Alternative
Alternative GW2: MNA, LUCs, and Inspections
Capital Cost Detail Sheet

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 LUCs	250	hr			$37.00		$0	$0	$9,250	$0	$9,250
1.2 MNA Work Plan											
planning meeting (2 people)	16	hr			$85.00		$0	$0	$1,360	$0	$1,360
analytical specs	16	hr			$105.00		$0	$0	$1,680	$0	$1,680
SAP preperation (Draft/Final)	160	hr			$85.00		$0	$0	$13,600	$0	$13,600
misc supplies, equipment, copying etc.	1	ea		$500.00			$0	$500	$0	$0	$500
Subtotal							$0	$500	$25,890	$0	$26,390
Overhead on Labor Cost @ 30%									$7,767		$7,767
G & A on Labor, Material, Equipment, & Subs Cost @ 10%							$0	$50	$2,589	$0	$2,639
Tax on Materials and Equipment Cost @ 7.0%								$35		$0	$35
Total Direct Cost							$0	$585	$36,246	$0	$36,831
Indirects on Total Direct Cost @ 0%	(excluding transportation and disposal cost)										$0
Profit on Total Direct Cost @ 10%											$3,683
Subtotal											$40,514
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$40,514
Engineering on Total Field Cost @ 10%											$4,051
Contingency on Total Field Cost @ 0%											$0
TOTAL CAPITAL COST											**$44,566**

NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI
Site 17 - Gould Island
Groundwater Alternative
Alternative GW2: MNA, LUCs, and Inspections

Annual Cost

Item	Annual Cost Years 1 - 30	Annual Cost Years 1-2	Annual Cost Years 3-30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,950				Labor and supplies once a year to inspect Land Use Controls with Report
Groundwater Sampling, analysis and report		$192,284	$48,071		LUCs and Monitoring at 14 monitoring wells: Quarterly for years 1-2, annually thereafter
Five-Year Review				$23,000	Assumes five year review is a component of the Newport Five Year Review
Subtotal	$2,950	$192,284	$48,071	$23,000	
Contingency @ 10%	$295	$19,228	$4,807	$2,300	
TOTAL	**$3,245**	**$211,512**	**$52,878**	**$25,300**	

NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI
Site 17 - Gould Island
Groundwater Alternative
Alternative GW2: MNA, LUCs, and Inspections

Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$44,566		$44,566	1.000	$44,566
1		$214,757	$214,757	0.980	$210,546
2		$214,757	$214,757	0.961	$206,418
3		$56,123	$56,123	0.942	$52,886
4		$56,123	$56,123	0.924	$51,849
5		$81,423	$81,423	0.906	$73,747
6		$56,123	$56,123	0.888	$49,836
7		$56,123	$56,123	0.871	$48,859
8		$56,123	$56,123	0.853	$47,901
9		$56,123	$56,123	0.837	$46,961
10		$81,423	$81,423	0.820	$66,795
11		$56,123	$56,123	0.804	$45,138
12		$56,123	$56,123	0.788	$44,253
13		$56,123	$56,123	0.773	$43,385
14		$56,123	$56,123	0.758	$42,534
15		$81,423	$81,423	0.743	$60,499
16		$56,123	$56,123	0.728	$40,883
17		$56,123	$56,123	0.714	$40,081
18		$56,123	$56,123	0.700	$39,295
19		$56,123	$56,123	0.686	$38,525
20		$81,423	$81,423	0.673	$54,795
21		$56,123	$56,123	0.660	$37,029
22		$56,123	$56,123	0.647	$36,303
23		$56,123	$56,123	0.634	$35,591
24		$56,123	$56,123	0.622	$34,893
25		$81,423	$81,423	0.610	$49,630
26		$56,123	$56,123	0.598	$33,538
27		$56,123	$56,123	0.586	$32,880
28		$56,123	$56,123	0.574	$32,236
29		$56,123	$56,123	0.563	$31,604
30		$81,423	$81,423	0.552	$44,951
				TOTAL PRESENT WORTH	**$1,718,405**

NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI
Site 17 - Gould Island
Offshore Alternative
Alternative SD3 Sediment Removal and Off-Site Disposal (Dredging:Stillwater Area); Limited Monitoring (Northeast Shoreline)
Capital Cost Detail Sheet

			Unit Cost				Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 PRE-DESIGN INVESTIGATION											
1.1 SAP Development	1	ls	$17,140.00				$17,140	$0	$0	$0	$17,140
1.2 Sampling	1	ls	$5,150.00				$5,150	$0	$0	$0	$5,150
1.3 Sample Analysis	1	ls	$9,632.00				$9,632	$0	$0	$0	$9,632
1.4 PDI Report Development	1	ls	$16,800.00				$16,800	$0	$0	$0	$16,800
2 PROJECT PLANNING & DOCUMENTS											
2.1 Prepare Documents & Plans	400	hr			$37.00		$0	$0	$14,800	$0	$14,800
2.2 Prepare Permits	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
2.3 Prepare LUCs	250	hr			$50.00		$0	$0	$12,500	$0	$12,500
3 MOBILIZATION AND DEMOBILIZATION											
3.1 Equipment Mobilization/Demobilization	1	ls	$1,450,000.00				$1,450,000	$0	$0	$0	$1,450,000
3.2 Silt Curtain Purchase and Management	1	ls	$150,000.00				$150,000	$0	$0	$0	$150,000
4 SITE PREPARATION											
4.1 Pier Demolition	1,270	ton	$1,000.00				$1,270,000	$0	$0	$0	$1,270,000
4.2 Bulkhead Replacement	1	ls	$2,727,648.00				$2,727,648	$0	$0	$0	$2,727,648
4.3 Debris Removal	2,050	ton	$300.00				$615,000	$0	$0	$0	$615,000
4.4 Multibeam Bathymetric Survey	1	ls	$18,000.00				$18,000	$0	$0	$0	$18,000
5 STILLWATER AREA DREDGING											
5.1 Mechanical Dredging/Dewatering (Expanded*)	9,850	cy	$75.00				$738,724	$0	$0	$0	$738,724
5.2 Water Quality Monitoring	1	ls	$50,000.00				$50,000	$0	$0	$0	$50,000
5.3 Transport and Offsite Disposal (RCRA D)	14,775	ton	$125.00				$1,846,875	$0	$0	$0	$1,846,875
6 NORTHEAST SHORELINE LIMITED MONITORING											
6.1 Planning Documents	1	ls	$17,140.00				$17,140	$0	$0	$0	$17,140
6.2 Round 1 & Report (Year 1)	1	ls	$36,392.00				$36,392	$0	$0	$0	$36,392
6.3 Round 2 & Report (Year 5)	1	ls	$36,392.00				$36,392	$0	$0	$0	$36,392
7 POST CONSTRUCTION COSTS											
7.1 Contractor Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
7.2 Remedial Action Closeout Report	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
7.3 Multibeam Bathymetric Survey	1	ls	$18,000.00				$18,000	$0	$0	$0	$18,000
Subtotal							$9,022,893	$0	$55,050	$0	$9,077,943
Total Direct Cost							$9,022,893	$0	$55,050	$0	$9,077,943
Subtotal											$9,077,943
Health & Safety Monitoring @ 2%											$181,559
Total Field Cost											$9,259,502
Engineering and Oversight on Total Field Cost @ 10%											$925,950
Contingency on Total Field Cost @ 20%											$1,851,900
TOTAL CAPITAL COST											**$12,037,352**
subtracted 6.2 and 6.3, this is year 0 cost											$11,964,568

Note: Rates are based on APEX CO 12/7/12
*7,186 CY in place volume is expanded using a factor of 1.37.

NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI
Site 17 - Gould Island
Offshore Alternative

Alternative SD3 Sediment Removal and Off-Site Disposal (Dredging:Stillwater Area); Limited Monitoring (Northeast Shoreline)
Annual Cost

Item	Item Cost Years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$0		Labor and supplies once a year to inspect Land Use Controls with Report
Sediment Sampling, analysis and report	$0		LUCs and Monitoring at 3 stations, Northeast Shoreline where no cover is installed
Five-Year Review		$0	Contamination Removed, no 5-Year Review
Subtotal	$0	$0	
Contingency @ 10%	$0	$0	
TOTAL	**$0**	**$0**	

NAVAL STATION (NAVSTA) NEWPORT
NEWPORT, RI
Site 17 - Gould Island
Offshore Alternative
Alternative SD3 Sediment Removal and Off-Site Disposal (Dredging:Stillwater Area); Limited Monitoring (Northeast Shoreline)
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$11,964,568		$11,964,568	1.000	$11,964,568
1	$36,392	$0	$36,392	0.980	$35,678
2		$0	$0	0.961	$0
3		$0	$0	0.942	$0
4		$0	$0	0.924	$0
5	$36,392	$0	$36,392	0.906	$32,961
6		$0	$0	0.888	$0
7		$0	$0	0.871	$0
8		$0	$0	0.853	$0
9		$0	$0	0.837	$0
10		$0	$0	0.820	$0
11		$0	$0	0.804	$0
12		$0	$0	0.788	$0
13		$0	$0	0.773	$0
14		$0	$0	0.758	$0
15		$0	$0	0.743	$0
16		$0	$0	0.728	$0
17		$0	$0	0.714	$0
18		$0	$0	0.700	$0
19		$0	$0	0.686	$0
20		$0	$0	0.673	$0
21		$0	$0	0.660	$0
22		$0	$0	0.647	$0
23		$0	$0	0.634	$0
24		$0	$0	0.622	$0
25		$0	$0	0.610	$0
26		$0	$0	0.598	$0
27		$0	$0	0.586	$0
28		$0	$0	0.574	$0
29		$0	$0	0.563	$0
30		$0	$0	0.552	$0
				TOTAL PRESENT WORTH	**$12,033,208**

Appendix C
Human Health Risk Assessment Summary Tables

Table C-1

TABLE 3.1

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
(a)anthracene	ug/kg	602	1441	2900		ug/kg	1441	95% Chebyshev(MVUE) UCL	(1)	1441	95% Chebyshev(MVUE) UCL	(1)
(a)pyrene	ug/kg	519	1240	2400		ug/kg	1240	95% Chebyshev(MVUE) UCL	(1)	1240	95% Chebyshev(MVUE) UCL	(1)
(b)fluoranthene	ug/kg	618	1835	2900		ug/kg	1835	H-UCL	(1)	1835	H-UCL	(1)
(g,h,i)perylene	ug/kg	297	684	1400	J	ug/kg	684	95% Chebyshev(MVUE) UCL	(1)	684	95% Chebyshev(MVUE) UCL	(1)
Benzo(k)fluoranthene	ug/kg	287	716	1300		ug/kg	716	95% Chebyshev(MVUE) UCL	(1)	716	95% Chebyshev(MVUE) UCL	(1)
Chrysene	ug/kg	605	1408	3000		ug/kg	1408	95% Chebyshev(MVUE) UCL	(1)	1408	95% Chebyshev(MVUE) UCL	(1)
Dibenzo(a,h)anthracene	ug/kg	93.6	218	440	J	ug/kg	218	95% Chebyshev(MVUE) UCL	(1)	218	95% Chebyshev(MVUE) UCL	(1)
Indeno(1,2,3-cd)pyrene	ug/kg	299	693	1500	J	ug/kg	693	95% Chebyshev(MVUE) UCL	(1)	693	95% Chebyshev(MVUE) UCL	(1)
Arsenic	mg/kg	3.2	3.8	5.1	J	mg/kg	3.8	Student-t	(1)	3.8	Student-t	(1)
Beryllium	mg/kg	0.28	0.37	0.62		mg/kg	0.37	Approximate Gamma 95% UCL	(1)	0.37	Approximate Gamma 95% UCL	(1)
Manganese	mg/kg	196	279	473		mg/kg	279	Approximate Gamma 95% UCL	(1)	279	Approximate Gamma 95% UCL	(1)
Vanadium	mg/kg	13	17	29		mg/kg	17	Approximate Gamma 95% UCL	(1)	17	Approximate Gamma 95% UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

(1) ProUCL

Table C-2

TABLE 3.2

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: All Soil (0 - 10 ft bgs)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)anthracene	ug/kg	395	1624	4400		ug/kg	1624	99% Chebyshev(Mean, Std) UCL	(1)	1624	99% Chebyshev(Mean, Std) UCL	(1)
Benzo(a)pyrene	ug/kg	313	1262	3700	J	ug/kg	1262	99% Chebyshev(Mean, Std) UCL	(1)	1262	99% Chebyshev(Mean, Std) UCL	(1)
Benzo(b)fluoranthene	ug/kg	404	1696	5200	J	ug/kg	1696	99% Chebyshev(Mean, Std) UCL	(1)	1696	99% Chebyshev(Mean, Std) UCL	(1)
Benzo(g,h,i)perylene	ug/kg	149	527	1400	J	ug/kg	527	99% Chebyshev(Mean, Std) UCL	(1)	527	99% Chebyshev(Mean, Std) UCL	(1)
Benzo(k)fluoranthene	ug/kg	185	717	1900	J	ug/kg	717	99% Chebyshev(Mean, Std) UCL	(1)	717	99% Chebyshev(Mean, Std) UCL	(1)
Chrysene	ug/kg	361	1435	3700		ug/kg	1435	99% Chebyshev(Mean, Std) UCL	(1)	1435	99% Chebyshev(Mean, Std) UCL	(1)
Dibenzo(a,h)anthracene	ug/kg	46	114	440	J	ug/kg	114	97.5% Chebyshev(Mean, Std) UCL	(1)	114	97.5% Chebyshev(Mean, Std) UCL	(1)
Indeno(1,2,3-cd)pyrene	ug/kg	149	551	1500	J	ug/kg	551	99% Chebyshev(Mean, Std) UCL	(1)	551	99% Chebyshev(Mean, Std) UCL	(1)
Trichloroethene	ug/kg	16	61	59		ug/kg	59	Max	(2)	16	Average	(2)
Aroclor, Total	ug/kg	37	86	600		ug/kg	86	95% Chebyshev(Mean, Std) UCL	(1)	86	95% Chebyshev(Mean, Std) UCL	(1)
Antimony	mg/kg	0.57	0.60	15.4	J	mg/kg	0.60	H-UCL	(1)	0.60	H-UCL	(1)
Arsenic	mg/kg	3.0	3.4	11	J	mg/kg	3.4	Modified-t UCL	(3)	3.4	Modified-t UCL	(3)
Beryllium	mg/kg	0.25	0.28	1	J	mg/kg	0.28	Approximate Gamma 95% UCL	(1)	0.28	Approximate Gamma 95% UCL	(1)
Cadmium	mg/kg	101	1090	5670	J	mg/kg	1090	99% Chebyshev(Mean, Std) UCL	(1)	1090	99% Chebyshev(Mean, Std) UCL	(1)
Chromium	mg/kg	17	42	340	J	mg/kg	42	95% Chebyshev(Mean, Std) UCL	(1)	42	95% Chebyshev(Mean, Std) UCL	(1)
Lead	mg/kg	66	360	2700	J	mg/kg	360	97.5% Chebyshev(Mean, Std) UCL	(1)	360	97.5% Chebyshev(Mean, Std) UCL	(1)
Manganese	mg/kg	161	178	473		mg/kg	178	Modified-t UCL	(3)	178	Modified-t UCL	(3)
Vanadium	mg/kg	13	15	44	J	mg/kg	15	Modified-t UCL	(3)	15	Modified-t UCL	(3)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

(1) ProUCL
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for RME EPC and average used for CTE.
(3) ProUCL recommended either the student -t or the Modified-t-UCL, the greater of the two was selected.

Table C-3

TABLE 3.3

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Intertidal Sediment

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
)(a)anthracene	ug/kg	466	1321	1600		ug/kg	1321	Approximate Gamma 95% UCL	(1)	1321	Approximate Gamma 95% UCL	(1)
)(a)pyrene	ug/kg	257	430	760		ug/kg	430	Student-t	(1)	430	Student-t	(1)
)(b)fluoranthene	ug/kg	335	794	1200		ug/kg	794	Approximate Gamma 95% UCL	(1)	794	Approximate Gamma 95% UCL	(1)
(k)fluoranthene	ug/kg	207	574	910		ug/kg	574	Approximate Gamma 95% UCL	(1)	574	Approximate Gamma 95% UCL	(1)
Chrysene	ug/kg	413	1123	1500		ug/kg	1123	Approximate Gamma 95% UCL	(1)	1123	Approximate Gamma 95% UCL	(1)
Dibenzo(a,h)anthracene	ug/kg	32	54	100		ug/kg	54	Student-t	(1)	54	Student-t	(1)
Indeno(1,2,3-cd)pyrene	ug/kg	94	156	280		ug/kg	156	Student-t	(1)	156	Student-t	(1)
Aroclor, Total	ug/kg	129	635	360		ug/kg	360	Max	(2)	129	Average	(2)
Antimony	mg/kg	5.7	548	44	J	mg/kg	44	Max	(2)	5.7	Average	(2)
Arsenic	mg/kg	3.8	5.3	7.3	J	mg/kg	5.3	Student-t	(1)	5.3	Student-t	(1)
Beryllium	mg/kg	0.33	0.36	0.41		mg/kg	0.36	Student-t	(1)	0.36	Student-t	(1)
Chromium	mg/kg	505	5345	3910		mg/kg	3910	Max	(2)	505	Average	(2)
Lead	mg/kg	2690	974738	21200		mg/kg	21200	Max	(2)	2690	Average	(2)
Manganese	mg/kg	246	301	418	J	mg/kg	301	Student-t	(1)	301	Student-t	(1)
Thallium	mg/kg	0.73	2.3	2.5	J	mg/kg	2.3	Approximate Gamma 95% UCL	(1)	2.3	Approximate Gamma 95% UCL	(1)
Vanadium	mg/kg	16	19	23	J	mg/kg	19	Student-t	(1)	19	Student-t	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

(1) ProUCL
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for RME EPC and average used for CTE.

Table C-4

TABLE 3.4

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Medium: Groundwater (Monitoring Wells)
Exposure Medium: Indoor Air
Exposure Point: Future on-site Buildings

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	,Medium EPC Rationale
T[illegible]loroethene	ug/L	0.96	3.0	6	J	ug/L	3.0	95% Chebyshev(Mean, Std) UCL	(1)	3.0	95% Chebyshev(Mean, Std) UCL	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
The above data were used to evaluate the indoor air pathway using EPA's subsurface Vapor Intrusion guidance (EPA 2002).
(1) ProUCL

Table C-5

TABLE 3.5A

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT RI

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Shallow Groundwater in Testpits

Chemical of [illegible]otential [illegible]oncern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,1-[illegible]yl	ug/L	8.9	24	33	J	ug/L	24	95% Chebyshev(Mean, Std) UCL	(1)	24	95% Chebyshev(Mean, Std) UCL	(1)
2,4-[illegible]ylphenol	ug/L	30	223	160		ug/L	160	Max	(2)	30	Average	(2)
4-M[illegible]enol	ug/L	25	N/R	160		ug/L	160	Max	(3)	25	Average	(3)
2-M[illegible]phthalene	ug/L	81	778	570		ug/L	570	Max	(2)	81	Average	(2)
Ace[illegible]ene	ug/L	17	N/R	73		ug/L	73	Max	(3)	17	Average	(3)
Ace[illegible]ylene	ug/L	6.5	N/R	1.4		ug/L	1.4	Max	(3)	1.4	Max	(3)
Ben[illegible]thracene	ug/L	8.3	72	53	J	ug/L	53	Max	(2)	8.3	Average	(2)
Ben[illegible]rene	ug/L	4.5	33	24	J	ug/L	24	Max	(2)	4.5	Average	(2)
Ben[illegible]oranthene	ug/L	6.8	51	43	J	ug/L	43	Max	(2)	6.8	Average	(2)
Benzo(k)fluoranthene	ug/L	6.0	38	37	J	ug/L	37	Max	(2)	6.0	Average	(2)
Carbazole	ug/L	25	181	130		ug/L	130	Max	(2)	25	Average	(2)
Chrysene	ug/L	9	82	61	J	ug/L	61	Max	(2)	9	Average	(2)
Dibenzofuran	ug/L	6.6	N/R	2.5	J	ug/L	2.5	Max	(3)	2.5	Max	(3)
Dibenzo(a,h)anthracene	ug/L	15	79	44	>1 max samples	ug/L	44	Max	(2)	15	Average	(2)
Fluoranthene	ug/L	43	399	290		ug/L	290	Max	(2)	43	Average	(2)
Fluorene	ug/L	17	642	78	J	ug/L	78	Max	(3)	17	Average	(3)
Indeno(1,2,3-cd)pyrene	ug/L	3.1	18	19	J	ug/L	18	99% Chebyshev(MVUE) UCL	(1)	18	99% Chebyshev(MVUE) UCL	(1)
Naphthalene	ug/L	54	N/R	310		ug/L	310	Max	(3)	54	Average	(3)
Pentachlorophenol	ug/L	23.1	72	25		ug/L	25	Max	(2)	23.1	Average	(2)
Phenanthrene	ug/L	53	3458	320		ug/L	320	Max	(2)	53	Average	(2)
Pyrene	ug/L	28	276	190		ug/L	190	Max	(2)	28	Average	(2)
Benzene	ug/L	0.56	0.69	1.0		ug/L	0.69	Modified-t UCL	(4)	0.69	Modified-t UCL	(4)
Aroclor, Total	ug/L	1.4	5.5	8		ug/L	5.5	95% Chebyshev(Mean, Std) UCL	(1)	5.5	95% Chebyshev(Mean, Std) UCL	(1)
DDD	ug/L	0.060	0.081	0.13		ug/L	0.081	Modified-t UCL	(4)	0.081	Modified-t UCL	(4)
DDE	ug/L	0.13	0.36	0.43		ug/L	0.36	95% Chebyshev(Mean, Std) UCL	(1)	0.36	95% Chebyshev(Mean, Std) UCL	(1)
Gamma-BHC	ug/L	0.077	0.59	0.44	J	ug/L	0.59	Max	(2)	0.077	Average	(2)
Heptachlor epoxide	ug/L	0.041	0.11	0.14	J	ug/L	0.11	95% Chebyshev(Mean, Std) UCL	(1)	0.11	95% Chebyshev(Mean, Std) UCL	(1)
Arsenic	ug/L	16	25	45	J	ug/L	25	Student-t	(1)	25	Student-t	(1)
Barium	ug/L	231	389	627	J	ug/L	389	Student-t	(2)	389	Student-t	(2)
Cadmium	ug/L	34	199	126		ug/L	126	Max	(2)	34	Average	(2)
Lead	ug/L	219	728	1000		ug/L	728	Approximate Gamma 95% UCL	(1)	728	Approximate Gamma 95% UCL	(1)
Manganese	ug/L	751	2256	2740		ug/L	2256	Approximate Gamma 95% UCL	(1)	2256	Approximate Gamma 95% UCL	(1)
Nickel	ug/L	82	115	146		ug/L	115	Student-t	(1)	115	Student-t	(1)
Vanadium	ug/L	52	85	126		ug/L	85	Student-t	(1)	85	Student-t	(1)
Zinc	ug/L	417	683	1160		ug/L	683	Student-t	(1)	683	Student-t	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
N/R - Bootstrap statistics can not be calculated because there are less than five unique samples.
(1) ProUCL
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for RME EPC and average used for CTE.
(3) 95% UCL could not be calculated, therefore max used for RME EPC and lower of maximum or average used for CTE EPC.
(4) ProUCL recommended either the student -t or the Modified-t-UCL, the greater of the two was selected.

Table C-6

TABLE 3.5B

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Medium: Groundwater (from testpits)
Exposure Medium: Air
Exposure Point: Excavation Trenches

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
phenyl	ug/L	8.9	24	33	J	mg/m^3	0.26	modeled from 95% Chebyshev(Mean, Std) UCL	(1)	0.26	modeled from 95% Chebyshev(Mean, Std) UCL	(1)
imethylphenol	ug/L	30	223	160		mg/m^3	0.082	modeled from Max	(2)	0.015	modeled from Average	(2)
hylphenol	ug/L	25	N/R	160		mg/m^3	0.034	modeled from Max	(3)	0.0055	modeled from Average	(3)
hylnaphthalene	ug/L	81	778	570		mg/m^3	6.9	modeled from Max	(2)	0.98	modeled from Average	(2)
aphthene	ug/L	17	N/R	73		mg/m^3	0.70	modeled from Max	(3)	0.16	modeled from Average	(3)
aphthylene	ug/L	6.5	N/R	1.4		mg/m^3	0.012	modeled from Max	(3)	0.012	modeled from Max	(3)
(a)anthracene	ug/L	8.3	72	53	J	mg/m^3	0.036	modeled from Max	(2)	0.0056	modeled from Average	(2)
(a)pyrene	ug/L	4.5	33	24	J	mg/m^3	0.0055	modeled from Max	(2)	0.0010	modeled from Average	(2)
(b)fluoranthene	ug/L	6.8	51	43	J	mg/m^3	0.30	modeled from Max	(2)	0.047	modeled from Average	(2)
(k)fluoranthene	ug/L	6.0	38	37	J	mg/m^3	0.0063	modeled from Max	(2)	0.0010	modeled from Average	(2)
Carbazole	ug/L	25	181	130		mg/m^3	0.00048	modeled from Max	(2)	0.000092	modeled from Average	(2)
Chrysene	ug/L	9	82	61	J	mg/m^3	0.42	modeled from Max	(2)	0.064	modeled from Average	(2)
Dibenzofuran	ug/L	6.6	N/R	2.5	J	mg/m^3	0.0060	modeled from Max	(3)	0.0060	modeled from Max	(3)
Dibenzo(a,h)anthracene	ug/L	15	79	44	>1 max samples	mg/m^3	0.00013	modeled from Max	(2)	0.000043	modeled from Average	(2)
Fluoranthene	ug/L	43	399	290		mg/m^3	0.79	modeled from Max	(2)	0.12	modeled from Average	(2)
Fluorene	ug/L	17	642	78	J	mg/m^3	0.53	modeled from Max	(3)	0.11	modeled from Average	(3)
Indeno(1,2,3-cd)pyrene	ug/L	3.1	18	19	J	mg/m^3	0.0056	modeled from 99% Chebyshev(MVUE) UCL	(1)	0.0056	modeled from 99% Chebyshev(MVUE) UCL	(1)
Naphthalene	ug/L	54	N/R	310		mg/m^3	3.9	modeled from Max	(3)	0.68	modeled from Average	(3)
Pentachlorophenol	ug/L	23.1	72	25		mg/m^3	0.00012	modeled from Max	(2)	0.00011	modeled from Average	(2)
Phenanthrene	ug/L	53	3458	320		mg/m^3	1.2	modeled from Max	(2)	0.20	modeled from Average	(2)
Pyrene	ug/L	28	276	190		mg/m^3	0.38	modeled from Max	(2)	0.056	modeled from Average	(2)
Benzene	ug/L	0.56	0.69	1.0		mg/m^3	0.012	modeled from Modified-t UCL	(4)	0.012	modeled from Modified-t UCL	(4)
Aroclor, Total	ug/L	1.4	5.5	8		mg/m^3	0.045	modeled from 95% Chebyshev(Mean, Std) UCL	(1)	0.045	modeled from 95% Chebyshev(Mean, Std) UCL	(1)
DDD	ug/L	0.060	0.081	0.13		mg/m^3	0.000057	modeled from Modified-t UCL	(4)	0.000057	modeled from Modified-t UCL	(4)
DDE	ug/L	0.13	0.36	0.43		mg/m^3	0.0010	modeled from 95% Chebyshev(Mean, Std) UCL	(1)	0.0010	modeled from 95% Chebyshev(Mean, Std) UCL	(1)
Gamma-BHC	ug/L	0.077	0.59	0.44	J	mg/m^3	0.00094	modeled from Max	(2)	0.00016	modeled from Average	(2)
Heptachlor epoxide	ug/L	0.041	0.11	0.14	J	mg/m^3	0.00016	modeled from 95% Chebyshev(Mean, Std) UCL	(1)	0.00016	modeled from 95% Chebyshev(Mean, Std) UCL	(1)
Arsenic	ug/L	16	25	45	J	mg/m^3	NV	NA	NA	NV	NA	NA
Barium	ug/L	231	389	627	J	mg/m^3	NV	NA	NA	NV	NA	NA
Cadmium	ug/L	34	199	126		mg/m^3	NV	NA	NA	NV	NA	NA
Lead	ug/L	219	728	1000		mg/m^3	NV	NA	NA	NV	NA	NA
Manganese	ug/L	751	2256	2740		mg/m^3	NV	NA	NA	NV	NA	NA
Nickel	ug/L	82	115	146		mg/m^3	NV	NA	NA	NV	NA	NA
Vanadium	ug/L	52	85	126		mg/m^3	NV	NA	NA	NV	NA	NA
Zinc	ug/L	417	683	1160		mg/m^3	NV	NA	NA	NV	NA	NA

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

Arithmetic Mean, 95%UCL, and Maximum Detected Concentration refer to groundwater testpit data: EPC Values refer to trench air concentration values estimated from groundwater data through the Virginia Department of Environmental Quality (VDEQ, 2004) trench air model. The EPC statistic provides the groundwater statistic selected as the input to the VDEQ trench air model.

N/R - Bootstrap statistics can not be calculated because there are less than five unique samples.

(1) ProUCL

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for RME EPC and average used for CTE.

(3) 95% UCL could not be calculated, therefore max used for RME EPC and lower of maximum or average used for CTE EPC.

(4) ProUCL recommended either the student -t or the Modified-t-UCL, the greater of the two was selected.

NV - Non-Volatile

NA - Not Applicable

TABLE 3.6

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Clams
Exposure Medium: Clams
Exposure Point: Clams

Table C-7

[illegible]mical [illegible]f [illegible]ntial [illegible]cern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aroc[illegible]otal	ug/kg	58	76	170		ug/kg	76	Modified-t UCL	(3)	76	Modified-t UCL	(3)
Beta[illegible]	ug/kg	2.8	3.4	6.6		ug/kg	3.4	Modified-t UCL	(3)	3.4	Modified-t UCL	(3)
Gam[illegible]HC	ug/kg	2.5	2.5	2.5	J	ug/kg	2.5	Max	(2)	2.5	Average	(2)
Arsenic	mg/kg	2.2	2.7	4.2	J	mg/kg	2.7	Student-t	(1)	2.7	Student-t	(1)
Cadmium	mg/kg	0.14	0.26	0.73	J	mg/kg	0.26	Approximate Gamma 95% UCL	(1)	0.26	Approximate Gamma 95% UCL	(1)
Chromium	mg/kg	0.89	1.9	6.1	J	mg/kg	1.9	95% Chebyshev(MVUE) UCL	(1)	1.9	95% Chebyshev(MVUE) UCL	(1)
Manganese	mg/kg	7.7	15	39	J	mg/kg	15	Approximate Gamma 95% UCL	(1)	15	Approximate Gamma 95% UCL	(1)
Thallium	mg/kg	0.046	0.068	0.18	J	mg/kg	0.068	Modified-t UCL	(3)	0.068	Modified-t UCL	(3)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

(1) ProUCL
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for RME EPC and average used for CTE.
(3) ProUCL recommended either the student -t or the Modified-t-UCL, the greater of the two was selected.

Table C-8

TABLE 3.7

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Mussels
Exposure Medium: Mussels
Exposure Point: Mussels

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Be[illegible]anthracene	ug/kg	17	47	66		ug/kg	47	95% Chebyshev(Mean, Std) UCL	(1)	47	95% Chebyshev(Mean, Std) UCL	(1)
Be[illegible]pyrene	ug/kg	13	19	33		ug/kg	19	Modified-t UCL	(3)	19	Modified-t UCL	(3)
Be[illegible]luoranthene	ug/kg	14	32	43		ug/kg	32	95% Chebyshev(Mean, Std) UCL	(1)	32	95% Chebyshev(Mean, Std) UCL	(1)
Ch[illegible]	ug/kg	17	47	66		ug/kg	47	95% Chebyshev(Mean, Std) UCL	(1)	47	95% Chebyshev(Mean, Std) UCL	(1)
Aroclor, Total	ug/kg	118	328	440		ug/kg	328	95% Chebyshev(Mean, Std) UCL	(1)	328	95% Chebyshev(Mean, Std) UCL	(1)
Arsenic	mg/kg	1.9	2.2	2.6	J	mg/kg	2.2	Student-t	(1)	2.2	Student-t	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

(1) ProUCL
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for RME EPC and average used for CTE.
(3) ProUCL recommended either the student -t or the Modified-t-UCL, the greater of the two was selected.

Table C-9

TABLE 4.1D

VALUES USED FOR DAILY INTAKE CALCULATIONS - RME AND CTE RECREATIONAL VISITOR CHILD CONTACT WITH SEDIMENT
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Intertidal Sediment
Receptor Population: Recreational Visitor
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	See EPC	(a)	See EPC	(a)	Intake (mg/kg-day) =
	IR-S	Ingestion Rate of Sediment	mg/day	200	EPA, 1997	100	EPA, 1997	CS x IR-S x FI x OABS x EF x ED x CF1/(BW x AT)
	FI	Fraction Ingested From Contaminated Source	--	1	(b)	1	(b)	
	OABS	Oral Absorption Factor	--	Chemical-Specific	(d)	Chemical-Specific	(d)	
	EF	Exposure Frequency	days/year	48	(b)	24	(b)	
	ED	Exposure Duration	years	6	Age 1 through 6	2	Age 3 through 4	
	CF1	Conversion Factor 1	kg/mg	1E-06	--	1E-06	--	
	BW	Body Weight	kg	16.6	EPA, 1997	16.6	EPA, 1997	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	730	EPA, 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	See EPC	(a)	See EPC	(a)	Dermal Absorbed Dose (mg/kg-day) =
	SA	Surface Area	cm2	2800	(c)	2800	(c)	CS x SA x SSAF x DABS x EV x EF x ED x CF1/(BW x AT)
	SSAF	Sediment-to-Skin Adherence Factor	mg/cm2	0.2	EPA, 2004	0.04	EPA, 2004	
	DABS	Dermal Absorption Factor (Solid)	--	Chemical-Specific	(d)	Chemical-Specific	(d)	
	EV	Event Frequency	events/day	1	(b)	1	(b)	
	EF	Exposure Frequency	days/year	48	(b)	24	(b)	
	ED	Exposure Duration	years	6	Age 1 through 6	2	Age 3 through 4	
	BW	Body Weight	kg	16.6	EPA, 1997	16.6	EPA, 1997	
	CF1	Conversion Factor 1	kg/mg	1E-06	--	1E-06	--	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	730	EPA, 1989	

Notes/Sources:
NA - Not Applicable

(a). EPC = Calculated Exposure Point Concentration. For datasets with greater than 10 samples: EPCs represent the 95 UCL of the arithmetic mean, unless the 95 percent UCL is greater than the maximum detected concentration. If the 95 percent UCL is greater than the maximum, the maximum is selected as the EPC for the RME case and the arithmetic mean is selected as the EPC for the CTE case. For datasets with 10 or less samples: the maximum detected and arithmetic mean concentration are selected as the EPCs for the RME and CTE cases, respectively.
(b). Professional Judgment.
(c). Surface Area represented by hands, head, feet, forearms, and lower legs of child (age 1-6).
(d). Various sources as provided by EPA Region I

EPA, 1985. Development of Statistical Distributions of Ranges of Standard Factors Used in Exposure Assessments. EPA 600/8-85/010. Office of Research and Development.
EPA, 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.
EPA, 1994. EPA Region I, Risk Updates. August 1994, Volume II.
EPA, 1997. Exposure Factors Handbook. Volume I, Aug. 1997. EPA/600/P-25/002FA.
EPA, 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E). Supplemental Guidance for Dermal Risk Assessment.

Table C-10

TABLE 4.5C

VALUES USED FOR DAILY INTAKE CALCULATIONS - RME AND CTE CONSTRUCTION WORKER CONTACT WITH GROUNDWATER
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Shallow Groundwater in Testpits
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Groundwater	mg/L	See EPC	(a)	See EPC	(a)	Intake (mg/kg-day) =
	IR-GW	Ingestion Rate of Groundwater	ml/day	50	EPA, 1997	25	EPA, 1997	CW x IR-GW x EF x ED x AAFoxCF/(BW x AT)
	EF	Exposure Frequency	days/year	130	(b)	52	(b)	
	ED	Exposure Duration	years	1	(b)	1	(b)	
	AAFo	Oral-water Absorption Adjustment Factor	--	Chemical-Specific	(d)	Chemical-Specific	(d)	
	BW	Body Weight	kg	70	EPA, 1997	70	EPA, 1997	
	CF	Conversion Factor	L/ml	1.00E-03	--	1.00E-03	--	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	
Dermal	CW	Chemical Concentration in Groundwater	mg/L	See EPC	(a)	See EPC	(a)	Dermal Absorbed Dose (mg/kg-day) =
	DA_{event}	Absorbed Dose per Event	mg/cm2-event	calculated		calculated		DAevent x SA x EV x EF x ED /(BW x AT)
	SA	Surface Area	cm2	3300	(c)	3300	(c)	
	Kp	Dermal Permeability Coefficients	cm/hr	Chemical-Specific	EPA, 2004	Chemical-Specific	EPA, 2004	for inorganics:
	ET	EventTime	hr	8	(d)	8	(d)	DAevent = CW x Kp x ET x CF
	EV	Event Frequency	events/day	1	(b)	1	(b)	for organics; the equation selected for DA event is dependent
	EF	Exposure Frequency	days/year	130	(b)	52	(b)	on t event. See text for the equations.
	ED	Exposure Duration	years	1	(b)	1	(b)	
	BW	Body Weight	kg	70	EPA, 1997	70	EPA, 1997	
	CF	Conversion Factor	L/cm^3	1.00E-03	--	1.00E-03	--	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

Notes/Sources:
NA - Not Applicable
(a). EPC = Calculated Exposure Point Concentration. For datasets with greater than 10 samples: EPCs represent the 95 UCL of the arithmetic mean, unless the 95 percent UCL is greater than the maximum detected concentration. If the 95 percent UCL is greater than the maximum, the maximum is selected as the EPC for the RME case and the arithmetic mean is selected as the EPC for the CTE case. For datasets with 10 or less samples: the maximum detected and arithmetic mean concentration are selected as the EPCs for the RME and CTE cases, respectively.
(b). Professional Judgment.
(c). Surface Area represented by hands, head, and forearms.
(d). Various sources as provided by EPA Region I

EPA, 1985. Development of Statistical Distributions of Ranges of Standard Factors Used in Exposure Assessments. EPA 600/8-85/010. Office of Research and Development.
EPA, 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.
EPA, 1994. EPA Region I, Risk Updates. August 1994, Volume II.
EPA, 1997. Exposure Factors Handbook. Volume I, Aug. 1997, EPA/600/P-25/002FA.
EPA, 2004: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. September 2004.

Table C-11

TABLE 4.5D

VALUES USED FOR DAILY INTAKE CALCULATIONS - RME AND CTE CONSTRUCTION WORKER CONTACT WITH VAPORS FROM GROUNDWATER
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Medium: Groundwater (from Testpits)
Exposure Medium: Air
Exposure Point: Excavation Trenches
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Inhalation	C	Modeled Chemical Concentration in Air	mg/m3	See EPC	(a)	See EPC	(a)	Intake (mg/kg-day) =
	IN	Inhalation Rate	m3/hr	1.6	EPA, 1997	0.6	EPA, 1997	(C x IN x AAFi x ET x EF x ED)/(BW x AT)
	AAFi	Inhalation Absorption factor	--	1	(b)	1	(b)	
	ET	Exposure Time	hr/day	8	(b)	8	(b)	
	EF	Exposure Frequency	days/year	130	(b)	52	(b)	
	ED	Exposure Duration	years	1	(b)	1	(b)	
	BW	Body Weight	kg	70	EPA, 1997	70	EPA, 1997	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

Notes/Sources:
NA - Not Applicable
(a). EPC = Modeled Exposure Point Concentration based on maximum shallow groundwater concentration.
(b). Professional Judgment. Exposure based on time at site.
EPA, 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.
EPA, 1997. Exposure Factors Handbook. Volume I, Aug. 1997, EPA/600/P-25/002FA.
EPA, 2001: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, August 2001, calculation for construction worker PEF provided in Appendix E.

Table C-12

TABLE 4.6A

VALUES USED FOR DAILY INTAKE CALCULATIONS - RME AND CTE ADULT FISHERMEN CONTACT WITH CLAMS*
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Clams*
Exposure Medium: Clams*
Exposure Point: Clams*
Receptor Population: Fishermen
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Chemical Concentration in Clams	mg/kg	See EPC	(a)	See EPC	(a)	Intake (mg/kg-day) =
	IR	Ingestion Rate of Clams	mg/day	71200	(b)	8800	(c)	C x IR x FI x EF x ED x CF1/(BW x AT)
	FI	Fraction Ingested From Contaminated Source	--	1	(d)	1	(d)	
	EF	Exposure Frequency	days/year	350	EPA, 1997	350	EPA, 1997	
	ED	Exposure Duration	years	24	EPA, 1997	9	EPA, 1997	
	CF1	Conversion Factor 1	kg/mg	1E-06	--	1E-06	--	
	BW	Body Weight	kg	70	EPA, 1997	70	EPA, 1997	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	3285	EPA, 1989	

Notes/Sources:
*These exposure parameters are also valid for Current/Future/Mussels/Mussels/Mussels at Site 17 - Newport, Rhode Island.

(a). EPC = Calculated Exposure Point Concentration. For datasets with greater than 10 samples: EPCs represent the 95 UCL of the arithmetic mean, unless the 95 percent UCL is greater than the maximum detected concentration. If the 95 percent UCL is greater than the maximum, the maximum is selected as the EPC for the RME case and the arithmetic mean is selected as the EPC for the CTE case. For datasets with 10 or less samples: the maximum detected and arithmetic mean concentration are selected as the EPCs for the RME and CTE cases, respectively.

(b). 150,000 mg seafood per serving * 180 servings per year * 1 year/350 days = 71,200 mg/day. Serving size Source: EPA, 1997.Servings per year: Professional judgment based on one-half subsistence level reported in EPA's "Guidance for Assessing Chemical Contaminant Data for Use in Fish advisories" EPA 823-B-00-007, November, 2000.

(c). 150,000 mg seafood per serving * 20 servings per year * 1 year/350 days = 8,800 mg/day. Serving size Source: EPA, 1997.Servings per year: Professional judgment based on one-half recreational level reported in EPA's "Guidance for Assessing Chemical Contaminant Data for Use in Fish advisories" EPA 823-B-00-007, November, 2000.

(d). Professional Judgment. Fraction ingested is 100% from source.

EPA, 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.
EPA, 1997. Exposure Factors Handbook. Volume I, Aug. 1997, EPA/600/P-25/002FA.

Table C-13

TABLE 4.6B

VALUES USED FOR DAILY INTAKE CALCULATIONS - RME AND CTE CHILD FISHERMEN CONTACT WITH CLAMS*
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Medium: Clams*
Exposure Medium: Clams*
Exposure Point: Clams*
Receptor Population: Fishermen
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Chemical Concentration in Clams	mg/kg	See EPC	(a)	See EPC	(a)	Intake (mg/kg-day) =
	IR	Ingestion Rate of Clams	mg/day	24,700	(b)	2,743	(c)	C x IR x FI x EF x ED x CF1/(BW x AT)
	FI	Fraction Ingested From Contaminated Source	--	1	(d)	1	(d)	
	EF	Exposure Frequency	days/year	350	EPA, 1997	350	EPA, 1997	
	ED	Exposure Duration	years	6	Age 1 through 6	2	Age 3 through 4	
	CF1	Conversion Factor 1	kg/mg	1E-06	--	1E-06	--	
	BW	Body Weight	kg	16.6	EPA, 1997	16.6	EPA, 1997	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	730	EPA, 1989	

Notes/Sources:

*These exposure parameters are also valid for Current/Future/Mussels/Mussels/Mussels at Site 17 - Newport, Rhode Island.

(a). EPC = Calculated Exposure Point Concentration. For datasets with greater than 10 samples: EPCs represent the 95 UCL of the arithmetic mean, unless the 95 percent UCL is greater than the maximum detected concentration. If the 95 percent UCL is greater than the maximum, the maximum is selected as the EPC for the RME case and the arithmetic mean is selected as the EPC for the CTE case. For datasets with 10 or less samples: the maximum detected and arithmetic mean concentration are selected as the EPCs for the RME and CTE cases, respectively.

(b). 48,000 mg seafood per serving * 180 servings per year * 1 year/350 days = 24,700 mg/day. Serving Size Source: 32% of adult serving size from EPA, 1997. Servings per year: Professional judgment based on one-half subsistence level reported in EPA's "Guidance for Assessing Chemical Contaminant Data for Use in Fish advisories" EPA 823-B-00-007, November, 2000.

(c). 48,000 mg seafood per serving * 20 servings per year * 1 year/350 days = 2,743 mg/day. Serving Size Source: 32% of adult serving size from EPA, 1997. Servings per year: Professional judgment based on one-half recreational level reported in EPA's "Guidance for Assessing Chemical Contaminant Data for Use in Fish advisories" EPA 823-B-00-007, November, 2000.

(d). Professional Judgment. Fraction ingested is 100% from source.

EPA, 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.
EPA, 1997. Exposure Factors Handbook. Volume I, Aug. 1997, EPA/600/P-25/002FA.

Table C-14

TABLE 5.1

NON-CANCER CHRONIC TOXICITY DATA -- ORAL/DERMAL
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value (1)	Oral RfD Units	GI Absorption in Toxicity Study	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YY)	Dermal Absorption Factor for Soils (DABS)	Oral Absorption Factor for Soils (OABS)
1,1-Biphenyl	Chronic	5.E-02	mg/kg-day	1.0E+00	5.00E-02	mg/kg-day	Kidney	1000	IRIS	1/10/2006	0.1	1.0
2,4-Dimethylphenol	Chronic	2.E-02	mg/kg-day	1.0E+00	2.00E-02	mg/kg-day	Blood	3000	IRIS	1/10/2006	0.1	1.0
4-Methylphenol	Chronic	5.E-03	mg/kg-day	1.0E+00	5.00E-03	mg/kg-day	NA		HEAST	1997	0.1	1.0
2-Methylnaphthalene	Chronic	4.E-03	mg/kg-day	1.0E+00	4.00E-03	mg/kg-day	Lungs	1000	IRIS	1/10/2006	0.13	1.0
Acenaphthene	Chronic	6.E-02	mg/kg-day	1.0E+00	6.00E-02	mg/kg-day	Liver	3000	IRIS	1/10/2006	0.13	1.0
Acenaphthylene	Chronic	2.E-02	mg/kg-day	1.0E+00	2.00E-02	mg/kg-day	NA	NA	(3)		0.13	1.0
Anthracene	Chronic	3.E-01	mg/kg-day	1.0E+00	3.00E-01	mg/kg-day	none	3000	IRIS	1/10/2006	0.13	1.0
Benzo(a)anthracene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Benzo(a)pyrene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Benzo(b)fluoranthene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Benzo(g,h,i)perylene	Chronic	4.E-02	mg/kg-day	1.0E+00	4.00E-02	mg/kg-day	Liver, kidney, blood	3000	(4)		0.13	1.0
Benzo(k)fluoranthene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Carbazole	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.1	1.0
Chrysene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Dibenzo(a,h)anthracene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Dibenzofuran	Chronic	2.E-03	mg/kg-day	1.0E+00	2.00E-03	mg/kg-day	NA	NA	NCEA	1/10/2006	0.1	1.0
Fluoranthene	Chronic	4.E-02	mg/kg-day	1.0E+00	4.00E-02	mg/kg-day	Liver, kidney, blood	3000	IRIS	1/10/2006	0.13	1.0
Fluorene	Chronic	4.E-02	mg/kg-day	1.0E+00	4.00E-02	mg/kg-day	NA	3000	IRIS	1/10/2006	0.13	1.0
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.13	1.0
Naphthalene	Chronic	2.E-02	mg/kg-day	1.0E+00	2.00E-02	mg/kg-day	Body Weight	3000	IRIS	1/10/2006	0.13	1.0
Pentachlorophenol	Chronic	3.E-02	mg/kg-day	1.0E+00	3.00E-02	mg/kg-day	Liver, kidney	100	IRIS	1/10/2006	0.25	1.0
Phenanthrene	Chronic	2.E-02	mg/kg-day	1.0E+00	2.00E-02	mg/kg-day	NA	NA	(3)		0.13	1.0
Pyrene	Chronic	3.E-02	mg/kg-day	1.0E+00	3.00E-02	mg/kg-day	Kidney	3000	IRIS	1/10/2006	0.13	1.0
Benzene	Chronic	4.E-03	mg/kg-day	1.0E+00	4.00E-03	mg/kg-day	Blood	300	IRIS	1/10/2006	NA	1.0
Trichloroethene	Chronic	6.E-03	mg/kg-day	1.0E+00	6.00E-03	mg/kg-day	NA	NA	RegIX	2000	NA	1.0
Aroclor, Total	Chronic	2.E-05	mg/kg-day	1.0E+00	2.00E-05	mg/kg-day	Skin/Eyes/Immune	300	IRIS	1/10/2006	0.14	1.0
DDD	Chronic	2.E-03	mg/kg-day	1.0E+00	2.00E-03	mg/kg-day	NA	NA	NCEA	1/10/2006	0.03	1.0
DDE	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.03	1.0
Beta-BHC	NA	NA	NA	1.0E+00	NA	NA	NA	NA	NA	NA	0.04	1.0
Gamma-BHC	Chronic	3.E-04	mg/kg-day	1.0E+00	3.00E-04	mg/kg-day	Liver, kidney	1000	IRIS	1/10/2006	0.04	1.0
Heptachlor epoxide	Chronic	1.E-05	mg/kg-day	1.0E+00	1.30E-05	mg/kg-day	Liver	1000	IRIS	1/10/2006	NA	1.0
Antimony	Chronic	4.E-04	mg/kg-day	0.15	6.00E-05	mg/kg-day	Blood	1000	IRIS	1/10/2006	NA	1.0
Arsenic	Chronic	3.00E-04	mg/kg-day	1.0E+00	3.00E-04	mg/kg-day	Skin, blood	3	IRIS	1/10/2006	0.03	1.0
Barium	Chronic	2.E-01	mg/kg-day	0.07	1.40E-02	mg/kg-day	Kidney	300	IRIS	1/10/2006	NA	1.0
Beryllium	Chronic	2.E-03	mg/kg-day	0.007	1.40E-05	mg/kg-day	GI	300	IRIS	1/10/2006	NA	1.0
Cadmium	Chronic	1.E-03	mg/kg-day	0.025	2.50E-05	mg/kg-day	Kidney	10	IRIS	1/10/2006	0.001	1.0
Chromium VI	Chronic	3.E-03	mg/kg-day	0.025	7.50E-05	mg/kg-day	None	900	IRIS	1/10/2006	NA	1.0
Lead	NA	NA	NA	N/A	NA	NA	NA	NA	NA	NA	NA	1.0
Manganese	Chronic	1.E-01	mg/kg-day	0.04	5.60E-03	mg/kg-day	CNS	1	IRIS	1/10/2006	NA	1.0
Nickel	Chronic	2.E-02	mg/kg-day	0.04	8.00E-04	mg/kg-day	Body Weight	300	IRIS	1/10/2006	NA	1.0
Thallium	Chronic	8.E-05	mg/kg-day	1.0E+00	8.00E-05	mg/kg-day	Blood	3000	IRIS	1/10/2006	NA	1.0
Vanadium	Chronic	9.E-03	mg/kg-day	0.026	2.34E-04	mg/kg-day	Hair	100	IRIS	1/10/2006	NA	1.0
Zinc	Chronic	3.E-01	mg/kg-day	1.0E+00	3.00E-01	mg/kg-day	Blood	3	IRIS	1/10/2006	NA	1.0

N/A = Not Applicable

(1) To be used for oral pathway only. Based on administered dose.

(2) Adjusted RfD = oral RfD x GI absorption value in toxicity study upon which the RfD is based. To be used for dermal pathway only.

(3) Toxicity values for naphthalene also used for acenaphthylene and phenanthrene.

(4) Toxicity values for fluoranthene also used for benzo(g,h,i)perylene.

Table C-15

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Chronic	1.0E-04	mg/m^3	2.9E-05	mg/kg/day	respiratory system	300	IRIS	1/6/2006
1,1-Biphenyl	Chronic	NA	NA	5.0E-02	mg/kg/day	Kidney	1,000	RegIX	2004
2,4-Dimethylphenol	Chronic	NA	NA	2.0E-02	mg/kg/day	Blood	3,000	RegIX	2004
4-Methylphenol	Chronic	NA	NA	5.0E-03	mg/kg/day	NA	NA	RegIX	2004
2-Methylnaphthalene	Chronic	NA	NA	4.0E-03	mg/kg/day	Lungs	1,000	IRIS-oral RFD	1/6/2006
Acenaphthene	Chronic	NA	NA	6.0E-02	mg/kg/day	Liver	3,000	RegIX	2004
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	Chronic	NA	NA	2.0E-03	mg/kg/day	NA	NA	RegIX	2004
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	Chronic	NA	NA	4.0E-02	mg/kg/day	Kidney, liver, blood	NA	RegIX	2004
Fluorene	Chronic	NA	NA	4.0E-02	mg/kg/day	blood	NA	RegIX	2004
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	3.0E-03	mg/m^3	8.6E-04	mg/kg/day	Body Weight	3,000	IRIS	1/6/2006
Pentachlorophenol	Chronic	NA	NA	3.0E-02	mg/kg/day	Liver, kidney	100	RegIX	2004
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	Chronic	NA	NA	3.0E-02	mg/kg/day	Kidney	3,000	RegIX	2004
Benzene	Chronic	3E-02	mg/m^3	8.6E-03	mg/kg/day	Blood	300	IRIS	1/6/2006
Aroclor, Total	Chronic	NA	NA	2.0E-05	mg/kg/day	Skin/Eyes/Immune	NA	RegIX	2004
DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-BHC	Chronic	NA	NA	3.0E-04	mg/kg/day	Liver, kidney	1,000	RegIX	2004
Heptachlor epoxide	Chronic	NA	NA	1.3E-05	mg/kg/day	Liver	1,000	RegIX	2004

N/A = Not Applicable
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA=National Center for Exposure Assessment
RegIX=EPA Region IX PRGs 2004

(1) InhalationRfD= Inhalation RfC x 20 m3/day x 1/70kg
(2) For IRIS values, the date IRIS was searched.
For HEAST values, the date of HEAST.
For NCEA values, the date of the search.

Table C-16

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Chemical of Potential Concern	Oral Cancer Slope Factor (1)	GI Absorption in Toxicity Study	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence Narrative Descriptor	Source	Date (MM/DD/YY)	Dermal Absorption Factor for Soils (DABS)	Oral Absorption Factor for Soils (OABS)
1,1-Biphenyl	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.1	1.0
2,4-Dimethylphenol	NA	NA	NA	NA	(8)			0.1	1.0
4-Methylphenol	NA	NA	NA	NA	(5)	IRIS	1/10/2006	0.1	1.0
2-Methylnaphthalene	NA	NA	NA	NA	(6)			0.13	1.0
Acenaphthene	NA	NA	NA	NA	(8)			0.13	1.0
Acenaphthylene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Anthracene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Benzo(a)anthracene	7.3E-01	1.0E+00	7.3E-01	1/(mg/kg-day)	(4)	EPA-NCEA		0.13	1.0
Benzo(a)pyrene	7.3E+00	1.0E+00	7.3E+00	1/(mg/kg-day)	(4)	IRIS	1/10/2006	0.13	1.0
Benzo(b)fluoranthene	7.3E-01	1.0E+00	7.3E-01	1/(mg/kg-day)	(4)	EPA-NCEA		0.13	1.0
Benzo(g,h,i)perylene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Benzo(k)fluoranthene	7.3E-02	1.0E+00	7.3E-02	1/(mg/kg-day)	(4)	EPA-NCEA		0.13	1.0
Carbazole	2.0E-02	1.0E+00	2.0E-02	1/(mg/kg-day)	(8)			0.1	1.0
Chrysene	7.3E-03	1.0E+00	7.3E-03	1/(mg/kg-day)	(4)	EPA-NCEA		0.13	1.0
Dibenzo(a,h)anthracene	7.3E+00	1.0E+00	7.3E+00	1/(mg/kg-day)	(4)	EPA-NCEA		0.13	1.0
Dibenzofuran	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.1	1.0
Fluoranthene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Fluorene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Indeno(1,2,3-cd)pyrene	7.3E-01	1.0E+00	7.3E-01	1/(mg/kg-day)	(4)	EPA-NCEA		0.13	1.0
Naphthalene	NA	NA	NA	NA	(5)	IRIS	1/10/2006	0.13	1.0
Pentachlorophenol	1.2E-01	1.0E+00	1.2E-01	1/(mg/kg-day)	(4)	IRIS	1/10/2006	0.25	1.0
Phenanthrene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Pyrene	NA	NA	NA	NA	(6)	IRIS	1/10/2006	0.13	1.0
Benzene	5.5E-02	1.0E+00	5.5E-02	1/(mg/kg-day)	(3)	IRIS	1/10/2006	NA	1.0
Trichloroethene	1.1E-02	1.0E+00	1.1E-02	1/(mg/kg-day)	(8)	RegIX	2000	NA	1.0
Aroclor, Total	2.0E+00	1.0E+00	2.0E+00	1/(mg/kg-day)	(4)	IRIS	1/10/2006	0.14	1.0
DDD	2.4E-01	1.0E+00	2.4E-01	1/(mg/kg-day)	(4)	IRIS	1/10/2006	0.03	1.0
DDE	3.4E-01	1.0E+00	3.4E-01	1/(mg/kg-day)	(4)	IRIS	1/10/2006	0.03	1.0
Beta-BHC	1.8E+00	1.0E+00	1.8E+00	1/(mg/kg-day)	(5)	IRIS	1/10/2006	0.04	1.0
Gamma-BHC	NA	NA	NA	NA	(8)	IRIS	1/10/2006	0.04	1.0
Heptachlor epoxide	9.1E+00	1.0E+00	9.1E+00	1/(mg/kg-day)	(4)	IRIS	1/10/2006	NA	1.0
Antimony	NA	0.15	NA	NA	(8)			NA	1.0
Arsenic	1.5E+00	1.0E+00	1.5E+00	1/(mg/kg-day)	(3)	IRIS	1/10/2006	0.03	1.0
Barium	NA	0.07	NA	NA	(7)	IRIS	1/10/2006	NA	1.0
Beryllium	NA	0.007	NA	NA	(6)	IRIS	1/10/2006	NA	1.0
Cadmium	NA	0.025	NA	NA	(4)	IRIS	1/10/2006	0.001	1.0
Chromium VI	NA	0.025	NA	NA	(6)	IRIS	1/10/2006	NA	1.0
Lead	NA	N/A	NA	NA	(4)	IRIS	1/10/2006	NA	1.0
Manganese	NA	0.04	NA	NA	(6)	IRIS	1/10/2006	NA	1.0
Nickel	NA	0.04	NA	NA	(8)			NA	1.0
Thallium	NA	1.0E+00	NA	NA	(6)	IRIS	1/10/2006	NA	1.0
Vanadium	NA	0.026	NA	NA	(8)			NA	1.0
Zinc	NA	1.0E+00	NA	NA	(6)	IRIS	1/10/2006	NA	1.0

IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA=National Center for Environnmental Assessment
(1) To be used for oral pathway only. Based on administered dose.
(2) Adjusted slope factor (SF) = oral SF x Gi absorption value in toxicity study upon which the SF is based. To be used for dermal pathway only.

Weight of Evidence Narrative Descriptions:
(3) - Carcinogenic to Humans
(4) - Likely to be Carcinogenic to Humans
(5) - Suggestive of Carcinogenic Potential
(6) - Inadequate Information to Assess Carcinogenic Potential
(7) - Not Likely to be Carcinogenic to Humans
(8) - Not assessed under the IRIS program

Table C-17

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT RHODE ISLAND

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YYYY)
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	NA	6.3E+00	$(mg/kg\text{-}d)^{-1}$	(4)	IRIS	1/6/2006
Chromium VI	1.2E-02	$(ug/m^3)^{-1}$	NA	4.2E+01	$(mg/kg\text{-}d)^{-1}$	(3)	IRIS	1/6/2006
1,1-Biphenyl	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
2,4-Dimethylphenol	NA	NA	NA	NA	NA	(8)	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	(5)	IRIS	1/6/2006
2-Methylnaphthalene	NA	NA	NA	NA	NA	(6)	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	(8)	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
Benzo(a)anthracene	NA	NA	NA	7.3E-01	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Benzo(a)pyrene	NA	NA	NA	7.3E+00	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Benzo(b)fluoranthene	NA	NA	NA	7.3E-01	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Benzo(k)fluoranthene	NA	NA	NA	7.3E-02	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Carbazole	NA	NA	NA	2.0E-02	$(mg/kg\text{-}d)^{-1}$	(8)	RegIX	2004
Chrysene	NA	NA	NA	7.3E-03	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Dibenzofuran	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
Dibenzo(a,h)anthracene	NA	NA	NA	7.3E+00	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Fluoranthene	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
Fluorene	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
Indeno(1,2,3-cd)pyrene	NA	NA	NA	7.3E-01	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Naphthalene	NA	NA	NA	NA	NA	(5)	IRIS	1/6/2006
Pentachlorophenol	NA	NA	NA	1.2E-01	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Phenanthrene	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
Pyrene	NA	NA	NA	NA	NA	(6)	IRIS	1/6/2006
Benzene	7.8E-06	$(ug/m^3)^{-1}$	NA	2.7E-02	$(mg/kg\text{-}d)^{-1}$	(3)	IRIS	1/6/2006
Aroclor, Total	5.7E-04	$(ug/m^3)^{-1}$	NA	2.0E+00	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
DDD	NA	NA	NA	2.4E-01	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
DDE	NA	NA	NA	3.4E-01	$(mg/kg\text{-}d)^{-1}$	(4)	RegIX	2004
Gamma-BHC	NA	NA	NA	1.3E+00	$(mg/kg\text{-}d)^{-1}$	(8)	NA	NA
Heptachlor epoxide	2.6E-03	$(ug/m^3)^{-1}$	NA	9.1E+00	$(mg/kg\text{-}d)^{-1}$	(4)	IRIS	1/6/2006

IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA=National Center for Exposure Assessment
RegIX=EPA Region IX PRGs 2004

(1) InhalationCSF= Inhalation Unit risk x 70kg x 1/20 m3/day x 1000 ug/mg
(2) For IRIS values, the date IRIS was searched.
For HEAST values, the date of HEAST.
For NCEA values, the date of the search.

Weight of Evidence Narrative Descriptions:
(3) - Carcinogenic to Humans
(4) - Likely to be Carcinogenic to Humans
(5) - Suggestive of Carcinogenic Potential
(6) - Inadequate Information to Assess Carcinogenic Potential
(7) - Not Likely to be Carcinogenic to Humans
(8) - Not assessed under the IRIS program

TABLE C-18
PRELIMINARY REMEDIATION GOALS FOR SOIL
SITE 17 - FORMER BUILDING 32, GOULD ISLAND,
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Chemical of Potential Concern (COPC)	2005 Data - Representative Site Concentration [1]		2005 and 2010 Combined Data - Representative Site Concentration [2]		Risk-Based Candidate PRGs: 10^{-6} Cancer Risk Level [a]		Risk-Based Candidate PRGs: Non-Cancer Risk of 1 [a]		ARAR-Based Candidate PRGs: RIDEM Direct Exposure Criteria (DEC)		ARAR-Based Candidate PRGs: RIDEM Leachability Criteria	Background[b] (Surface/ All Soil)	Selected PRG[c]		Rationale
	Surface Soil (0 - 2 ft)	All Soil (0 - 10 ft)	Surface Soil (0 - 2 ft)	All Soil (0 - 10 ft)	Residential	Industrial	Residential	Industrial	Residential	Industrial			Residential	Industrial	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	as noted	mg/kg	mg/kg	mg/kg	
1,1-Biphenyl[3]	NA	NA	0.090	0.151	NC	NC	NC	NC	0.8	10000	--	--	--[e]	--[f]	Site concentration does not exceed any candidate PRG
Benzo(a)anthracene	1.44	1.62	1.985	1.064	NC	NA	NC	NA	0.9	7.8	--	--	0.9	7.8	RIDEM DEC
Benzo(a)pyrene	1.24	1.26	1.602	0.840	NC	NA	NC	NA	0.4	0.8	240 mg/kg	--	0.4	0.8	RIDEM DEC
Benzo(b)fluoranthene	1.83	1.70	1.626	1.072	NC	NA	NC	NA	0.9	7.8	--	--	0.9	7.8	RIDEM DEC
Benzo(g,h,i)perylene	0.68	0.53	0.759	0.27	NC	NA	NC	NA	0.8	10000	--	--	0.8	--[f]	RIDEM DEC
Benzo(k)fluoranthene	0.72	0.72	0.814	0.43	NC	NA	NC	NA	0.9	78	--	--	0.9	--[f]	RIDEM DEC
Chrysene	1.41	1.44	1.472	0.996	NC	NA	NC	NA	0.4	780	--	--	0.4	--[f]	RIDEM DEC
Dibenzo(a,h)anthracene	0.22	0.11	0.293	0.103	NC	NA	NC	NA	0.4	0.8	--	--	0.4	0.8	RIDEM DEC
Fluoranthene[3]	NA	NA	4.082	2.17	NC	NA	NC	NA	20	10000	--	--	--[e]	--[f]	Site concentration does not exceed any candidate PRG
Indeno(1,2,3-cd)pyrene	0.69	0.55	0.741	0.27	NC	NA	NC	NA	0.9	7.8	--	--	0.9	--[f]	RIDEM DEC
Naphthalene	NA	NA	0.230	0.13	NC	NA	NC	NA	54	10000	0.8 mg/kg	--	0.8	0.8	**Three locations (SB304, SB306 & TP08) exceeded LC**
Phenanthrene[3]	NA	NA	3.085	1.74	NC	NA	NC	NA	40	10000	--	--	--[e]	--[f]	Site concentration does not exceed any candidate PRG
Pyrene	NA	NA	4.010	2.17	NC	NA	NC	NA	13	10000	--	--	13	--[f]	RIDEM DEC
Trichloroethene	NA	0.06	0.003	0.0046	NC	--	NC	NA	13	520	0.2 mg/kg	--	--[e]	--[f]	Site concentration does not exceed any candidate PRG
Aroclor, Total	NA	0.086	0.27	0.196	NC	--	NC		10	10	--	--	1[h]	--[f]	EPA Residential Criterion
Antimony [3,g]	NA	0.60	1.59	1.01	NC	--	NC	--	10	820	0.05 mg/L SPLP	--	--[g]	--[g]	Site concentration does not exceed any candidate PRG
Arsenic	3.8	3.4	3.83	3.641	NC		NC		7	7	--	10.4/7.99	7.99	7.99	Lower of the surface/subsurface background levels
Beryllium ([3,g]	0.37	0.28	0.28	0.27	NC	--	NC	--	1.5	1.5	0.03 mg/L SPLP	0.534/0.474	--[g,e]	--[g,f]	Site concentration does not exceed background
Cadmium [g]	NA	1090	1358	418.5	NC	--	NC	--	39	1000	0.03 mg/L SPLP	0.134/0.103	39	1000	RIDEM DEC and potentially leachability at TP09-02
Chromium [3,g]	NA	42	49.39	20.07	NC	--	NC	--	390 [d]	10000	1.1 mg/L SPLP	13.01/12.21	--[g]	--[g]	Site concentration does not exceed any candidate PRG
Lead	NA	360	344.80	167.5	NC	--	NC	--	150	500	0.04 mg/L SPLP	19.6/16.95	150	500	RIDEM DEC and potentially leachability at TP09-02
Manganese	279	178	224.60	186.8	NC	--	NC	--	390	10000	--	189.7/250.3	390	--[f]	RIDEM DEC
Vanadium[3]	17	15	14.29	14	NC	--	NC	--	550	10000	--	19.3/17.12	--[e]	--[f]	Site concentration does not exceed any candidate PRG

(1) This representative site concentration is the 95% UCL calculated from the results of the Phase I RI for Site 17, Building 32, Gould Island (Tetra Tech, 2006).
(2) This representative site concentration is the 95% UCL calculated from the combined results from the Phase I RI and the Phase II RI and BERA for Site 17, Building 32, Gould Island (Tetra Tech, 2006 and 2011).
(3) These COPCs were detected at the site, but do not exceed RIDEM DEC. They are included for completeness in comparing detected results to RIDEM cleanup criteria.
(a) Risk-based PRGs are calculated for the risk-based COCs identified from the HHRA (Tetra Tech, 2006). See Appendix B.
(b) Background values are based on the Upper Predictive Limit (UPL) of the background sample data set for surface soils alone and for all soils (a combination of surface and subsurface soil).
(c) These selected PRGs are based on RIDEM Direct Exposure and Leachability Criteria.
(d) Standard shown for Cr(VI)
(e) A residential PRG was not selected because the maximum COC concentration does not exceed the residential standards.
(f) An industrial PRG was not selected because the maximum COC concentration does not exceed the industrial standards.
(g) Potential COC based on RIDEM leachability criteria. PRGs may be modified based on the leachability criteria if sampling during the Remedial Action shows that SPLP criteria are being exceeded by the identified metals in soil.
(h) The residential PRG for total aroclor (PCBs) was selected based on the EPA cleanup levels for high-occupancy areas, identified by EPA as a regulatory-based ARAR for this contaminant.
DEC - Direct Exposure Criteria
HI - Hazard Index
mg/kg - milligram per kilogram
PRG - Preliminary Remediation Goal
EPA - United States Environmental Protection Agency
RIDEM - Rhode Island Department of Environmental Management
SPLP - Synthetic Precipitation Leaching Procedure
NC - Not Calculated
NA - Not Applicable. Not considered a COPC in surface soil during the HHRA.

TABLE C-19
PRELIMINARY REMEDIATION GOALS FOR GROUNDWATER AND TEST PIT WATER
SITE 17 - FORMER BUILDING 32, GOULD ISLAND,
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Chemical of Potential Concern	Site Concentration, Test Pit Water[a] (µg/L)	Site Concentration Groundwater From Monitoring Wells [a] (µg/L)	Risk-Based Candidate PRGs		ARAR- Based Candidate PRGs		Selected PRG (µg/L)	Rationale[c]	Test Pit Location Exceeded [f]	Monitoring Well Location Exceeded
			Cancer Risk Level (10^{-6})	Noncancer Risk Level, (HI≥1)	EPA MCL (µg/L)	RIDEM GA Criteria[b] (µg/L)				
2-Methylnaphthalene	160	1.4	NA	350	--	--	350	Risk-based criteria (d)	None	None
Benzo(a)anthracene	53	0.3	380	NA	--	--	380	Risk-based criteria (d)	None	None
Benzo(a)pyrene	24	0.1	38	NA	0.2	0.2	0.2	Drinking Water Criteria	TP-02, 06, 08, 10b, 13 [f]	None
Benzo(b)fluoranthene	43	0.3	380	NA	--	--	380	Risk-based criteria (d)	None	None
Chrysene	61	0.3	37,700	NA	--	--	37,700	Risk-based criteria (d)	None	None
Dibenzo(a,h)anthracene	2.5	ND	38	NA	--	--	38	Risk-based criteria (d)	None	None
Fluoranthene	290	0.7	NA	157,200	--	--	157,200	Risk-based criteria (d)	None	None
Indeno(1,2,3-cd)pyrene	19	0.1	375	NA	--	--	375	Risk-based criteria (d)	None	None
Phenanthrene	320	0.4	NA	118,000			118,000	Risk-based criteria (d)	None	None
Benzene	1	3 J	NA	NA	5	5	5	Drinking Water Criteria	None	None
Carbazole	130	5 J	NA	NA	--	--	--	--	None	None
Dibenzofuran	44	2 J	NA	NA	--	--	--	--	None	None
Naphthalene	310	9.4	1.4	2	--	100	100	Drinking Water Criteria	TP-06, TP-08, TP-10B	None
Pentachlorophenol	25	7 J	690	19600	1	1	1	Drinking Water Criteria	TP-06 [f]	MW-306S
Tetrachloroethene	ND	6 J	NA	NA	5	5	5	Drinking Water Criteria	None	MW-300S
Trichloroethene	ND	1	NA	NA	5	5	5	Drinking Water Criteria	None	None
Total Aroclors	8	ND	140	NA	0.5	0.5	0.5	Drinking Water Criteria	TP-08 [f]	None
Arsenic	44.9	5.4	NA	NA	10	10	10	Drinking Water Criteria	TP-02, 06, 08, 10b, 12 [f]	None
Manganese	2740	4210 J	NA	NA	300 [e]	--	300	EPA Health Advisory	TP-02, 10B, 11B [f]	Numerous

(a) Maximum detected concentration in water as noted during the Remedial Investigation (Tetra Tech, 2006). Test pit water is separated from groundwater collected from monitoring wells (see text).
(b) RIDEM's Method 1 GA Groundwater Objectives from Section 8.03 of the the Rhode Island Remediation Regulations, DEM-DSR-01-93, as amended Nov. 2011.
(c) If available, the EPA MCL or RIDEM GA was selected as the PRG (groundwater was not included in the risk assessment).
(d) Risk-based criteria are developed for construction workers contact/incidental ingestion of water from test pits.
(e) EPA has requested that their Drinking Water Health Advisory (lifetime) guidance value be used for manganese.
(f) Drinking water criteria do not apply to water standing in test pits. Test pit water does not exceed the risk-based PRG for this constituent. See text.
PRG - Preliminary Remediation Goal
µg/L - microgram per liter
HI - Hazard Index
EPA - United States Environmental Protection Agency
MCL - Maximum Contaminant Level (Federal Drinking Water Standard)
RIDEM - Rhode Island Department of Environmental Management
NA - Risk-based PRG not calculated: risk from residential use of groundwater is assumed (see text Section 1.10), and this constituent did not contribute to risk to construction workers.
ND- not detected
J - value is approximate
-- criteria are not established
Shaded values are the selected PRGs.
Yellow shading indicates Site concentration exceeds PRG for corresponding medium, and COC is carried forward for remedial action.

TABLE C-20
PRELIMINARY REMEDIATION GOALS FOR SEDIMENT
SITE 17 - BUILDING 32, GOULD ISLAND, FEASIBILITY STUDY
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Parameter	Units	Ecological Results / PRGs							Proposed Human Health Risk-Based PRG[4]	Selected PRG
		Initial Data Set[1]			Revised Data Set[2]			Proposed Ecological Risk-Based PRG		
		NOEC	LOEC	PRG[7]	NOEC	LOEC	PRG[7]			
Antimony	mg/kg	0.81	NA	NC[3]	0.81	NA	NC[3]	---	---	---
Copper	mg/kg	186	NA	NC[3]	186	NA	NC[3]	---	---	---
Chromium^{+6}	mg/kg	NA	NA	NA	NA	NA	NA	---	22[5][6]	855,500[6]
Chromium^{+3}	mg/kg	NA	NA	NA	NA	NA	NA	---	855,500[6]	
Lead	mg/kg	199	NA	NC[3]	41.6	96.8	NC[3]	---	---	---
Mercury	mg/kg	0.239	NA	NC[3]	0.239	NA	NC[3]	---	---	---
Nickel	mg/kg	32.8	33.4	NC[3]	32.8	33.4	NC[3]	---	---	---
Silver	mg/kg	0.524	NA	NC[3]	0.524	NA	NC[3]	---	---	---
HMW PAHs	µg/kg	32,000	48,600	NC[3]	32,000	48,600	NC[3]	---	---	---
LMW PAHs	µg/kg	7,750	NA	NC[3]	7,750	NA	NC[3]	---	---	---
Total PAHs	µg/kg	38,700	55,100	46,178	38,700	55,100	46,178	46,178	---	46,178
Total PCB Homologs [4]	µg/kg	2,590	2,720	2,654	1,240	2,590	1,792	1,792	1,500	1,500
Mean ERM-Q	---	1.59	2.29	1.91	1.27	1.59	1.42	1.42	NA	0.71[8]

Notes:

1 - The source of the data is Table 6-29 in the BERA (Tetra Tech, 2011) using survival cutoff as statistically lower than the laboratory reference

2 - The source of the data is Table 6-32 in the BERA (Tetra Tech, 2011) using survival cutoff at 70% plus that for Table 6-29

3 - NC - Not calculated - specific PRGs were not calculated for this parameter, as discussed in Appendix B, Section 2.

4 - Human health risk-based PRGs for sediment were developed as presented in Appendix B, Section 1.

5 - This PRG for chromium is based on the assumption that chromium is present as Cr^{+6} valence, which is not likely in marine sediment.

6 - A PRG of 855,500 mg/kg is established for Cr^{+3}, which is the likely valence state at the Site. The value of 22 mg/kg is for reference only (Table B-1.8, Appendix B1).

7 - This PRG value is the geometric mean between the NOEC and LOEC

8 - Based on uncertainty of toxicity test results, a value of one-half the calculated ERM-Q of 1.42 was selected for the PRG (See Appendix B-2 Section B.2.1 of the final FS.

PRG - Preliminary remediation goal

NOEC - No observed effects concentration

LOEC - Lowest observed effects concentration

HMW PAHs - High molecular weight polyaromatic hydrocarbons

LMW PAHs - Low molecular weight polyaromatic hydrocarbons

PCB - polychlorinated biphenyls

ERM-Q - Effects range median-quotient

NA - Not available

NC - Not calculated

Concentrations are presented in mg/kg for metals and µg/kg for organics.

Table C-21

TABLE 9.1D RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - RECREATIONAL VISITOR EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT RHODE ISLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational Visitor
Receptor Age: Child

Me	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sed	Sediment	Intertidal Sediment	Benzo(a)anthracene	1.31E-07	--	4.77E-08	1.79E-07	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	4.26E-07	--	1.55E-07	5.81E-07	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	7.87E-08	--	2.86E-08	1.07E-07	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	5.69E-09	--	2.07E-09	7.77E-09	Benzo(k)fluoranthene	NA	--	--	--	--
			Chrysene	1.11E-09	--	4.05E-10	1.52E-09	Chrysene	NA	--	--	--	--
			Dibenzo(a,h)anthracene	5.37E-08	--	1.95E-08	7.32E-08	Dibenzo(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1.55E-08	--	5.63E-09	2.11E-08	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Aroclor, Total	9.78E-08	--	3.83E-08	1.36E-07	Aroclor, Total	Skin/Eyes/Immune	2.85E-02	--	1.12E-02	3.97E-02
			Antimony	--	--	--	--	Antimony	Blood	1.72E-01	--	--	1.72E-01
			Arsenic	1.07E-06	--	9.00E-08	1.16E-06	Arsenic	Skin, blood	2.78E-02	--	2.33E-03	3.01E-02
			Beryllium	--	--	--	--	Beryllium	GI	2.89E-04	--	--	2.89E-04
			Chromium VI	--	--	--	--	Chromium VI	None	2.07E+00	--	--	2.07E+00
			Lead	--	--	--	--	Lead	NA	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.41E-03	--	--	3.41E-03
			Thallium	--	--	--	--	Thallium	Blood	4.46E-02	--	--	4.46E-02
			Vanadium	--	--	--	--	Vanadium	Hair	3.40E-03	--	--	3.40E-03
			(Total)	1.88E-06	0.00E+00	3.87E-07	2.27E-06	(Total)		2.35E+00	0.00E+00	1.35E-02	2.36E+00
						Total Risk Across Sediment	2.27E-06					Total Hazard Index Across Sediment	2.36E+00
						Total Risk Across All Media and All Exposure Routes	2.27E-06					Total Hazard Index Across All Media and All Exposure Routes	2.36E+00

Total Skin HI =	6.98E-02
Total Eye/Immune HI =	3.97E-02
Total CNS HI =	3.41E-03
Total Blood HI =	2.47E-01
Total GI HI =	2.89E-04
Total Hair HI =	3.40E-03

Table C-22

TABLE 9.5C RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION WORKER CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Groundwater in Testpits	1,1-Biphenyl	--	--	--	--	1,1-Biphenyl	Kidney	1.22E-04	--	--	1.22E-04
			2,4-Dimethylphenol	--	--	--	--	2,4-Dimethylphenol	Blood	2.04E-03	--	--	2.04E-03
			4-Methylphenol	--	--	--	--	4-Methylphenol	NA	8.14E-03	--	--	8.14E-03
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	Lungs	3.63E-02	--	--	3.63E-02
			Acenaphthene	--	--	--	--	Acenaphthene	Liver	3.10E-04	--	--	3.10E-04
			Acenaphthylene	--	--	--	--	Acenaphthylene	NA	1.78E-05	--	--	1.78E-05
			Benzo(a)anthracene	1.41E-07	--	5.34E-05	5.35E-05	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	6.37E-07	--	4.11E-04	4.12E-04	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	1.14E-07	--	7.57E-05	7.58E-05	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	9.82E-09	--	--	9.82E-09	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	9.45E-09	--	--	9.45E-09	Carbazole	NA	--	--	--	--
			Chrysene	1.62E-09	--	6.14E-07	6.16E-07	Chrysene	NA	--	--	--	--
			Dibenzofuran	--	--	--	--	Dibenzofuran	NA	3.18E-04	--	--	3.18E-04
			Dibenzo(a,h)anthracene	1.17E-06	--	1.20E-03	1.20E-03	Dibenzo(a,h)anthracene	NA	--	--	--	--
			Fluoranthene	--	--	--	--	Fluoranthene	Kidney, liver, blood	1.84E-03	--	--	1.84E-03
			Fluorene	--	--	--	--	Fluorene	NA	4.96E-04	--	--	4.96E-04
			Indeno(1,2,3-cd)pyrene	4.83E-08	--	3.46E-05	3.46E-05	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	Body Weight	3.94E-03	--	8.76E-02	9.15E-02
			Pentachlorophenol	1.09E-08	--	3.93E-06	3.94E-06	Pentachlorophenol	Liver, kidney	2.12E-04	--	7.64E-02	7.66E-02
			Phenanthrene	--	--	--	--	Phenanthrene	NA	4.07E-03	--	1.86E-01	1.90E-01
			Pyrene	--	--	--	--	Pyrene	Kidney	1.61E-03	--	--	1.61E-03
			Benzene	1.38E-10	--	2.06E-08	2.07E-08	Benzene	Blood	4.39E-05	--	6.55E-03	6.60E-03
			Aroclor, Total	4.02E-08	--	--	4.02E-08	Aroclor, Total	Skin/Eyes/Immune	7.03E-02	--	--	7.03E-02
			DDD	7.07E-11	--	1.49E-08	1.50E-08	DDD	NA	1.03E-05	--	2.17E-03	2.18E-03
			DDE	4.40E-10	--	7.78E-08	7.82E-08	DDE	NA	--	--	--	--
			Gamma-BHC	--	--	--	--	Gamma-BHC	Liver, kidney	5.03E-04	--	5.93E-03	6.43E-03
			Heptachlor epoxide	3.74E-09	--	5.17E-08	5.55E-08	Heptachlor epoxide	Liver	2.21E-03	--	3.06E-02	3.28E-02
			Arsenic	1.38E-07	--	7.27E-08	2.10E-07	Arsenic	Skin, blood	2.14E-02	--	1.13E-02	3.27E-02
			Barium	--	--	--	--	Barium	Kidney	4.95E-04	--	3.73E-03	4.23E-03
			Cadmium	--	--	--	--	Cadmium	Kidney	3.21E-02	--	6.77E-01	7.09E-01
			Lead	--	--	--	--	Lead	NA	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	4.10E-03	--	5.41E-02	5.82E-02
			Nickel	--	--	--	--	Nickel	Body Weight	1.46E-03	--	3.86E-03	5.33E-03
			Vanadium	--	--	--	--	Vanadium	Hair	2.40E-03	--	4.86E-02	5.10E-02
			Zinc	--	--	--	--	Zinc	Blood	5.79E-04	--	1.83E-04	7.62E-04
			(Total)	2.32E-06	0.00E+00	1.78E-03	1.78E-03	(Total)		1.95E-01	0.00E+00	1.19E+00	1.39E+00

Total Risk Across Soil	1.78E-03
Total Risk Across All Media and All Exposure Routes	1.78E-03
Total Hazard Index Across Soil	1.39E+00
Total Hazard Index Across All Media and All Exposure Routes	1.39E+00

Total Skin HI =	1.03E-01
Total Eye/Immune HI =	7.03E-02
Total Kidney HI =	8.00E-01
Total Liver HI =	1.18E-01
Total CNS HI =	5.82E-02
Total Blood HI =	4.40E-02
Total Lungs HI =	3.63E-02
Total Body Weight HI =	9.69E-02
Total Hair HI =	5.10E-02

Table C-23

TABLE 9.5D RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION WORKER CONTACT WITH TRENCH AIR
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk: Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater from Testpits	Air	Excavation trenches	1,1-Biphenyl	--	--	--	--
			2,4-Dimethylphenol	--	--	--	--
			4-Methylphenol	--	--	--	--
			2-Methylnaphthalene	--	--	--	--
			Acenaphthene	--	--	--	--
			Acenaphthylene	--	--	--	--
			Benzo(a)anthracene	--	2.42E-05	--	2.42E-05
			Benzo(a)pyrene	--	3.74E-05	--	3.74E-05
			Benzo(b)fluoranthene	--	2.04E-04	--	2.04E-04
			Benzo(k)fluoranthene	--	4.25E-07	--	4.25E-07
			Carbazole	--	8.88E-09	--	8.88E-09
			Chrysene	--	2.87E-06	--	2.87E-06
			Dibenzofuran	--	--	--	--
			Dibenzo(a,h)anthracene	--	8.83E-07	--	8.83E-07
			Fluoranthene	--	--	--	--
			Fluorene	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	3.81E-06	--	3.81E-06
			Naphthalene	--	--	--	--
			Pentachlorophenol	--	1.39E-08	--	1.39E-08
			Phenanthrene	--	--	--	--
			Pyrene	--	--	--	--
			Benzene	--	3.12E-07	--	3.12E-07
			Aroclor, Total	--	8.33E-05	--	8.33E-05
			DDD	--	1.28E-08	--	1.28E-08
			DDE	--	3.16E-07	--	3.16E-07
			Gamma-BHC	--	1.14E-06	--	1.14E-06
			Heptachlor epoxide	--	1.35E-06	--	1.35E-06
			Arsenic	--	--	--	--
			Barium	--	--	--	--
			Cadmium	--	--	--	--
			Lead	--	--	--	--
			Manganese	--	--	--	--
			Nickel	--	--	--	--
			Vanadium	--	--	--	--
			Zinc	--	--	--	--
			(Total)	0.00E+00	3.60E-04	0.00E+00	3.60E-04
						Total Risk Across Trench Air	3.60E-04
						Total Risk Across All Media and All Exposure Routes	3.60E-04

Chemical	Non-Carcinogenic Hazard Quotient: Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
1,1-Biphenyl	Kidney	--	3.40E-01	--	3.40E-01
2,4-Dimethylphenol	Blood	--	2.66E-01	--	2.66E-01
4-Methylphenol	NA	--	4.49E-01	--	4.49E-01
2-Methylnaphthalene	Lungs	--	1.12E+02	--	1.12E+02
Acenaphthene	Liver	--	7.57E-01	--	7.57E-01
Acenaphthylene	NA	--	--	--	--
Benzo(a)anthracene	NA	--	--	--	--
Benzo(a)pyrene	NA	--	--	--	--
Benzo(b)fluoranthene	NA	--	--	--	--
Benzo(k)fluoranthene	NA	--	--	--	--
Carbazole	NA	--	--	--	--
Chrysene	NA	--	--	--	--
Dibenzofuran	NA	--	1.96E-01	--	1.96E-01
Dibenzo(a,h)anthracene	NA	--	--	--	--
Fluoranthene	Kidney, liver, blood	--	1.29E+00	--	1.29E+00
Fluorene	blood	--	8.63E-01	--	8.63E-01
Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
Naphthalene	Body Weight	--	2.97E+02	--	2.97E+02
Pentachlorophenol	Liver, kidney	--	2.70E-04	--	2.70E-04
Phenanthrene	NA	--	--	--	--
Pyrene	Kidney	--	8.32E-01	--	8.32E-01
Benzene	Blood	--	9.35E-02	--	9.35E-02
Aroclor, Total	Skin/Eyes/Immune	--	1.46E+02	--	1.46E+02
DDD	NA	--	--	--	--
DDE	NA	--	--	--	--
Gamma-BHC	Liver, kidney	--	2.04E-01	--	2.04E-01
Heptachlor epoxide	Liver	--	7.97E-01	--	7.97E-01
Arsenic	--	--	--	--	--
Barium	--	--	--	--	--
Cadmium	--	--	--	--	--
Lead	--	--	--	--	--
Manganese	--	--	--	--	--
Nickel	--	--	--	--	--
Vanadium	--	--	--	--	--
Zinc	--	--	--	--	--
(Total)		0.00E+00	5.61E+02	0.00E+00	5.61E+02
				Total Hazard Index Across Trench Air	5.61E+02
				Total Hazard Index Across All Media and All Exposure Routes	5.61E+02

Total Skin/Eye/Immune HI =	1.46E+02
Total Kidney HI =	2.66E+00
Total Liver HI =	3.04E+00
Total Blood HI =	2.51E+00
Total Lungs HI =	1.12E+02
Total Body Weight HI =	2.97E+02

Table C-24

TABLE 9.6A RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FISHERMAN EXPOSURE TO CLAMS
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Receptor Population: Fishermen
Receptor Age: Adult

Med	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Cla	Clams	Clams	Aroclor, Total	5.10E-05	--	--	5.10E-05	Aroclor, Total	Skin/Eyes/Immune	3.72E+00	--	--	3.72E+00
			Beta-BHC	2.06E-06	--	--	2.06E-06	Beta-BHC	NA	--	--	--	--
			Gamma-BHC	--	--	--	--	Gamma-BHC	Liver, kidney	8.13E-03	--	--	8.13E-03
			Arsenic	1.35E-03	--	--	1.35E-03	Arsenic	Skin, blood	8.74E+00	--	--	8.74E+00
			Cadmium	--	--	--	--	Cadmium	Kidney	2.56E-01	--	--	2.56E-01
			Chromium	--	--	--	--	Chromium	None	6.12E-01	--	--	6.12E-01
			Manganese	--	--	--	--	Manganese	CNS	1.03E-01	--	--	1.03E-01
			Thallium	--	--	--	--	Thallium	Blood	8.29E-01	--	--	8.29E-01
			(Total)	1.40E-03	0.00E+00	0.00E+00	1.40E-03	(Total)		1.25E+01	0.00E+00	0.00E+00	1.25E+01
						Total Risk Across Clams	1.40E-03					Total Hazard Index Across Clams	1.25E+01
						Total Risk Across All Media and All Exposure Routes	1.40E-03					Total Hazard Index Across All Media and All Exposure Routes	1.25E+01

Total Skin HI =	1.25E+01
Total Eye/Immune HI =	3.72E+00
Total Blood HI =	9.57E+00
Total Kidney HI =	2.64E-01
Total Liver HI =	8.13E-03
Total CNS HI =	1.03E-01

Table C-25

TABLE 9.6B RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FISHERMAN EXPOSURE TO CLAMS
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Receptor Population: Fishermen
Receptor Age: Child

Me	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Cl	Clams	Clams	Aroclor, Total	1.86E-05	--	--	1.86E-05	Aroclor, Total	Skin/Eyes/Immune	5.44E+00	--	--	5.44E+00
			Beta-BHC	7.55E-07	--	--	7.55E-07	Beta-BHC	NA	--	--	--	--
			Gamma-BHC	--	--	--	--	Gamma-BHC	Liver, kidney	1.19E-02	--	--	1.19E-02
			Arsenic	4.93E-04	--	--	4.93E-04	Arsenic	Skin, blood	1.28E+01	--	--	1.28E+01
			Cadmium	--	--	--	--	Cadmium	Kidney	3.74E-01	--	--	3.74E-01
			Chromium	--	--	--	--	Chromium	None	8.95E-01	--	--	8.95E-01
			Manganese	--	--	--	--	Manganese	CNS	1.51E-01	--	--	1.51E-01
			Thallium	--	--	--	--	Thallium	Blood	1.21E+00	--	--	1.21E+00
			(Total)	5.13E-04	0.00E+00	0.00E+00	5.13E-04	(Total)		1.82E+01	0.00E+00	0.00E+00	1.82E+01
						Total Risk Across Clams	5.13E-04					Total Hazard Index Across Clams	1.82E+01
						Total Risk Across All Media and All Exposure Routes	5.13E-04					Total Hazard Index Across All Media and All Exposure Routes	1.82E+01

Total Skin HI =	1.82E+01
Total Eye/Immune HI =	5.44E+00
Total Blood HI =	1.40E+01
Total Kidney HI =	3.86E-01
Total Liver HI =	1.19E-02
Total CNS HI =	1.51E-01

Table C-26

TABLE 9.7A RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FISHERMAN EXPOSURE TO MUSSELS
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Receptor Population: Fishermen
Receptor Age: Adult

Med	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Mus	Mussels	Mussels	Benzo(a)anthracene	1.16E-05	--	--	1.16E-05	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	4.56E-05	--	--	4.56E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	7.82E-06	--	--	7.82E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Chrysene	1.16E-07	--	--	1.16E-07	Chrysene	NA	--	--	--	--
			Aroclor, Total	2.19E-04	--	--	2.19E-04	Aroclor, Total	Skin/Eyes/Immune	1.60E+01	--	--	1.60E+01
			Arsenic	1.10E-03	--	--	1.10E-03	Arsenic	Skin, blood	7.12E+00	--	--	7.12E+00
			(Total)	1.38E-03	0.00E+00	0.00E+00	1.38E-03	(Total)		2.31E+01	0.00E+00	0.00E+00	2.31E+01

Total Risk Across Mussels	1.38E-03
Total Risk Across All Media and All Exposure Routes	1.38E-03
Total Hazard Index Across Mussels	2.31E+01
Total Hazard Index Across All Media and All Exposure Routes	2.31E+01

Total Skin HI =	2.31E+01
Total Eye/Immune HI =	1.60E+01
Total Blood HI =	7.12E+00

Table C-27

TABLE 9.7B RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FISHERMAN EXPOSURE TO MUSSELS
REASONABLE MAXIMUM EXPOSURE
SITE 17: BUILDING 32, GOULD ISLAND
REMEDIAL INVESTIGATION REPORT
NAVSTA NEWPORT, NEWPORT, RI

Scenario Timeframe: Current/Future
Receptor Population: Fishermen
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Mussels	Mussels	Mussels	Benzo(a)anthracene	4.24E-06	--	--	4.24E-06	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.67E-05	--	--	1.67E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	2.86E-06	--	--	2.86E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Chrysene	4.24E-08	--	--	4.24E-08	Chrysene	NA	--	--	--	--
			Aroclor, Total	8.01E-05	--	--	8.01E-05	Aroclor, Total	Skin/Eyes/Immune	2.34E+01	--	--	2.34E+01
			Arsenic	4.01E-04	--	--	4.01E-04	Arsenic	Skin, blood	1.04E+01	--	--	1.04E+01
			(Total)	5.05E-04	0.00E+00	0.00E+00	5.05E-04	(Total)		3.38E+01	0.00E+00	0.00E+00	3.38E+01
						Total Risk Across Mussels	5.05E-04					Total Hazard Index Across Mussels	3.38E+01
						Total Risk Across All Media and All Exposure Routes	5.05E-04					Total Hazard Index Across All Media and All Exposure Routes	3.38E+01

Total Skin HI =	3.38E+01
Total Eye/Immune HI =	2.34E+01
Total Blood HI =	1.04E+01

Appendix D
Ecological Risk Assessment Summary Tables

TABLE D-1
SUMMARY STATISTICS FOR PHASE 1 AND PHASE 2 INVESTIGATIONS
SURFACE SOIL

SITE 17 GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

	PHASE I				PHASE II			
PARAMETER	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**
METALS (MG/KG)								
ALUMINUM	6790	8990	4660 - 8990	7311	6080	8070	3370 - 8070	6677
ANTIMONY	ND	ND	ND	NC	1.7	1.7	1.7 - 1.7	NC
ARSENIC	3.54	5.9	2 - 5.9	4.022	4.12	11.4	1.9 - 11.4	5.634
BARIUM	47	164	14.7 - 164	63.53	28.4	50.5	14.4 - 50.5	34.08
BERYLLIUM	0.253	0.62	0.17 - 0.62	0.295	0.262	0.44	0.16 - 0.44	0.318
CADMIUM	1.61	7.6	0.19 - 7.6	1.801	3.48	31.5	0.071 - 31.5	28.98
CALCIUM	11300	59700	581 - 59700	53576	4060	21500	362 - 21500	12630
CHROMIUM	12.2	26.5	6.2 - 26.5	14.25	9.91	20.4	5.1 - 20.4	12.27
COBALT	4.62	7.5	3.4 - 7.5	5.072	3.98	6.1	1.8 - 6.1	4.714
COPPER	28.2	71.9	11.4 - 71.9	36.87	20.2	34.3	5.3 - 34.3	25.56
CYANIDE	0.12	0.12	0.12 - 0.12	NC	NA	NA	NA	NC
IRON	14900	29600	8700 - 29600	17558	16000	22500	7440 - 22500	18470
LEAD	101	750	5.7 - 750	512.6	48.4	194	7 - 194	86.14
MAGNESIUM	2860	6920	1900 - 6920	3355	2040	2900	1120 - 2900	2348
MANGANESE	196	473	92 - 473	230	241	440	96.1 - 440	297
MERCURY	0.0269	0.06	0.0065 - 0.06	0.0277	0.0328	0.097	0.0068 - 0.097	0.0667
NICKEL	12	22.4	6.2 - 22.4	13.6	8.84	14.2	3.6 - 14.2	10.59
POTASSIUM	1000	4960	469 - 4960	1428	568	746	458 - 746	611.7
SILVER	ND	ND	ND	NC	0.1	0.1	0.1 - 0.1	NC
SODIUM	156	638	26.7 - 638	231.1	89.2	376	22.6 - 376	218.1
THALLIUM	ND	ND	ND	NC	0.25	0.32	0.15 - 0.32	0.342
VANADIUM	13.8	28.7	7.5 - 28.7	16.06	12.4	21.9	6.7 - 21.9	14.52
ZINC	69.1	213	21.3 - 213	94.94	68.5	234	22 - 234	99.41
PESTICIDES/PCBS (UG/KG)								
4,4'-DDE	43.5	64	23 - 64	64	NA	NA	NA	NC
4,4'-DDT	27	27	27 - 27	NC	NA	NA	NA	NC
ALPHA-CHLORDANE	2.1	2.1	2.1 - 2.1	NC	NA	NA	NA	NC
AROCLOR-1248	ND	ND	ND	NC	1200	1200	1200 - 1200	NC
AROCLOR-1254	ND	ND	ND	NC	640	640	640 - 640	NC
AROCLOR-1260	308	700	59 - 700	312.8	98.5	110	87 - 110	NC
BETA-BHC	2.55	3.1	2 - 3.1	2.285	NA	NA	NA	NC
ENDOSULFAN SULFATE	46	46	46 - 46	NC	NA	NA	NA	NC
ENDRIN	94	170	18 - 170	98.92	NA	NA	NA	NC
ENDRIN ALDEHYDE	9.9	16	3.8 - 16	16	NA	NA	NA	NC
ENDRIN KETONE	90.3	270	4.1 - 270	93.33	NA	NA	NA	NC
METHOXYCHLOR	179	250	67 - 250	114.9	NA	NA	NA	NC
TOTAL AROCLOR	308	700	59 - 700	317.8	679	1840	87 - 1840	NC
TOTAL CHLORDANE	2.1	2.1	2.1 - 2.1	NC	NA	NA	NA	NC
TOTAL DDD/DDE/DDT	57	64	50 - 64	52.64	NA	NA	NA	NC

TABLE D-1
SUMMARY STATISTICS FOR PHASE 1 AND PHASE 2 INVESTIGATIONS
SURFACE SOIL

SITE 17 GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

	PHASE I				PHASE II			
PARAMETER	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**
PETROLEUM HYDROCARBONS (MG/KG)								
EXTRACTABLE PETROLEUM HYDROCARBONS	2110	14000	15 - 14000	11549	NC	NA	NA	NC
TOTAL PETROLEUM HYDROCARBONS	NA	NA	NA	NC	52.6	88	25 - 88	63.59
SEMIVOLATILES (UG/KG)								
1,1-BIPHENYL	2370	5500	360 - 5500	2656	NA	NA	NA	NC
2-METHYLNAPHTHALENE	2870	19000	3.8 - 19000	14237	214	330	98 - 330	164.3
4-METHYLPHENOL	49	49	49 - 49	NC	NA	NA	NA	NC
ACENAPHTHENE	10600	100000	2.92 - 100000	66575	782	2500	37 - 2500	858
ACENAPHTHYLENE	385	3300	5.4 - 3300	2208	260	260	260 - 260	NC
ANTHRACENE	16500	140000	5 - 140000	96434	914	5200	46 - 5200	1401
BENZO(A)ANTHRACENE	29900	210000	6.7 - 210000	159125	1020	8400	36 - 8400	3984
BENZO(A)PYRENE	22900	160000	3.02 - 160000	122916	891	6700	65 - 6700	4219
BENZO(B)FLUORANTHENE	28000	170000	7.15 - 170000	141941	1100	8200	100 - 8200	5162
BENZO(G,H,I)PERYLENE	14100	96000	34 - 96000	72380	655	4700	55 - 4700	2953
BENZO(K)FLUORANTHENE	12000	74000	2.78 - 74000	61848	609	4600	44 - 4600	2894
BIS(2-ETHYLHEXYL)PHTHALATE	106	320	49 - 320	149.2	NA	NA	NA	NC
BUTYL BENZYL PHTHALATE	74	74	74 - 74	NC	NA	NA	NA	NC
CARBAZOLE	10500	65000	40 - 65000	46206	NA	NA	NA	NC
CHRYSENE	27200	190000	7.7 - 190000	144520	1010	8100	41 - 8100	3860
DIBENZO(A,H)ANTHRACENE	3740	26000	10 - 26000	19299	470	2000	39 - 2000	1304
DIBENZOFURAN	13600	47000	120 - 47000	11706	NA	NA	NA	NC
DI-N-BUTYL PHTHALATE	42	45	39 - 45	47.22	NA	NA	NA	NC
FLUORANTHENE	62400	530000	3.6 - 530000	259154	2070	17000	57 - 17000	15803
FLUORENE	9750	77000	3.8 - 77000	53607	696	2400	41 - 2400	647.2
HIGH MOLECULAR WEIGHT PAHS	239000	1910000	3.6 - 1910000	577737	9600	79300	187 - 79300	73490
INDENO(1,2,3-CD)PYRENE	13200	92000	2.78 - 92000	71258	625	4600	72 - 4600	2878
LOW MOLECULAR WEIGHT PAHS	102000	840000	40.2 - 840000	586455	2720	24400	40 - 24400	22657
NAPHTHALENE	5910	44000	4.35 - 44000	33402	500	730	270 - 730	730
PENTACHLOROPHENOL	270	270	270 - 270	NC	NA	NA	NA	NC
PHENANTHRENE	56600	460000	22.5 - 460000	322702	1550	13000	40 - 13000	12135
PYRENE	48400	360000	16.5 - 360000	264099	1850	15000	53 - 15000	13932
TOTAL CARCINOGENIC PAHS-HALFND	137000	922000	31.8 - 922000	719134	5160	42600	252 - 42600	20173
TOTAL CARCINOGENIC PAHS-POS	137000	922000	27.5 - 922000	719134	5130	42600	77 - 42600	39432
TOTAL PAHS	329000	2750000	3.6 - 2750000	822368	12300	104000	227 - 104000	96376
VOLATILES (UG/KG)	VOCs not analyzed in soil during Phase 2 investigations							

For the purposes of this comparison, Total Petroleum Hydrocarbons is considered to be comparable to extractable petroleum hydrocarbons
NA - Not applicable, analyte was not sought in the data set presented
NC - Not calculated
ND - Analyte not detected in the data set presented.
Phase 1 UCLs recalculated using the most recent version of USEPA ProUCL software
Yellow highlights indicate that the 95% UCL value from Phase 2 exceeds the 95% UCL value from Phase 1.
Orange highlights indicate the Phase 2 UCL is more than 2x the Phase 1 UCL.

TABLE D-2
SUMMARY STATISTICS FOR
SUBSURFACE SOIL
PHASE 2 REMEDIAL INVESTIGATION
SITE 17 GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

	PHASE I				PHASE II			
PARAMETER	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**
METALS (MG/KG)								
ALUMINUM	7240	19900	3260 - 19900	7913	6650	9490	3610 - 9490	7125
ANTIMONY	1.94	15.4	0.068 - 15.4	1.253	ND			NC
ARSENIC	3.4	23.1	1.3 - 23.1	5.118	2.11	10.1	0.57 - 10.1	2.577
BARIUM	25.7	273	7.5 - 273	44.54	23.2	37.5	11.6 - 37.5	25.67
BERYLLIUM	0.235	1	0.073 - 1	0.256	0.248	0.71	0.12 - 0.71	0.297
CADMIUM	269	5670	0.038 - 5670	619.5	3.41	22.6	0.11 - 22.6	11.68
CALCIUM	3710	68200	453 - 68200	9739	1140	7260	369 - 7260	2247
CHROMIUM	17.1	340	4.7 - 340	38.86	10.6	22.6	3.9 - 22.6	11.88
COBALT	6.93	26.1	2.2 - 26.1	7.8	5.48	12.3	3.2 - 12.3	6.16
COPPER	31.4	424	7.2 - 424	64.1	20	84.8	5.8 - 84.8	35.55
CYANIDE	0.34	0.54	0.14 - 0.54	0.16	NA			NC
IRON	18500	181000	6270 - 181000	30462	15900	22300	8470 - 22300	17033
LEAD	67.4	2700	3.3 - 2700	242.5	16.9	111	4.8 - 111	35.58
MAGNESIUM	3220	12900	1360 - 12900	3616	2610	3700	1130 - 3700	2808
MANGANESE	158	601	64.1 - 601	176.9	171	411	87.6 - 411	196.2
MERCURY	0.0444	0.27	0.0082 - 0.27	0.0244	0.0242	0.086	0.0065 - 0.086	0.0238
NICKEL	17	56.8	4.5 - 56.8	18.98	10.9	22.2	5.6 - 22.2	12.15
POTASSIUM	751	3950	249 - 3950	1012	913	2240	423 - 2240	1062
SELENIUM	ND	ND	ND	NC	0.63	0.63	0.63 - 0.63	NC
SILVER	ND	ND	ND	NC	0.079	0.079	0.079 - 0.079	NC
SODIUM	293	2710	22.1 - 2710	526.7	77.8	544	17.4 - 544	189.7
THALLIUM	ND	ND	ND	NC	0.353	0.58	0.18 - 0.58	0.58
VANADIUM	13.8	71.6	5.5 - 71.6	15.99	13.2	24	5.7 - 24	14.4
ZINC	59.1	653	12.1 - 653	113.8	36	99	20.5 - 99	41.81
PESTICIDES/PCBS (UG/KG)								
4,4'-DDD	48	48	48 - 48	NC	NA	NA	NA	NC
4,4'-DDE	4.44	5.18	3.7 - 5.18	3.78	NA	NA	NA	NC
4,4'-DDT	30	30	30 - 30	NC	NA	NA	NA	NC
ALPHA-BHC	3	3	3 - 3	NC	NA	NA	NA	NC
ALPHA-CHLORDANE	3.7	4.9	2.5 - 4.9	2.62	NA	NA	NA	NC
AROCLOR-1016	40	40	40 - 40	NC	ND	ND	ND	ND
AROCLOR-1254	308	460	140 - 460	390	ND	ND	ND	ND
AROCLOR-1260	326	600	51 - 600	109.3	82	82	82 - 82	NC
BETA-BHC	2.6	2.6	2.6 - 2.6	NC	NA	NA	NA	NC
ENDOSULFAN I	2.88	2.88	2.88 - 2.88	NC	NA	NA	NA	NC
ENDOSULFAN SULFATE	104	140	67 - 140	140	NA	NA	NA	NC
ENDRIN	7.01	7.92	6.1 - 7.92	6.191	NA	NA	NA	NC
ENDRIN ALDEHYDE	20	68	4.6 - 68	8.025	NA	NA	NA	NC
ENDRIN KETONE	70.2	340	5.1 - 340	36.51	NA	NA	NA	NC
HEPTACHLOR EPOXIDE	20	20	20 - 20	NC	NA	NA	NA	NC
METHOXYCHLOR	148	480	19.5 - 480	40.34	NA	NA	NA	NC
TOTAL AROCLOR	279	600	40 - 600	169.7	82	82	82 - 82	NC
TOTAL CHLORDANE	3.7	4.9	2.5 - 4.9	4.9	NA	NA	NA	NC
TOTAL DDD/DDE/DDT	21.7	48	3.7 - 48	31.07	NA	NA	NA	NC

TABLE D-2
SUMMARY STATISTICS FOR
SUBSURFACE SOIL
PHASE 2 REMEDIAL INVESTIGATION
SITE 17 GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

	PHASE I				PHASE II			
PARAMETER	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**
PETROLEUM HYDROCARBONS (MG/KG)								
EXTRACTABLE PETROLEUM HYDROCARBONS	494	4800	15 - 4800	662.2	NA	NA	NA	NC
TOTAL PETROLEUM HYDROCARBONS	NA			NC	429	1200	32 - 1200	633.6
SEMIVOLATILES (UG/KG)								
1,1-BIPHENYL	739	4300	45 - 4300	293.5	NA	NA	NA	NC
2-METHYLNAPHTHALENE	705	13000	4.7 - 13000	1544	ND			NC
4-METHYLPHENOL	660	660	660 - 660	NC	NA	NA	NA	NC
ACENAPHTHENE	2110	52000	4.1 - 52000	6006	106	200	40 - 200	135.2
ACENAPHTHYLENE	143	1800	4 - 1800	168.5	ND			NC
ANTHRACENE	3540	94000	3.7 - 94000	10913	91	120	73 - 120	90.67
BENZALDEHYDE	79	79	79 - 79	NC	NA	NA	NA	NC
BENZO(A)ANTHRACENE	5310	140000	3.6 - 140000	16656	133	310	40 - 310	121.9
BENZO(A)PYRENE	4740	110000	3.2 - 110000	13093	142	300	42 - 300	116.9
BENZO(B)FLUORANTHENE	4700	100000	2.8 - 100000	12755	143	360	49 - 360	124.5
BENZO(G,H,I)PERYLENE	1950	36000	4.5 - 36000	3445	92.1	180	40 - 180	78.56
BENZO(K)FLUORANTHENE	1980	37000	4.72 - 37000	3541	85.7	230	36 - 230	77
BIS(2-ETHYLHEXYL)PHTHALATE	92.7	270	38 - 270	105.6	NA	NA	NA	NC
BUTYL BENZYL PHTHALATE	56	56	56 - 56	NC	NA	NA	NA	NC
CARBAZOLE	3000	37000	41 - 37000	3403	NA	NA	NA	NC
CHRYSENE	4950	130000	4.2 - 130000	15358	151	370	46 - 370	132.4
DIBENZO(A,H)ANTHRACENE	497	8000	3.38 - 8000	810.6	ND			NC
DIBENZOFURAN	3550	39000	43 - 39000	3549	NA	NA	NA	NC
DI-N-BUTYL PHTHALATE	67.7	150	39 - 150	80.5	NA	NA	NA	NC
FLUORANTHENE	11200	370000	3.9 - 370000	44043	245	760	39 - 760	243.1
FLUORENE	2520	61000	4 - 61000	7031	197	400	42 - 400	400
HIGH MOLECULAR WEIGHT PAHS	38200	1220000	3.9 - 1220000	146523	942	3150	39 - 3150	957
INDENO(1,2,3-CD)PYRENE	1900	34000	4.4 - 34000	4346	84.8	150	44 - 150	88.37
LOW MOLECULAR WEIGHT PAHS	18200	626000	4.2 - 626000	72442	319	1430	37 - 1430	579.9
NAPHTHALENE	1680	44000	3.6 - 44000	5014	250	250	250 - 250	NC
PHENANTHRENE	10600	360000	4.2 - 360000	41854	196	490	37 - 490	170.9
PHENOL	410	610	210 - 610	610	NA	NA	NA	NC
PYRENE	8530	260000	3.8 - 260000	30977	250	880	42 - 880	240.8
TOTAL CARCINOGENIC PAHS-HALFND	22300	559000	15.2 - 559000	67716	669	1760	267 - 1760	611.2
TOTAL CARCINOGENIC PAHS-POS	22300	559000	6.4 - 559000	67712	581	1720	87 - 1720	495.1
TOTAL PAHS	54700	1850000	3.9 - 1850000	219111	1190	3680	39 - 3680	1199
VOLATILES (UG/KG)	VOCs not analyzed in soil during phase 2 investigations							

For the purposes of this comparison, Total Petroleum Hydrocarbons is considered to be comparable to extractable petroleum hydrocarbons.
NA - Not applicable, analyte was not sought in the data set presented
NC - Not calculated
ND - Analyte not detected in the data set presented.
Phase 1 UCLs recalculated using the most recent version of USEPA ProUCL software
Yellow highlights indicate that the 95% UCL value from Phase 2 exceeds the 95% UCL value from Phase 1.
Orange highlights indicate the Phase 2 UCL is more than 2x the Phase 1 UCL.

TABLE D-3
SUMMARY STATISTICS FOR PHASE 1 AND PHASE 2 INVESTIGATIONS
CLAM AND MUSSEL TISSUE

SITE 17 GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

	PHASE I				PHASE II			
PARAMETER	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**
METALS (MG/KG)								
ALUMINUM	ND	ND	ND	NC	23.6	38.8	7.6 - 38.8	31.21
ARSENIC	2.06	4.2	0.75 - 4.2	2.421	3.09	3.8	2.1 - 3.8	3.528
BARIUM	ND	ND	ND	NC	0.573	0.754	0.255 - 0.754	0.66
BERYLLIUM	0.00732	0.012	0.0055 - 0.012	0.00681	ND	ND	ND	NC
CADMIUM	0.184	0.73	0.062 - 0.73	0.219	0.171	0.198	0.123 - 0.198	0.189
CALCIUM	1180	8140	188 - 8140	2907	2420	4540	751 - 4540	3290
CHROMIUM	1.26	6.1	0.14 - 6.1	1.334	0.306	0.533	0.174 - 0.533	0.392
COBALT	0.13	0.21	0.032 - 0.21	0.135	0.126	0.176	0.087 - 0.176	0.149
COPPER	1.41	2.1	0.59 - 2.1	1.392	1.99	2.7	1.4 - 2.7	2.305
IRON	46.7	73.7	19.9 - 73.7	48.64	64.6	99.6	26 - 99.6	83.67
LEAD	0.659	1.1	0.218 - 1.1	1.1	0.493	1.4	0.216 - 1.4	0.951
MAGNESIUM	665	799	464 - 799	698.3	704	838	609 - 838	757.3
MANGANESE	11.6	38.6	1.5 - 38.6	8.802	7.09	12.1	3 - 12.1	9.609
MERCURY	0.0114	0.022	0.0051 - 0.022	0.0113	0.0129	0.016	0.006 - 0.016	0.015
NICKEL	0.475	0.59	0.405 - 0.59	0.478	0.399	0.59	0.269 - 0.59	0.51
POTASSIUM	2340	2900	1760 - 2900	2463	2560	3120	2160 - 3120	2762
SELENIUM	ND	ND	ND	NC	0.768	0.876	0.67 - 0.876	0.82
SILVER	ND	ND	ND	NC	0.204	0.48	0.012 - 0.48	0.325
SODIUM	3920	4870	2610 - 4870	4154	4270	5560	3510 - 5560	4682
THALLIUM	0.126	0.18	0.072 - 0.18	0.18	ND	ND	ND	NC
VANADIUM	0.346	1.2	0.11 - 1.2	0.411	0.223	0.294	0.19 - 0.294	0.245
ZINC	14.8	36.1	7.1 - 36.1	17.42	16.4	19.5	15.1 - 19.5	17.53

TABLE D-3
SUMMARY STATISTICS FOR PHASE 1 AND PHASE 2 INVESTIGATIONS
CLAM AND MUSSEL TISSUE

SITE 17 GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

	PHASE I				PHASE II			
PARAMETER	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**	**Avg Of Detects**	**Max**	**Range Of Detects**	**UCL**
PCB HOMOLOGS (UG/KG)								
DICHLOROBIPHENYLS	NA	NA	NA	NC	2.1	2.1	2.1 - 2.1	NC
HEPTACHLOROBIPHENYLS	NA	NA	NA	NC	11.8	21	4.7 - 21	14.18
HEXACHLOROBIPHENYL	NA	NA	NA	NC	26.2	81	6.9 - 81	48.51
PENTACHLOROBIPHENYLS	NA	NA	NA	NC	9.25	14	4 - 14	14
TETRACHLOROBIPHENYLS	NA	NA	NA	NC	3.4	5.7	1.1 - 5.7	5.7
TOTAL PCB HOMOLOGS	NA	NA	NA	NC	39.3	81	6.9 - 81	54.77
TOTAL PCB HOMOLOGS-HALFND	NA	NA	NA	NC	54.4	137	12.5 - 137	80.17
PESTICIDES/PCBS (UG/KG)								
AROCLOR-1260	217	440	98 - 440	200.5	NA	NA	NA	NC
BETA-BHC	6.6	6.6	6.6 - 6.6	NC	NA	NA	NA	NC
ENDRIN	13	13	13 - 13	NC	NA	NA	NA	NC
ENDRIN ALDEHYDE	13	13	13 - 13	NC	NA	NA	NA	NC
GAMMA-BHC (LINDANE)	2.5	2.5	2.5 - 2.5	NC	NA	NA	NA	NC
GAMMA-CHLORDANE	8	8	8 - 8	NC	NA	NA	NA	NC
TOTAL AROCLOR	217	440	98 - 440	201	NA	NA	NA	NC
TOTAL CHLORDANE	8	8	8 - 8	NC	NA	NA	NA	NC
SEMIVOLATILES (UG/KG)	SVOCs not analyzed in Biota during phase 2 investigations							

NA - Not applicable, analyte was not sought in the data set presented
NC - Not calculated
ND - Analyte not detected in the data set presented.
For the purposes of this comparison, Total Aroclor is considered to be comparable to Total PCB homologues with 0.5 x detection limit used for ND values
Phase 1 UCLs recalculated using the most recent version of USEPA ProUCL software
Yellow highlights indicate that the 95% UCL value from Phase 2 exceeds the 95% UCL value from Phase 1.
Orange highlights indicate the Phase 2 UCL is more than 2x the Phase 1 UCL.

TABLE D-4
SUMMARY OF NOECS AND LOECS FOR LEPTOCHEIRUS PLUMULOSUS BASED ON ALL ENDPOINTS BY AREA

SITE 17, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

Sample Area	Sample Number	Concentration (mg/kg)						Concentration (ug/kg)				Average ERM-Q
		Antimony	Copper	Lead	Mercury	Nickel	Silver	HMW PAHs	LMW PAHs	Total PAHs	Total PCB Homologs	
	Toxic Samples[1]											
GI_SD_STILLWATER_2010	GI-SD501-0006	0.79 UJ	28.7 J	35.2 J	0.107	7.7 J	0.145 J	48600	6550 J	55100 J	2720 J	2.29
GI_SD_STILLWATER_2010	GI-SD503-0006	0.7 UJ	9.6 J	13.9 J	0.059	6.7 J	0.23 UJ	8900	944 J	9840 J	5.71 U	0.17
GI_SD_STILLWATER_2010	GI-SD505-0006	0.208 J	25 J	20.4	0.079	6.7	0.271 U	5510	801 J	6310 J	950	0.66
GI_SD_STILLWATER_2010	GI-SD508-0006-AVG	0.65 UJ	14.8 J	10.6 J	0.0195 J	8.9 J	0.0435 J	2150 J	326 J	2480 J	895 J	0.58
GI_SD_STILLWATER_2010	GI-SD509-0006	0.68 UJ	11.8 J	10.6 J	0.0285	5.85 J	0.106 J	3000 J	593 J	3600 J	460 J	0.34
GI_SD_STILLWATER_2010	GI-SD509-0006-D	0.68 UJ	11.8 J	10.6 J	0.0285	5.85 J	0.106 J	3000 J	593 J	3600 J	460 J	0.34
	Non-Toxic Samples[1]											
GI_SD_STILLWATER_2010	GI-SD502-0006	0.81 J	21.2 J	11.3 J	0.02 J	10 J	0.27 U	27000 J	7750 J	34700 J	862 J	1.06
GI_SD_STILLWATER_2010	GI-SD504-0006	0.72 UJ	17.8 J	21 J	0.083	7 J	0.223 J	5960	1240 J	7200 J	394 J	0.38
GI_SD_STILLWATER_2010	GI-SD506-0006	0.692 UJ	11.1 J	11.4	0.035	6.5	0.231 UJ	3570	494 J	4060 J	547	0.39
GI_SD_STILLWATER_2010	GI-SD507-0006	0.69 UJ	12.5 J	12.4 J	0.045	6.5 J	0.143 J	7430 J	1090 J	8520 J	2590	1.59
GI_SD_STILLWATER_2010	GI-SD527-0006	0.71 UJ	14.9 J	15 J	0.054	7.7 J	0.23 UJ	1570	233 J	1800 J	25.3	0.08
GI_SD_STILLWATER_2010	GI-SD532-0006	0.71 UJ	10.4 J	7.1 J	0.023 J	8.4 J	0.24 U	32000	6650 J	38700 J	1240	1.27
	NOEC[2]	0.81	21.2	21	0.083	10	0.223	32000	7750	38700	2590	1.59
	[Max.] in toxic sample	0.208	28.7	35.2	0.107	8.9	0.145	48600	6550	55100	2720	2.29
	LOEC[3]	NA	25	35.2	0.107	NA	NA	48600	NA	55100	2720	2.29
	Geometric mean of NOEC and LOEC	NA	23	27	0.094	NA	NA	39436	NA	46178	2654	1.91

Sample Area	Sample Number	Concentration (mg/kg)						Concentration (ug/kg)				Average ERM-Q
		Antimony	Copper	Lead	Mercury	Nickel	Silver	HMW PAHs	LMW PAHs	Total PAHs	Total PCB Homologs	
	Toxic Samples[1]											
GI_SD_NE_2010	GI-SD512-0006	1.77 UJ	30.6 J	8.4 J	0.006 J	33.4	0.2 UJ	3910 J	1880 J	5790 J	3.2 J	0.21
GI_SD_NE_2010	GI-SD518-0006	0.57 UJ	17.9 J	14.5 J	0.023	9.6 J	0.19 U	5100	840 J	5940 J	164 J	0.22
GI_SD_NE_2010	GI-SD566-0006	0.71 UJ	16 J	17.7 J	0.03	8.8 J	0.24 UJ	3290 J	949 J	4240 J	129 J	0.18
GI_SD_NW_2010	GI-SD520-0006	0.67 UJ	6.5 J	9.3 J	0.015 J	6.7	0.435 J	1520 J	J	1950 J	6.7 J	0.06
GI_SD_NW_2010	GI-SD523-0006	0.6 UJ	37.7 J	35.9 J	0.005 J	17.2	0.277 UJ	1450 J	360 J	1810 J	3.92 J	0.12
	Non-Toxic Samples[1]											
GI_SD_NE_2010	GI-SD510-0006	0.63 UJ	17.7 J	10.7 J	0.012 J	10.8 J	0.017 U	1020 J	244 J	1260 J	2.14 UJ	0.07
GI_SD_NE_2010	GI-SD511-0006	0.71 UJ	10.6 J	20.7 J	0.029	7.6 J	0.24 UJ	271 J	55.8 J	327 J	276 J	0.20
GI_SD_NE_2010	GI-SD513-0006	2.05 UJ	6.8 J	7.3 J	0.039 U	6.2	0.524	283 J	38.4 J	321 J	4.3 J	0.04
GI_SD_NE_2010	GI-SD514-0006	0.89 UJ	13.9 J	23 J	0.087	6.3 J	0.3 U	8700 J	2470 J	11200 J	16 J	0.22
GI_SD_NE_2010	GI-SD515-0006	0.253 J	18.7 J	18.3 J	0.239	8.2 J	0.27 U	4970 J	1390 J	6360 J	290 J	0.31
GI_SD_NE_2010	GI-SD517-0006-AVG	1.46 UJ	13.8 J	41.6 J	0.031 J	8.5	0.245 UJ	342 J	37.2 J	380 J	150 J	0.15
GI_SD_NE_2010	GI-SD519-0006	0.665 UJ	10.9 J	17.9	0.02 J	6	0.222 UJ	633	112 J	745 J	286	0.21
GI_SD_NE_2010	GI-SD528-0006	0.67 UJ	16.4 J	96.8 J	0.018 J	7.3	0.254 UJ	551 J	124 J	675 J	56.1 J	0.12
GI_SD_NE_2010	GI-SD530-0006	0.69 UJ	186 J	20.9 J	0.031	32.8	0.23 UJ	711 J	123 J	834 J	8.1 J	0.19
GI_SD_NE_2010	GI-SD531-0006	0.75 UJ	102 J	199 J	0.229	8.2	0.25 UJ	824 J	166 J	990 J	19.1 J	0.19
GI_SD_NW_2010	GI-SD521-0006	0.58 UJ	22.9 J	13.2 J	0.019 J	9.4	0.19 UJ	14100 J	3800 J	17900 J	1.42 U	0.32
GI_SD_NW_2010	GI-SD522-0006	2.6 UJ	40.6 J	22.2 J	0.039	21.6	0.492 J	1490 J	116 J	1600 J	6.4 J	0.13
	NOEC[2]	0.253	186	199	0.239	32.8	0.524	14100	3800	17900	290	0.32
	[Max.] in toxic sample	NA	37.7	35.9	0.03	33.4	0.44	5100	1880	5940	164	0.22
	LOEC[3]	NA	NA	NA	NA	33.4	NA	NA	NA	NA	NA	NA
	Geometric mean of NOEC and LOEC	NA	NA	NA	NA	33.1	NA	NA	NA	NA	NA	NA

Footnotes:
1 - Risk characterization in Table 6-17.
2 - Greatest concentration in a non-toxic sample.
3 - Lowest concentration in a toxic sample that is greater than the maximum concentration in a non-toxic sample.

ERM-Q - Effects range medium quotient
NOEC - No observed effects level
LOEC - Lowest observed effects level

TABLE D-5
SUMMARY OF NOECS AND LOECS FOR LEPTOCHEIRUS PLUMULOSUS BASED ON ALL ENDPOINTS

SITE 17, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

Sample Area	Sample Number	Concentration (mg/kg)						Concentration (ug/kg)				Average ERM-Q
		Antimony	Copper	Lead	Mercury	Nickel	Silver	HMW PAHs	LMW PAHs	Total PAHs	Total PCB Homologs	
	Toxic Samples[1]											
GI_SD_STILLWATER_2010	GI-SD501-0006	0.79 UJ	28.7 J	35.2 J	0.107	7.7 J	0.145 J	48600	6550 J	55100 J	2720 J	2.29
GI_SD_STILLWATER_2010	GI-SD503-0006	0.7 UJ	9.6 J	13.9 J	0.059	6.7 J	0.23 UJ	8900	944 J	9840 J	5.71 U	0.17
GI_SD_STILLWATER_2010	GI-SD505-0006	0.208 J	25 J	20.4	0.079	6.7	0.271 U	5510	801 J	6310 J	950	0.66
GI_SD_STILLWATER_2010	GI-SD508-0006-AVG	0.65 UJ	14.8 J	10.6 J	0.0195 J	8.9 J	0.0435 J	2150 J	326 J	2480 J	895 J	0.58
GI_SD_STILLWATER_2010	GI-SD509-0006	0.68 UJ	11.8 J	10.6 J	0.0285	5.85 J	0.106 J	3000 J	593 J	3600 J	460 J	0.34
GI_SD_STILLWATER_2010	GI-SD509-0006-D	0.68 UJ	11.8 J	10.6 J	0.0285	5.85 J	0.106 J	3000 J	593 J	3600 J	460 J	0.34
GI_SD_NE_2010	GI-SD512-0006	1.77 UJ	30.6 J	8.4 J	0.006 J	33.4	0.2 UJ	3910 J	1880 J	5790 J	3.2 J	0.21
GI_SD_NE_2010	GI-SD518-0006	0.57 UJ	17.9 J	14.5 J	0.023	9.6 J	0.19 U	5100	840 J	5940 J	164 J	0.22
GI_SD_NE_2010	GI-SD566-0006	0.71 UJ	16 J	17.7 J	0.03	8.8 J	0.24 UJ	3290 J	949 J	4240 J	129 J	0.18
GI_SD_NW_2010	GI-SD520-0006	0.67 UJ	6.5 J	9.3 J	0.015 J	6.7	0.435 J	1520 J	425 J	1950 J	6.7 J	0.06
GI_SD_NW_2010	GI-SD523-0006	0.6 UJ	37.7 J	35.9 J	0.005 J	17.2	0.277 UJ	1450 J	360 J	1810 J	3.92 J	0.12
	Non-Toxic Samples[1]											
GI_SD_STILLWATER_2010	GI-SD502-0006	0.81 J	21.2 J	11.3 J	0.02 J	10 J	0.27 U	27000 J	7750 J	34700 J	862 J	1.06
GI_SD_STILLWATER_2010	GI-SD504-0006	0.72 UJ	17.8 J	21 J	0.083	7 J	0.223 J	5960	1240 J	7200 J	394 J	0.38
GI_SD_STILLWATER_2010	GI-SD506-0006	0.692 UJ	11.1 J	11.4	0.035	6.5	0.231 UJ	3570	494 J	4060 J	547	0.39
GI_SD_STILLWATER_2010	GI-SD507-0006	0.69 UJ	12.5 J	12.4 J	0.045	6.5 J	0.143 J	7430 J	1090 J	8520 J	2590	1.59
GI_SD_STILLWATER_2010	GI-SD527-0006	0.71 UJ	14.9 J	15 J	0.054	7.7 J	0.23 UJ	1570	233 J	1800 J	25.3	0.08
GI_SD_STILLWATER_2010	GI-SD532-0006	0.71 UJ	10.4 J	7.1 J	0.023 J	8.4 J	0.24 U	32000	6650 J	38700 J	1240	1.27
GI_SD_NE_2010	GI-SD510-0006	0.63 UJ	17.7 J	10.7 J	0.012 J	10.8 J	0.017 U	1020 J	244 J	1260 J	2.14 UJ	0.07
GI_SD_NE_2010	GI-SD511-0006	0.71 UJ	10.6 J	20.7 J	0.029	7.6 J	0.24 UJ	271 J	55.8 J	327 J	276 J	0.20
GI_SD_NE_2010	GI-SD513-0006	2.05 UJ	6.8 J	7.3 J	0.039 U	6.2	0.524	283 J	38.4 J	321 J	4.3 J	0.04
GI_SD_NE_2010	GI-SD514-0006	0.89 UJ	13.9 J	23 J	0.087	6.3 J	0.3 U	8700 J	2470 J	11200 J	16 J	0.22
GI_SD_NE_2010	GI-SD515-0006	0.253 J	18.7 J	18.3 J	0.239	8.2 J	0.27 U	4970 J	1390 J	6360 J	290 J	0.31
GI_SD_NE_2010	GI-SD517-0006-AVG	1.46 UJ	13.8 J	41.6 J	0.031 J	8.5	0.245 UJ	342 J	37.2 J	380 J	150 J	0.15
GI_SD_NE_2010	GI-SD519-0006	0.665 UJ	10.9 J	17.9	0.02 J	6	0.222 UJ	633	112 J	745 J	286	0.21
GI_SD_NE_2010	GI-SD528-0006	0.67 UJ	16.4 J	96.8 J	0.018 J	7.3	0.254 UJ	551 J	124 J	675 J	56.1 J	0.12
GI_SD_NW_2010	GI-SD521-0006	0.58 UJ	22.9 J	13.2 J	0.019 J	9.4	0.19 UJ	14100 J	3800 J	17900 J	1.42 U	0.32
GI_SD_NW_2010	GI-SD522-0006	2.6 UJ	40.6 J	22.2 J	0.039	21.6	0.492 J	1490 J	116 J	1600 J	6.4 J	0.13
GI_SD_NE_2010	GI-SD530-0006	0.69 UJ	186 J	20.9 J	0.031	32.8	0.23 UJ	711 J	123 J	834 J	8.1 J	0.19
GI_SD_NE_2010	GI-SD531-0006	0.75 UJ	102 J	199 J	0.229	8.2	0.25 UJ	824 J	166 J	990 J	19.1 J	0.19
GI_SD_S_2010	GI-SD529-0006	0.718 UJ	8.1 J	12.7	0.027 J	8.4	0.252 UJ	1780	567 J	2350 J	16	0.08
GI_SD_REF_2010	GI-SD524-0006	0.68 UJ	6.2 J	9.2 J	0.028	7 J	0.097 J	229 J	31 J	260 J	0.543 U	0.04
GI_SD_REF_2010	GI-SD525-0006	0.83 UJ	15 J	20.6 J	0.083	10.2 J	0.19 J	673 J	96.6 J	770 J	0.669 U	0.07
GI_SD_REF_2010	GI-SD526-0006	0.68 UJ	9.9 J	10.6 J	0.039	11.7 J	0.144 J	173 J	10.4 J	184 J	0.538 U	0.05
	NOEC[2]	0.81	186	199	0.239	32.8	0.524	32000	7750	38700	2590	1.59
	[Max.] in toxic sample	0.208	37.7	35.9	0.107	33.4	0.435	48600	6550	55100	2720	2.29
	LOEC[3]	NA	NA	NA	NA	33.4	NA	48600	NA	55100	2720	2.29
	Geometric mean of NOEC and LOEC	NA	NA	NA	NA	33.1	NA	39436	NA	46178	2654	1.91

Footnotes:
1 - Risk characterization in Table 6-17.
2 - Greatest concentration in a non-toxic sample.
3 - Lowest concentration in a toxic sample that is greater than the maximum concentration in a non-toxic sample.

ERM-Q - Effects range medium quotient
NOEC - No observed effects level
LOEC - Lowest observed effects level

TABLE D-6
UNCERTAINTY ANALYSIS - SUMMARY OF NOECS AND LOECS FOR LEPTOCHEIRUS PLUMULOSUS BASED ON ALL ENDPOINTS

SITE 17, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

Sample Area	Sample Number	Total Organic Carbon (%)	Concentration (mg/kg)						Concentration (ug/kg)							
			Antimony	Copper	Lead	Mercury	Nickel	Silver	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene
	Toxic Samples[1]															
GI_SD_STILLWATER_2010	GI-SD501-0006	1.17	0.79 UJ	28.7 J	35.2 J	0.107	7.7 J	0.145 J	520 U	130 J	210 J	4400	5200	3800	4100	1600
GI_SD_STILLWATER_2010	GI-SD503-0006	0.8	0.7 UJ	9.6 J	13.9 J	0.059	6.7 J	0.23 UJ	93 U	42 J	24 J	300	1000	760	770	330
GI_SD_STILLWATER_2010	GI-SD505-0006	1.38	0.208 J	25 J	20.4	0.079	6.7	0.271 U	110 U	38 J	54 J	270	580	600	590	320
GI_SD_STILLWATER_2010	GI-SD507-0006	0.724	0.69 UJ	12.5 J	12.4 J	0.045	6.5 J	0.143 J	46 UJ	62 J	51 J	230 J	750 J	740 J	770 J	330 J
GI_SD_STILLWATER_2010	GI-SD508-0006-AVG	0.288	0.65 UJ	14.8 J	10.6 J	0.0195 J	8.9 J	0.0435 J	21.5 U	18 J	12 J	94.5 J	185 J	118 J	145 J	61.5
GI_SD_STILLWATER_2010	GI-SD509-0006	0.57	0.68 UJ	11.8 J	10.6 J	0.0285	5.85 J	0.106 J	17.8 J	44 J	17 J	136 J	300 J	285 J	260 J	155 J
GI_SD_STILLWATER_2010	GI-SD509-0006-D	0.59	0.68 UJ	11.8 J	10.6 J	0.0285	5.85 J	0.106 J	17.8 J	44 J	17 J	136 J	300 J	285 J	260 J	155 J
GI_SD_NE_2010	GI-SD510-0006	0.474	0.63 UJ	17.7 J	10.7 J	0.012 J	10.8 J	0.017 U	8.4 UJ	11 J	12 J	76 J	96 J	130 J	120 J	71 J
GI_SD_NE_2010	GI-SD512-0006	0.233	1.77 UJ	30.6 J	8.4 J	0.006 J	33.4	0.2 UJ	42 J	190 J	32 UJ	360 J	420 J	380 J	280 J	190 J
GI_SD_NE_2010	GI-SD518-0006	0.97	0.57 UJ	17.9 J	14.5 J	0.023	9.6 J	0.19 U	37 U	70	13 J	160	560	540	430	330
GI_SD_NE_2010	GI-SD519-0006	0.524	0.665 UJ	10.9 J	17.9	0.02 J	6	0.222 UJ	1.8 J	6.8 J	2.3 J	25	68	68	60	37
GI_SD_NW_2010	GI-SD520-0006	0.429	0.67 UJ	6.5 J	9.3 J	0.015 J	6.7	0.435 J	8.9 J	21 J	12 J	70 J	150 J	150 J	110 J	92 J
GI_SD_NW_2010	GI-SD521-0006	0.296	0.58 UJ	22.9 J	13.2 J	0.019 J	9.4	0.19 UJ	31 J	290 J	12 J	780 J	1600 J	1400 J	990 J	680 J
GI_SD_NW_2010	GI-SD523-0006	0.366	0.6 UJ	37.7 J	35.9 J	0.005 J	17.2	0.277 UJ	4.8 J	30	2 J	65	150	150	110	89
GI_SD_NE_2010	GI-SD528-0006	0.44	0.67 UJ	16.4 J	96.8 J	0.018 J	7.3	0.254 UJ	3.1 J	13	2.2 J	22	55	53 J	46	38 J
GI_SD_NE_2010	GI-SD531-0006	0.646	0.75 UJ	102 J	199 J	0.229	8.2	0.25 UJ	3.5 J	17	6 J	32	69	77 J	93	78 J
GI_SD_NE_2010	GI-SD566-0006	1.03	0.71 UJ	16 J	17.7 J	0.03	8.8 J	0.24 UJ	13 J	91 J	5.7 J	190 J	340 J	330 J	250 J	180 J
	Non-Toxic Samples[1]															
GI_SD_STILLWATER_2010	GI-SD502-0006	0.946	0.81 J	21.2 J	11.3 J	0.02 J	10 J	0.27 U	320 U	200 J	110 J	2300	2200	1500	1700	620
GI_SD_STILLWATER_2010	GI-SD504-0006	1.13	0.72 UJ	17.8 J	21 J	0.083	7 J	0.223 J	96 U	110	29 J	240	650	590	490	340
GI_SD_STILLWATER_2010	GI-SD506-0006	0.72	0.692 UJ	11.1 J	11.4	0.035	6.5	0.231 UJ	46 U	19 J	35 J	97	290	260	280	150
GI_SD_NE_2010	GI-SD511-0006	0.59	0.71 UJ	10.6 J	20.7 J	0.029	7.6 J	0.24 UJ	9.3 U	4.2 J	1.9 J	11	25	28	27	21
GI_SD_NE_2010	GI-SD513-0006	0.67	2.05 UJ	6.8 J	7.3 J	0.039 U	6.2	0.524	1.4 J	9 U	12	9 U	28	31 J	22	25 J
GI_SD_NE_2010	GI-SD514-0006	1.37	0.89 UJ	13.9 J	23 J	0.087	6.3 J	0.3 U	117 UJ	220 J	47 J	500 J	910 J	890 J	700 J	490 J
GI_SD_NE_2010	GI-SD515-0006	1.47	0.253 J	18.7 J	18.3 J	0.239	8.2 J	0.27 U	26 J	150 J	14 J	260 J	510 J	530 J	440 J	290 J
GI_SD_NE_2010	GI-SD517-0006-AVG	0.825	1.46 UJ	13.8 J	41.6 J	0.031 J	8.5	0.245 UJ	1.95 J	2.75 J	3.75 J	11 UJ	37 J	37 J	38.5 J	24 J
GI_SD_NW_2010	GI-SD522-0006	1.19	2.6 UJ	40.6 J	22.2 J	0.039	21.6	0.492 J	2.9 J	7.5 J	5.2 J	25	130	81 J	76	43 J
GI_SD_REF_2010	GI-SD524-0006	0.59	0.68 UJ	6.2 J	9.2 J	0.028	7 J	0.097 J		9.1 U	4.6 J	4.1 J	22	24	19	20
GI_SD_REF_2010	GI-SD525-0006	1.16	0.83 UJ	15 J	20.6 J	0.083	10.2 J	0.19 J		3.9 J	13 J	15 J	61 J	73 J	58 J	48 J
GI_SD_REF_2010	GI-SD526-0006	0.849	0.68 UJ	9.9 J	10.6 J	0.039	11.7 J	0.144 J		8.9 U	3.6 J	5 J	15	18	15	14
GI_SD_STILLWATER_2010	GI-SD527-0006	1.14	0.71 UJ	14.9 J	15 J	0.054	7.7 J	0.23 UJ	18 U	13 J	17 J	57	160	160	160	98
GI_SD_S_2010	GI-SD529-0006	0.83	0.718 UJ	8.1 J	12.7	0.027 J	8.4	0.252 UJ	13	57	2.4 J	98	180	180	140	110
GI_SD_NE_2010	GI-SD530-0006	0.5	0.69 UJ	186 J	20.9 J	0.031	32.8	0.23 UJ	3.2 J	7.9 J	6.9 J	23	68	67 J	59	40 J
GI_SD_STILLWATER_2010	GI-SD532-0006	0.442	0.71 UJ	10.4 J	7.1 J	0.023 J	8.4 J	0.24 U	290 U	230 J	87 J	2400	2900	2100	2600	970
	NOEC[2]		0.81	186	41.6	0.239	32.8	0.524	26	230	110	2400	2900	2100	2600	970
	[Max.] in toxic sample		0.208	102	199	0.229	33.4	0.435	42	290	210	4400	5200	3800	4100	1600
	LOEC[3]		NA	NA	96.8	NA	33.4	NA	31	290	210	4400	5200	3800	4100	1600
	Geometric mean of NOEC and LOEC		NA	NA	63.5	NA	33.1	NA	28	258	152	3250	3883	2825	3265	1246

Footnotes:
1 - Uncertainty analysis risk characterization is presented in Section 6.5.4
2 - Greatest concentration in a non-toxic sample.
3 - Lowest concentration in a toxic sample that is greater than the maximum concentration in a non-toxic sample.

ERM-Q - Effects range medium quotient
NOEC - No observed effects level
LOEC - Lowest observed effects level

TABLE D-6
UNCERTAINTY ANALYSIS - SUMMARY OF NOECS AND LOECS FOR LEPTOCHEIRUS PLUMULOSUS BASED ON ALL ENDPOINTS

SITE 17, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT RI

Sample Area	Sample Number	Concentration (ug/kg)													Average ERM-Q
		Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	HMW PAHs	LMW PAHs	Total PAHs	Total PCB Homologs	
	Toxic Samples[1]														
GI_SD_STILLWATER_2010	GI-SD501-0006	3900	6900	580	12000	210 J	1600	520 U	1600	8900	48600	6550 J	55100 J	2720 J	2.29
GI_SD_STILLWATER_2010	GI-SD503-0006	580	1100	130	2100	38 J	330	93 U	540	1800	8900	944 J	9840 J	5.71 U	0.17
GI_SD_STILLWATER_2010	GI-SD505-0006	520	840	110	830	49 J	280	110 U	390	840	5510	801 J	6310 J	950	0.66
GI_SD_STILLWATER_2010	GI-SD507-0006	590 J	1100 J	120 J	1500 J	72 J	330 J	67 J	610 J	1200 J	7430 J	1090 J	8520 J	2590	1.59
GI_SD_STILLWATER_2010	GI-SD508-0006-AVG	125 J	270 J	20.5 J	655	21.5 J	56.5	21.5 U	180 J	515	2150 J	326 J	2480 J	895 J	0.58
GI_SD_STILLWATER_2010	GI-SD509-0006	225 J	425 J	55 J	625 J	44 J	155 J	36.5 UJ	345 J	520 J	3000 J	593 J	3600 J	460 J	0.34
GI_SD_STILLWATER_2010	GI-SD509-0006-D	225 J	425 J	55 J	625 J	44 J	155 J	36.5 UJ	345 J	520 J	3000 J	593 J	3600 J	460 J	0.34
GI_SD_NE_2010	GI-SD510-0006	93 J	140 J	26 J	150 J	23 J	73 J	12 J	110 J	120 J	1020 J	244 J	1260 J	2.14 UJ	0.07
GI_SD_NE_2010	GI-SD512-0006	260 J	370 J	70 J	1000 J	170 J	190 J	130 J	990 J	750 J	3910 J	1880 J	5790 J	3.2 J	0.21
GI_SD_NE_2010	GI-SD518-0006	360	560	110	1000	57	310	37 U	540	900	5100	840 J	5940 J	164 J	0.22
GI_SD_NE_2010	GI-SD519-0006	49	74	13	120	6.3 J	34	2.7 J	67	110	633	112 J	745 J	286	0.21
GI_SD_NW_2010	GI-SD520-0006	110 J	160 J	29 J	360 J	34 J	82 J	19 J	260 J	280 J	1520 J	425 J	1950 J	6.7 J	0.06
GI_SD_NW_2010	GI-SD521-0006	1100 J	1500 J	270 J	3300 J	290 J	690 J	78 UJ	2400 J	2600 J	14100 J	3800 J	17900 J	1.42 U	0.32
GI_SD_NW_2010	GI-SD523-0006	110	150	30	320	28	84	7.9 UJ	230	260 J	1450 J	360 J	1810 J	3.92 J	0.12
GI_SD_NE_2010	GI-SD528-0006	40	54	12	120	9.3	33	8.8 U	74	100 J	551 J	124 J	675 J	56.1 J	0.12
GI_SD_NE_2010	GI-SD531-0006	64	82	25	140	13	66	10 U	95	130 J	824 J	166 J	990 J	19.1 J	0.19
GI_SD_NE_2010	GI-SD566-0006	230 J	340 J	74 J	770 J	66 J	190 J	33 J	550 J	590 J	3290 J	949 J	4240 J	129 J	0.18
	Non-Toxic Samples[1]														
GI_SD_STILLWATER_2010	GI-SD502-0006	1400	3800	250 J	8800	440	690	320 U	4700	6000	27000 J	7750 J	34700 J	862 J	1.06
GI_SD_STILLWATER_2010	GI-SD504-0006	530	730	110	1200	87 J	320	96 U	770	1000	5960	1240 J	7200 J	394 J	0.38
GI_SD_STILLWATER_2010	GI-SD506-0006	240	480	49	940	26 J	140	7 J	310	740	3570	494 J	4060 J	547	0.39
GI_SD_NE_2010	GI-SD511-0006	24	31	7.1 J	49	4.7 J	16	9.3 U	34	43	271 J	55.8 J	327 J	276 J	0.20
GI_SD_NE_2010	GI-SD513-0006	24	31	6.8 J	48	9 U	19	9 U	25	48 J	283 J	38.4 J	321 J	4.3 J	0.04
GI_SD_NE_2010	GI-SD514-0006	630 J	940 J	170 J	2000 J	200 J	470 J	117 UJ	1500 J	1500 J	8700 J	2470 J	11200 J	16 J	0.22
GI_SD_NE_2010	GI-SD515-0006	340 J	500 J	100 J	1100 J	100 J	300 J	54 J	790 J	860 J	4970 J	1390 J	6360 J	290 J	0.31
GI_SD_NE_2010	GI-SD517-0006-AVG	32 J	42 J	7.7 J	56.5 J	3.75 J	22 J	10 UJ	25 J	45.5 J	342 J	37.2 J	380 J	150 J	0.15
GI_SD_NW_2010	GI-SD522-0006	89	160	15	490	6.9 J	42	11 U	69	360 J	1490 J	116 J	1600 J	6.4 J	0.13
GI_SD_REF_2010	GI-SD524-0006	18	27	4.1 J	40	2.3 J	15	9.1 U	20	40	229 J	31 J	260 J	0.543 U	0.04
GI_SD_REF_2010	GI-SD525-0006	52 J	71 J	15 J	130 J	6.7 J	45 J	11 UJ	58 J	120 J	673 J	96.6 J	770 J	0.669 U	0.07
GI_SD_REF_2010	GI-SD526-0006	13	17	3.2 J	36	1.8 J	12	8.9 U	17 U	30	173 J	10.4 J	184 J	0.538 U	0.05
GI_SD_STILLWATER_2010	GI-SD527-0006	140	240	33	260	16 J	91	18 U	130	230	1570	233 J	1800 J	25.3	0.08
GI_SD_S_2010	GI-SD529-0006	150	180	36	400	47	98	30	320	310	1780	567 J	2350 J	16	0.08
GI_SD_NE_2010	GI-SD530-0006	55	100	15	140	7.9 J	37	9.2 U	74	130 J	711 J	123 J	834 J	8.1 J	0.19
GI_SD_STILLWATER_2010	GI-SD532-0006	2000	4900	360	8900	330	980	290 U	3600	6300	32000	6650 J	38700 J	1240	1.27
	NOEC[2]	2000	4900	360	8900	440	980	54	4700	6300	32000	7750	38700	1240	1.27
	[Max.] in toxic sample	3900	6900	580	12000	290	1600	130	2400	8900	48600	6550	55100	2720	2.29
	LOEC[3]	3900	6900	580	12000	NA	1600	67	NA	8900	48600	NA	55100	2590	1.59
	Geometric mean of NOEC and LOEC	2793	5815	457	10334	NA	1252	60	NA	7488	39436	NA	46178	1792	1.42

Footnotes:
1 - Uncertainty analysis risk characterization is presented in S
2 - Greatest concentration in a non-toxic sample.
3 - Lowest concentration in a toxic sample that is greater than

ERM-Q - Effects range medium quotient
NOEC - No observed effects level
LOEC - Lowest observed effects level

Appendix E
ARARs and To Be Considered Guidance

TABLE E-1

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs – SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
EPA Human Health Assessment Cancer Slope Factors (CSFs).	None	To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media. Removal of contaminated soil and LUCs will prevent exposure to site contaminants exceeding risk levels.
Reference Dose (RfD)	None	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants. Removal of contaminated soil and LUCs will prevent exposure to site contaminants exceeding risk levels.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants. Removal of contaminated soil and LUCs will prevent exposure to site contaminants exceeding risk levels.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants. Removal of contaminated soil and LUCs will prevent exposure to site contaminants exceeding risk levels.

TABLE E-1

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs – SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State				
State of Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Short Title: Remediation Regulations)	DEM-DSR-01-93, Section 8.02A(i), (ii), and (iii); 8.02B (with the exception of 8.02A(iv)-TPH); Code of Rhode Island Rules (CRIR) 12-180-001	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a remedy when they are more stringent than federal standards. Establishes criteria for both direct contact and leachability of contaminants in soil.	Removal of contaminated soil and LUCs will prevent exposure to site contaminants exceeding criteria.

TABLE E-2

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs - SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
Fish and Wildlife Coordination Act	16 United States Code (USC) 661 et seq	Applicable	Requires that the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), and related state agencies be consulted prior to structural modification of any body of water, including wetlands.	Excavations may impact the wetlands (shoreline). Federal and state fish and wildlife officials would be consulted on how to minimize impacts of any remedial activities on any fish, wildlife and endangered species.
Endangered Species Act (ESA)	50 Code of Federal Regulations (CFR) 81 and 402	Applicable	Remedial actions may not jeopardize the continued existence of federally-listed endangered or threatened species, or adversely modify or destroy their critical habitat. The Atlantic Sturgeon has been listed as an Endangered Species in the region including Narragansett Bay.	The Navy will consult with the appropriate federal resource agencies to ensure that the excavation and backfill will be conducted to minimize disturbance to aquatic habitats in Narragansett Bay that may be used by the federally endangered Atlantic Sturgeon.
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	FEMA 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.	Remedial alternatives conducted within the 100-year coastal storm floodplain or within federal jurisdictional wetlands and aquatic habitats will be implemented in compliance with these standards. During the remedial design stage, the effects of soil remedial actions on federal jurisdictional wetlands will be evaluated. All practicable means will be used to minimize harm to the wetlands. Wetlands disturbed by soil remediation will be mitigated in accordance with requirements. The Navy solicited public comment as part of the proposed plan on the measures taken through the remedial action to protect floodplain and wetland/aquatic habitat resources and received no specific comments on this matter.

TABLE E-2

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs - SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal (continued)				
Coastal Zone Management Act	16 USC Parts 1451 *et. seq*.	Applicable	Requires that any actions must be conducted in a manner consistent with state-approved management programs.	The site is located within a coastal zone management area; therefore, applicable coastal zone management requirements need to be addressed.
National Historic Landmarks (Historic Sites Act)	16 USC 461 et seq.; 36 CFR Part 65	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this remedy impact historical properties/structures determined to be protected by this standard, activities will be coordinated with the Department of the Interior.
Protection of Historic Properties (National Historic Preservation Act)	16 USC 470 et seq., 36 CFR Part 800	Relevant and Appropriate	Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this remedy impact properties/structures determined to be protected by this standard, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE E-2

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs - SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State				
Coastal Resources Management	Rhode Island General Laws (RIGL) 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources. Jurisdiction includes areas within 200 feet of coastal features, within 50 feet of wetlands under the jurisdiction of the CRMC, and floodplains.	Remedial actions on soils areas that are within 200 feet of coastal features shall be conducted with safeguards employed to provide protection of protected natural resources as required by the cited statute.
Rhode Island Historical Preservation Act	RIGL 42-45 et seq.	Applicable	Requires action to take into account effects on properties included on or eligible for the National register of Historic Places and minimizes harm to National Historic Landmarks.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this remedy impact properties/structures determined to be protected by this standard, activities will be coordinated with the State Agency.

TABLE E-3

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs - SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 - BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
Toxic Substances Control Act - PCB Remediation Waste	40 Code of Federal Regulations (CFR) 761.61(c)	Applicable	Risk-based standards for the sampling, cleanup, or disposal of PCB remediation waste. Written approval for the proposed risk-based clean-up will be obtained from the Office of Site Remediation and Restoration, EPA Region 1.	Standards apply to sampling, cleanup, and disposal. The Navy solicited public comment in the Proposed Plan about the finding that the proposed remedy for PCB contamination at the Site will not pose an unreasonable risk of injury to health or the environment. An EPA finding that the remedy meets these standards will be included in the Record of Decision. The excavation and off-site disposal of PCB-contaminated sump debris and soil will prevent exposure to PCBs exceeding cleanup levels in shallow groundwater and sediment.
State				
Standards for Identification and Listing of Hazardous Waste	Rules and Regulations for Hazardous Waste Management, Code of Rhode Island Rules (CRIR), 12-030-003, Rule 5.8	Applicable	Rhode Island is delegated to administer the federal RCRA statute through its state regulations. Defines the listed and characteristic hazardous wastes.	These regulations apply to all waste generated during actions at the site, such as excavated soil. Will be used when determining whether or not a solid waste is hazardous.
Standards for Generators of Hazardous Waste	Rules and Regulations for Hazardous Waste Management, CRIR 12-030-003, Rule 5.2, 5.3, and 5.4	Applicable	Establishes manifesting and pre-transport requirements for hazardous waste.	These regulations would apply to all waste generated at the site during removal, if hazardous.

TABLE E-3

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs - SOIL ALTERNATIVE SO4: EXCAVATION OF SOIL EXCEEDING INDUSTRIAL CLEANUP GOALS, LUCs, AND INSPECTIONS
SITE 17 - BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State (continued)				
Well Standards	State of Rhode Island Rules and Regulations for Groundwater Quality – Appendix 1	Applicable	Identifies the standards and specification that must be followed for the installation or abandonment of monitoring wells.	Applies to the abandonment of existing monitoring wells.
Rhode Island Solid Waste Regulations – Closure	DEM OWMSW0401, 1.7.14(b)	Relevant and Appropriate	Regulation pertaining to closure of solid waste management units.	Sump debris will be removed and disposed off-site in compliance with these solid waste closure standards.
Clean Air Act - Fugitive Dust Control	CRIR 12-31-05	Applicable	Requires that reasonable precaution be taken to prevent particulate matter from becoming airborne.	Removal and temporary storage of soil during excavation would be conducted in a manner to prevent material from becoming airborne.
Clean Air Act - Emissions Detrimental to Persons or Property	CRIR 12-31-07	Applicable	Prohibits emissions of contaminants that may be injurious to human, plant, or animal life or cause damage to property, or which reasonably interfere with the enjoyment of life and property.	Monitoring of air emissions during excavation will be used to assess compliance with these standards if threshold levels are reached.
Rhode Island Soil Erosion and Sediment Control (SESC) Manual	None	To be considered	RIGL Erosion and Sediment Control Act places enforcement of soil erosion and sediment control at the local level. The SESC Manual is the primary guidance document.	An erosion and sediment control plan will be prepared according to the SESC Manual for all activities with land disturbance.
Identification and Management of Aquatic Invasive Species	None	To be Considered	Guidance on addressing aquatic invasive species in Rhode Island.	Remedial work along the shore will be conducted in a manner to prevent the establishment or spread of aquatic invasive species.

TABLE E-4

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs –
GROUNDWATER ALTERNATIVE 2: MONITORED NATURAL ATTENUATION AND LUCS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to be Taken to Attain ARAR
Federal				
EPA Human Health Assessment Cancer Slope Factors (CSFs)	None	To Be Considered	Guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media. Land Use Controls (LUCs) will prevent exposure to contaminants in groundwater exceeding risk levels until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.
Reference Dose (RfD)	None	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants. LUCs will prevent exposure to contaminants in groundwater exceeding risk levels until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risks.	Used to calculate potential carcinogenic risks caused by exposure to contaminants. LUCs will prevent exposure to contaminants in groundwater exceeding risk levels until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.

TABLE E-4

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs – GROUNDWATER ALTERNATIVE 2: MONITORED NATURAL ATTENUATION AND LUCS SITE 17 – FORMER BUILDING 32, GOULD ISLAND NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to be Taken to Attain ARAR
Federal (continued)				
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants. LUCs will prevent exposure to contaminants in groundwater exceeding risk levels until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.
Safe Drinking Water Act, National Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)	40 Code of Federal Regulations (CFR) 141 Subpart B and G	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources.	Under federal standards, is considered a potential drinking water source and therefore groundwater must achieve these standards. Groundwater LUCs will be maintained until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.
Safe Drinking Water Act, National Primary Drinking Water Regulations - Maximum Contaminant Level Goals (MCLGs)	40 CFR 141 Subpart F	Relevant and Appropriate (non-zero MCLGs only)	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Under federal standards, groundwater within the Site is considered a potential drinking water source and therefore groundwater must achieve this standard. Groundwater LUCs will be maintained until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.

TABLE E-4

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs – GROUNDWATER ALTERNATIVE 2: MONITORED NATURAL ATTENUATION AND LUCS SITE 17 – FORMER BUILDING 32, GOULD ISLAND NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to be Taken to Attain ARAR
Federal (continued)				
Drinking Water Health Advisory for Manganese (EPA Office of Drinking Water), 2004	None	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 0.3 ppm.	Health advisory for manganese was used as an indication of non-carcinogenic risk resulting from exposure to manganese. Under federal standards, groundwater within the Site is considered a potential drinking water source and therefore groundwater must achieve these standards. Groundwater LUCs will be maintained until MNA achieves the cleanup goals (between 54 and 87 years). Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.
State				
Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Short Title: Remediation Regulations)	Code of Rhode Island Rules (CRIR) 12-180-001, DEM-DSR-01-93, Section 8.03A(i) and (iii); and 8.03B.	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a CERCLA remedy when they are more stringent than federal standards. Establishes criteria for groundwater.	Concentrations of COCs are already less than Groundwater Objectives. LUCs will prevent residential use of groundwater. Periodic monitoring to be conducted as part of MNA will verify that Groundwater Objectives are not exceeded. Source control measures with follow-up monitoring will address exceedances of standards in shallow groundwater.

TABLE E-5

**ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs –
GROUNDWATER ALTERNATIVE 2: MONITORED NATURAL ATTENUATION AND LUCS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND**

Requirement	Citation	Status	Synopsis of Requirement	Action to be Taken to Attain ARAR
Federal				
Floodplain Management and Protection of Wetlands	44 Code of Federal Regulations (CFR) 9	Relevant and Appropriate	FEMA 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.	Monitoring activities conducted within the 100-year coastal storm floodplain or within federal jurisdictional wetlands and aquatic habitats will be implemented in compliance with these standards. During the remedial design stage, the effects of groundwater remedial actions on federal jurisdictional wetlands will be evaluated. All practicable means will be used to minimize harm to the wetlands. The Navy solicited public comment as part of the proposed plan on the measures taken through the remedial action to protect floodplain and wetland/aquatic habitat resources and received no negative comments.
Coastal Zone Management Act	16 United States Code (USC) Parts 1451 *et. seq*.	Applicable	Requires that any actions must be conducted in a manner consistent with state-approved management programs.	The site is located within a coastal zone management area; therefore, applicable coastal zone management requirements need to be addressed.
State				
Coastal Resources Management	Rhode Island General Laws (RIGL) 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources.	The entire site is located in a coastal resource management area; therefore, activities conducted under this alternative would be conducted in compliance with applicable coastal resource management requirements.

TABLE E-6

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs –
GROUNDWATER ALTERNATIVE 2: MONITORED NATURAL ATTENUATION AND LUCS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVAL STATION NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to be Taken to Attain ARAR
Federal				
EPA Groundwater Protection Strategy	August 1984; NCP Preamble, Vol. 55, No. 46, March 8, 1990, 40 CFR 300, p. 8733); Guidelines for Ground-Water Classification (November 1986)	To Be Considered	The Groundwater Protection Strategy provides a common reference for preserving clean groundwater and protecting the public health against the effects of past contamination. Guidelines for consistency in groundwater protection programs focus on the highest beneficial use of a groundwater aquifer.	Guidance standards will be met since federal drinking water standards, non-zero Maximum Contaminant Level Goals (MCLGs), and more stringent state groundwater standards and risk-based standards will be met through application of the Land Use Controls (LUCs) and source control measures and monitoring for the shallow groundwater.
Toxic Substances Control Act (TSCA) - PCB Remediation Waste	40 Code of Federal Regulations (CFR) 761.61(c)	Applicable	Risk-based standards for the sampling, cleanup, or disposal of PCB remediation waste. Written approval for the proposed risk-based clean-up will be obtained from the Office of Site Remediation and Restoration, EPA Region 1.	Standards apply to sampling, cleanup, and disposal. The Navy solicited public comment in the Proposed Plan about the finding that the proposed remedy for PCB contamination at the site will not pose an unreasonable risk of injury to health or the environment. An EPA finding that the remedy meets these standards is included in the Record of Decision. PCB contamination in shallow groundwater exceeding PCB cleanup goals will be addressed through source control measures and monitoring.
Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites	OSWER Directive 9200.4-17P (April 21, 1999)	To Be Considered	EPA guidance regarding the use of monitored natural attenuation for the cleanup of contaminated soil and groundwater. In particular, a reasonable time frame is defined as achieving cleanup standards though monitored attenuation would be comparable to that which could be achieved through active restoration.	The monitored natural attenuation component of any groundwater alternative will only meet these standards if natural attenuation will attain all groundwater cleanup standards for each COC within a timeframe that is reasonable compared to that offered by other methods.

TABLE E-6

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs –
GROUNDWATER ALTERNATIVE 2: MONITORED NATURAL ATTENUATION AND LUCS
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVAL STATION NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to be Taken to Attain ARAR
State				
Standards for Identification and Listing of Hazardous Waste	Rules and Regulations for Hazardous Waste Management, Code of Rhode Island Rules (CRIR), 12-030-003, Rule 5.8	Applicable	Rhode Island is delegated to administer the federal RCRA statute through its state regulations. Defines the listed and characteristic hazardous wastes.	These regulations apply to all waste generated during actions at the Site, such as investigation-derived waste (IDW) from monitoring. Will be used when determining whether or not a solid waste is hazardous. IDW is not expected to be hazardous.
Standards for Generators of Hazardous Waste	Rules and Regulations for Hazardous Waste Management, CRIR 12-030-003, Rule 5.2, 5.3, and 5.4	Applicable	Establishes accumulation, manifesting, and pre-transport requirements for hazardous waste.	These regulations would apply to any waste generated at the Site that is determined to be hazardous, such as IDW from monitoring. IDW is not expected to be hazardous.
Drilling of Drinking Water Wells; Rules and Regulations Governing the Enforcement of Chapter 46-13.2 Relating to the Drilling of Drinking Water Wells	Rule 7.01	Applicable	Prohibits installing drinking water wells near pollution sources or potential contamination sources.	LUCs would prevent the installation of residential groundwater wells near pollution sources or potential contamination sources.
Rules and Regulations for Groundwater Quality (Well Standards) – Appendix 1	Rhode Island General Law (RIGL) Ch.46-12, Sec 46-12-2; Ch.46-13.1, Ch. 23-18.9; Sec 23-18-9.1; Appendix 1	Applicable	Identifies the standards and specification that must be followed for the installation or abandonment of monitoring wells.	Applies to the abandonment of existing monitoring wells.

TABLE E-7

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs –
SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
EPA Human Health Assessment Cancer Slope Factors (CSFs)	None	To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media. Removal of contaminated sediment by dredging will prevent exposure to site contaminants exceeding risk levels.
EPA Risk Reference Doses (RfDs)	None	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants. Removal of contaminated sediment by dredging will prevent exposure to site contaminants exceeding risk levels.
Guidance for Carcinogen Risk Assessment	EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants. Removal of contaminated sediment by dredging will prevent exposure to site contaminants exceeding risk levels.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants. Removal of contaminated sediment by dredging will prevent exposure to site contaminants exceeding risk levels.
National Oceanographic and Atmospheric Administration (NOAA) Incidence of Adverse Biological Effects within Ranges of Chemical Concentration in Marine and Estuarine Sediments, Long, *et al.*, 1995	None	To be Considered	Guidance on concentration ranges of contaminants in sediment that correspond to the likelihood of adverse effects to organisms.	Used to establish sediment cleanup standards. Removal of contaminated sediment will prevent adverse effects to organisms.

TABLE E-7

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs –
SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State				
There are no state chemical-specific ARARs.				

TABLE E-8

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs – SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE SITE 17 – FORMER BUILDING 32, GOULD ISLAND NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
Clean Water Act -Section 404 (b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material	40 Code of Federal Regulations (CFR) 230 and 33 CFR 322 and 323	Applicable	These rules regulate the discharge of dredge and fill materials in federal jurisdictional wetlands, vegetated shallows, and navigable waters. Such discharges are not allowed if practicable alternatives are available. Sets forth criteria for obstructions or alterations of navigable waters. For discharges, the Navy must identify a remedial alternative that is the Least Environmentally Damaging Practicable Alternative (LEDPA) for protecting wetlands and aquatic habitat resources. The Navy will solicit public comment as part of the Proposed Plan as to its LEDPA determination.	Dredging operations including sediment dewatering would be conducted in a manner that will minimize impacts to navigable waters. Water will be treated prior to discharge within the dredge area to meet applicable standards. There is no practicable alternative to the discharge of treated water to navigable waters. The dredging and dewatering components would meet the substantive environmental requirements of these standards. The Navy has identified Alternative SD3 as the Least Environmentally Damaging Practicable Alternative with respect to the aquatic ecosystem because it provides the best balance of addressing contaminated sediment within the marine waterway (permanent removal) and minimizing alteration of the aquatic habitat (both SD2 and SD3 would alter the habitat over the short term). No negative comments were received during the public comment period concerning the LEDPA finding.
Harbors and Rivers Act, Section 10	33 USC 403, 33 CFR 320-323	Applicable	Sets forth criteria for obstructions and alterations of navigable waters.	Installation of access restriction markers during dredging activities or during construction/ upgrade of shoreline ramps or work on bulkheads, if necessary, will be performed in compliance with the substantive environmental requirements of the statute.
Fish and Wildlife Coordination Act	16 United States Code (USC) 661 *et. seq.*	Applicable	Requires that the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), and related state agencies be consulted prior to structural modification of any body of water, including wetlands.	Dredging will impact the waters of the United States. Federal and state fish and wildlife officials would be consulted on how to minimize impacts of any remedial activities on any fish, wildlife and endangered species.

TABLE E-8

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs –
SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal (continued)				
Endangered Species Act (ESA)	50 CFR 200 and 402	Applicable	Remedial actions may not jeopardize the continued existence of federally-listed endangered or threatened species, or adversely modify or destroy their critical habitat.	The Navy will consult with the appropriate federal resource agencies to ensure that dredging will be conducted to minimize disturbance to aquatic habitats in Narragansett Bay that may be used by endangered species.
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	FEMA 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.	Remedial activities conducted within the 100-year coastal storm floodplain or within federal jurisdictional wetlands and aquatic habitats will be implemented in compliance with these standards. During the remedial design stage, the effects of sediment remedial actions on federal jurisdictional wetlands will be evaluated. Such wetlands include the inter-tidal area and vegetated shallows south (outside) of the dredge area. All practicable means will be used to minimize harm to the wetlands. Wetlands disturbed by sediment remediation and limited monitoring will be mitigated in accordance with requirements. The Navy solicited public comment as part of the proposed plan on the measures taken through the remedial action to protect floodplain and wetland/aquatic habitat resources and received no negative comments.
Coastal Zone Management Act	16 USC Parts 1451 *et. seq*.	Applicable	Requires that any actions must be conducted in a manner consistent with state-approved management programs.	The site is located within a coastal zone management area; therefore, applicable coastal zone management requirements need to be addressed.

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs –
SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State				
Coastal Resources Management	Rhode Island General Laws (RIGL) 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources. Jurisdiction includes areas within 200 feet of coastal features, within 50 feet of wetlands under the jurisdiction of the CRMC, and floodplains.	The entire site is located in a coastal resource management area, identified as a Type 2 shoreline and therefore, activities conducted under this alternative would be coordinated with CRMC and conducted in compliance with applicable coastal resource management requirements.

TABLE E-9

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs – SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE SITE 17 – FORMER BUILDING 32, GOULD ISLAND NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
Toxic Substances Control Act - PCB Remediation Waste	40 Code of Federal Regulations (CFR) 761.61(c)	Applicable	Risk-based standards for the sampling, cleanup, or disposal of PCB remediation waste. Written approval for the proposed risk-based clean-up will be obtained from the Office of Site Remediation and Restoration, EPA Region 1.	Standards apply to sampling, cleanup, and disposal. The Navy solicited public comment in the Proposed Plan about the finding that the proposed remedy for PCB contamination at the Site will not pose an unreasonable risk of injury to health or the environment. An EPA finding that the remedy meets these standards is included in the Record of Decision. Removal and off-site disposal of the sediment containing PCBs exceeding risk-based PCB cleanup goals developed for this site will achieve these standards.
CWA, Section 402, National Pollution Discharge Elimination System (NPDES)	33 USC 1342; 40 CFR 122 through 125	Applicable	Sets standards for discharging of dewatering liquid to surface waters at the site. These standards govern point source discharges of pollutants to surface water.	Water generated by dewatering operations on barges and on the island will be treated using a portable package treatment plant to meet these standards prior to discharge back to Narragansett Bay.
Contaminated Sediment Remediation Guidance for Hazardous Waste Sites	OSWER 9355.0-85, (December 2005)	To be Considered	This document provides technical and policy guidance for making remedy decisions for contaminated sediment sites. Issues addressed include: Chapter 4, Monitored Natural Recovery; Chapter 5, In-situ Capping; Chapter 6, Dredging and Excavation; Chapter 7, Remedy Selection; and Chapter 8, Long-term Monitoring	Sediment dredging, dewatering, and disposal will be conducted in a manner that meets the standards established in this guidance.
Clean Water Act, National Recommended Water Quality Criteria (NRWQC)	33 USC 1251 *et seq.*; 40 CFR 122.44	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	These are standards for water quality monitoring that would be conducted to ensure that these criteria are not exceeded during dredging and dewatering activities.

**ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs –
SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND**

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State				
Standards for Identification and Listing of Hazardous Waste	Rules and Regulations for Hazardous Waste Management, Code of Rhode Island Rules (CRIR), 12-030-003, Rule 5.8	Applicable	Rhode Island is delegated to administer the federal RCRA statute through its state regulations. Defines the listed and characteristic hazardous wastes.	These regulations apply to all waste generated during actions at the site, such as dredged sediment and investigation-derived waste (IDW) from monitoring. Will be used when determining whether or not a solid waste is hazardous.
Standards for Generators of Hazardous Waste	Rules and Regulations for Hazardous Waste Management, CRIR 12-030-003, Rule 5.2, 5.3, and 5.4	Applicable	Establishes manifesting and pre-transport requirements for hazardous waste.	These regulations would apply to all waste generated at the site during dredging and monitoring and sampling IDW, if hazardous.
Rules and Regulations for Dredging and the Management of Dredged Material	DEM-OWR-DR-02-03, Sections 5, 6, 7, 8, 9, and 11	Applicable	Standards to ensure that dredging in the marine environment and management of the associated dredged material is conducted in a manner which is protective of groundwater and surface water quality so as to ensure the continued viability and integrity of drinking water and fish and wildlife resources. Establish standards and criteria governing the dewatering of dredged material for upland use or disposal.	Dredging operations, including dewatering, will be conducted in accordance with the substantive requirements of these standards.
Clean Air Act - Fugitive Dust Control	CRIR 12-31-05	Applicable	Requires that reasonable precautions be taken to prevent particulate matter from becoming airborne.	Removal, processing, and temporary storage of debris and sediments during dewatering and before shipment would be implemented to prevent material from becoming airborne.

TABLE E-9

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs –
SEDIMENT ALTERNATIVE 3: SEDIMENT REMOVAL, OFF-SITE DISPOSAL, LIMITED MONITORING – NE SHORELINE
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State (continued)				
Clean Air Act - Emissions Detrimental to Persons or Property	CRIR 12-31-07	Applicable	Prohibits emissions of contaminants which may be injurious to humans, plant or animal life, or cause damage to property, or which reasonably interferes with the enjoyment of life and property.	Monitoring of air emissions during dredging and dewatering will be used to assess compliance with these standards if threshold levels are reached.
Clean Air Act - Air Toxics	CRIR 12-31-22	Applicable	Prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels or acceptable ambient levels as set in the regulations.	Emissions of hydrogen sulfide during dredging, dewatering, and stockpiling would be controlled.
Water Quality Regulations	Water Quality Regulations, CRIR 12-190-001	Applicable	Establishes water use classification and water quality criteria for waters of the state.	Dredging will be conducted in a manner as to minimize degradation of water quality. Any drainage from the temporary sediment storage area and any dewatering discharge would be treated as required to meet this requirement and discharged into Narragansett Bay.
Water Pollution Control – Pollutant Discharge Elimination System (PDES)	Regulations of Rhode Island Pollutant Discharge Elimination System	Applicable	Contains applicable effluent monitoring requirements, and standards and special conditions for discharges.	Discharge of water from sediment dewatering activities to surface water will meet these standards.
Rhode Island Soil Erosion and Sediment Control (SESC) Manual	None	To be considered	RIGL Erosion and Sediment Control Act places enforcement of soil erosion and sediment control at the local level. The SESC Manual is the primary guidance document.	An erosion and sediment control plan will be prepared according to the SESC Manual for all activities with land disturbance.
Identification and Management of Aquatic Invasive Species	None	To be considered	Guidance on addressing aquatic invasive species in Rhode Island.	Remedial work in the bay will be conducted in a manner to prevent the establishment or spread of aquatic invasive species.

Appendix F
Public Hearing Transcript and Response to Public Comments

RESPONSIVENESS SUMMARY
PROPOSED PLAN
SITE 17 – FORMER BUILDING 32, GOULD ISLAND
OPERABLE UNIT 6
NAVAL STATION NEWPORT
JAMESTOWN RHODE ISLAND

Comments during the Public Hearing:

1. Dr. Kathy Abbass (Newport) noted that the Navy should take caution of the potential for submerged materials, particularly any potential ordnance that may be present in the sediment that you are removing.

   Response: The Navy appreciates the concern expressed, and while there is no expectation to find ordnance in the potential dredge area, it is always a possibility during sediment dredging programs near naval facilities. Debris surveys are anticipated prior to dredging, and mitigation plans and processes will be in place for potential encounter of ordnance.

Written Comments:

1. David Brown (Newport): After reading the proposal and attending the briefing, I feel satisfied that a good assessment of the hazards and cleanup options has been conducted, and I would feel satisfied with the preferred option.

   Response: The comment is noted, thank you.

2. Michael O'Connor Weeks Marine Inc.: Good afternoon Ms. Rama, Weeks Marine Inc. did attend the public hearing of March 19 and has two questions: When is the excavation and removal work schedule to start for the sediment and the soil? How can Weeks Marine join the bidders list for this work, assuming there will be one? We would like to remain on your mailing list, our contact information is below:

   Weeks Marine Inc.
   4 Commerce Drive,
   Cranford NJ 07016
   908-272-4010
   Email: mjoconnor@weeksmarineinc.com

Response: The Navy expects to contract the cleanup work using a task order to prequalified contractors under the Navy's Response Action Contract (RAC) procured by NAVFAC Mid-Atlantic. The prime contractor, who has not yet been identified, has the option to solicit support and subcontract portions of the work to local businesses and labor organizations. Interested parties should continue to seek updates through FedBizOps or similar Navy contracting outreach efforts. The excavation work is currently in design and is being programmed to begin in 2015 and continue in phases through 2016.

SIGN IN SHEET

PROPOSED PLAN
SITE 17- BUILDING 32 AREA, GOULD ISLAND
PUBLIC MEETING AND HEARING
NAVAL STATION NEWPORT
MARCH 19, 2014

NAME	TOWN/AFFILIATION	TELEPHONE NO.
D.K. Abrams	Npt	
Manuel Marques	Middletown	486-8651
Maritza Montegross	Navy	757-341-2013
Margaret Kirschner	Newport	857-472-9191
Kymberlee Keckler	USEPA	617.918.1385
[illegible]	Ports. Cons. Comm.	683-0085
Darlene Ward	Naval Station	401 841 6376
Marco T Camacho	Newport City Council	(401) 924-4077
CHRIS TOMPSETT	NUWC NEWPORT	401-832-5816
David Dorocz	NSN	401-841-7671
David W. Brown	Newport	401-848-9427
WILLIAM MUNALO	NUWC	401-832-7307
DENNIS TIERNEY	NUWC	401-832-2919
MICHAEL O'CONNOR	CONTRACTOR	908 400 7107
Karen Bradbury	Senator Whitehouse	401 453-5294

Proposed Plan

Site 17 Former Building 32, Gould Island

Operable Unit 6

Naval Station Newport

Newport, Rhode Island

Courtyard Marriott
9 Commerce Drive
Middletown, RI

Wednesday
March 19, 2014
8:30 p.m.

MR. PARKER: This is the public hearing for the Site 17. I should mention that Carol is our stenographer. She is going to take down what you say. If you have a comment you want to make, please make it, identify yourself and whom you represent, and feel free to speak your mind, and that comment will be recorded and published in the responsive summary. This is a hearing to hear your comments and thoughts on the proposed remedial action plan for Site 17 which is the Building 32 area at Gould Island. So I am going to open it to the floor and ask if anybody has any comments, feel free to speak up.

MS. ABBASS: Let me repeat what I said, that you need to be careful about also materials that, particularly ordinances, could be in the sediment that you're going to be removing.

MR. PARKER: Thank you. Any other comments? I can leave a dead silence for

60 seconds. So if there are comments that you think of after the meeting, feel free to write them down and email them to Lisa Rama. She is identified on the last page of the proposed plan. She is the public affairs officer who works for the public affairs office at the Naval Station. She is the one collecting the comments officially. And/or feel free to mail them to Lisa's address which is also written in the proposed plan.

And I think that's it. If there is no comments, I'll close the hearing and thank you all for coming, and I will be here for unofficial questions after the session.

THE FLOOR: Good job.

(Hearing closed at 8:38 p.m.)

C E R T I F I C A T E

I hereby certify that the foregoing 3 pages contain a full, true and correct transcription of all my stenographic notes to the best of my ability taken in the above-captioned matter at said time and place commencing at 8:36 p.m.

____
Carol DiFazio
Registered Professional Reporter