UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
1 CONGRESS STREET, SUITE 1100 (HBT)
BOSTON, MASSACHUSETTS 02114-2023

August 6, 2007

Kirk A. Stevens, P.E.
NAVFAC Mid-Atlantic
Bldg N-26, Room 3208
OPNEEV
9742 Maryland Avenue
Norfolk, VA 23511-3095

Re: ***Five-Year Review (2003-2007), Portsmouth Naval Shipyard, Kittery, Maine***

Dear Mr. Stevens:

This office is in receipt of the Navy's *Five-Year Review Report, Portsmouth Naval Shipyard* dated June 2007. Upon review of this report, EPA concurs with the findings that all remedies which have been implemented are currently protective of human health and the environment.

This initial five-year review was triggered by the first remedial action which began in 2002. Consistent with Section 121(c) of CERCLA and EPA's *Comprehensive Five-Year Review Guidance* (OSWER *Directive 9355.7-03B-P)*, the next statutorily required five-year review must be finalized by September 30, 2012.

Sincerely,

James T. Owens III, Director
Office of Site Remediation and Restoration

cc. Mary Sanderson/EPA
Bryan Olson/EPA
Matthew Audet/EPA
Iver McLeod/ME DEP

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PITT-04-7-016

April 12, 2007

Project Number 1291

Mr. Matthew Audet
Environmental Protection Agency
Region I (Mail Code: HBT)
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Mr. Iver McLeod
Maine Department of Environmental Protection
State House Station 17
Augusta, Maine 04333-0017

Reference: Contract No. N62472-03-D-0057 (CLEAN)
Contract Task Order No. 022

Subject: Draft Final Five-Year Review Report
Portsmouth Naval Shipyard (PNS), Kittery, Maine

Dear Mr. Audet/Mr. McLeod:

On behalf of the U.S. Navy, Tetra Tech NUS, Inc. is pleased to provide to the U.S. Environmental Protection Agency Region I (USEPA) and to the Maine Department of Environmental Protection (MEDEP) 2 and 3 copies, respectively, of the subject document. Appendix C includes the responses to USEPA and MEDEP comments (dated February 5, 2007 and December 20, 2006, respectively) on the draft document.

As per the project schedule, comments are due by **May 14, 2007**.

If you have any comments or questions, or if additional information is required, please contact Mr. Kirk Stevens at 757-444-4125.

For the Community Restoration Advisory Board (RAB) members; if you have any comments or questions on these issues, they can be provided to the Navy at a RAB meeting, by calling the Public Affairs office at (207) 438-1140 or by writing to:

Portsmouth Naval Shipyard
Code 106.3R Bldg. 44
Attn: Marty Raymond
Portsmouth, NH 03804-5000

Sincerely,

Deborah J. Cohen, P.E.
Project Manager

DJC/kf
Enclosure

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Without Enclosure
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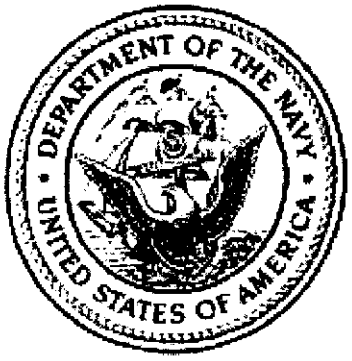
U.S. Fish and Wildlife (K. Munney)
COMSUBGRU TWO (C. Barnett)

Five-Year Review Report

Portsmouth Naval Shipyard

Kittery, Maine



Naval Facilities Engineering Command
Mid-Atlantic
Contract Number N62472-03-D-0057
Contract Task Order 022

June 2007

REVISION 0
JUNE 2007

FIVE-YEAR REVIEW REPORT

PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
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CONTRACT NO. N62472-03-D-0057
CONTRACT TASK ORDER 022

JUNE 2007

PREPARED UNDER THE DIRECTION OF:

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KING OF PRUSSIA, PENNSYLVANIA

LIST OF REVISIONS

Section	Revision	Description
Navy Five-Year Review Signature Cover	Revision 0; June 2007	The Navy Cover was signed and included in the final document. Page numbering was updated based on the addition of the List of Revisions.
Table of Contents	Revision 0; June 2007	The List of Revisions was added to the Table of Contents and the page numbering was updated.
Acronyms and Abbreviations	Revision 0; June 2007	Page numbering was updated based on the addition of the List of Revisions.
1.0 – Introduction, pages 1-10 and 1-14	Revision 0; June 2007	The bullet for Clean Water Act was corrected as provided in the responses to comments on the draft final document, included in Appendix C.
4.4.1 – Document and Data Review, page 4-13	Revision 0; June 2007	The last sentence of the section was revised as provided in the responses to comments on the draft final document, included in Appendix C.
Appendix C	---	The responses to comments on the draft final document were included in Appendix C.

Navy Five-Year Review Signature Cover

Key Review Information

Site Identification			
Site Name: Portsmouth Naval Shipyard			EPA ID: *ME7170022019*
Region: 1	State: ME	City/County: Kittery/York	
Site Status			
NPL Status: Final			
Remediation Status (under construction, operating, complete): Under Construction and Operating			
Multiple OU's* (highlight): **Y** N		Number of Sites/OUs: 12/7	
Construction Completion Date: To be determined			
Fund/PRP/Federal Facility Lead: Federal Facility		Lead Agency: Department of the Navy Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic	
Has site been put into reuse? (highlight): **Y** N			
Review Status			
Who conducted the review (EPA Region, State, Federal Agency): NAVFAC Mid-Atlantic			
Author Name: Kirk Stevens		Author Title: Remedial Project Manager	
Author Affiliation: Department of the Navy, Naval Facilities Engineering Command Mid-Atlantic			
Review Period: July 2006 to January 2007		Date(s) of Site Inspection: August 29-30 and September 25-26, 2006; January 16-17, 2007	
Highlight: **Statutory**	Policy Type (name): 1. Pre-SARA **2. Ongoing** 3. Removal Only 4. Regional Discretion	Review Number (1, 2, etc) 1	
Triggering Action Event: Initiation of the remedial action for Site 8 – Jamaica Island Landfill (OU3)			
Trigger Action Date: *June 2002*			
Due Date: *June 2007*			

* OU refers to Operable Unit

Issues:

One major item was noted at OU3: Internal drain pipe outlets could not be located as shown on final construction drawings.

The following minor items were also noted for each OUs and study area at PNS:

- OU1: One well cover bolt should be replaced and one crawl space sign should be reattached at Site 10. There are no items at Site 21.
- OU2: Monitoring wells should be maintained and additional rip-rap should be placed over the fabric in the eastern portion of the shoreline controls.
- OU3: A comprehensive figure showing all necessary features for site inspection is needed. Wells should be labeled and repaired as necessary. Screens should be placed over all gas vents and an adequate vertical distance between the ground surface and gas vent openings should be maintained. Trailer parking and use of blocks to prevent damage to the asphalt cover should be monitored. Brush, debris, and cattails in culvert inlets and/or ditches should be removed to prevent growth or debris from impeding flow.
- OU7: Monitoring wells should be maintained.
- Site 30: Monitoring wells should be maintained.

No items were noted at OU4, OU8, and OU9.

The Navy's proposed schedule for addressing these items is discussed in Section 10.0 of the Five-Year Review Report.

Recommendations and Required Actions:

The Navy/PNS should continue to enforce the Shipyard dig policy. Any planned and approved digging or excavation at an Installation Restoration Program (IRP) site should be conducted following the appropriate health and safety protocols for hazardous waste sites and any excavated material should be managed appropriately. Groundwater at the Shipyard is not used for drinking, irrigation, industrial processes, firefighting, or any other purpose; therefore, no groundwater restrictions are required. Additional recommendations and actions required for each OU and study area are as follows:

- OU1: Address minor maintenance items and complete RI/FS process to determine the appropriate remedial action(s) for Site 10 and to document No Further Action (NFA) for Site 21.
- OU2: Address minor maintenance items and complete RI/FS process to determine the appropriate remedial action(s) for Sites 6 and 29.
- OU3: Continue post-remedial operations, maintenance, and monitoring for OU3, address the noted maintenance items, and finalize the Land Use Control Plan.
- OU4: Collect and evaluate Rounds 9 and 10 of the Interim Offshore Monitoring Program and complete the Additional Scrutiny Report.
- OU7: Address minor maintenance items and complete RI/FS process to determine the appropriate remedial action(s) for Site 32.
- OU8: Begin the RI/FS process to determine the appropriate remedial action(s) for Site 31.
- OU9: Conduct removal action as planned and then begin the RI/FS process to determine the appropriate remedial action(s) for Site 34.
- Site 30: Address minor maintenance items, periodically inspect for crystal growth, remove crystals until the removal action is implemented, and conduct planned removal action. Following completion of the removal action, evaluate whether further investigation or action is needed for Site 30.

Protectiveness Statement(s):

The remedial actions that have been completed for the sites at PNS are protective of human health and the environment. Remedial actions to address immediate or potential future threats from exposure to soil and migration of groundwater have been implemented for OU3. The groundwater monitoring program has been initiated at OU3, but monitoring results have not yet been reported. At OU4, the results of the Rounds 1 through 7 Interim Offshore Monitoring Report, Additional Scrutiny sampling, and Round 8 monitoring do not indicate any imminent threats to human health or the environment under current land use scenarios. The Navy is continuing CERCLA investigations of the remaining IRP sites. Additionally, PNS maintains a "no dig" policy through the Shipyard's Solid Waste Operations Manual. Chapter 12 of the Manual, Control of Excavation Activities, provides instructions requiring authorization and approval from the PNS Environmental Division for all excavation through use of a permit. Groundwater at the Shipyard is not used for drinking or any other use. Environmental investigations at the IRP sites are conducted following the appropriate health and safety protocols for hazardous waste sites.

This Five-Year Review shows that the Navy is meeting the requirements of the RODs for the sites at PNS.

Other Comments:

In accordance with Navy guidance, the five-year review completed for PNS included all relevant CERCLA/IRP sites, regardless of whether decision documents have been prepared for the sites. It is believed that inclusion of all of the sites in this First Five-Year Review Report will simplify preparation of future five-year review reports.

Next Review:

The next five-year review of PNS sites will be completed by June 2012.

Signature of U.S. Department of the Navy and Date

CAPT USN — 6/12/2007

J.C. Iverson
Captain, USN
Commander
Portsmouth Naval Shipyard
Kittery, Maine

Date

TABLE OF CONTENTS

SECTION			PAGE NO.
LIST OF REVISIONS			iii
NAVY COVER PAGE			v
ACRONYMS AND ABBREVIATIONS			xii
EXECUTIVE SUMMARY			ES-1
1.0	INTRODUCTION		1-1
	1.1	PURPOSE AND SCOPE OF THE FIVE-YEAR REVIEW	1-1
	1.2	OVERVIEW OF PNS	1-4
	1.2.1	Land Use	1-5
	1.2.2	Regulatory History and Overview of Environmental Investigations	1-5
	1.2.3	Site Information	1-7
	1.3	FIVE-YEAR REVIEW PROCESS	1-9
	1.4	APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND SITE-SPECIFIC ACTION LEVEL CHANGES	1-10
	1.5	REPORT ORGANIZATION	1-12
2.0	OPERABLE UNIT 1		2-1
	2.1	HISTORY AND SITE CHRONOLOGY	2-1
	2.2	BACKGROUND INFORMATION	2-2
	2.3	REMEDIAL ACTIONS	2-3
	2.3.1	Remedy Selection	2-3
	2.3.2	Remedy Implementation	2-4
	2.4	FIVE-YEAR REVIEW PROCESS	2-4
	2.4.1	Document and Data Review	2-4
	2.4.2	ARAR and Site-Specific Action Level Changes	2-4
	2.4.3	Site Inspection	2-4
	2.5	TECHNICAL ASSESSMENT	2-5
	2.6	ISSUES	2-5
	2.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	2-5
	2.8	PROTECTIVENESS STATEMENT	2-5
3.0	OPERABLE UNIT 2		3-1
	3.1	HISTORY AND SITE CHRONOLOGY	3-1
	3.2	BACKGROUND	3-2
	3.3	REMEDIAL ACTIONS	3-5
	3.3.1	Remedy Selection	3-5
	3.3.2	Remedy Implementation	3-5
	3.4	FIVE-YEAR REVIEW PROCESS	3-5
	3.4.1	Document and Data Review	3-6
	3.4.2	ARAR and Site-Specific Action Level Changes	3-6
	3.4.3	Site Inspection	3-6
	3.5	TECHNICAL ASSESSMENT	3-7
	3.6	ISSUES	3-7
	3.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	3-7
	3.8	PROTECTIVENESS STATEMENT	3-8

TABLE OF CONTENTS (Continued)

SECTION		PAGE NO.
4.0	**OPERABLE UNIT 3**	**4-1**
4.1	HISTORY AND SITE CHRONOLOGY	4-1
4.2	BACKGROUND	4-2
4.3	REMEDIAL ACTIONS	4-4
4.3.1	Remedy Selection	4-4
4.3.2	Remedy Implementation	4-6
4.3.3	System Operations/Operation and Maintenance	4-8
4.4	FIVE-YEAR REVIEW PROCESS	4-12
4.4.1	Document and Data Review	4-12
4.4.2	ARAR and Site-Specific Action Level Changes	4-13
4.4.3	Site Inspection	4-14
4.5	TECHNICAL ASSESSMENT	4-16
4.6	ISSUES	4-20
4.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	4-20
4.8	PROTECTIVENESS STATEMENT	4-20
5.0	**OPERABLE UNIT 4**	**5-1**
5.1	HISTORY AND SITE CHRONOLOGY	5-1
5.2	BACKGROUND	5-2
5.3	REMEDIAL ACTIONS	5-5
5.3.1	Remedy Selection	5-6
5.3.2	Remedy Implementation	5-7
5.4	FIVE-YEAR REVIEW PROCESS	5-9
5.4.1	Document and Data Review	5-9
5.4.2	ARAR and Site-Specific Action Level Changes	5-10
5.4.3	Site Inspection	5-11
5.5	TECHNICAL ASSESSMENT	5-11
5.6	ISSUES	5-14
5.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	5-14
5.8	PROTECTIVENESS STATEMENT	5-14
6.0	**OPERABLE UNIT 7**	**6-1**
6.1	HISTORY AND SITE CHRONOLOGY	6-1
6.2	BACKGROUND	6-1
6.3	REMEDIAL ACTIONS	6-4
6.3.1	Remedy Selection	6-4
6.3.2	Remedy Implementation	6-4
6.4	FIVE-YEAR REVIEW PROCESS	6-4
6.4.1	Document and Data Review	6-5
6.4.2	ARAR and Site-Specific Action Level Changes	6-5
6.4.3	Site Inspection	6-5
6.5	TECHNICAL ASSESSMENT	6-6
6.6	ISSUES	6-6
6.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	6-6
6.8	PROTECTIVENESS STATEMENT	6-6

TABLE OF CONTENTS (Continued)

SECTION		PAGE NO.
7.0	**OPERABLE UNIT 8**	**7-1**
7.1	HISTORY AND SITE CHRONOLOGY	7-1
7.2	BACKGROUND	7-1
7.3	REMEDIAL ACTIONS	7-3
7.3.1	Remedy Selection	7-3
7.3.2	Remedy Implementation	7-4
7.4	FIVE-YEAR REVIEW PROCESS	7-4
7.4.1	Document and Data Review	7-4
7.4.2	ARAR and Site-Specific Action Level Changes	7-4
7.4.3	Site Inspection	7-4
7.5	TECHNICAL ASSESSMENT	7-5
7.6	ISSUES	7-5
7.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	7-5
7.8	PROTECTIVENESS STATEMENT	7-5
8.0	**OPERABLE UNIT 9**	**8-1**
8.1	HISTORY AND SITE CHRONOLOGY	8-1
8.2	BACKGROUND	8-1
8.3	REMEDIAL ACTIONS	8-3
8.3.1	Remedy Selection	8-3
8.3.2	Remedy Implementation	8-3
8.4	FIVE-YEAR REVIEW PROCESS	8-4
8.4.1	Document and Data Review	8-4
8.4.2	ARAR and Site-Specific Action Level Changes	8-4
8.4.3	Site Inspection	8-4
8.5	TECHNICAL ASSESSMENT	8-4
8.6	ISSUES	8-5
8.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	8-5
8.8	PROTECTIVENESS STATEMENT	8-5
9.0	**STUDY AREA – SITE 30**	**9-1**
9.1	HISTORY AND SITE CHRONOLOGY	9-1
9.2	BACKGROUND	9-1
9.3	REMEDIAL ACTIONS	9-4
9.3.1	Remedy Selection	9-4
9.3.2	Remedy Implementation	9-4
9.4	FIVE-YEAR REVIEW PROCESS	9-5
9.4.1	Document and Data Review	9-5
9.4.2	ARAR and Site-Specific Action Level Changes	9-5
9.4.3	Site Inspection	9-5
9.5	TECHNICAL ASSESSMENT	9-5
9.6	ISSUES	9-6
9.7	RECOMMENDATIONS AND FOLLOW-UP ACTIONS	9-6
9.8	PROTECTIVENESS STATEMENT	9-6
10.0	**BASE-WIDE CONCLUSIONS AND RECOMMENDATIONS**	**10-1**
10.1	PROTECTIVENESS STATEMENT	10-1
10.2	NEXT REVIEW	10-1
REFERENCES		**R-1**

TABLE OF CONTENTS (Continued)

APPENDICES

A FIVE-YEAR REVIEW INSPECTION ITEMS
- A.1 PNS LAND USE CONTROL AREAS
- A.2 AS BUILT FIGURES
- A.3 INSPECTION LISTS AND PROPOSED MAINTENANCE SCHEDULE
- A.4 OU3 INSPECTION FORM
- A.5 ARARs FOR OU3 AND OU4
- A.6 NO FURTHER ACTION SITE LOCATIONS

B PHOTOGRAPHS

C RESPONSES TO COMMENTS

TABLES

NUMBER		PAGE NO.
4-1	Updated Aqueous Screening Level Summary for OU3 Post-Remedial Monitoring Program	4-21
5-1	Overall Recommendations for Sampling Freuqncy and Additional Scrutiny at Each Monitoring/Reference Station	5-15

FIGURES

NUMBER		PAGE NO.
1-1	Portsmouth Naval Shipyard Vicinity Map	1-13
1-2	Facility Site Map	1-15
2-1	Site 10 Layout	2-7
3-1	OU2 Layout Map	3-9
4-1	OU3 Layout Map	4-29
4-2	OU3 Post-Remedial Action Monitoring Location Map	4-31
5-1	Overview of Interim Offshore Monitoring Station Locations	5-17
5-2	Overview of Reference Station Locations for the Interim Offshore Monitoring Program	5-19
5-3	Overview of Additional Scrutiny Soil, Sediment, and Catch Basin Sample Locations	5-21
5-4	Locations of Additional Scrutiny Sediment Samples at Reference Stations	5-23
6-1	OU7 Layout Map	6-7
7-1	OU8 Layout Map	7-7
7-2	OU8 Historical Layout Map	7-9
8-1	OU9 Layout Map	8-7
9-1	Site 30 Layout Map	9-7

ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below ground surface
CDC	Child Development Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIA	Controlled Industrial Area
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of concern
COPC	Chemical of potential concern
CSF	Cancer Slope Factor
CTO	Contract Task Order
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
EERA	Estuarine Ecological Risk Assessment
ER-L	Effects Range-Low
ER-M	Effects Range-Median
ESD	Explanation of Significant Difference
FCS	Final Confirmation Study
FDA	Food and Drug Administration
FFA	Federal Facility Agreement
FS	Feasibility Study
FY	Fiscal Year
GCL	Geosynthetic clay liner
HSWA Permit	Corrective Action Permit under the RCRA Hazardous and Solid Waste Amendments of 1984
HMW	High molecular weight
IAS	Initial Assessment Study
IRG	Interim Remediation Goal
IRP	Installation Restoration Program
JILF	Jamaica Island Landfill
MBI and MBII	Mercury Burial Sites (I and II)
MCL	Maximum Contaminant Level
MEDEP	Maine Department of Environmental Protection

mg/kg	Milligram per kilogram
MTADS	Multi-sensor Towed-Array Detection System
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
O&M	Operation and maintenance
OM&M	Operation, Maintenance and Monitoring
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PNS	Portsmouth Naval Shipyard
PRG	Preliminary Remediation Goal
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
SMP	Site Management Plan
SVOC	Semivolatile organic compound
SWMU	Solid Waste Management Unit
TBC	To be considered
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TtEC	Tetra Tech EC, Inc.
TtNUS	Tetra Tech NUS, Inc.
TW	Temporary well
US Army	United States Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound
WW	World War

EXECUTIVE SUMMARY

This is the first five-year review of Portsmouth Naval Shipyard (PNS). This review covers seven Operable Units (OUs) and one Study Area, totaling 12 sites. The triggering action for this review was the initiation of the remedial action for OU3, which began in June 2002. Because hazardous substances remain at OU3 above levels that allow for unrestricted use and unlimited exposure, subsequent five-year reviews are required. A Record of Decision (ROD) has been signed for OU3, and an interim ROD has been signed for OU4. Although the remainder of the OUs in this review are still under investigation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and therefore do not have decision documents, a five-year review was conducted for those sites because hazardous substances, pollutants, or contaminants remain on site in excess of levels that allow for unlimited use and unrestricted exposure.

The technical assessment conducted during a five-year review examined the following three questions:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

These questions have been answered for the sites at PNS where a remedy has been implemented or is currently being implemented (i.e., OU3) or an interim remedy is currently being implemented (i.e., OU4). It was determined that recalculation of risk or a risk assessment was not necessary to determine whether a remedy protects human health and the environment. Where applicable, monitoring and sampling data and the documentation of operation and maintenance (O&M) were also examined, and the information is included in the site-specific sections. In addition, as part of the five-year review, the PNS excavation restriction policy was also reviewed. PNS maintains a "no dig" policy through the Shipyard's Solid Waste Operations Manual; no change in the instructions related to the "no dig" policy is necessary based on this review. Groundwater at PNS is not used for drinking, irrigation, industrial processes, firefighting, or any other purposes; therefore, the Shipyard has not developed a groundwater use policy.

United States ~~Department of~~ Environmental Protection Agency (USEPA) and Maine Department of Environmental Protection (MEDEP) input was incorporated through review and comment on the draft versions of the Five-Year Review Report, and the draft report was submitted to the Restoration Advisory Board (RAB)

members and presented at a RAB meeting. Community RAB members typically provide input to environmental activities conducted as part of the Installation Restoration Program (IRP) through RAB presentations. The RAB members are included on the distribution of correspondence, meeting minutes, technical memorandum, and reports that are prepared as part of the IRP. An announcement about the Five-Year Review was provided at the September 26, 2006 RAB meeting, and the draft Five-Year Review Report was presented at the December 7, 2006 RAB meeting. The RAB update fact sheets are also provided to other interested community members. A public notice of the availability of the final Five-Year Review Report will be made, and the final report will be placed in the Information Repositories for PNS.

The 12 sites addressed in this five-year review were visually inspected in August/September 2006. An additional inspection of selected sites was conducted in January 2007. No conditions presenting immediate threats or unacceptable risks were observed.

The remedy at OU3 is currently protective of human health and the environment. The source of contamination is contained. The hazardous waste landfill cover minimizes infiltration and subsequent contaminant migration and prevents direct contact with soil. A landfill gas monitoring and O&M program is being implemented to verify that the cap is performing as designed, and preliminary results suggest that the cap is performing as planned. Groundwater monitoring is being implemented to address migration of groundwater. Continued implementation of land use controls and O&M will maintain the effectiveness of the remedy into the future.

A final remedy at OU4 has not yet been selected. The selected interim remedy (monitoring) is protective of human health and the environment in the short term and is intended to provide adequate means to take protective measures until the final ROD is signed. The interim remedy complies with federal and State ARARs for this limited-scope action and is cost effective.

Remedies have not been selected for OUs 1, 2, 7, 8, or 9 or Site 30; however, the CERCLA process is being carried out at these sites. Although final remedial actions have not been determined, no conditions presenting an immediate threat or unacceptable risk were observed. Land use at the sites is industrial/commercial, and groundwater is not used for drinking or other purposes. Continuation of the CERCLA process has been recommended for these sites.

1.0 INTRODUCTION

This first Five-Year Review Report for Portsmouth Naval Shipyard (PNS), Kittery, Maine was prepared by Tetra Tech NUS, Inc. (TtNUS) for the United States Department of Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract Number N62472-03-D-0057, Contract Task Order (CTO) 022. This report describes the results of the five-year review that was conducted for the current PNS Installation Restoration Program (IRP) sites and study areas where remedial actions have been completed, are ongoing, or are pending. The report reflects the status of the IRP sites and study area as of January 31, 2007. The report was prepared to fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as discussed in Section 1.1.

The Navy conducted the first five-year review of the remedial actions implemented at PNS, Kittery, Maine. United States Environmental Protection Agency (USEPA) Region I and Maine Department of Environmental Protection (MEDEP) provided input through review and comment on the draft and draft final reports.

The National Superfund electronic database identification (CERCLIS ID) number for PNS is ME7170022019.

1.1 PURPOSE AND SCOPE OF THE FIVE-YEAR REVIEW

The purpose of the five-year review is to evaluate the implementation and performance of the remedies at the sites to determine whether the remedies are protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and provide recommendations to address them.

This five-year review is required by statute. The Navy must implement five-year reviews consistent with CERCLA [40 United States Code (USC) Sections §§9601 et seq.] and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 Code of Federal Regulations (CFR) Part 300]. CERCLA Section §121(c), as amended, states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP, 40 CFR Part 300.430(f)(4)(ii), states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the first five-year review of PNS. The triggering action for this review was the initiation of the remedial action for Operable Unit (OU) 3 that began in June 2002. Because hazardous substances remain at OU3 above levels that allow for unrestricted use and unlimited exposure, subsequent five-year reviews are required.

As discussed in the USEPA Comprehensive Five-Year Review Guidance (USEPA, June 2001), a five-year review determines whether the remedy at a site is protective of human health and the environment. When a remedial action is still under construction, a five-year review determines whether immediate threats have been addressed and whether the remedy is expected to be protective when all remedial actions are completed. In addition, a five-year review identifies any deficiencies and recommends steps to correct them. To do this, the technical assessment conducted during a five-year review examines the following three questions:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

These questions will be answered for the sites at PNS where a remedy has been implemented or is currently being implemented (i.e., OU3) or an interim remedy is currently being implemented (i.e., OU4). To answer these questions, this five-year review included review of documents, discussions with personnel associated with the sites, site inspection, and review of newly promulgated standards and changes in the standards that were identified as Applicable or Relevant and Appropriate Requirements (ARARs), to-be-consider criteria (TBCs), and the factors used to develop site-specific, risk-based levels at the time the Record of Decision (ROD) was signed. This information was reviewed to determine whether changes since the time of the ROD or interim ROD may call into question the protectiveness of the

remedy. It was determined that recalculation of risk or a risk assessment was not necessary to determine whether a remedy protects human health and the environment, as will be discussed in later sections. Where applicable, monitoring and sampling data and the documentation of operation and maintenance (O&M) were also examined, and the information is included in the subsequent site-specific sections. In addition, as part of the five-year review, the PNS excavation restriction policy was also reviewed. PNS maintains a "no dig" policy through the Shipyard's Solid Waste Operations Manual. Chapter 12 of the *Manual, Control of Excavation Activities, provides instructions requiring authorization and approval from* the PNS Environmental Division for all excavation through use of a permit. The instruction, dated April 24, 2003, was updated February 4, 2005. Only editorial revisions were made to Chapter 12; there was no change in the instructions related to the "no dig" policy. Groundwater is not used for drinking, irrigation, industrial processes, fire fighting, or any other purposes; therefore, the Shipyard has not developed a groundwater use policy.

For completeness, this five-year review also includes evaluation of the sites and study area that are pending remedial action based on ongoing remedial or site screening investigations. Site inspections were conducted for these sites and study area to determine whether there are any changes in status. No status changes were noted based on the site inspection and review of the PNS land use figure (included in Appendix A). During the site inspection it was determined that there were no imminent concerns, although minor maintenance items were identified, as discussed in later sections.

The IRP sites that are included in the five-year review are grouped into seven OUs and one study area. The OUs that have final or interim remedies are OU3 and OU4. The OUs where Remedial Investigations (RIs) are being conducted are OU1, OU2, OU7, OU8, and OU9. The study area, Site 30, is in the site screening investigation stage. A general site location map of PNS is presented as Figure 1-1, and the locations of the OUs and associated sites are shown on Figure 1-2. The sites within each OU are also listed in Section 1.2.3, and site information and evaluations are provided in Section 2.0 through 9.0.

No Further Action (NFA) decision documents have been prepared under CERCLA for six former IRP sites. An NFA Decision Document for Site 12 - Boiler Blowdown Tank, Building 72, Site 13 - Rinse Water Tank, Building 76, Site 16 - Rinse Water Tank, Building 174, and Site 23 - Chemical Cleaning Facility Tank, Building 174 was prepared to document that no further response actions are warranted for these sites (Navy, July 1997). In August 2001, NFA under CERCLA decision documents were signed for Sites 26 and 27 (Navy, August 2001a and 2001b).

Site 12 consisted of an underground storage tank that was used from 1974 as a flow-through tank for boiler blowdown, acting as a lift station and allowing the water to cool prior to discharge to the sanitary sewer system (that discharged to the Kittery Sewage Treatment Plant). Testing of the tank and tank contents

showed that the tank was sound, intact, and stable and that the contents were determined to be non-hazardous. Therefore, it was determined that actual or threatened releases of hazardous substances from this site was not a concern and that no further remedial action was necessary for Site 12 to ensure protection of human health and the environment. Subsequently, in 1996, the tank was taken out of service because of operational changes. The tank was excavated and determined to be intact with no evidence of leaking (Navy, July 1997).

Sites 13, 16, and 23 consisted of underground storage tanks that were used to hold industrial discharges for treatment (off site) before discharge to the sanitary sewer system. The tanks were used from the mid to late 1970s until the mid to late 1980s. The tanks were excavated and found to be intact, and there was no evidence of spills or leaks. Confirmation soil samples (subsurface) were collected from the tank excavation, and the area was backfilled and covered with 18 inches of sandy gravel and 4 inches of asphalt. Because the sites were located in a controlled industrial area, risks for occupational exposure (e.g., construction worker) to subsurface soil were evaluated and determined to be acceptable. Based on the history of use, the tank removals, and results of confirmation samples, it was determined that actual or threatened releases of hazardous substances from these sites were not a concern and that no further remedial action was necessary for Sites 13, 16, and 23 (Navy, July 1997). Although these sites were closed using industrial standards, the Navy believes that no restrictions are required for these sites because there was no potential impact to surface soil from site operations (i.e., temporary storage in underground storage tanks) or residual contamination that would be a concern for non-industrial exposure.

Site 26 was part of OU4 and Site 27 was the only site in OU5. Site 26 was recommended for NFA under CERCLA (and therefore recommended for removal from OU4) because the tanks at Site 26 are portable tanks and are used for petroleum wastes only as mandated by state and federal laws. Site 27 (OU5) was recommended for NFA under CERCLA. The only contaminant of concern at Site 27 is petroleum product. Petroleum wastes and products are exempt from the definition of hazardous substances, pollutants, and contaminants under CERCLA.

Based on the NFA decisions, Sites 12, 13, 16, 23, 26, and 27 are not discussed further in this five-year review document. A map showing the former locations of these sites is provided in Appendix A.

1.2 OVERVIEW OF PNS

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

Portsmouth, New Hampshire, at the mouth of the Great Bay Estuary (commonly referred to as *Portsmouth Harbor*).

1.2.1 Land Use

PNS is engaged in the conversion, overhaul, and repair of submarines for the Navy. The long history of shipbuilding in Portsmouth Harbor dates back to 1690, when the first warship launched in North America, the Falkland, was built. PNS was established as a government facility in 1800, and it served as a repair and building facility for ships during the Civil War. The first government-built submarine was designed and constructed at PNS during World War I. A large number of submarines have been designed, constructed, and repaired at this facility since 1917. PNS continues to service submarines as its primary military focus.

Military activities are concentrated in the western portion of the facility in the Controlled Industrial Area (CIA) (the southern and southwestern portions of Dennett's Island). This area includes all of the dry docks and submarine berths and numerous buildings that house trade shops related to maintenance activities. Access to the area is tightly controlled and limited to individuals having appropriate clearances. The CIA is covered with buildings and asphalt to support military operations at PNS. Uses of other portions of PNS include administration offices, officers' residences, equipment storage, parking, and recreational facilities. Outside the CIA, areas are covered with asphalt, grass, and/or buildings depending on the use of the area. As part of the remedy for OU3, wetlands were constructed north of the OU3, adjacent to Jamaica Cove, and a parking lot and a recreational area were constructed on top of the OU3 landfill cap.

Water for operations and drinking at the Shipyard are supplied by the Kittery Water District. Kittery's water supply originates from surface reservoirs located in the vicinity of York, Maine. Groundwater at PNS is not used for drinking, irrigation, industrial processes, fire fighting, or any other purposes.

A portion of PNS is on the National Register of Historic Places. The area between the two bridges connecting PNS to Kittery, Maine was placed on the Register by the National Park Service in 1977. Based on a Cultural Resources Survey of PNS (Louis Berger Group, Inc., April 2003), the boundary of the PNS Historic District was expanded and includes the majority of the CIA. Two other historic districts were also identified (Portsmouth Naval Hospital and Portsmouth Naval Prison Historic Districts).

1.2.2 Regulatory History and Overview of Environmental Investigations

Prior to CERCLA and Resource Conservation and Recovery Act (RCRA) regulation at PNS, years of shipbuilding and submarine repair work at PNS resulted in hazardous substances being released into the

soils, groundwater, surface water, and sediment on and around Seavey Island. As a result, investigation and remediation activities were performed under the Department of Defense (DoD) IRP. The IRP parallels CERCLA and is further discussed in the Site Management Plan (SMP) for PNS [Amended Fiscal Year (FY07), Navy, July 2006]. Investigations of hazardous substance releases at PNS began in 1983. USEPA became involved with PNS in 1985 when the agency requested information on PNS' hazardous wastes and conducted a visual site inspection under the authority of RCRA. Since 1988, MEDEP has also provided oversight of investigation and remediation of PNS. In March 1989, USEPA issued a Corrective Action Permit under the RCRA Hazardous and Solid Waste Amendments of 1984 (HSWA Permit) (USEPA, March 1989) that required PNS to investigate 13 Solid Waste Management Units (SWMUs) and take appropriate corrective action. Until the mid-1990s, investigations at the PNS were conducted under RCRA authority. Effective May 31, 1994, PNS was included on the National Priorities List (NPL), and subsequent studies have been conducted under the authority of CERCLA, commonly known as Superfund. Consistent with the transition from RCRA to CERCLA, the SWMU terminology was replaced with "site." Ongoing work meets the intent of the HSWA Permit, but the ongoing studies to develop and evaluate remedial activities are conducted as part of a Feasibility Study (FS) (CERCLA terminology) and combines both RCRA and CERCLA criteria.

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

During the initial investigations of PNS, 28 potential sites (referred to as SWMUs at that time) located onshore and offshore of PNS were identified. After the 28 potential sites were examined in greater depth, 15 were eliminated from further investigation, leaving 13 sites that required investigation and appropriate corrective action (Kearney & Baker/TSA, July 1986). These 13 sites, Sites 5, 6, 8, 9, 10, 11, 12, 13, 16, 21, 23, 26, and 27, were the sites listed in the HSWA Permit. Subsequent to the HSWA, four sites (Sites 12, 13, 16, and 23) were identified as NFA sites, and four site screening areas (Sites 30, 31, 32, and 34) were identified. In addition, a portion of Site 6 was separated and given a separate site number (Site 29). Therefore, the FFA included Sites 5, 6, 8, 9, 10, 11, 21, 26, 27, 29, 30, 31, 32, and 34. NFA under CERCLA documents for Sites 26 and 27 were signed in 2001.

A list of important PNS historical events related to environmental investigations and relevant dates is shown below. The identified events are illustrative, not comprehensive. Additional information on site- or OU-specific investigations is provided in the discussion related to the specific OU or site screening area (Sections 2.0 through 9.0).

Event	Date
Initial Assessment Study (IAS) completed	1983
USEPA involvement began	1985
Final Confirmation Study (FCS) completed	1986
RCRA Facility Assessment completed	1986
MEDEP oversight began	1988
PNS Corrective Action Permit under the HSWA issued	March 1989
RCRA Facility Investigation (RFI) Report and Addendum to RFI Report and On-shore Ecological Risk Assessment completed	1992 and 1993
Sampling to support offshore risk assessments conducted	1991 through 1993
Placed on the NPL	May 31, 1994
Onshore and offshore components of investigation separated	1994
Offshore Human Health Risk Assessment completed	1994
RFI Data Gap Report and Air Monitoring Report completed	1995 and 1996
Four rounds of groundwater and intertidal seep and sediment monitoring conducted	1996/1997
FFA signed, supersedes the HSWA Permit	1999
Onshore/offshore Contaminant Fate and Transport Modeling completed	1999
Interim ROD for OU4 signed, Interim Offshore Monitoring Plan completed, and monitoring started	1999
Estuarine Ecological Risk Assessment (EERA) for offshore areas of concern (AOCs) completed	2000
Site investigations for Sites 10, 29, 30, 31, and 32 conducted	2000
ROD for OU3 signed	2001
Start of significant construction for OU3 remedy	June 24, 2002

1.2.3 Site Information

The sites identified in the HSWA Permit as well as the newly identified sites were grouped, based on similar characteristics or proximity, into OUs. As of the signing of the FFA, four sites were determined to require NFA under CERCLA (Sites 12, 13, 16, and 23) and therefore were not included in an OU. The sites listed in the FFA were grouped into five OUs (OU1 through OU5). Since then, four additional OUs (OU6 through OU9) were identified. Subsequently, two of the nine OUs have been deleted, OU5 was removed

from the CERCLA program (based on the NFA under CERCLA determination for Site 27), and OU6 was recombined with OU3. Between 2000 and 2005, OU6 was identified to address management of migration of groundwater from OU3; however, as of October 2005, OU6 was recombined with OU3. In 2001, Site 26 was removed from OU4 (based on the NFA under CERCLA determination for this site). There is one study area at PNS, Site 30. The following is a list of the current IRP sites in each OU:

- OU1 contains Site 10 – Former Battery Acid Tank No. 24 and Site 21 – Former Acid/Alkaline Drain Tank (groundwater only). In 1996, a Consensus Document for NFA for soils at Site 21 was prepared to document that no further remedial action is required for soils at this site; however, further investigation and evaluation of potential groundwater impact from the site was required (Navy, October 1996).

- OU2 contains Site 6 – Defense Reutilization and Marketing Office (DRMO) Storage Yard including DRMO Impact Area, Quarters S, N, and 68 and Site 29 – Former Teepee Incinerator Site.

- OU3 contains Site 8 – Jamaica Island Landfill (JILF), Site 9 – Former Mercury Burial Sites (MBI and MBII), and Site 11 – Former Waste Oil Tanks Nos. 6 and 7. The JILF Impact Area, Former Child Development Center (CDC), was previously included as part of Site 8; however, based on the OU3 ROD (Navy, August 2001c), this area was separated from Site 8 and further investigated separately. Based on the results of an investigation in 2003, it was determined that NFA is necessary for this area (TtNUS, April 2004).

- OU4 contains Site 5 – Former Industrial Waste Outfalls and Offshore Areas Potentially Impacted by PNS Onshore Sites. As part of the EERA (NCCOSC, May 2000), the offshore area was investigated based on six AOCs; the interim offshore monitoring program (TtNUS, October 1999) includes 14 monitoring stations within the offshore area.

- OU7 contains Site 32 – Topeka Pier Site.

- OU8 contains Site 31 – West Timber Basin.

- OU9 contains Site 34 – Former Oil Gasification Plant, Building 62.

- The study area is Site 30 – Galvanizing Plant, Building 184.

The OUs and study area are discussed further in Sections 2.0 through 9.0.

1.3 FIVE-YEAR REVIEW PROCESS

The five-year review was led by Kirk Stevens, the Navy Remedial Project Manager. The following team members assisted in the review:

- Matt Audet, USEPA Region I Remedial Project Manager
- Iver McLeod, MEDEP Remedial Project Manager
- Ken Plaisted, PNS Environmental Division Head
- John Gildersleeve, PNS IRP Coordinator
- Deborah Cohen, TtNUS Facility Coordinator/Project Manager (Navy CLEAN contractor)
- Nina Balsamo, TtNUS Lead Engineer (Navy CLEAN contractor)

The five-year review consisted of a review of relevant documents and site inspections conducted by the Navy and Navy contractor. PNS personnel also attended the site inspection of OU3. No official interviews were conducted as part of the five-year review. Current site information was obtained during discussions with PNS Environmental personnel as part of planning, implementation, and reporting of environmental investigations. USEPA and MEDEP input was provided through review and comment on the draft and draft final Five-Year Review Report. Responses to regulatory comments are provided in Appendix C.

The draft report was submitted to the Restoration Advisory Board (RAB) members and presented at a RAB meeting. Community RAB members typically provide input to the environmental activities as part of the IRP through RAB presentations. The RAB members are included on the distribution of correspondence, meeting minutes, technical memorandum, and reports that are prepared as part of the IRP. An announcement about the review was provided at the September 26, 2006 RAB meeting, and the draft Five-Year Review Report was presented at the December 7, 2006 RAB meeting. The RAB update fact sheet from the September 26, 2006 RAB, which provided an announcement about the start of the review, was submitted to the PNS distribution list, which includes Navy, PNS, USEPA, MEDEP, Trustees, and RAB members, on November 16, 2006. Meeting minutes and RAB update fact sheet for the December 7, 2006 RAB meeting were submitted to the PNS distribution list on February 13, 2007. The RAB update fact sheets are also provided to other interested community members. Public notices announcing the date, time, location, and topic for RAB meetings are placed in the Portsmouth Herald and Fosters Daily Democrat the week before the RAB meetings. A public notice of the availability of the final Five-Year Review Report will be provided in these two newspapers.

The final report will be placed in the Information Repositories for PNS. Most project documentation can be found at the following Information Repository locations:

Kittery Town Hall
200 Rogers Rd. Ext.
Kittery, ME 03904
Telephone: (207) 439-1633
Mon.-Fri.: 9:00 am to 5:00 pm

Portsmouth Public Library
175 Parrott Street
Portsmouth, NH 03801
Telephone: (603) 427-1540
Mon.-Thur: 9:00 am to 9:00 pm
Fri: 9:00 am to 5:30 pm
Sat: 9:00 am to 5:00 pm

1.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND SITE-SPECIFIC ACTION LEVEL CHANGES

The five-year review is being conducted to verify that the remedy at a site remains protective of human health and the environment by evaluating the implementation and performance of the selected remedy. In addition to evaluating the protectiveness of the in-place remedy, changes in ARARs or site-specific action levels were reviewed to determine whether the changes may call into question the protectiveness of the remedy.

The chemical-specific ARARs and TBCs identified in the OU3 ROD (Navy, August 2001c) and the OU4 Interim ROD (Navy, May 1999) were reviewed, as were new federal and state regulations that have been promulgated since finalization of the RODs. This section describes the overall impacts of the new or changed ARARs on the risk posed to human health or the environment. It was determined that recalculation of risk or risk assessments was not necessary to determine whether the OU3 remedy or the OU4 interim remedy protects human health and the environment. This section also indicates changes in site-specific action levels and how the changes would affect the status of the other OUs and study area where ongoing RIs are being conducted. Based on the changes discussed herein, there is no change in status of any of the OUs or study area.

The chemical-specific ARARs and TBCs for OU3 are as follows:

- Clean Water Act, Section 304 (a), National Recommended Water Quality Criteria (Relevant and Appropriate ARAR) and Maine Surface Water Toxics Control Program, Chapter 530.5, Statewide Water Quality Criteria (Applicable ARAR).

- USEPA health advisories for drinking water, risk Reference Doses (RfDs), and Cancer Slope Factors (CSFs) (TBCs).

- State of Maine Guidance Manual for Human Health Risk Assessments at Hazardous Substance Sites (June 1994) (TBC)

These National and statewide water quality criteria are used as ecological action levels for the groundwater monitoring program as part of the Post-Remedial Operations, Maintenance, and Monitoring (OM&M) Plan for OU3 (TtNUS, June 2006a). The water quality criteria are updated periodically, and any updates that affect the monitoring program will be taken into account during the evaluation of the groundwater monitoring data as part of the monitoring program. The first two rounds of OM&M were conducted in July and December 2006, and the associated data packages will be completed 2007.

The human health risk assessment for OU3 was completed in 2000 using the TBCs identified. Except for monitoring, the components of the remedial action for OU3 (capping, shoreline controls, and institutional controls) are not chemical specific and therefore any updates to risk assessment guidance, RfDs, and/or CSFs would not impact the protectiveness of these components of the OU3 remedy. The human health action levels for the groundwater monitoring program as part of the OU3 OM&M plan were calculated using the RfDs and CSFs. The RfDs and CSFs are updated periodically and any updates that affect the monitoring program will be taken into account during the evaluation of the groundwater monitoring data as part of the monitoring program. In addition, updates to risk assessment guidance will be taken into account as part of the monitoring program as discussed further in Section 4.4.2.

The chemical-specific ARARs and TBCs for OU4 are as follows:

- Clean Water Act, Section 304 (a), National Recommended Water Quality Criteria (Relevant and Appropriate ARAR) and Maine Surface Water Toxics Control Program, Chapter 530.5, Statewide Water Quality Criteria (Relevant and Appropriate ARAR).

- Food and Drug Administration (FDA) Action Levels and USEPA Proposed Sediment Quality (TBCs).

- NOAA Effects-Range Low (ER-L) and Effects-Range Median (ER-M) concentrations (Long et al., 1995) and NOAA National Status and Trends Program Mussel Watch Data (TBCs)

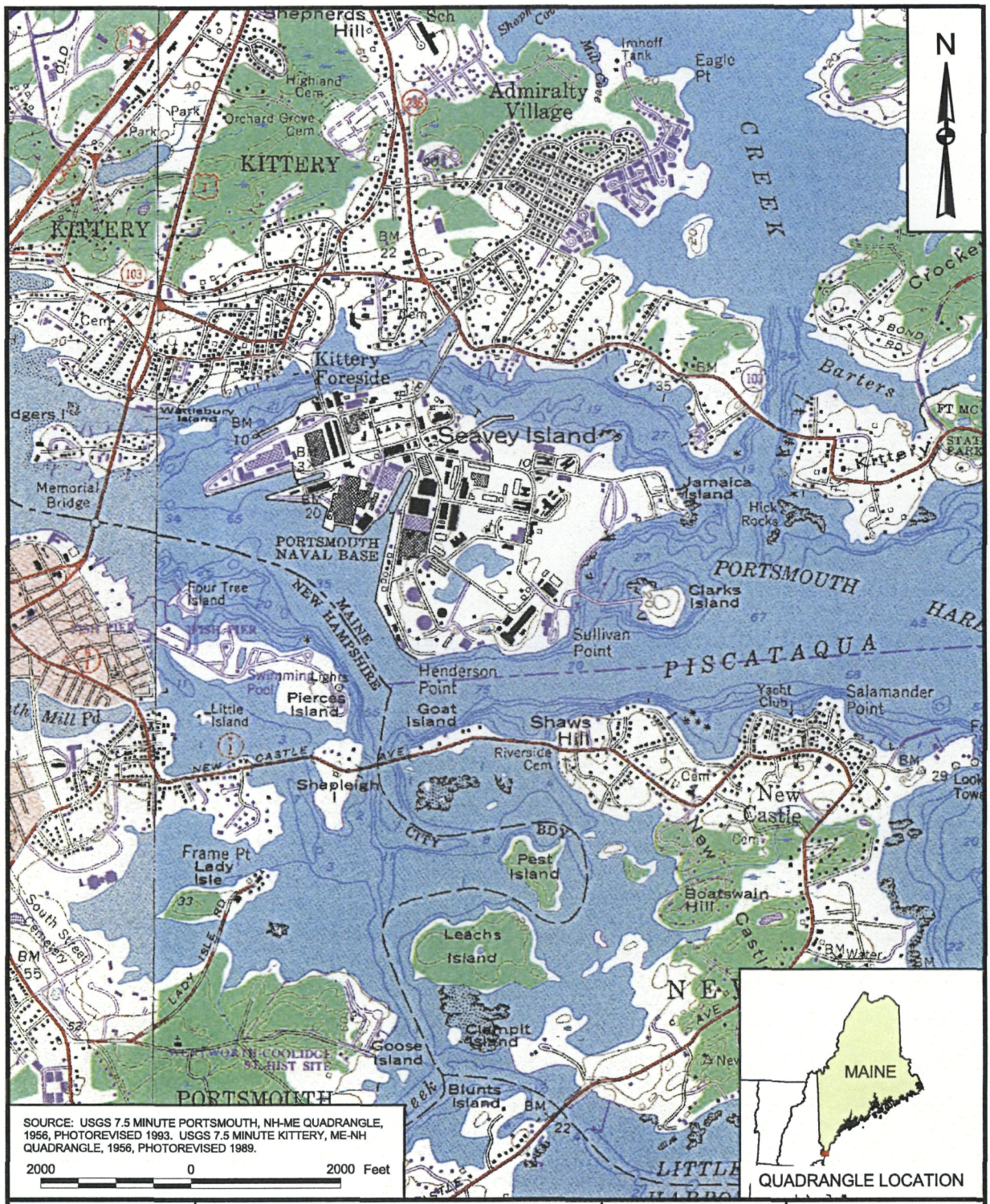
Of the above listed ARARs and TBCs, only the water quality criteria and ER-L and ER-M concentrations were used to develop Preliminary Remediation Goals (PRGs) for OU4 (TtNUS, November 2001). The PRGs are used as part of the interim offshore monitoring program as discussed in the Interim Offshore Monitoring Plan (TtNUS, October 1999) and related documents. There were minor changes in water quality criteria (2002) since development of the PRGs and the changes would not significantly affect the PRG calculations. The ER-L and ER-M concentrations have not changed, and there is no new sediment

guidance that would affect the PRGs. At the time the FS for OU4 is conducted, ARARs and TBCs should be re-evaluated and changes to the PRGs made as necessary for use in the FS.

For sites under RI, the benchmarks used to select chemicals of potential concern (COPCs) for direct contact with soil and sediment included USEPA Region III Risk-Based Concentrations (RBCs) until approximately 1998; subsequently, USEPA Region IX PRGs are used for selecting COPCs. The benchmarks used to select COPCs for groundwater for sites with fresh groundwater included USEPA Region III RBCs (until approximately 1998), USEPA Region IX PRGs (after 1998), and USEPA Maximum Contaminant Levels (MCLs). For sites with freshwater and saline/brackish groundwater, facility-specific screening levels for construction worker exposure are used. For sites with potential for groundwater migration to the offshore, water quality criteria (with consideration of dilution as appropriate) are used for screening groundwater. For sites with intertidal areas (OU3 and OU7), human health screening levels were developed for exposure to seeps and surface water in the intertidal area. The various screening levels are updated periodically based on changes to RfDs and CSFs. Region IX PRGs are generally similar to Region III RBCs. Updates to screening levels and other benchmarks would not significantly change the risk conclusions for the sites under remedial investigation. Risk assessment as part of a RI, PRG development as part of an FS, and/or clean-up level development as part of a ROD for each OU will use the most current risk assessment guidance and RFDs, CSFs, and other benchmarks as appropriate.

1.5 REPORT ORGANIZATION

This report has been organized with the intent of meeting the general format requirements specified in the Comprehensive Five-Year Review Guidance document (USEPA, June 2001) and summarizing the results of the five-year review for the eight IRP areas in a cohesive and comprehensive manner. Section 1.0 gives an overview of PNS and the five-year review process, as well as a discussion of changes in ARARs and site-specific action levels. Sections 2.0 through 9.0 summarize the five-year reviews conducted for each of the individual OUs and one study area. Section 10.0 provides a general summary, conclusions, and protectiveness statement for PNS. This section also identifies when the next five-year review is required and the other tasks that should be performed as part of that five-year review. Three appendices are included in this report. Appendix A contains the five-year review inspection checklist for OU3 and items related to the inspection of the IRP sites, Appendix B contains photographs of the sites, and Appendix C contains responses to comments on the Five-Year Review Report.



DRAWN BY: J. LAMEY — DATE: 12/29/03	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 1291	OWNER NO.: CTO 022
CHECKED BY: D. COHEN — DATE: 10/26/06	PORTSMOUTH NAVAL SHIPYARD VICINITY MAP FIVE-YEAR REVIEW REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY: — DATE: —	
COST/SCHEDULE-AREA		APPROVED BY: — DATE: —	
SCALE: AS NOTED		DRAWING NO.: FIGURE 1 - 1	REV: 0

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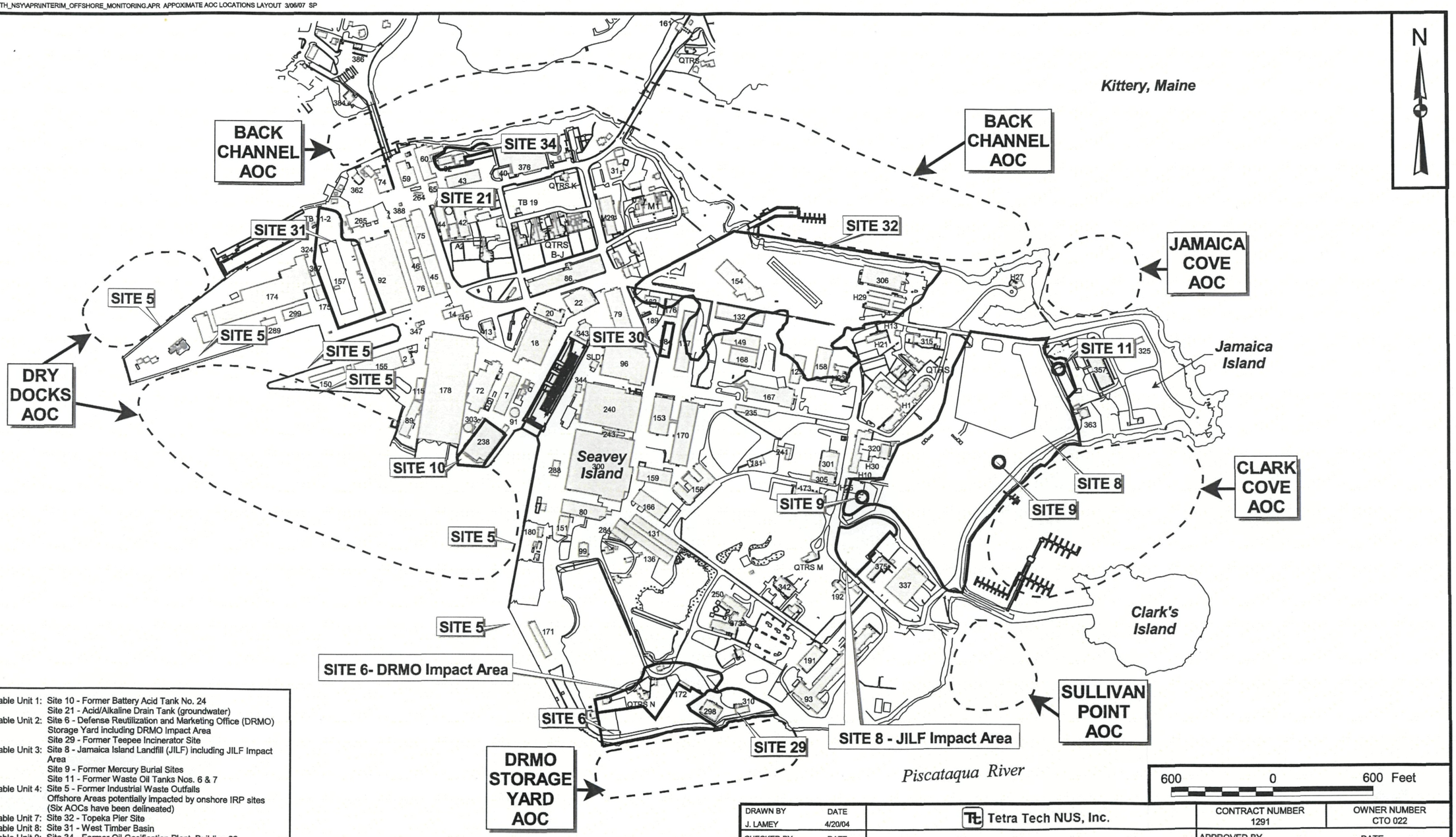
P:\GIS\PORTSMOUTH_NSY\APR\INTERIM_OFFSHORE_MONITORING.APR APPOXIMATE AOC LOCATIONS LAYOUT 3/06/07 SP



Operable Unit 1: Site 10 - Former Battery Acid Tank No. 24
Site 21 - Acid/Alkaline Drain Tank (groundwater)
Operable Unit 2: Site 6 - Defense Reutilization and Marketing Office (DRMO) Storage Yard including DRMO Impact Area
Site 29 - Former Teepee Incinerator Site
Operable Unit 3: Site 8 - Jamaica Island Landfill (JILF) including JILF Impact Area
Site 9 - Former Mercury Burial Sites
Site 11 - Former Waste Oil Tanks Nos. 6 & 7
Operable Unit 4: Site 5 - Former Industrial Waste Outfalls
Offshore Areas potentially impacted by onshore IRP sites (Six AOCs have been delineated)
Operable Unit 7: Site 32 - Topeka Pier Site
Operable Unit 8: Site 31 - West Timber Basin
Operable Unit 9: Site 34 - Former Oil Gasification Plant, Building 62

Site Screening Area: Site 30 - Galvanizing Plant, Building 184

Note: 2006 PNS Base Map

DRAWN BY J. LAMEY	DATE 4/20/04	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1291 / OWNER NUMBER CTO 022
CHECKED BY D. COHEN	DATE 3/06/07	FACILITY SITE MAP FIVE-YEAR REVIEW REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 2 / REV 0

2

2.0 OPERABLE UNIT 1

OU1 consists of Site 10 – Former Battery Acid Tank No. 24 and Site 21 – Former Acid/Alkaline Drain Tank (groundwater only). An RI is currently being conducted for OU1. Although OU1 is still under investigation under CERCLA, a five-year review is being conducted because hazardous substances, pollutants, or contaminants are at Site 10 in excess of levels that would allow for unlimited use and unrestricted exposure. As provided in the paragraph below, the selected remedy for Site 21 is expected to be NFA because no hazardous substances, pollutants, or contaminants remain on site in excess of levels that allow for unlimited use and unrestricted exposure, and therefore NFA is expected to be protective of human health and the environment. Therefore, the five-year review for OU1 focuses only on Site 10 and not on Site 21.

Site 21 was a 695-gallon underground steel tank used from 1974 until 1991 to hold discharge from two washing machines. The washing machines were used to clean air filters that were used to remove dirt and debris from ships. In 1991, as part of the RFI for PNS, the tank was excavated and removed in accordance with a closure plan. The tank was not intact. Stained fill and exposed bedrock were evident in the excavation. Confirmation soil samples were collected from the excavation, which was then backfilled with clean fill and covered with asphalt. A Consensus Document for NFA for soils at Site 21 (Navy, October 1996) was prepared to document that no further remedial action is required for soils at this site; however, further investigation and evaluation of potential groundwater impact from the site was required. Site 21 groundwater was investigated as part of the Site 31 Site Screening Investigation, and the results indicated that groundwater has not been impacted by Site 21. The Navy recommended NFA for groundwater (TtNUS, May 2000). The NFA decision for Site 21 will be documented as part of the remedy selection (i.e., ROD) for OU1 or in a separate document for Site 21.

2.1 HISTORY AND SITE CHRONOLOGY

The history of environmental activities at PNS is discussed in Section 1.2.2. A list of important Site 10 historical events and relevant dates in site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Filling of area was conducted and area apparently used for berthing and/or launching boats	Before 1826 to 1860s and 1900s to 1915
Other industrial uses of area apparently began	1910s to 1920s
Building 238 built and lead-acid battery recharging operations began within the building	1955

Event	Date
Lead-battery acid wastes were discharged directly to the river (through an industrial waste outfall that is part of Site 5)	1955 to 1974
Lead-battery acid wastes discharged to underground storage tank south of Building 238	1974 to 1984
Leak in underground tank discovered and use of tank discontinued	1984
Underground tank and surrounding contaminated soil removed	1986
RFI sampling conducted	1991
Additional sampling of soil and groundwater to determine nature and extent of contamination conducted at Site 10	1998, 2001, and 2006

The offshore area of Site 10 is part of the Dry Dock AOC that was investigated as part of the EERA and is part of the more recent interim offshore sampling at monitoring station MS-12. Sampling locations at MS-12 are in a depositional area west of Site 10 and south of Building 178 (TtNUS, November 2004a). Sediment sampling locations (AS12 locations) included as part the Additional Scrutiny Investigation (TtNUS, August 2005a) are in the MS-12 sampling area and in the Berths 4 and 5 area. The offshore area is discussed as part of OU4 in Section 5.0.

2.2 BACKGROUND INFORMATION

Site 10 is a small peninsula located in the CIA near the southern shore of PNS (see Figure 1-2). Site 10 is currently and has historically been located within an industrial area. The site is located on fill material that was placed prior to the 1920s. Building 238, located on Site 10, consists of office space; some minor battery recharging work is still performed but that process does not generate chemical waste. A map of the site layout is presented as Figure 2-1.

The grounds surrounding Building 238 and spanning Site 10 are covered by asphalt. A loading dock is located on the southern and eastern side of the building. The site is bounded by the Piscataqua River on the east and south. The southern portion of the western site boundary is formed by the Piscataqua River; however, the remainder of the western boundary is formed by an adjacent building (Building 303). The northern boundary consists of additional operational buildings. The Site 10 shoreline along the Piscataqua River from the west to the southeast is bounded by a quay wall of granite blocks. Berths 4 and 5 are located south and east of Building 238, respectively. Barges are commonly docked at the berths. A crawl space with an earthen floor exists beneath a portion of Building 238 and the loading dock. The ground elevation of the earthen floor is approximately 5 to 6 feet below the ground elevation outside the building and loading dock.

Building 238 was constructed in 1955. Lead-acid battery recharging operations were conducted within the building. Sulfuric acid used for the recharging was stored in large tanks inside Building 238. Large lead-

acid storage batteries were drained inside Building 238, and until 1974, the acidic discharges drained directly to the offshore through an industrial waste outfall (Site 5) (TtNUS, June 2006b; Weston, June 1983). In 1974, the acidic discharges were directed into a lead-acid drain pipeline to an underground storage tank. The drain line exited the building in the crawl space and then dropped vertically into the earthen floor of the crawl space. The acidic discharge flowed through the drain line through the floor of the building to a steel underground storage tank (Battery Acid Tank No. 24) of 9,680-gallon capacity. A leak was discovered in the tank in 1984, and the tank and surrounding contaminated soil were removed in 1986 (TtNUS, June 2006b). The location of the tank and excavation area are shown on Figure 2-1.

Soil and/or groundwater at Site 10 was investigated in 1991 as part of the RFI (McLaren/Hart, July 1992), in 1998 as part of the Site 10 Field Investigation (TtNUS, March 2000), and in 2001 as part of the Site 10 Additional Investigation (TtNUS, March 2003a). The investigations showed the fill material was rocky and ranged in thickness from 10 feet to 40 feet (particularly nearer to the shoreline). Gravel, bricks, and other building materials were also found in the fill material. Groundwater at the site is tidally influenced and is saline or brackish.

Based on evaluation of the data for Site 10, it was determined that lead was the primary contaminant of concern, and in addition to soils in the area of the tank leak, soils in the crawl space by the drain line had high concentrations of lead [greater than 10,000 milligram per kilogram (mg/kg)]. Groundwater concentrations did not indicate that groundwater was a medium of concern for human health exposure or for offshore impact. It was determined that additional information on the nature and extent of lead in soil in the areas with high concentrations of lead and on lead concentrations in groundwater were necessary before preparing the RI Report. The Site 10 Data Gap Investigation Quality Assurance Project Plan (QAPP) was finalized in 2006 (TtNUS, June 2006b), and the investigation was conducted In July and August 2006. The Navy is currently preparing the RI Report.

2.3 REMEDIAL ACTIONS

A final remedy has not been selected or implemented for OU1. This section discusses the current CERCLA status of the site and associated schedule.

2.3.1 Remedy Selection

Offshore discharge of lead-battery acid was discontinued in 1974, and discharge of lead-battery acid to the underground storage tank was discontinued in 1984. Residual lead contamination (at concentrations greater than risk-based screening levels) is present in the soil at Site 10. Low-levels of lead (less than risk-based screening levels) were found in groundwater at Site 10. An RI is currently being performed to determine the risks associated with site contamination. Based on the FY07 schedule for OU1 (Navy,

July 2006), the FS for OU1 will be prepared in 2008. A remedy for Site 10 contamination will be selected after the FS is finalized.

2.3.2 Remedy Implementation

A final remedy has not yet been chosen for OU1. Based on the FY07 RI/FS schedule for OU1 (Navy, July 2006), the ROD for OU1 is scheduled to be signed in 2009 and remedy implementation is scheduled to begin in 2010. Therefore, it is expected that a decision document will be signed for OU1 prior to the Second Five-Year Review, and additional information regarding the remedy would be provided at that time.

2.4 FIVE-YEAR REVIEW PROCESS

This section provides a summary of the five-year review process and the actions taken to complete this review.

2.4.1 Document and Data Review

The Site 10 Additional Investigation Report (TtNUS, March 2003a) and Site 10 Data Gap Investigation QAPP (TtNUS, June 2006b) were the primary documents reviewed for this five-year review. The Site 10 Additional Investigation Report indicated that lead in soil is the primary concern and that lead levels exceed acceptable risk levels for current and potential future site uses. As part of the Data Gap Investigation, additional investigation of lead-contaminated soil under Building 238 (in the crawl space) and by the tank was recommended to evaluate the nature and extent of lead, particularly by site source areas. Lead concentrations in site groundwater were less than acceptable risk levels; however, additional groundwater sampling for lead was included in the Data Gap Investigation to address regulatory concerns regarding potential groundwater migration at the site to the offshore. The fieldwork for the Data Gap Investigation was conducted in July (soil sampling) and August (groundwater sampling) 2006.

2.4.2 ARAR and Site-Specific Action Level Changes

A remedy has not been selected and a ROD has not been signed for OU1; therefore, ARARs and site-specific action levels have not been identified for OU1.

2.4.3 Site Inspection

Site 10 was visually inspected on August 29, 2006. Weather conditions during the inspection were cool (60 degrees Fahrenheit), drizzling, and overcast at high tide. TtNUS personnel conducted the inspection and were escorted by Shipyard personnel because Site 10 is in a controlled industrial area. No

conditions presenting an immediate threat or unacceptable risk were observed. Minor maintenance items were noted on the inspection log in Appendix A. The Shipyard has no plans to change the current use of the site, although the Shipyard is planning to eventually remove the large water tank (Building 303) on the western side of Building 238 when the electronic test facility is moved. The removal of this tank is not expected to affect Site 10 conditions or uses.

Photographs of the crawl space at Site 10 were taken by PNS personnel during the July 2006 fieldwork. A photograph of the crawl space is provided in Appendix B.

2.5 TECHNICAL ASSESSMENT

A final remedy has not been selected for OU1; therefore, conclusions cannot be made at this time to support the determination that a remedy for OU1 is protective of human health and the environment. The 2006 field investigation and the 2006 site inspection do not indicate any imminent threats to human health or the environment. The site is in a controlled industrial area with restricted access, and contaminated soil is covered by asphalt or Building 238. The area is designated on the Shipyard land use control map as an IRP site. As discussed in Section 1.1, Shipyard policy restricts digging and excavation activities without a permit from the PNS Environmental Division and groundwater is not used at PNS.

2.6 ISSUES

A final remedy has not been implemented at OU1; therefore, deficiencies cannot be determined at this time. Minor maintenance items noted during the first five-year review site inspection are listed in Appendix A.

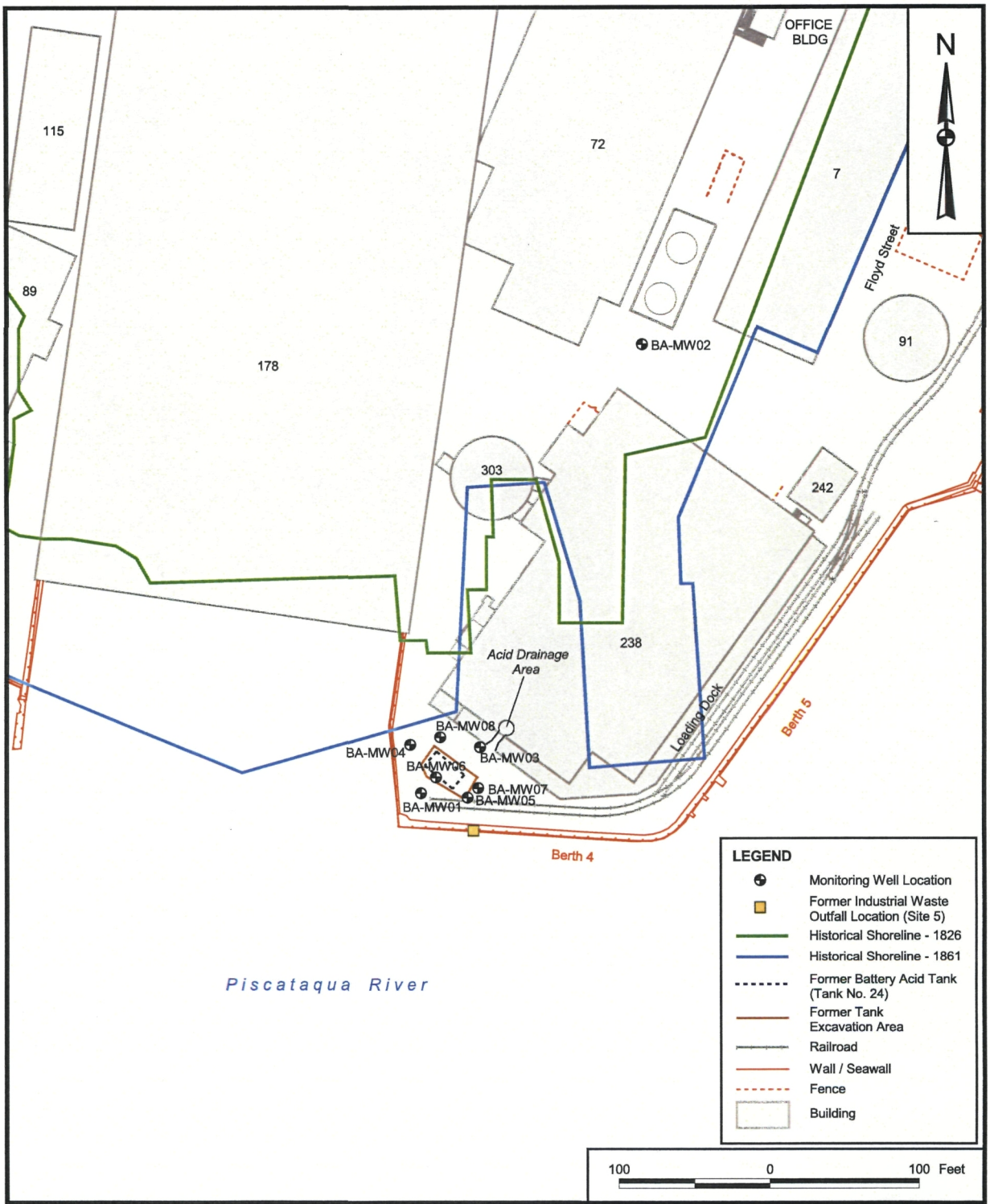
2.7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

It is recommended that the RI/FS be completed to determine the appropriate remedial action for Site 10 that is protective of human health and the environment. An appropriate decision document will be prepared after the RI/FS is completed to document the selected remedial alternative for Site 10 and to document NFA for Site 21. The Navy/PNS should address the minor maintenance items (see Appendix A) and continue to enforce the Shipyard dig policy. Any planned and approved digging or excavation in the area should be conducted following the appropriate health and safety protocols for a hazardous waste site, and any excavated material should be managed appropriately.

2.8 PROTECTIVENESS STATEMENT

A remedy for OU1 has not yet been selected. The results of investigations do not indicate any imminent threats to human health or the environment under current land use scenarios. Current site conditions and

Shipyard policies provide for protection of human health and the environment until a final remedy is selected.



DRAWN BY: A. JANOCHA — DATE: 3/30/04	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 1291	OWNER NUMBER: CTO 022
CHECKED BY: D. COHEN — DATE: 4/12/07	SITE 10 LAYOUT FIVE-YEAR REVIEW REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE	
COST/SCHEDULE-AREA		APPROVED BY — DATE	
SCALE: AS NOTED		DRAWING NO.: FIGURE 2 - 1	REV: 0

P:/GIS/PORTSMOUTH_NSY/APR/SITE10.APR SITE LAYOUT - FIVE YEAR REPORT 4/12/07 SP

3

3.0 OPERABLE UNIT 2

OU2 consists of Site 6 – DRMO Storage Yard, Site 29 – Former Teepee Incinerator Site, and DRMO Impact Area – Quarters S, N, and 68. An RI/FS is currently being conducted for OU2. Although OU2 is still under investigation under CERCLA, a five-year review is being conducted because hazardous substances, pollutants, or contaminants remain on site in excess of levels that allow for unlimited use and unrestricted exposure. No decision documents have been prepared for OU2.

3.1 HISTORY AND SITE CHRONOLOGY

The history of environmental activities at PNS is discussed in Section 1.2.2. A list of important OU2 historical events and relevant dates in site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
OU2 area filled with material excavated from Henderson's Point	1902 to 1905
DRMO activities began (stone crusher and scrap metal yard)	1920
Additional filling and disposal at OU2 (in waste disposal area)	1920 to 1975/1979
Seawall constructed	1940s
Coal and coke storage facility located at Site 6 (Building 172)	1942 to 1957
Sandblast grit (unused) storage located at Site 6 (Building 172)	1957 to 1960
Teepee Incinerator (Building 290) operated	1965 to 1975
Building 298 used as industrial waste treatment facility	1975 to 1980s
Hose handling facility located at Site 29 (Building 310)	1980 to present
Pesticide handling conducted at Building 314	1982 to 1995
Open storage of batteries at DRMO discontinued	1983
Environmental sampling began at OU2 (as part of FCS)	1984
RFI and RFI Data Gap investigation conducted at Site 6 (including what is now Site 29)	1989 to 1992 and 1995
DRMO capped as an interim corrective measure	1993
Clean closure of industrial waste treatment facility (Building 298)	1997
Portion of Site 6 separated into a new site (Site 29) and field investigation at Site 29 conducted	1998
Emergency Removal Action (shoreline stabilization) at Site 6	1999
Excavation for utility trench at Building 298 conducted	2002
Draft FS prepared for OU2	2004
Soil washing treatability study conducted	2005
Emergency Removal Action (shoreline stabilization) conducted at Site 29	2005 and 2006

The offshore area of OU2 is part of the DRMO AOC that was investigated as part of the EERA and is part of the more recent interim offshore sampling at monitoring station MS-11. Sampling locations at MS-11 are in a depositional area east of OU2 (east of the seawall at Site 29) and along the OU2 shoreline (mussel sampling locations) (TtNUS, November 2004a). Samples of eroding material along the shore of OU2 and a catch basin sample (AS11 locations) were included as part of the Additional Scrutiny Investigation (TtNUS, August 2005a). The offshore area is discussed as part of OU4 in Section 5.0.

3.2 BACKGROUND

OU2 is located in the south-central portion of PNS as shown on Figure 1-2. The OU2 layout is shown on Figure 3-1. Since the area was filled, Sites 6 and 29 within OU2 have been industrial and commercial areas. The DRMO Impact Area, included in OU2 because this area was thought to be impacted by particulate deposition from DRMO activities, has been a residential (military) area since before 1900.

The current DRMO area is the fenced area south of Quarters S and N and west of Building 298. The DRMO is responsible for the reuse, transfer, donation, sale, or disposal of excess and surplus DoD property in New England. DRMO operations are conducted in the paved portion of the fenced area; the area that was capped in 1993 is covered with grass and barricaded from use for any activities. The operations use temporary trailers and buildings; there are no permanent buildings located at the DRMO. Building 298 is used for office space, and Building 310 is the hose handling facility. There are no hazardous waste-related activities at the site, and hazardous chemicals are not used as part of any of the current site operations.

OU2 is located along the Piscataqua River. The OU2 shoreline is steeply sloped and the shoreline has shoreline erosion controls (riprap and a seawall). The shoreline controls that include riprap were placed along portions of the shoreline in 1999, 2005, and 2006 as part of emergency removal actions to provide shoreline protection along the OU2 shoreline. The OU2 shoreline is difficult and dangerous to access because of the strong river currents and the location at the base of a steep embankment. There is a small intertidal sediment area adjacent to OU2 to the east.

After Site 6 and the majority of Site 29 were filled in the early 1900s, the area was used for DRMO operations (from approximately 1920). Over the time the area was used as a DRMO, materials reportedly stored at the DRMO included lead and nickel-cadmium battery elements, motors, typewriters, paper products, and scrap metal. The major hazardous materials of concern were the lead battery cells and plates that were stockpiled on uncovered pallets. Nickel-cadmium batteries were also stored in the same manner. Historically, DRMO operations primarily appear to have occurred in the current fenced area of the DRMO, but operations could have occurred in areas directly adjacent to the DRMO. Operations, such as open storage of batteries and other materials, that could cause contaminants to be leached or otherwise released by pathways such as infiltration or runoff was terminated in approximately 1983. In

1993, interim corrective measures were conducted for a portion of the DRMO and included the capping and paving of sections of the area, installation of storm water controls, and installation of a new concrete curb (McLaren/Hart, April 1993).

The main activities that occurred in the Site 29 area are related to open burning, waste disposal, and industrial incineration. Filling of the remaining portion of OU2 may have begun in the 1920s. This area was apparently filled with paper, wood, rubbish, and ash, and is referred to as the waste disposal area. The ash is reportedly from open burning of trash that was conducted in the waste disposal area from approximately 1918 until 1965, when the teepee incinerator was built. Ash from the teepee incinerator was also disposed in the waste disposal area. Onsite disposal reportedly ended in 1975 when trash was being taken off site for disposal. Also, construction drawings of Building 298 from 1973 and of Building 310 from 1980 and Shipyard maps from the mid- to late 1970s support that disposal in the waste disposal area ended between 1975 and 1979 (between when Building 298 and Building 310 were constructed). Materials identified in soil borings located in the waste disposal area are generally consistent with the background information; waste materials observed in the borings include ash, cinders, wire, glass, wood, and metal pieces. Asbestos was also found during the excavation of the Building 310 foundation, which is located over the waste disposal area.

The teepee incinerator was built in 1965 and used to burn waste material until 1975. The teepee incinerator (Building 290) was used primarily for disposal of wood, paper, and rubbish, with occasional burning of cans of paint and solvents. Ash from the incinerator was deposited south of the incinerator until 1971 when the residue began to be landfilled in the JILF (at OU3, located approximately 1,000 feet northeast of OU2) and the Kittery municipal landfill. The incinerator ceased operations in 1975. The incinerator was apparently demolished soon after operations ended.

Building 298 was built in 1975 and was used as an industrial waste treatment facility until the 1980s. Industrial waste waters were treated in the facility and the treated effluent from the facility was discharged to the Shipyard's sanitary sewer system (and then the Kittery Municipal Treatment Plan). Sludge generated in the treatment process was disposed by a private contractor. Spill prevention and control methods were in place during operation of the facility and there were no releases that would affect soil or water outside the building. Clean closure under RCRA was documented in May 1997 and accepted by the MEDEP in November 1997. The building is currently used as office space. In 2002, a utility trench was excavated to place new utilities to service the offices. The excavated soil was disposed as hazardous material, the trench was backfilled with clean fill material, and the trench is considered a clean area within the OU2 boundary. Building 310 was built around 1980 and is used as a hose handling facility.

Environmental sampling began at OU2 in 1984 as part of the FCS (LEA, June 1986). OU2 has been included in various investigations since then including the RFI (McLaren/Hart, July 1992), RFI Data Gap Investigation (Halliburton NUS, November 1995), groundwater monitoring (TtNUS, August 1999), Site 29 field investigation (TtNUS, March 2000), 1999 removal action at Site 6 (FWENC, June 2001), Building 298 trenching (TtNUS, November 2002), and OU2 soil washing treatability study (TtNUS, January 2006a). The investigations showed that Site 6 and much of Site 29 (in the area filled in the early 1900s as part of Henderson's Point excavation), consists of angular rock fragments overlain by general fill material composed of sand and gravel with minor amount of wood and metal debris and cinders. In the remaining fill area of OU2, sand, gravel, and silt overlie waste fill that includes cinders, ash, plastic, glass, wire, and other waste materials. Fill thicknesses generally range from approximately 6 feet to 23 feet; however, the maximum fill thickness is approximately 40 feet (along the shoreline in the waste disposal area). The groundwater at OU2 is tidally influenced and is generally brackish or saline.

The Sites 6 and 29 data indicate that the main contaminants in soil are metals (particularly lead), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) and in groundwater are metals. Except for possibly just north of the DRMO fenceline, the DRMO Impact Area does not appear to have been impacted by operations at Sites 6 or 29. OU2 has little natural areas that would be a habitat for onshore ecological receptors. The human health risk assessment (TtNUS, November 2000) indicated unacceptable risks for current and future potential receptors exposed to Site 6 or Site 29 soils; risks were acceptable for exposure to groundwater and soils in the DRMO Impact Area. Contaminant fate and transport modeling conducted for OU2 (TtNUS, December 1999) indicated that migration of groundwater to the offshore was not anticipated to impact the offshore. A draft FS was prepared for OU2 in 2004 (TtNUS, November 2004b) to identify and evaluate potential remedial options. Based on regulatory comments, the Navy determined that additional investigation to better define the extent of soil contamination at OU2 was necessary to refine potential remedial options in the FS. Additional groundwater data are also needed to address regulatory concerns regarding groundwater migration to the offshore. The Navy is currently preparing a QAPP for the additional investigation at OU2 (including the area adjacent to the north of the DRMO fenceline). After conducting the investigation, the Navy will prepare a supplemental RI and revised draft FS.

Sampling activities as part of the Additional Scrutiny Investigation for OU4 (discussed further in Section 5.0) included samples of soil eroding along the top of the Site 29 shoreline (TtNUS, August 2005a). The data showed that the erosion was likely the cause of the elevated metals (copper, lead, nickel) observed in offshore sediments (TtNUS, February 2006). Shoreline controls were placed in the eroding areas in November 2005 and June 2006 as part of emergency removal actions (TtEC, October 2005 and September 2006). As part of the June 2006 activities, surficial debris (including metal pieces and wires)

was removed in the eastern portion of Site 29 and the area was covered with gravel. Figures showing as-built conditions for the shoreline controls are provided in Appendix A.

3.3 REMEDIAL ACTIONS

A final remedy has not been selected or implemented for OU2. This section discusses the current CERCLA status for OU2 and the associated schedule.

3.3.1 Remedy Selection

The main sources of contamination at the DRMO have been discontinued, and the areas with higher contamination levels have been capped or covered with asphalt. The wastes in the waste disposal area are covered with topsoil/vegetation or buildings. Incineration and waste disposal activities were discontinued in the 1970s. Interim measures (capping and asphalt) were conducted at Site 6 in 1993. Emergency removal actions to stabilize portions of the OU2 shoreline were conducted in 1999, 2005, and 2006. A draft FS for OU2 (TtNUS, November 2004b) was prepared to identify and evaluate remedial options for contaminated soil at OU2 to protect onshore human receptors and offshore ecological receptors. Groundwater was not identified as a medium of concern based on risk evaluation. Based on regulatory comments on the draft FS, the Navy determined that additional investigation was necessary before completing the FS. A supplemental RI will be performed and a revised draft FS will be prepared. Based on the FY07 schedule for OU2 (Navy, July 2006), the FS will be revised in 2008. Remedies for OU2 will be selected after the FS is finalized.

3.3.2 Remedy Implementation

A final remedy has not yet been chosen for OU2. Based on the FY07 RI/FS schedule for OU2 (Navy, July 2006), the ROD for OU2 is scheduled to be signed in 2009 and remedy implementation is scheduled to begin in 2010. Therefore, it is expected that a decision document will be signed for OU1 prior to the Second Five-Year Review, and additional information regarding the remedy would be provided at that time.

3.4 FIVE-YEAR REVIEW PROCESS

This section provides a summary of the five-year review process and the actions taken to complete this review.

3.4.1 Document and Data Review

The draft OU2 FS (TtNUS, November 2004b), Removal Action Work Plan for Site 29 Shoreline Stabilization (TtEC, October 2005), and Closeout Report for the Site 29 Removal of Waste Debris (TtEC, September 2006) were the primary documents reviewed as part of the five-year review for OU2. The draft OU2 FS compiled information from the various investigations conducted at or near OU2 before November 2004. During preparation of the FS, erosion along the OU2 shoreline was noted. Additional Scrutiny sampling of the eroding material was conducted in May 2005, and results were presented in the data package for the sampling (TtNUS, February 2006). The investigation results showed that there were visual signs of soil erosion that would indicate contaminated soil is potentially being released to the offshore area, there was metal debris in the eroding soil areas, and elevated levels of metals (copper, lead, and nickel) were found in the soil samples from the eroding areas. The soil adjacent to the offshore monitoring station sampling location (MS-11, location 3) in the sediment depositional area at the eastern end of the seawall had the greatest metals concentrations, which were greater than the metals concentrations in sediment. The Navy stabilized in the eroding portions of the shoreline in 2005 and 2006 and removed surficial debris from Site 29 during the 2006 work.

3.4.2 ARAR and Site-Specific Action Level Changes

A remedy has not been selected and a ROD has not been signed for OU2; therefore, ARARs and site-specific action levels have not been identified for OU2.

3.4.3 Site Inspection

Site 29 was visually inspected on August 29, 2006. Weather conditions during the inspection were cool (60 degrees Fahrenheit), damp, and overcast at high tide. Site 6 was inspected on September 25, 2006. Weather conditions during the inspection were cool (60 degrees Fahrenheit), and cloudy. The OU2 shoreline was viewed at low and high tides on January 16, 2007. Weather conditions were cold. The inspections were performed by TtNUS personnel escorted by Shipyard personnel. No conditions presenting an immediate threat or unacceptable risk were observed. Minor monitoring well maintenance items were noted on the inspection log in Appendix A. Asphalt in the DRMO area was not in good condition; however, no areas of exposed soil were observed. This area is within the fence around the DRMO which is secured and locked. Access to the DRMO is restricted to personnel working at the DRMO. Foot traffic in this area is minimal; most personnel working in the DRMO use motorized equipment such as fork lifts, etc.

The recently constructed shoreline controls at Site 29 were observed, and it appears that the previously exposed shoreline material is covered and well protected from erosion. The Shipyard recently installed a

paper shredder facility in Building 298 at Site 29. A portion of the facility (dumpster) is outside on the southern side of the building. The Shipyard has no other plans to change the current use of Site 29. The Shipyard is planning to eventually remove the DRMO operations from the Site 6 area; however, a schedule has not been determined.

Photographs of the shoreline controls were taken by PNS personnel. The photographs are provided in Appendix B.

3.5 TECHNICAL ASSESSMENT

A final remedy has not been selected for OU2; therefore, conclusions cannot be made at this time to support the determination that a remedy at OU2 is protective of human health and the environment. An Interim action was conducted in 1983 to address soil contamination at Site 6 before a final remedy is selected. Time-critical removal actions were conducted in 1999, 2005, and 2006 to address shoreline erosion concerns along the OU2 shoreline. Surficial debris in the wooded area on the eastern side of Site 29 was removed during the 2006 removal action, and the area was covered with gravel. The August and September 2006 site inspections do not indicate any imminent threats to human health or the environment. During the preparation of the OU2 FS, it was determined that additional investigation is necessary to develop and evaluate remedial options for OU2. The Navy is preparing a work plan for the additional investigation; subsequent to the investigation, the OU2 FS will be updated and finalized. The majority of contaminated materials at OU2 are covered by asphalt, cap, or buildings. Other areas are vegetated, but there are no areas of exposed contaminated materials; contaminated materials are in the subsurface in these areas. The area is designated on Shipyard land use maps as IRP Sites 6 and 29. As discussed in Section 1.1, Shipyard policy restricts digging and excavation activities without a permit from the PNS Environmental Division and groundwater is not used at PNS.

3.6 ISSUES

A final remedy has not been implemented at OU2; therefore, deficiencies cannot be determined at this time. Minor monitoring well maintenance items were noted on the inspection log in Appendix A. The asphalt at Site 6 (in the DRMO) was in disrepair; however, no areas of exposed soil were observed. This area is within the fence of the DRMO and access to the DRMO, is restricted to personnel working at the DRMO.

3.7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

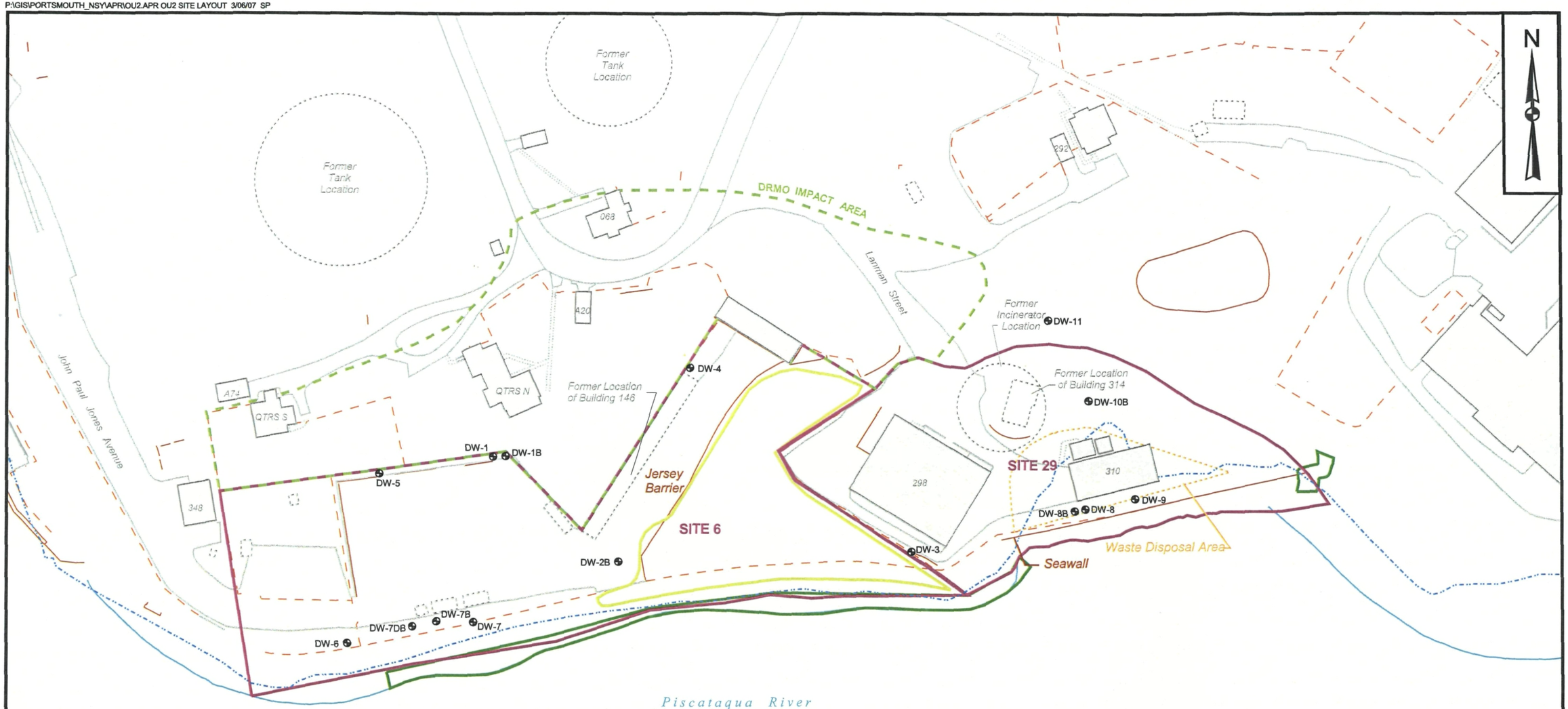
It is recommended that the RI/FS be completed to determine the appropriate remedial action for OU2 that is protective of human health and the environment. An appropriate decision document will be prepared

after the RI/FS is completed to document the selected remedial alternative for OU2. The Navy/PNS should address the maintenance items (see Appendix A) and continue to enforce the Shipyard dig policy. Any planned and approved digging or excavation in the area should be conducted following the appropriate health and safety protocols for a hazardous waste site, and any excavated material should be managed appropriately.

3.8 PROTECTIVENESS STATEMENT

A remedy at OU2 has not yet been selected. The results of investigations and removal/interim actions for OU2 do not indicate any imminent threats to human health or the environment under current land use scenarios. The primary use of OU2 is industrial and commercial, the future planned land use is anticipated to remain the same, and much of the area is capped or paved. Current site conditions and Shipyard policies provide for protection of human health and the environment until a final remedy is selected.

P:\GIS\PORTSMOUTH_NSY\APR\OU2.APR OU2 SITE LAYOUT 3/06/07 SP



Legend

- Monitoring Well Location
- Approximate Boundary of DRMO Impact Area
- Approximate Site Boundary
- Shoreline Erosion Controls
- Clay/Concrete Cap
- Building/Structure
- Former Building/Tank
- Fence
- Wall/Jersey Barrier
- Shoreline
- Historical Shoreline - 1910
- Road
- Railroad
- Sidewalk

Notes
1) Building 146 was removed in 2003/2004

100 0 100 Feet

DRAWN BY S. PAXTON	DATE 10/25/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1291	OWNER NUMBER CTO 022
CHECKED BY D. COHEN	DATE 3/06/07	OU2 LAYOUT MAP FIVE-YEAR REVIEW REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3 - 1	REV 0

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4.0 OPERABLE UNIT 3

OU3 consists of Site 8 - JILF, Site 9 - Former Mercury Burial Sites (MBI and MBII), and Site 11 - Former Waste Oil Tanks Nos. 6 & 7. This five-year review of OU3 is required by statute because hazardous substances, pollutants, or contaminants remain on site that do not allow for unlimited use and unrestricted exposure. The selected remedy in the ROD for OU3 was to install a hazardous waste landfill cover and to implement institutional controls, erosion controls, and monitoring (Navy, August 2001c). In addition, a 2003 Explanation of Significant Difference (ESD) for the ROD (Navy, September 2003) described excavation and consolidation of material within the limits of the JILF, which was completed in 2002, and construction of the wetlands within the excavated area, which was completed in 2003. Cap construction was completed in September 2004. A second ESD was issued in 2005 (Navy, October 2005) to recombine management of groundwater migration (formerly OU6) with the source control remedy (OU3). The OM&M program for OU3 was initiated in July 2006. Rounds 1 and 2 sampling and inspection activities were conducted in July and December 2006, respectively; however, the results were not available for inclusion in this five-year review. Round 1 maintenance activities were conducted in October 2006 as discussed in Section 4.4.3.

The JILF Impact Area, Former CDC, was previously included as part of Site 8; however, based on the OU3 ROD (Navy, August 2001c), this area was separated from Site 8 and further investigated separately. Based on the results of an investigation in 2003, it was determined that no further action is necessary for this area (TtNUS, April 2004). Therefore, this area is not discussed as part of the five-year review for OU3.

4.1 HISTORY AND SITE CHRONOLOGY

The history of environmental activities at PNS is discussed in Section 1.2.2. A list of important OU3 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Use of underground storage tanks at Site 11 to store waste oil before offsite disposal began	1943
Landfilling of tidal flats east of Seavey Island and west - southwest of Jamaica Island began	1945
Poured concrete blocks and precast concrete pipes containing mercury-contaminated wastes buried in two locations (MBI and MBII) at the JILF	Between 1973 and 1975
Dredged sediment from the Dry Dock area disposed at the JILF and landfilling of the area discontinued	1978
IAS identifies the JILF and MBI and MBII as sites	1983

Event	Date
Environmental investigations began at OU3 (as part of the FCS)	1984
Use of tanks at Site 11 discontinued and tanks and surrounding soil removed	1989
RFI and RFI Data Gap investigations conducted	1989 to 1992 and 1994
Pipe and blocks (three) removed from MBI and disposed off site	1994 and 1997
Geophysical survey of OU3 conducted	1998
Blocks (eight) removed from MBII and disposed off site	2000
Revised OU3 Risk Assessment and FS for OU3 prepared	2000
Test pitting investigation conducted based on results of geophysical survey; 40 drums containing non-hazardous material located and removed	2000
ROD for OU3 signed	2001
Phase I remedial design completed, evaluation of consolidation for MBII area and Jamaica Cove area conducted, and Phase II remedial design completed	2002
Significant construction of remedy started	2002
Changes to OU3 ROD document in ESD documents	2003 and 2005
Remedy construction completed	2004
Remedial action construction report completed	2006
Post-remedial OM&M plan finalized without the Land Use Control Remedial Action Plan (see Section 4.4.1.)	2006
OU3 Round 1 post-remedial groundwater and landfill gas monitoring and inspection conducted	July 2006
OU3 Round 1 post-remedial maintenance activities conducted	October 2006
OU3 Round 2 post-remedial groundwater and landfill gas monitoring and inspection conducted	December 2006

The offshore area of OU3 is part of the Jamaica Cove and Clark Cove AOCs that were investigated as part of the EERA and are part of the more recent interim offshore sampling at monitoring stations MS-5 through MS-9. Sampling locations are within the intertidal and subtidal areas of Jamaica and Clark Coves (TtNUS, November 2004a). Sediment sampling locations (AS05 and AS09 locations) are included as part of the Additional Scrutiny Investigation (TtNUS, August 2005a). The offshore monitoring results are discussed as part of OU4 (Section 5.0).

4.2 BACKGROUND

OU3 is located in the eastern portion of PNS as shown on Figure 1-2. The current OU3 layout is shown on Figure 4-1. The current OU3 area is approximately 22 acres and is used for parking, occupational uses, and recreational uses. Wetlands are located adjacent to the northern end of OU3, by Jamaica Cove. The hazardous waste storage facility (Building 357) is located to the northeast, and waste material extends under a portion of the paved area to the west of the building. Clark Cove is to the east of the landfill. The solid waste storage facility (Building 337) is located to the south. The Automotive Hobby Shop and hospital are located to the west. Waste material in the saturated zone extends under a portion

of the paved area at the Automotive Hobby Shop. The current features reflect post-remedial construction conditions.

Site 8 is the landfill (JILF) and Sites 9 and 11 were located within the JILF boundary. The Navy used the JILF, which previously consisted of tidal mudflats, as a disposal area from 1945 to 1978 for general refuse, trash, construction rubble, dredged sediment, and various industrial wastes. The boundary of OU3 is defined by the boundary of the landfill. Prior to the OU3 remedy, the landfill was 25 acres; however, landfill material from 3 acres adjacent to Jamaica Cove were excavated as part of the remedy and this area was removed from the landfill footprint. Mercury burial vaults (MBI and MBII) were placed in two locations within the landfill in the 1970s and then removed (intact) and disposed off site in the 1990s/early 2000. There is no indication that mercury from the vaults has contaminated surrounding soil or groundwater. The waste oil tanks at Site 11 were used from 1943 to 1989. The tanks were removed intact along with surrounding soil in 1989. Soil contamination remaining in the vicinity of Site 11 appears to be landfill material mixed with petroleum materials that may have originated from spills during filling of the tanks formerly at Site 11.

Environmental sampling began at OU3 in 1984 as part of the FCS (LEA, June 1986). OU3 has been included in various investigations including the RFI, RFI Data Gap investigation, groundwater monitoring and seep and sediment sampling in the intertidal area in 1996 and 1997, geophysical survey, and test pitting investigation. Removal actions were also conducted to remove the vaults at MBI and MBII. As discussed in the OU3 ROD (Navy, August 2001c), OU3 is characterized as containing a large volume of low-level hazardous materials. There is no indication of residual contamination from Site 9 (mercury), and soil contamination remaining in the vicinity of Site 11 appears to be landfill material mixed with petroleum materials that may have originated from spills during filling of tanks formerly located at Site 11. Soil and groundwater data for Sites 8, 9, and 11 show similar chemical contamination throughout the area of the landfill. A variety of organic and inorganic constituents were detected in soil and groundwater and include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs, pesticides, metals, and petroleum hydrocarbons. During the 2000 test pitting at the JILF (in February/March), dioxin analysis of selected subsurface soil samples was conducted and low levels of dioxins were detected. The contamination distribution at the three sites is consistent with the heterogeneous nature of the materials that were landfilled at the JILF (i.e., a range of concentrations of a variety of chemicals was detected in the JILF suggesting a heterogeneous mixture of wastes in the landfill).

The risk assessment for OU3 showed that remedial action was necessary and the FS was prepared in 2000. The ROD for OU3 was signed in 2001. The United States Army Corps of Engineers (US Army) performed the Remedial Design for OU3 in 2002 and 2003. Tetra Tech EC, Inc. (TtEC) performed the remedial action for OU3 in 2002 through 2004.

4.3 REMEDIAL ACTIONS

The selected remedial alternative as documented in the OU3 ROD (Navy, August 2001c) was a hazardous waste landfill cover, institutional controls, erosion controls and monitoring. The ROD was revised based on ESD documents in 2003 (Navy, September 2003) and 2005 (Navy, October 2005).

4.3.1 Remedy Selection

The following are the Remedial Action Objectives (RAOs), as provided in the OU3 ROD, that address exposure to materials within the JILF boundary (OU3) based on risks to potential receptors (human and ecological):

1. Prevent human exposure through ingestion, dust inhalation, and dermal contact to contaminated soils and/or waste within the landfill at unacceptable levels.

2. Prevent human exposure through ingestion of contaminated groundwater at unacceptable levels.

3. Prevent erosion of contaminated soils and/or waste on the edge of the landfill to the Piscataqua River or the Back Channel.

4. Provide for JILF's current and future uses (organized and unorganized sports, equipment storage, and parking) while providing sufficient protection of human health and the environment.

The following RAO was added to the OU3 remedy as part of the 2005 ESD document based on the addition of management of migration:

- Ensure that the migration of groundwater contaminants does not adversely impact the offshore environment.

The selected remedy for source control for the JILF (OU3) includes the following components:

- A multiple layer cover over the landfill surface to prevent receptors on the surface from coming into contact with contaminated soil and/or waste and to minimize infiltration of water to the landfill material. Portions of the JILF that have buildings and structures were not covered by the hazardous waste landfill cover.

- Institutional controls to restrict land and fresh water groundwater uses within the JILF boundary to prevent unacceptable human exposure to site contaminants. Institutional controls will also be used to prevent unrestricted disturbance of the hazardous waste landfill cover, shoreline erosion controls, and buildings and structures within the boundary of the JILF.

- Shoreline erosion controls, including rip-rap and/or wetlands created along the shoreline, to minimize the potential for washing away of soil and/or waste materials from the edge of the JILF.

- Monitoring of site media to assess the effectiveness of the remedy over the long term.

- Routine inspections and maintenance of the cover, shoreline erosion controls, and institutional controls to ensure continued effectiveness.

- Five-year site reviews to confirm that RAOs are being achieved and that the remedy remains protective.

The selected remedy addressed source control for OU3 (i.e., soil and groundwater within the boundary of the JILF). However, based on the ESD signed in October 2005, management of groundwater migration (formerly OU6) is included in the remedy for OU3 (Navy, October 2005). Therefore, components of the remedy (monitoring and five-year site review, in particular) also address management of migration.

As part of the ROD, the Navy agreed to re-evaluate the feasibility of consolidating portions of the landfill, the Jamaica Cove area, and the area surrounding the former MBII into the remaining portions of the landfill. Removal of waste material from both areas and consolidation in the remaining landfill area would reduce the extent of the hazardous waste landfill cover and reduce the quantity of waste in contact with groundwater. Based on the evaluation, it was decided that waste would be removed from the Jamaica Cove area but not from the MBII area. Removal of waste material in the vicinity of Jamaica Cove provided the additional benefit of removing landfill material from a tidally influenced area and provided area for the construction of wetlands. Removal of waste material in the former MBII area was considered so that the Navy could locate the discharge from two freshwater ponds that is believed to enter the landfill in this area, allowing the discharge to be directed away from the landfill, reducing the amount of groundwater flowing into this portion of the landfill. This discharge point was rerouted without waste removal to discharge into a surface drainage channel adjacent to the final landfill cover. The ESD documents the revisions to the ROD for: (1) excavation of contaminated soil/waste from an approximately 2.6-acre area bounded by Parker Avenue, Stephenson Road, and Jamaica Cove; (2) consolidation of the excavated material within the limits of the JILF south of Parker Avenue; and (3) construction of wetlands within the excavated area. In addition, it was determined that the waste in

the area of the Automotive Hobby Shop (see Figure 4-1) was removed to the groundwater table, backfilled with clean material, and paved with asphalt. This area was not included under the landfill cover. Following excavation, a geotextile was placed beneath the clean fill to delineate the boundary, which would assist during any future excavation in this area.

The selected remedy for OU3 addresses the current and future potential threats to human health and the environment by providing a cover to prevent human exposure to landfill materials, by implementing institutional controls to prevent use of site groundwater for drinking and to prevent land use that is not compatible with the cover, by providing shoreline erosion controls to prevent erosion of landfill material from the edge of the landfill, and by monitoring site media to assess the effectiveness of the remedy and to determine the need for additional action, if warranted, based on the monitoring results. Institutional controls are being used to prevent unrestricted disturbance of the hazardous waste landfill cover, shoreline erosion controls, and buildings and structures within the boundary of the JILF. Routine inspections and maintenance of the cover, erosion controls, and institutional controls are being conducted to ensure that the remedy remains effective over the long term. The inspection and maintenance activities also include verification activities to determine whether the buildings and structures with the JILF boundary are still in place.

4.3.2 Remedy Implementation

The US Army prepared the OU3 Phase I Remedial Design (June 2002a; June 2002b; and June 2002c), and Phase II Remedial Design (US Army, November 2002). In Phase I, the portion of the landfill adjacent to Jamaica Cove was excavated and consolidated within other portions of the landfill. Within the excavated area, a salt marsh wetland was established and shoreline rock protection was constructed to minimize the effects of wave action in Jamaica Cove. The Phase I design was completed in June 2002.

The Phase II design was completed in November 2002 and included the design of the remaining portions of the remedy. The Phase II remedial action includes the hazardous waste landfill cover, shoreline protection for Clark Cove, parking lots, surface drainage and erosion controls, recreational facilities (softball field and running track), and various ancillary items (e.g., lights, fencing, etc.)

TtEC was the Navy's environmental construction contractor for this project. Phase I of the project began on June 24, 2002, and the consolidation activities were completed in September 2002. The wetlands planting (salt marsh plants) was completed in spring 2003. Phase II of the remedial action started in the spring of 2003 and was completed in September 2004.

The landfill cover includes both a vegetated and a paved cover system. The vegetated cover system consists of the following components (from top to bottom):

- 6-inch-thick layer of topsoil
- 18-inch-thick (minimum) layer of select fill varied to accommodate drainage layer slope, (maximum thickness was 42-inches)
- Geosynthetic drainage layer
- Geomembrane
- Geosynthetic clay liner (GCL)
- Low permeability soil layer
- Gas collection layer

The top two layers (topsoil and select fill) are incorporated into the cover system to protect the underlying low permeability layers from physical damage, freeze/thaw cycles, and ultraviolet light. The topsoil is specifically included to ensure that a good stand of grass is established to limit erosion of the cover. The select fill will also provide an additional depth of soil to allow for grass growth.

The geosynthetic drainage layer is included to remove any water that infiltrates through the overlying layers. The removal of water will reduce the head on the underlying low permeability layers, and this will increase the stability of the cap system. Also, in the event of a small defect in the low permeability layers, a reduced head will also reduce any leakage through the cover system.

The geomembrane is the primary layer that will limit infiltration through the cap system. The GCL is included to stop any water that might get through the geomembrane because of a defect. The low permeability soil would also retard the downward migration of any water that might get though the geomembrane and GCL. The gas collection layer will collect any gases produced under the low permeability layers and convey the gas to collection strips and then finally to vents to the atmosphere.

The paved cover system design consists of the following components (from top to bottom):

- Pavement (asphalt or Portland cement concrete)
- Aggregate base
- Geosynthetic drainage layer
- Geomembrane
- GCL
- Low permeability soil layer
- Gas collection layer

As in the vegetated cover system, the top two layers provide protection of the underlying low permeability layers by physically separating those layers from physical hazards. The paved cover system also

provides the added utility of allowing vehicular traffic. Depending on the final use and anticipated vehicle traffic, three different pavement sections were used as part of the OU3 remedy.

Shoreline protection was designed and installed along the areas of Clark Cove and Jamaica Cove where OU3 comes in contact with these water bodies. The shoreline protection consists of rip-rap underlain by sand and geotextile. The shoreline protection will protect the landfill from erosion due to flooding and/or wave action.

The surface water controls constructed as part of the remedy consist of a network of ditches, chutes, pipes, and culverts. These features are included in the remedy to remove surface water from the landfill cover system and to minimize erosion.

The final design also included various recreational facilities that allow reuse of the site following construction.

4.3.3 System Operations/Operation and Maintenance

4.3.3.1 Monitoring Program

The field sampling and analysis plan for groundwater and landfill gas is included in the OU3 Post-Remedial OM&M Plan (TtNUS, June 2006a). The sampling locations are shown on Figure 4-2. The groundwater sampling rationale is as follows:

- Based on groundwater discharge zones, downgradient monitoring wells will be sampled at three locations along Clark Cove and two locations along the new Jamaica Cove boundary. Upgradient monitoring wells will be sampled for each groundwater discharge zone.

- Based on the saturated fill thickness at low tide, one well within the saturated zone will be sampled at each location. A one-time tidal study will be conducted to determine the appropriate sampling times.

- Based on regulatory concerns related to groundwater flow in the vicinity of and concentrations of organics detected at the JW-13 well cluster, the Navy will include the bedrock well (JW-13B) in the first four rounds of groundwater monitoring. The well will be included for organic analysis, and if the concentrations of organic chemicals exceed action levels and are greater than the concentrations in JW-13D, the well will be retained in the monitoring program.

The items related to sampling monitoring wells, including sampling methods, sampling frequency, etc., are listed below. The groundwater samples will be collected using low-flow sampling procedures.

- Groundwater samples for the first four rounds will be collected twice per year, in April and September. Subsequently, the Navy will evaluate sampling frequency. Initially, five upgradient wells (JW-7, JW-8, JW-9, HW-2, and HW3) and six downgradient wells (JW-13B, JW-13D, JW-20, JW-21, JW-22, and JW-23) will be monitored.

- The groundwater samples for the first four rounds will be analyzed for organics (VOCs, SVOCs, pesticide/PCBs) and metals (total and filtered). Groundwater samples for subsequent rounds will be analyzed for PAHs, inorganics, and other organic compounds detected in groundwater at concentrations exceeding screening levels.

- Well stabilization parameters during sampling activities, salinity measurements, and total suspended solids will be measured for all wells in the monitoring program for all rounds.

- Water level measurements will also be taken at all wells.

- Additional wells, JW-19 and JW-24, will be used to refine the groundwater contours and hydraulic gradient; therefore, water level measurements will be taken at these two additional wells.

The groundwater data will be compared to screening criteria to determine whether contaminant concentrations in groundwater could adversely impact offshore media.

As part of Round 1, a one-time tidal study was conducted before initiation of sampling as part of the OU3 post-remedial program. The results of the tidal study were used to determine the tidal lag and appropriate sampling times as well as the timing for well development. Groundwater sampling is targeted around low tidal levels for tidally influenced groundwater monitoring well locations, whereas landfill gas measurements are targeted during rising tidal levels for gas probes. The tidal study was conducted in the monitoring wells and a stilling well (installed at a suitable location in the river) to determine the magnitude of tidal effects, response times, and appropriate sampling times for the tidally influenced monitoring wells. The results of this study were used to determine the appropriate time for landfill gas measurements and to assist in determining the appropriate timing of the one-time well development.

Landfill gas will be sampled and analyzed (real-time) for methane from seven gas probes (G1 through G7), shown on Figure 4-2. Landfill gas field measurements will be taken from gas sampling ports using a direct-reading instrument. Sampling will occur while the water level is rising at the location of the gas monitoring probe during the time estimated from the post-remedial tidal study. The results of the landfill

gas sampling will be used to determine whether landfill gas could adversely impact sampling activities or people in nearby buildings.

4.3.3.2 Inspection

Inspection items are discussed in the O&M Manual, which is included in the OU3 Post-Remedial OM&M Plan (TtNUS, June 2006a) as Appendix D. Inspection items include grass-covered areas, erosion-control features, fencing, drainage, monitoring wells and gas vents, as well as inspection of settlement and slope stability and verification of land use controls. Findings of the inspections will be documented on the inspection checklist provided in the manual.

The remedial design and remedial action for OU3 include many features that allow for reuse of the site. The O&M Manual only covers the O&M of components of the remedy that are included as part of the ROD. Therefore O&M of components such as the running track, softball field and fences, paving areas, and lighting are not included in the O&M Manual. For instance, maintenance of the softball scoreboard is not covered by the O&M Manual; however, because the scoreboard footer penetrates the geomembrane layer of the cap, the scoreboard will be inspected to determine whether the footer has moved, which in turn could affect the integrity of the geomembrane (i.e., a noticeable settling or lean of the scoreboard would trigger performance of an evaluation).

Inspection of the remedy at OU3 will be performed at a minimum semi-annually for the first 2 years, except for inspection of the wetland vegetation, which will be performed annually for the first 5 years. The preferred season for one of the inspection events is spring because the winter thaw and spring precipitation may have the most effect on the remedy. After the first 2-year period, site conditions will be evaluated, and the Navy may propose to reduce inspections to an annual frequency. In addition, unscheduled episodic inspections may be required because of unforeseen events (such as damaging weather).

An episodic inspection of OU3 was performed in February 2006 to inspect for winter storm damage. Inspection items, as identified in the O&M Manual, included the vegetated cover system, paved cover system, storm water drainage system, gas management system, wetland vegetation, groundwater monitoring wells, shoreline protection, fencing and miscellaneous features, and settlement survey monuments. The landfill cap was inspected for erosion and differential settling. The function of the drainage layer of the cover was monitored by inspection for ponding water on the surface of the cover system or areas of saturation within the vegetated cap. The paved cover system was inspected for the general condition of the pavement, cracks in the pavement, holes in or penetration of the pavement, bulges, differential settling, and for any exposed cap components. The gas management system was inspected to ensure that the system continues to function properly. The inspection included checking for

physical damage to the vents and vent screens, settlement in the area surrounding the gas vents, leaning gas vents, and obstructions within the gas vent piping. Gas probes were checked for physical damage or blockage of the orifices, presence of the lid on the probe casing, and operation of the gas probe sample valve. Monitoring wells were inspected for rusted locks, damage to the well casing/riser caused by subsidence or vandalism, and blockage of the well opening caused by rocks or other debris. Survey monuments were not inspected. Overall, the landfill surface was noted to be in very good condition. The Round 1 inspection was conducted in July 2006. Based on the results of the inspection, maintenance activities were conducted in October 2006. The Round 1 inspection and maintenance activities are discussed in Section 4.4.1.

Jamaica Cove will be monitored annually for Years 1 through 5 of the OM&M program. As part of the monitoring, a qualitative evaluation of vegetation (e.g., species present, percent coverage, evidence of invasive species, presence of algae mats, etc.) and animal life present in the constructed Jamaica Cove wetland will be conducted.

Clark Cove will be monitored annually from Years 1 through 5 of the OM&M Program. Monitoring will be limited to a wetlands functions and values assessment in accordance with the US Army Highway Methodology utilizing the adjacent mudflat at Jamaica Island as a reference wetland.

4.3.3.3 Maintenance

Maintenance items are discussed in the O&M Manual, which is included in the OU3 Post-Remedial OM&M Plan (TtNUS, June 2006a) as Appendix D. The vegetative cover of the landfill cap will be mowed at least once a year in the early fall to prevent the overgrowth of open areas by deep-rooted and woody plants in the areas overlying the impermeable cap. The vegetative cover at OU3 will also require regular maintenance to repair soil erosion resulting from rain, snow, wind, and other natural factors. Holes created by burrowing animals will be identified for possible damage to the drainage layer and geomembrane. Any damaged geosynthetic drainage layer or geomembrane will be replaced in accordance with the project specifications, and the hole will be filled and compacted with the appropriate soil material. Any necessary repairs to the geomembrane or GCL will be performed by a qualified installer.

As long as the paved surfaces are not allowing erosion of the underlying cap surfaces and are not indicative of potential problems with the underlying cap components, the pavements should not require repairs to fulfill the requirements of the ROD. Any repairs to the pavement will be conducted in accordance with project specifications.

Maintenance of the storm water drainage system will include removing accumulated sediment and vegetative growth in ditches and debris accumulated on the trash racks. If ponding is observed in areas of the storm drainage system, further evaluation will be conducted and recommendations will be made to promote positive drainage. Any damage to the storm water control structures due to subsidence or erosion will be repaired as soon as possible.

Maintenance of the gas vents and probes will be performed as determined during the site inspections. Any monitoring wells noted during the inspections as being damaged will be repaired or replaced, as necessary. Shoreline stone revetments erosion will be repaired, if necessary, with placement of appropriate stone, granular material, or soil. Settlement survey monument concrete surfaces will be repaired as needed for cracks, chips, spalling, etc., and survey markers will be cleaned by removing any accumulated dirt or debris from engraved letters.

No maintenance or repair of the Jamaica Cove wetland will be conducted under CERCLA.

It is anticipated that the Clark Cove wetland (i.e., mudflat) will naturally maintain itself without active intervention. However, maintenance activities may be required to assure continuation of the Clark Cove wetland so that the wetland meets 85 percent of its functions and values prior to excavation in the wetland area.

Any observed movement of the fencing or light poles will be noted in the inspection checklist and will be evaluated for further investigation or repair as necessary. For instance, a leaning ballfield fence post may not require maintenance because the fence posts do not penetrate the liner. However, if the movement is significant for any structure that penetrates the liner, the area of movement or settlement will be removed to observe the integrity of the foundation and its connection to the geomembrane.

Based on the Round 1 inspection of OU3, maintenance activities were conducted in October 2006. The Round 1 inspection and maintenance activities are discussed in Section 4.4.1.

4.4 FIVE-YEAR REVIEW PROCESS

This section provides a summary of the five-year review process and the actions taken to complete this review.

4.4.1 Document and Data Review

The primary documents reviewed for the first five-year review are the ROD for OU3 (Navy, August 2001c), September 2003 ESD (Navy, September 2003), October 2005 ESD (Navy, October 2005), and

OM&M Plan (TtNUS, June 2006a). Remedial design documents (US Army, June 2002 and November 2002) and remedial action completion report (TtEC, May 2006) were also reviewed.

OU3 post-remedial OM&M was initiated in 2006. The tidal study was performed in March 2006. The groundwater and landfill gas sampling and the O&M inspection of OU3 for Round 1 were performed in July 2006, and wetlands inspection and OU3 maintenance activities for Round 1 were conducted in October 2006.

Landfill gas was not detected during Round 1 sampling of the gas probes. Several minor maintenance items were noted during the Round 1 inspection. The wetlands evaluation for Jamaica Cove and Clark Cove did not indicate any concerns. Maintenance activities conducted in October 2006 included the following:

- Removal of the stone check dam at the upgradient end of the vegetated portion of Ditch 5 to reduce the ponding of water at the base of Channel Chute 2.
- Removal of cattails within the channel.
- Removal of trash and debris from all culvert trash racks.
- Repairs at monitoring wells JW-7, JW-7B, JW-13DB, and JW-20.
- Filling of three rodent burrows.
- Placement of bird screens in all exposed gas vents.

The results of the tidal study and Round 1 activities will be provided in the OU3 Post-Remedial OM&M Round 1 Data Package.

The Land Use Control Plan, which will be included as Appendix E of the OU3 Post-Remedial OM&M Plan, has not been finalized, and all verification activities were not conducted as part of the Round 1 inspection. Therefore, additional activities to verify existing and proposed land use controls were conducted as part of the Five-Year site inspection as discussed in Section 4.4.3.

4.4.2 ARAR and Site-Specific Action Level Changes

The remedial action implemented for soil at the JILF includes a hazardous waste landfill cover, institutional controls, erosion controls, and monitoring. ARARs and TBCs were reviewed to determine whether there have been changes since the ROD, ESDs, and OM&M Plan were issued. ARAR tables from the OU3 ROD and ESDs are provided in Appendix A. Because the cover and erosion controls have been constructed, the only changes in ARARs and TBCs that could affect the remedy at this time are related to the OM&M components of the remedy. The post-remedial OM&M plan for OU3 was finalized in

June 2006, and it outlines the activities to be conducted as part of the OM&M program. The ARARs and TBCs used to develop the screening criteria for the monitoring program are the following chemical-specific ARARs and TBCs for OU3:

- Clean Water Act, Section 304 (a), National Recommended Water Quality Criteria
- Maine Surface Water Toxics Control Program, Chapter 530.5, Statewide Water Quality Criteria.
- USEPA health advisories for drinking water, risk RfDs, and CSFs.
- State of Maine Guidance Manual for Human Health Risk Assessments at Hazardous Substance Sites (June 1994)

Other ARARs and TBCs used to develop the OM&M program for OU3 are as follows:

- 40 CFR, Subpart F, Releases from Solid Waste Management Units (264.95 and 264.97)
- 40 CFR, Subpart N, Closure and Post-Closure Care (264.310)
- Maine Hazardous Waste Management Rules, Chapter 854
- RCRA Subtitle C, Subpart F, 264.101 Corrective Action for Solid Waste Management Units
- Maine Solid Waste Management Regulations, Chapter 405
- Maine Solid Waste Management Regulations, Chapter 401

The ARARs and TBCs were used to develop the OM&M program as discussed in Section 1.6.2 of the Post-Remedial OM&M Plan for OU3 (TtNUS, June 2006a). The water quality criteria are updated periodically, and any updates that affect the monitoring program will be taken into account as part of evaluation of the groundwater monitoring data. The human health action levels for the OU3 OM&M groundwater monitoring program were calculated using RfDs and CSFs in accordance with current risk guidance. The risk guidance, RfDs, and CSFs are updated periodically, and any updates that affect the monitoring program will be taken into account as part of the evaluation of the groundwater monitoring data. Table 4-1 provides the most current criteria for use in evaluating groundwater monitoring data. The table includes the criteria updated based on changes to risk guidance, RfDs, and CSFs; there were no changes to water quality criteria since the OU3 OM&M Plan was prepared.

4.4.3 Site Inspection

OU3 was visually inspected on August 30, 2006. Weather conditions during the inspection were warm (70 to 78 degrees Fahrenheit), cloudy to sunny, at low tide. The inspection was performed by TtNUS and Shipyard personnel. The site inspection checklist completed during the inspection is provided in Appendix A. TtNUS also visited OU3 on September 26, 2006 and additional observations based on the

September visit were noted on the inspection checklist. PNS took photographs of site features in January 2007, and the photographs are included in Appendix B.

The site inspection included visual observations of the current condition of the hazardous waste landfill cover and shoreline erosion controls at OU3. During the site inspection, the team found that the land use for the site has remained unchanged since the remedial action. The Shipyard continues to use the area for parking and recreation. In general, the site inspection found that the landfill cover and erosion controls were working as intended, and that overall, the site was in very good condition. Signs were observed during the inspection at the entrances to the site, warning that personnel should not dig at the site. Items were identified during the site inspection that should be addressed. One major concern was that OU3 cap internal pipe outlets could not be located as shown on final construction drawings. Changes to the design of these outlets should be checked to assure proper functioning of the landfill cover. The other items were minor maintenance items. These items are noted in the site inspection checklist provided in Appendix A. The items and their potential long-term impacts on the cap system include the following:

- Minor amounts of vegetation are growing in the rock lining in Ditch 5, some cattails are growing in the vegetated portion of Ditch 5, and minor amounts of debris are present at two of the trash racks of the culvert inlets. Vegetation and/or debris in the ditches could reduce channel flow and if significant, could results in overtopping of the channel.

- Various types of trailers (boat, camper, etc.) are being stored on the asphalt in the parking area. Improper storage or use on the asphalt could result in damage to the asphalt, because holes/penetrations could allow surface water to enter the cap drainage layer.

- A few monitoring wells require maintenance. Although there were no severely damaged monitoring wells, if any wells become severely damaged these wells could provide a direct conduit to the groundwater aquifer beneath the site.

- The gas vents do not have bird screens. The screens prevent habitation of animals in the vents and prevent unwanted material (e.g., trash) from being deposited in them. Also, an adequate vertical distance between the ground surface and gas vent openings should be maintained.

In addition, drawings specifically for site inspections are needed to aid in locating and identifying landfill features.

The Navy conducted some of the maintenance activities in October 2006, including removal of vegetation and debris, repair of monitoring wells, and placement of bird screens in the gas vents. The vertical

distance between the ground surface and vent openings was evaluated in October 2006 and determined to be adequate. The Navy observes the parking area regularly to ensure that storage of trailers is being conducted appropriately. The schedule for conducting the remaining maintenance activities is provided in Appendix A.

4.5 TECHNICAL ASSESSMENT

The following conclusions support the determination that the remedy for OU3 is currently protective of human health and the environment.

Question 1. Is the remedy functioning as intended by the decision documents?

- ***Remedial Action Performance:*** A hazardous waste landfill cover was installed at the JILF and is currently effective in limiting direct exposure to contaminated soil and/or waste materials. The cover also reduces infiltration of water through contaminated soil and/or waste materials. Shoreline erosion controls are minimizing the potential for washing away of soil and/or waste materials from the edge of the JILF (Clark Cove area). Contaminated soil and waste materials were excavated from the area adjacent to Jamaica Cove, and wetlands were created in the excavated area; therefore, erosion from the JILF in this area is no longer a concern. A groundwater and landfill gas monitoring program is being conducted to evaluate the performance of the remedy regarding minimizing contaminant migration and to ensure that groundwater contaminants are not at concentrations that could adversely impact the offshore environment. The data from the first round of sampling were not available for this five-year review.

- ***System Operations/O&M/Costs:*** Installation of the hazardous waste landfill cover was completed in 2004. An O&M Manual was developed in 2006, and an O&M program was initiated in July 2006. The cap system is functioning as intended, and maintenance is being performed to maintain proper long-term performance of the landfill cover and shoreline erosion protection.

  Monitoring of groundwater and landfill gas began in July 2006; however, the data are still being evaluated and a data package is being prepared. Therefore costs are not available. The projected annual monitoring costs in the ROD are listed below. The ROD costs were projected prior to the development of the monitoring plan, and assumed annual sampling and analysis for 16 groundwater samples for VOCs, SVOCs, and metals and eight groundwater samples for pesticides; 10 filtered and unfiltered surface water samples for SVOCs, metals, pesticides, and PCBs; and 30 samples of sediment for metals PAHs, pesticides, PCBs, and limited dioxins; and validation and reporting. The difference in projected and actual costs will be evaluated as part of the next five-year review.

Source	Year	Cost of Monitoring
Projected Annual Cost in ROD	1 - 5	$88,865
	6 - 30	$86,865
	Every 5 Years	$12,000

O&M of the cap system began in July 2006; however, the results are still being evaluated and a data package is being prepared. Therefore costs are not available for Round 1. The projected annual maintenance costs in the ROD are listed below. The ROD costs were projected prior to the development of the O&M plan and assumed inspection and replacement of 25 percent of wetland plants, soil cap maintenance, and asphalt cap patching during Year 1; soil cap maintenance and asphalt cap patching during Years 2 through 4 and Years 6 through 9; soil cap maintenance and asphalt cap patching, crack repair, and clean and seal pavement during Years 5, 15, and 25; and soil cap maintenance and repaving the asphalt cap (1½ inches thick) during Years 10, 20, and 30. The difference in projected and actual costs will be evaluated as part of the next five-year review.

Source	Year	Cost of O&M
Projected Annual Cost in ROD	1	$62,800
	2-4 and 6-9	$7,800
	5, 15, and 25	$64,700
	10, 20, and 30	$169,840

- ***Opportunities for Optimization:*** The OM&M Plan describes opportunities for optimization that will be possible after the first four rounds of data have been collected and evaluated. To date, two rounds of sampling have occurred; however, the results were not available for this five-year review. Round 3 is planned for spring 2007, and Round 4 of monitoring is planned for summer/fall 2007; therefore, the following opportunities for optimization will be available prior to the second 5-year review:

  - Based on regulatory concerns related to groundwater flow in the vicinity of and concentrations of organics detected at the JW-13 well cluster, the Navy will include the bedrock well (JW-13B) in the first four rounds of groundwater monitoring. The well will be included for organic analysis, and if the concentrations of organic chemicals do not exceed action levels and are not greater than the concentrations in JW-13D, the well will not be retained in the monitoring program.

  - The Navy will evaluate the first four rounds of data and, if warranted, may make a recommendation for reducing the sampling frequency and/or selecting a sampling season. In addition, the Navy will evaluate whether modification to the monitoring program (frequency, analytes, etc.) is necessary at a minimum of every 5 years from the start of the monitoring program and will make the appropriate recommendations to the regulators. Modifications to the monitoring program will be made in consultation with the regulators.

- The groundwater samples for the first four rounds will be analyzed for organics (VOCs, SVOCs, pesticide/PCBs) and metals (total and filtered). Groundwater samples for subsequent rounds will be analyzed for PAHs, inorganics, and other organic compounds detected in groundwater at concentrations exceeding the screening level.

- During the first four rounds of landfill gas monitoring, methane gas readings will be taken at the beginning, middle, and end of rising water levels (for wells in the vicinity of the probes). If the differences in the readings are not significant, the Navy will recommend a reduction in the number of readings to be taken from one or more probes.

In addition, the following item would optimize OU3 site O&M:

- Drawings with adequately labeled site features, including gas vents, monitoring wells, settlement monuments, gas probes, drainage layer outlets, ditches, channel chutes, culverts and drain pipes.

- ***Early Indicators of Potential Remedy Failure:*** Minor deficiencies were noted during the O&M inspections of the cap system. The deficiencies do not compromise the protectiveness of the remedy, and it is unlikely that they would contribute to remedy failure in the future. OM&M activities will be used to determine any concerns related to groundwater migration and/or gas generation at OU3.

- ***Implementation of Institutional Controls and Other Measures:*** A Land Use Control Plan is being prepared and addresses the actions to provide land use controls. Verification of land use controls is a component of the O&M inspections. The specific inspection items as part of the O&M inspections will be provided in the Land Use Control Plan. However, as part of the five-year review site inspection, verification activities were conducted. As discussed in Section 1.0, TtNUS inspection personnel verified with Shipyard environmental personnel that there were no significant changes to the Shipyard dig policy. As part of the OU3 inspection, Shipyard environmental personnel indicated that there has been no unauthorized disturbance of the cap, and the inspection of OU3 verified this. The only authorized disturbance was for the placement around the landfill of signs indicating that no disturbance of the cap is allowed. Groundwater is not used at OU3; the only wells are groundwater monitoring wells.

Question 2. Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

- ***Changes in Exposure Pathways:*** There have been no changes at the site that would have resulted in new exposure pathways to human or ecological receptors. Based on the remedial construction activities, there are no longer seeps in the intertidal area, and most of the mid-to high tide intertidal area sediments are covered by the shoreline erosion controls. Therefore, less exposure to seeps and sediments in the intertidal area are expected.

- ***Changes in Land Use:*** There have been no changes in land use at the site that would have resulted in new exposure pathways to human or ecological receptors.

- ***New Contaminants and/or Contaminant Sources:*** There have been no new contaminants or contaminant sources at the site.

- ***Remedy Byproducts:*** There are no byproducts from the remedy.

- ***Changes in Standards, Newly Promulgated Standards, and TBCs***: ARARs and TBCs considered during preparation of the ROD and ESDs were reviewed to determine changes since the remedial design and OM&M Plan were issued. There have been no changes to currently relevant ARARs. Monitoring action levels presented in the OU3 OM&M plan were updated based on changes in ARARs and TBCs and are presented on Table 4-1. The main change to the monitoring criteria are based on updates to risk guidance, RfDs, and CSFs, which affected several of the human health action levels.

- ***Changes in Toxicity and Other Contaminant Characteristics:*** There have been no changes in human health toxicity criteria that would impact the monitoring criteria, except as discussed in the previous bullet.

- ***Expected Progress Towards Meeting RAOs:*** The RAOs for OU3 are being met by installing and maintaining the hazardous waste landfill cover, and shoreline erosion controls and by conducting groundwater and landfill gas monitoring and O&M activities.

- ***Changes in Risk Assessment Methods:*** Except for groundwater monitoring, the remedy components are not chemical specific, and changes in risk assessment methodology would not impact the protectiveness of the remedy. Groundwater monitoring action levels for human health are risk based and take into account the current risk assessment methods and criteria.

Question 3. Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified that would call into question the protectiveness of the remedy.

4.6 ISSUES

OU3 cap internal pipe outlets could not be located as shown on construction drawings. Changes to the design of these outlets should be checked to assure proper functioning of the landfill cover. A few minor O&M items were noted during the five-year review site inspection that should be resolved. The items are presented in Sections 4.4.3 and listed in Appendix A. Many of the activities were conducted in October 2006. A schedule for conducting the remaining activities is provided in Appendix A.

4.7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of the site inspection and review, the following recommendations are made for OU3:

- Continue OM&M of the site and address the O&M items noted in Section 4.4.3 (see Appendix A)
- Finalize the Land Use Control Plan

4.8 PROTECTIVENESS STATEMENT

The remedy at OU3 is currently protective of human health and the environment. The source of contamination is contained. The hazardous waste landfill cover minimizes infiltration and subsequent contaminant migration and prevents direct contact with soil. A landfill gas monitoring and O&M program is being implemented to verify that the cap is performing as designed, and the results of the program suggest that the cap is performing as planned. Groundwater monitoring is being implemented to address migration of groundwater. Continued implementation of land use controls and OM&M will maintain the effectiveness of the remedy into the future.

TABLE 4-1

UPDATED AQUEOUS SCREENING LEVEL SUMMARY FOR OU3 POST-REMEDIAL MONITORING PROGRAM
FIVE-YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 1 OF 7

Parameter	Ecological Screening Levels			Human Health Screening Levels[6]	
	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)
Volatiles					
1,1,1-TRICHLOROETHANE	3,120(3)	312(5)	Buchman, 1999	17000	N
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	NA	NA	NA	1300000	N
1,1,2,2-TETRACHLOROETHANE	902(3)	90.2(5)	Buchman, 1999	21	C
1,1,2-TRICHLOROETHANE	1,800(1)(3)	940(1)(4)	Buchman, 1999	82	C
1,1-DICHLOROETHANE	NA	NA	NA	17000*	N
1,1-DICHLOROETHENE	450(1)	25(1)	Suter and Tsao, 1996	3400	N
1,2,4-TRICHLOROBENZENE	16(3)	12.9(4)	Buchman, 1999	160	N
1,2-DIBROMO-3-CHLOROPROPANE	NA	NA	NA	3	C
1,2-DIBROMOETHANE	NA	NA	NA	2.9*	C
1,2-DICHLOROETHANE	11,300(3)	1,130(5)	Buchman, 1999	62	C
1,2-DICHLOROBENZENE	197(3)	12.9(4)	Buchman, 1999	2400	N
1,2-DICHLOROPROPANE	1,030(4)	304(4)	Buchman, 1999	65	C
1,3-DICHLOROBENZENE	NA	NA	NA	63*	N
1,4-DICHLOROBENZENE	197(3)	12.9(4)	Buchman, 1999	60	C
2-BUTANONE	240,000(1)	14,000(1)	Suter and Tsao, 1996	77000	N
2-HEXANONE	1,800(1)	99(1)	Suter and Tsao, 1996	NA	NA
4-METHYL-2-PENTANONE	2,200(1)	170(1)	Suter and Tsao, 1996	NA	N
ACETONE	28,000(1)	1,500(1)	Suter and Tsao, 1996	120000	N
BENZENE	510(3)	70(4)	Buchman, 1999	60	C
BROMODICHLOROMETHANE	1,200(3)	640(4)	Buchman, 1999	82	C
BROMOFORM	NA	NA	NA	700	C
BROMOMETHANE	NA	NA	NA	160	N
CARBON DISULFIDE	17(1)	0.92(1)	Suter and Tsao, 1996	5600	N
CARBON TETRACHLORIDE	5,000(3)	500(5)	Buchman, 1999	21	C
CHLOROBENZENE	16(3)	12.9(4)	Buchman, 1999	780	N
CHLOROETHANE	NA	NA	NA	1700	C
CHLOROFORM	2,890(1)(3)	124(1)(4)	Buchman, 1999	840	C
CHLOROMETHANE	NA	NA	NA	NA	C
CIS-1,2-DICHLOROETHENE	22,400(3)	2,240(5)	Buchman, 1999	700	N
CIS-1,3-DICHLOROPROPENE	79(3)	7.9(5)	Buchman, 1999	44	C
CYCLOHEXANE	NA	NA	NA	NA	N
DIBROMOCHLOROMETHANE	1,200(3)	640(4)	Buchman, 1999	64	C
DICHLORODIFLUOROMETHANE	1,200(3)	640(4)	Buchman, 1999	15000	N
ETHYLBENZENE	43(3)	4.3(5)	Buchman, 1999	2700	C

TABLE 4-1

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FIVE-YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 2 OF 7

Parameter	Ecological Screening Levels			Human Health Screening Levels[8]	
	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)
ISOPROPYLBENZENE	NA	NA	NA	1700	N
METHYL ACETATE	NA	NA	NA	130000	N
METHYLCYCLOHEXANE	NA	NA	NA	NA	N
METHYLENE CHLORIDE	1,200(3)	640(4)	Buchman, 1999	790	C
METHYL TERT-BUTYL ETHER	NA	NA	NA	1600	C
STYRENE	NA	NA	NA	6500	N
TETRACHLOROETHENE	1,020(3)	45(4)	Buchman, 1999	3	C
TOLUENE	630(3)	500(4)	Buchman, 1999	3000*	N
TRANS-1,2-DICHLOROETHENE	22,400(3)	2,240(5)	Buchman, 1999	1600	N
TRANS-1,3-DICHLOROPROPENE	79(3)	7.9(5)	Buchman, 1999	55	C
TRICHLOROETHENE	200(3)	20(5)	Buchman, 1999	9	C
TRICHLOROFLUOROMETHANE	1,200(3)	640(4)	Buchman, 1999	18000	N
VINYL CHLORIDE	NA	NA	NA	4	C
TOTAL XYLENES	230(1)	13(1)	Suter and Tsao, 1996	5600	N
Semivolatiles					
ACENAPHTHENE	NA	40	USEPA, Jan. 1996	880	N
ACENAPHTHYLENE	30(3)	3(5)	Buchman, 1999	720(9)	NA
ANTHRACENE	30(3)	3(5)	Buchman, 1999	2400	N
BENZO(A)ANTHRACENE	30(3)	3(5)	Buchman, 1999	5**	C
BENZO(A)PYRENE	30(3)	3(5)	Buchman, 1999	0.5**	C
BENZO(B)FLUORANTHENE	30(3)	3(5)	Buchman, 1999	5**	C
BENZO(G,H,I)PERYLENE	30(3)	3(5)	Buchman, 1999	16(10)	NA
BENZO(K)FLUORANTHENE	30(3)	3(5)	Buchman, 1999	50**	C
BIS(2-CHLOROETHOXY)METHANE	1,200(3)	640(4)	Buchman, 1999	NA	NA
BIS(2-CHLOROETHYL)ETHER	NA	NA	NA	6	C
BIS(2-ETHYLHEXYL)PHTHALATE	400	360	Buchman, 1999	53	C
4-BROMOPHENYL PHENYL ETHER	NA	1.5(1)	Suter and Tsao, 1996	NA	NA
BUTYL BENZYL PHTHALATE	294.4(3)	0.34(4)	Buchman, 1999	2500	N
CARBAZOLE	NA	NA	NA	64	C
4-CHLORO-3-METHYLPHENOL	NA	NA	NA	NA	N
4-CHLOROANILINE	16(3)	12.9(4)	Buchman, 1999	380	N
2-CHLORONAPHTHALENE	0.75(3)	0.075(5)	Buchman, 1999	1200	N
2-CHLOROPHENOL	438(1)(3)	43.8(1)(5)	Buchman, 1999	390	N

TABLE 4-1

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FIVE-YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 3 OF 7

Parameter	Ecological Screening Levels			Human Health Screening Levels[6]	
	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)
4-CHLOROPHENYL PHENYL ETHER	NA	NA	NA	NA	NA
CHRYSENE	30(3)	3(5)	Buchman, 1999	500**	C
DIBENZO(A,H)ANTHRACENE	30(3)	3(5)	Buchman, 1999	0.5**	C
DIBENZOFURAN	66(1)	3.7(1)	Suter and Tsao, 1996	NA*	N
3,3'-DICHLOROBENZIDINE	NA	NA	NA	5	C
DIETHYL PHTHALATE	294.4(3)	0.34(4)	Buchman, 1999	71000	N
DI-N-BUTYL PHTHALATE	294.4(3)	0.34(4)	Buchman, 1999	2500	N
DI-N-OCTYL PHTHALATE	294.4(3)	0.34(4)	Buchman, 1999	NA*	N
4,6-DINITRO-2-METHYLPHENOL	NA	NA	NA	10	N
2,4-DINITROPHENOL	485(3)	48.5(5)	Buchman, 1999	240	N
2,4-DINITROTOLUENE	59(3)	37(4)	Buchman, 1999	200	N
2,4-DICHLOROPHENOL	202(1)(3)	36.5(1)(4)	Buchman, 1999	130	N
DIMETHYL PHTHALATE	294.4(3)	0.34(4)	Buchman, 1999	NA*	N
2,4-DIMETHYLPHENOL	212(1)(3)	21.2(1)(5)	Buchman, 1999	1400	N
2,6-DINITROTOLUENE	59(3)(11)	37(4)(11)	Buchman, 1999	110	N
FLUORANTHENE	NA	11	USEPA, Jan. 1996	180	N
FLUORENE	30(3)	3(5)	Buchman, 1999	430	N
HEXACHLOROBENZENE	16(3)	12.9(4)	Buchman, 1999	5	C
HEXACHLOROBUTADIENE	3.2(3)	0.32(5)	Buchman, 1999	28	C
HEXACHLOROCYCLOPENTADIENE	0.7(3)	0.07(5)	Buchman, 1999	39	N
HEXACHLOROETHANE	94(3)	9.4(5)	Buchman, 1999	23	C
INDENO(1,2,3-CD)PYRENE	30(3)	3(5)	Buchman, 1999	5**	C
ISOPHORONE	1,290(3)	129(5)	Buchman, 1999	6100	C
2-METHYLNAPHTHALENE	30(3)	3(5)	Buchman, 1999	59*	NA
2-METHYLPHENOL	230(1)	13(1)	Suter and Tsao, 1996	4100	N
4-METHYLPHENOL	230(1)(12)	13(1)(12)	Suter and Tsao, 1996	410	N
NAPHTHALENE	235(3)	23.5(5)	Buchman, 1999	530	N
2-NITROANILINE	NA	NA	NA	NA*	N
3-NITROANILINE	NA	NA	NA	NA*	N
4-NITROANILINE	NA	NA	NA	NA*	N
NITROBENZENE	668(3)	66.8(5)	Buchman, 1999	46	N
2-NITROPHENOL	485(3)(13)	48.5(5)(13)	Buchman, 1999	NA	N

TABLE 4-1

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FIVE-YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	Ecological Screening Levels			Human Health Screening Levels[8]	
	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)
4-NITROPHENOL	485(3)	48.5(5)	Buchman, 1999	NA	N
N-NITROSO-DI-N-PROPYLAMINE	NA	NA	NA	0.9	C
N-NITROSODIPHENYLAMINE	330,000(3)	33,000(5)	Buchman, 1999	530	C
2,2'-OXYBIS(1-CHLOROPROPANE)	NA	NA	NA	59	C
PENTACHLOROPHENOL	13	7.9	USEPA, Nov. 2002	67	C
PHENANTHRENE	NA	8.3	USEPA, Jan. 1996	240(10)	N
PHENOL	580(3)	58(5)	Buchman, 1999	30000	N
PYRENE	30(3)	3(5)	Buchman, 1999	110	N
2,4,5-TRICHLOROPHENOL	240	11	Buchman, 1999	12000	N
2,4,6-TRICHLOROPHENOL	NA	97(1)(4)	Buchman, 1999	120	C
Pesticides/PCBs					
ALDRIN	1.3	0.13(3)	USEPA, Nov. 2002	0.3	C
ALPHA-BHC	0.16(14)	0.016(3)	USEPA, Nov. 2002	0.2(14)	C
ALPHA-CHLORDANE	0.09	0.004	USEPA, Nov. 2002	2(15)	C
BETA-BHC	0.16(14)	0.016(3)	USEPA, Nov. 2002	0.7(14)	C
4,4'-DDE	0.13(6)	0.001(6)	USEPA, Nov. 2002	23	C
4,4'-DDD	0.13(6)	0.001(6)	USEPA, Nov. 2002	33	C
4,4'-DDT	0.13	0.001	USEPA, Nov. 2002	23	C
DELTA-BHC	0.16(14)	0.016(3)	USEPA, Nov. 2002	0.2(14,16)	C
DIELDRIN	0.71	0.0019	USEPA, Nov. 2002	0.09	C
ENDOSULFAN I	0.034	0.0087	USEPA, Nov. 2002	440(17)	N
ENDOSULFAN II	0.034(17)	0.0087(17)	USEPA, Nov. 2002	420(17)	N
ENDOSULFAN SULFATE	0.034(17)	0.0087(17)	USEPA, Nov. 2002	430(17)	N
ENDRIN	0.037	0.0023	USEPA, Nov. 2002	8	N
ENDRIN ALDEHYDE	0.037(18)	0.0023(18)	USEPA, Nov. 2002	16(18)	N
ENDRIN KETONE	0.037(18)	0.0023(18)	USEPA, Nov. 2002	5(18)	N
GAMMA-BHC (LINDANE)	0.16	0.016(3)	USEPA, Nov. 2002	2	C
GAMMA-CHLORDANE	0.09	0.004	USEPA, Nov. 2002	2(15)	C
HEPTACHLOR	0.053	0.0036	USEPA, Nov. 2002	0.4	C
HEPTACHLOR EPOXIDE	0.053	0.0036	USEPA, Nov. 2002	0.08	C
METHOXYCHLOR	NA	0.03	USEPA, Nov. 2002	48	N
TOXAPHENE	0.21	0.0002	USEPA, Nov. 2002	1	C

TABLE 4-1

UPDATED AQUEOUS SCREENING LEVEL SUMMARY FOR OU3 POST-REMEDIAL MONITORING PROGRAM
FIVE-YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 5 OF 7

Parameter	Ecological Screening Levels			Human Health Screening Levels[B]	
	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)
AROCLOR-1016	NA	0.03(7)	USEPA, Nov. 2002	9.8	C
AROCLOR-1221	NA	0.03(7)	USEPA, Nov. 2002	0.21	C
AROCLOR-1232	NA	0.03(7)	USEPA, Nov. 2002	0.21	C
AROCLOR-1242	NA	0.03(7)	USEPA, Nov. 2002	0.03	C
AROCLOR-1248	NA	0.03(7)	USEPA, Nov. 2002	0.028	C
AROCLOR-1254	NA	0.03(7)	USEPA, Nov. 2002	2.8	C
AROCLOR-1260	NA	0.03(7)	USEPA, Nov. 2002	0.0029	C
Inorganics					
ALUMINUM	750(1)	87(1)	USEPA, Nov. 2002	NA*	N
ANTIMONY	1500	500	Buchman, 1999	36.6	N
ARSENIC	69(2)	36(2)	USEPA, Nov. 2002	4.9	C
BARIUM	50000	50000	USEPA, May 1996	13000*	N
BERYLLIUM	13(1)(3)	0.53(1)(4)	Buchman, 1999	22.6	N
CADMIUM	40(2)	8.8(2)	USEPA, Nov. 2002	27.0	N
CALCIUM	NA	NA	NA	NA	NA
CHROMIUM(21)	1,100(2)	50(2)	USEPA, Nov. 2002	56.9	N
COBALT	1,500(1)	23(1)	Suter and Tsao, 1996	NA*	N
COPPER	4.8(2)	3.1(2)	USEPA, Nov. 2002	5200	N
IRON	NA	1000(1)	USEPA, Nov. 2002	39000	N
LEAD	210(2)	8.1(2)	USEPA, Nov. 2002	15 (19)	NA
MAGNESIUM	NA	NA	NA	NA	NA
MANGANESE	2,300(1)	120(1)	Suter and Tsao, 1996	1120	N
MERCURY	1.8(2)	0.94(2)	USEPA, Nov. 2002	20 (20)	N
NICKEL	74(2)	8.2(2)	USEPA, Nov. 2002	2010	N
POTASSIUM	NA	NA	NA	NA	NA
SELENIUM	290(2)	71(2)	USEPA, Nov. 2002	650	N
SILVER	1.9(2)	0.19(3)	USEPA, Nov. 2002	319	N
SODIUM	NA	NA	NA	NA	NA
THALLIUM	213(3)	21.3(5)	Buchman, 1999	9.1	N
VANADIUM	280(1)	20(1)	Suter and Tsao, 1996	10.3	N
ZINC	90(2)	81(2)	USEPA, Nov. 2002	40200	N

TABLE 4-1

UPDATED AQUEOUS SCREENING LEVEL SUMMARY FOR OU3 POST-REMEDIAL MONITORING PROGRAM
FIVE-YEAR REVIEW REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
PAGE 6 OF 7

	Ecological Screening Levels			Human Health Screening Levels[8]	
Parameter	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)

Notes:
Units: Surface water parameters are in ug/L for all chemicals
NA = Not applicable/not available

These screening levels will be used in conjunction with upgradient chemical concentrations (and dilution factors for the chronic value) to develop action levels.
* indicates the value has been updated based on changes in reference doses and cancer slope factors since the June 2006 OM&M Plan.
** indicates the value has been updated since the June 2006 OM&M Plan based on updates to USEPA guidance (March 2005a and b).

Footnotes:
1 - Value is based on freshwater criteria.
2 - Value is based on dissolved concentrations.
3 - Chronic value was calculated by multiplying acute value by 0.1. Acute value was calculated by multiplying the acute LOEL by 0.1 (to estimate an acute NOEL).
4 - Value was calculated by multiplying the chronic LOEL by 0.1 to estimate a chronic NOEL.
5 - Value was calculated by multiplying the acute LOEL by 0.01 to estimate a chronic NOEL.
6 - Value is based on DDT criteria.
7 - Value is the total PCBs.
8 - The screening levels presented on this table correspond to a cancer risk level of 1×10^{-6} or a hazard index of 0.1. See text of Technical Memorandum (TtNUS, December 2002), for further explanation of screening levels selected for several of the carcinogenic PAHs, TCDD, total PCBs, and DDT family of compounds. Values for chemicals not included in the technical memorandum were calculated following the methodology presented in the technical memorandum.
9 - The reference dose for acenaphthene was used as a surrogate reference dose for the calculation of the human health final screening level for acenaphthylene.
10 - The reference dose for pyrene was used as a surrogate reference dose for the calculation of the human health final screening level for benzo(g,h,i)perylene and phenanthrene.
11 - 2,4-dinitrotoluene was used as a surrogate for 2,6-dinitrotoluene.
12 - 2-methylphenol was used as a surrogate for 4-methylphenol.
13 - 4-nitrophenol was used as a surrogate for 2-nitrophenol.
14 - Gamma-BHC was used as a surrogate for alpha-BHC, beta-BHC, and delta-BHC.
15 - The reference dose for chlordane was used as a surrogate reference dose for the calculation of the final screening level for alpha- and gamma-chlordane.
16 - The reference dose for alpha-BHC was used as a surrogate reference dose for the calculation of the human health
17 - The reference dose for endosulfan was used as a surrogate reference dose for the calculation of the human health final screening level for endosulfan I, endosulfan II, and endosulfan sulfate. Additionally, the ecological water value for endosulfan I was used as a surrogate for endosulfan II, and endosulfan sulfate.
18 - The reference dose for endrin was used as a surrogate reference dose for the calculation of the human health final screening level for endrin aldehyde and endrin ketone. Additionally, the ecological water value for endrin was used as a surrogate for endrin aldehyde and endrin ketone.
19 - The screening levels for lead are not calculated risk-based concentrations. The concentration presented for water (15 ug/L) is an action level often used to select chemicals of potential concern using a residential land use scenario.
20 - Screening levels for mercury are derived using toxicity data for mercuric chloride.
21 - Chromium VI screening levels will be used to evaluate the groundwater data.

Parameter	Ecological Screening Levels			Human Health Screening Levels[8]	
	Acute Values (µg/L)	Chronic Values (µg/L)	Source	Screening Level (µg/L)	Carcinogen (C) or Noncarcinogen (N)

References:

Buchman, M. F., 1999. NOAA Screening Quick Reference Tables, NOAA HAZMAT Report 99-1, Seattle, WA, Coastal Protection and Restoration Division, National Oceanic and Atmospheric Administration. http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

Suter, G.W. II. and C.L. Tsao. 1996. Toxicological Benchmarks for Screening Potential Constituents of Concern for Effects on Aquatic Biota:1996 Revision. Oak Ridge National Laboratory. ES/ER/TM-96/R2.

USEPA (United States Environmental Protection Agency), January 1996. ECO Update, Ecotox Thresholds. United States Environmental Protection Agency. Office of Solid Waste and Emergency Response. Intermittent Bulletin, Volume 3, Number 2. EPA540/F-95/038.

USEPA, May 1996. Quality Criteria for Water - 1986. Office of Water, Regulations and Standards. EPA 440/5-86-001.

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USEPA, March 2005b. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, EPA/630/R-03/003F.

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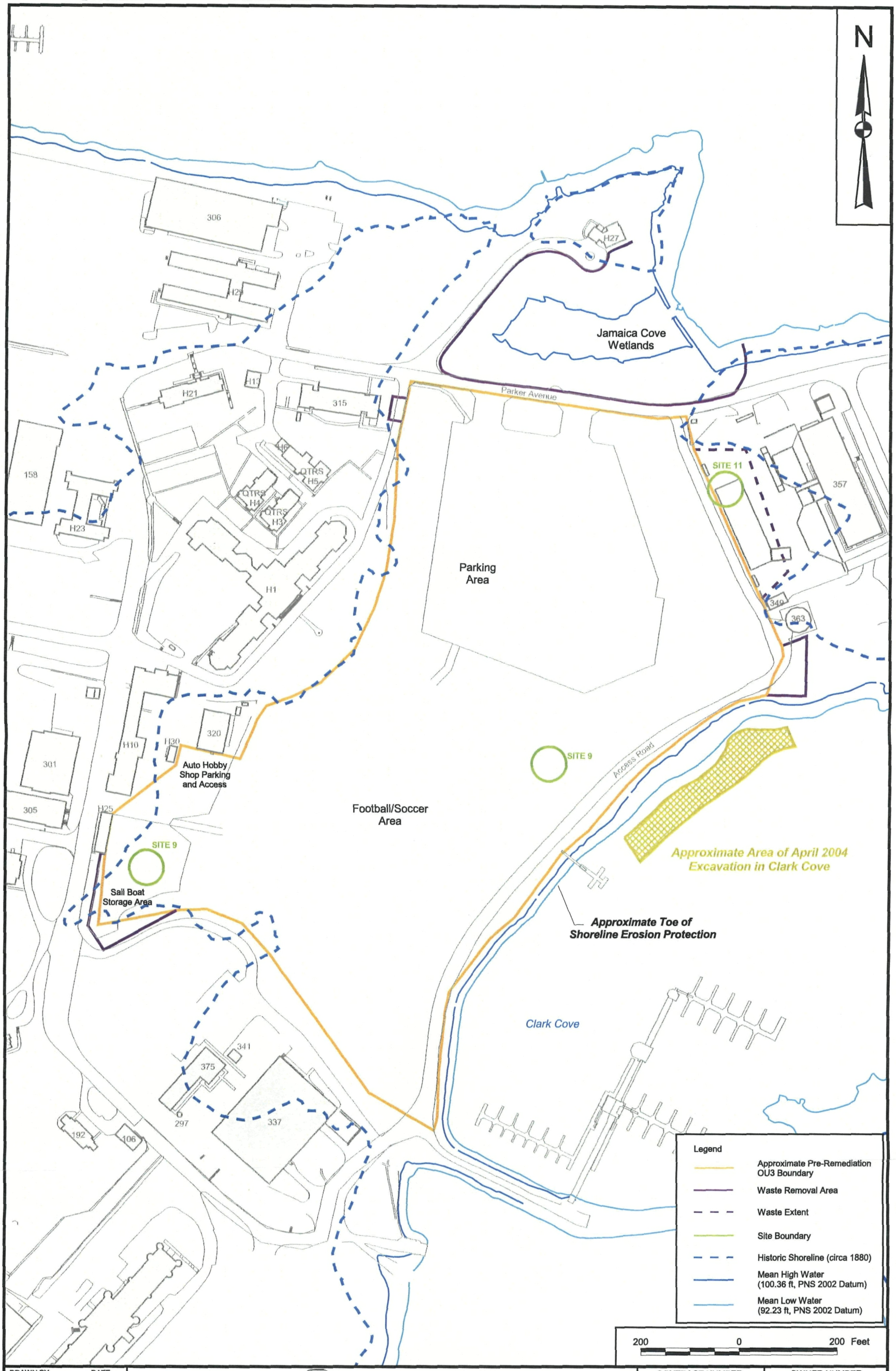

DRAWN BY A. JANOCHA	DATE 7/15/03	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1291 / OWNER NUMBER CTO 022
CHECKED BY D. COHEN	DATE 11/07/06	OU3 LAYOUT MAP FIVE-YEAR REVIEW REPORT PORTSMOUTH NAVAL SHIPYARD PORTSMOUTH, MAINE	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 1 / REV 0

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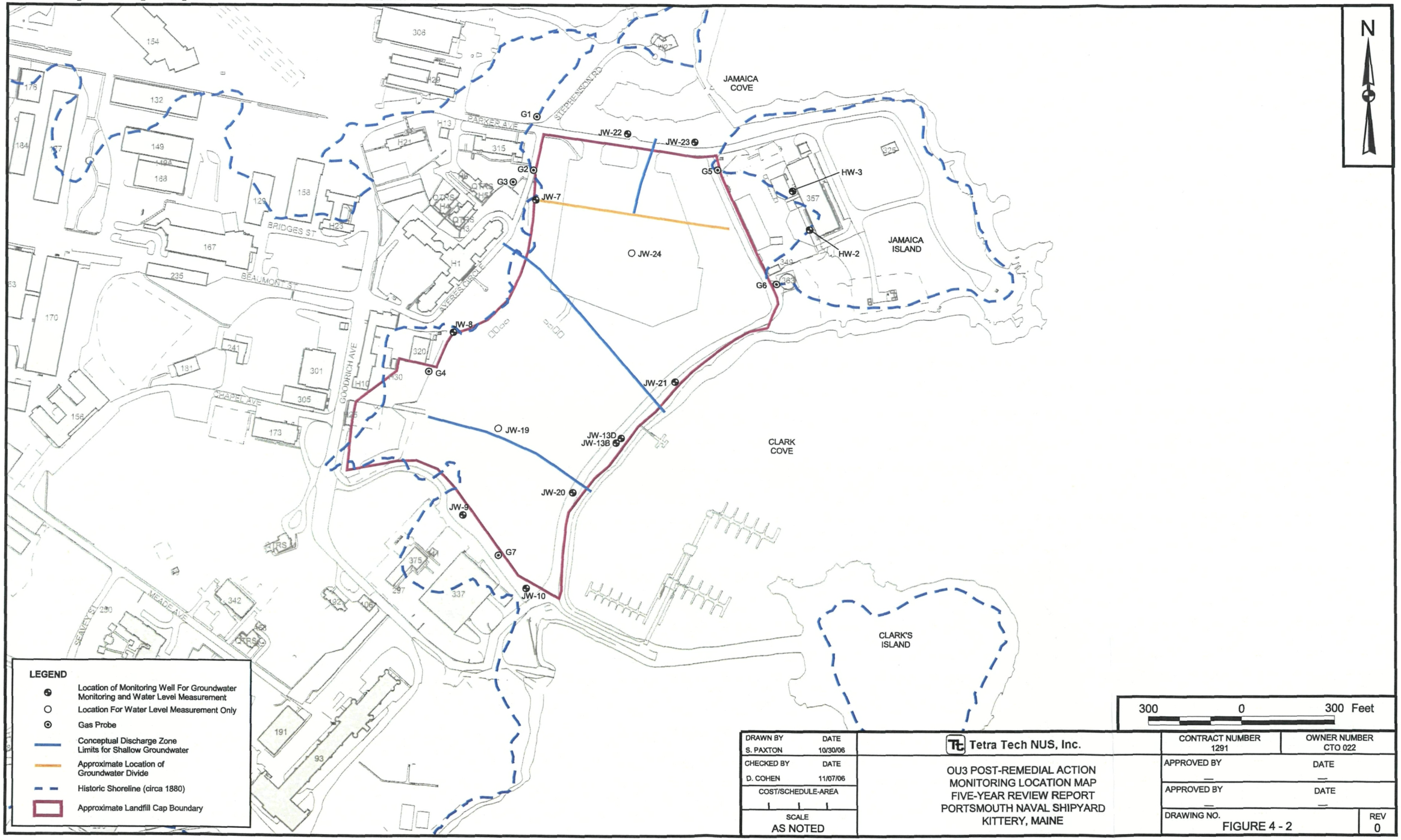
P:\GIS\PORTSMOUTH_NSY\APR\INTERIM_OFFSHORE_MONITORING.APR OU3 MONITORING STATION LOCATION LAYOUT 10/30/06 SP



DRAWN BY S. PAXTON	DATE 10/30/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 1291 / OWNER NUMBER CTO 022
CHECKED BY D. COHEN	DATE 11/07/06	OU3 POST-REMEDIAL ACTION MONITORING LOCATION MAP FIVE-YEAR REVIEW REPORT PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 2 / REV 0