UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
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September 29, 2005

Lonnie Monaco (monacolj@efane.northdiv.navy.mil)
Engineering Field Activity Northeast, Naval Facilities Engineering Command
Code 1821/LM, 10 Industrial Highway, Mailstop 82
Lester, PA 19113-2090

Re: Second Five-Year Review Report (1999- 2004) for the Naval Air Station, Brunswick, Maine NPL Site

Dear Mr. Monaco:

This office is in receipt of the Navy's Second Five-Year Review Report, Brunswick Naval Air Station, dated September 2005. 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. EPA also concurs that follow-up actions (such as optimizing the extraction system, determining the concentrations of 1,4-Dioxane in the Eastern Plume, revising the institutional controls, and updating the ARAR tables) are necessary to address long-term protectiveness.

This second five-year review was triggered by the first five year review, signed on March 31, 2000. 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 December 31, 2009.

Sincerely,

for Susan Studlien, Director
Office of Site Remediation and Restoration

cc: Bryan Olson, EPA-New England
Mary Sanderson, EPA-New England
Christine Williams, EPA-New England
Katherine Garufi, EPA HQ
Claudia Sait, ME DEP
Lisa Joy, NASB

SDMS DocID 237088

Second Five-Year Review Report for Naval Air Station Brunswick, Maine

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Prepared for

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
North Loop & American Way, Building G
Code 182
Lester, Pennsylvania 19113-2090

Prepared by

Environmental Chemical Corporation
50 D'Angelo Drive
Marlborough, Massachusetts 01752

and

EA Science and Technology
3 Washington Center
The Maple Building
Newburgh, New York 12550

September 2005
FINAL
EA Project No. 61771.04

Second Five-Year Review Report for Naval Air Station Brunswick, Maine

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Approved by: _____ Date: 04 Oct 05

Captain George G. Wornack
Commanding Officer
Naval Air Station Brunswick
U.S. Department of the Navy

September 2005
FINAL
EA Project No. 61771.04

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EPA's Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Brunswick Naval Air Station		
EPA: ME8170022018		
Region: I	**State:** ME	**City/County:** Cumberland County

SITE STATUS	
NPL status: Final X Deleted Other (specify) _____	
Remediation status (choose all that apply): Under construction Operating X Complete	
Multiple OUs?* YES X NO	**Construction completion date:** / /
Has site been put into reuse? YES NO X	* = portions of the former facility

REVIEW STATUS	
Lead agency: EPA State Tribe Other Federal Agency U.S. Department of the Navy X	
Author name: Prepared by EA Engineering, Science, and Technology under contract to U.S. Department of the Navy, Engineering Field Activity Northeast (EFANE)	
Author title:	**Author affiliation:**
EPA's Review period: 12 / 06 / 1999 to 12 / 06 / 2004	
Date(s) of site inspection: / /	**Various for sites 1, 2, 3, 7, 9, & Eastern Plume**
Type of review: Post-SARA X Pre-SARA _____ NPL-Removal only _____ Non-NPL Remedial Action Site _____ NPL State/Tribe-lead _____ Regional Discretion _____	
Review number: 1 (first) 2 (second) X 3 (third) Other (specify)	
Triggering action: Actual RA Onsite Construction at OU # _____ Actual RA Start at OU # _____ Construction Completion _____ Previous Five-Year Review Report X Other _____	
Triggering action date: 12 / 06 / 1999	
Due date (five years after triggering action date): 12 / 06 / 2004	

NOTES:
* "OU" refers to operable unit.

Navy designation	EPA designation
Sites 1 and 3	OU1
Site 2	OU7
Site 7	OU7
Site 9	OU6
Eastern Plume	OU2 & OU5

NOTE: All No Further Action sites (Sites 4, 5, 6, 8, 11, 13, 14, 15, 16, and 18) are summarized in Appendix A of the Second Five-Year Review Report.

Five-Year Review Summary Form, cont'd.

Issues:
Summarize issues.

For Sites 1 and 3:
Finalize the Operation and Maintenance Plan for the Sites 1 and 3 Landfill. No project action levels for comparing sediment and leachate seep sediment sample Long-Term Monitoring Plan (LTMP) have been established. Finalize and issue updated Quality Assurance Project Plan (QAPP). No Land Use Control Implementation Plan (LUCIP). Institutional control monitoring (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and disturbance of the ground surface). Institutional control boundary for site. Applicable or Relevant and Appropriate Requirement (ARAR) tables are not consistent across National Priorities List site. Potential impacts of Sites 1 and 3 Landfill to Mere Brook.

For Site 2:
No project action levels for comparing sediment and leachate seep sediment sample LTMP data have been established. Finalize and issue updated QAPP. Potential source area located north of Site 2 Landfill. Second round of Mere Brook fish tissue sampling is needed as recommended by Naval Air Station Brunswick's First Five-Year Review Report and the 1989 Record of Decision (ROD). No LUCIP. Bedrock well outside of Site 2 boundary at Dyers Corner gate. Eliminate high turbidity in the leachate. Evaluate institutional control boundaries. Monitoring performance standards are not consistent with ARARs.

For Site 7:
Finalize and issue the QAPP and determine groundwater flow direction for the LTMP monitoring network. Long-Term Monitoring Program sampling began with the Spring 2005 event. No institutional control monitoring has been implemented. No LUCIP has been developed. Evaluate institutional control boundaries. No current QAPP has been issued for the site. No institutional control monument marker has been installed to mark the physical boundary of the institutional control area. Spread stockpiled soils over site soil. ARAR tables are not consistent across National Priorities List site.

For Site 9:
Finalize and issue updated LTMP and QAPP. Finalize and issue the LUCIP. Develop institutional control boundary. Finalize the draft final direct-push investigation reports for Site 9. Install an additional well in the southwestern corner of the current institutional control boundary to be included in the LTMP. ARAR tables are not consistent across National Priorities List site.

For the Eastern Plume:
Finalize and issue updated LTMP and QAPP. No LUCIP for Eastern Plume. Evaluate institutional control boundaries. Assess occurrence of 1,4-dioxane within and upgradient of the Eastern Plume. Install two replacement extraction wells in the Eastern Plume. Evaluate natural attenuation data during monitoring events and assess the effectiveness of natural attenuation within the Eastern Plume. Optimize the Long-Term Monitoring Program hydraulic containment and contaminant mass removal. Optimize the extraction well network for contaminant containment and removal. Conduct additional surface water sampling in Mere Brook to determine if plume is discharging to Mere Brook. Develop institutional controls for Building 584 and soils at Sites 4, 11, and 13. Additional investigation near monitoring well MW-313. ARAR tables are not consistent across National Priorities List site. Plume shift.

Recommendations and Follow-Up Actions:
Summarize recommendations and follow-up actions.

Five-Year Review Summary Form, cont'd.

For Sites 1 and 3:

1. Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill
2. Establish appropriate standards to compare sediment and sediment seep samples for LTMP data.
3. Generate an LUCIP.
4. Develop institutional control boundary for site.
5. Expand bi-annual institutional control checklist to include noting construction activities or ground disturbance within the Weapons Compound Area.
6. LTMP to be updated to current conditions and QAPP to be finalized.
7. Update ARAR tables.
8. Evaluate potential impacts of Sites 1 and 3 Landfill to Mere Brook.

For Site 2:

1. Establish project action levels for comparing sediment and leachate sediment sample LTMP data.
2. Finalize and issue updated QAPP for the Site 2 LTMP.
3. Investigate the area north of Site 2 Landfill.
4. Continue discussion amongst project stakeholders regarding Mere Brook fish tissue sampling (second sampling event).
5. Generate an LUCIP.
6. Refine institutional control boundary for site.
7. Continue sampling and reporting results from bedrock well at Dyers Corner gate to regulators.
8. Install shallow well points to evaluate elevated turbidity in leachate seep samples.
9. Update monitoring performance standard tables.
10. Evaluate institutional control boundary.

For Site 7:

1. Finalize and issue updated QAPP.
2. Install 2 piezometers and conduct quarterly gauging to assist with locating an additional well(s) for the Long-Term Monitoring Program.
3. Initiate Long-Term Monitoring Program sampling after finalizing the LTMP and QAPP.
4. Install new groundwater monitoring wells pending completion of the quarterly gauging program and concurrence from the regulators.
5. Generate an LUCIP.
6. Develop institutional control boundary for site.
7. Update ARAR tables.

For Site 9:

1. Finalize revisions to the LTMP and issue updated and revised LTMP.
2. Finalize draft QAPP and issue updated QAPP.
3. Finalize and issue the LUCIP document.
4. Finalize draft final direct-push investigation reports for 2003 and 2004 for Site 9.
5. Install new monitoring well in southwestern corner of the current institutional control boundary.
6. Develop institutional control boundary for site.
7. Update ARAR tables.

For the Eastern Plume:

1. Finalize revisions to the LTMP and issue updated and revised LTMP.
2. Finalize draft QAPP and issue updated QAPP.
3. Generate an LUCIP document for Eastern Plume.
4. Continue assessment of occurrence of 1,4-dioxane in the Eastern Plume.
5. Install replacement extraction wells in the Eastern Plume.
6. Continue collection of natural attenuation data during monitoring events and assess the effectiveness of natural attenuation within the Eastern Plume.
7. Optimize the Long-Term Monitoring Program and remedy.
8. Develop appropriate actions if Building 584 is demolished, or if soils are disturbed at Sites 4, 11, and 13. Includes appropriate changes to the Naval Air Station Brunswick Base Instruction.
9. Develop/refine institutional control boundary for site.
10. Additional investigation for new monitoring well MW-313.
11. Collect additional surface water samples in Mere Brook in the vicinity of MW-313.
12. Update ARAR tables.
13. Investigate causes of plume shift.

Five-Year Review Summary Form, cont'd.

Protectiveness Statement(s):
Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than one operable unit, include an additional and comprehensive protectiveness statement covering all of the remedies at the site.

For Sites 1 and 3:
The remedy is expected to be protective of human health and the environment upon attainment of the clean up goals as presented in the 1992 ROD, which is expected to take 30 years to achieve. During the period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater. In addition, the site remains within a restrictive area of the base limiting access only to authorized personnel. Current monitoring data indicate that the remedy is functioning as required. In order for the remedy to remain protective in the long-term, institutional controls will need to be refined.

For Site 2:
The remedy (Minimal Action) is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls (Base Instruction) that restrict soil excavation and the usage of the groundwater. In addition, the site remains within a restricted area of the base limiting access only to authorized personnel. In the short term, current monitoring data indicate that the remedy is functioning as required; however, additional monitoring and refinement of institutional controls are needed to ensure the remedy is protective in the long term.

For Site 7:
The remedy at Site 7 is expected to be protective of human health and the environment upon attainment of the cleanup goals, as presented in the 2002 ROD, which is expected to take up to 10 years to achieve (U.S. Navy 2002). During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and the usage of the groundwater. In addition, the site is currently undeveloped. In order for the remedy to remain protective in the long-term, institutional controls will need to be refined.

For Site 9:
The remedy is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1999 ROD, which was expected to take 20 years to achieve. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict excavation of waste and the usage of the groundwater. Current monitoring data indicate that the remedy is functioning as required; however, additional monitoring in the southwestern corner of the site is needed to ensure the remedy is protective in the long term and institutional controls will need to be refined.

For the Eastern Plume:
The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.

Site-Wide
The remedies and institutional controls are in place at the known Installation Restoration sites and are considered protective in the short term; therefore, there are no current exposures. Follow-up actions (such as optimizing the extraction system and refining the institutional controls) are necessary to address long-term protectiveness.

EXECUTIVE SUMMARY

Naval Air Station (NAS) Brunswick is an active base, owned and operated by the Federal government through the Department of the Navy. NAS Brunswick is located in Brunswick, Cumberland County, Maine, south of the Androscoggin River and south of Route 1 between Routes 24 and 123. The base supports the Navy's antisubmarine warfare operations in the Atlantic Ocean with several squadrons of P-3 maritime patrol aircraft. In the mid- to late 1980s, environmental contamination was identified at several areas on the base; and in July 1987, the NAS Brunswick, Maine became a National Priorities List site.

The NAS facility is participating in the Navy's Installation Restoration Program. Currently, there are 18 areas within NAS Brunswick that have been, or are being, investigated. The cleanup of these sites is being conducted under the Navy's Installation Restoration Program, and meets the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986.

A Second Five-Year Review was conducted at NAS Brunswick, Maine, a National Priorities List site. This five-year review was conducted in accordance with current and applicable U.S. Environmental Protection Agency guidance (EPA 540-R-01-007, OSWER No. 9355.7-03B-P) and current Department of the Navy Policy for Conducting CERCLA Statutory Five-Year Reviews (U.S. Navy 2004). The Department of the Navy is the lead agency that is remediating the NAS Brunswick National Priorities List site in accordance with the requirements of CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986. The purpose of the five-year review process is to ensure that the remedial actions selected for the NAS Brunswick National Priorities List sites remain protective of human health and the environment, and are functioning as designed.

The Federal Facilities Agreement for NAS Brunswick, Maine, dated 19 October 1990, also requires a five-year review. The trigger date for this statutory review was determined by the remedial action at Operable Unit 1, the Sites 1 and 3 Landfill, that consisted of onsite construction of the landfill cap and slurry wall. A first five-year review for NAS Brunswick was conducted in 1999 and finalized in March 2000. The first five-year review found that site remedies were functioning as intended and remained protective of human health and the environment.

A total of six sites were reviewed during this second five-year review: Site 1 – Orion Street Landfill – North and Site 3 – Hazardous Waste Burial Area (Operable Unit 1), Site 2 – Orion Street Landfill – South (Operable Unit 7), Site 7 Old Acid Caustic Pit (Operable Unit 7), Site 9 Neptune Drive Disposal Area (Operable Unit 6), and Eastern Plume (Operable Units 2 and 5). The remedies at the sites, as presented in the various Records of Decision, were reviewed to ensure that they are functioning as designed and that they continue to be protective of human health and the environment. The remedies and institutional controls are in place at the known Installation Restoration sites and are considered protective in the short term; therefore, there are no current exposures. Follow-up actions (such as optimizing the extraction system and refining the institutional controls) are necessary to address long-term protectiveness.

1. INTRODUCTION

Under Contract No. N62472-02-D-0810, Contract Task Order No. 017, the Department of the Navy, Engineering Field Activity Northeast (EFANE) contracted with Environmental Chemical Corporation to prepare this Second Five-Year Review Report for the Naval Air Station (NAS), Brunswick, Maine. The location of the NAS Brunswick facility is shown on Figure 1-1.

1.1 OVERVIEW OF THE FIVE-YEAR REVIEW PROCESS

This Second Five-Year Review Report has been prepared in accordance with the U.S. Environmental Protection Agency (EPA) Comprehensive Five-Year Review Guidance, June 2001, EPA 540-R-01-007, OSWER No. 9355.7-03B-P, and the U.S. Department of the Navy Policy for Conducting Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Statutory Five-Year Reviews (U.S. Navy 2004).

The purpose of the five-year review process is to determine whether the remedies at National Priorities List (NPL) sites at NAS Brunswick are, or are expected to be, protective of human health and the environment based on review of the existing reports. The findings and conclusions of the review are documented in this report for the NAS Brunswick NPL sites.

The following presents the requirements for five-year reviews:

a. The statutory requirement for a five-year review was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986. A five-year review is required when **both** of the following conditions are met, whether the site is on the NPL or not:

    1. Upon completion of the remedial actions at a site, hazardous substances, pollutants, or contaminants will remain above levels that allow for unlimited use and unrestricted exposure. For example, if a site is restricted to industrial use because hazardous substances, pollutants, or contaminants remain above levels that allow for unlimited use and unrestricted exposure, five-year reviews must be conducted.

    2. The Record of Decision (ROD) or Decision Document for the site was signed on or after 17 October 1986 (the effective date of the Superfund Amendments and Reauthorization Act).

b. CERCLA §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. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with Section [104] or [106], the President shall take or require such action. The President shall report to the

Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

c. The National Contingency Plan, 42 U.S.C. § 9621(c), implementing regulations, 40 C.F.R. Part 300.430(f)(4)(ii), provide:

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 initiation of the selected remedial action.

The description and status of the seven sites for which No Further Action has been determined through investigation or removal action (Sites 5, 6, 8, 14, 15, 16, and 18) are provided as Appendix A. The locations of the Installation Restoration Program (IRP) sites at NAS Brunswick are shown on Figure 1-2.

In keeping with the requirements of CERCLA Section 121(c) and the National Contingency Plan, initiation of a selected remedial action for a site at an installation that will result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure after the remedial action is complete is the "trigger" that starts the five-year review clock. The trigger date for the five-year review was determined by the start of remedial action construction for the Sites 1 and 3 Landfill cover and slurry wall on 6 December 1994 (Operable Unit 1) (Figure 1-3). The first five-year review for NAS Brunswick was completed in March 2000.

This is the second five-year review of NAS Brunswick NPL sites that covers the period of December 1999 – December 2004.

NAS Brunswick was placed on the CERCLA NPL on 22 July 1987. A Federal Facilities Agreement (FFA) was signed by the Navy, Maine Department of Environmental Protection (MEDEP), and EPA on 19 October 1990. The FFA outlines the response action requirements under CERCLA and the Navy's IRP at NAS Brunswick, and was developed in part to ensure that disposal sites are thoroughly investigated and remediated as necessary.

1.1.1 Community Involvement

During the April and October 2004 Restoration Advisory Board (RAB) meetings, the community was informed of the five-year review process for NAS Brunswick and copies of a related EPA handout were provided by the Navy entitled *Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites* (U.S. EPA 2001a). Persons with related comments and/or information were asked to contact the EPA Remedial Project Manager (RPM) and/or the Navy RPM. A copy of the EPA handout was included with the notes of the RAB meeting.

Upon completion of the second five-year review, a summary of the findings of this report is scheduled to be presented to the public during the Fall 2005 RAB meeting. The summary will include a description of remedial actions, deficiencies, recommendations, and follow-up actions

that are directly related to protectiveness of the remedies, and the determination(s) of whether the remedies are or are expected to be protective of human health and the environment. The summary will also provide the location of where a copy of the complete report can be reviewed, and provide the date of the next five-year review or notify the community that five-year reviews will no longer be necessary. Five-year reviews are not Administrative Record material and are not to be included therein. However, the Navy will ensure that the signed Five-Year Review Report is placed in the site information repository.

1.1.2 Naval Air Station Brunswick Location and Description

NAS Brunswick is an active base, owned and operated by the Federal government through the Department of the Navy. NAS Brunswick is located in Brunswick, Cumberland County, Maine, south of the Androscoggin River and south of Route 1 between Routes 24 and 123 (Figure 1-1). The base supports the Navy's antisubmarine warfare operations in the Atlantic Ocean with several squadrons of P-3 maritime patrol aircraft.

The base occupies approximately 3,094 acres of land. The operational area covers approximately 138 acres and lies east of the two parallel runways and consists of numerous office buildings, barracks, recreational facilities, hangars, repair shops, and other facilities to support NAS Brunswick aircraft. Forested areas, grasslands, shrubland, marsh, and open water comprise approximately 83 percent of the base with the remaining 17 percent of the base consisting of an operations area and paved areas (primary flight ramps and runways). The southern edge of the base borders coves and estuaries of the Gulf of Maine.

Undisturbed topography at NAS Brunswick is characterized by low undulating hills with deeply incised brooks. Ground surface elevations range from mean sea level (msl) in lowland drainage areas and the Harpswell Cove estuary to more than 110 ft above msl west and southwest of the southern end of the runways. Topography in the developed areas of the base has been modified by construction, with ground surface elevations generally ranging from 50 to 75 ft above msl.

Property uses surrounding NAS Brunswick are primarily suburban and rural residential, with some commercial and light industrial uses along Routes 1, 24, and 123. An elementary school and a college are located within a 1-mi radius of the western base boundary.

Currently, this facility is participating in the Navy's IRP. In 1987, EPA placed NAS Brunswick on the NPL. Currently, there are 18 areas within NAS Brunswick that have been, or are being, investigated. The cleanup of these sites is being conducted under the Navy's IRP and meets the requirements of CERCLA and Superfund Amendments and Reauthorization Act.

Remedies that include institutional controls are noted in the base instruction. Geographic institutional control boundaries and the specific restrictions are included for each site. In addition, requirements to include institutional controls in transfer by lease or deed documents are included. The Base point-of-contact for the Base Operating Instruction is the NAS Brunswick IRP coordinator. The NAS Brunswick Public Works Officer is responsible for regulating and enforcing the Base Operating Instruction.

1.2 ROLES AND RESPONSIBILITIES

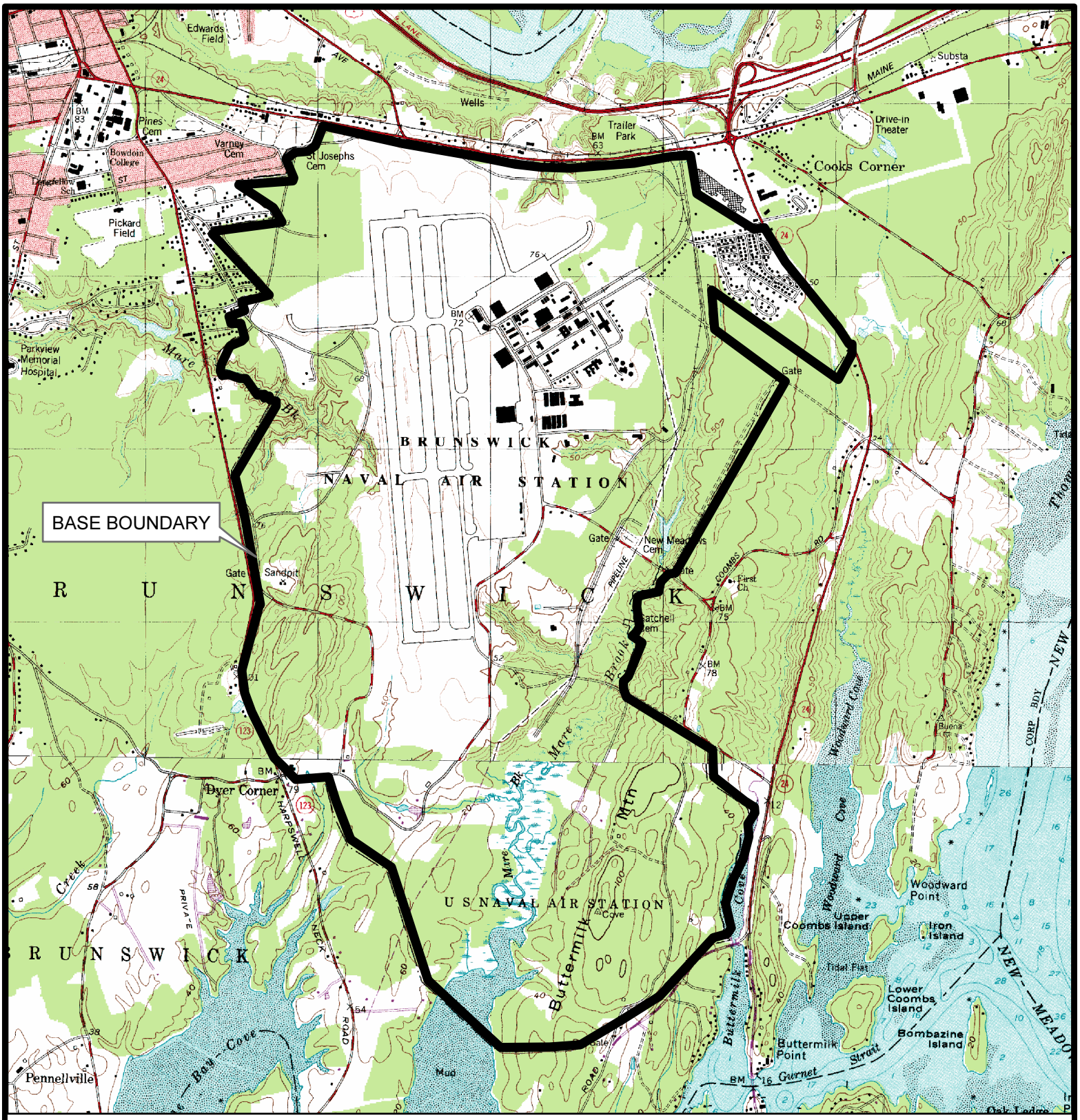
EA has been contracted by EFANE to prepare this second five-year review for the NAS Brunswick NPL site with their review and input. The review team includes EPA, MEDEP, and the consultant for the Brunswick Area Citizens for a Safe Environment group. The Navy is the lead agency for performing cleanup at NAS Brunswick with oversight by EPA and MEDEP.

1.3 ORGANIZATION OF REPORT

Section 1 presents the introduction and description of the five-year review process, description and background of the NAS Brunswick, and community awareness. Section 2 presents the active sites with the selected remedy implemented. Appendix A presents the status of sites for which No Further Action has been determined to be appropriate. Appendix B provides the sites under investigation at NAS Brunswick. Appendixes C through G provide the support documentation for Sites 1 and 3, Site 2, Site 7, Site 9, and the Eastern Plume, respectively. Appendix H provides the NAS Brunswick Instruction 5090.1B. Appendix I provides copies of the responses to comments received from the regulatory agencies for the Draft and Revised Draft versions of this document. Appendix J provides response to comments received on the Draft Final version of this document (addressed during the 22 September 2005 Web conference).

1.4 NEXT FIVE-YEAR REVIEW

The Third Five-Year Review for NAS Brunswick is required on 6 December 2009.



0 365 730 1,460 2,190 2,920 Feet

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EA®	NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 1-1 LOCATION MAP OF NAVAL AIR STATION BRUNSWICK

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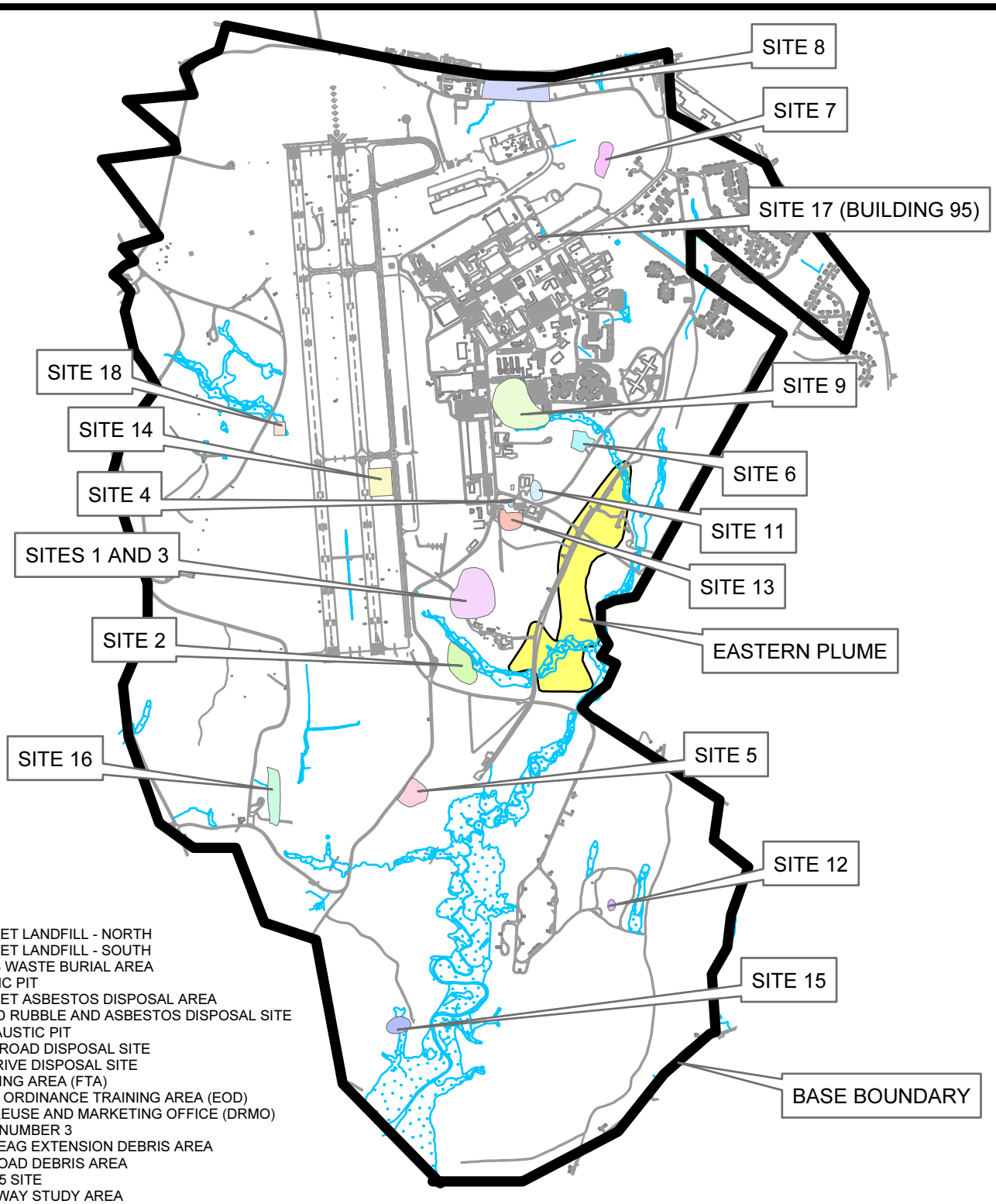

SITE 1 - ORION STREET LANDFILL - NORTH
SITE 2 - ORION STREET LANDFILL - SOUTH
SITE 3 - HAZARDOUS WASTE BURIAL AREA
SITE 4 - ACID/CAUSTIC PIT
SITE 5 - ORION STREET ASBESTOS DISPOSAL AREA
SITE 6 - SANDY ROAD RUBBLE AND ASBESTOS DISPOSAL SITE
SITE 7 - OLD ACID/CAUSTIC PIT
SITE 8 - PERIMETER ROAD DISPOSAL SITE
SITE 9 - NEPTUNE DRIVE DISPOSAL SITE
SITE 11 - FIRE TRAINING AREA (FTA)
SITE 12 - EXPLOSIVE ORDINANCE TRAINING AREA (EOD)
SITE 13 - DEFENSE REUSE AND MARKETING OFFICE (DRMO)
SITE 14 - OLD DUMP NUMBER 3
SITE 15 - MERRICONEAG EXTENSION DEBRIS AREA
SITE 16 - SWAMPY ROAD DEBRIS AREA
SITE 17 - BUILDING 95 SITE
SITE 18 - WEST RUNWAY STUDY AREA
EASTERN PLUME

0 340 680 1,360 2,040 2,720 Feet

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NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1-2
INSTALLATION RESTORATION
PROGRAM SITES

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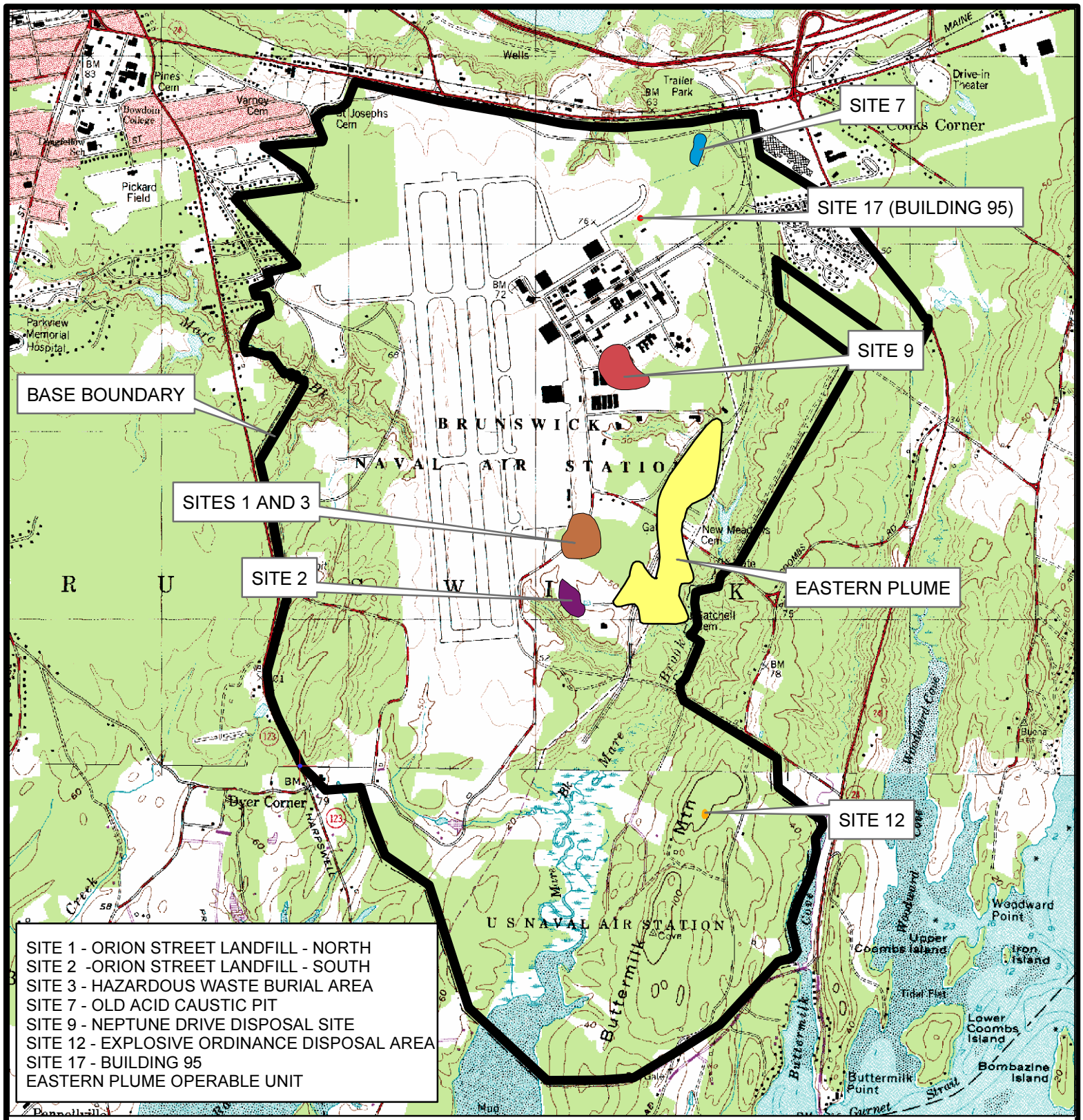

EA®	NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 1-3 ACTIVE INSTALLATION RESTORATION PROGRAM SITES

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2. ACTIVE SITES IN LONG-TERM MONITORING

2.1 SITE 1 ORION STREET LANDFILL – NORTH AND SITE 3 HAZARDOUS WASTE BURIAL AREA

2.1.1 Site Description

Sites 1 and 3 are two closed (inactive) hazardous waste landfills within the same operable unit (Operable Unit 1), and are located within a restricted area in the central portion of NAS Brunswick (Figure 2-1). Records indicate that the Site 1 landfill was used from 1955 to 1975 and the Site 3 landfill operated as a disposal area from 1960 to 1973 (E.C. Jordan 1990). These landfills were used to dispose of wastes, including garbage, food, waste oil, solvents, pesticides, petroleum products, paint, aircraft and automobile parts, and various chemicals. No waste material was observed at Site 3, and low-level soil contamination was detected (E.C. Jordan 1990). Although Site 3 originally was believed to be a separate disposal area from Site 1, field sampling activities did not show a clear delineation between the two sites.

2.1.2 Site Chronology

The following presents a chronologic summary of site events:

- In December 1982, EPA's contractor, NUS Corporation, completed a Preliminary Assessment of the base that included Sites 1 and 3 (NUS Corporation 1983a).
- In June 1983, an Initial Assessment Study (IAS) was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick (Weston 1983).
- In August 1984, EPA's contractor, NUS Corporation completed a Site Inspection of Sites 1 and 3 Landfill (NUS Corporation 1983b).
- In June 1985, the Navy completed a Pollution Abatement Confirmation Study. This study recommended further investigation of the site as identified in earlier assessments and inspections.
- In July 1987, NAS Brunswick was placed on EPA's NPL.
- In 1987, the remedial investigation (RI)/feasibility study (FS) process began for seven sites, including Sites 1 and 3 Landfill.
- In August 1990, the Draft Final RI Report and Draft Final Phase I FS were completed that included Sites 1 and 3 Landfill.
- In October 1990, the Navy entered into an FFA with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick (U.S. Navy 1990).

- In August 1991, the Draft Final Supplemental Investigation Report was completed that included Sites 1 and 3.

- In October 1991, the Final Focused FS was completed for the Sites 1 and 3 Landfill.

- In June 1992, a ROD for a Remedial Action was signed for Sites 1 and 3 (U.S. Navy 1992a).

- In July 1992, a Draft Remedial Design Work Plan for Sites 1 and 3 and the Eastern Plume was provided to regulators.

- In October 1992, the Proposed Plan was presented by the Navy for the Sites 1 and 3 Landfill. The plan proposed to use the excavation material from Site 8 (construction debris and rubble) as subgrade fill for the cover at Sites 1 and 3 Landfill.

- In March 1993, the Navy presented a second revised Proposed Plan for Site 8 that included the removal of all material at Site 8 and its use as subgrade fill at Sites 1 and 3 Landfill.

- In May 1993, a Remedial Design Summary Report for Sites 1 and 3 was completed (U.S. Navy 1993).

- In 1994, MEDEP adopted the risk-based Maximum Exposure Guidelines (MEGs) for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units. Based on the MEGs, cadmium and manganese exceeded their respective limits.

- In August 1994, a Long-Term Monitoring Plan (LTMP) was established for Sites 1 and 3 Landfill.

- In September 1994, an Explanation of Significant Differences (ESD) at Sites 1 and 3 Landfill was finalized which allowed for the use of the contaminated materials at Sites 5, 6, and 8 to be removed, transported to Sites 1 and 3, and used as subgrade fill for the cover at the site. The 1994 ESD was necessary since the 1992 ROD did not include the transport and use of this material from Sites 5, 6, and 8 as a component of the remedy.

- Between 10 and 11 November 1994, two groundwater extraction wells (EW-6 and EW-7) were installed at Sites 1 and 3 Landfill.

- On 6 December 1994, remedial action construction began with the installation of a cover over and slurry wall around the landfill.

- In March 1995, long-term monitoring was initiated (Monitoring Event 1) at Sites 1 and 3 Landfill (EA 1995).

- In June 1995, the groundwater extraction and treatment system (GWETS) began operation.

- In 1995, the Remedial Action Report for Sites 1 and 3 Landfill was finalized.

- On 19 November 1997, the 2 extraction wells (EW-6 and EW-7) were deactivated at Sites 1 and 3 Landfill. Operation of the extraction wells was no longer required due to decreasing yields and stabilized water levels within the confines of the slurry wall. The groundwater levels had dropped below the bottom of the landfilled waste in all but 1 well.

- In 1999, the U.S. Department of Energy, Federal Technology Center through Science and Engineering Associates, Inc. requested the landfill cap slurry wall be used to demonstrate a vadose zone barrier monitoring system. Only a portion of the slurry wall was used for the demonstration.

- In June 1999, a corrective measure was executed and completed to repair erosion of the landfill cap, which was observed during the 1998 landfill inspection. During the 1998 inspection, erosion of the landfill's protective cap was observed; although a small potion of the landfill liner was exposed, it was undamaged.

- In March 2000, the First Five-Year Review Report was finalized for NAS Brunswick (EA 2000a).

- In December 2000, the Navy finalized an ESD for the Eastern Plume (EA 2000b). The ESD included documenting the institutional control boundary of the Eastern Plume. The institutional control boundary includes Sites 1 and 3 Landfill.

- On 31 December 2000, the Navy updated and finalized the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities* to include Groundwater Use Restrictions at the various IRP sites, including Sites 1 and 3 Landfill.

- In September 2002, EPA issued a Preliminary Close-Out Report for the NAS Brunswick NPL site that includes Sites 1 and 3 Landfill.

- On 30 May 2003, MEDEP notified the Navy of a non-compliance issue with the Sites 1 and 3 Landfill groundwater gauging program.

- On 7 October 2003, the Navy issued a letter with a response to the non-compliance and outlined action items to prevent the reoccurrence of this issue in the future.

- In February 2004, a revised Draft LTMP and updated Quality Assurance Project Plan (QAPP) were issued in draft to the regulators for comment. The Navy is currently responding to the regulator's comments and expects to finalize the revised LTMP and updated QAPP in late 2005.

- As of August 2004, a total of 24 Long-Term Monitoring Program monitoring events have been conducted at Sites 1 and 3 Landfill.

2.1.3 Background

2.1.3.1 Physical Characteristics

Sites 1 and 3 Landfill is located within a restricted area in the central portion of NAS Brunswick (Figure 2-2). The general area of Site 1 covers approximately 60 acres, although the specific area of documented refuse disposal is much smaller, approximately 8.5 acres. Site 3 consists of approximately 1.5 acres and is contiguous to Site 1. The combined approximate total land area of the sites is 10 acres.

The 8.5-acre disposal site area at Site 1 is an open, slightly rolling, grass-covered field bordered to the north, west, and east by woodlands, and to the south by the Weapons Compound and steep embankments bordering Mere Brook. Site 3 is located adjacent to Site 1 to the southwest and consists of a small knoll covered with grass and a pine grove.

Lowland areas along Mere Brook are heavily wooded. The slopes along portions of the brook are typically very steep in areas adjacent to the Sites 1 and 3 landfill.

A slurry wall was placed around the landfill, with the exception of the Weapons Compound area. It diverts clean groundwater flow around the landfill, preventing it from coming into contact with the landfill waste. The slurry wall was keyed into the underlying marine clay unit and has a permeability rating of 10^{-6} to 10^{-7} cm/sec. In addition, a low permeability cap was placed over the landfill to reduce the amount of infiltration, thus reducing leachate coming from the landfill waste. The cap was extended over the slurry wall to prevent infiltration within the slurry wall limits. A small portion (less than 0.3 acres) of Site 1 is located within the Weapons Compound and was not included in the cover system due to security concerns for the Weapons Compound (U.S. Navy 1992a).

There are 2 extraction wells within the Sites 1 and 3 Landfill (EW-6 and EW-7) located within the slurry wall, which are currently off-line. These extraction wells operated since June 1995 and ran intermittently from 1 to 18 November 1997. The extraction wells were deactivated on 19 November 1997, with the approval of MEDEP and EPA, due to: (1) decreasing yields; (2) stabilized water levels within the confines of the slurry wall; and (3) water levels measured inside the Sites 1 and 3 were 0.9 ft above the lowest reported depth of waste material with the exception of MW-234R, thus achieving the design intent of the low permeability cap, slurry wall, and landfill extraction wells. Currently, there are 28 wells and piezometers that are gauged twice a year as part of the Long-Term Monitoring Program for this site. Of the 28 wells and piezometers, only 8 wells are currently sampled as part of the Long-Term Monitoring Program.

2.1.3.2 Land and Resource Use

Sites 1 and 3 Landfill is located within a restricted area in the central portion of NAS Brunswick (Figure 2-2). Historical records indicate that the Site 1 landfill was used from 1955 to 1975.

Materials that were reportedly disposed of in this landfill include garbage, food waste, refuse, waste oil, solvents, pesticides, petroleum products, paint wastes, aircraft and automobile parts, and various chemicals.

Site 3 is defined as the area across from Site 1, next to the access road into the Weapons Compound. Historical information reports that Site 3 operated as a disposal area from 1960 to 1973 and the wastes disposed of at this site included solvents, paints, and isopropyl alcohol. No waste material was observed at Site 3 and only low level soil contamination was reported in the RI (E.C. Jordan 1990). Although Site 3 was originally believed to be a separate disposal area from Site 1, field sampling activities did not show a clear delineation between these two sites.

Groundwater at the site is not used for potable purposes or any other uses. The base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course and Dyers Corner gate entrance guard station. The bedrock well is located approximately 200 ft west of Site 2 Landfill. This well, installed in 2002, is screened below a relatively impermeable marine clay and is not affected by Site 2 based on limited data. The base golf course is distant from Sites 1 and 3 Landfill and is not affected by groundwater flow from Sites 1 and 3 Landfill. Mere Brook, south of Sites 1 and 3 landfill, receives drainage from the runways, as well as runoff and leachate from the landfills. Since this area is restricted, the Brook is not used for recreational activities in the reaches of the Brook adjacent to the landfills. Mere Brook flows into the Atlantic Ocean at Harpswell Cove, which is designated as a potential aquacultural area by the State of Maine. Harpswell Cove supports various commercially important fish species (U.S. Navy 1994a).

2.1.3.3 History of Contamination

From 1955 to 1975, historical records indicate that the Site 1 Landfill was used during this period of time. The materials that were reportedly disposed of in this landfill include garbage, food waste, refuse, waste oil, solvents, pesticides, petroleum products, paint wastes, aircraft and automobile parts, and various chemicals. From 1960 to 1973, the Site 3 Landfill was used and the wastes disposed at this site included solvents, paints, and isopropyl alcohol.

The estimated volume of the landfilled waste is 300,000 yd^3 which was determined from the test pits completed at the site.

During the 1990s, environmental contamination was observed in several media at Sites 1 and 3, including soils, groundwater, leachate, leachate sediment, surface water, and sediments. Contaminants detected above background included polynuclear aromatic hydrocarbons (PAHs) and pesticides in soil; volatile organic compounds (VOCs) and metals in groundwater; metals, VOCs, and semivolatile organic compounds (SVOCs) in leachate; and metals in surface water. The source area for this contamination is considered to be the landfill (ABB-ES 1992, Page 10) located north and west of the Weapons Compound. No single, well defined source of contamination has been identified in the landfill (ABB-ES 1992). Based on the proximity of the two sites, common historical land use, and hydrogeological characteristics, the impacts of

past disposal practices from Sites 1 and 3 could not be distinguished. Therefore, these areas of contamination were combined and have been presented as one site since the Final ROD was signed in June 1992 (U.S. Navy 1992a).

2.1.3.4 Initial Response

The Sites 1 and 3 Landfill operations occurred from 1955 to 1975 during which approximately 300,000 yd^3 of waste was deposited into the landfills. As a result of the initial investigation results, NAS Brunswick was placed on the NPL in 1987. Subsequent RIs during the early to mid-1990s further characterized the sites and supported the finalization of the June 1992 ROD and September 1994 ESD for the Sites 1 and 3 Landfill.

2.1.3.5 Basis for Taking Action

The contaminants of concern (COCs) that have been identified at the site in different media include:

Surface Soil	Subsurface Soil	Groundwater
Arsenic	Arsenic	Arsenic
Cadmium	Cadmium	Aluminum
Chromium	Lead	Barium
Copper	Manganese	Chromium
Cyanide	PAHs	Chlorobenzene
Lead	Bis(2-ethylhexyl)phthalate	Lead
Manganese	Polychlorinated biphenyls	Manganese
Mercury	DDT	Nickel
Nickel	Dieldrin	Sodium
Vanadium		1,1-Dichloroethane
Zinc		1,2-Dichloroethylene
1,1,2,2-Tetrachloroethane		Ethylbenzene
PAHs		Methylene chloride
Polychlorinated biphenyls		Toluene
DDT		Vinyl chloride
		Xylene
Leachate	**Surface Water**	**Sediment**
Arsenic	Lead	Arsenic
Antimony	Manganese	Cadmium
Beryllium	Zinc	Chromium
Cadmium		Copper
Chromium		Lead
Cyanide		Manganese
DDT		Mercury
Lead		Nickel
Manganese		PAHs
Mercury		Vanadium
Nickel		Zinc
Vanadium		1,1,2,2-Tetrachloroethane
Zinc		Bis(2-ethylhexyl)phthalate
1,4-Dichlorobenzene		

Leachate	Surface Water	Sediment
1,1-Dichloroethane		
1,2-Dichloroethylene		
Ethylbenzene		
1,1,2,2-Tetrachloroethane		
Trichloroethylene		
Vinyl chloride		
Xylene		

During the RI, a Baseline Risk Assessment was conducted to estimate the potential risks to human health and the environment from exposure to contaminants at Sites 1 and 3. The Human Health Risk Assessment (HHRA) followed a 4-step process:

1. Contaminant identification, which identified those hazardous substances that, given the specifics of the site, were of significant concern

2. Exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure

3. Toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances

4. Risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at Sites 1 and 3 Landfill, including carcinogenic and non-carcinogenic risks (U.S. Navy 1992a).

Human health risks were quantitatively evaluated based on potential exposure to COCs under both current (including worker exposure) and future land use (e.g., residential) scenarios. Several hypothetical exposure pathways were developed to reflect possible exposure to hazardous substances detected in the soil, groundwater, surface water, sediment, and leachate. Since access to these sites is currently controlled, long-term repetitive exposure to soil, sediments, and surface water was not considered likely. In addition, exposure to groundwater is not considered likely as this area of NAS Brunswick is serviced by a public water supply system. No exposure routes were considered to present a risk to human health under present land use conditions. However, since this was a Baseline Risk Assessment, potential risks under a future residential scenario were estimated. The evaluated exposure pathways included direct contact and incidental ingestion of soil, sediment, surface water, leachate, and groundwater (U.S. Navy 1992a).

Risk estimates developed as part of the Baseline Risk Assessment were evaluated using EPA criteria and target risk range to identify the need for remedial actions at this site. Those chemicals present at Sites 1 and 3 Landfill at concentrations in excess of health-based criteria or the target risk range were identified for each exposure pathway and appropriate target cleanup levels were developed (U.S. Navy 1992a).

Carcinogenic risks in excess of 10^{-4} and non-carcinogenic risks greater than a hazard index of 1.0 were associated with future potential exposure to certain contaminants detected in groundwater beneath Sites 1 and 3 landfill. The carcinogenic risks ranged from 6×10^{-4} (average scenario) to 5×10^{-3} (maximum) and non-carcinogenic hazard indexes ranged from 0.6 (average) to 20 (maximum scenario) based on standard EPA exposure parameters. The COCs in groundwater included arsenic, vinyl chloride, methylene chloride, 1,2-dichloroethene, chromium, lead, and nickel. The compound 1,1-dichloroethane was originally listed as a COC; however, since it was detected at concentrations less than its risk reference dose (0.1 mg/kg per day, or 3.5 mg/L, assuming a 70-kilogram adult ingests 2 liters of water per day), it was eliminated as a COC.

Human health risks associated with future potential exposure via long-term repetitive dermal contact and incidental ingestion of soil were also evaluated under a future scenario. The carcinogenic risks associate with this scenario ranged from 3×10^{-6} (average scenario, adult exposure) to 3×10^{-4} (maximum scenario, child exposure), and were attributed almost entirely to the presence of PAHs. These risks estimates are considered to be conservative as they do not account for any decrease in contaminant concentrations that will result from the natural degradation and dispersion processes. Only one scenario had risks in excess of the EPA target risk range of 10^{-6} to 10^{-4}, and it was based on exposure to the maximum detected soil concentrations. All other risks estimates were within the EPA target risk range. Risk estimates based on other exposure pathways were within or below the EPA target risk range for carcinogens or hazard index of 1.0 for non-carcinogens.

The environmental risk assessment concluded that contaminated groundwater discharging to Mere Brook could adversely impact the aquatic environment. Mere Brook flows adjacent to the landfill and groundwater flowing from the landfill discharges to the brook and flows out along the banks as leachate seeps.

Iron and zinc were detected in the surface water of Mere Brook adjacent to Sites 1 and 3 Landfill at concentrations exceeding their Ambient Water Quality Criteria (AWQC) established for the protection of aquatic life. Iron and zinc were also detected at concentrations greater than their AWQC upstream of Sites 1 and 3 Landfill, suggesting that other areas in addition to Sites 1 and 3 Landfill leachate seeps are affecting the brook. Potential sources of iron and zinc are the runways upstream of Sites 1 and 3 Landfill (U.S. Navy 1992a).

The environmental risk assessment concluded that iron and zinc in the portion of Mere Brook adjacent to Sites 1 and 3 Landfill may cause some adverse impacts to aquatic organisms. The concentrations of iron and zinc downstream of Sites 1 and 3 Landfill and at monitoring locations in Harpswell Cove are below their respective AWQC. All other contaminants in Mere Brook were detected below levels considered to present ecological risk (U.S. Navy 1992a).

Mercury was detected in the sediment around the leachate areas. Since some environmental receptors (e.g., earthworms, small birds, and rodents) could feed in these areas, they may be exposed to mercury. The results of a quantitative food-web analysis indicated that potential exposure to mercury from these areas could cause adverse impacts to these organisms. The same

food-web analysis indicated that all other contaminants in the sediment around the leachate areas were detected below levels considered to present an ecological risk. While the remedial action would not directly reduce mercury concentrations in the sediments, other natural processes (e.g., scour or sedimentation) will reduce concentrations over time (U.S. Navy 1992a). The trends of sediment samples since the remedy was initiated are presented in Section 2.1.6.4.

2.1.4 Remedial Actions

The ROD was signed on 16 June 1992 and presents the remedy for Sites 1 and 3 Landfill. The selected remedy for the site includes containment by constructing a cap over the landfills and a slurry wall around the waste to divert clean water away from the landfills. Contaminated groundwater contained by the cap and slurry wall will be pumped from the landfill using extraction wells and treated. Eliminating leachate seeps will mitigate surface water and sediment contamination in Mere Brook (U.S. Navy 1992a). The Navy concluded that the selected remedial action was, and continues to remain, protective of human health and the environment.

As stated in the 1992 ROD, the remedial actions for Sites 1 and 3 were to minimize the human health and ecological risks associated with exposure to contaminated groundwater and leachate sediment. The 1992 ROD established the following Remedial Action Goals for the site:

- Reduce the generation and migration of contaminated groundwater
- Reduce the potential risks associated with ingestion of contaminated groundwater
- Minimize future negative impacts to Mere Brook and the sediment in the leachate seeps resulting from the discharge of contaminated groundwater, leachate, and sediment
- Reduce the concentrations of metals (iron and zinc) discharging to Mere Brook.

As a result of the remedial actions specified in the 1992 ROD, long-term monitoring goals were established for Sites 1 and 3 Landfill. These goals are:

- Monitor the effectiveness of the remedial action for the protection of human health and the environment
- Monitor the effectiveness of the installed low permeability cover and slurry wall to limit groundwater contact with the waste
- During field activities, conduct inspections of the site monitoring wells and other physical features, such as the landfill cover and other appurtenances
- Assess the dispersion and degradation of contamination that has already emanated from the landfill

- Gauge monitoring wells within the landfill to ensure that the water elevation does not rise above the level of established trigger elevations

- Monitoring of institutional controls.

Remedial measures were initiated in April 1995. Remedial activities undertaken at Sites 1 and 3 include the installation of a slurry wall around the western, northern, and eastern perimeters of the landfill footprint, and the installation of a low permeability cap (Figure 2-1). Contaminated soil was removed from Sites 5, 6, and 8 and was used as subgrade fill in Sites 1 and 3 Landfill cover as per the 1994 ESD. Two groundwater extraction wells (EW-6 and EW-7) were constructed and used to dewater the landfill within the slurry wall. After 3 years of operation, these extraction wells were deactivated in November 1997 when the water table was lowered below the bottom of the waste fill (with the exception of the area around monitoring well MW-234R) and did not rise during a subsequent 6-month period of monitoring water levels. Since July 1999, the water level at MW-234R has remained below the bottom of the waste.

The ROD stated that one pore volume of groundwater within the slurry wall (estimated at 16 million gal) was to be removed by the extraction wells. Approximately 3.6 million gal were removed by extraction wells EW-6 and EW-7 from January 1996 to November 1997 when the wells were deactivated once water elevations stabilized below the majority of the waste. It is likely that a significant volume of water also migrated out of the landfill through the opening in the slurry wall, which contributed to the stabilized water elevations within the landfill. The calculation was completed by E.C. Jordan in the Feasibility Study for Sites 1 and 3 (E.C. Jordon 1991).

2.1.4.1 Remedy Implementation

In May 1993, the Remedial Design Summary Report was finalized for Sites 1 and 3 Landfill and remedial construction began in Fall 1994. During 1994, the Navy finalized an ESD for the site, which allowed for the use of the contaminated materials at Sites 5, 6, and 8 to be removed, transported to Sites 1 and 3, and used as subgrade fill for the cover at the site. The 1994 ESD was necessary since the 1992 ROD did not include the transport and use of this material from Sites 5, 6, and 8 as a component of the remedy. Environmental monitoring as per the 1992 ROD was initiated in March 1995 (Monitoring Event 1). As of December 2004, 25 monitoring events will have been completed at the site.

2.1.4.2 System Operation/Operation and Maintenance

The Navy is conducting long-term monitoring and maintenance as per the current LTMP for Sites 1 and 3 Landfill (EA 2000c). The LTMP is currently undergoing revisions and is expected to be finalized in 2005. The revised LTMP, as well as the stand-alone Operation and Maintenance Plan for the landfill, will include the operation and maintenance activities listed below:

- Visual inspection of the cover with regard to vegetation, settlement, stability, animal burrows, and need for corrective action; in addition, the grass on the cover is mowed twice a year.

- Inspection of the drainage swales for blockages, erosion or instability, and any need for corrective action.

- Inspection of the stormwater detention basin at Sites 1 and 3 Landfill, and any need for corrective action.
- Inspection of the condition of the groundwater monitoring wells and gas probes.

- Inspection of the condition of equipment, such as fencing, culverts, and catch basins, and any need for corrective action.

- Inspection of the slope south of the landfill along Mere Brook for the presence of erosion or sloughing.

- Identify settlement of parking lot or access roads.

- Bi-annual environmental monitoring of groundwater, surface water, sediment, sediment seeps, and leachate seeps.

- Inspection for drinking water wells and any ground disturbance within the institutional control boundary.

- Inspection of required signage around the landfill and near the seep sample locations.

- Inspection of the institutional control boundary (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and any ground disturbance of the ground surface).

In addition, the Navy continues to monitor the groundwater levels within Sites 1 and 3 Landfill on a quarterly basis. The quarterly gauging program task has been added to the revised LTMP as a result of the non-notification issue raised by MEDEP in October 2003 to the Navy (MEDEP 2003). The Navy developed a response to MEDEP on 27 October 2003 that included several tasks to refine the gauging program and notification of regulators. The quarterly gauging data are distributed to the regulators within 10 days of collection to allow for regulatory review, and allows for prompt corrective action to be implemented if it is required.

2.1.5 Progress Since the Last Five-Year Review

The First Five-Year Review was completed during 1999, and finalized in March 2000 for Sites 1 and 3 Landfill. No areas of non-compliance with the remedial action for Sites 1 and 3 were identified during the First Five-Year Review and all areas currently comply with the ROD

remedial objectives. The First Five-Year Review found that the selected remedy at the site remains protective of human health and the environment and was functioning as designed.

The First Five-Year Review recommended the following:

- No further response actions are required at this time.
- An institutional control to restrict groundwater use will be added in the next revision of the Operating Instruction NASBINST 5090.1A, *Restriction on Excavation Activities.* Groundwater institutional controls were not documented in the 1992 ROD, and need to be added to the ROD.
- Ongoing operation and maintenance activities should continue and be summarized in annual reports. Annual reports and monitoring event reports will continue to be submitted to EPA and MEDEP.

Since the First Five-Year Review, the following changes have been made at the site:

- To satisfy the recommendation made in the First Five-Year Review, the Navy updated the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use* in December 2000. This updated version of the Operating Instruction included groundwater institutional controls, which were not documented in the ROD or ESD for Sites 1 and 3 Landfill. Digging is restricted anywhere on or adjacent to the landfill cap, or within the landfill's supporting stormwater management ditches and retaining basin.
- In December 2000, the Navy finalized an ESD for the Eastern Plume that documented the area of the institutional control boundary for groundwater use restrictions which included Sites 1 and 3 Landfill and the Eastern Plume (EA 2000b).
- Beginning with the April 2002 Long-Term Monitoring Program reports, the reporting format was changed from a data presentation to a report that included the elements of the annual report in each monitoring event report.
- In September 2002, EPA Region 1 issued a Preliminary Close-Out Report for NAS Brunswick, Maine. The Preliminary Close-Out Report documents the completion of construction activities at the site (NAS Brunswick) that includes Sites 1 and 3 Landfill (U.S. EPA 2002).
- In October 2003, as the result of a non-compliance issue with groundwater gauging at Sites 1 and 3 landfill, the project stakeholders formalized a schedule, procedure, revised trigger elevations, and reporting deadlines for the quarterly gauging data after MEDEP notified the Navy that they were not in compliance with previous agreements to monitor and report the gauging data at Sites 1 and 3 Landfill (U.S. Navy 2003).

- A draft revision of the LTMP was submitted to the project stakeholders for review and comment. The revised LTMP includes an up-to-date list of sampling locations, analysis, and analytical methods. The Navy is responding to comments received and plan to issue a final version of the updated LTMP prior to the end of 2004.

- As part of the update and revisions to the LTMP, the site-specific QAPP was issued in draft form to the regulators for review and comment. The QAPP has been updated to conform with current EPA guidance. The Navy expects to issue the final updated QAPP by the end of 2004.

- Ten LTMP sampling events have been completed since the First Five-Year Review Report was finalized in March 2000 (EA 2000a).

2.1.6 Five-Year Review Process

2.1.6.1 Administrative Components

Refer to Section 1.1.

2.1.6.2 Community Involvement

Refer to Section 1.1.

2.1.6.3 Document Review

Documents reviewed are referenced in Section 2.1, and the citations are included in the References section.

2.1.6.4 Data Review

As of December 2004, a total of 25 long-term monitoring events will have been completed at the site since long-term monitoring began in March 1995. More details regarding the specific sample locations and location data from each monitoring event can be found the monitoring event reports produced for each monitoring event.

Groundwater Monitoring

Specifically, groundwater samples are collected from 8 well locations (MW-202A, MW-203, MW-204, MW-217B, MW-218, MW-219, MW-240, and MW-2101) at Sites 1 and 3 Landfill. The most recent event data (Monitoring Event 23) demonstrate a continued overall trend of decreasing VOC contamination in the shallow and deep groundwater wells for Sites 1 and 3 Landfill. No VOCs have been detected above Maximum Contaminant Levels (MCLs) or MEGs in the wells located downgradient or outside of the landfill. Vinyl chloride remains above the MEG (0.15 µg/L) in MW-217B (well located within the landfill), however, it has displayed a steady level trend over the past four monitoring events. In addition to vinyl chloride in well

MW-217B, 1,4-dichlorobenzene has exceeded the applicable MEG (25 µg/L) within the five-year period (e.g., 79 µg/L in April 2001, 40 µg/L in April 2002, 38 µg/L in May 2003, and 17.3 µg/L in May 2004). However, total VOC concentrations have declined since 1999, and 1,4-dichlorobenzene has been below the MEG since 2003.

The inorganic groundwater data from the monitoring wells generally show stable or decreasing trends with the exception of sodium, which has increased in concentration. No increases in inorganic concentrations have been noted which would indicate that additional groundwater or surface water is infiltrating the cover or slurry wall surrounding a majority of the Sites 1 and 3 Landfill. Arsenic has been reported above MEGs/MCLs during this five-year review period. The review of groundwater quality results for Sites 1 and 3 indicate that arsenic has been persistent at concentrations above the MCL. The arsenic concentrations appear to be fairly stable ranging between approximately 100 and 300 µg/L. Arsenic has been reported at concentrations above the MCL in recent monitoring events at MW-15B, MW-303, MW-313, MW-338A, MW-NASB-212, MW-217B, and MW-218. The arsenic concentrations will continue to be tracked as part of the monitoring event reporting. The significance of the reported arsenic concentrations at Sites 1 and 3 will be evaluated as part of the next five-year review.

Surface Water Monitoring

The surface water sampling data collected during each bi-annual sampling event from 6 sample locations have shown stable and/or decreasing concentration trends for VOCs since the late 1990s. The inorganic data display the same type of stable and/or decreasing trend at the surface water sample locations. From April 2000 (Monitoring Event 16), iron has exceeded the AWQC (1,000 µg/L for iron) at various surface water sampling locations, but the concentrations have been stable, ranging from approximately 1,000 to 1,600 µg/L. It should be noted that the 1992 ROD stated that iron and zinc were detected in the sediment samples at elevated concentrations in the upgradient, background sampling locations collected during the RI of the site (U.S. Navy 1992a).

Sediment Monitoring

The sediment sampling data are collected annually during the Fall sampling event from 6 sample locations (SED-9, SED-15, SED-16, SED-17, SED-18, and SED-19). The sediment samples are analyzed for inorganics. The inorganic sampling results have shown that the inorganic concentrations have remained within historical ranges for the COCs. The 1992 ROD had established a cleanup goal for mercury of 1.0 mg/kg, and mercury has not been detected in sediment samples at least since the September 1999 monitoring event (Monitoring Event 15).

Note that project action limits have not been developed for sediment samples, and should be developed after discussions between the Navy and regulators.

Leachate Seep Monitoring

The leachate seep sampling data are collected during each bi-annual sampling event from 5 sampling locations (SEEP-1, SEEP-3, SEEP-4, SEEP-5, and SEEP-9) for VOCs and inorganic analyses. Since the mid-1990s, VOCs have been detected in the seep samples at concentrations ranging from non-detect to 40 µg/L. Overall, VOCs concentrations have demonstrated a generally stable or decreasing concentration trend. The inorganic data for the leachate seep samples have demonstrated a stable contaminant trend within historical concentration ranges; however, aluminum, iron, and zinc continue to exceed their respective AWQC for most monitoring events. It is noted that arsenic and manganese concentrations have exhibited fluctuations and exceedances above their respective AWQC at leachate seep locations SEEP-05 and SEEP-09.

The 1992 ROD noted mercury was the only contaminant identified in the Baseline Risk Assessment to present a propensity to bioaccumulate and biomagnify in terrestrial food chains. Other contaminants (e.g., VOCs and inorganic metals) do not exhibit the same behavior and, therefore, were not considered to present a risk to terrestrial receptors (U.S. Navy 1992a).

Leachate Seep Sediment Monitoring

The leachate seep sediment sampling data are collected during each bi-annual sampling event from 5 sampling locations (LT-1, LT-3, LT-4, LT-5, and LT-9) for VOCs and inorganic analyses. As of September 2004, VOCs in the leachate seep sediments have ranged from non-detect to less than 100 mg/kg over the last 23 monitoring events. Inorganic concentrations remain within historical concentration ranges for the COCs with occasional spikes above the concentration range.

Note that project action limits have not been developed for sediment samples, and should be developed after discussions between the Navy and the regulators to determine appropriate standards/benchmarks to compare the sediment sample data against.

Inorganic concentrations remain within historical concentrations ranges from the COCs with occasional spikes (of VOCs, manganese, and arsenic) above the concentration range, in primarily SEEP-04, SEEP-05, and SEEP-09. The leachate seep sediment samples will continue to be monitored and tracked in the monitoring event reports.

2.1.6.5 Site Inspections

Site inspections are conducted during each long-term monitoring sampling event that occurs in April and September of each year. In addition, all project stakeholders conducted an annual site visit during technical meetings to review the current site conditions. The results of the inspection conducted during each monitoring event are documented in the monitoring event report generated for each long-term monitoring sampling event.

2.1.6.6 Interviews

No interviews were conducted as part of the five-year review process. However, during the October 2004 RAB meeting, the community was informed of the five-year review process for the NAS Brunswick facility, and copies of a related EPA handout were provided by the Navy entitled *Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites* (U.S. EPA 2001a). Persons with related comments and/or information were asked to contact the EPA RPM and/or Navy RPM. Meeting minutes of the RAB meetings were prepared and distributed to all meeting attendees. A copy of the EPA handout was included with the October 2004 RAB meeting minutes.

2.1.7 Technical Assessment

Question A: *Is the remedy functioning as intended by the decision documents?*

The review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the monitoring event data set indicate that the remedy is functioning as intended in the 1992 ROD and 1994 ESD. The cap and slurry wall were installed and remain in good condition. The extraction wells dewatered the landfill materials within the landfill and quarterly gauging continues to verify that water levels remain below the waste material. The ROD stated that environmental monitoring would be required for a minimum of 30 years, of which 9 years have been completed. The Navy performed the technical assessment based on EPA's guidance provided in Section 4.0 of the Comprehensive Five-Year Review Guidance (U.S. EPA 2001b).

Question B: *Are the assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?*

There have been no changes in the physical conditions of the site or land use that would affect the exposure assumptions, cleanup values, RAOs, or the protectiveness of the remedy. The assumption in the ROD that groundwater would not be used at the site is invalid due to the unavailability of a public water supply in some areas. Therefore, the institutional controls will be re-evaluated.

No unacceptable risks for ecological receptors were identified in earlier reviews at the Sites 1 and 3 Landfill. Since the first five-year review was completed, additional sampling data have been reported exceedances in surface water samples collected at Sites 1 and 3 Landfill, which exceeded the AWQC. No circumstances have changed that might alter this conclusion; therefore, monitoring for the protection of ecological receptors continues to be unnecessary.

The previous risk assessment for Sites 1 and 3 was reviewed to determine whether exposure assumptions and toxicity data used previously had been revised. The HHRA analyzed potential risk for hypothetical resident and worker exposure to soil, sediment, groundwater, and surface water. The receptors were analyzed for incidental ingestion and dermal exposure to soil, surface water, and sediment, and ingestion of groundwater.

Inhalation was not addressed as a potential pathway, although VOCs were detected in several media, including groundwater. Current risk assessment practice includes an inhalation of indoor air pathway for groundwater VOCs via the Johnson and Ettinger model. Further, inhalation of volatiles from tap water when groundwater is used as potable is assessed. However, since the land use has not changed since the HHRA, or is expected to change in the future, this potential pathway will not be evaluated. Additionally, there are restrictions on excavation and groundwater use in the Base Operating Instruction which would not allow this pathway to exist at the site.

COCs for which both carcinogenic and non-carcinogenic toxicity values exist were not evaluated for both carcinogenic and non-carcinogenic effects (e.g., vinyl chloride).

The ROD and the HHRA compared calculated cancer risks for all receptors to EPA's acceptable risk range of 10^{-4} to 10^{-6}. Non-cancer risks were compared to an acceptable threshold of 1.0. Detected constituents above these acceptable standards were considered COCs. Several inorganics, pesticides, PAHs, and VOCs were determined to be COCs.

Toxicity data for COCs were reviewed to determine if any revisions have been made since the ROD was issued. Toxicity values were obtained from the EPA Instructional Resources Information System (U.S. EPA 2004), a peer-reviewed toxicity database. If toxicity values were not available from the Instructional Resources Information System, values from the National Center for Environmental Assessment were used. Federal MCLs and Maine MEGs were also reviewed to determine whether the MCLs have been revised since the ROD.

Several of the COCs have had revisions to their toxicity values including arsenic, chromium, vinyl chloride, and xylene; however, none of these changes would affect the protectiveness of the remedy for Sites 1 and 3 Landfill.

The toxicity value analysis is provided in Table 2-1.

The ARAR evaluation has not indicated any changes in Standards or To Be Considered that would call into question the protectiveness of the remedy in the short term; however, the ARAR tables will be made consistent across the site.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

No other information has come to light that could call into question the protectiveness of the remedy at this time.

Technical Assessment Summary

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1992 ROD and 1994 ESD. There have been no changes in the physical conditions or land use of the site that would affect the protectiveness of the remedy.

One MCL (arsenic) was reduced from 50 to 10 µg/L by EPA. This change has been updated in the LTMP, and is not expected to have a negative impact on the remedy.

No other information has come to light that could call into question the protectiveness of the remedy.

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1992 ROD, and as modified by the 1994 ESD.

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The ARARs related to implementation of the remedy were met. The toxicity values, exposure assumptions, and RAOs used at the time of the remedy selection are still valid. Although there was one change in standards, the MCL for arsenic, it is not expected to have a negative impact on the remedy. There is no other information that calls into question the protectiveness of the remedy.

2.1.8 Issues

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill	No	Yes
No project action levels for comparing sediment and leachate seep sediment sample LTMP data have been established	No	Yes
Finalize and issue updated LTMP and QAPP	No	Yes
No LUCIP	No	Yes
Institutional control monitoring (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and disturbance of the ground surface)	No	Yes
Institutional control boundary for site	No	Yes
ARAR tables are not consistent across NPL site	No	No
Potential impacts of Sites 1 and 3 Landfill to Mere Brook	No	Yes

2.1.9 Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Operation and Maintenance Plan for site	Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill	Navy	EPA/ MEDEP	2005	No	Yes
No project action limits for sediment samples	Establish appropriate standards to compare sediment and leachate sediment seep samples for LTMP data	Navy	EPA/ MEDEP	2005	No	Yes

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
No LUCIP	Generate an LUCIP for review by project stakeholders, respond to comments, and finalize document.	Navy	EPA/ MEDEP	2005-2006	No	Yes
Construction or ground disturbance within the Weapons Compound	Expand bi-annual institutional control checklist to include noting construction activities or ground disturbances within the Weapons Compound area	Navy	EPA/ MEDEP	Not applicable	No	Yes
Updated LTMP and QAPP	LTMP to be updated to current conditions and QAPP to be finalized	Navy	EPA/ MEDEP	2005	No	Yes
Development of institutional control boundary for site	Generate an LUCIP for the site	Navy	EPA/ MEDEP	Not applicable	No	Yes
Inconsistent ARARs	Update ARAR tables	Navy	EPA/ MEDEP	End of 2nd quarter FY06	No	No
Potential impacts of Sites 1 and 3 Landfill to Mere Brook	Evaluate potential impacts of Sites 1 and 3 Landfill to Mere Brook	Navy	EPA/ MEDEP	2006	No	Yes

2.1.10 Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of the clean up goals as presented in the 1992 ROD, which is expected to take 30 years to achieve. During the period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restrictive area of the base limiting access only to authorized personnel. Current monitoring data indicate that the remedy is functioning as required. In order for the remedy to remain protective in the long term, institutional controls will need to be refined.

2.1.11 Next Review

The next five-year review for NAS Brunswick that includes Sites 1 and 3 Landfill is required by 6 December 2009, 5 years from the date of this review.

2.2 SITE 2 ORION STREET LANDFILL – SOUTH

2.2.1 Site Introduction

Refer to Section 1.1 for a description of the purpose of the five-year review.

2.2.2 Site Description

Site 2 is an inactive landfill located adjacent to Mere Brook and south of Sites 1 and 3 landfill, and near the southern end of the main runways. Site 2 is located within a restricted area in the central portion of NAS Brunswick (Figure 2-2). The CERCLA Information System operable unit number assigned to Site 2 is OU2. The site was used as the primary base landfill from 1945 until 1955, although it may have been in actual operation for less than 10 years because NAS Brunswick was closed from 1946 to 1951. The base was occupied by non-military tenants from 1946 to 1951, and it is unknown if the landfill was utilized during that period of time.

The Site 2 landfill occupies approximately 2 acres of land that was covered with soil upon closure in 1955, and currently supports a dense stand of conifers on the top of the landfill. The face of the landfill is vegetated with tall meadow grass. Miscellaneous refuse was once exposed along the eastern side of the landfill, including drums, small containers, office furniture, and domestic wastes. These items were subsequently removed from the site. Other waste reportedly disposed in the landfill included solvents, paint, oil, toluene, methyl ethyl ketone, and medical supplies. Solid waste was reportedly incinerated at the site and, therefore, a substantial component of the disposed material could be ash. The actual quantity of hazardous material disposed of at Site 2 is unknown.

At Site 2, the Navy is performing long-term monitoring and maintenance as specified in the Proposed Plan (ABB-ES 1997) and Record of Decision (HLA 1998). The location of Site 2 is shown on Figure 2-2. In February 2000, the LTMP (EA 2000d) was established pursuant to the ROD. The purpose of the LTMP is to verify the effectiveness of the selected remedial action (Minimal Remedial Action) at Site 2.

2.2.3 Site Chronology

The following presents the chronology of site events:

- In December 1982, EPA's contractor, NUS Corporation, completed a preliminary assessment of the base that included Site 2.
- In June 1983, an IAS was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick.
- In August 1984, EPA's contractor, NUS Corporation, completed a site inspection of Site 2.
- In June 1985, the Navy completed a Pollution Abatement Confirmation Study. This study recommended further investigation of the site as identified in earlier assessments and inspections.
- In July 1987, NAS Brunswick was placed on EPA's NPL.

- In 1987, the RI/FS process began for seven sites that included Site 2 landfill.
- *In August 1990, a Draft Final RI was completed that included Site 2 Landfill.*
- In October 1990, the Navy entered into an FFA with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick.
- In March 1992, an FS was generated for Site 2 and other operable units at NAS Brunswick.
- In 1994, MEDEP adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units. Based on the MEGs, cadmium and manganese exceeded their respective limits.
- During Summer 1995, the U.S. Fish and Wildlife Service conducted fish sampling of Mere Brook near Site 2. Fish samples were analyzed to determine if adverse impacts to the fish from inorganic contamination was occurring, but no adverse effects were identified resulting from inorganic contamination. The report did note the presence of elevated concentrations of some pesticide-related compounds, however, the source of these compounds was not determined as a part of this study.
- In May 1997, a Proposed Remedial Action Plan (PRAP) was issued for Site 2, and a public meeting was held on 13 May 1997 to inform the public of the proposed remedy for Site 2.
- In September 1998, the Final ROD for Site 2 was signed.
- In August 1999, a remedial action undertaken to remove debris and stabilize the face of the landfill was completed.
- In February 2000, an LTMP was issued.
- In March 2000, the First Five-Year Review report for NAS Brunswick was finalized.
- In April 2000, the LTMP was initiated with Monitoring Event 1.
- On 22 June 2000, groundwater monitoring well MW-241 was installed at Site 2.
- On 31 December 2000, the Navy updated and finalized the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities and Groundwater Restrictions* that included Groundwater Use Restrictions at the various IRP sites, including Site 2.
- In September 2002, EPA Region 1 submitted a Preliminary Closeout Report for NAS Brunswick.

- In January 2004, a draft LTMP was issued to the regulators for review and comment. The Navy is addressing comments and expects to finalize the updated LTMP by the end of 2005.

- In March 2004, a draft QAPP was issued to the regulators for review and comment. The Navy is addressing comments and expects to finalize the updated QAPP by the end of 2005.

2.2.4 Background

2.2.4.1 Physical Characteristics

The subsurface geology at Site 2 includes an upper sandy layer ranging in thickness from 14 to 21 ft and a transitional layer of interbedded silts and sand ranging in thickness from 5 to 11 ft. A clay layer occurs below the transition layer. The surface of the clay layer dips strongly to the east toward Mere Brook.

Groundwater flow in the Site 2 area was assessed based on subsurface exploration data from monitoring wells. Groundwater flow above the shallow clay layer is to the northeast, toward Mere Brook. Based on the flow direction, the presence of the shallow clay, and the results from stream gauging on Mere Brook, the groundwater at Site 2 is believed to discharge to Mere Brook.

2.2.4.2 Land and Resource Use

The Orion Street Landfill (Site 2) is an inactive landfill located south and across Mere Brook from Sites 1 and 3 landfill within a restricted area in the central portion of NAS Brunswick. The Site 2 landfill occupies approximately 2 acres of land that was closed in 1955, which was covered with soil upon closure, and currently supports a dense stand of conifers. The site area has been left as open space.

Groundwater associated with the site is not used for potable purposes or any other uses. In some areas, the Base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course and one new bedrock well located to the west of Site 2. The base golf course is distant from Site 2 Landfill and is not affected by groundwater flow from the Site 2 Landfill. A bedrock well is located approximately 200 ft west of Site 2 at the guard entrance station at Dyers Corner. This well was installed in 2002, is screened below a relatively impermeable marine clay, and is not affected by Site 2. This well has been sampled for Site 2 COCs, and no compounds or elements were detected in the samples collected to date, therefore, it appears that it is not impacted based on the current data. Mere Brook, north-northeast of the Site 2 Landfill, receives drainage from the runways, as well as runoff and leachate from the landfills. Since this area is restricted, the Brook is not commonly used for recreational activities in the reaches of the Brook adjacent to the landfill. Mere Brook flows into the Atlantic Ocean at Harpswell Cove, which is designated as a potential aquacultural area by the State of Maine. Harpswell Cove supports various commercially important fish species (U.S. Navy 1994a).

2.2.4.3 History of Contamination

Based upon the available sample results, environmental impacts were reported in several media at Site 2, including the following: surface water, stream sediment, leachate seep, and surface soil associated with seep locations. The COCs identified in the 1998 ROD (HLA 1998) include:

- Iron and zinc in surface water
- Iron and the PAH phenanthrene in stream sediment
- 4,4'-dichlorodiphenyltrichloroethane, 4,4,'-dichlorodiphenyldichloroethylene, arsenic, cadmium, chromium, lead, mercury, and nickel in leachate seeps
- Mercury in surface soil associated with seep locations.

The highest levels of contamination at Site 2 were detected in the leachate seep and seep sediment samples. Elevated concentrations of inorganics, including aluminum, calcium, magnesium, iron arsenic, copper, cobalt, chromium, mercury, vanadium, and zinc, were detected. The 1990 RI Report stated that the VOCs detected in the leachate seep samples are suspected laboratory contaminants. No VOCs were detected in the seep sediment samples. SVOCs and Polychlorinated biphenyls were not reported in any leachate seep or seep sediment samples. Low levels of 4,4'-dichlorodiphenyltrichloroethane, 4,4'-dichlorodiphenyltrichloroethane, and 4,4'-dichlorodiphenyldichoroethylene were reported in leachate seep samples LT-201 and adjacent surface soil.

The U.S. Fish and Wildlife Service conducted a study to determine concentrations of trace elements and pesticides in fish samples collected from Mere Brook near Site 2 (USFWS 1997). These samples were analyzed for adverse impacts on fish from inorganic constituents. The report does note the presence of elevated concentrations of some pesticide-related compounds, but the source of these compounds was not determined as part of the study. It was recommended that fish or biota sampling be conducted following the completion of remedial actions at Site 2 to monitor environmental contamination in Mere Brook. However, it was also noted that Mere Brook is a small stream that could rapidly be depleted of fish from over-sampling.

2.2.4.4 Initial Response

In August 1999, Foster Wheeler removed and disposed of miscellaneous surface debris located immediately south and east of Site 2 Landfill and placed a soil cover on the landfill, where none had existed (Foster Wheeler 1999). Approximately 3,980 lb of recyclable metal was recovered from Site 2 and Site 16, combined. Upon completion of the debris removal activities, a minimum 12-in. thick lift of clean common fill was placed and compacted over the prepared subgrade. A 3-in. thick layer of topsoil was placed over the common fill to create the surface of the new soil cover of the landfill. The soil cap is designed to prevent direct contact with the material remaining in the landfill, however, not an impermeable cap. Signs and fencing have been installed to limit access to the Site 2 area.

2.2.4.5 Basis for Taking Action

During the RI/FS, environmental impacts were reported in the surface water, stream sediment, leachate seep, and surface soil associated with these seeps at Site 2. The COCs at Site 2 in different media include:

Leachate Seeps		
4,4'-dichlorodiphenyltrichloroethane		Chromium
4,4'-dichlorodiphenyltrichloroethane		Lead
4,4'-dichlorodiphenyldichoroethylene (low levels)		Mercury
Arsenic		Nickel
Cadmium		
Surface Water	Stream Sediment	Surface Soils
Iron Zinc	PAHs Phenanthrene (PAH) Iron	Mercury

Although no COCs for groundwater have been formally identified, concentrations of inorganic compounds have been detected in site groundwater at concentrations which exceed the State MEG and Federal MCL.

A Baseline Risk Assessment was completed as part of the RI at Site 2 to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with Site 2, assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways needed to be addressed by the remedial action. The HHRA followed a 4-step process:

1. **Contaminant Identification**—Identified those hazardous substances which, given the specifics of the site, were of significant concern

2. **Exposure Assessment**—Identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure

3. **Toxicity Assessment**—Considered the types and magnitude of adverse health effects associated with exposure to hazardous substances

4. **Risk Characterization**—Integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.

The HHRA was completed in 1990 (E.C. Jordan 1990) for Site 2 surface soils and surface water. No unacceptable risk to human health was identified under the hypothetical future residential land use scenario. Carcinogenic risk estimates associated with the exposure under future residential land use ranged from 1.5×10^{-9} to 9.2×10^{-8}, which are well below EPA and MEDEP risk targets. Non-carcinogenic hazard indexes ranged from 0.03 to 0.2, which are well below the target hazard index of 1.0 (HLA 1998). A quantitative exposure assessment for the ingestion of groundwater was not developed for Site 2 because there is no current exposure to groundwater at

the site. Future use of groundwater is not considered likely as this property is under the control of the Navy and because the shallow aquifer between Site 2 and Mere Brook is not likely to be used as a drinking water source.

An ecological risk assessment was completed for Site 2 during the 1990 RI. Contaminant concentrations detected in surface water and sediments from Mere Brook Beaver Marsh and leachate seeps were compared to AWQC or incorporated into a food chain analysis to determine potential risks to aquatic and terrestrial organisms. All contaminants detected in these media were evaluated in the Baseline Risk Assessment (E.C. Jordan 1992).

Chronic or acute effects to terrestrial organisms are not predicted from exposure to contaminants detected in the soils and leachate seeps at Site 2. Risks associated with wildlife drinking from the leachate seeps were determined to be insignificant. A food chain analysis was conducted to simulate the uptake and bioaccumulation of mercury in terrestrial organisms. Of all contaminants detected in the leachate seeps and sediments, mercury has the greatest propensity to bioaccumulate within a food chain and, therefore, is considered the contaminant posing the greatest risk to ecological receptors. The calculations used in the food web analysis are provided in Appendix A of the 1990 RI report. Based on the predicted concentrations of mercury in various trophic levels organisms, it was concluded that the concentrations of mercury in the seeps and sediments did not present an environmental risk.

Potential ecological risks are associated with exposure to mercury at Sites 1 and 3; however, the concentration of mercury at Site 2 was lower than detected at Sites 1 and 3, and the area potentially impacted by mercury contamination at Site 2 is much smaller than at the Sites 1 and 3 Landfill. Therefore, the potential for contaminant exposure is less at Site 2 because terrestrial organisms would be receiving a smaller fraction of their total food and/or water intake from the contaminated area. These factors account for the different conclusions reached for Site 2 and Sites 1 and 3 (E.C. Jordan 1992).

The Baseline Risk Assessment evaluated the potential impacts of Sites 1, 2, and 3 on the Mere Brook Beaver Marsh ecosystem. Sites 1, 2, and 3 border a portion of this ecosystem. Iron and zinc in surface water, and phenanthrene (a PAH compound) and iron in sediment were selected as contaminants of concern for this area. These contaminants are found at elevated levels throughout NAS Brunswick, including upgradient locations. However, exceedances of criteria were minimal, indicating minimal risk to potentially exposed aquatic receptors. Several VOCs; DDT; and arsenic, cadmium, chromium, lead, mercury, and nickel were selected as contaminants of concern in the seeps associated with Sites 1 and 3. Based on the assumptions of the drinking water model, little risk is expected for this exposure pathway. For Site 2, DDT and the same group of metals were selected as contaminants of concern and, again, potential risks associated with wildlife drinking from these seeps were determined to be minimal (E.C. Jordan 1992).

Contaminants selected for soils (e.g., adjacent to leachate seeps) at Sites 1, 2, and 3 included eight PAHs, DDT, and mercury. The potential risks from PAHs were not evaluated in the terrestrial food web model due to the lack of information regarding the potential class of

compounds to bioaccumulate. For DDT and mercury, a comparison of expected exposure levels with toxicological data suggests that only mercury levels in the soil at Sites 1 and 3 may be sufficient to represent some long-term impact on populations of terrestrial organisms in this area.

2.2.5 Remedial Actions

Based upon the results of the RI/FS, and the community response to the Proposed Plan, the selected remedy for Site 2 was Minimal Action. A complete description of the selected alternative is presented in Section VIII of the ROD (U.S. Navy 1998). The selected remedial alternative is a site remedy, which was planned to be protective of human health and the environment.

The Site 2 ROD was signed on 29 September 1998 for a Minimal Action remedy. A Minimal Action remedy was proposed and implemented at this site, since there was no risk to human health or ecological receptors was indicated by the Baseline Risk Assessment (U.S. Navy 1998).

As stated in the ROD, the Minimal Action alternative included the following components:

- Institutional controls, including maintenance of the existing fence, installation of warning signs, and land use restrictions. Land use restrictions will be documented in the Brunswick Operating Instructions for site development, which require environmental review. Should NAS Brunswick close and/or transfer this property, EPA and MEDEP will be notified and appropriate wording will be included in the necessary real estate documents.

- Removal of surface debris that is visible on the depression immediately south and east of the landfill.

- Installation of an additional groundwater monitoring well.

- Environmental monitoring, including collection and analysis of samples of groundwater, seeps, surface water, and sediment.

- Five-year reviews.

- Modifications to the selected remedy, if necessary.

2.2.5.1 Remedy Implementation

In August 1999, the Navy's Remedial Action Contractor, Foster Wheeler Environmental Corporation, removed and disposed of miscellaneous surface debris located south and east of the Site 2 Landfill and placed a soil cover on the landfill where none had existed. The miscellaneous surface debris (crushed empty drums, chairs, and miscellaneous metal debris) was removed and placed in roll-off containers for offsite disposal. During the 1999 removal action of the surface debris at Site 2, the Navy's contractor identified a potential unexploded ordnance (UXO) and

immediately stopped work at the site. A UXO contractor was brought in to identify and dispose of the UXO. It was later determined by the UXO contractor to be a grenade fuse. No other UXO was found at Site 2 before or after the site work in 1999.

In February 2000, the Navy completed an LTMP for Site 2 Landfill and, in April 2000, completed the first monitoring event (Monitoring Event 1). To date, the Navy has completed 8 long-term monitoring events at Site 2 Landfill.

In March 2000, the Navy completed the First Five-Year Review that included the Site 2 Landfill. The First Five-Year Review stated that a determination of the success of the Minimal Action remedy could not be made at this time since the Long-Term Monitoring Program sampling had not been initiated. However, the location of the site within a restricted area and the restrictions on excavation and groundwater use reduced the potential for human exposure, thereby providing partial protection of human health.

In June 2000, the Navy installed groundwater monitoring well MW-NASB-241 as required by the 1998 ROD.

On 31 December 2000, the Navy updated and finalized the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities and Groundwater Restrictions* that included Groundwater Use Restrictions at the various IRP sites, including Site 2.

2.2.5.2 System Operation/Operation and Maintenance

The Navy is conducting long-term monitoring and maintenance as per the current LTMP for the Site 2 Landfill. The LTMP is currently undergoing revisions. The revision of the LTMP is scheduled to be finalized by the end of 2004. The revised LTMP includes the operation and maintenance activities listed below:

- Visual inspection of the cover with regards to erosion and differential settlement
- Inspection for animal burrows in cover
- Inspection for vegetative distress
- Inspection for seeps
- Inspection of the condition of the groundwater monitoring wells
- Change of land use or new construction in the area
- Inspection of the condition of equipment, such as fencing, signage, and any need for corrective action.

The visual inspections are completed during each monitoring event and the results documented in each monitoring event report.

2.2.6 Progress Since the Last Five-Year Review

The First Five-Year Review was completed during 1999, and finalized in March 2000 for Site 2 Landfill. No areas of non-compliance with the remedial action for Site 2 Landfill were identified during the First Five-Year Review, and the site complied with the ROD remedial objectives. The First Five-Year Review found that the selected remedy at the site remains protective of human health and the environment and was functioning as designed.

The First Five-Year Review recommended the following:

- No further response actions are required at this time
- Implement the LTMP and commence monitoring
- Submit the sampling event reports and annual reports to EPA and MEDEP
- Refine the LTMP as needed based on the annual reports
- Amend the Operating Instruction NASBINST 5090.1A, *Restriction on Excavation Activities* to include a restriction of use and physical contact with the groundwater.

Since the First Five-Year Review, the following progress has been made at the site:

- In February 2000, the LTMP was updated and finalized.
- In April 2000, the first long-term monitoring event was completed at Site 2 Landfill.
- In June 2000, groundwater monitoring well MW-NASB-241 was installed as required in the ROD and as recommended by the First Five-Year Review.
- In December 2000, the Navy updated the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use*. This updated version of the Operating Instruction included groundwater institutional controls, which were not documented in the ROD for Site 2 Landfill.
- In December 2000, the Navy finalized an ESD for the Eastern Plume that documented the area of the institutional control boundary for groundwater use restrictions which included Site 2, Sites 1 and 3 Landfill, and the Eastern Plume (EA 2000b).
- In June 2000, groundwater monitoring well MW-NASB-241 was installed as required in the ROD and as recommended by the First Five-Year Review.
- During 2004, the Site 2 LTMP was updated and revised. The revised final LTMP was issued in January 2005.

- In Fall 2004, the Navy submitted a proposal for the investigation of the northern portion of the site and the installation of shallow piezometers to evaluate inorganic and VOC concentrations in the leachate seeps associated with Site 2.

2.2.7 Five-Year Review Process

2.2.7.1 Administrative Components

Refer to Section 1.1.

2.2.7.2 Community Involvement

Refer to Section 1.1.

2.2.7.3 Document Review

Documents reviewed are referenced in Section 2.2 and the citations are included in the References section.

2.2.7.4 Data Review

Long-term monitoring was initiated in April 2000 at Site 2. The Navy will be finalizing the revisions to the LTMP prior to the end of 2004. The Fall 2004 sampling event will be the tenth long-term monitoring sampling event completed at Site 2 Landfill.

Ten sets of long-term monitoring sample data are available at Site 2 since monitoring was initiated in April 2000.

Groundwater Sampling

Five groundwater monitoring wells (MW-103, MW-104, MW-241, MW-242, and MW-243) are sampled bi-annually at the Site 2 Landfill. The wells are sampled for VOCs and inorganic analyses. The general trend of VOCs at the Site 2 Landfill monitoring wells has been stable at non-detected concentrations since 2000. The exception to this is the detection of trichloroethene in wells MW-NASB-241 and MW-NASB-242 at concentrations of 13 µg/L and 12 µg/L, respectively, that exceeded both the Federal MCL and State MEG of 5 µg/L. The trichloroethylene detections above the MCL and MEG at MW-NASB-241 and MW-NASB-242 proved to be one-time detections and subsequent monitoring rounds have not verified the results. In addition, the landfill has a cover that allows surface water and precipitation (snow and rain) to infiltrate the cover material (sand) into the landfilled material at Site 2.

Inorganics detected in the Site 2 Landfill wells above MCLs and/or MEGs include: aluminum, arsenic, chromium, iron, manganese, nickel, selenium, and thallium. Two inorganic elements, nickel and selenium, were detected for the first time in excess of Federal MCL and State MEG standards during Monitoring Event 8 (September 2003). Nickel was detected in well MW-103

(171 µg/L) and selenium was detected in well MW-242 (11.5 µg/L). Nickel concentrations have ranged from non-detected to 15.8 µg/L between 2000 and Monitoring Event 7. Selenium has ranged from non-detected to 4.1 µg/L between 2000 and Monitoring Event 7.

Overall, inorganic concentrations have remained similar to the concentrations detected during the RIs. The inorganic concentrations are likely related to leachate originating from the Site 2 Landfill. The primary components of leachate appear to be magnesium, iron, and aluminum, which is not unusual considering the materials present in the Site 2 Landfill that consist of municipal waste, which may include bulk metal items.

It is noted that metal exceedances (i.e., aluminum, arsenic, chromium, iron, lead, manganese, and nickel) have been reported in the more recent groundwater data at Site 2. In order to further evaluate the possibility of corrosion occurring within the monitoring wells, the Navy will employ the use of a corrosion meter to determine the degree of corrosivity occurring within the well.

Surface Water Sampling

Surface water is collected bi-annually from two surface water sampling locations (SW-4 and SW-7) at Site 2. The surface water is analyzed for VOCs and inorganic elements. Only one VOC (acetone) has been detected in the surface water samples (maximum concentration was 12 µg/L in April 2002 during Monitoring Event 5). No other VOCs have been detected in the surface water samples collected between 2000 and 2004. Inorganic elements detected in the surface water include aluminum, arsenic, iron, magnesium, manganese, mercury, nickel, selenium, sodium, thallium, vanadium, and zinc. However, iron is the only inorganic element in the surface water samples that is found above the Federal and State Water Quality Criteria of 1,000 µg/L. The maximum detected concentration of aluminum during the past eight monitoring events was 1,310 µg/L (State Water Quality Criteria for aluminum is 750 µg/L) at sample location SW-7 (May 2001). No other inorganic elements are found in excess of Federal or State Water Quality Criteria.

Sediment Sampling

Sediment samples are collected annually during the September LTMP from three sediment sample locations (SED-17, SED-18, and SED-19) at Site 2. The sediment samples are analyzed for inorganic elements and pesticides. The inorganic elements typical of landfill leachate (aluminum, arsenic, iron, magnesium, manganese, mercury, nickel, selenium, sodium, thallium, vanadium, and zinc) have been detected in the stream sediment sample locations within Mere Brook. Since 1999, the concentrations of mercury have declined to non-detected concentrations at all of the sediment sampling locations. Iron was detected at sediment sample location SED-18 at a maximum concentration of approximately 440, 000 mg/Kg.

Note that project action limits have not been developed for sediment samples, and should be developed after discussions between the Navy and the regulators to determine appropriate standards/benchmarks to compare the sediment sample data against.

Leachate Sediment Sampling

Leachate sediment samples are collected bi-annually from three leachate sediment sample locations (LT-201, LT-202, and LT-203) at Site 2. The leachate sediment samples are analyzed for VOCs and inorganic elements. There are three VOCs (2-butonone, acetone, and xylenes) that are consistently detected in the leachate sediment samples and may be laboratory or sampling artifacts. Inorganics consisting of arsenic, aluminum, nickel, iron, lead, mercury, and zinc are some of the inorganics that are typically reported in the leachate sediment samples.

Note that project action limits have not been developed for sediment or leachate sediment samples, and should be developed after discussions between the Navy and the regulators to determine appropriate standards/benchmarks to compare the sediment and leachate sediment sample data against.

Leachate Seep Sampling

Leachate seep samples are collected bi-annually from three leachate seep sample locations (LT-201, LT-202, and LT-203) at Site 2. The leachate seep samples are analyzed for VOCs and inorganic elements. The levels of contamination detected in the leachate seep samples during the Long-Term Monitoring Program are consistent with the concentrations detected during the RI. The physical size of these seeps has not increased since the RI. As noted in the 1998 ROD, because the seeps are not large enough to support aquatic populations, the ecological risk assessment evaluated an exposure scenario consisting of wildlife drinking from the seeps. The risk assessment concluded that only slight risk existed, but that deleterious effects would be unlikely under actual exposure conditions.

2.2.7.5 Site Inspections

Refer to Section 2.2.4.2.

2.2.7.6 Interviews

No interviews were conducted as part of the five-year review process. However, during the October 2004 RAB meeting, the community was informed of the five-year review process for NAS Brunswick, and copies of a related EPA handout were provided by the Navy entitled *Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites* (U.S. EPA 2001a). Persons with related comments and/or information will be asked to contact the EPA RPM and/or the Navy RPM. Meeting minutes of each RAB meeting are prepared and distributed to meeting attendees. A copy of the EPA handout will be included as an attachment to the October 2004 RAB meeting minutes.

2.2.8 Technical Assessment

Question A: *Is the remedy functioning as intended by the decision documents?*

The review of documents, ARARs, risk assumptions, environmental monitoring data, and the results of site inspections indicate that the remedy is functioning as intended by the 1998 ROD. The effective implementation of institutional controls and cover maintenance have prevented exposure to soil, debris, and groundwater.

Question B: *Are the assumptions, toxicity data, cleanup values, and RAOs used at the time of the remedy selection still valid?*

The 1998 ROD and the HHRA concluded that cancer risks for all receptors were within EPA's acceptable risk range of 10^{-4} to 10^{-6}. The non-cancer hazard index for all receptors was below EPA's target level of 1.0. The HHRA and the ROD identified only 1 contaminant that exceeded promulgated standards. Lead was detected in groundwater above Federal MCLs and Maine's MEG.

While no unacceptable risks were determined, the HHRA noted high levels of mercury and iron were present in seep samples along the landfill boundary. Toxicity data for mercury and iron were reviewed during the five-year review process to determine if any revisions have been made since 1990. Toxicity values were obtained from the EPA Instructional Resources Information System (U.S. EPA 2004), a peer-reviewed toxicity database. If toxicity values were not available from the Instructional Resources Information System, values from the National Center for Environmental Assessment were used. Federal MCLs and Maine's MEGs were also reviewed to determine whether the MCLs have been revised since the ROD.

The assumption in the ROD that groundwater would not be used at the site is invalid due to the unavailability of a public water supply in some areas. Therefore, the institutional controls will be re-evaluated.

None of the contaminants have had revisions to their toxicity values. In addition, the Federal MCL for lead has remained at 15 µg/L. However, the Maine MEG for lead has been lowered to 10 µg/L. As noted in the ROD, no remedial actions were proposed for groundwater at the site because the area is serviced by a public water supply. However, in 2004, a bedrock well was installed at Dyers Gate, near Site 2, in order to service the guard shack. The results of the five-year review indicate that Site 2 would still be considered a minimal action site. Therefore, no additional revisions to the final selected remedy are warranted at this time, with the exception of evaluating the institutional control boundaries at the site.

The monitoring performance standards evaluation has not indicated any changes that would call into question the protectiveness of the remedy in the short term; however, the tables will be made consistent across the site.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

There is no information such as land use changes or an ecological risk that calls into question the protectiveness of the remedy. The proposed investigation north of Site 2, due to increases of metal concentrations observed in the leachate seep sample locations, may identify a new site or alter the Minimal Action remedy of Site 2, depending on the results of the investigation of this area. The institutional control boundary for Site 2 was based on the assumption that the base was serviced by public water; however, a new bedrock well was installed for the Dyers Corner gate project; therefore, the institutional control boundary for Site 2 could be affected. The Navy will sample this well on a periodic basis.

Technical Assessment Summary

According to the data reviewed and site inspections, the remedy has functioned as intended by the 1998 ROD. There have been no changes in the physical conditions of Site 2 Landfill that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the COCs that were used in the Baseline Risk Assessment, and there have been no changes to the standardized risk assessment methodology that would affect the protectiveness of the remedy.

2.2.9 Issues

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
No project action levels for comparing sediment and leachate sediment sample LTMP data have been established	No	Yes
Finalize and issue updated QAPP for the Site 2 LTMP	No	No
Investigate potential source area north of Site 2 Landfill	No	Yes
No agreement as to the need for Mere Brook fish tissue sampling as recommended by NAS Brunswick's First Five-Year Review Report and required by the ROD	No	Yes
No LUCIP	No	Yes
Bedrock well outside of Site 2 boundary at Dyers Corner gate	No	No
Eliminate turbidity levels in leachate seep samples	No	No
Institutional control boundary for site	No	Yes
Monitoring performance standards not consistent with ARARs	No	No

2.2.10 Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Establish project action limits for sediment samples	Establish appropriate standards to compare sediment and leachate sediment seep samples for LTMP data.	Navy	EPA/ MEDEP	2005	No	Yes
Finalize Site 2 QAPP for the LTMP	Issue the final updated QAPP for the LTMP for Site 2 Landfill.	Navy	EPA/ MEDEP	2005	No	No

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Investigate area north of Site 2 Landfill	Conduct limited investigation in area north of Site 2 Landfill. Investigation tasks may include magnetometer survey, soil borings, and hand installed piezometers.	Navy	EPA/ MEDEP	2006	No	Yes
Second Fish Sampling Event for Mere Brook	Continue discussions amongst the project stakeholders to reach consensus on the need for a second fish sampling event to benchmark the 1995 survey.	Navy	EPA/ MEDEP	2005-2006	No	No
No institutional control monitoring	Generate an LUCIP for the site	Navy	EPA/ MEDEP	2005	No	Yes
Bedrock well at Dyers Corner gate	Continue sampling well and report results to project stakeholders after each sampling event	Navy	EPA/ MEDEP	2005-2006	No	No
Elevated turbidity in leachate seep samples	Install shallow well points	Navy	EPA/ MEDEP	2005	No	Yes
Inconsistent standard tables	Update monitoring performance standard tables	Navy	EPA/ MEDEP	End of 2nd quarter FY06	No	No
Institutional control boundary for site	Evaluate institutional control boundary	Navy	EPA/ MEDEP	2005-2006	No	Yes

2.2.11 Protectiveness Statement

The remedy (Minimal Action) is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls (Base Instruction) that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base limiting access only to authorized personnel. In the short term, current monitoring data indicate that the remedy is functioning as required; however, additional monitoring and refinement of institutional controls are needed to ensure the remedy is protective in the long term.

2.2.12 Next Review

The next five-year review for the NAS Brunswick that includes Site 2 is required by 6 December 2009, 5 years from the date of this review.

2.3 SITE 7 OLD ACID CAUSTIC PIT

2.3.1 Introduction

Refer to Section 1.1 for a description of the purpose of the five-year review.

2.3.2 Site Description

Site 7, the Old Acid Caustic Pit site, is located in the northern portion of the base, west of the main gate (Fitch Avenue) and northeast of the former Old Navy Fuel Farm. The site is a relatively flat, open clearing surrounded by woods to the west, north, and east. The south side of the site abuts the former Old Navy Fuel Farm (Figure 2-3). Site 7 was formerly the location of the old acid caustic pit used from 1952 to 1969 for liquid waste disposal. Wastes reportedly disposed of included transformer oils, battery acids, solvents, and miscellaneous liquids. In addition to the acid caustic pit, the area was used as an equipment laydown area and Defense Reuse and Marketing Office facility. Currently, the site is undeveloped.

At Site 7, the Navy will begin performing long-term monitoring and maintenance as specified in the ROD (EA 2002a). The location of Site 7 is shown on Figure 2-3. In January 2005, the LTMP (EA 2005) was established pursuant to the ROD and issued as a final document. The purpose of the LTMP is to verify the effectiveness of the selected remedial action (institutional controls with groundwater monitoring) at Site 7.

2.3.3 Site Chronology

The following presents the chronology of site events:

- In June 1983, an IAS was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick. Ten sites, including Site 7, were identified in this IAS (Weston 1983).
- In June 1985, the Navy completed a Pollution Abatement Confirmation Study. This study recommended further investigation of the site as identified in earlier assessments and inspections (E.C. Jordan 1985).
- In July 1987, NAS Brunswick was placed on the EPA NPL.
- In 1987, the RI/FS process began for the 7 sites recommended for further investigation (E.C. Jordan 1990).
- In August 1990, a Draft Final RI was completed that included Site 7.
- In October 1990, the Navy entered into an FFA with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick.

- In 1991, the Draft Final Supplemental RI Report was issued, which identified the remedial action objectives and alternatives for the sites studied (E.C. Jordan 1991a).

- In March 1992, an FS was generated for Site 7 and other operable units at NAS Brunswick.

- In 1994, MEDEP adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units. Based on the MEGs, cadmium and manganese exceeded their respective limits.

- In March 1999, groundwater monitoring well MW-NASB-228 was installed at Site 7.

- In September 1999, based on the data from well MW-NASB-228, another groundwater well (MW-NASB-229) was installed at Site 7 within 5 ft of MW-NASB-094; cadmium was reported at 18.3 ppb (MCL and MEG equal 5 ppb) and manganese was reported at 1,290 ppb (MCL at 50 ppb and MEG at 200 ppb).

- In March 2000, the First Five-Year Review report for NAS Brunswick was finalized.

- In December 2000, a short duration pump test was conducted to assess the volume and extent of the cadmium plume at Site 7, and to determine whether groundwater extraction changed cadmium concentrations.

- On 31 December 2000, the Navy updated and finalized the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities and Groundwater Restrictions* that included Groundwater Use Restrictions at the various IRP sites, including Site 7.

- In July 2001, test pit excavations were completed in the vicinity of well MW-NASB-094 and included areas immediately upgradient and downgradient of well MW-NASB-094 (EA 2002a).

- In November 2001, a groundwater sampling round was completed for all Site 7 wells. Cadmium was detected in wells MW-NASB-099 and MW-NASB-091 at concentrations of 22 ppb (which exceeds the State MEG and Federal MCL of 5 ppb) and 0.7 ppb, respectively. Periodic groundwater sampling has been completed subsequent to this sampling round, although formal long-term monitoring of site groundwater has not been initiated.

- In March 2002, as detailed in the Final Completion Report for Stockpiled Soil Removal at Site 7, prepared by Foster Wheeler Environmental Corporation (2 October 2002), Foster Wheeler conducted an inspection of the 5 soil stockpiles at Site 7 and determined that Stockpiles 1 and 2 should be merged into one pile. Foster Wheeler collected one composite soil sample from each of the four stockpiles and sent them to Analytics for laboratory analysis for waste characterization. Foster Wheeler evaluated the waste

characterization results and determined that piles FW-2 and FW-5 required offsite disposal, while piles FW-1 and FW-3 could remain spread onsite. The soil remaining onsite was graded to match the existing ground surface. The waste characterization results are provided in Appendix A of the Foster Wheeler Final Completion Report.

- On 29 March 2002, the Navy issued the PRAP for Site 7.
- On 9 April 2002, the Navy held a public meeting to present the selected remedy for Site 7.
- In April 2002, the Navy's Remedial Action Contractor removed the stockpiled soils at Site 7, which were excavated in an attempt to identify and remove the cadmium source area that could have been impacting groundwater. As part of this removal action, 400 yd^3 of soil were excavated, 140 yd^3 of contaminated soil was disposed of offsite, and 260 yd^3 of excavated soil was spread on the ground surface at Site 7 (approximately 6-in. layer) and may be covering soil identified during the RI as contaminated with DDT and PAHs. (Foster Wheeler 2002).
- On 27 September 2002, the Record of Decision for Site 7 was finalized. The remedy selected is institutional controls with groundwater monitoring.
- In September 2002, EPA Region 1 submitted a Preliminary Close-Out Report for NAS Brunswick.
- In January 2005, the final LTMP was issued .

2.3.4 Background

2.3.4.1 Physical Characteristics

Site 7 is a generally flat, open clearing surrounded by woods to the west, north, and east. The suspected source area at Site 7 is approximately 3,800 ft^2 in area and is located in the northern portion of the base. The land area is zoned industrial, and the area is undeveloped. There are no structures present, i.e., barracks, housing, offices, etc., at Site 7. A drainage ditch is located to east of the site access road and parallels the access road (Figure 2-3). A more complete description of Site 7 is provided in Chapter 9 of the RI (E.C. Jordan 1990).

2.3.4.2 Land and Resource Use

Site 7 was the former location of the old acid caustic pit used from 1952 to 1969 for liquid waste disposal. The pit was located in the area between RI test pits TP-702 and TP-704. Wastes reportedly disposed of at the site included transformer oil, battery acid, caustics, solvents, and other miscellaneous liquids. The site was also a Defense Reuse and Marketing Office area and used for an equipment laydown area and storage.

Future land use at Site 7 is likely to remain undeveloped. Groundwater is not used as a potable or domestic source, and there are no plans to extract site groundwater for potable and/or domestic use.

The Site 7 area is underlain by fine to medium sand at depths ranging up to 20 ft. A transitional unit, common elsewhere at NAS Brunswick, was not identified underlying the sand at Site 7. Underlying the sand is a clay unit. The depth to bedrock at the site has been inferred based upon refusal depth to range from 11.7 to 20.6 ft below ground surface (bgs).

Hydrogeology at Site 7 is characterized by shallow groundwater in the overburden soil, and the water table varies in depth between 4 and 7 ft bgs. There are no wetland areas, ponds, or streams located at Site 7; however, there is a drainage ditch within the institutional control boundary.

2.3.4.3 History of Contamination

From 1952 to 1969, Site 7 was used to dispose of transformer oils, battery acids, solvents, and miscellaneous liquids. In addition to the acid caustic pit, the area was used as an equipment laydown area and Defense Reuse and Marketing Office facility. The handling and storage of these materials resulted in isolated spills and leaks of fuels and oils. Contamination in groundwater at the site includes cadmium and manganese, and in the surface and shallow soils includes PAHs and pesticides. The contamination was discovered during the pollution abatement confirmation study and RI/FS that resulted from the historical use of the acid caustic pit and use of the site as a Defense Reuse and Marketing Office area.

2.3.4.4 Initial Response

The RI activities completed at Site 7 identified inorganic elements, primarily cadmium and manganese, in groundwater at Site 7, and represent a low level threat to groundwater due to the relatively low concentrations of these elements and isolated area of occurrence. The concentrations of cadmium noted in the groundwater at Site 7 have been low, with elevated concentrations localized to a small area in the vicinity of MW-NASB-094 and MW-NASB-229. Groundwater sampling data indicated that the maximum detected concentration of cadmium was 52 ppb during the pump test in December 2000. Prior to the pump test, maximum cadmium concentrations ranged from 8 to 15 ppb. After the December 2000 pump test, cadmium concentrations decreased from a high of 32.6 ppb (June 2001) to 22 ppb (November 2001).

During the RI groundwater sampling completed in 1988, manganese was detected at concentrations exceeding the Federal Secondary MCL of 50 ppb in wells MW-NASB-094 (950 ppb) and MW-NASB-096 (51 ppb). In addition, the State MEG of 200 ppb was exceeded in well MW-NASB-094 during the 1988 sampling event. During additional groundwater sampling activities in 1999, manganese was detected at levels exceeding both the State MEG (200 ppb) and Federal Secondary MCL (50 ppb) in wells MW-NASB-096 (178 ppb), MW-NASB-228 (280 ppb), and MW-NASB-229 (1,290 ppb [duplicate sample reported manganese at 1,480 ppb]).

To date, the Navy has not detected any evidence of movement of COCs from Site 7 above Federal MCLs or State MEGs.

Contamination detected during the RI/FS at Site 7 identified PAHs and pesticide compound (DDT) present in the site soils from a depth of 0-2 ft bgs. PAHs were identified in soil samples collected from the test pits completed in 1988 and reported concentrations ranging from 350 to 20,000 ppb in the soils to a depth of 2 ft bgs. The specific test pit locations that reported concentrations of PAHs are TP-709, TP-710, TP-711, TP-713, TP-714, TP-715, TP-716, TP-717, and TP-719. The pesticide compound DDT was reported in the top 2 ft of soil at Site 7 in test pits TP-709, TP-710, TP-711, TP-712, TP-714, TP-716, TP-717, TP-718, and TP-719 with concentrations ranging from 25 to 420 ppb. The observed contamination is consistent with the historical use of this site as an Acid Disposal Pit and Defense Reuse and Marketing Office facility. The surface and shallow soil distribution of PAHs is consistent with the former use of this area as an equipment laydown area/recycling area. The presence of pesticides in the shallow soils is related to the use of this pesticide and/or handling practices of the former Defense Reuse and Marketing Office facility.

2.3.4.5 Basis for Taking Action

During the RI/FS, PAH and pesticide contamination was detected in the surface and shallow soils, and inorganic contamination was found in groundwater at Site 7. The COCs at Site 7 in different media include:

Groundwater	Surface and Shallow Soils
Cadmium	PAHs
Manganese	DDT, DDD, and DDE

The response action at Site 7 was based on the following:

- Residential use of the site in the future may present an unacceptable risk to human health.
- The baseline HHRA revealed that children who may trespass or play in this area are not potentially at risk if exposed to COCs via repetitive dermal contact or accidental ingestion (E.C. Jordan 1990). However, additional risk estimates (E.C. Jordan 1992) identified risks that exceed the State of Maine risk threshold.
- If not addressed by implementing the selected remedy in the ROD, these factors may present an unacceptable risk to human health or the environment.

A Baseline Risk Assessment was completed as part of the RI at Site 7 to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with Site 7, assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways needed to be addressed by the remedial action. The HHRA followed a 4-step process:

1. **Contaminant Identification**—Identified those hazardous substances which, given the specifics of the site, were of significant concern

2. **Exposure Assessment**—Identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure

3. **Toxicity Assessment**—Considered the types and magnitude of adverse health effects associated with exposure to hazardous substances

4. **Risk Characterization**—Integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.

The HHRA was completed for Site 7 surface and subsurface soils and groundwater. The HHRA was completed in 1990 (E.C. Jordan 1990, Appendix Q) using the established methods at that time.

A total of 16 COCs were identified in the RI and were selected for evaluation in the HHRA. COCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. Tables Q-5, Q-12, Q-13, and Q-14 in Appendix Q of the Draft Final RI Report (E.C. Jordan 1990) show a summary of site COCs, exposure point concentrations used to evaluate the reasonable maximum exposure scenario, and estimates of average or central tendency exposure concentrations. The maximum concentration for each COC was used to determine the worst-case scenario risk estimate at Site 7.

Potential human health effects associated with exposure to the COCs were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site.

Conservative assumptions for the risk assessment included the following:

- Site 7 is presently undeveloped land with no structures present at the site.

- Groundwater at Site 7 is not currently used as a source of drinking water.

- It is predicted that land and groundwater use will remain the same, as there are no plans to close the base in the foreseeable future.

- Risks were also calculated to determine residential exposure based on incidental ingestion of soil occurring 350 days per year for 30 years. This scenario includes potential risk for both current and reasonable future land use.

The following paragraphs contain a brief summary of the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the risk assessment, including estimates for an average exposure scenario, can be found in Appendix Q of the RI (E.C. Jordan 1990).

Cancer slope factor adjustments were used for chemicals with less than 50 percent absorption via the ingestion route. However, adjustments were not necessary for the chemicals evaluated at this site. As a result, the same values presented in the risk assessment were also used as dermal carcinogenic slope factors. Inhalation and external radiation routes of exposure were not applicable at Site 7.

Risk estimates for the significant routes of exposure at Site 7 were developed for the risk assessment. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an exposure to groundwater. Risk estimates for surface water were not included since they do not exist at this site.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical-specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds; that is, true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000) and indicate (using this example) that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk," or the additional cancer risk on top of that which individuals face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site-related) causes has been estimated to be as high as 1 in 3. EPA's generally acceptable risk range for site-related exposure is from 10^{-4} to 10^{-6}. MEDEP's incremental carcinogenic guideline is 1×10^{-5}. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse effects other than cancer, a hazard quotient is calculated by dividing the daily intake level by the reference dose or other suitable benchmark. Reference doses have been developed by EPA, and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. Reference doses are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A hazard quotient indicates that a receptor's dose of a single contaminant is less than the reference dose, and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index is generated by adding the hazard quotients for all COCs that affect the same target organ (e.g., liver) within or across all media to which a given individual may reasonably be exposed. A hazard index <1 indicates that toxic non-carcinogenic effects are unlikely.

As part of the RI, an ecological risk assessment was completed for Site 7. The complete risk assessment is provided in Appendix Q in the 1990 Draft Final RI report. No environmental risks are associated with the contaminants detected in surface soils or groundwater for Site 7. Since there are no streams or wetland areas associated with this site, environmental risks were estimated for terrestrial organisms. Levels of PAHs and DDT in the soils from this area were below levels considered to pose an environmental risk (E.C. Jordan 1990).

In 1992, additional risk estimates were generated for Site 7 based on a standardized future residential exposure scenario developed by EPA (E.C. Jordan 1992). This guidance was not available at the time the risk assessment was conducted during the Draft Final RI. The incremental carcinogenic risks associated with exposure under a future potential residential land use scenario is 3×10^{-5}, assuming exposure to average concentration and 1×10^{-4} assuming exposure to the maximum concentration (E.C. Jordan 1992). While both risk estimates are within EPA's target risk range of from 10^{-6} to 10^{-4}, they exceed the State of Maine's target risk threshold of 1×10^{-5}.

2.3.5 Remedial Actions

The Navy conducted additional field investigations to identify the nature and extent of the cadmium contamination at Site 7. In July 1997, 2 site wells (MW-NASB-093 [formerly MW-703] and MW-NASB-095 [formerly MW-705]) were sampled as part of background well sampling for the Monitoring Event 9 of the Long-Term Monitoring Program. The 2 wells were sampled for Target Analyte List (TAL) inorganic elements by utilizing the low-flow sampling procedure. The results showed that neither MW-NASB-093 nor MW-NASB-095 had an exceedance of the Federal MCL or State MEG for TAL inorganic elements. These wells are located upgradient of MW-NASB-094 and MW-NASB-096.

In March 1999, the Navy installed 1 new well (MW-NASB-228), east-northeast of the existing well network to assess whether cadmium detected in groundwater may extend downgradient of Site 7 (i.e., more north and east than the existing well network).

Monitoring wells MW-NASB-094, MW-NASB-096, and MW-NASB-228 were sampled for TAL elements. Analytical results indicated that MW-NASB-094 was the only well with elevated concentrations of cadmium (13.6 ppb) above the State MEG (5 ppb). Manganese was detected in 3 wells (MW-NASB-094, MW-NASB-096, and MW-228) at concentrations of 37.2 ppb, 178 ppb, and 280 ppb, respectively. The MEG for manganese (200 ppb) was only exceeded in well MW-NASB-228.

In September 1999, based on the findings of the March 1999 sampling round, the Navy installed another new well (MW-NASB-229) to verify the concentrations of cadmium noted in MW-NASB-094. After discussion with the RAB, the location of the well was positioned within 5 ft downgradient of MW-NASB-094. A sample was collected from MW-NASB-229 and submitted for analysis of TAL elements. Cadmium was detected above both the Federal MCL (5 ppb) and State MEG (5 ppb) in well MW-NASB-229 at concentrations of 18.3 ppb and

16.3 ppb (duplicate sample). Manganese was detected above both the Federal Secondary MCL (50 ppb) and State MEG (200 ppb) in well MW-NASB-229 at concentrations of 1,290 ppb and 1,480 ppb (duplicate sample).

In 2000 and 2001, supplemental field investigations were performed to search for and remove a potential soil source of continuing cadmium concentrations in groundwater above the Federal MCL and State MEG. In December 2000, a 51-hour pump test was conducted using MW-NASB-094 as the pumping well and monitoring 7 other nearby monitoring wells during the test. The cadmium concentrations detected during the pump test were 51 ppb (baseline sample), 52 ppb (approximately 18 hours after starting the pump test), 50 ppb (approximately 36 hours after the pump test began), 48 ppb (approximately 51 hours after the pump test began), and 41 ppb (approximately 24 hours after the pump test ended), all of which were above the Federal MCL and State MEG of 5 ppb. Following the pump test, the Navy completed additional investigations to assess whether an isolated man-made or natural source of cadmium was present in the site soils. Four temporary sampling points were installed to better define the impact of cadmium on the groundwater. Two of these points (TEMP-03 and TEMP-04) reported cadmium levels (17.7 ppb and 32.6 ppb, respectively) higher than drinking water standards of 5 ppb (Federal MCL and State MEG). These data were used to delineate the extent of the excavation. The excavation encountered metal debris and substantial organic material, either of which could be contributing to the cadmium concentrations observed. During excavations, no definite soil source was identified, although excavated soil was removed in an attempt to decrease groundwater cadmium concentrations. Two soil samples collected from the removed soil had cadmium detected at concentrations of 110 and 204 ppm as measured by a field x-ray fluorescence detector during the test pit excavations in July 2001. The Navy excavated over 400 yd^3 of material from the site and removed 140 yd^3 for disposal (EA 2002a; Foster Wheeler 2002). The remaining 260 yd^3 was spread out across the site since laboratory analysis did not identify it as contaminated material requiring offsite disposal.

In November 2001, a groundwater sampling round was completed for all Site 7 wells. The samples were collected using the low-flow sampling procedure and submitted for analysis of cadmium by EPA Method 6010B. Cadmium was detected in 2 wells (MW-NASB-099 and MW-NASB-091) at concentrations of 22 ppb and 0.7 ppb, respectively. The MEG for cadmium (5 ppb) was only exceeded in well MW-NASB-099 during this sampling event. The findings of these sampling rounds have been summarized in a letter report issued in March 2002 (EA 2002b).

Between March and April 2002, Foster Wheeler was tasked with conducting a removal action at Site 7 to remove the stockpiled soils. This remedial action consisted of collecting soil samples to characterize the stockpiled soil, transporting and disposal of contaminated soil, and restoring the site. Two of 5 stockpiles (EA-1 and EA-2) were consolidated into 1 stockpile (identified as FW-1). Composite soil samples were collected from stockpiles FW-1, FW-2, FW-3, and FW-5. The analytical results indicated that stockpiles FW-2 and FW-5 required disposal offsite, and stockpiles FW-1 and FW-3 could remain onsite. Debris such as asphalt and metal were removed from stockpiles FW-1 and FW-3. The debris was transported for offsite disposal. Stockpiles

FW-1 and FW-3 were then spread out across the ground surface of Site 7. Stockpiles FW-2 and FW-5 were loaded, transported, and disposed of at ESMI in New Hampshire. Approximately 140 yd^3 of material was disposed of at ESMI (Foster Wheeler 2002).

In September 2002, the ROD was signed for Site 7 and presents the remedy for the site. The selected remedy for the site was institutional controls with groundwater monitoring. The selected remedial action will be protective of human health and the environment as soon as the LTMP is implemented beginning in 2005, and the institutional controls are re-evaluated for Site 7.

The selected remedy for Site 7, institutional controls with groundwater monitoring, is comprised of the following major components needed to address soil and groundwater contamination at Site 7:

- Implement institutional controls, such as land use restrictions, to prevent human contact with and use of the soil and groundwater at the site, and ensure that there are no violations of the institutional controls.
- Conduct long-term monitoring of groundwater to verify that the contamination remains localized and to monitor the trend of contamination until it is consistently below the Federal MCL and State MEG.
- Reduction in contaminant mass is expected to occur over a period of years that is difficult to estimate at this time. However, natural attenuation is not considered active treatment, and an alternative that relies upon natural attenuation does not meet the statutory preference for treatment under CERCLA.
- Perform five-year reviews.

2.3.5.1 Remedy Implementation

Prior to the ROD, the Navy had implemented institutional controls to prevent the use of and contact with site groundwater and soil at Site 7; however, the current Operating Instructions will be revised based on stakeholder comments. These institutional controls consist of groundwater and soil use restrictions per the current NAS Brunswick Operations Instructions in effect. The Operations Instructions are used to identify and screen environmental areas for inappropriate construction or development activities. A copy of the Operations Instructions was placed in the Administrative Record for Site 7. The Operations Instructions will not be modified in any way that affects these use restrictions or the Site 7 remedy. The institutional controls will be inspected, noted, verified, and reported during the Long-Term Monitoring Program to be implemented at Site 7 in accordance with the FFA. The monitoring and reporting of institutional controls will be described in the Site 7 LTMP, which has been submitted to regulators in draft format. In accordance with the 2002 Site 7 ROD, if in the future, the site use was to change, i.e., for residential use, the Navy will issue a memorandum to the RAB for review and comment and to EPA and MEDEP for their review, comment, and finalization in accordance with the FFA detailing the tasks to be competed to remove the shallow soil that has PAH and DDT impacts.

The Navy will institute a Long-Term Monitoring Program that will be adjusted based on sample results. A monitoring plan has been developed and was forwarded to the RAB for consultation as well as to EPA and MEDEP for review, comment, and finalization in accordance with the FFA. When the Navy revises the Long-Term Monitoring Program, the Navy will forward the revisions to the RAB for consultation as well as to EPA and MEDEP for review, comment, and finalization in accordance with the FFA, prior to incorporating the revisions into the LTMP. The goals of the Long-Term Monitoring Program are as follows:

- Assess variations in the concentrations of cadmium and manganese in groundwater to determine the effectiveness of natural attenuation
- Assess whether contamination is migrating offsite
- Assess variations in groundwater flow patterns
- Monitor structural integrity of the groundwater monitoring wells.

2.3.5.2 System Operation/Operation and Maintenance

The current remedy for the site is institutional controls with groundwater monitoring and groundwater sampling twice a year (during the Spring and Fall of each year). Active monitoring and site inspections began in Spring 2005.

- Inspection for drinking water wells within the institutional control boundary.
- Inspection of the site area to determine if construction (including new or renovations) or disturbance of the ground surface has occurred at the site.

2.3.6 Progress Since the Last Five-Year Review

This is the First Five-Year Review for this site. The ROD was finalized in September 2002 for Site 7.

2.3.7 Five-Year Review Process

2.3.7.1 Administrative Components

Refer to Section 1.1.

2.3.7.2 Community Involvement

Refer to Section 1.1.

2.3.7.3 Document Review

Documents reviewed are referenced in Section 2.2, and the citations are included in References section.

2.3.7.4 Data Review

Long-term monitoring has not been initiated to date at this site. The Navy is scheduled to finalize the LTMP prior to the end of 2004 and expects to conduct the first long-term monitoring sampling event during the Spring 2005 Long-Term Monitoring Program sampling.

2.3.7.5 Site Inspections

The current remedy for the site is institutional controls with groundwater monitoring and groundwater sampling twice a year (during the spring and fall of each year). Active monitoring and site inspections began in Spring 2005.

2.3.7.6 Interviews

No interviews were conducted as part of the five-year review process. However, during the October 2004 RAB meeting, the community was informed of the five-year review process for NAS Brunswick, and copies of a related EPA handout were provided by the Navy entitled *Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites* (U.S. EPA 2001a). Persons with related comments and/or information will be asked to contact the EPA RPM and/or the Navy RPM. Meeting minutes of each RAB meeting are prepared and distributed to meeting attendees. A copy of the EPA handout will be included as an attachment to the October 2004 RAB meeting minutes.

2.3.8 Technical Assessment

Question A: *Is the remedy functioning as intended by the decision documents?*

The remedy is expected to function as intended by the 2002 ROD (institutional controls with groundwater monitoring). Institutional controls (the Base Operating Instruction NASBINST 5090.1B, Restrictions on Excavation Activities and Groundwater Use) will be implemented at the site per stakeholder's review and comments to restrict use of groundwater and excavation of site soils. Long-term monitoring will be initiated during the first Long-Term Monitoring Program sampling event following the finalization of the LTMP by the end of 2004. At that time, the site remedy will be fully in place and functioning.

Question B: *Are the assumptions, toxicity data, cleanup values, and RAOs used at the time of the remedy selection still valid?*

The Site 7 risk assessment was reviewed to determine whether exposure assumptions and toxicity data used previously had been revised. The HHRA analyzed potential risk for hypothetical resident and worker exposure to surface and subsurface soil and groundwater.

The receptors were analyzed for incidental ingestion and dermal exposure to soil and ingestion of groundwater.

Potential risks were calculated based on the maximum detected concentration in each medium (e.g., surface soil), which is more conservative than current guidance. Current guidance indicates that a reasonable maximum exposure scenario can be calculated based on a 95 percent upper confidence limit on the mean.

The ROD and the HHRA compared calculated cancer risks for all receptors to EPA's acceptable risk range of 10^{-4} to 10^{-6}. Non-cancer risks were compared to an acceptable threshold of 1.0. Detected constituents above these acceptable standards were considered COCs. The only COCs for groundwater were cadmium and manganese, and only groundwater was deemed to have potential unacceptable risks to humans.

As part of the RI, an ecological risk assessment was completed for Site 7. The complete risk assessment is provided in Appendix Q of the 1990 Draft Final RI Report. No environmental risks are associated with the contaminants detected in surface soils or groundwater for Site 7 because there are no streams or wetlands areas associated with this site; environmental risks were estimated for terrestrial organisms. Levels of PAHs and DDT in the soils from this area were below levels considered to pose on environmental risk (E.C. Jordan 1990).

Toxicity data for COCs were reviewed to determine if any revisions have been made since the ROD was issued. Toxicity values were obtained from the EPA Instructional Resources Information System (U.S. EPA 2004), a peer-reviewed toxicity database. If toxicity values were not available from the Instructional Resources Information System, values from the National Center for Environmental Assessment were used. Federal MCLs and Maine MEGs were also reviewed to determine whether the MCLs have been revised since the 2002 ROD. Significant changes to screening and toxicological values have not occurred, therefore, there is no need for remedy modifications based on the toxicity values.

The assumption in the ROD that groundwater would not be used at the site is invalid due to the unavailability of a public water supply in some areas. Therefore, the institutional controls will be re-evaluated.

The ARAR evaluation has not indicated any changes in Standards or To Be Considered that would call into question the protectiveness of the remedy in the short term; however, the ARAR tables will be made consistent across the site.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

No other information has come into light, or is available, that would call into question the protectiveness of the remedy.

Technical Assessment Summary

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 2002 ROD (institutional controls with groundwater monitoring). The following supports the determination that the remedy remains protective:

- Institutional controls for Site 7 have been implemented in the Base's Navy update of the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities and Groundwater Restrictions* that included Groundwater Use Restrictions at the various IRP sites, including Site 7. However, institutional controls will be evaluated.

- A groundwater monitoring plan has been generated and was finalized in 2005.

2.3.9 Issues

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
Implement LTMP	No	Yes
Finalize and issue the draft Site 7 QAPP	No	Yes
Install two piezometers and conduct quarterly gauging to assist with locating an additional well(s) for the Long-Term Monitoring Program	No	Yes
No institutional control monitoring	No	Yes
Spread stockpiled soils over site soil	No	Yes
Need to finalize institutional controls and incorporate into the Operating Instructions	No	Yes
ARAR tables are not consistent across NPL site	No	Yes

2.3.10 Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Finalize the QAPP for Site 7	Submit the final Site 7 QAPP	Navy	EPA/ MEDEP	12/31/04	No	Yes
Install 2 piezometers and a staff gauge within drainage ditch	Install 2 piezometers to refine the understanding of localized groundwater flow conditions at the site; once the piezometers are installed, quarterly gauging will be conducted for a period of 12 months.	Navy	EPA/ MEDEP	4/30/05	No	No
Install additional monitoring well(s)	Pending outcome of the piezometer gauging data, install a monitoring well(s) to incorporate into the LTMP	Navy	EPA/ MEDEP	5/30/06	No	Yes
Revise and update the LTMP	Revise the LTMP to include the new groundwater monitoring points	Navy	EPA/ MEDEP	7/31/06	No	Yes

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Spread stockpiled soils over contaminated soil on the site	Determine where the soil was spread out across the site. The final closure report will be reviewed to determine the extent of soil spreading at the site.	Navy	EPA/ MEDEP	2005	No	No
Development of institutional control boundary for site	General an LUCIP for the site	Navy	EPA/ MEDEP	Not applicable	No	Yes
Inconsistent ARARs	Update ARAR tables	Navy	EPA/ MEDEP	End of 2nd quarter FY06	No	No

2.3.11 Protectiveness Statement

The remedy at Site 7 is expected to be protective of human health and the environment upon attainment of the cleanup goals, as presented in the 2002 ROD, which is expected to take up to 10 years to achieve (EA 2002a). During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and usage of the groundwater. In addition, the site is currently undeveloped. In order for the remedy to remain protective in the long term, institutional controls will need to be refined.

2.3.12 Next Review

The next five-year review for NAS Brunswick that includes Site 7 is required by 6 December 2009, 5 years from the date of this review.

2.4 SITE 9 NEPTUNE DRIVE DISPOSAL SITE

2.4.1 Site Description

Site 9 is approximately 20 acres in area and is located in the central portion of the base. The CERCLA Information System operable unit number assigned to Site 9 is OU6. Records indicate that a former incinerator, ash landfill/dump area, and disposal area are located at Site 9. The incinerator was reportedly used from April 1943 until the Fall of 1946, but may have been used as late as 1953 when the barracks buildings were constructed. Solid wastes were incinerated and the ash was disposed of in the dump (now referred to as the ash landfill/dump area), and other wastes disposed of into the dump reportedly included solvents which were burned on the ground, paint sludge, and possibly wastes from the metal shop (U.S. Navy 1994b [PRAP]). Historical documents and aerial photographs show what was once a possible solvent burning or dumping area southeast of Building 201. The former burning and dumping area may have been a potential

source of contamination. Building 201 also had a septic system that was identified as a suspected source of contamination during the RIs in the early to mid-1990s although subsequent investigations failed to identify a source in this area.

The primary concern at Site 9 is VOCs in groundwater, particularly vinyl chloride which is the primary COC. Other VOC COCs at the site include 1,2-dichloroethane and dichloroethene. No source area has been identified for the groundwater vinyl chloride plume, and it appears likely this compound is generated due to favorable geochemical conditions at Site 9 which breakdown parent compounds tetrachloroethene and trichloroethene via anaerobic dechlorination.

Land use is residential/commercial, and present structures include barracks, a dining facility, and picnic/recreation areas. Currently, there are eight barracks buildings located on Site 9 (Buildings 212 through 215 and 217 through 220). Site 9 is generally flat with two steep-sided stream channels in the southern portion of the site. Avenue C "Neptune Drive" divides the site on a west-east axis, and Orion Street borders the western edge of Site 9.

Impoundment ponds were constructed in 1997 on the primary drainage pathway bordering Site 9 and receive surface drainage from the majority of the operations (industrial) area of the base, including the flight line and hangar areas. The impoundment ponds are located to the south, southeast, and east of Building 201 (a dining facility).

2.4.2 Site Chronology

The following presents a chronologic summary of site events:

- In June 1983, an IAS was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick at 10 sites, including the Neptune Drive Disposal Site (Site 9).

- In June 1985, the Navy completed a Pollution Abatement Confirmation Study. This study recommended further investigation at Site 9 as identified in earlier assessments and inspections.

- In July 1987, NAS Brunswick was placed on EPA's NPL.

- In 1987, the RI/FS process began for 7 sites recommended for further investigation in the Pollution Abatement Confirmation Study that included Site 9.

- In August 1990, a Draft Final RI was completed that included Site 9 (E.C. Jordan 1990). Vinyl chloride contamination was identified in groundwater, but test pits and soil borings found no source of the contamination. The RI/FS included a risk assessment for the site.

- In October 1990, the Navy entered into an FFA with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick.

- In August 1991, the Draft Final Supplemental Investigation Report was completed that included Site 9.

- Also in 1991, the Navy completed the Phase I FS Report (E.C. Jordan 1991b), which identified remedial action objectives and alternatives for the sites studied.

- In 1994, MEDEP adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units. Based on the MEGs, cadmium and manganese exceeded their respective limits.

- In July 1994, the Navy presented a Proposed Plan for Site 9 that recommended an interim remedial action consisting of natural attenuation and long-term monitoring of groundwater, sediment, and seeps.

- In September 1994, an Interim ROD was finalized that selected natural attenuation and long-term monitoring as the interim remedy for the site, and it required the Navy to conduct an additional source investigation to determine the source of vinyl chloride at the site (U.S. Navy 1994c).

- In January 1995, an LTMP was established for Site 9.

- In March 1995, long-term monitoring was initiated (Monitoring Event 1) at Site 9.

- From 1995 through 1996, additional source investigations were conducted and the investigations failed to pinpoint a specific source for the vinyl chloride contamination. No likely soil source for groundwater impacts was located at the inactive landfill or the Building 201 septic system.

- In 1997, the U.S. Fish and Wildlife Service performed a Toxicity Test and Sediment Chemistry Investigation (USFWS 1997) to characterize sediment in the unnamed streams and assess the potential risk to affect aquatic organisms. The U.S. Fish and Wildlife Service determined that the concentrations of PAHs and other contaminants in the sediment were not toxic to the two test organisms.

- In August 1999, the Navy finalized a revision and update to the LTMP for Site 9.

- In July 1999, the Navy published the PRAP for Site 9. The Navy presented the PRAP to the public on 15 July 1999 at a public meeting.

- In September 1999, the final ROD was signed for Site 9. The Site 9 remedy is monitored natural attenuation with long-term monitoring and institutional controls.

- In March 2000, the First Five-Year Review Report was finalized for NAS Brunswick.

- On 31 December 2000, the Navy updated and finalized the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities* to include Groundwater Use Restrictions at the various IRP sites, including Site 9.

- During Summer 2001, the Navy demolished Barracks Building 216. The building foundation was left intact.

- In September 2002, EPA issued a Preliminary Close-Out Report for NAS Brunswick that included Site 9 (OU6).

- From May through June 2003, the Navy conducted a direct-push investigation at Site 9 to assess whether VOCs may be entering the site from the west based on the continued detection of low concentrations of VOCs in MW-NASB-227. Additionally, soil data were collected to assess the nature, lateral extent, and depth of the ash landfill/dump at Site 9 to assess whether excavation of the landfill is feasible as part of future barrack demolition activities.

- In February 2004, the revised LTMP and updated QAPP were issued in draft to the regulators for comment. The Navy is currently responding to the regulator's comments and expects to finalize the revised LTMP and updated QAPP in late 2004.

- As of March 2004, a total of 23 LTMP monitoring events have been conducted at Site 9.

- In June 2004, the Navy installed two additional direct-push borings south of Building 29 and collected groundwater samples for laboratory analysis for VOCs to assess whether an unidentified pocket of VOCs may be present along the top of the clay unit. The June 2004 groundwater sampling results indicated that trichloroethene was reported at the Federal MCL/State MEG concentration of 5 µg/L. This information will be presented in a Draft Final Direct-Push Groundwater and Ash Landfill/Dump Area Delineation Investigation Summary Report for Site 9, issued in November 2004.

- On 7 July 2004, the Navy submitted a draft LUCIP for regulator review and comment. The Navy is currently addressing the regulator comments and intends to finalize the plan in 2006.

2.4.3 Background

2.4.3.1 Physical Characteristics

Site 9 is located within the central developed area of NAS Brunswick. The site is bounded to the north by Burbank Avenue, to the east by Building 211 and paved parking area, to the south by the impoundment ponds, and to the west by aircraft hangars and the flight line area (Figure 2-4). There are currently 7 barracks buildings on the site.

Groundwater occurs at Site 9 at a depth of 10-14 ft bgs, and is unconfined. Based on groundwater elevation data gathered as part of the Long-Term Monitoring Program, groundwater flow direction is generally toward the unnamed stream and surface water impoundment ponds.

Groundwater is believed to discharge to the unnamed stream surface water impoundments.

2.4.3.2 Land and Resource Use

Site 9 was the former location of an incinerator and ash landfill/dump and a reported hazardous waste disposal area. These historical activities may have contributed to current environmental conditions. There are several structures present within the footprint of Site 9 and include military barracks buildings (Buildings 212 through 220), a dining facility (Building 201), and a recreation building (Building 29). Barracks Building 216 was demolished in 2002.

The Site 9 area is underlain by fine to medium sand at depths ranging in thickness up to 40 ft. The sand unit decreases in thickness from east to south. Underlying the sand is a transition unit composed of fine sand and silt with clay. A clay unit underlies the transition unit and extends to an undetermined depth. The depth to bedrock at the site has not been determined.

Groundwater is believed to discharge to the unnamed stream and surface water impoundment ponds.

Former Incinerator and Ash Landfill/Dump Area

No record of the precise location of the incinerator or ash landfill has been found. The Navy has assumed that the incinerator was located in the northeast corner of what is currently the location of Building 220, and the landfill was in the current location of Buildings 218 and 219. All three of these buildings are military barracks. It is believed that the incinerator was in operation from April 1943 until Fall of 1946. The incinerator may have been used as late as 1953 when the current buildings (barracks) were built. Reportedly, the wastes disposed of in this area were solvents that may have been burned on the ground, paint sludge, and wastes from the metal shop. Both the incinerator and ash landfill were in operation and closed prior to the effective date of Resource Conservation and Recovery Act regulations (1976).

Construction maps showing grading in the vicinity of the barracks (Buildings 212 through 220) indicated an oval "dump area" approximately 125 ft × 75 ft, underlying the current location of Buildings 218 and 219. The plans also show an old 42-in. diameter drain adjacent to the dump area. This drain ran from north of Orion Street, past the ash landfill area, under Neptune Drive, between Buildings 201 and 293 to the unnamed stream. This drain may have been a potential pathway for contaminant migration. The drain was reportedly removed during construction of the barracks, and no evidence that this drain is still in place has been found. Prior to 1953, the inactive ash landfill was closed and a soil cover installed over it. In 1953, Buildings 218 and 219, which are currently military barracks, were constructed over the former landfill area. The extent of the ash landfill/dump area was defined by the draft final 2003 direct-push investigation of this area and detailed in the draft final report issued in November 2004.

Building 201

Historical documents and aerial photographs show what was once a possible solvent burning or dumping area southeast of Building 201. This former burning or dumping area may have been a potential source of contamination. In addition, a septic system associated with Building 201 was suspected to be a potential source of contamination at Site 9. Building 201 was used as the Chief's Club until 1993 when it was converted into its present use as the galley (cafeteria). Currently, a picnic area and barbecue pit are located directly to the southeast of Building 201.

Unnamed Streams

Building 201 is bordered on the northeast and south sides by two unnamed streams, which discharge into the Picnic Pond, located 2,000 ft downstream of Site 9. Groundwater seeps have been observed flowing into the northern stream.

In 1997, surface water impoundment ponds were constructed to capture the runoff from the central portion of the base including runways, parking lots, and roads. Construction of the impoundment ponds have consequently flooded the former southern unnamed stream, and partially flooded the northern unnamed stream.

NAS Brunswick will be demolishing the barrack buildings located over the landfill. It is planned to take the buildings down to 1 ft bgs. The Navy plans to excavate the ash landfill/dump during the 2005 field season.

2.4.3.3 History of Contamination

During the mid-1940s, an incinerator was reportedly used at Site 9 and the incinerator ash was disposed of into the dump area, now referred to as the ash landfill/dump area underlying Barracks Buildings 218 and 219. Other wastes disposed of in the ash landfill/dump area included solvents that were burned on the ground, paint sludge, and waste from the metal shops. The incinerator may have been used as late as 1953 when the current buildings (barracks) were built. As a result of the 2003 direct-push investigation data, the estimated volume of the ash landfill/dump area is 16,000 yd^3 which was determined from the 30 borings completed in this area of the site (EA 2003).

Historical documents and aerial photographs show what was once a possible solvent burning or dumping area southeast of Building 201. This former burning or dumping area may have been a potential source of contamination. In addition, a septic system associated with Building 201 was suspected to be a potential source of contamination at Site 9.

During the 1990s, an RI was conducted at Site 9. The RI sampling and analysis identified contamination in the soil and groundwater at Site 9. The environmental sampling identified VOCs (vinyl chloride, 1,2-dichloroethene, and dichloroethane) and elevated concentrations of inorganics in the groundwater downgradient of the ash landfill/dump area. Vinyl chloride and 1,2-dichloroethene were reported at concentrations exceeding the Federal MCL and State MEG, and dichloroethane was reported at concentrations exceeding the State MEG.

The 1994 Interim ROD and the 1999 ROD for Site 9 defined three areas of potential concern at Site 9:

1. The former location of the incinerator at the north end of Barracks Building 220, and an inactive ash landfill/dump area underlying Barracks Buildings 218 and 219.

2. A reported disposal area behind (to the east and southeast of the building) Building 201 (the dining facility south of Neptune Drive).

3. Two streams/impoundment ponds bordering the recreational area east of Building 201.

2.4.3.4 Initial Response

The Site 9 incinerator reportedly operated from 1943 to 1946 during which time the incinerator ash was disposed into the dump area, which had approximately 16,000 yd^3 of waste deposited into the landfills as determined by investigations during Summer 2003. As a result of the initial investigation results, NAS Brunswick was placed on the NPL in 1987. Subsequent RIs during the early to mid-1990s further characterized the site and supported the finalization of a 1994 Interim ROD that required the Navy to undertake further investigation efforts to identify the source of the vinyl chloride contamination in groundwater. After subsequent investigations were completed in 1993 and 1994 that identified the ash landfill/dump area as the most likely source of vinyl chloride, a final ROD was signed in September 1999 that had a natural attenuation with long-term environmental monitoring remedy.

2.4.3.5 Basis for Taking Action

The COCs that have been identified at the site in different media include:

Sediment	Groundwater	
Benz(a)anthracene	Vinyl chloride	Aluminum
Chrysene	1,1-dichloroethane	Barium
Benzo(b)fluoranthene	1,2-dichloroethylene	Cadmium
Benzo(k)fluoranthene	2-butanone	Chromium
Benzo(a)pyrene	Toluene	Manganese
Indeno(1,2,3-cd)pyrene	PAHs (total)	Mercury
Dibenzo(a,h)anthracene		Vanadium
Carcinogenic PAHs		

A Baseline Risk Assessment was completed as part of the RI at Site 9 to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with Site 9, assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways needed to be addressed by the remedial action. The HHRA followed a 4-step process:

1. **Contaminant Identification**—Identified those hazardous substances which, given the specifics of the site, were of significant concern

2. **Exposure Assessment**—Identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure

3. **Toxicity Assessment**—Considered the types and magnitude of adverse health effects associated with exposure to hazardous substances

4. **Risk Characterization**—Integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.

A summary of those aspects of the HHRA that support the need for remedial action is discussed below, followed by a summary of the ecological risk assessment. An additional risk assessment was completed as part of the Technical Memorandum (ABB-ES 1994) to calculate risks associated with groundwater at Site 9, since the RI did not find groundwater as a source of significant contamination. Additional risk calculations were presented in the Technical Memorandum to include data collected as part of that investigation (ABB-ES 1994).

The HHRA was completed for Site 9 surface soil, surface water, stream sediment, leachate, and leachate sediment. At the time of the RI, groundwater and the contents of the inactive landfill were not considered significant hazards and, thus, were not included in the HHRA. In 1994, groundwater risks were calculated for the ingestion route of exposure in the Technical Memorandum (ABB-ES 1994). The HHRA was completed in 1990 (E.C. Jordan 1990; Appendix Q) using the established methods at that time.

A total of 36 COCs were identified in the RI and were selected for evaluation in the HHRA. COCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. Tables Q-7, Q-23, Q-24, Q-32, and Q-33 in Appendix Q of the Draft Final RI Report (E.C. Jordan 1990) show a summary of all COCs, exposure point concentrations used to evaluate the reasonable maximum exposure scenario, and estimates of average or central tendency exposure concentrations.

Risk estimates for groundwater were taken from the Technical Memorandum (ABB-ES 1994). Estimates for stream sediments were taken from Appendix Q of the 1990 RI (E.C. Jordan 1990). An HHRA was not conducted for the contents of the inactive ash landfill because there is no significant exposure route due to the presence of soil cover and, more significantly, military barracks are located on top of the landfill site.

Potential human health effects associated with exposure to the COCs were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site.

Assumptions included the following:

- Present land use at Site 9 is for barracks, a dining facility, and picnic and recreation areas for base personnel.

- Groundwater at Site 9 is not currently used as a source of drinking water.
- It is predicted that land and groundwater use will remain the same. The Base Realignment and Closure 05 list will become final by the end of 2005.
- Risks were also calculated to determine residential exposure based on incidental ingestion of soil occurring 350 days per year for 30 years. This scenario includes potential risk for both current and reasonable future land use.

The following paragraphs contain a brief summary of the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the risk assessment, including estimates for an average exposure scenario, can be found in Appendix Q of the RI (E.C. Jordan 1990).

Table 2-3 of the 1999 ROD provides carcinogenic risk information relevant to the COCs in both soil and groundwater. Cancer slope factor adjustments were used for chemicals with less than 50 percent absorption via the ingestion route. However, adjustments were not necessary for the chemicals evaluated at this site. As a result, the same values presented in Table 2-3 of the 1999 ROD were also used as dermal carcinogenic slope factors. Inhalation and external radiation routes of exposure were not applicable at Site 9.

Table 2-4 of the 1999 ROD provides risk estimates for the significant routes of exposure at Site 9. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an exposure to stream sediment and groundwater, as well as the toxicity of carcinogenic PAHs and vinyl chloride. Risk estimates for surface soil, surface water, and leachate seep and sediment were not included in this table as they did not pose a significant risk. It should be noted that the contents of the ash landfill were not included in any of the risk assessments conducted at Site 9.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical-specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000) and indicate (using this example) that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk," or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site-related) causes has been estimated to be as high as 1 in 3.

EPA's generally acceptable risk range for site-related exposure is from 10^{-4} to 10^{-6}. MEDEP's incremental carcinogenic guideline is 1×10^{-5}. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse effects other than cancer, a hazard quotient is calculated by dividing the daily intake level by the reference dose or other suitable benchmark. Reference doses have been developed by EPA, and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. Reference doses are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A hazard quotient indicates that a receptor's dose of a single contaminant is less than the reference dose, and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index is generated by adding the hazard quotients for all COCs that affect the same target organ (e.g., liver) within or across all media to which a given individual may reasonably be exposed. A hazard index <1 indicates that toxic non-carcinogenic effects are unlikely.

Groundwater

Risks associated with future groundwater use were calculated as part of the Technical Memorandum (ABB-ES 1994). The assessment assumed a 70-kg adult consuming 2 L of water per day for 30 years. The hazard index was 6.0 for the maximum concentrations and 3.0 for the average concentration. These values are above the EPA target level and MEDEP guideline of 1.0, and are attributed to the elevated concentrations of manganese.

The assessment also indicated a cancer risk of 2×10^{-4} for vinyl chloride exposure based on ingestion or dermal contact with contaminated groundwater. This exceeds the EPA target risk level of 1×10^{-6} and MEDEP guideline of 1×10^{-5}.

Table 2-5 of the 1999 ROD provides non-carcinogenic risk information relevant to the COCs in groundwater. Dermal contact and inhalation were not considered applicable routes of exposure at Site 9 (ABB-ES 1994).

Table 2-6 of the 1999 ROD provides hazard quotients for ingestion of groundwater at Site 9. The estimated hazard index of 6.0 indicates that the potential for adverse non-cancer effects is likely from exposure to contaminated groundwater containing manganese.

Stream Sediment

The Site 9 RI risk assessment identified sediment as the only media having an exposure risk above the EPA target range due to total carcinogenic PAH contamination (as shown in Table 2-2 of the 1999 ROD). Risks were evaluated for exposure via dermal contact or accidental ingestion for older children (aged 7-12) playing in stream sediment 48 times per year for 6 years. The most probable risk estimate was 2.98×10^{-5}, falling within EPA's acceptable target range, but slightly above the MEDEP guideline (E.C. Jordan 1990; Appendix Q). The worst-case estimate for this age group was 2.56×10^{-4} which exceeds the target range, based on the maximum concentration at the site (Table 2-4 of the 1999 ROD). Since the Interim ROD in 1994, risks due to stream sediment have been primarily attributed to non-Site 9 sources.

Leachate, Water, and Surface Soil

Exposure to surface water and leachate is below the EPA target range and is not considered a human health risk. Surface soil at Site 9 had lifetime exposure risks ranging from 3.1×10^{-5} to 8.6×10^{-5} due to the presence of PAHs. These risks are within EPA's acceptable target range of from 10^{-4} to 10^{-6}, but slightly above the MEDEP guideline of 1×10^{-5} for site-related exposures. It should be noted that this estimate is for surface soil, not landfill contents. The contents of the inactive landfill were not included in the HHRA.

Ecological Risks

Ecological risks indicate that the presence of contaminants in surface water may have the potential for deleterious effects on aquatic organisms, however, the impacts of chemical-related stress are not predicted to be severe. Additionally, much of the impact is attributed to elevated levels of contaminants that are found basewide and cannot be associated with Site 9 activities. Risks to terrestrial organisms with regards to contact or ingestion with soil, leachate seep, surface water, or stream sediment are presumed to be minimal or insignificant. Groundwater contamination poses no threat to wildlife, as it is inaccessible.

The Baseline Risk Assessment indicated a potential for serious impact on benthic macroinvertebrates. An additional risk assessment was conducted by the U.S. Fish and Wildlife Service to determine risks associated with sediment toxicity. The U.S. Fish and Wildlife Service determined that chemical constituents in sediment were not toxic to two test organisms.

2.4.4 Remedial Actions

In May 1994, the Navy submitted a Technical Memorandum that described the results of additional field investigations of the septic system and former ash landfill/dump area at Site 9. The document concluded that VOCs, including vinyl chloride, were present in Site 9 groundwater at concentrations above Federal MCLs and State MEGs, but that no distinct source area for the vinyl chloride contamination could be identified at Site 9. The document determined that the septic system at Building 201 was no longer an active source of vinyl chloride in groundwater, but could have been an historical source. The Technical Memorandum also concluded that the PAHs were present in the ash in the inactive landfill, but not in the groundwater downgradient of the landfill. The Memorandum did note that elevated concentrations of metals above Federal MCLs and State MEGs, including aluminum, iron, and manganese, were present in groundwater downgradient of the ash landfill/dump area. Therefore, the Navy recommended that groundwater remediation through natural attenuation with long-term monitoring of groundwater, surface water, sediment, and leachate be initiated by an interim ROD, while additional source investigations continue at Site 9. In July 1994, the Interim ROD was signed.

The ROD (U.S. Navy 1999), signed 30 September 1999, presents the selected whole-site remedy (natural attenuation with long-term monitoring and institutional controls) for Site 9.

Per the 1999 ROD, the RAOs for Site 9 are as follows:

- Reduce contaminant concentrations in Site 9 groundwater to below Federal MCL and State MEG target cleanup levels
- Prevent human exposure and ecological exposure (i.e., ingestion, dermal contact) to Site 9 groundwater
- Prevent human exposure and ecological exposure (i.e., ingestion, dermal contact) to the contents of the inactive ash landfill/dump area at Site 9
- Prevent any migration of the Site 9 groundwater plume offsite or of contaminants from the inactive ash landfill/dump area to groundwater and/or surface water.

To accomplish these objectives within the 20-year time period stated in the 1999 ROD, the following components were implemented:

- **Natural Attenuation**—This remedy relies on *in situ* biological systems to degrade the organic contaminants and on recovery of redox conditions to reduce the mobility of inorganic constituents. The goal is to reduce COCs to concentrations sustained at, or below, MCLs and MEGs. Groundwater monitoring results showing contaminant concentrations will be compared to these remediation goals, and the selected remedy will continue until the site goals are achieved.
- **Long-Term Monitoring**—Long-term monitoring has been implemented to:
  - — Assess variations in the concentrations of contaminants in groundwater, leachate, surface water, and sediment to determine the effectiveness of natural attenuation.
  - — Assess whether groundwater downgradient of the ash landfill/dump area is impacted by inorganics from the site
  - — Assess whether contamination is migrating offsite
  - — Assess variations in groundwater flow patterns
  - — Monitor the structural integrity of the groundwater monitoring wells
  - — Monitor and report the institutional controls.
- **Institutional Controls**—Institutional controls are being used to prevent use of and contact with impacted groundwater, and prevent the disturbance of or contact with the contents of the ash landfill/dump area at Site 9. These controls primarily consist of groundwater and land use restrictions.

- **Five-Year Reviews**—Data collected from the Long-Term Monitoring Program are being reviewed and recommendations for modifications will be made as part of annual reports and in the five-year reviews.

2.4.4.1 Remedy Implementation

The 1994 Interim ROD stipulated remedial action of groundwater remediation through natural attenuation, institutional controls, and long-term monitoring at Site 9. In January 1995, the Navy finalized the first LTMP for Site 9. The first monitoring event (Monitoring Event 1) was completed in March 1995. Results of investigations completed in 1995-1996 failed to pinpoint a specific source for the vinyl chloride. In September 1999, the ROD was finalized. Subsequent direct-push investigations were completed in 2003 and 2004 which further defined the extent of groundwater impacts, and the limit of the ash landfill. As of December 2004, 25 monitoring events have been completed at the site.

2.4.4.2 System Operation/Operation and Maintenance

The Navy is conducting long-term monitoring and maintenance as per the current LTMP for Site 9. The LTMP is currently undergoing revisions, and is scheduled to be finalized by the end of 2005. As part of the LTMP, the integrity and condition of the site monitoring wells are inspected during each monitoring event and the results are documented in the report generated for each monitoring event.

2.4.5 Progress Since the Last Five-Year Review

The First Five-Year Review was completed during 1999, and finalized in March 2000 for Site 9. The First Five-Year Review found that the selected remedy had been successfully implemented and is protective of human health and the environment, and functioning as designed. The First Five-Year Review recommended the following:

- No further response actions are required at this time; however, if sampling trends indicate sustained increases in vinyl chloride concentrations in groundwater, additional field work may be required to better delineate a potential plume of deep-seated vinyl chloride.

- Ongoing operation and maintenance activities will continue and will be summarized in annual reports. Annual reports and monitoring event reports will continue to be submitted to EPA and MEDEP.

- The LTMP will be refined as needed based on annual and monitoring event reports.

- Amend Operating Instruction NASBINST 5090.1A, *Restriction on Excavation Activities,* to include a restriction of use and physical contact with the groundwater.

Since the First Five-Year Review, the following changes have been made at the site:

- To satisfy a recommendation from the First Five-Year Review, the Navy updated the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use* in December 2000. This updated version of the Operating Instruction included restrictions on the use and contact with groundwater and soil at Site 9.

- Beginning with the April 2002 Long-Term Monitoring Program reports, the reporting format was changed from a data presentation to a report that included the elements of the annual report in each monitoring event.

- The LTMP was revised and updated and released as a draft in February 2004 to the project stakeholders for review and comment. The Navy intends to finalize the revision and update prior to the end of 2005. This satisfies a recommendation from the First Five-Year Review.

- The QAPP for the Site 9 LTMP was released in draft form in March 2004 to the project stakeholders for review and comment. The Navy is addressing stakeholder's comments and intends to finalize the QAPP by the end of 2005. This revision of the QAPP conforms with the EPA QAR-5 guidance for producing QAPPs for CERCLA projects.

- Additional investigation work was completed at Site 9 during the Summers of 2003 and 2004. During the Summer of 2003, 38 direct-push borings were advanced in the area of Barracks Buildings 218 and 219 to define the extent of the ash landfill/dump area. In addition to the work at the ash landfill/dump area, 9 direct-push borings were advanced at the site to gain additional geological information at Site 9. Based on the 2003 data collected and reviewed, 2 additional direct-push borings were completed in June 2004. The draft report will be revised to incorporate the June 2004 data collected, and a draft final report released for regulator review and comment by the end of 2005. This satisfies a recommendation from the First Five-Year Review.

- In July 2004, the Navy issued a draft Land Use Control and Implementation Plan (LUCIP) to the project stakeholders for review and comment. The Navy anticipates finalizing this document in 2006.

- The Navy plans to excavate the ash landfill/dump area during the 2005 field season.

2.4.6 Five-Year Review Process

2.4.6.1 Administrative Components

Refer to Section 1.1.

2.4.6.2 Community Involvement

Refer to Section 1.1.

2.4.6.3 Document Review

Documents reviewed are referenced in Section 2.1 and the citations are included in References section.

2.4.6.4 Data Review

As of December 2004, a total of 25 long-term monitoring events will have been completed at the site since long-term monitoring began in March 1995. More details regarding specific sample locations and location data from each monitoring event can be found in the monitoring event reports produced for each monitoring event.

Groundwater Monitoring

Currently, 17 monitoring wells and 2 stream gauges are gauged prior to sampling activities at Site 9. Groundwater is collected from 10 wells at Site 9 for volatile organic analysis per EPA Method 8260B using passive diffusion samplers. In addition to VOC analysis, 3 of 10 wells are sampled for SVOCs and TAL metals via the low-flow method.

Vinyl chloride continues to be reported at concentrations greater than the corresponding Federal MCL and State MEG. Based primarily on low-flow data, 1,2-dichloroethene and vinyl chloride have declined slightly at the hot-spot (MW-NASB-069) in the past 5 years, but remained well above pre-1999 levels . At two other locations (MW-NASB-080 and MW-NASB-227), concentrations of 1,2-dichloroethene have been relatively consistent. Vinyl chloride concentrations fluctuated at MW-NASB-080; and continued to be non-detect at MW-NASB-227, where parent VOCs are routinely detected below MCLs/MEGs. The maximum concentration of vinyl chloride, particularly noted at MW-NASB-069, appears to have reached a maximum in 2001, and has subsequently been stable or is decreasing. Assessed indicators of natural attenuation include vinyl chloride trends in the Long-Term Monitoring Program and the ratio of vinyl chloride to 1,2-dichloroethene with time.

Based on groundwater data collected during historical monitoring events, the vinyl chloride plume at Site 9 is limited to the central portion of the site, although data from recent 2003 and 2004 direct-push sampling investigations indicated low concentrations of vinyl chloride (7.1 µg/L) between MW-NASB-071 and MW-NASB-076 (EA 2004). It cannot be conclusively shown that this apparently small region of impacted groundwater will move past site monitoring wells; however, the close spacing of wells suggests that the monitoring wells in the long-term monitoring network appear to be well positioned to assess changes in vinyl chloride. The monitoring well network has been designed to track changes in groundwater concentrations of VOCs in the main portion of the vinyl chloride plume (near MW-NASB-069) and in other areas of Site 9 where vinyl chloride has been detected. The LTMP will be revised as necessary to monitor the natural attenuation.

Three monitoring wells are sampled bi-annually for TAL metals at Site 9. These three monitoring wells are located directly downgradient of the ash landfill/dump area. The inorganics detected in groundwater at these monitoring wells include arsenic, aluminum, antimony, barium, calcium, cadmium, manganese, magnesium, nickel, iron, sodium, potassium, and zinc. Manganese has been reported at concentrations exceeding both the Federal MCL and State MEG at each of the three monitoring wells. Antimony has also been reported in excess of the State MEG at well MW-NASB-070 (Monitoring Event 23).

During 2003, a total of 30 groundwater samples were collected from the upgradient/ crossgradient area west of Site 9 utilizing direct-push methods. Analytical results from 25 of 30 samples did not contain VOCs at concentrations above State MEGs or Federal MCLs. A total of 5 samples were reported with VOC concentrations in excess of the MEGs or MCLs. Vinyl chloride, trichlororethene, and methylene chloride were reported in direct-push groundwater samples at concentrations above the MEGs (or MCLs).

On the basis of the 2003 and 2004 investigations, it is proposed that one additional monitoring well be installed in the southwestern area at Site 9 in order to fully define the extent of groundwater impact near the boundary of the site.

Surface Water Monitoring

Historically, total VOC and vinyl chloride concentrations have remained consistently low, ranging between non-detect and approximately 3 µg/L, with the exception of one spike in the total VOC concentrations in 1996.

Sediment Monitoring

Since 1995, total VOC concentrations have ranged from non-detect to approximately 64 µg/kg. Historically, the concentration of vinyl chloride has remained consistently low (<2 µg/kg) in sediment samples.

Seep Monitoring

Historically, the concentration of vinyl chloride has remained at non-detect levels since 1995. The concentration of total VOCs generally ranges from non-detect to approximately 2 µg/L, although three spikes were noted in 1995, 1997, and 1998.

2.4.6.5 Site Inspections

Site inspections of monitoring wells, staff gauges, and overall site conditions are conducted during each long-term monitoring sampling event that occurs in April and September of each year. The results of the inspection are documented in the monitoring event reports generated for each long-term monitoring sampling event.

2.4.6.6 Interviews

No interviews were conducted as part of the five-year review process. However, during the October 2004 RAB meeting, the community was informed of the five-year review process for the NAS Brunswick facility, and copies of a related EPA handout were provided by the Navy entitled *Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites* (U.S. EPA 2001a). Persons with related comments and/or information will be asked to contact the EPA RPM and/or the Navy RPM. Meeting minutes of the RAB meetings were prepared and distributed to all meeting attendees. A copy of the EPA handout will be included with the October 2004 RAB meeting minutes.

2.4.7 Technical Assessment

Question A: *Is the remedy functioning as intended by the decision documents?*

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1999 ROD. The ARAR review is summarized in Appendix F using the ARAR tables from the ROD modified with the second five-year findings. Monitoring of groundwater beneath the site and the sediment/surface water will continue to provide data to ensure that contaminated groundwater from the site continues to pose no unacceptable risk to human health or the environment and to monitor the natural attenuation.

Question B: *Are the assumptions, toxicity data, cleanup values, and RAOs used at the time of the remedy selection still valid?*

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The assumption in the ROD that groundwater would not be used at the site is invalid due to the unavailability of a public water supply in some areas. Therefore, the institutional controls will be re-evaluated.

No unacceptable risks for ecological receptors were identified earlier for Site 9. No circumstances have changed that might alter this conclusion; therefore, monitoring for the protection of ecological receptors continues to not be necessary.

The previous risk assessment for Site 9 was reviewed to determine whether exposure assumptions and toxicity data used previously had been revised. The HHRA analyzed potential risk for hypothetical resident exposure to surface soil, surface water, stream sediment, leachate, and leachate sediment. The residents were analyzed for incidental ingestion and dermal exposure to all media above. Groundwater risks were calculated for the ingestion route of exposure in the Technical Memorandum (ABB-ES 1994). The contents of the ash landfill have not been assessed for potential risks based on a determination that they were not considered a significant hazard due to the presence of soil cover.

The ROD and the HHRA compared cancer risks for all receptors to EPA's acceptable risk range of 10^{-4} to 10^{-6}. The non-cancer hazard index for all receptors was compared to EPA's target level of 1.0.

Non-carcinogenic risks were calculated for groundwater above the target level of 1.0 for both the average and maximum scenarios, and are primarily attributable to manganese. Cancer risks also exceeded acceptable levels (above 10^{-4}) based primarily on vinyl chloride. Inhalation risks were not assessed, although several COCs are volatile. Current guidance indicates that volatile COCs in groundwater should be evaluated for potential indoor air exposure (U.S. EPA 2004).

Non-carcinogenic and carcinogenic risks were also calculated above acceptable thresholds for sediment. However, risks due to stream sediment have since been primarily attributed to non-Site 9 sources. Moreover, contamination in the stream sediment is addressed under the Clean Water Act National Pollutant Discharge Elimination System program.

Leachate and surface water potential risks were determined to be at or below acceptable levels. Therefore, exposure to these media is not considered a human health risk. Potential soil risks were calculated as only slightly in exceedance of the MEDEP acceptable level of 10^{-5} and were below or within EPA acceptable levels.

Toxicity data COCs were reviewed to determine if any revisions have been made since the last five-year review. Toxicity values were obtained from the EPA Instructional Resources Information System (U.S. EPA 2004), a peer-reviewed toxicity database. If toxicity values were not available from the Instructional Resources Information System, values from the National Center for Environmental Assessment were used. Federal MCLs and Maine MEGs were also reviewed to determine whether the MCLs have been revised since the ROD.

Several of the contaminants have had revisions to their toxicity values, including vinyl chloride. In addition, the Federal MCL for lead has remained at 15 µg/L. However, the Maine MEG has been lowered to 10 µg/L.

The results of the Second Five-Year Review indicate that the Site 9 selected remedy limits potential risks to human health and the environment. Therefore, no revisions to the final selected remedy are warranted at this time, with the exception of re-evaluation of the institutional control boundary at this site.

The ARAR evaluation has not indicated any changes in Standards or To Be Considered that would call into question the protectiveness of the remedy in the short term; however, the ARAR tables will be made consistent across the site.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

From 2003 to 2004, the Navy completed additional direct-push investigations at Site 9 to assess the potential for a source of 1,2-dichloroethene in groundwater that had been detected in well MW-NASB-227 (EA 2004). A total of 11 direct-push borings were completed along the western and southwestern areas of Site 9. As a result of the 2003-2004 direct-push investigation, the Navy has recommended that a new monitoring well be installed near the southwestern boundary

of the institutional control for groundwater use. The purpose of this monitoring well will be to ensure that the groundwater restriction boundary, noted in the institutional controls, remains protective.

No other information has come to light that could call into question the protectiveness of the remedy.

Technical Assessment Summary

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1999 ROD. There have been changes in the physical conditions of the site; however, these changes do not affect the protectiveness of the remedy. Barracks Building 216 has been demolished down to the foundation and a paved parking area constructed over the footprint of former Barracks Building 216. The Navy is planning to demolish the remaining barracks buildings at Site 9 down to the foundations, approximately 1 ft bgs. These physical changes may not affect the remedy (natural attenuation with long-term monitoring and institutional controls) since there is no significant intrusion into the ground surface. The excavation of the ash landfill/dump area is expected to positively affect the remedy since this potential source is going to be addressed. The Long-Term Monitoring Program data will then provide information to determine the effect on the groundwater at Site 9, especially in areas downgradient of the ash landfill/dump area. The ARARs related to implementation of the remedy were met.

One MCL (arsenic) was changed and has, accordingly, been updated in the LTMP and is not expected to have a negative impact on the remedy.

No other information has come to light that could call into question the protectiveness of the remedy.

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1999 ROD.

2.4.8 Issues

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
Finalize revisions to the LTMP and issue the updated and revised LTMP	No	Yes
Finalize the draft QAPP and issue the updated QAPP	No	Yes
Finalize and issue the LUCIP document	No	Yes
Finalize the draft final direct-push investigation reports for 2003-2004 for Site 9	No	Yes
Install an additional well in the southwestern corner of the current institutional control boundary	No	Yes
Develop institutional control boundary for the site	No	Yes
ARAR tables are not consistent across NPL site	No	Yes

2.4.9 Recommendations and Follow-Up Actions

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Finalize revised LTMP	Complete updated and revisions to draft LTMP and issue final LTMP	Navy	EPA/ MEDEP	2005	No	Yes
Finalize QAPP	Issue the QAPP for Site 9	Navy	EPA/ MEDEP	2005	No	Yes
Finalize LUCIP	Issue final LUCIP	Navy	EPA/ MEDEP	2006	No	Yes
Finalize the draft final direct-push investigation report	Generate and issue a final direct-push investigation report after addressing comments from regulators on the draft final report	Navy	EPA/ MEDEP	2005	No	Yes
Install new monitoring well in southwest area of site	Install monitoring well in southwest area of site to determine groundwater quality in this areas.	Navy	EPA/ MEDEP	2006	No	Yes
Development of institutional control boundary for site	Generate an LUCIP for the site	Navy	EPA/ MEDEP	Not applicable	No	Yes
Inconsistent ARARs	Update ARAR tables	Navy	EPA/ MEDEP	End of 2nd quarter FY06	No	No

2.4.10 Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1999 ROD, which was expected to take 20 years to achieve. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict excavation of waste and utilization of the groundwater as a potable source. Current monitoring data indicate that the remedy is functioning as required; however, additional monitoring in the southwestern corner of the site is needed to ensure the remedy is protective in the long term and institutional controls will need to be refined.

2.4.11 Next Review

The next five-year review for NAS Brunswick that includes Site 9 is required by 6 December 2009, 5 years from the date of this review.

2.5 EASTERN PLUME OPERABLE UNIT (SITE 4 ACID CAUSTIC PIT, SITE 11 FIRE TRAINING AREA, AND SITE 13 DEFENSE REUSE AND MARKETING OFFICE)

2.5.1 Site Introduction

Refer to Section 1.1 for a description of the purpose of the five-year review.

2.5.2 Site Description

The Eastern Plume is the groundwater contamination resulting from three sites, Site 4 Acid Caustic Pit, Site 11 Fire Training Area, and Site 13 Defense Reuse and Marketing Office. The Eastern Plume is identified as Operable Units 2 and 5, and is located within the central portion of NAS Brunswick (Figure 2-5). The Eastern Plume has been attributed to past solvent disposal practices from Site 4, Site 11, and Site 13, which leached into groundwater. A description of each of the sites that are suspected source areas for the contaminated groundwater of the Eastern Plume is provided below:

- ***Site 4***—An acid caustic pit was used from 1969 to 1974 for disposal of liquid waste, and is located under the corner of Building 584. The wastes were poured into the pit which was approximately 4 ft square and 3 ft deep.

- ***Site 11***—A former fire training area that was used regularly over a 30-year period but has not been used since the Fall of 1990. Waste liquids (fuels, oils, degreasing solvents) were used as field for the fire training exercises.

- ***Site 13***—The Defense Reutilization and Marketing Office area immediately south of Building 584 and Site 4. Site 13 consists of three underground storage tanks: one for diesel fuel, and the other two for storing waste fuels, oils, and degreasing solvents. All three tanks were removed in the late 1980s. The diesel tank was replaced with a fiberglass underground storage tank; however, this tank was subsequently removed and replaced with an aboveground tank.

The dissolved-phase plume associated with these disposal activities was found to consist primarily of chlorinated VOCs, including, among others, tetrachloroethene, 1,1,1,-trichloroethane, and trichloroethene. A groundwater treatment system, which consisted of 5 groundwater extraction wells screened through the shallow and deep zones of the overburden aquifer, and a treatment plant began operation in June 1995 to remediate both the northern and southern lobes of the Eastern Plume and provided hydraulic control of the VOC plume and removed dissolved-phase VOCs from groundwater. Extraction well EW-2 was installed across the shallow and lower water-bearing units, but was not removing significant VOC concentrations. Therefore, a sixth extraction well (EW-2A) screened in the deep zone of the overburden aquifer was installed near the confluence of Mere Brook and Merriconeag Stream and pumping began in June 1998 to improve the hydraulic control and remediation of the Eastern Plume. Groundwater within the Eastern Plume will continue to be remediated to address groundwater contamination (ABB-ES 1998). In January 2001, extraction well EW-5A was

installed to replace extraction well EW-5. One extraction well (EW-3) has been removed from service due to well collapse. As of December 2004, a total of 4 active extraction wells are in operation (EW-1, EW-2A, EW-4, and EW-5A).

2.5.3 Site Chronology

The following presents a chronologic summary of site events:

- In June 1983, an IAS was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick.
- In June 1985, the Navy completed a Pollution Abatement Confirmation Study. This study recommended further investigation of the site as identified in earlier assessments and inspections.
- In July 1987, NAS Brunswick was placed on the EPA NPL.
- In 1987, the RI/FS process began for seven sites, including the Eastern Plume.
- In August 1990, a Draft Final RI Report was completed that included the Eastern Plume.
- In October 1990, the Navy entered into an FFA with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick.
- In August 1991, the Draft Final Supplemental Investigation Report was completed that included the Eastern Plume.
- In June 1992, an Interim ROD for an Interim Remedial Action at the Eastern Plume Operable Unit was signed (U.S. Navy 1992b).
- In July 1992, a Draft Remedial Design Work Plan for Sites 1 and 3 and the Eastern Plume was provided to regulators. This document presented the pre-design of the treatment system.
- In September 1992, the Navy presented the results of the pre-design in Remedial Design Schematic Submission for Sites 1 and 3 and Eastern Plume.
- In January 1993, a Numerical Modeling Report for the Eastern Plume was finalized.
- In May 1993, a Remedial Design Summary Report for the Eastern Plume was completed (U.S. Navy 1993).

- In 1994, MEDEP adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Construction, Altering, and Operating Certain Types of Hazardous Waste Units. Based on the MEGs, cadmium and manganese exceeded their respective limits.

- In August 1994, an LTMP was established for the Eastern Plume.

- In October 1994, extraction wells EW-1 through EW-5 were installed within the Eastern Plume.

- In June 1995, the GWETS began operation.

- In 1998, the ROD for the Eastern Plume was signed for hydraulic containment, recovery, and treatment to remediate groundwater.

- In 1998, a new extraction well was installed (EW-2) to remove a hotspot of VOC contamination near MW-311. Concentrations at this well have decreased approximately 3 orders of magnitude since the well was installed.

- In July 1998, extraction well EW-02A began remedial pumping in a deep-seated downgradient contaminant hotspot close to Mere Brook.

- In 1999, a Department of Defense assessment team studied the Eastern Plume remediation data and issued a technical recommendations report (Radian 1999).

- In January 2000, the Navy's Geostatistical Assessment of the Eastern Plume is finalized (EA 2000e). This assessment was completed to evaluate the monitoring well network to identify data gaps and redundancies in the monitoring network.

- In February 2000, the LTMP revision and update was completed and distributed.

- In March 2000, the First Five-Year Review Report was finalized for NAS Brunswick.

- In December 2000, the Navy finalized an ESD for the Eastern Plume. The ESD included documenting the institutional control boundary of the Eastern Plume and changes to the treatment equipment for the GWETS. The institutional control boundary includes Sites 1 and 3 Landfill.

- On 31 December 2000, the Navy updated and finalized the Operating Instruction NASBINST 5090.1B *Restriction on Excavation Activities* to include Groundwater Use Restrictions at the various IRP sites, including Sites 1 and 3 Landfill.

- In January 2001, the Navy completed the treatment plant equipment change over from ultraviolet oxidation to air stripper with carbon polishing of the effluent.

- In January 2002, the Navy switched the treatment plant effluent from the Brunswick Sewer District to the onsite infiltration gallery.

- In September 2002, EPA issued a Preliminary Close-Out Report for the NAS Brunswick NPL site that includes the Eastern Plume.

- In August 2003, the Navy installed 7 wells (MW-335, MW-336, MW-337, MW-338A, MW-338B, MW-338C, and MW-339) in the Southern Boundary along the southernmost boundary of the Eastern Plume.

- In September 2003, the Operation and Maintenance Manual is updated for the treatment plant and infiltration gallery.

- In February 2004, a revised LTMP and updated QAPP were issued in draft to the regulators for comment. The Navy is currently responding to the regulator's comments and expects to finalize the revised LTMP and updated QAPP in late 2005.

- During the April 2004 Long-Term Monitoring Program sampling event, in addition to the standard LTMP sampling and analysis, the Navy collected samples from 5 monitoring wells for analysis of 1,4-dioxane. Samples were collected to assess whether this compound may be present, and to compare concentrations to current guidance. This compound was detected in the 5 monitoring wells sampled in the Eastern Plume.

- In June 2004, the Navy completed 3 direct-push boring in the vicinity of monitoring well MW-313 in response to steadily increasing VOC concentrations at this sentinel monitoring well. Three direct-push borings were logged by electrical conductivity and groundwater samples were collected from water bearing intervals from the borings.

- As of August 2004, a total of 24 Long-Term Monitoring Program monitoring events have been conducted at the Eastern Plume.

2.5.4 Background

2.5.4.1 Physical Characteristics

The Eastern Plume is located in the eastern-central portion of the base. The plume extends north-south along the Weapons Compound Road for approximately 0.6 mi. The northern portion of the plume is located in the woods to the north of Old Gurnet Road. The northern third of the plume is located beneath woodland and a recreational and picnic area on base. There are two surface water bodies located in this area (Picnic Pond and Merriconeag Stream). The southern two-thirds of the plume is located in a restricted section of the base (Weapons Compound) and is subject to limited access. The land in the southern two-thirds of the plume is comprised of woodland, wetlands, and paved access roads. There are two surface water bodies located in this area (Mere Brook and Merriconeag Stream).

2.5.4.2 Land and Resource Use

The stratigraphy of the eastern portion of NAS Brunswick is comprised of overburden sand, silt, and clay units overlying an irregular bedrock surface. Three major units were identified in the overburden: sand, transition, and clay (E.C. Jordan 1991a). The lower sand which lies within the lower part of the transition unit and close to the underlying clay has been the primary focus of recent-year remediation efforts at the Eastern Plume. The lower sand joins with the upper sand under the Eastern Plume source areas (i.e., Sites 4, 11, and 13). Clay thickness is variable across the Eastern Plume, ranging from 0 to greater than 60-ft thick. The top surface of the clay and bedrock have variable topography which are inferred to influence VOC migration downgradient, with higher concentrations occurring in sand beds within the clay troughs.

Groundwater occurs beneath the site in both overburden and bedrock. Variations in groundwater flow directions have been observed when comparing the shallow and deep flow systems. Shallow groundwater flows toward Mere Brook and Merriconeag Stream. Groundwater within the overburden unit is generally unconfined in the western portions of the site. The lower sand unit is found between the transition unit and clay. This contaminated lower sand unit is found in the general area of the confluence of Mere Brook and Merriconeag Stream, and is under confined aquifer conditions in these areas. Deep groundwater flow is generally to the south-southeast and may discharge to specific reaches of Mere Brook or its adjacent wetlands. The nature of any discharge is not currently understood, however, groundwater sampling near the stream was expanded in 2004. Trough-shaped depressions in the upper surface of the Presumpscot clay unit are present along the eastern boundary of the Eastern Plume and appear to influence groundwater flow and VOC migration in the deep interval and concentrating VOCs in troughs (E.C. Jordan 1990).

Bedrock is overlain by relatively impermeable Presumpscot clay, creating confined conditions (E.C. Jordan 1991a). Groundwater flow is through fractures and joints in the bedrock, and the horizontal and vertical distribution of groundwater in these water-bearing zones is believed to be highly variable. Upper portions of the bedrock have higher permeability than deeper zones (E.C. Jordan 1990).

Groundwater associated with the site is not used for potable purposes or any other uses. The base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course and Dyers Corner gate entrance guard station. A bedrock well is located approximately 200 ft west of Site 2 Landfill at the gate that serves the guard station. This well was installed in 2002 and is screened below a relatively impermeable marine clay and is not affected by Site 2. The base golf course is distant from the Eastern Plume and is not affected by groundwater flow from the Eastern Plume. Mere Brook, located at the southern end of the plume, receives drainage from the runways, as well as runoff and leachate from the landfills (Site 2 Landfill and Sites 1 and 3 Landfills). Since this area is restricted, the Brook is not used for recreational activities in the reaches of the Brook adjacent to the landfills and the Eastern Plume. Mere Brook flows into the Atlantic Ocean at Harpswell Cove, which is designated as a potential aquacultural area by the State of Maine. Harpswell Cove supports various commercially important fish species (U.S. Navy 1994a).

2.5.4.3 History of Contamination

The Eastern Plume is contaminated groundwater that originated from Sites 4, 11, 13. These sites are described in Section 2.5.2. The distribution of contaminants within the Eastern Plume was determined by sampling monitoring wells and piezometric cone penetrometer testing sampling. Based on the sampling results, an area of VOC-contaminated groundwater was identified northeast, east, and southeast of Sites 4, 11, and 13. Total VOC concentrations within the Eastern Plume vary from low levels near the plume boundary, to concentrations as high as 19,000 µg/L within the center of the plume. Groundwater contamination has not been observed in bedrock monitoring wells within the plume boundary.

Based on data collected during the RI and Long-Term Monitoring Program, the following interpretations are made regarding contaminant transport and distribution within the Eastern Plume:

- Sites 4, 11, and 13 have been identified as source areas of the Eastern Plume, and are located to the north-northwest of the current plume. These sites have been investigated, and source removal occurred in the early 1990s; subsequently, natural attenuations have occurred. These events appear to have effectively depleted nearly all the residual fuel and solvents in the source areas. Chlorinated solvents released at these sites entered the upper sand, migrated around or through the upper transition unit, and eventually reached the lower sand deep within the transition unit. Within the Eastern Plume historic footprint, the upper sand unit is nearly remediated of contaminants. Some limited impacts have been observed in the shallow interval, near monitoring wells MW-1104 and MW-332. Near the source area at Site 11 (MW-1104), some residual concentrations of VOCs remain at or above State MEGs or Federal MCLs, although concentrations have been decreasing since 1995 following source removal. Shallow groundwater contamination near MW-332 is believed to have resulted from unrestricted artesian flow of contaminated groundwater from MW-311 from 1990 to 1995.

- The majority of the groundwater plume is located within the lower sand near the base of the transition unit. Based on existing data, the Eastern Plume extends to the vicinity of New Gurnett Road. The Eastern Plume and the lower sand unit are not present immediately east of Mere Brook along the eastern base boundary. The clay unit underlying the transition forms a clay trough whose eastern slope rises toward the southeast and western slope rises toward the southwest where the lower sand unit pinches out. The lack of lower sand and the presence of this clay unit along the eastern and southern plume boundary acts to retard movement of the Eastern Plume.

- No permeable pathways for contaminants have been identified along the southwestern boundary of the base where overburden consists of low permeability units such as silt and clay. These units do not conduct significant amounts of groundwater. Along the southern base boundary, overburden has been measured to be approximately 50-ft thick.

- The 6 monitoring wells located in bedrock have not shown concentrations of VOCs above State MEGs or Federal MCLs. Several detections of 1 µg/L were recorded in the 1990s at estimated concentrations.

- Shallow diffusion samplers placed in Mere Brook and associated wetland showed concentrations of Eastern Plume VOCs in upwelling groundwater north of New Gurnett Road, but not south of this road. Upwelling of the Eastern Plume at low concentrations has also been confirmed in Merriconeag Stream just north of Picnic Pond in and in Picnic Pond (Gannett Fleming 2003).

In summary, the Eastern Plume has been slowly migrating to the south and southeast, with minor diffusion into Picnic Pond. One monitoring well (MW-313) has noted concentrations in excess of the State MEGs and Federal MCLs beginning in 2003. Eastern Plume VOCs have been detected in the past 2 years at concentrations below the State MEGs and Federal MCLs in MW-230A, MW-333, and MW-334, indicating minor migration on base to the south and east of the junction of New Gurnett and Merriconeag roads (Conceptual Model of the Eastern Plume [EA 2003]).

2.5.4.4 Initial Response

The RI conducted during the early 1990s identified contaminated groundwater that originated from Sites 4, 11, and 13 exceeded the target risk levels, Federal MCL and State MEG. Therefore, the Navy completed and finalized an Interim ROD in 1992 to allow the Navy to begin to extract, treat, and discharge the Eastern Plume groundwater to address the dissolved phase solvent contaminated groundwater. The interim remedial action was intended to control and prevent further migration of contaminated groundwater toward Harpswell Cove and to begin to reduce the amount of contamination within the Eastern Plume (U.S. Navy 1998).

2.5.4.5 Basis for Taking Action

The COCs that have been identified at the site groundwater:

Groundwater
1,1-Dichloroethene
1,1-Dichloroethane
cis-1,2-dichloroethene
trans-1,2-dichloroethene
1,1,1-Trichloroethane
Trichloroethene
Perchloroethene

During the RI, a Baseline Risk Assessment was conducted to estimate the potential risks to human health and the environmental from exposure to contaminants at the Eastern Plume. The HHRA followed a 4-step process:

1. Contaminant identification, which identified those hazardous substances that, given the specifics of the site, were of significant concern

2. Exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure

3. Toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances

4. Risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at Sites 1 and 3 Landfill, including carcinogenic and non-carcinogenic risks (U.S. Navy 1992b).

Carcinogenic and non-carcinogenic risks were quantitatively evaluated for each site. Carcinogenic risks were compared to the EPA target carcinogenic risk range of 1×10^{-4} to 1×10^{-6} and to the MEDEP maximum acceptable incremental lifetime carcinogenic risk of 1×10^{-5}. Non-carcinogenic risks were compared to the EPA non-carcinogenic hazard index of 1.0.

Human health risks associated with contaminant exposure at Sites 4, 11, and 13 and the Eastern Plume were estimated based on the analytical data collected during Sampling Rounds I through IV, and are presented in Appendix Q of the Draft Final RI (E.C. Jordan 1990). Analytical data collected during the Post-Screening Work Plan was reviewed and additional risk estimates calculated for exposure to contaminated soil at Site 11. The groundwater data collected as part of the Post-Screening Work Plan were consistent with earlier data and additional risk calculations were not necessary. No additional COCs or routes of exposure were identified. These data were presented in the Draft Final Supplemental RI Report (E.C. Jordan 1991a).

The Baseline Risk Assessment identified ingestion of groundwater as the route of exposure associated with a human health risk. VOCs were detected in the Eastern Plume at concentrations exceeding drinking water standards (e.g., MCLs and MEGs) and health-based criteria (e.g., maximum contamination goals and reference doses). Although groundwater in the Eastern Plume is not currently used for potable water purposes, human health risks associated with exposure to groundwater were considered. The COCs in groundwater include 1,1-dichloroethylene, dichloroethane, 1,2-dichloroethene, trichloroethane, trichloroethene, and tetrachloroethene. Benzene, lead, and cadmium were eliminated as COCs based on their low concentrations and frequency of detection.

Risks associated with exposure to contaminants through direct contact and ingestion of soil were evaluated separately for Sites 4, 11, and 13. These risk estimates were presented in Appendix Q of the Draft Final and Supplemental RI reports (E.C. Jordan 1990 and 1991a). Minimal health risks were associated with exposure to surface soils at Sites 4 and 13. The area of potential contamination at Site 4 is located beneath the eastern portion of Building 584, effectively limiting any potential exposure. Contamination in surface soil at Site 13 was limited to DDT. However, the maximum detected concentration of this compound is below levels considered to present a health risk (direct contact and incidental ingestion exposure). The quantitative risk

estimates calculated for Site 13 (residual scenario) ranged from 3×10^{-9} to 6×10^{-10} for incremental carcinogenic risks and 0.00005 to 0.000003 for non-carcinogenic hazard index. These risk estimates are well below the EPA target risk range (10^{-4} to 10^{-6}) and the MEDEP maximum incremental risk (10^{-5}) for carcinogenic risks, and a hazard index of 1.0 for non-carcinogenic risks (refer to Appendix Q, Draft Final RI for further details and information).

Additional soil samples were collected at Site 11 during the Post-Screening Work Plan to better delineate the distribution of contamination in the source area. Analytical results indicated that surface soil contamination (i.e., 0-12 in. bgs) was limited to 1 test pit location (TP-1106). SVOCs and inorganic metals were the only contaminants detected in this sample. PAHs were detected at a total concentration of 2.8 mg/kg. The sum of carcinogenic PAHs was 1.8 mg/kg. Human health risks were estimated based on exposure to the maximum detected PAH concentration. No VOCs were detected in the surface soil at Site 11. The distribution of contamination at Site 11 was similar to that observed at other fire training areas at other military installations. The distribution is characterized by minimal surface soil contamination with much greater contamination in deeper soils. The non-carcinogenic hazard index was less than 1.0. The lifetime incremental carcinogenic risk for direct contact and incidental ingestion exposure was 6.7×10^{-5}. The carcinogenic risk estimate fell with the EPA target risk range of 10^{-4} to 10^{-6}, however, slightly exceeded the MEDEP maximum acceptable risk of 1×10^{-5}.

An ecological risk assessment evaluated the potential risks to terrestrial organisms from contaminant exposure at Sites 4, 11, and 13. Since sampling from both the RI and the current Long-Term Monitoring Program has determined that the Eastern Plume has not migrated beyond the most downgradient wells (the 300 series wells, i.e., MW-338A, MW-338B, and MW-338C), exposure to aquatic receptors in Harpswell Cove were not evaluated. If the Eastern Plume does not migrate and discharge to surface water, potential exposure may result. In June 2004, the Navy completed a limited direct-push investigation (3 direct-push borings) in the vicinity of monitoring well MW-313 to assess the extent of contamination in this area of the Eastern Plume. Concentrations of Eastern Plume constituents, including 1,1-dichloroethene and 1,1-dichloroethane, were identified in several of the direct-push groundwater sample intervals collected at each direct-push boring location. These results indicate that the leading edge of the Eastern Plume appears to be present in the vicinity of MW-313 and confirms the previously collected LTMP data from MW-313. If it appears that the plume has migrated into the MW-313 area, the Navy will be monitoring the surface water in Mere Brook to determine if the Eastern Plume is discharging to the Brook in the vicinity of MW-313. This surface water sampling program is expected to occur during the Summer of 2005.

As stated in the 1990 RI Risk Assessment (E.C. Jordan 1990), the routes of exposure evaluated included dermal contact and incidental ingestion of soils, surface water, sediment, leachate, and leachate sediment at Sites 7, 8, 9, and Picnic Area Pond. Exposure scenarios were developed for younger and older children based on land use, accessibility, and potential recreational activities at these sites. The potential for adult non-worker exposure at these sites was not considered to be significant. Risks were evaluated in the Picnic Area Pond, at downstream locations on the Merriconeag Stream, and at Harpswell Cove. In general, aquatic organisms were found to have minimal risk with the levels of inorganic or organic compounds measured in the environment. The sites considered to present a public health risk included: Sites 1 and 3 and Sites 4, 11, and

13 (the Eastern Plume) for groundwater contamination. Sites or areas considered to present an ecological risk included: Sites 1 and 3 (Mere Brook Beaver Marsh/Beaver Marsh Area). For the complete risk assessment, refer to Chapter 15 of 1990 RI Report (E.C. Jordan 1990).

2.5.5 Remedial Actions

In June 1992, an Interim ROD for Eastern Plume was finalized which allowed the Navy to proceed with remedial design tasks to address the groundwater contamination that the Navy identified during RIs. The interim remedial action was intended to control and prevent further migration of contaminated groundwater towards Harpswell Cove and to begin reducing the amount of contamination within the Eastern Plume. The remedial action of the Interim ROD was designed to:

- Extract, treat, and discharge of groundwater
- Maximize the collection of the contaminated groundwater
- Contain the southern end of the plume
- Collect contaminated groundwater from the northern part of the plume
- Develop a monitoring program.

In June 1995, the GWETS became operational and consisted of 5 extraction wells within the Eastern Plume and treatment equipment consisting of ultraviolet oxidation. In February 1998, the ROD for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume groundwater monitoring was finalized. No further Action for soils was determined to be appropriate for Sites 4, 11, and 13 since the soils did not pose an unacceptable risk from direct contact or incidental ingestion.

The remedy for the Eastern Plume was the same as was selected and presented in the 1992 Interim ROD, and included:

- Operation of the GWETS installed in 1995.
- Discharge of treated water to the publicly-owned treatment works or returning the treated water to the aquifer through infiltration gallery.
- Long-term monitoring to evaluate the effectiveness of the extraction system and confirm that the source areas are not continuing to impact the groundwater.
- Conduct five-year reviews.

Based on the types of contaminants, environmental media of concern, and potential exposure pathways, RAOs were developed for the Eastern Plume to mitigate existing and future potential threats to human health and the environment. These RAOs are to:

1. Minimize further migration of the Eastern Plume

2. Minimize any future negative impact to surface water resulting from discharge of contaminated groundwater

3. Reduce the potential risks associated with ingestion of contaminated groundwater to acceptable levels

4. Restore the aquifer.

To accomplish these objectives within a 17- to 72-year timeframe as specified in the ROD, the following components were implemented:

- **Groundwater Extraction and Treatment**—Continuance of the existing extraction system. In 1992, an Interim ROD was signed to initiate control and prevent further migration of the contaminated groundwater toward Harpswell Cove and to begin reducing the amount of contamination within the Eastern Plume. The system, operating since May 1995, provides pretreatment to remove turbidity and inorganics, ultraviolet-oxidation to destroy VOCs, discharge of treated water to the local publicly-owned treatment works, and periodic disposal of filter press sludge from the inorganics treatment process. An additional extraction well (EW-2A) was added to the extraction system in July 1998. EW-2A was designed to prevent further movement of migration towards surface water, and recover more mass of contaminants located in an area of the plume found to have a greater accumulation of VOCs. In late 2000, Foster Wheeler removed the ultraviolet oxidation system and installed an air stripper system with carbon polishing. In January 2001, the air stripper and carbon went through a prove-out period; and, on 11 January 2001, the ultraviolet oxidation system was taken offline. The GWETS continued to discharge to the Brunswick Sewer District with the new treatment equipment. During 2001, Foster Wheeler designed and installed an infiltration gallery over Site 11. In January 2002, discharge of the GWETS effluent changed from the Brunswick Sewer District to the infiltration gallery that was constructed during 2001 at Site 11.

- **Long-Term Monitoring**—The purpose is to measure the performance of the groundwater extraction system and to ensure that contamination currently in the groundwater does not continue migrating toward the surface water. The goals of the plan are as follows:

  — Provide a tiered approach to attain the requirements of MEDEP water quality standards

  — Monitor changes in the plume boundaries and potential migration pathways

  — Monitor changes in groundwater contamination

— Monitor the effectiveness of the remedial action for the protection of human health and the environment by assessing temporal trends in the concentrations of contaminants of concern.

— Monitor the treatment plant effluent.

- **Five-Year Reviews**—Since the remedy will result in hazardous substances (COCs listed in the Final 1998 ROD) remaining in place, five-year reviews will continue to be conducted. In addition, conditions at Sites 4, 11, and 13 will be evaluated to determine whether additional response actions may be necessary at those sites. For example, if Building 538 was removed, the need for additional sampling in that area will be assessed. Conditions at Sites 4 and 13 have not changed since the last five-year review. However, the physical conditions at Site 11 have changed since the infiltration gallery was installed at Site 11. The area downgradient of the infiltration gallery is monitored as part of the Long-Term Monitoring Program for the Eastern Plume. Further details of the Second Five-Year Review evaluation regarding Sites 4, 11, and 13 have been included in Appendix A.

2.5.5.1 Remedy Implementation

Groundwater within the Eastern Plume is currently being remediated by a treatment system that consists of 4 active extraction wells (EW-1, EW-2A, EW-4, and EW-5A) that were designed to provide hydraulic control of the aquifer, maximize recovery of dissolved contaminant mass, and a treatment plant to remove the volatile organic contamination from the groundwater prior to discharge. The Navy is currently in the process of assessing two areas within the Eastern Plume to install replacement extraction wells. One area is in the vicinity of MW-331 and the other in the area of P-106. The new extraction well near MW-331 will be a replacement for former extraction well EW-3. The extraction system has been operational since June 1995, and has been successful in reducing hot-spot concentrations of VOCs and total VOC concentrations in the Eastern Plume. The current system is extracting less groundwater now than when it was originally activated due to well failures. Therefore, two replacement extraction wells are proposed to be added to the system. In general, total VOC concentrations at extraction wells in the network have reached asymptotic influent conditions and, therefore, system improvements are planned to increase the mass of VOCs being removed. Institutional control boundary was documented in the December 2000 ESD for the Eastern Plume. The institutional control boundary was documented in the December 2000 ESD for the Eastern Plume.

In 2001, the infiltration gallery was built and the Navy began discharging the treated effluent to the infiltration gallery. The Navy still maintains the connection to the Brunswick Sewer District in the event of an emergency so that the effluent can be directed to the Brunswick Sewer District at any time.

The Navy is conducting long-term monitoring and maintenance as per the current LTMP for Eastern Plume. The LTMP is currently undergoing revisions. The revision of the LTMP will be finalized by the end of 2005. As of September 2004, there have been 24 monitoring events

completed for the Eastern Plume. The Navy completed the First Five-Year Review in March 2000.

2.5.5.2 System Operation/Operation and Maintenance

The extraction system has been operational since June 1995 and has undergone changes to improve operational efficiency. Extraction well EW-02A, located within the Eastern Plume in the vicinity of monitoring well MW-311, was activated on 12 June 1998 to provide additional VOC removal and hydraulic control in this area. On 27 September 2000, extraction well EW-02 was removed from service and decommissioned. Extraction well EW-03 is no longer operational and was removed from service in December 1998 and decommissioned on 27 September 2000. One replacement extraction well (EW-05A) was installed during September 2000 and brought on-line on 10 January 2001. EW-05 was removed from service and decommissioned on 17 January 2001. The following table summarizes the installation and status of all the extraction wells at NAS Brunswick for the Eastern Plume and Sites 1 and 3 Landfill:

Extraction Well No.	Date Installed	Status
EW-1	October 1994	Active
EW-2	October 1994	Decommissioned – 27 September 2000
EW-2A	April 1998	Active
EW-3	October 1994	Decommissioned – 27 September 2000
EW-4	October 1994	Active
EW-5	October 1994	Decommissioned – 17 January 2001
EW-5A	September 2000	Active
EW-6[a]	November 1994	Not active – 19 November 1997
EW-7[a]	November 1994	Not active – 19 November 1997
(a) EW-6 and EW-7 are for Sites 1 and 3 and the others are for the Eastern Plume.		

On 11 September 2001, the extraction well network and treatment plant were ordered shut down by the Commanding Officer of NAS Brunswick. During the 1 October 2001 project conference call between the Navy, MEDEP, and EPA Remedial Project Managers, it was agreed that the extraction well network and treatment plant would remain off-line until completion of the Fall 2001 Long-Term Monitoring Program. The extraction well network and treatment plant were placed back in service on 13 November 2001. The extraction well network and treatment plant had been off-line for a total of 63 days.

On 9 November 2003, the pump and motor controller for extraction well EW-4 were damaged beyond repair due to an electrical surge in the base's power grid. In May 2004, a new pump and motor controller were installed and EW-4 was returned to normal operation. During this period, extraction well EW-4 was out of service for 176 days.

Between 2000 and 2001, the GWETS was changed to improve VOC removal efficiencies. The original ultraviolet oxidation system was replaced with an air stripper with carbon polishing system. The new treatment system became operational in early 2002.

Monthly GWETS operations reports were provided to the Brunswick Sewer District, EPA, and MEDEP summarizing additional details related to treatment plant operation and maintenance.

However, after the GWETS Infiltration Gallery went on-line in February 2002, monthly reports were no longer provided to the Brunswick Sewer District. Monthly reports are still generated and are provided to MEDEP and EPA on a monthly basis.

2.5.6 Progress Since the Last Five-Year Review

The First Five-Year Review was completed during 1999, and finalized in March 2000 for the Eastern Plume. No areas of non-compliance with the remedial action for the Eastern Plume was identified during the First Five-Year Review and concluded that all areas currently complied with the ROD remedial objectives. The First Five-Year Review found that groundwater extraction and treatment system and the groundwater monitoring program have been only partially successful as implemented; but given the current data, these remedies appear to be protective of human health and the environment with the existing institutional controls as exercised by the Navy (restricted access area surrounded by fencing). The addition of institutional controls in the ROD to restrict groundwater use will better ensure the protection of the selected remedy in the future and formalize the controls implemented by NASBINST 5090.1A.

The First Five-Year Review recommended the following:

- Enhance mass removal of contaminants in the Eastern Plume. Mass removal would be improved by replacement of existing extraction wells EW-4 and EW-5 with wells that are screened solely in the lower sand unit "hotspots." In order to ensure appropriate piping size and treatment system capacity, determine groundwater flow rates and mass removal from these new extraction wells prior to making any modifications to the aboveground treatment system (Radian 1999).

- Add groundwater institutional controls to the ROD and amend Operating Instruction NASBINST 5090.1A "Restriction on Excavation Activities," to add a restriction on use and physical contact with contaminated groundwater.

- Modify the aboveground treatment system to allow effluent discharge to surface water or to an infiltration gallery after confirming the most effective and efficient option based on a detailed technical review and lifecycle cost analysis (Radian 1999).

- Determine if the southern terminus sentinel wells are adequately placed, and initiate work to correct the situation if necessary.

- Begin a formal evaluation for Monitored Natural Attenuation for the Eastern Plume. In particular, determine whether natural wetland biodegradation and/or natural attenuation processes are occurring at acceptable rates in the aquifer zone. Also, verify that the plume is stable. Groundwater monitoring results indicate that the downgradient extent of the plume apparently has not changed since at least 1995; however, additional remedial actions may be warranted in the area of the southern terminus of the Eastern Plume prior to formal initiation of monitored natural attenuation.

- Pursue negotiations with the regulatory agencies to establish risk-based cleanup levels for the entire Eastern Plume and alternate concentration limits for any groundwater discharging to Mere Brook. Groundwater at the Eastern Plume is not a drinking water source, thus cleanup to MCLs or State of Maine standards is not necessary for the remedy to remain protective of human health. In particular, begin discussions with the regulatory agencies to establish definitive criteria for discontinuing active ongoing operation and maintenance activities.

Since the First Five-Year Review, the following progress has been made at the site:

- In December 2000, the Navy updated the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use*. This updated version of the Operating Instruction included groundwater institutional controls, which were not documented in the ROD or ESD for Sites 1 and 3 Landfill.

- In December 2000, the Navy finalized an ESD for the Eastern Plume that documented the area of the institutional control boundary for groundwater use restrictions which included Sites 1 and 3 Landfill and the Eastern Plume (EA 2000b).

- In January 2001, the Navy completed the treatment plant equipment change over from ultraviolet oxidation to air stripper with carbon polishing of the effluent.

- Beginning with the April 2002 Long-Term Monitoring Program reports, the reporting format was changed from a data presentation to a semi-annual report that included the elements of the annual report in each monitoring event report.

- In September 2002, EPA Region 1 issued a Preliminary Close-Out Report for NAS Brunswick, Maine. The Preliminary Close-Out Report documents the completion of construction activities at the site (NAS Brunswick) that included the Eastern Plume (U.S. EPA 2002).

- Between May and June 2001, the Navy conducted direct-push investigations in the Southern Boundary of the Eastern Plume and at Site 11. This investigation included the use of electrical conductivity and membrane interface probe logging at these sites. In addition, direct push groundwater samples were collected and laboratory analyzed for VOCs.

- In October 2003, the Navy began collection of monitored natural attenuation parameters to assess whether geochemical conditions may be favorable for natural attenuation of chlorinated VOCs, selected wells in the Eastern Plume were analyzed for natural attenuation parameters. This sampling was not required by the LTMP but was collected to provide initial data regarding the likelihood of natural degradation of chlorinated VOCs.

- A draft revision of the LTMP was submitted to the project stakeholders for review and comment. The Navy is responding to comments received and plan to issue a final version of the updated LTMP prior to the end of 2005.

- As part of the update and revisions to the LTMP, the site-specific QAPP was issued in draft form to the regulators for review and comment. The Navy expects to issue the final updated QAPP by the end of 2005.

- During the field work season in 2004, the Navy completed additional direct-push investigation work in the vicinity of MW-313, advanced borings to assist with the locating replacement extraction wells in the Eastern Plume, and began collecting groundwater samples to assess the presence of 1,4-dioxane within the Eastern Plume as a potential COC.

- Beginning in May 2001, the Navy conducted a direct-push electrical conductivity and membrane interface probe investigation in order to address the data gaps identified during the Technical Meeting held in December 2000. The investigation activities were conducted in the Southern Boundary of the Eastern Plume, in the vicinity of Old Gurnet Road (now called Huey Drive). The objectives of these investigations were to determine the presence of the Eastern Plume and the terminus of the lower sand unit, in addition to determining the groundwater flow patterns in the Southern Boundary.

- During June and November 2003, 7 soil borings were completed in the Southern Boundary (SB-B-1 through SB-B-7) in order to fill data gaps identified following the 2001 investigation. A total of 7 monitoring wells were installed at selected boring locations (i.e., MW-335, MW-336, MW-337, MW-338A, MW-338B, MW-338C, and MW-339). One of the monitoring well locations (MW-338) was located within a clay trough which was considered to be the most likely point for discharge of the Eastern Plume and was, therefore, constructed with 3 well screens to monitor separate intervals. The 2001 and 2003 investigation data were used to provide additional subsurface geological data, further evaluate the lateral and vertical distribution of VOC impacts in the Southern Boundary, and assess groundwater flow patterns in the Southern Boundary. These investigations indicate that the Southern Boundary is not a migration pathway for the Eastern Plume. This conclusion is based on the geological and analytical groundwater data obtained during the investigations conducted between 2001 and 2003.

- In 1999, EPA completed an investigation using diffusion samplers to assess how the Eastern Plume may be expressed in surface water. The results of this investigation indicated that low concentrations of Eastern Plume contaminants are upwelling into Picnic Pond and along some limited areas of Mere Brook.

- In 2004, additional direct-push sampling of groundwater was completed to assess the potential for upwelling of the Eastern Plume near monitoring well MW-313. The results of this investigation indicate the Eastern Plume is slowly migrating into this region, and may begin to discharge to surface water in the future. Surface water sampling results do

not indicate the plume is currently discharging to Mere Brook. Elevated total VOCs were reported in surface water sample SW-12 in November 1998 and May 2003. The total VOC concentration in November 1998 (9.5 µg/L) was comprised of xylenes, trichloroethene, perchloroethylene, and ethylbenzene. The total VOC concentration in May 2003 (4 µg/L) was comprised of perchloroethylene.

2.5.7 Five-Year Review Process

2.5.7.1 Administrative Components

Refer to Section 1.1.

2.5.7.2 Community Involvement

Refer to Section 1.1.

2.5.7.3 Document Review

Documents reviewed are referenced in Section 2.1, and the citations are included in the References section.

2.5.7.4 Data Review

As of December 2004, a total of 25 long-term monitoring events will have been completed at the site since long-term monitoring began in March 1995. More details regarding the specific sample locations and location data from each monitoring event can be found the monitoring event reports produced for each monitoring event.

Groundwater Monitoring

Concentration trends from monitoring wells located along the edges of the Eastern Plume boundary appear to be relatively stable, suggesting limited migration of the VOC plume during the period in which the five-year review has been conducted. Although, in general, VOC concentrations have been stable, the highest concentrations of the Eastern Plume are now noted at monitoring well MW-331 when they were previously recorded at P-106, approximately 1,000 ft to the north. However, continued increases in concentrations at MW-331 in 2003 have been noted and this well is currently the monitoring point with the highest total VOC concentrations.

Elevated VOC concentrations (1,1-dichloroethene) have been reported in the deep diffusion sample collected from MW-313 in April 2002 and May and October 2003. Vinyl chloride (0.4J) was reported in the mid-depth diffusion sample collected from MW-313 in October 2002. In addition, 1,4-dioxane was reported in the low-flow groundwater samples collected at MW-313 during the April (84 ppb) and September (93.8 ppb) 2004 monitoring events.

Beginning with Monitoring Event 23, the Navy initiated additional groundwater sampling to assess whether geochemical conditions may be favorable for natural attenuation of chlorinated VOCs at selected wells in the Eastern Plume and were analyzed for natural attenuation parameters. This sampling was not required by the LTMP but was collected to provide initial data regarding the likelihood of natural degradation of chlorinated VOCs.

A subset of monitoring wells at the Eastern Plume was selected and sampled during the October 2003 monitoring event for natural attenuation parameter analysis. Eight shallow wells and 13 deep wells were sampled in order to provide initial information on the occurrence of natural attenuation within the Eastern Plume. The wells were selected to provide a general overview of natural attenuation conditions, and included shallow and deep wells located in mid-plume, downgradient, and sentinel locations.

A natural attenuation assessment groundwater study was conducted to provide data that can be used to assess whether evidence is present which suggests chlorinated VOC degradation by reductive dechlorination. Groundwater sampling activities for select natural attenuation parameters were performed at 21 locations from the shallow and deep aquifer zones at the Eastern Plume. A background groundwater sample was collected from location MW-1104.

Findings related to individual natural attenuation parameters (methane, dissolved oxygen, Eh, and the distribution of the chlorinated VOC breakdown products), and results of an initial quantitative weighted scoring, provide adequate evidence that conditions are favorable for reductive dechlorination of chlorinated VOCs in certain areas of the Eastern Plume. This evidence is particularly strong in the southern boundary region of the Eastern Plume, where groundwater sample data define the edge of the plume (MW-313, MW-333, and MW-334). These data suggest that the deeper saturated zones in the southern portion of the Plume are most likely to have conditions favorable for natural attenuation.

Surface Water Monitoring

The surface water sampling data collected during each bi-annual sampling event from 5 sample locations have shown stable and/or decreasing concentration trends for VOCs since the late 1990s, although one surface water sample in Spring 2003 noted 4 µg/L of trichloroethene at surface water sampling station SW-12 (close to MW-313).

The increasing concentrations of VOCs in the shallow and deep intervals (noted at monitoring wells MW-333 and MW-313) over the last 1-3 years suggest the Eastern Plume is slowly migrating into the vicinity of New Gurnet Road. The VOC migration is suspected from the diffusion and/or dispersion, in addition to groundwater movement to the south-southeast. Surface water sample SW-12 noted a low concentration detection of trichloroethene for the first time in May 2003, which coincides with an increase in total VOC concentrations at nearby well MW-313. No VOCs were detected at SW-12 during the October 2003 monitoring event. The combination of possible increasing VOCs at these locations suggests that the Eastern Plume may be flowing upward into Mere Brook near this location. The EPA investigation in 2000 did not indicate that chlorinated VOCs were present at this location. This location appears to be only recently affected by chlorinated VOCs in deep groundwater, although data from Monitoring

Event 23 did not show continued surface water impacts. Based on observations noted above, the Navy has planned for additional sampling in the vicinity of SW-12 to assess the water quality beginning in 2005.

Sediment Monitoring

The sediment sampling data are collected bi-annually from 1 sample location (SED-11). The sediment sample is analyzed for inorganics and pesticides. Analytical results have shown nominal concentrations of these analytes in long-term monitoring samples.

Note that project action limits have not been developed for sediment samples, and should be developed after discussions between the Navy and regulators to determine appropriate standards/benchmarks to compare sediment sample data against.

Leachate Seep Monitoring

The leachate seep sampling data are collected during each bi-annual sampling event from 2 sampling locations (SEEP-10 and SEEP-11) for VOCs analysis. Since the mid-1990s, VOCs have been detected in the seep samples at concentrations ranging from non-detect to 33 µg/L, although no clear trend has been established.

2.5.7.5 Site Inspections

Site inspections of monitoring wells, extraction wells, and the GWETS are conducted during each long-term monitoring sampling event that occurs in April and September of each year. In addition, project stakeholders conducted a site visit in April 2003 during a technical meeting to review the current site conditions. The results of the inspection conducted during each monitoring event are documented in the monitoring event report generated for each long-term monitoring sampling event.

2.5.7.6 Interviews

No interviews were conducted as part of the five year review process. However, during the October 2004 RAB meeting, the community was informed of the five-year review process for the NAS Brunswick facility, and copies of a related EPA handout were provided by the Navy entitled *Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites* (U.S. EPA 2001a). Persons with related comments and/or information were asked to contact the EPA RPM and/or Navy RPM. Meeting minutes of the RAB meetings were prepared and sent out to all meeting attendees. A copy of the EPA handout was included with the October 2004 RAB meeting minutes.

2.5.8 Technical Assessment

Question A: *Is the remedy functioning as intended by the decision documents?*

The review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the monitoring event data set indicate that the remedy is functioning as intended in the 1992 Interim ROD, 1998 Final ROD, and 2000 ESD. The ROD stated that environmental monitoring would be required for a minimum of 14 to a maximum of 72 years, of which 9 years have been completed. The Navy performed the technical assessment based on EPA's guidance provided in Section 4.0 of the Comprehensive Five-Year Review Guidance (U.S. EPA 2001b).

Question B: *Are the assumptions, toxicity data, cleanup values, and RAOs used at the time of the remedy selection still valid?*

There have been no changes in the physical conditions of the site or land use that would affect the protectiveness of the remedy. The assumption in the ROD that groundwater would not be used at the site is invalid due to the unavailability of a public water supply in some areas. Therefore, the institutional controls will be re-evaluated.

No unacceptable risks for ecological receptors were identified earlier for Eastern Plume. No circumstances have changed that might alter this conclusion; therefore, monitoring for the protection of ecological receptors continues to be unnecessary.

The risk assessment for the Eastern Plume was reviewed to determine whether exposure assumptions and toxicity data used previously had been revised. The HHRA analyzed potential risk for hypothetical resident exposure to Eastern Plume groundwater as tap water.

COCs for which both carcinogenic and non-carcinogenic toxicity values exist were not evaluated for both carcinogenic and non-carcinogenic effects.

The ROD and the HHRA compared calculated cancer risks for all receptors to EPA's acceptable risk range of 10^{-4} to 10^{-6}. Non-cancer risks were compared to an acceptable threshold of 1.0. Detected constituents above these acceptable standards were considered COCs. *cis-* and *trans-* 1,2-dichloroethene, 1,1,1-trichloroethane, and trichloroethene were determined to be COCs.

Toxicity data for COCs were reviewed to determine if any revisions have been made since the ROD was issued. Toxicity values were obtained from the EPA Instructional Resources Information System (U.S. EPA 2004), a peer-reviewed toxicity database. If toxicity values were not available from the Instructional Resources Information System, values from the National Center for Environmental Assessment were used. Federal MCLs and Maine MEGs were also reviewed to determine whether the MCLs have been revised since the ROD.

The results of the five-year review indicate that the remedy for Eastern Plume is adequate and no modifications are needed based on the toxicity values at this time.

One surface water sampling location (SW-12) is located immediately downgradient of MW-313, within the area of the suspected plume discharge region. Significant impacts have not been noted at this location, with the exception of one detection of trichloroethene at 4 ppb in May 2003. Subsequent sampling has not detected VOCs. Surface water data support the hypothesis that the plume is present in subsurface units near the brook but plume constituents are not present at detectable concentrations within Mere Brook.

The ARAR evaluation has not indicated any changes in Standards or To Be Considered that would call into question the protectiveness of the remedy in the short term; however, the ARAR tables will be made consistent across the site.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

The overall pumping rate of the extraction network has decreased since 1995 due to extraction well failure and other considerations. New extraction wells are planned to increase pumping rates and speed remediation of the plume. Overall, the extraction network has been successful in decreasing VOC concentrations within the Eastern Plume. Increasing concentrations of VOCs have been noted at monitoring well MW-313, located adjacent to Mere Brook in the southern boundary of the Eastern Plume. This area is under investigation at this time.

Data indicate the protectiveness of the remedy, with the exception of 1,4-dioxane in the low flow samples collected from MW-313, MW-331, MW-333, MW-338A, and P-106 and the Eastern Plume combined effluent grab sample collected during Monitoring Events 24 and 25 (April and September 2004). The Navy shall continue to monitor this potential COC for at least one more sampling round.

In late 2004, the groundwater monitoring indicated a shift in the Eastern Plume boundary. The Navy will investigate the causes for this plume shift, which will include the possible influence of the infiltration gallery.

Technical Assessment Summary

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1992 Interim ROD, 1998 Final ROD, and 2000 ESD. There have been no changes in the physical conditions or land use of the site that would affect the protectiveness of the remedy. However, it is noted that the current extraction system is not considered to fully contain the plume hydraulically.

One MCL (arsenic) was changed and has, accordingly, been updated in the LTMP, and it is not expected to have an impact on the remedy. The revised MCL for arsenic will impact the recovery of the aquifer to drinking water standards. The cause of the elevated arsenic levels is unknown and may be a result of natural conditions (i.e., pervasively high background arsenic concentrations are known to exist in many areas of the State of Maine). The mobilization of arsenic may be due to degradation of the organic contaminants and changes in the redox

conditions within the plume. The toxicity data for some of the COCs have changed. However, assessment of those changes indicates that it is not necessary to derive new cleanup values for the Eastern Plume.

No other information has come to light that could call into question the protectiveness of the remedy.

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 1992 Interim ROD, 1998 Final ROD, and as modified by the 2000 ESD.

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The ARARs related to implementation of the remedy were met. The toxicity values, exposure assumptions, and RAOs used at the time of the remedy selection are still valid. Although there was one change in standards, the MCL for arsenic, it is not expected to have a negative impact on the remedy. There is no other information that calls into question the protectiveness of the remedy.

2.5.9 Issues

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
Finalize and issue the LTMP	No	Yes
Finalize and issue the QAPP	No	Yes
Generate an LUCIP document for the Eastern Plume	No	Yes
Complete assessment of 1,4-dioxane in the Eastern Plume and report findings of the initial sampling program (minimum of three rounds of sampling data)	No	Yes
Complete field work to install 2 replacement extraction wells in the Eastern Plume	No	Yes
Continue collection of monitored natural attenuation parameters	No	Yes
Expedite assessment to optimize the Long-Term Monitoring Program and remedy	No	Yes
Eastern Plume not contained by current extraction well network	No	Yes
Optimize the extraction well network for contaminant containment and removal	No	Yes
Additional investigation near monitoring well MW-313	No	Yes
Develop institutional controls for Building 584, and soils at Sites 4, 11, and 13	No	Yes
Additional assessment of surface water in the vicinity of MW-313	No	Yes
Conduct the additional surface water sampling in Mere Brook in the vicinity of MW-313 as recommended in recent monitoring event reports	No	Yes
Develop institutional control boundary for the site	No	Yes
Plume shift	No	Yes
ARAR tables are not consistent across NPL site	No	Yes

2.5.10 Recommendations and Follow-Up Actions

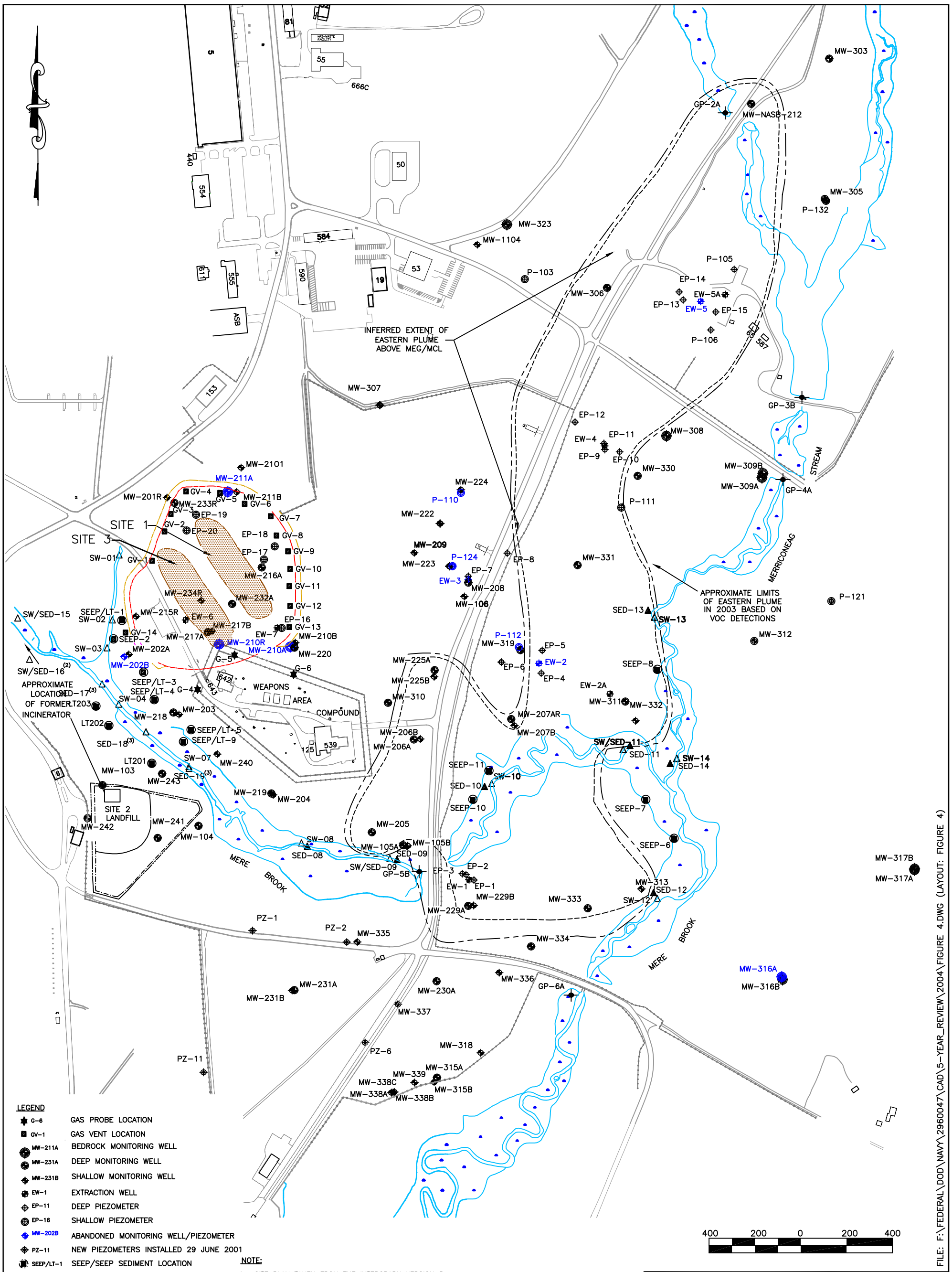
Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Finalize updated LTMP	Finalize the LTMP and issue updated LTMP	Navy	EPA/ MEDEP	2005	No	Yes
Finalize updated QAPP	Finalize the QAPP and issued the updated QAPP	Navy	EPA/ MEDEP	2005	No	Yes
Generate an LUCIP	Generate an LUCIP document for the Eastern Plume	Navy	EPA/ MEDEP	2006	No	Yes
Assess occurrence of 1,4-dioxane	Continue assessment of 1,4-dioxane in the Eastern Plume	Navy	EPA/ MEDEP	2005	No	Yes
Install 2 replacement extraction wells	Install 2 replacement extraction wells in the Eastern Plume	Navy	EPA/ MEDEP	2005-2006	No	Yes
Collect monitored natural attenuation parameters	Continue collection of monitored natural attenuation parameters	Navy	EPA/ MEDEP	2005-2006	No	Yes
Long-Term Monitoring Program and remedy optimization	Assess ways to optimize the Long-Term Monitoring Program and remedy	Navy	EPA/ MEDEP	2005-2008	No	Yes
Optimize the extraction well network	Install new extraction wells to replace/augment existing wells	Navy	EPA/ MEDEP	2005-2008	No	Yes
Additional Investigation near monitoring well MW-313	Assess migration of Eastern Plume into this area, assess degree of upwelling into Mere Brook	Navy	EPA/ MEDEP	2005-2006	No	Yes
Develop institutional controls for Building 584, and soils at Sites 4, 11, and 13	Develop appropriate actions if building is demolished or if soils are disturbed at Sites 4, 11, and 13	Navy	EPA/ MEDEP	2005-2009	No	Yes
Collect additional surface water samples in Mere Brook in the vicinity of MW-313	Collect additional surface water samples	Navy	EPA/ MEDEP	2005	No	Yes
Plume shift	Investigate causes	Navy	EPA/ MEDEP	2006-2007	No	Yes
Institutional control boundary	Refine institutional control boundary	Navy	EPA MEDEP	2006	No	Yes
Inconsistent ARARs	Update ARAR tables	Navy	EPA/ MEDEP	End of 2nd quarter FY06	No	No

2.5.11 Protectiveness Statement

The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict the usage of the groundwater. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.

2.5.12 Next Review

The third five-year review for NAS Brunswick that includes the Eastern Plume is required by 6 December 2009, 5 years from the date of this review.



LEGEND

G-6	GAS PROBE LOCATION
GV-1	GAS VENT LOCATION
MW-211A	BEDROCK MONITORING WELL
MW-231A	DEEP MONITORING WELL
MW-231B	SHALLOW MONITORING WELL
EW-1	EXTRACTION WELL
EP-11	DEEP PIEZOMETER
EP-16	SHALLOW PIEZOMETER
MW-202B	ABANDONED MONITORING WELL/PIEZOMETER
PZ-11	NEW PIEZOMETERS INSTALLED 29 JUNE 2001
SEEP/LT-1	SEEP/SEEP SEDIMENT LOCATION
SW/SED-17	SURFACE WATER/SEDIMENT LOCATION
GP-5A	SURFACE WATER GAUGING POINT
	INFERRED AREA ABOVE STATE MEG/FEDERAL MCL CONCENTRATION
	FENCE
	APPROXIMATE LIMITS OF SLURRY WALL
	APPROXIMATE LIMITS OF SITES 1 AND 3
	APPROXIMATE LIMITS OF FORMER DISPOSAL TRENCHES
	APPROXIMATE BOUNDARY OF SITE 2 LANDFILL
	APPROXIMATE LIMITS OF EASTERN PLUME IN 2003
	INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL

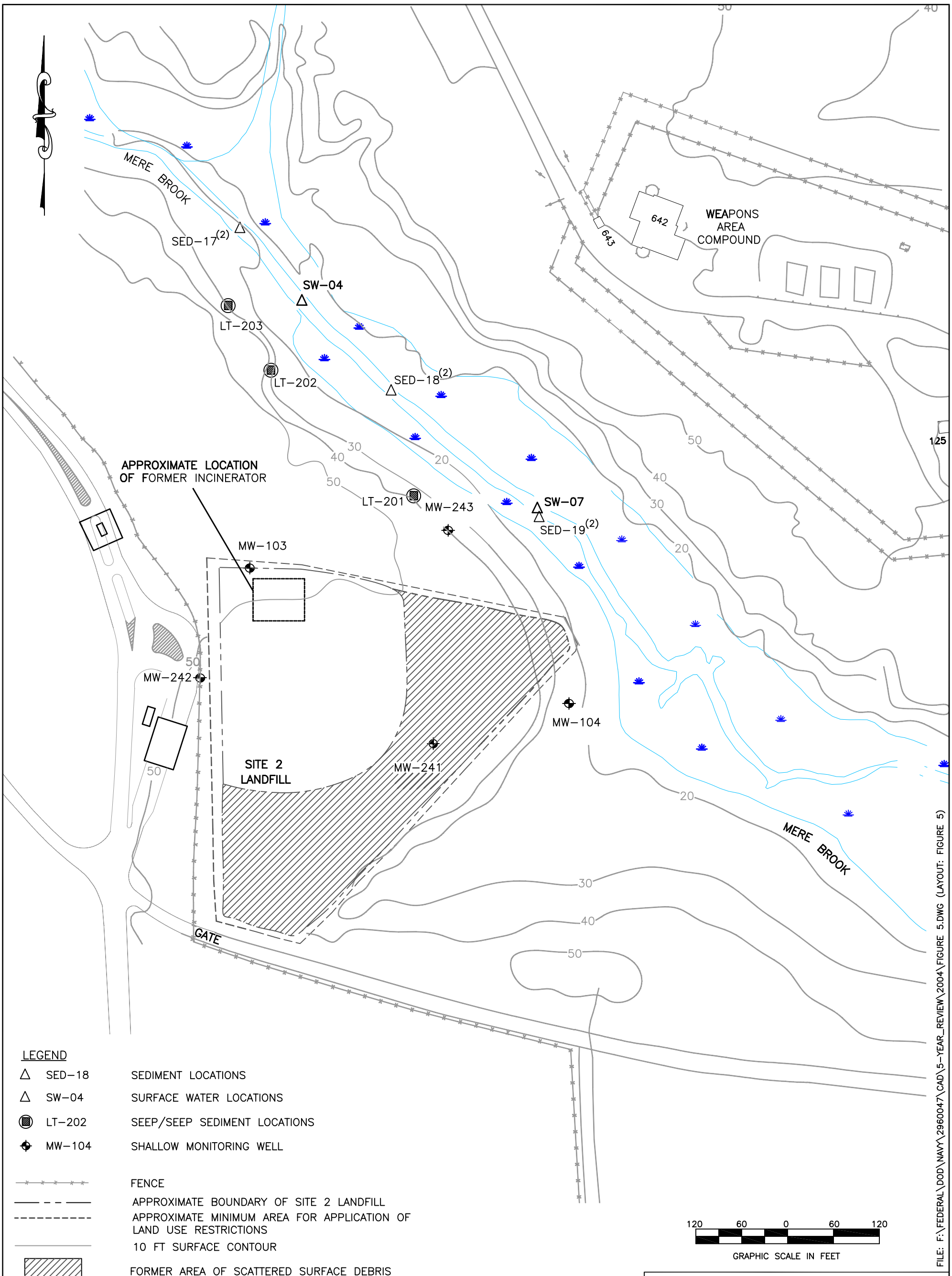
NOTE:

1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995. SITE PLAN UPDATED BASED ON BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 JANUARY 2004.
2. SW-16 LOCATED APPROXIMATELY 1,000 FT UPSTREAM OF SITES 1 AND 3.
3. INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL BASED ON MONITORING EVENT 23 DATA (OCTOBER 2003).

FIGURE 2-1
SITE PLAN
SITES 1 AND 3 LANDFILL
NAVAL AIR STATION, BRUNSWICK, MAINE

DATE 24 AUGUST 2004		PROJECT NUMBER 29600.47
DESIGNED BY ACE		SCALE 1"=400'
DRAWN BY SAP		FILE NAME FIGURE 4.DWG
CHECKED BY GMC		DRAWING NUMBER –
PROJECT MANAGER AE		SHEET NUMBER –

FILE: F:\FEDERAL\DOD\NAVY\2960047\CAD\5-YEAR_REVIEW\2004\FIGURE 4.DWG (LAYOUT: FIGURE 4)



LEGEND

△	SED-18	SEDIMENT LOCATIONS
△	SW-04	SURFACE WATER LOCATIONS
◉	LT-202	SEEP/SEEP SEDIMENT LOCATIONS
⊕	MW-104	SHALLOW MONITORING WELL
		FENCE
		APPROXIMATE BOUNDARY OF SITE 2 LANDFILL
		APPROXIMATE MINIMUM AREA FOR APPLICATION OF LAND USE RESTRICTIONS
		10 FT SURFACE CONTOUR
		FORMER AREA OF SCATTERED SURFACE DEBRIS

NOTE:

1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995. SITE PLAN UPDATED BASED ON BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 JANUARY 2004.
2. APPROXIMATE SAMPLE LOCATIONS SHOWN.

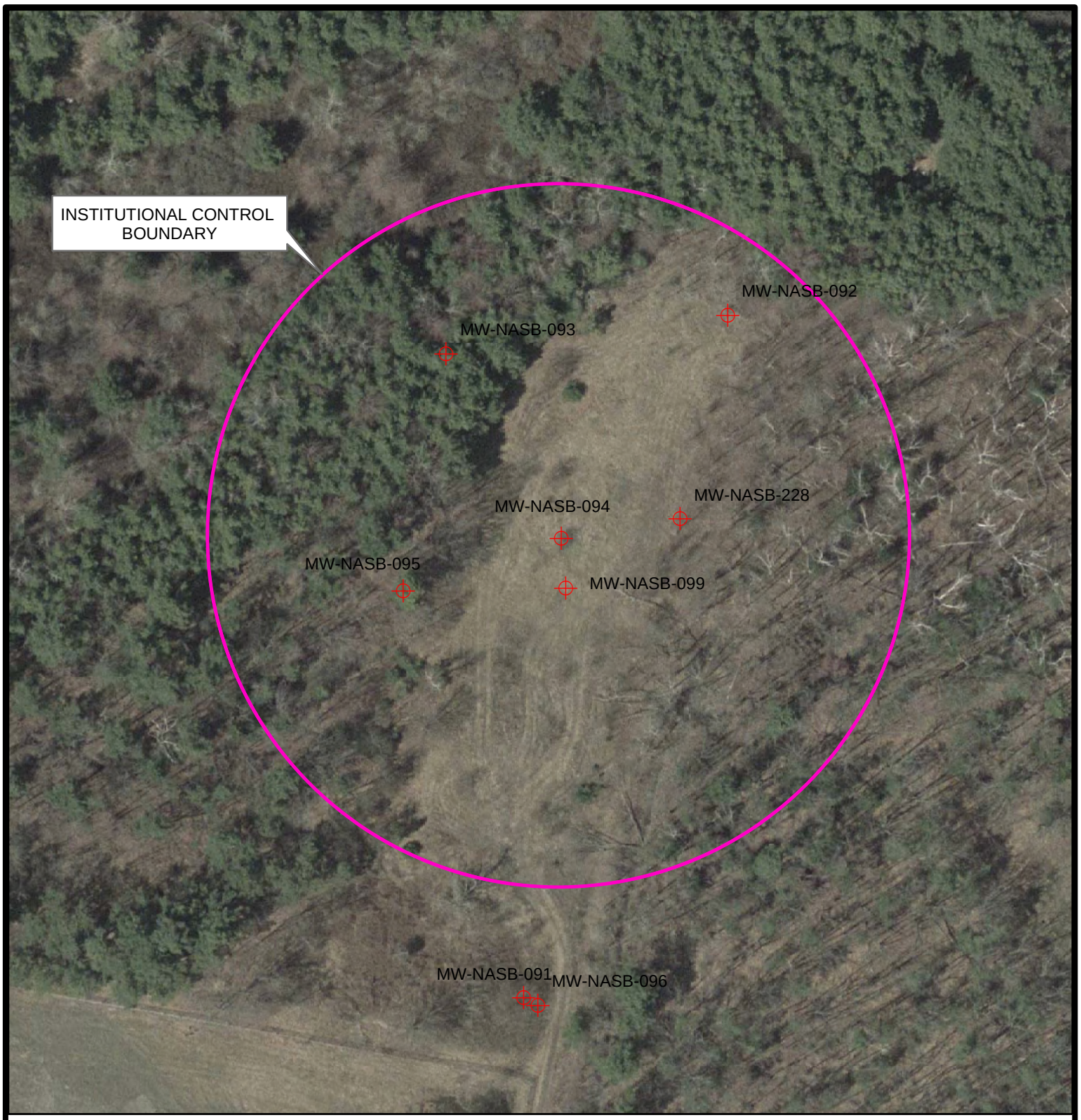
120 60 0 60 120

GRAPHIC SCALE IN FEET

FILE: F:\FEDERAL\DOD\NAVY\2960047\CAD\5-YEAR_REVIEW\2004\FIGURE 5.DWG (LAYOUT: FIGURE 5)

FIGURE 2-2
SITE PLAN
SITE 2
NAVAL AIR STATION, BRUNSWICK, MAINE

DATE 24 AUGUST 2004		PROJECT NUMBER 29600.47
DESIGNED BY SAP		SCALE 1"=120'
DRAWN BY SAP		FILE NAME FIGURE 5
CHECKED BY EA/GMC		DRAWING NUMBER –
PROJECT MANAGER AE		SHEET NUMBER –



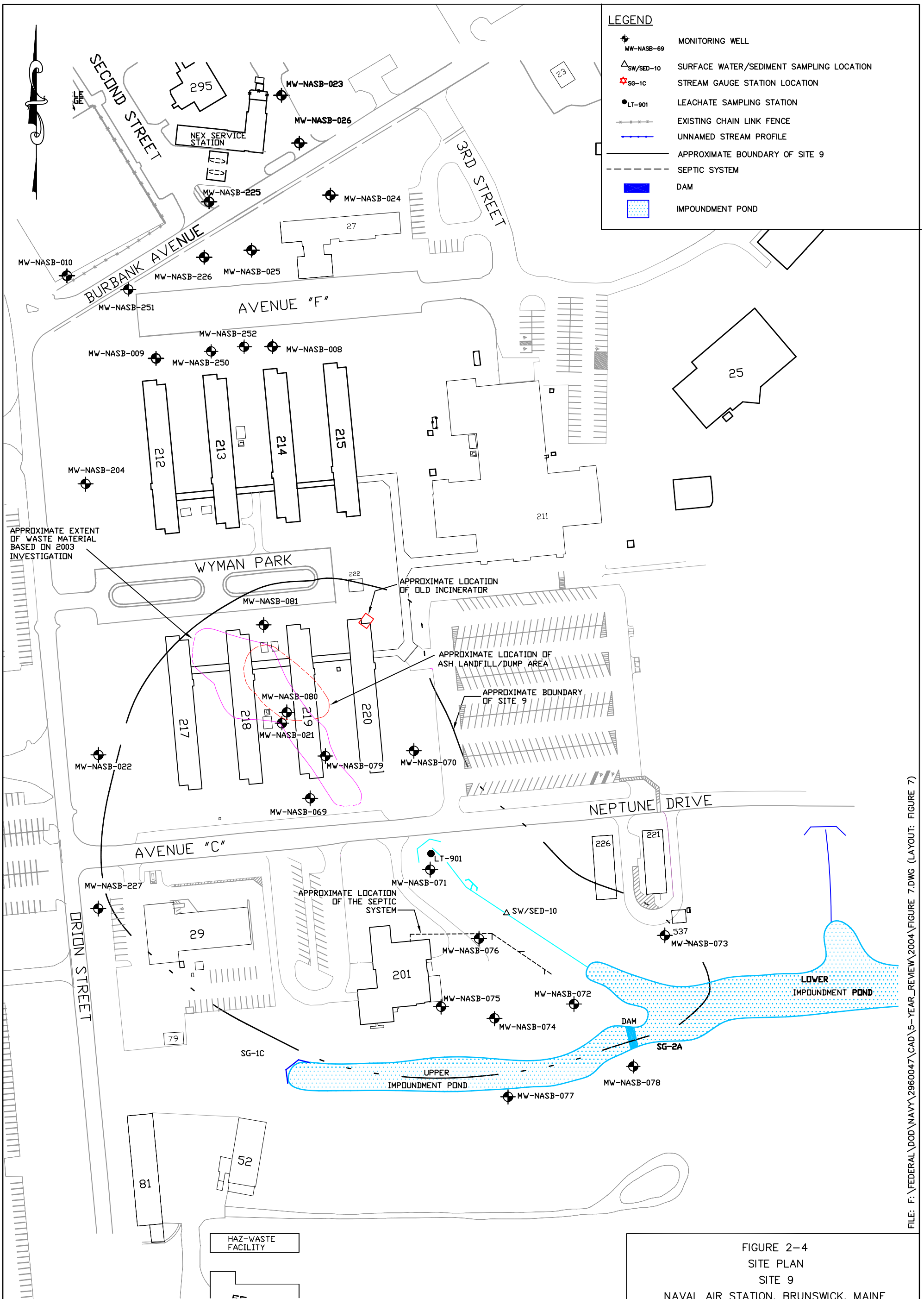
0 5 10 20 30 40 Feet

N

NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2-3
SITE PLAN FOR SITE 7

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	SCALE:	DATE:	PROJECT NO:	FILE NO:
ACE	DC	DC	ACE	AS SHOWN	AUGUST 2004	2960047	I:\NASB\NASB_ site7siteplan.mxd



FILE: F:\FEDERAL\DOD\NAVY\2960047\CAD\5-YEAR_REVIEW\2004\FIGURE 7.DWG (LAYOUT: FIGURE 7)

NOTE:

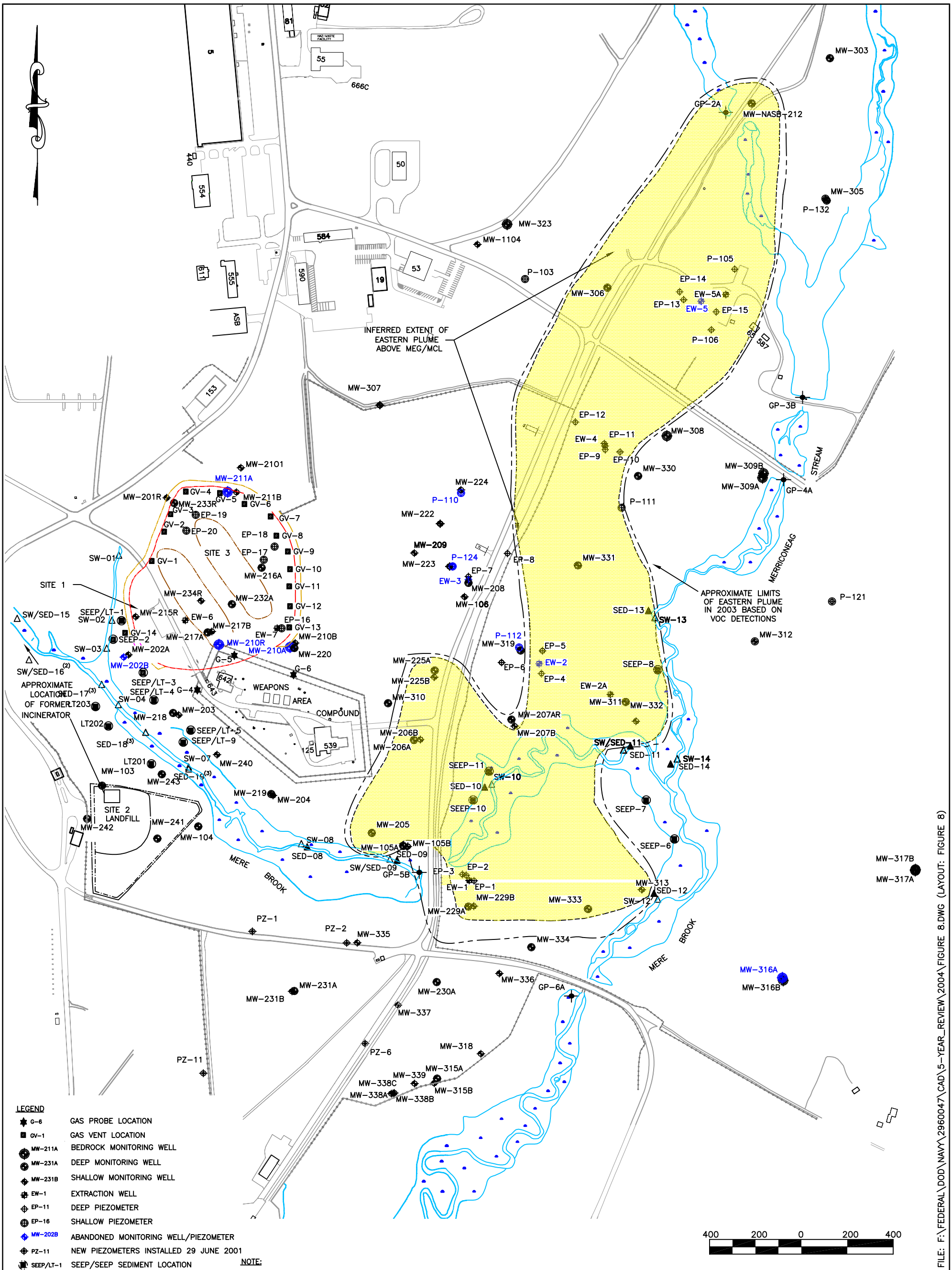
SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995. SITE PLAN UPDATED BASED ON BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 JANUARY 2004.

140 70 0 70 140

GRAPHIC SCALE IN FEET

FIGURE 2-4
SITE PLAN
SITE 9
NAVAL AIR STATION, BRUNSWICK, MAINE

DATE 24 AUGUST 2004		PROJECT NUMBER 29600.47
DESIGNED BY SAP		SCALE 1"=140'
DRAWN BY SAP		FILE NAME FIGURE 7.DWG
CHECKED BY AE/GMC		DRAWING NUMBER –
PROJECT MANAGER AE		SHEET NUMBER –



LEGEND

G-6	GAS PROBE LOCATION
GV-1	GAS VENT LOCATION
MW-211A	BEDROCK MONITORING WELL
MW-231A	DEEP MONITORING WELL
MW-231B	SHALLOW MONITORING WELL
EW-1	EXTRACTION WELL
EP-11	DEEP PIEZOMETER
EP-16	SHALLOW PIEZOMETER
MW-202B	ABANDONED MONITORING WELL/PIEZOMETER
PZ-11	NEW PIEZOMETERS INSTALLED 29 JUNE 2001
SEEP/LT-1	SEEP/SEEP SEDIMENT LOCATION
SW/SED-17	SURFACE WATER/SEDIMENT LOCATION
GP-5A	SURFACE WATER GAUGING POINT
	INFERRED AREA ABOVE STATE MEG/FEDERAL MCL CONCENTRATION
	FENCE
	APPROXIMATE LIMITS OF SLURRY WALL
	APPROXIMATE LIMITS OF SITES 1 AND 3
	APPROXIMATE LIMITS OF FORMER DISPOSAL TRENCHES
	APPROXIMATE BOUNDARY OF SITE 2 LANDFILL
	APPROXIMATE LIMITS OF EASTERN PLUME IN 2003
	INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL

NOTE:

1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995. SITE PLAN UPDATED BASED ON BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 JANUARY 2004.
2. SW-16 LOCATED APPROXIMATELY 1,000 FT UPSTREAM OF SITES 1 AND 3.
3. INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL BASED ON MONITORING EVENT 23 DATA (OCTOBER 2003).

400 200 0 200 400

FIGURE 2-5
SITE PLAN
EASTERN PLUME
NAVAL AIR STATION, BRUNSWICK, MAINE

DATE 24 AUGUST 2004		PROJECT NUMBER 29600.47
DESIGNED BY ACE		SCALE 1"=400'
DRAWN BY SAP		FILE NAME FIGURE 8.DWG
CHECKED BY GMC		DRAWING NUMBER –
PROJECT MANAGER AE		SHEET NUMBER –

FILE: F:\FEDERAL\DOD\NAVY\2960047\CAD\5-YEAR_REVIEW\2004\FIGURE 8.DWG (LAYOUT: FIGURE 8)

TABLE 2-1 COMPARISON OF TOXICITY VALUES FOR GROUNDWATER CHEMICALS OF CONCERN, 1990 HUMAN HEALTH RISK ASSESSMENT TO 2005, NAVAL AIR STATION BRUNSWICK, MAINE

Chemicals of Concern	RfDo (mg/kg/day)		SFo ([mg/kg/day]$^{-1}$)		MCL (µg/L)			MCLG (µg/L)		
					1990 HHRA			1990 HHRA		
	1990 HHRA	2005	1990 HHRA	2005	Final	Proposed	2005	Final	Proposed	2005
Aluminum	---	1[a]	---		---	---		---	---	---
Arsenic	0.001	0.0003	1.75	1.50	50	---	10	0	---	0
Barium	0.05	0.07	---	---	---	5,000	2,000	---	---	---
Benzene	0.00014	0.004	0.029	0.055	5	---	5	0	---	0
Cadmium	0.0005	0.0005	---	---	10	5	5	---	---	---
Chlorobenzene	0.02	0.02	---	---	---	100		---	---	---
Chromium	0.005	0.003	---	---	50	100	100	---	---	---
1,1-Dichloroethane	0.1	0.2[b]	9.10E-02	---	---	---		---	---	---
1,1-Dichloroethene	0.009	0.05	6.00E-01	---	7	---	7	---	---	---
cis-1,2-Dichloroethene		0.01	---	---	---	70	70	---	---	---
trans-1,2-Dichloroethene	0.02	0.02	---	---	---	100	100	---	---	---
Ethylbenzene	0.1	0.1	---	---	---	700	700	---	---	---
Lead	0.00014	---	---	---	50	5	0	---	0	TT
Manganese	0.2	0.02[c]	---	---	---	---	---	---	---	---
Mercury	0.0003		---	---	2	2	2	---	---	---
Methylene chloride	0.06	0.06	0.0075	0.0075	---	---		---	---	---
Napthalene	---	0.02	---	---	---	---	---	---	---	---
Nickel	0.02	0.02	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	0.09	0.28[d]	---	---	200	---	200	---	---	---
Trichloroethene	0.009	0.0003[d]	0.011	0.4[d]	5	---	5	0	---	0
Tetrachloroethene	0.01	0.01	0.051	0.54[d]	---	5	5	---	0	0
Toluene	0.3	0.2	---	---	---	2,000	1,000	---	---	---
Vinyl chloride	0.00006	0.003	2.3	1.4[e]	2	---	2	0	---	0
Xylene, Total	2	0.2	---	---	---	10,000	10,000	---	---	---
Zinc	0.2	0.3	---	---	---	---	---	---	---	---

(a) U.S. Environmental Protection Agency provisional peer-reviewed value.
(b) Health Effects Assessment Summary Tables value.
(c) Based on non-food intake.
(d) U.S. Environmental Protection Agency/National Center for Environmental Assessment provisional value.
(e) Based on exposure from birth.

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
RfDo = Reference oral dose.
SFo = Slope factor.
HHRA = Human Health Risk Assessment.
TT = Treatment technology.
Shading indicates areas that have changed.
Dashes (---) indicate not applicable or not available.

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Appendix A

Status of
No Further Action Sites

Status of No Further Action Sites
Naval Air Station
Brunswick, Maine

Prepared for

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
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September 2005
Revision: FINAL
EA Project No. 61771.04

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1. INTRODUCTION

This appendix has been included in the second five-year review of Naval Air Station (NAS) Brunswick to document the status of the 10 sites for which "No Further Action" has been determined through investigations or removal actions (Sites 4, 5, 6, 8, 11, 13, 14, 15, 16, and 18). Their locations are shown on Figure 1. These sites are considered to have completed remedies and do not require additional investigation or environmental monitoring. Therefore, discussions of these sites are limited to the overview provided below.

2. SITE 4 – ACID/CAUSTIC PIT

2.1 SITE LOCATION AND DESCRIPTION

Site 4 is located off Old Gurnet Road between the intersection of Orion Street and Sandy Road. The location of the former acid/caustic pit is under the eastern portion of Building 584 (which currently houses the NAS Brunswick Public Works maintenance shops). Between 1969 and 1974, liquid waste was poured into the acid/caustic pit for disposal. The pit was approximately 4 ft long × 4 ft wide × 3 ft deep. Site 4 is one of three sources of groundwater contamination of the Eastern Plume.

2.2 HISTORY OF CONTAMINATION

From 1969 to 1974, liquid waste was disposed into the pit at this site. Wastes reportedly disposed of into the pit included transformer oil, battery acid, caustics, solvents (including trichloroethene), and paint thinners. Quantities of wastes disposed of are unknown.

During the late 1980s, the Navy completed a remedial investigation/feasibility study (RI/FS) at Site 4 that included a gas survey, soil borings, and soil and groundwater sampling that were analyzed for Target Compound List organic and inorganic compounds. Halocarbon soil gases were detected in the subsurface around Building 584, but below detection limits in all other samples. Trichloroethene was detected in groundwater adjacent to Building 584 ranging in concentrations from 6 to 23 µg/L. Volatile organic compounds (VOCs) were not detected in the subsurface soil samples; however, these samples were not collected directly from the source area due to obstruction caused by the footprint of Building 584. Air monitoring samples collected outside the building did not indicate the presence of VOCs.

2.3 SUMMARY OF RISK ASSESSMENT

As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment. Minimal health risks were associated with exposure to surface soils at Site 4 since the former pit is located beneath the eastern portion of Building 584, effectively limiting any potential exposure. If Building 584 is ever removed, an additional investigation and remedial action may be required (ABB-ES 1998[1]). Ingestion of groundwater was identified as a human health risk at Site 4; however, groundwater within this area of the site is not presently used for potable purposes and is, therefore, considered a minimal risk. An ecological risk assessment was completed during the RI and concluded that there is no significant risk to terrestrial receptors from soil and groundwater contamination at the site.

1. ABB-Environmental Services (ABB-ES). 1998. Final Record of Decision for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume. February.

2.4 REMEDY SELECTED

In February 1998, a Record of Decision was finalized for Site 4, and the selected remedial alternative for soils at Site 4 was No Further Action. This alternative was selected since the soils did not pose an unacceptable risk from direct contact or incidental ingestion. The No Further Action decision was supported by the results of the 1990 FS, which concluded that the only risk at this site was for the potential of continuing impacts to groundwater from soils at Sites 11 and 13. The 1998 Record of Decision noted that if, in the future, Building 584 is removed, further investigations and remedial action may be required (ABB-ES 1998). The groundwater contamination is addressed by the continued operation of the groundwater remedy for the Eastern Plume.

3. SITE 5 – ORION STREET ASBESTOS DISPOSAL SITE

3.1 SITE LOCATION AND DESCRIPTION

Site 5 is an overgrown area of approximately 0.25 acre located off Merriconeag Road south of the main runway. Site 5 is relatively flat with the exception of an embankment that drops off southeast of the site. The site is posted with signs that note this site is an asbestos disposal area.

3.2 HISTORY OF CONTAMINATION

In 1979, Site 5 was reportedly used by a contractor to dispose of asbestos-lined pipes from a demolished base building. The pipes were placed in two trenches. One of the trenches was 3 ft wide × 20 ft long × 7 ft deep and contained six 1-in. diameter asbestos pipes that ranged in length from 4 to 12 ft. The second parallel trench measured 15 ft wide × 30 ft long × 10 ft deep and contained up to eight pieces of corrugated pipe of varying lengths that had smaller asbestos pipe inside.

3.3 SUMMARY OF RISK ASSESSMENT

In the early 1990s, the Navy completed an RI/FS at Site 5. The investigation assessed the distribution of contamination at the site and evaluated the most feasible cleanup alternatives. The RI/FS activities included a geophysical survey, surface soil sampling, and a physical inspection of the site. Based on the results of the RI, and the baseline risk assessment, no asbestos was detected in the surface soil samples; therefore, there is no current risk to human health and the environment from exposure to asbestos. As a result, target cleanup levels for asbestos were not calculated.

3.4 REMEDY SELECTED

In August 1993, a Record of Decision was finalized for Site 5 and the selected remedial alternative chosen was a comprehensive remedy that included excavation of the asbestos-containing material and construction debris and disposal of the material as necessary subgrade fill for the Sites 1 and 3 Landfill cover. The remedy was designed to remove the buried wasted and place it beneath a permanent, low permeability cap at the Sites 1 and 3 Landfill. The excavated material provided the necessary subgrade material beneath the low permeability cap for the Sites 1 and 3 landfill cover. After excavation, soil samples were collected to confirm that the removal of asbestos was complete, and the site was regraded to minimize erosion and seeded to re-establish vegetation.

Based on the results of the confirmatory sampling, no further action is recommended under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for Site 5. Since the contaminated soil was removed from the site, no institutional controls were necessary and the five-year review process would not apply to this site.

4. SITE 6 – SANDY ROAD RUBBLE AND ASBESTOS DISPOSAL SITE

4.1 SITE LOCATION AND DESCRIPTION

Site 6 is bordered by Sandy Road to the southeast and by a stream behind Building 516 to the north. Reportedly, the site originally had a small depression that was filled with construction debris, aircraft parts, and asbestos-lined pipes. The site is approximately 1 acre and is nearly flat.

4.2 HISTORY OF CONTAMINATION

Site 6 originally had a small depression that was later filled with construction debris until the late 1970s. Aircraft parts reportedly were disposed of at this site and asbestos-covered pipes were seen protruding from the surface soil during a site inspection in 1980. It was estimated that approximately 250 yd^3 of the fill material at Site 6 contained asbestos.

4.3 SUMMARY OF RISK ASSESSMENT

In the early 1990s, the Navy completed an RI/FS at Site 6. The investigation assessed the distribution of contamination at the site and evaluated the most feasible cleanup alternatives. The RI/FS activities included a geophysical survey, surface soil sampling, and a physical inspection of the site. Based on the RI and baseline risk assessment results, no asbestos was detected in the surface soil samples; therefore, there was no current risk to human health and the environment from exposure to asbestos. As a result, target cleanup levels for asbestos were not calculated.

4.4 REMEDY SELECTED

In August 1993, a Record of Decision was finalized for Site 6. The selected remedial alternative for Site 6 included excavation of the asbestos-containing material and construction debris and disposal of the material as necessary subgrade fill for the Sites 1 and 3 Landfill cover. The remedy was designed to remove the buried waste and place it beneath a permanent, low permeability cap at Sites 1 and 3 Landfill. The excavated material provided the necessary subgrade material beneath the low permeability cap at Sites 1 and 3 Landfill. After excavation, soil samples were collected to confirm the removal of asbestos was complete. After receipt of the confirmatory sampling data, Site 6 was re-graded to minimize erosion and seeded to re-establish vegetation.

Based on the results of the confirmatory sampling, no further action is recommended under CERCLA for Site 6. Since the contaminated soil was removed from the site, no institutional controls were necessary and the five-year review process would not apply to this site.

5. SITE 8 – PERIMETER ROAD DISPOSAL AREA

5.1 SITE LOCATION AND DESCRIPTION

Site 8 covers approximately 0.5 acre and is located north of Perimeter Road. The site is a flat, open area with steep, wooded embankments down to two small tributaries bordering the site, which discharge to the Androscoggin River. The Jordan Avenue Wellfield, a municipal drinking water supply for the Town of Brunswick, is located approximately 1,800 ft northwest of Site 8.

5.2 HISTORY OF CONTAMINATION

From 1964 to 1974, the site was reportedly a disposal area for rubble, debris, and trash. Soil sampling conducted during the RI/FS indicated that surface and shallow soils were contaminated with polycyclic aromatic hydrocarbons (PAHs).

5.3 SUMMARY OF RISK ASSESSMENT

During the early 1990s, the Navy completed RI/FS activities for Site 8, which included extensive sampling and analysis of surface and subsurface soils, groundwater, leachate and sediments, and surface water and sediments. Results showed PAHs in surface and shallow soils. As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment. The risk associated with exposure to contaminants was calculated assuming both current use and future residential use of the site, which is the most conservative scenario. The estimated incremental cumulative, carcinogenic risks to an individual under the current exposure scenarios were within or below the U.S. Environmental Protection Agency's target risk range. The non-carcinogenic Hazard Index was below 1.0. The assumed worst-case scenario resulted in a slightly higher carcinogenic risk. While this scenario is unlikely, excavation of the PAH-contaminated soil at Site 8 would address this potential risk. No other contaminants were found to pose a risk to human health or the environment. The RI also established that Site 8 does not impact the Jordan Avenue wellfield due to the limited groundwater contamination at the site, the considerable distance between Site 8 and the wellfield, and groundwater patterns which flow to the tributaries rather than the wellfield.

5.4 REMEDY SELECTED

In August 1993, a Record of Decision was finalized for Site 8. The selected remedial alternative for Site 8 included excavation of PAH-contaminated soil, construction rubble, and debris, and disposal of the material as necessary subgrade fill for the Sites 1 and 3 Landfill cover. The remedy was designed to remove the buried waste and place it beneath a permanent, low permeability cap at Sites 1 and 3 Landfill. After excavation of the rubble and debris, soil samples were collected to confirm removal of waste was complete. After the confirmatory sampling data were received and reviewed, Site 8 was re-graded to minimize erosion and seeded to re-establish vegetation.

Based on the results of the confirmatory sampling, no further action is recommended under CERCLA for Site 8. Since the contaminated soil and debris were removed from the site, no institutional controls were necessary and the five-year review process would not apply to this site.

6. SITE 11 – FIRE TRAINING AREA

6.1 SITE LOCATION AND DESCRIPTION

Site 11 is located off Old Gurnet Road between the intersection of Orion Street and Sandy Road. Site 11 is the location of a former Fire Training Area that was used regularly over a 30-year period ending in the Fall of 1990. Waste liquids (fuels, oils, and degreasing solvents) were used as fuels for the fire training exercises, resulting in the contamination of soil and groundwater at the site. Originally, the training exercises introduced the various combustible materials directly onto the ground surface at the site. In 1987, a circular concrete liner, berm, and 6,000-gal underground storage tank (UST) (located north of the pit) were installed at the site. The concrete pad and UST were removed from the site in 1995. Site 11 is one of three sources of the groundwater contamination of the Eastern Plume.

6.2 HISTORY OF CONTAMINATION

From the 1950s to the Fall of 1990, the former Fire Training Area was used to train Navy personnel in firefighting techniques. Firefighting exercises introduced various combustible materials into the soil at the site including waste oils, fuels, solvents, and other miscellaneous liquids. Beginning in 1987, the various combustibles were introduced onto the concrete pad for fire training exercises. Quantities of combustible materials used in the former Fire Training Area are unknown.

During the late 1980s, the Navy completed an RI/FS at Site 11 that included a gas soil survey, installation of monitoring wells and test pits, soil and groundwater sampling, and aquifer permeability testing. In August 1991, a supplemental RI was completed. The RI and supplemental RI found that contamination was consistent with the past use of the area and VOCs, semivolatile organic compounds (SVOCs), and inorganics were detected in the subsurface soil and groundwater at the site.

The Site 11 contamination consisted of groundwater contaminated with 1,1-dichloroethane, 1,2-dichloroethene, trichloroethane, and trichloroethene, and soil contaminated with chlorinated solvents and fuel-related products that included PAHs. No soil samples were collected from beneath the former Fire Training Area at the time of the RI or supplemental RI due to the presence of a concrete pad. Test pit excavations and subsurface soil sampling completed during the RI around the former Fire Training Area pad identified the presence of VOCs and SVOCs in the shallow subsurface and VOCs in the deeper soils. Surface soil contamination was identified at one test pit location where total PAH concentrations were 1.8 mg/Kg. Based on the test pit sampling result, a 50-ft × 100-ft area of contaminated soil was assumed, extending from the southern end of the pit north to well MW-1102 (former). Residual contamination was detected in monitoring wells in subsequent groundwater monitoring rounds. The Navy implemented two removal actions at Site 11. The first removal action occurred in December 1994, and buried drums and metallic debris from several locations were excavated and removed around Site 11.

The second removal action occurred in June 1995, and consisted of the removal of the concrete pad and between 6-10 ft of soil from below the 0.5-acre site. Confirmation soil samples were collected to document the condition of the soil left in place. Laboratory analysis of the soil samples identified trichloroethene at concentrations ranging from not detected to 6.5 mg/Kg. The excavation at Site 11 was backfilled with clean soil and planted with grass.

6.3 SUMMARY OF RISK ASSESSMENT

As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment. The distribution of contamination is characterized by minimal surface contamination with increased contamination in deeper soils. The non-carcinogenic hazard index was less than 1.0. The lifetime incremental carcinogenic risk for direct contact and incidental ingestion exposure was 6.7×10^{-5}, which is within the U.S. Environmental Protection Agency target risk range but slightly exceeds the Maine Department of Environmental Protection maximum acceptable risk of 1×10^{-5}. Ingestion of groundwater was identified as a human health risk at Site 11. Currently, groundwater within the area of the site is not used for potable purposes and, therefore, no significant risk exists. An ecological risk assessment was completed during the RI, and found that the ecological risk to terrestrial receptors from soil and groundwater contamination was minimal.

6.4 REMEDY SELECTED

In February 1998, a Record of Decision was finalized for Site 11 and the selected remedial alternative for soil at Site 11 was No Further Action. This alternative was selected since the soil did not pose an unacceptable risk from direct contact or incidental ingestion. The No Further Action decision was supported by the results of the 1990 FS, which concluded that the only risk at this site was for the potential of continuing impacts to groundwater from soil at Sites 11 and 13. The groundwater contamination is addressed by the continued operation of the groundwater remedy for the Eastern Plume.

7. SITE 13 – DEFENSE REUTILIZATION AND MARKETING OFFICE AREA

7.1 SITE LOCATION AND DESCRIPTION

Site 13, the Defense Reutilization and Marketing Office Area, is located off Old Gurnet Road between the intersection of Orion Street and Sandy Road, immediately south of Building 584 (NAS Brunswick Public Works maintenance shops) and Site 4. The Defense Reutilization and Marketing Office Area storage yard was a paved, fenced enclosure, approximately 280 ft × 300 ft. Buildings 584, 93, and 19 abut the enclosure on the north, northeast, and east, respectively. Orion Street borders the Defense Reutilization and Marketing Office Area yard to the west. Site 13 is the former location of three USTs (a 10,000-gal fuel oil tank, a 5,000-gal waste oil tank, and a 5,000-gal solvent storage tank). All three USTs were removed in the late 1980s. The 10,000-gal fuel oil UST was initially replaced with a fiberglass UST that was later removed and replaced by an aboveground storage tank. The 5,000-gal USTs were removed and not replaced. No soil was removed with the USTs.

7.2 HISTORY OF CONTAMINATION

In the late 1980s when the USTs were pulled, surrounding soil was not removed. During the late 1980s, the Navy completed an RI/FS. Contamination was detected in the shallow soil, subsurface soil, and groundwater. Fuel-related SVOCs were detected in subsurface soil at one location at Site 13. Dichlorodiphenyltrichloroethane (DDT) was detected in two shallow soil samples from test pits. The RI report states that the DDT concentrations are relatively low and probably related to historic use and storage of DDT in this site area. Groundwater contamination detected in monitoring wells was restricted to VOCs. Since the removal of the tanks, the concentrations of VOCs in groundwater have decreased significantly. No removal actions have occurred at Site 13.

7.3 SUMMARY OF RISK ASSESSMENT

As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment at Site 13. Minimal health risks are associated with exposure to soil at Site 13 due to the paved parking area surrounding Building 584. The quantitative risk estimates calculated for the site are below the U.S. Environmental Protection Agency target risk range and the Maine Department of Environmental Protection maximum incremental risk. Currently, groundwater within the area of the site is not used for potable purposes and, therefore, no significant risk exists. An ecological risk assessment was completed during the RI, and only DDT in soil was selected as a contaminant of concern for the site. The maximum detected concentration of DDT was below levels considered to present a health risk. The ecological risk to terrestrial receptors from soil and groundwater contamination appears to be minimal.

7.4 REMEDY SELECTED

In February 1998, a Record of Decision was finalized for Site 13 and the selected remedial alternative for soil at Site 13 was No Further Action. This alternative was selected since the soil did not pose an unacceptable risk from direct contact or incidental ingestion. The No Further Action decision was supported by the results of the 1990 FS that concluded the only risk at this site was for the potential of continuing impacts to groundwater from soil at Sites 11 and 13. The groundwater contamination is addressed by the continued operation of the groundwater remedy for the Eastern Plume.

8. SITE 14 – OLD DUMP NO. 3

8.1 SITE LOCATION AND DESCRIPTION

The location of Old Dump No. 3 is based on a 1946 base map of NAS Brunswick. The site is located east of the main runways and is bordered by Runway I-19 and Taxiways A and D. Runway I-19 and the taxiways were constructed in 1951.

8.2 HISTORY OF CONTAMINATION

Military operations at NAS Brunswick were suspended during the late 1940s until the base was recommissioned in 1951. In 1951, the existing runways were constructed. Runway construction would have ended any further use of Site 14, and the construction activities may have resulted in removal of the dump material. Based on the station's history, it is anticipated that most of the potential disposal activities at Site 14 occurred prior to and during World War II.

8.3 SUMMARY OF RISK ASSESSMENT

To assess the presence or absence of refuse material at Site 14, and potential soil and groundwater contamination in the area, a magnetometer survey was conducted over approximately 6 acres of terrain. Observed magnetic anomalies were the result of runway and taxiway lights and drainage structures. No unexplained anomalies were detected. Based on the absence of unexplained anomalies, no further investigations were conducted.

8.4 REMEDY SELECTED

Based on the results of the magnetic data, no test pits or monitoring wells were installed, and no further investigations were conducted. It was concluded that the former dump does not exist or was probably removed during the runway and taxiway construction activities. Therefore, no further action is recommended under CERCLA for Site 14.

9. SITE 15 – MERRICONEAG EXTENSION DEBRIS SITE

9.1 SITE LOCATION AND DESCRIPTION

The Merriconeag Extension Debris site is located southeast of the NAS Brunswick golf course near Harpswell Cove.

9.2 HISTORY OF CONTAMINATION

The Merriconeag Extension Debris site was reported in 1990 by an NAS employee and consists of a concrete rubble and soil dam that creates a 0.75-acre pond on a small, unnamed stream. Miscellaneous debris items were visible on the face of the dam and on the ground surface near its eastern end. There are no Navy records regarding historical dumping at Site 15.

A site inspection was conducted in November 1992. The investigation included a magnetometer survey; test pits; and the collection of soil, surface water, and sediment samples. The magnetometer survey indicated the presence of ferrous debris at the site, and was used to identify three locations for test pits. The test pits encountered few or no debris items. Two soil samples were collected from the test pits and five additional surface soil samples were collected from areas that contained the greatest number of debris items. Four surface water and sediment samples were also collected from the unnamed stream and pond. All asbestos cement pipe sections and scrap metal debris items encountered were removed from the site and disposed in 1999. A hand-held magnetometer survey in 1999 confirmed that no additional metallic items remained after debris items were removed.

9.3 SUMMARY OF RISK ASSESSMENT

A formal risk assessment was not conducted for Site 15. Debris was found on the ground surface with no indications of a substantial area of buried waste. Reported concentrations of contaminants in soil, surface water, and sediment were compared to state and federal standards and did not indicate a need for remediation.

9.4 REMEDY SELECTED

Based on the results of the site investigation, no further action is recommended under CERCLA for Site 15.

10. SITE 16 – SWAMPY ROAD DEBRIS SITE

10.1 SITE LOCATION AND DESCRIPTION

The Swampy Road Debris site is located along the west bank of an unnamed stream on the NAS Brunswick golf course.

10.2 HISTORY OF CONTAMINATION

Site 16 was brought to the Navy's attention in 1990 by an NAS employee who observed refuse along its banks. Surface debris was visible at various locations in a 1,700-ft section of the stream. There are no Navy records regarding historical dumping at Site 16. A site inspection was conducted in November 1992. The inspection included a magnetometer survey; test pits; and the collection of soil, surface water, and sediment samples. The magnetometer survey indicated the presence of ferrous debris items at the site and was used to identify five locations for test pits. Test pits showed shallow debris over native soil. Soil samples were collected from the test pits and surface soil was collected in areas that contained the greatest number of debris items. Surface water and sediment samples were also collected from the unnamed stream. One surface soil sample was initially found to have a lead concentration of 1,250 mg/kg. A confirmation sample taken at the same location in 2000 verified the lead concentration to be 84 mg/kg. A hand-held magnetometer was used to locate, remove for disposal, or assess additional debris.

10.3 SUMMARY OF RISK ASSESSMENT

A formal risk assessment was not conducted for Site 16. Debris was found primarily at the ground surface with no indications of buried waste having environmental significance. Reported concentrations of contaminants in soil, surface water, and sediment were compared to state and federal standards and did not indicate a need for remediation.

10.4 REMEDY SELECTED

Based on the results of the site investigation, no further action is recommended under CERCLA for Site 16.

11. SITE 18 – WEST RUNWAY STUDY AREA

11.1 SITE LOCATION AND DESCRIPTION

The West Runway Study Area is a seep located approximately 650 ft west of Runway I-19 between Mere Brook and Ordnance Road No. 3. The seep is near the former location of an ordnance bunker that was dismantled in the mid-1970s.

11.2 HISTORY OF CONTAMINATION

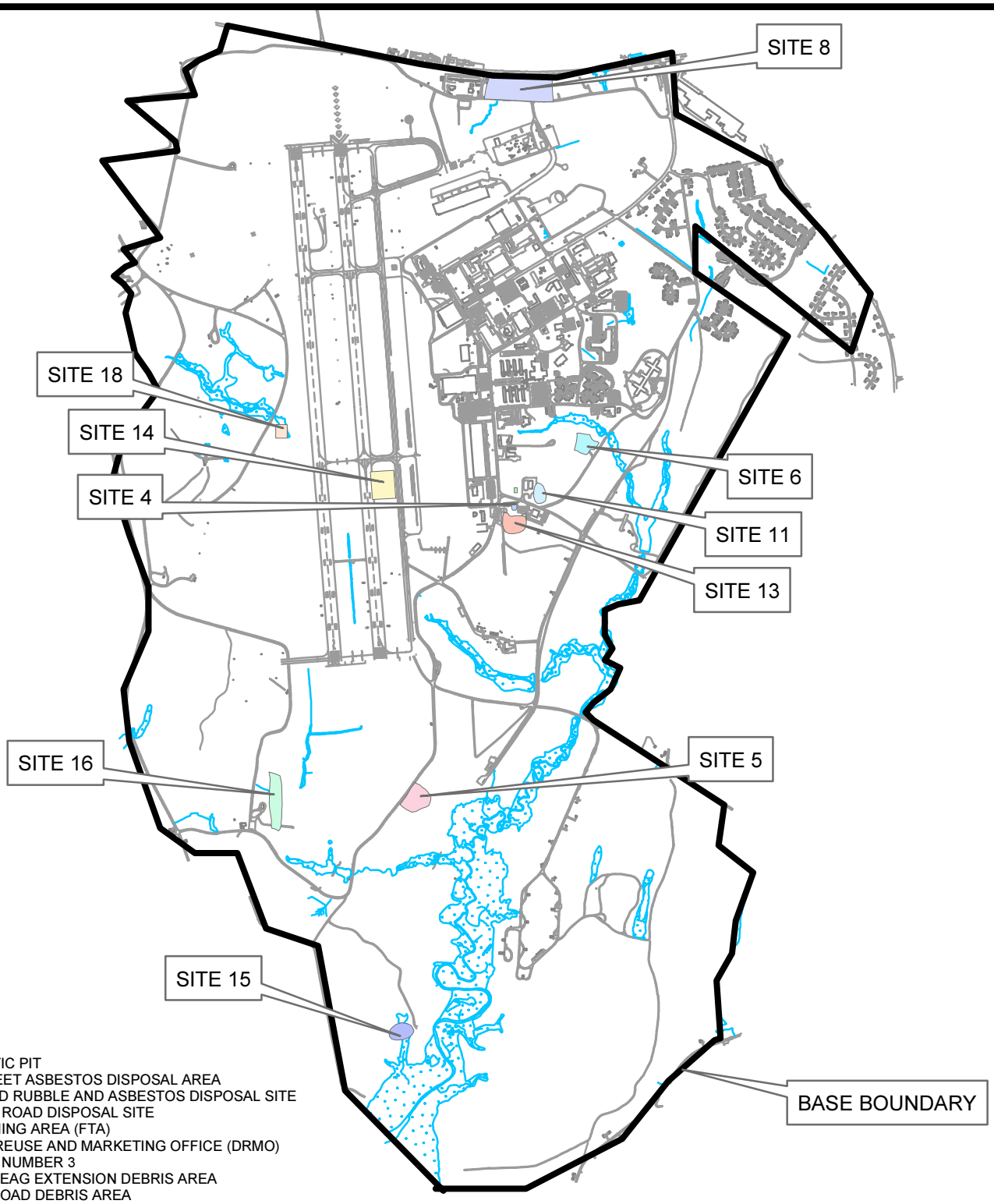
Site 18 was brought to the Navy's attention in 1992 during runway setback clearance activities by an NAS employee. The employee observed water containing a surface sheen seeping from a hillside along Ordnance Road No. 3. The employee collected a water sample of the seep in a soda bottle. The seep water sample was then analyzed by a field chemist using a portable gas chromatograph that was operating at the Building 95 site at the time, and was found to contain elevated levels of several VOCs. The seep was sampled an additional three times and failed to reproduce the elevated VOC concentrations of the soda bottle sample. There are no records regarding historical dumping at this site. Several aerial photographs did not show any indications of active dumping at this site. A site inspection was conducted in 1993. The investigation included a geophysical survey using a magnetometer and ground penetrating radar; test pits; and the collection of soil, seep water, surface water, and sediment samples. The geophysical survey revealed a small number of anomalous areas that potentially indicated buried debris. These results were used to select 7 test pit locations. The test pits revealed fill soils and innocuous metallic objects. Five soil samples were collected from the test pits. Surface water and sediment samples were collected from 2 locations within Mere Brook and at 2 seep locations. An additional sediment sample was collected from a third seep location that was dry at the time of the site inspection. In response to comments from the citizen's group, an additional round of aqueous samples was collected from the three seep locations in 1994.

11.3 SUMMARY OF RISK ASSESSMENT

A formal risk assessment was not conducted for Site 18. Reported laboratory concentrations of analytes/compounds in soil, seep water, surface water, and sediment were compared to state and federal standards and did not indicate a need for remediation.

11.4 REMEDY SELECTED

Based on the results of the site investigation, no further action is recommended under CERCLA for Site 18.



SITE 4 - ACID/CAUSTIC PIT
SITE 5 - ORION STREET ASBESTOS DISPOSAL AREA
SITE 6 - SANDY ROAD RUBBLE AND ASBESTOS DISPOSAL SITE
SITE 8 - PERIMETER ROAD DISPOSAL SITE
SITE 11 - FIRE TRAINING AREA (FTA)
SITE 13 - DEFENSE REUSE AND MARKETING OFFICE (DRMO)
SITE 14 - OLD DUMP NUMBER 3
SITE 15 - MERRICONEAG EXTENSION DEBRIS AREA
SITE 16 - SWAMPY ROAD DEBRIS AREA
SITE 18 - WEST RUNWAY STUDY AREA

0 330 660 1,320 1,980 2,640 Feet

N

NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1
NO FURTHER ACTION SITES

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	SCALE:	DATE:	PROJECT NO:	FILE NO:
PN	DC	DC	PN	AS SHOWN	AUGUST 2005	6177102	I:\NASB\NASB_fig1_nofurtheraction.mxd

Appendix B

Sites under Investigation

Sites Under Investigation
Naval Air Station
Brunswick, Maine

Prepared for

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2	Site plan, Site 12, Naval Air Station, Brunswick, Maine.
3	Site plan, Site 17 (Building 95), Naval Air Station, Brunswick, Maine.

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Number	Title
1	List of materials detonated between 1991 and 2003.

1. SITE 12 (EXPLOSIVE ORDNANCE DISPOSAL AREA)

1.1 SITE DESCRIPTION

Sire 12, Explosive Ordnance Disposal (EOD) area, at Naval Air Station (NAS) Brunswick is located in the southeast portion of the Base (Figure 1). The site is located in a remote, large, open upland area on Buttermilk Mountain, approximately 4,307 ft southeast of Building 539 in the Weapons Compound (Figure 2). The EOD area consists of a bermed area approximately 60 × 100 ft, with 5- to 6-ft berms. The EOD area occupies approximately 50 percent of the area suspected of being a former sand/gravel pit. In 1989, 2 small demolition craters and a dumpster were located within the bermed area at the site. The dumpster was reportedly used for flashing small quantities of explosives and/or propellants such as grenade fuses. One control bunker is approximately 100 ft from the pit. Military personnel occupy the bunker during detonation of charges.

This area has been used since 1981 for disposal of small quantities of ordnance, pyrotechnics, privately manufactured explosive devices, and war souvenirs. Based on the quantities involved, low level contamination of unburned explosive residues and elevated concentrations of lead, cadmium, chromium, and mercury might be expected in the surface soils. Elevated levels of aluminum (from aluminum perchlorate) could also be present. Based on the quantities of ordnance and explosives involved, and the migration potential of the chemicals involved, no groundwater contamination is expected (E.C. Jordan 1991).

1.2 SITE CHRONOLOGY

The following presents a chronologic summary of site events:

- In 1981, EOD activities began at the site.
- In June 1983, an Initial Assessment Study (IAS) was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick. The IAS identified the EOD area as a range or impact zone. No further information was given.
- In July 1987, NAS Brunswick was placed on the U.S. Environmental Protection Agency (EPA) National Priorities List.
- On 2 March 1989, in support of the supplemental remedial investigation (RI), a site inspection was completed, 3 test pits were installed, soil samples were collected, and an interview with the EOD detachment was conducted.
- In October 1990, the Navy entered into a Federal Facilities Agreement with EPA and the Maine Department of Environmental Protection (MEDEP) regarding the cleanup of environmental contamination at NAS Brunswick.

- In July 1991, the Draft Final Supplemental Feasibility Study (FS) was completed that included Site 12. The FS recommended a "No Action" alternative for Site 12 since the baseline risk assessment did not identify a risk to either human health or the environment.

- In August 1991, the Draft Final Supplemental RI Report was completed for Site 12. The Supplemental RI found low levels of explosive related compounds (nitrate/nitrite, nitrogen, and phosphorus) and metals (chromium, lead, and mercury) in near surface shallow soils. The low levels and limited distribution of mercury and nitrate/nitrite in the near surface soils are consistent with minor explosive ordnance disposal activities at Site 12 (E.C. Jordon 1991). According to the 1991 Supplemental RI Report, chromium, lead, and phosphorus are suspected to represent background conditions.

- In 1994, MEDEP adopted the risk-based Maximum Exposure Guidelines (MEGs) for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing Construction, Altering, and Operation Certain Types of Hazardous Waste Units.

- During 2003, EPA's consultant conducted a field investigation of bedrock in the EOD area (Hager GeoScience 2004). The consultant collected information on composition, strike and dip, and fractures of bedrock at Site 12 and the surrounding area.

- On 1 June 2004, EOD activities at NAS Brunswick were officially deactivated.

- In 2004, a Tactical Air Navigation System was constructed to the south of Site 12 (approximately 850 ft between the navigation system and magazines and Site 12). The EOD area site was not impacted by the construction.

- In 2005, renovation and replacement of the magazines to the west and southwest of the EOD area are planned (approximately 850 ft between the navigation system and magazines and Site 12). The EOD area will not be impacted by the construction.

1.3 BACKGROUND

1.3.1 Physical Characteristics

The EOD area occupies approximately 50 percent of a suspected former sand/gravel pit. The overburden geology of the site is known from the 3 test pits excavated within the bermed area installed during the Supplemental RI (E.C. Jordan 1991). Bedrock (micaceous schist) was encountered at 3 ft below ground surface in 2 of 3 test pits. Both test pits had fill and disturbed soil over 1-2 ft of very dense till. Water was also observed seeping into the bottom of 1 of 2 test pits. At the third test pit, till and bedrock were not encountered within the first 6 ft. The third test pit had 2 ft of fill or disturbed soil on top of desiccated, very stiff, gray silty clay. Bedrock geology at Site 12 is characterized by thinly bedded gray schist. Bedding planes and schistosity of the formation strike to the north-northeast, and dip steeply to the southeast.

Groundwater at Site 12 is believed to flow within the thin overburden soils overlying bedrock. Groundwater may also flow within the upper portion of the bedrock unit. Based on the location of Site 12 relative to Mere Brook, groundwater is presumed to flow in a generally western direction and discharge to Mere Brook. No monitoring wells were installed at this site, therefore, site-specific groundwater flow is not known.

1.3.2 Land and Resource Use

The EOD area at NAS Brunswick in located in the southeast portion of the base. The site is located in a remote, large, open upland area on Buttermilk Mountain. Access is gained by an access road. The EOD area structures consist of a bermed area approximately 60 × 100 ft, with 5- to 6-ft berms, and a control bunker approximately 100 ft to the southwest from the bermed area.

Groundwater associated with the site is not used for any reason.

1.3.3 History of Contamination

Minor contamination at Site 12 is directly related to the past uses of the area. Site 12 was used between 1981 and 1 June 2004 for disposal of small quantities of ordnance, pyrotechnics, privately manufactured explosive devices, and war souvenirs. A list of materials detonated between 1991 and 2003 is provided in Table 1.

1.3.4 Initial Response

In June 1983, an IAS was completed which detailed historical hazardous material usage and waste disposal practices at NAS Brunswick. The IAS identified the EOD area as a range or impact zone. No further information was provided.

1.3.5 Basis for Taking Action

In March 1989, as part of the Draft Final Supplemental RI/FS, 3 test pits were excavated within the bermed area. Three soil samples were collected from each test pit and analyzed for explosives and explosive by-products including 2,4,6-trinitrotoluene, cyclotrimethylenetrinitraniine, cyclotetramethylenetetranitramine, 2,4-dinitrotoluene, 2,6-dinitrotoluene, and tetryl. The soils also were analyzed for metals associated with explosive material including cadmium, chromium, mercury, lead, phosphorus, and total nitrogen.

Explosive compounds were not detected in any of the test pits. Low levels of chromium (11-62 mg/Kg), lead (9-47 mg/Kg), and phosphorus (100-530 mg/Kg) were detected in all analytical soil samples. Nitrate/nitrite was detected in 2 soil samples with 2 mg/Kg found in a 1-ft sample and 1.1 mg/Kg detected in another 1-ft sample. Mercury (at 0.27 mg/Kg) was also detected 1 sample.

Environmental contamination at Site 12 was restricted to shallow soils. The presence of low levels of mercury (0.27 mg/Kg), nitrate/nitrite (2 mg/Kg), and nitrogen (1.1 mg/Kg) are consistent with the limited EOD activity reported at Site 12. The Draft Final Supplemental RI/FS assumed that the mercury detections were likely related to mercury fulminate, which is used in fuses and detonators. The nitrate/nitrite residues are commonly produced in the burning of explosive materials. The detections of chromium, lead, and phosphorus in all test pit soil samples are believed to represent background distribution of these metals.

A baseline human health risk assessment was conducted at Site 12 during the Draft Final Supplemental FS. The findings from the risk assessment are summarized below.

1.3.5.1 Exposure Assessment

Site 12 is remote, within a highly secured area of the base where access is controlled. Since children cannot access this area, direct contact exposure to soils is considered unlikely; therefore, exposure to children under a current land use scenario was not evaluated. There is a very limited exposure in this area to contaminated soil during work-related activities due to its remote location and limited frequency of human access into the site area. Historically, there was only one burn per year at the site from 1984 through 1989 (E.C. Jordan 1992). With limited frequency of exposure and the low concentrations of contaminants in both surface and subsurface soils, dermal absorption and incidental ingestion of soils were not evaluated for the current land use. A residential scenario, using the maximum concentrations of contaminants in soil, was used as a worst-case estimate of future exposures through dermal absorption and inadvertent ingestion.

1.3.5.2 Human Health Risk Characterization

Based on the restricted access to this site, direct contact exposure to contaminated soils is considered unlikely. In addition, contaminant concentrations in surface soils are below levels considered to present a public health risk. Lifetime residential exposure to maximum contaminant concentrations in soils at Site 12 results in insignificant non-carcinogenic risks. The total estimated site Hazard Index was below 1 for both children (0.609) and adults (0.166). No carcinogenic risks are posed by the contaminants identified at Site 12.

A Draft Final Supplemental RI was completed in 1991 and a Feasibility Study was completed in 1992 by E.C. Jordon. The FS found a "No Action" alternative appropriate for Site 12 because the baseline risk assessment did not indicate a risk to either human health or the environment; therefore, an initial response was not required. Due to the continued use of Site 12 since the 1991 RI/FS, additional investigation activities have been requested by MEDEP to confirm the findings of the 1991 RI/FS, and to determine if continued use of the EOD area has created any additional environmental impacts. The Navy is currently planning to further investigate Site 12 to define and determine the nature and extent of contamination associated with the historic activities at the site.

1.4 REMEDIAL ACTIONS

No remedial actions have been taken at Site 12. Any remedial action will be documented in a Record of Decision (ROD).

1.4.1 Remedy Implementation

No remedy has been implemented at Site 12. Any remedy will be implemented following the signing of a ROD.

1.4.2 System Operation/Operation and Maintenance

Any remediation system and subsequent operation and maintenance needed at Site 12 will follow implementation of a ROD.

1.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the first five-year review for this site.

1.6 FIVE-YEAR REVIEW PROCESS

1.6.1 Administrative Components

Refer to Section 1.

1.6.2 Community Involvement

Refer to Section 1.

1.6.3 Document Review

Documents reviewed are referenced and included in the list of References.

1.6.4 Data Review

No groundwater or soil data have been collected since the Draft Final Supplemental RI/FS. Further investigation has been requested by MEDEP.

1.6.5 Site Inspections

On 2 March 1989, in support of the Supplemental RI, a site inspection was completed, 3 test pits were installed, and soil samples were collected.

1.6.6 Interviews

On 2 March 1989, in support of the Supplemental RI, an interview with the EOD detachment was conducted.

1.7 TECHNICAL ASSESSMENT

Question A: *Is the remedy functioning as intended by the decision documents?*

The section is not applicable because the site is still under investigation. A remedy has not been selected for Site 12. A ROD has not been put in place.

Question B: *Are the exposure assumptions, toxicity data, cleanup values, and remedial objectives used at the time of the remedy selection still valid?*

The section is not applicable because the site is still under investigation.

Changes in Standards and To-Be-Considered

The section is not applicable because the site is still under investigation.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The section is not applicable because the site is still under investigation.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

The section is not applicable because the site is still under investigation.

Technical Assessment Summary

The section is not applicable because the site is still under investigation.

1.8 ISSUES

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
MEDEP has requested further investigation to confirm the findings of the 1991 RI/FS	NA	Yes

1.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date[a]	Affects Protectiveness	
					Current	Future
MEDEP has requested further investigation to confirm the findings of the 1991 RI/FS	Further investigate the soil and groundwater at Site 12 to confirm the 1991 RI/FS findings and determine if the continued use of Site 12 as an EOD area has impacted the site. A Work Plan is recommended.	Navy	EPA/ MEDEP	12/30/05	NA	Yes

(a) A set date where an action will be taken to address a particular issue.

1.10 PROTECTIVENESS STATEMENT

This site is in the investigation phase, therefore, a ROD has not yet been signed for Site 12; i.e. the remedy for the site has not been selected. A protectiveness determination of the remedy at these sites cannot be made at this time until further information is obtained.

1.11 NEXT REVIEW

The next five-year review for the NAS Brunswick facility that includes Site 12 is required by 6 December 2009, 5 years from the date of this review.

2. SITE 17 (FORMER BUILDING 95)

2.1 SITE DESCRIPTION

Site 17 is located in the north-central area of the base, one block north of Fitch Avenue at the corner of Fifth Street and Avenue B (Figure 1). The site is bounded to the northeast by the former Old Navy Fuel Farm, to the southeast by Avenue B, and to the southwest to northwest by Fifth Street (Figure 3). South of Avenue B there were abandoned railroad tracks running parallel to Avenue B that were removed in 1994. The Building 95 site housed base pest control operations that included storage, mixing, and disposal of pesticides and herbicides from 1955 until 1985. In 1985, pest control operations moved from Building 95 to Building 647.

There were 3 former buildings located on the site:

1. Building 95 was constructed in the late 1940s and had approximate dimensions of 15 ft × 20 ft. It was a 1-story building constructed of wood on a cinder block foundation. At a later date, a heated storage shed with a plywood floor was added to the north side of Building 95 that measured approximately 8 ft × 11 ft. A drum storage rack was located outside of the building along the eastern side. Subsurface utilities consisted of potable water and steam that provided heat for the building. The building was served by a 500-gal, stainless steel septic tank and associated tile overflow pipe. The building and septic tank were removed from the site between January and February 1994.

2. Building 31 was located east of Building 95 and had approximate dimensions of 12 ft × 25 ft. The date of construction of Building 31 is unknown. The building was built on 4 concrete footings. This building was used by NAS Brunswick workers conducting asbestos abatement for changing and showering. Reportedly, shower and lavatory facilities were connected to and shared the septic system that served Building 95. Subsurface utilities consisted of potable water and steam that provided heat, while electricity for Building 31 was provided by overhead wires. Building 31 was removed from the site between January and February 1994.

3. A storage shed was located north of Building 95 that had approximate dimensions of 8 ft × 10 ft and was constructed on a cinder block foundation. The storage shed was used to store asbestos abatement equipment. The shed was not used to store asbestos-contaminated materials. The storage shed was removed from the property between January and February 1994.

Currently, the ground surface at the site is grass covered and has small trees and shrubs also located within the site boundary. The site topography slopes gently downward from the west and north to the east and southeast and has no distinct surface water drainage features.

2.2 SITE CHRONOLOGY

- Beginning in 1955, the Building 95 site was used as the base pest control operations, including storage, mixing, and disposal of pesticides and herbicides.

- On 26 November 1980, MEDEP issued an Interim License for storage of hazardous wastes at NAS Brunswick. The interim license also included provisions for storage of pesticide wastes at the Building 95 site.

- In June 1983, an IAS was completed which detailed hazardous waste material usage and waste disposal practices at NAS Brunswick. The IAS identified pesticides and herbicides stored at Building 95 (Roy F. Weston 1983).

- In 1985, pest control operations moved from Building 95 to Building 647.

- On 13 June 1986, NAS Brunswick requested to terminate the Interim License and submitted a Closure Plan for MEDEP review and approval.

- In July 1987, NAS Brunswick was placed on EPA's National Priorities List.

- On 8 July 1988, the Closure Plan was revised and approved by MEDEP.

- In September 1990, 4 soil samples were collected at the site for analysis of pesticides. Dichlorodiphenyldichloroethylene (DDE) and dichlorodiphenyltrichloroethane (DDT) were found at all 4 soil sample locations. The highest concentrations of these detected pesticides occurred at the drum storage/rinse rack along the east side of Building 95. Based on these data, the Navy decided to perform an Engineering Evaluation/Cost Analysis (EE/CA) in support of a soil removal action (ABB-ES 1993a).

- In October 1990, the Navy entered into a Federal Facilities Agreement with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick.

- On 9 May 1991, the Navy requested that removal actions at the site be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and that the site be included in the Installation Restoration Program from MEDEP.

- On 22 May 1991, MEDEP issued a Resource Conservation and Recovery Act Closure Order for NAS Brunswick that included a specific condition for the Building 95 site.

- On 29 May 1991, MEDEP concurred with the Navy's request to proceed with cleanup of the site under CERCLA. MEDEP noted that the removal action must be undertaken in accordance with Section XI: Removal and Emergency Actions of the Federal Facilities Agreement for NAS Brunswick (MEDEP 1991).

- In November 1991, the Navy submitted a Site Evaluation Work Plan for Building 95. The Work Plan presented the site-specific activities for evaluating soil and groundwater at the site, conducting wipe sampling of the building surfaces, and evaluating the septic system at the site.

- Between June and July 1992, soil sampling to support the EE/CA was completed. The data identified pesticides and herbicides in soils and on several structures. The pesticides detected most frequently included DDT, dichlorodiphenyldichloroethane (DDD), DDE, pyrethrins, dieldrin, and chlordane.

- In November 1992, the Navy completed and issued the EE/CA for the Building 95 site. The purpose of the EE/CA was to identify removal action objectives for pesticide-contaminated soil at the site and evaluate removal action alternatives that would achieve the objectives.

- As part of the EE/CA, a baseline risk assessment was completed and indicated that exposure to contaminated soil at the site poses a risk to both human and ecological receptors. The greatest risks to humans for carcinogenic and non-carcinogenic effects were associated with exposure to DDT, DDD, and DDE. Similarly, DDT posed the greatest acute and chronic risks to ecological receptors.

- In April 1992, the Navy issued an Action Memorandum. The Action Memorandum served as the primary decision document to sustain the removal action. The primary groundwater contaminants at Building 95 include 4,4, DDE, 4,4,-DDT, endrin, alpha chlordane, gamma chlordane, and heptachlor epoxide.

- In June 1993, the Navy issued the Remedial Design Summary Report (ABB-ES 1993b) for Building 95. This document defined the design basis and provided design information for removal action at the site.

- In 1994, MEDEP adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing Construction, Altering, and Operation Certain Types of Hazardous Waste Units.

- Between January and February 1994, Buildings 31 and 95, the storage shed, septic tank, and railroad lines were demolished and removed from the site.

- From 2 February through 2 March 1994, the Navy completed the initial excavation of soils that exceeded the Preliminary Remedial Goals (PRGs), and remedial action was conducted at the site. A total of 1,260 yd^3 of soil was excavated from the site.

- In August 1994, the Final Long-Term Monitoring Plan for Building 95 was completed.

- On 17 October 1994, additional site soil excavation was conducted based on the results of the confirmatory soil samples collected in February 1994. Four areas north of Avenue B were targeted for additional excavation based on the February 1994 sample data. An additional 45 yd^3 of material was excavated from the site.

- In December 1994, additional excavation of 5 yd^3 of soil was conducted due to sample results from confirmatory sampling conducted after the October 1994 excavation event. Two areas, around the former septic tank and leach bed, were found exceeding the PRGs.

- In March 1995, long-term monitoring was initiated for the Building 95 site.

- In June 1996, following Monitoring Event 4, the Long-Term Monitoring Plan sampling frequency at the Building 95 site was reduced from quarterly to tri-annual.

- During 1997, the Navy conducted 7 groundwater gauging events at the site to assess the direction of groundwater flow at Building 95 and 2 other contiguous sites, the Old Navy Fuel Farm and Site 7. The 7 gauging events were conducted in January, March, May, July, August, September, and November 1997 (EA 1999).

- In 1997, following Monitoring Event 7, the Long-Term Monitoring Plan sampling frequency at the Building 95 site was reduced from tri-annual to annual.

- In May 1998, the Navy's contractor, HLA, conducted soil and groundwater sampling at Building 95 using direct-push techniques. This sampling effort was requested by MEDEP after a discrepancy between field and offsite laboratory results for 1 of the laboratory samples caused some uncertainty as to whether PRGs were fully attained.

- In June 1998, the Summary Report on Sampling and Analysis of Soil and Groundwater at Building 95 concluded that the previous soil results from the offsite laboratory were anomalous, and that the May 1998 sample results were well below the PRG established for the removal action.

- In August 1998, the Draft Final Closure Report was issued for the removal action activities completed at the Building 95 site between January 1994 and April 1995.

- In 2000, following Monitoring Event 10, the Long-Term Monitoring Plan sampling frequency at the Building 95 site was increased from annual to biannual.

- In March 2000, the Navy installed 2 downgradient wells (MW-NASB-097 and MW-NASB-098) at the request of MEDEP.

- In May 2000, the Long-Term Monitoring Plan was revised based upon discussions with EPA, MEDEP, and members of the Restoration Advisory Board.

- In December 2000, the Navy updated the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use*. This version of the Operating Instruction includes groundwater use restrictions and excavation restriction for the Building 95 site. The Navy, with input from the regulators, is in the process of updating the Base Operating Instruction to ensure that the regulators are notified of any potential future groundwater use prior to installation (except in matters relating to National security). The regulators will be given the opportunity to comment on future revisions of the Base Operating Instruction NASBINST 5090.1B, Restrictions on Excavation Activities and Groundwater Use.

- In April 2001, groundwater monitoring well MW-NASB-067 was returned to the Long-Term Monitoring Program at the request of MEDEP. During Monitoring Event 13, rotenone was added to the Long-Term Monitoring Plan analyte list.

- In July 2001, the MEDEP agreed that avitrol could be eliminated from the Long-Term Monitoring Program. Avitrol had not been detected in the groundwater since 1992. In the same memorandum, MEDEP requested that pesticides maleic hydrazide and rotenone be analyzed for in the next scheduled Long-Term Monitoring Program event.

- In September 2001, the Navy analyzed the groundwater samples for the pesticide rotenone along with maleic hydrazide. Additional groundwater samples were collected from monitoring wells MW-NASB-067, MW-NASB-097, and MW-NASB-098.

- In October 2001, 2 additional wells (MW-NASB-062 and MW-NASB-209R) were added to the gauging task of the Long-Term Monitoring Program at Building 95.

- In April 2002, project stakeholders agreed to eliminate the following analytical parameters for groundwater samples:

  — Target Compound List (TCL) volatile organic compounds (VOCs)
  — TCL semivolatile organic compounds (SVOCs)
  — Target Analyte List (TAL) metals
  — Rotenone.

- In August 2002, the Navy requested that the pesticide maleic hydrazide be eliminated from the Long-Term Monitoring Program at Building 95.

- In August 2002, MEDEP did not concur that the pesticide maleic hydrazide be eliminated from the Long-Term Monitoring Program at Building 95, and requested additional rounds of sampling for maleic hydrazide.

- On 23 September 2002, EPA agreed to the Navy's August 2002 proposal to eliminate maleic hydrazide from the Building 95 Long-Term Monitoring Program.

- In Spring 2003, as a result of discussions between the Navy and MEDEP, well MW-NASB-097 would be sampled for maleic hydrazide, but only after the water level had reached 71.5 ft mean sea level or higher elevation, which represented seasonal high groundwater conditions.

- In April 2003, the water level had reached 71.5 ft mean sea level and was sampled for maleic hydrazide at well MW-NASB-097. No maleic hydrazide was detected in the sample collected from well MW-NASB-097.

- In September 2003, the Navy issued a letter to MEDEP requesting that maleic hydrazide be eliminated from the Long-Term Monitoring Program at Building 95.
- On 16 September 2003, MEDEP issued a letter of concurrence at Navy's request.

- In October 2004, a dog kennel was completed to the north, abutting the Building 95 site.

- In November 2004, the Navy issued a revised (Revision 2) Long-Term Monitoring Plan for the Building 95 site.

- As of February 2005, 20 Long-Term Monitoring Program events have been completed at Building 95.

- Pesticides, rotenone, heptachlor epoxide, and alpha-chlordane have been reported in groundwater samples collected from monitoring wells MW-NASB-068 and MW-NASB-097 at Building 95 at concentrations exceeding the MEGs/MCLs.

2.3 BACKGROUND

2.3.1 Physical Characteristics

Currently, the ground surface at the site is grass covered and has small trees and shrubs also located within the site boundary. The site topography slopes gently downward from the west and north to the east and southeast and has no distinct surface water drainage features. The surrounding area is relatively level.

The overburden geology in the vicinity of the Building 95 site consists of well sorted sand and silty clay units. Generally, the glacio-marine clay underlies the sand unit and has been reported to be approximately 8-ft thick. The depth to bedrock at the site has not been determined. As part of remediation activities conducted at the site, the upper portion of the area of concern at the site was excavated, a geotextile liner was emplaced, and the excavation backfilled with clean fill. Excavation activities resulted in the removal of up to 7 ft of soil from the site.

The overburden water table is generally present at 5-10 ft below ground surface. Groundwater flow is generally toward the southeast. Four monitoring wells (MW-NASB-065, MW-NASB-066, MW-NASB-067, and MW-NASB-068) were installed at the site in 1993. Two additional monitoring wells (MW-NASB-097 and MW-NASB-098) were installed in March 2000.

The total depths of site monitoring wells range from 15 to 20 ft below ground surface.

2.3.2 Land and Resource Use

The Building 95 site housed base pest control operations that included storage, mixing, and disposal of pesticides and herbicides from 1955 until 1985. In 1985, pest control operations moved from Building 95 to Building 647. Currently, the ground surface at the site is grass covered and has small trees and shrubs also located within the site boundary.

A dog kennel was constructed in October 2004 abutting the site to the north.

The base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course and Dyers Corner gate entrance guard station. A bedrock well is located approximately 200 ft west of Site 2 Landfill. This well was installed in 2002 and is screened below a relatively impermeable marine clay.

2.3.3 History of Contamination

The Building 95 site housed base pest control operations that included storage, mixing, and disposal of pesticides and herbicides from 1955 until 1985. During the winter months, chemicals were stored in the building to keep from freezing. Additional storage space was available in the detached storage building located to the north.

The IAS lists the past pesticide and herbicide use at NAS Brunswick, including the estimated quantities of use per year. The following pesticides were identified in the IAS as being stored at Building 95: malathion, diazinon, Baygon, pyrethrin, cyndgas, Sevin, esmethrin, 4,4'-DDT (used from 1955 to 1970), chlordane (used from 1955 to 1970), dieldrin (used in 1960), zinc phosphide (used from 1970 to 1975), arsenic lead (used from 1960 to at least 1983), rotenone (used from 1960 to at least 1983), and Avitrol (used from 1960 to 1980). Lindane and carbaryl may also have been used. The following herbicides were identified in the IAS as being stored at Building 95: drexel, simazine, monuron trichloroethane, 2,4-dichlorophenoxyacetic acid (used from 1955 to at least 1983), 2,4,5-trichlorophenoxyacetic acid (used in 1978), and maleic hydrazide. The most commonly used liquid chemicals, such as malathion, DDT, and drexel, were reportedly stored in drums on a rack outside of Building 95.

NAS Brunswick personnel respond to service calls on an as-needed basis. Pesticide and herbicide chemicals and a carrier such as water or kerosene were mixed when needed. Prior to 1976, any materials left over after the service call reportedly was dumped onsite at Building 95. Dumping of unused materials stopped in 1976. Empty containers were rinsed, crushed, and put in the trash for disposal.

Previous investigations identified the presence of several herbicides and pesticides, including 4,4'-dichlorodiphenyltrichloroethane and pyrethrins, in the soil and on the structures at the site. Additionally, low concentrations of pesticides and inorganics were reported in the groundwater samples. The site groundwater is monitored on a bi-annual basis for pesticides with the monitoring results provided in monitoring event reports.

2.3.4 Initial Response

In June 1983, an IAS of NAS Brunswick was completed. The IAS identified that pesticides and herbicides were stored at the Building 95 site. Some of the pesticides and herbicides stored at Building 95 were DDT, chlordane, dieldrin, zinc phosphide, arsenic lead, rotenone, pyrethrum, avitrol, 2,4-dichlorophenoxyacetic acid, and 2,4,5-trichlorophenoxyacetic acid.

2.3.5 Basis for Taking Action

In September 1990, 4 surface soil samples were collected by the Navy in the vicinity of Building 95, and analyzed for TCL pesticides and polychlorinated biphenyls. The initial sampling results indicated that the soils were impacted with DDT, and its degradation products DDD and DDE. No polychlorinated biphenyls were detected. Based on these data and the small size of the site (less than 1 acre), the Navy decided to perform an EE/CA in support of a soil removal action.

From June through July 1992, the Navy conducted a site evaluation in order to evaluate the vertical and horizontal distribution of the soil contamination and the potential risk, develop preliminary remediation goals, and evaluate the engineering alternatives to address the pesticide-contaminated soils. Soil samples were collected by direct-push methods and analyzed by an onsite field gas chromatograph and at an offsite laboratory. The pesticides detected most frequently were DDT, DDD, DDE, pyrethrins, dieldrin, and chlordane. The maximum detected concentrations of DDT, DDD, and DDE were 310 mg/Kg, 81 mg/Kg, and 27 mg/Kg, respectively. Dieldrin, chlordane, and pyrethrins were detected at maximum concentrations of 88 mg/Kg, 130 mg/Kg, and 5,000 mg/Kg, respectively. DDT was detected as deep as 16 ft below ground surface at a concentration of 2.2 mg/Kg. As part of the site evaluation effort, groundwater samples were also collected from direct-push locations and analyzed for VOCs, SVOCs, pesticides/herbicides, and metals. No VOCs, SVOCs, or herbicides were detected in the samples. DDT, rotenone, and some metals were identified in the samples at concentrations greater than background. As a result of these groundwater samples, a subsequent groundwater sampling event that used the site monitoring wells was planned for the near future.

The baseline risk assessment conducted as part of the November 1992 EE/CA concluded that exposure to contaminated soil at the site poses a risk to both human and ecological receptors. The greatest risks to humans for both carcinogenic and non-carcinogenic effects are associated with exposure to DDT, DDD, and DDE. The pesticide DDT was found to pose the greatest acute and chronic risks to ecological receptors. The highest concentrations of DDT were detected in shallow surface soils.

The EE/CA presented PRGs for the site, and a soil cleanup level of 0.5 mg/Kg was developed for DDT in surface soils (0-2 ft). This concentration is at a level below protection of human health exposures, although slightly above the ecological PRG of 135 mg/kg that would have destroyed the forested habitat along the northern section of the site in the process of removing the contaminated soil. In addition, a 135 mg/Kg PRG for subsurface soils (2-4 ft below ground surface) was developed for DDT.

In January 1993, 12 surface soil samples were collected at the site and submitted for laboratory analysis for VOCs, SVOCs, pesticides and herbicides, and TAL metals. The purpose of this sampling event was to better define the area of soils requiring remediation. Concentrations of DDT, DDD, and DDE at 11 of 12 sampling locations were below the PRG of 0.5 mg/Kg for total DDT, DDD, and DDE. The total concentration of DDT, DDD, and DDE at SS-9 was 1.6 mg/Kg; and because this sample location was found exceeding the PRG, this sample location area was included in the area to be excavated. Total pyrethin concentrations were identified at sample locations SS-9 (54 mg/Kg) and SS-11 (970 mg/Kg) exceeding the total pyrethin PRG of 10 mg/Kg. As a result, these areas were included in the area to be excavated at the site.

In February 1993, the Navy collected groundwater samples from the 4 existing site monitoring wells. The groundwater was collected and submitted for laboratory analysis for VOCs, SVOCs, pesticides and herbicides, and TAL metals. The data are presented in Appendix A of the 1993 Action Memorandum. Six pesticides were identified in the groundwater samples: DDT, DDE, endrin, alpha chlordane, gamma chlordane, and heptachlor epoxide. Several of the detected pesticide compounds were found exceeding Federal Maximum Contaminant Levels (MCLs) and State MEGs. Gamma chlordane was detected greater than the Federal MCL (2.0 µg/L) and the Maine MEG (0.27 µg/L).

In the June 1993, Remedial Design Summary Report (ABB-ES 1993b), a PRG for soils contaminated with the pesticide pyrethrin was developed for soils to a depth of 2 ft below ground surface; therefore, soils found exceeding a concentration of 10 mg/Kg would be required to be excavated from the site.

2.4 REMEDIAL ACTIONS

Between January and February 1994, Buildings 31 and 95, the storage shed, septic tank, and railroad lines were demolished and removed from the site. Prior to demolition, an asbestos abatement contractor removed all asbestos-containing materials from these structures and transported 64 bags of asbestos-containing material to a disposal facility in Michigan. After the asbestos abatement was complete, the buildings were demolished and the debris transported as hazardous waste for disposal in Michigan. The septic tank was removed, cleaned, cut into pieces, and disposed of as hazardous debris. The septic tank was found to contain a black, "cake-type" sludge, which was removed and stockpiled with the excavated soil for transport and disposal. Railroad ties were removed from approximately 150 ft of abandoned rail line south of Avenue B and disposed of as hazardous debris at a disposal facility in Michigan.

From 2 February through 2 March 1994, the Navy completed the initial excavation of soils that exceeded the PRGs remedial action. A total of 1,260 yd^3 of soil was excavated from the site and transported to a disposal facility for incineration at the Aptus, Inc. incineration facility in Aragonite, Utah. Confirmatory soil sampling was completed at the limits of the excavation and identified the presence of site contaminants at concentrations exceeding the established PRGs.

On 17 October 1994, additional site excavation was conducted based on the results of the confirmatory soil samples collected in February 1994. Four areas north of Avenue B were targeted for additional excavation based on the February 1994 sample data. An additional 45 yd^3 of material was excavated from the site. In addition, an area immediately south of Avenue B was found exceeding the surface soil PRGs, but not the subsurface soil PRGs. The soil from this area was excavated and placed in a 6-in. layer within the area of previously excavated material south of Avenue B (Figure X **[to be determined]**). This 6-in. layer of soil was then covered with 2 ft of common fill during site restoration.

In December 1994, additional excavation was conducted due to sample results from confirmatory sampling conducted after the October 1994 excavation event. Two areas, around the former septic tank and leach bed, were found exceeding the PRGs. A total of 5 yd^3 was removed during December 1994 and transported to the Aptus incineration facility for disposal.

2.4.1 Remedy Implementation

The section is not applicable because this site is still under investigation. Building 95 does not have a ROD in place.

2.4.2 System Operation/Operation and Maintenance

The section is not applicable because this site is still under investigation. Although a ROD does not exist for Building 95, long-term groundwater monitoring is conducted twice a year (during the spring and fall of each year) for investigative purposes.

2.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the first five-year review for this site.

2.6 FIVE-YEAR REVIEW PROCESS

2.6.1 Administrative Components

Refer to Section 1.

2.6.2 Community Involvement

Refer to Section 1.

2.6.3 Document Review

Documents reviewed are included in the list of References.

2.6.4 Data Review

Long-term monitoring was initiated in May 1995 at Building 95. As of February 2005, 20 sampling events have been completed under the Long-Term Monitoring Program. The Navy finalized the revised Long-Term Monitoring Plan for Building 95 in November 2004.

Between May 1995 and September 2001, the Long-Term Monitoring Plan at the Building 95 site required groundwater samples to be collected for TCL VOCs, TCL SVOCs, TAL metals, pesticides, rotenone, maleic hydrazide, and pyrethrines. In April 2002, the project stakeholders agreed to eliminate the following analytical parameters due to a history of non-detects or very low level concentrations: TCL VOCs, TCL SVOCs, TAL metals, and rotenone. Pesticides and maleic hydrazide remained required sampling analysis in the Long-Term Monitoring Plan.

The recent final monitoring event reports note that there are pesticides in the groundwater present in the low parts per billion range, which is consistent with the past use of the site as a pesticide storage, mixing, and distribution point. Two pesticides exceeding State MEGs have been detected in 1 site well (MW-NASB-097) in the past. These 2 compounds, heptachlor epoxide and alpha-chlordane, have noted a relatively stable concentration trend which has exceeded the State MEG in past monitoring events; however, alpha-chlordane has shown a decreasing trend since October 2001. In the April 2004 monitoring event data, neither compound was found exceeding the State MEGs.

2.6.5 Site Inspections

Site inspections are conducted during each long-term monitoring sampling event that occurs in the spring (April) and fall (September) of each year. The results of the inspection are documented in the monitoring event reports generated for each long-term monitoring sampling event. As of October 2004, 20 sampling events (and subsequent site inspections) have been completed under the Long-Term Monitoring Program.

2.6.6 Interviews

No interviews were conducted as part of the five-year review process.

2.7 TECHNICAL ASSESSMENT

Question A: *Is the remedy functioning as intended by the decision documents?*

The section is not applicable because this site is still under investigation.

Question B: *Are the exposure assumptions, toxicity data, cleanup values, and remedial objectives used at the time of the remedy selection still valid?*
The section is not applicable because this site is still under investigation. Although the Building 95 site does not have a ROD in place, a risk assessment was completed as part of the EE/CA in November 1992. The 1992 risk assessment was completed to estimate the potential risks to human health and the environment from exposure to the site contaminants of concern detected

in the soil and groundwater. The baseline risk assessment indicated that exposure to contaminated soil at the site posed a risk to human and ecological receptors. The greatest risks to humans for carcinogenic and non-carcinogenic effects were associated with exposure to DDT, DDD, and DDE. DDT was found to pose the greatest acute risk and chronic risk to ecological receptors. In 1994, the surface soil contaminated with DDT and/or pyrethrins was removed from the site, except for some pyrethrin-contaminated soil south of Avenue B. The pyrethrin-contaminated soils south of Avenue B were excavated and then consolidated in the center of excavation area south of Avenue B. This area of the site was then covered with 2 ft of clean fill and the relocated pyrethrin-contaminated soils were marked with a geotextile placed over these soils. Since the removal action was completed, the risk of exposure to the surface soils has been removed.

Changes in Standards and To-Be-Considered

The section is not applicable because this site is still under investigation.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The section is not applicable because this site is still under investigation.

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

The section is not applicable because this site is still under investigation.

Technical Assessment Summary

The section is not applicable because this site is still under investigation.

2.8 ISSUES

Issue	Currently Affects Protectiveness	Affects Future Protectiveness
No consensus statement	No	No
Pesticide contaminated soil remains at the site south of Avenue B	No	Yes
Removal Action Report not finalized	No	Yes
Additional sampling to support clean closure of the site is needed	No	Yes
New institutional controls for soil or groundwater	No	Yes

2.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date[(a)]	Affects Protectiveness?	
					Current	Future
No Consensus Statement	Generate Consensus Statement to allow agreement from stakeholders to transition site from Resource Conservation and Recovery Act to CERCLA	Navy	EPA MEDEP	2005	No	No
Pesticide contaminated soil remains at the site south of Avenue B	Excavate and dispose of pesticide contaminated soil that was placed south of Avenue B in 1994 during the soil removal action	Navy	EPA/ MEDEP	2006	No	Yes
Removal Action Report not finalized	Finalize the Removal Action Report	Navy	EPA/ MEDEP	2006	No	Yes
Additional sampling is needed to support clean closure of the site	Conduct additional sampling to support clean closure of the site	Navy	EPA/ MEDEP	2006	No	Yes
Development of institutional controls	Revise the NAS Brunswick Base Instructions for institutional controls after developing site-specific boundaries	Navy	EPA/ MEDEP	2006	No	Yes

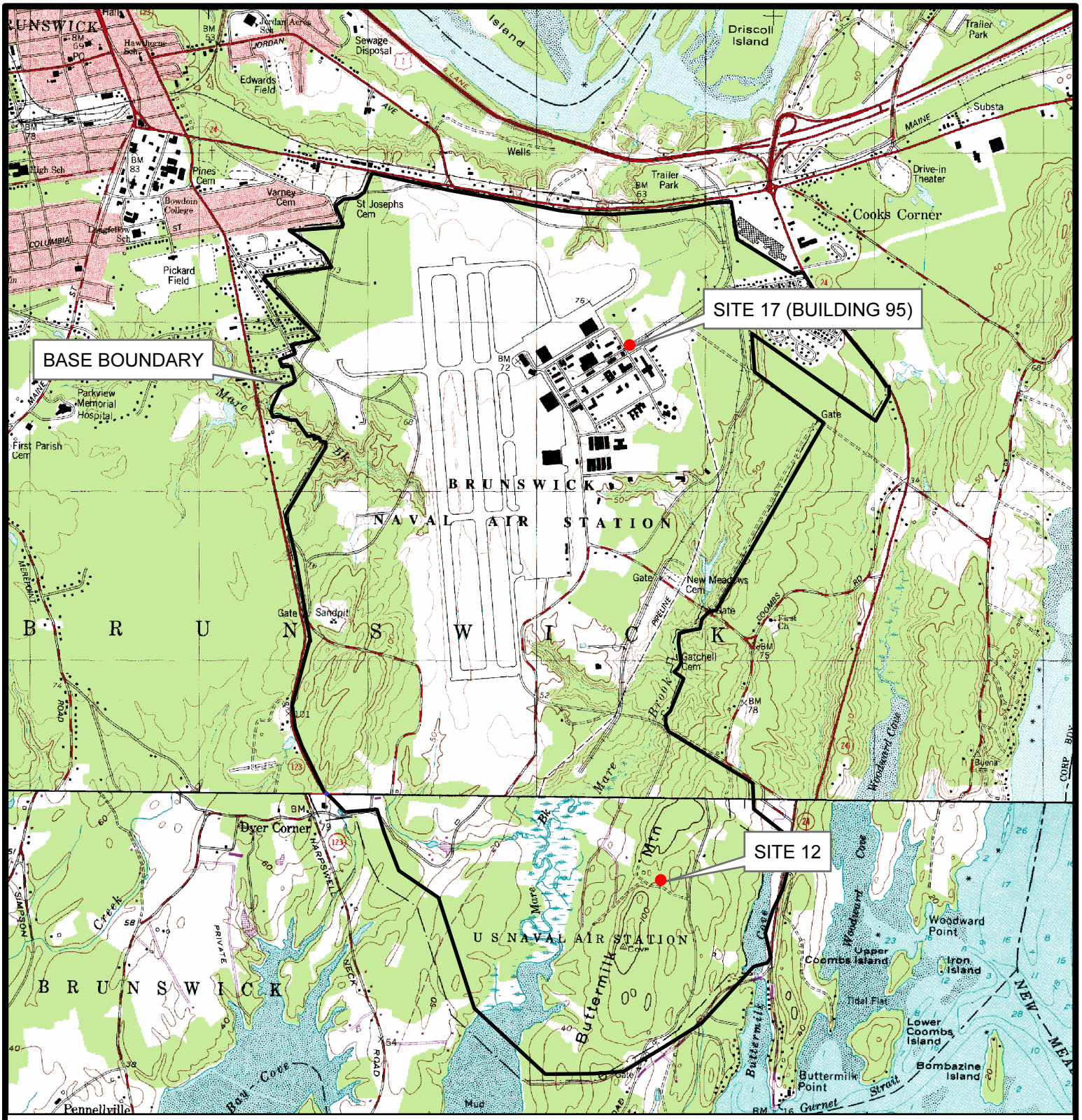
(a) A set date where an action will be taken to address a particular issue.

2.10 PROTECTIVENESS STATEMENT

This site is in the investigation phase, therefore, a ROD has not yet been signed for Building 95; i.e., the remedy for the site has not been selected. A protectiveness determination of the remedy at this site cannot be made at this time until further information is obtained.

2.11 NEXT REVIEW

The next five-year review for the NAS Brunswick facility that includes Building 95 (Site 17) is required by 6 December 2009, 5 years from the date of this review.



0 375 750 1,500 2,250 3,000 Feet

N

EA®	NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 1 SITE LOCATION MAP

PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	SCALE:	DATE:	PROJECT NO:	FILE NO:
ACE	DC	DC	ACE	AS SHOWN	FEBRUARY 2005	6177102	I:\NASB\NASB_figB-1_ SITELOCATION.mxd

0 50 100 200 300 400 Feet

N

SITE 12
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2
SITE PLAN

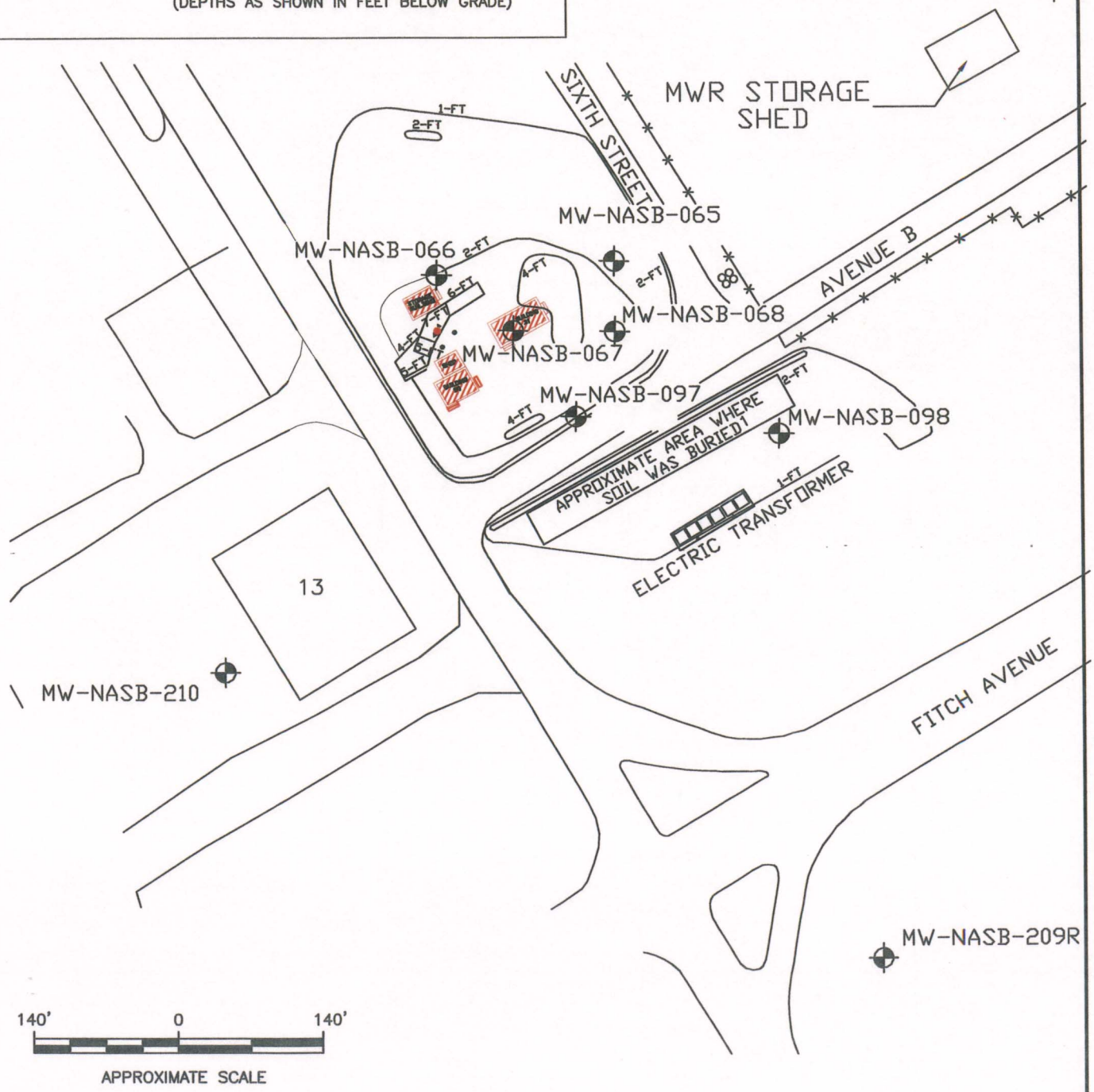
PROJECT MGR:	DESIGNED BY:	CREATED BY:	CHECKED BY:	SCALE:	DATE:	PROJECT NO:	FILE NO:
ACE	DC	DC	ACE	AS SHOWN	FEBRUARY 2005	6177102	I:\NASB\NASB_fig1_ SITE12.mxd

LEGEND

MW-NASB-065	MONITORING WELL LOCATION
ABB26	CONFIRMATORY SOIL SAMPLE LOCATION ABOVE SOIL TO GROUNDWATER PATHWAY CRITERIA
▲	CONFIRMATORY SOIL SAMPLING LOCATION
●	CONFIRMATORY GROUNDWATER SAMPLING LOCATION
	FORMER BUILDINGS
1-FT	APPROXIMATE SOIL EXCAVATION LIMITS (DEPTHS AS SHOWN IN FEET BELOW GRADE)

NOTES:

1. INDICATES SOIL WITH CONCENTRATIONS OF PYRETHRINS BELOW HUMAN HEALTH PRGS. ABB-ES 1993.
2. DETAILS OF SOIL REMOVAL CAN BE FOUND IN THE HARDING LAWSON ASSOCIATES (HLA). 1998. DRAFT FINAL CLOSURE REPORT, BUILDING 95. AUGUST.



DWG. FILE No. F:\Federal\DoD\Navy\2960047\CAD\LTMP\BLD95\2003\event18\SITE17.dwg (Layout: Site Plan)

SITE 17 (BUILDING 95)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 3
SITE PLAN

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
ACE	GMC/JG	SAP	CDS	AS SHOWN	FEBRUARY 2005	61771.02	BLDG 95

TABLE 1 LIST OF MATERIALS DETONATED BETWEEN 1991 AND 2003

Date	Item	Quantity
15 October 1991	M18 SMOKES	16
	M115A2 GROUND BRUST SIM	1
	MK 19 EXPLOSIVE FITTING	1
	MK 20 EXPLOSIVE FITTING	1
	RIFLE GRENADE UNK MK/MOD	1
	WATER GEL	6
	40MM GRENADE	1
	37MM AA CARTRIDGE	1
	AK47 ROUNDS	31
	7.62 BALL	378
	7.62 BALL	141
	20MM USSR	2
	5.56 BLANKS	600
24 October 1991	SQUIBS	37
	M80s	5
	M80s	17
	7.62 TRACER	164
	5.56 BLANKS	500
	20 GAUGE CARTS	2 BX
	VARIOUS FIRING DEVICES	
	SQUIBS/GROUND DISCONNECT	1
	20MM HEI	5
	40MM WHITE STAR	1
	M116 SMOKE	1
	M18A1 SMOKE	1
31 October 1991	CS GRENADES	5
	M1 DYNAMITE STICK	1
	TYPE 100 81MM JAPANESE MOTAR	
	81MM MOTAR	
	M43A1	
	N/M52B10 FUZE	
	M604 AT FUZE (PRAC)	
	M-315-B GAS GEN	
	T45E1 BOOSTER ADAPTERS	9
7 November 1991	T45E1 BOOSTER ADAPTERS	8
	T45E1 BOOSTER ADAPTERS	8
	T45E1 BOOSTER ADAPTERS	8
	T45E1 BOOSTER ADAPTERS	8
10 December 1991	1 BX T45E1 BOOSTERS	8
	1 BX T45E1 BOOSTERS	7
	1 BX T45E1 BOOSTERS	8
	5-in. PROJO MK64	1

Date	Item	Quantity
17 January 1992	M65 SIGNAL GROUND SMOKE	10
	MK64 SUS	1
	2.25-in. PRAC ROCKET	1
	5-in. PROJO MK64	1
30 January 1992	6-in. PROJO	
	6-in. PROJO	
	MK25	2
	40MM PROJO	1
	JAU-1B CADS	3
	LANDMINE	1
	.50CAL BALL	1
	40MM MOTAR	1
12 February 1992	5-in. PROJO	2
	M131 NON-ELEC CAPS	184
23 April 1992	M130 ELEC CAPS	12
6 May 1992	M17 GAS GEN	19
	PUU/13 INITHBERS	34
25 August 1992	M37 A/C CADS	
	30 CAL BLANKS	
	PROJO 12	1 lb
	PIPE BOMBS	
	MT FUZE	
	M115A1 SIM.	
1 April 1993	58MM MOTAR	
	SMALL ARMS AMMO	
	FUZES,	
	HC SMOKE	
	M30 PRAC GRENADE	
	M16A1	
	2.75-in. WHD	
	JAPANESE MOTAR	
	50 CAL	
	37MM PROJO	
	M84A1	
4 May 1993	VARIOUS INERT ITEMS	
	PIPE BOMBS	
	MK25 FLARE	
	M115A2	
24 September 1993	COMP ‘D’ EXPLOSIVE BOOSTER	
	VARIOUS SMALL ARMS/ BLANKS	
	DET CORD LENGTHS FROM AIRSHOW ‘93	
	M1 PRESS + PULL FIRING DEVICES	
	SHAPE CHARGES FROM PERSONAL KIT	
	RETRD/MISFIRED NON-ELEC AND DETONATORS AIRSHOW ‘93	
	M80s	
	SCRAP DATA SHEET	

Date	Item	Quantity
24 September 1993 (Continued)	DET CORD	
	MK 79 PENCIL FLARE KIT	
	MK 2 EXPLOSIVE VALVES	
	MARINE MARKER / FLARES	
	BOWL CHARGES	
22 March 1995	25 MM	5
	M131 CAPS	13
	MK 58	2
	3-in. ROUNDS	2
	STICKS DYNAMITE	6
	M193	137
	40 MM GAUGE	2
	DET CORD	30
30 April 1996	NG DYNAMITE	13
	INTERT GRENADE WITH FUZE	1
22 August 1996	DYNAMITE	10
	NG DYNAMITE	94
	MK182	
9 October 1996	MK25 MLM	4
	2.75 INERT W/H MOTOR MK 1 SERIES	1
	M112	8
	M131	4
	M130	4
	30MM	1
31 October 1996	M232	1
	M179	1
	M031	15
	L55A	1
	FIREWORKS SOFTBALL	1
	B650	1
	L275	1
	MK3 PRAC BOMB	2
	M023	12
	M131	8
	M670	76
	M766	9
	M456	50
7 January 1997	MK58 MARINE MARKER	1
	MK25 MARINE MARKER	3
	G217 M9 DELAY	
	M190	2,290
	30 MIN SMOKE MARINE	
	M755 FUZE	
	M112 BLOCK C-4	
7 January 1997 (Continued)	M981	
	M985	

Date	Item	Quantity
23 February 1997	5-in. PROJO	
27 February 1997	2-in. ROCKET MOTORS	19
	5-in.PROJO	4
	MO29	20 ft
4 February 1997	2-in. ROCKET MOTORS	17
25 March 1997	2.2 ROCKET MOTORS	17
	5-in. ROCKET WARHEAD	2
	5-in. MK1 RKT W/H INERT	4
	3.5 RKT MOTORS	4
	2.25 RKT MOTORS	19
3 April 1997	2.25 RKT MOTORS	14
	5-in. MK1 RKT W/H INERT	2
29 May 1997	5-in. RKT W/H INERT	1
	MK28 MOD 3 PARA PAK GAS GEN	1
	INERT BALL PRAC RKT MOT	1
	MK76	1
	2-in. ROCKET MOTORS	4
	ROAD FLARES	4
	M49 TRIP FLARE	1
	2-in. ROCKET MOTORS	4
	2-in. ROCKET MOTORS	4
	2-in. ROCKET MOTORS	4
	2-in. ROCKET MOTORS	4
	3-in. RKT	1
	2-in. ROCKET MOTORS	4
	2-in. ROCKET MOTORS	4
	M130 CAPS ONLY	2
5 June 1997	2-in. ROCKET MOTORS	5
	MK1 5-in. RKT MOTOR	1
10 June 1997	2.25-in. RKT MOTORS	16
	M103 FUZE COMPONENTS	6
23 October 1997	MK37 TORP	1
	MK37TORP	1
	MK52 MINE	1
	2.75 ROCKET MOTOR	1
	MK 25 MARINE MARKER	1
	WATER GEL	1
	MK124 SMOKE	1
23 January 1998	GRENADES VARIOUS US/UK/FR	65
	L201 FLARES	7
	MK13 DIVER RESCUE FLARE	10
	B550	1
	L601	1

Date	Item	Quantity
11 February 1998	MK25	4
	MK117	1
	3-in. PROJECTILE	
	3-in. PROJOS	2
	25 MM PROJO	1
	K866 ABC-M5, 30LBS HC SMOKE	3
12 May 1998	MK25	2
7 July 1998	PTTF FUZES	11
	PTTF FUZES	11
	3-in. PROJECTILE	2
	PTTF FUZES	9
	PTTF FUZES	10
	3-in. PROJECTILE	5
	3-in. PROJECTILE	4
17 September 1998	MK 58 SMOKE	1
	MK 25 MARINE MARKER	1
	MK 2 FRAG GRENADE	6
	HC SMOKE 7.5	105
	3-in. FRAG PROJO CAL ROUNDS	
	FRENCH RIFLE GRENADE	2
	PTTF FUZES	3
	BOOSTER SIGNALS	2
	MOTAR ILLUMINATION	1
	M301	
	ITROD TORCH	
	81MM MOTAR	1
	2-in. PROJO	1
	DIVER RECALLS	6
	M118 BOOBY TRAP L599	5
	M119 BOOBY TRAP L600	5
	EXRODs	2
	M60s 50 A011	10
8 October 1998	M029	2
	M130	2
	MK 2	5
	GRENADES	4
	FLARES	6
	M58s	6
	M130	2
	LUM 27A2 FLARE	2
14 December 1998	30 CAL SMALL ARMS	
	BOMB FRAG/ BLU 97/A/B	
	61 MORTAR SIGNAL FLARE	
	SS6/7.62 SMALL ARMS	
	MK 346 FUZE PD	3
	40MM AMBER STAR	

Date	Item	Quantity
14 December 1998 (Continued)	40MM RED SMOKE	
	IGNITER DW53	
	STICK GRENADE	
	3-in. PROJOS	
	MK2 GRENADES	
	M142 FIRING DEVICES	
	SONOBUOYS	5
12 January 1999	M100 FUZE	7
	FRENCH RIFLE GRENADE	6
	MK3 PRAC BOMB	1
	5-in. PROJO MK32	1
	90MM CTG	1
	90MM M71	1
	CTG 30MM	1
	CTG 20MM	1
	CTGAA 40MM	3
	PROJO 3-in.	1
	PROJO 37MM	1
	CTG 20MM	2
	FRENCH RIFLE GRENADE	8
	PROPELLANT GRAIN	2
	CTG 20MM	5
	GRENADE MK2	11
	FUZE, PTTF	5
16 February 1999	PTTF	
	PROJO FUZE	
	30MM ROUND	
	BOOSTERS	
	50 CAL BALL	
	20MM	
	60MM	
	PROJO FUZE	
	25MM	
	EXPLOSIVE GEL	4
	EXPLOSIVE GEL	2
	TNT BLOCKS	6
	M023	
	DET CORD	
	SMOKELESS POWDER	
17 February 1999	DEMO/SHAPE	
	CHARGE TRNG	
19 April 1999	PTTF	7
	MK2 PRAC BOMB	
	20MM	1
	FRENCH GRENADE	1
	PRIMERS	5

Date	Item	Quantity
19 April 1999 (Continued)	MK 339 FUZES	1
	JAU/B	2
	PENCIL FLARES	14
	MK13 FLARES	4
	JAU-22B	1
22 July 1999	UNK FLARES	3
	MWD M-1 DYNAMITE	6
	BARE DEMO	
	GRENADE TRNG	6
21 October 1999	50 CAL CTG	4
	37MM PROJO	1
	M116 SIMULATOR	1
	MK 25 SMOKES	2
	WWII FLARE/SMOKES	1
31 January 2000	PTTF	1
	VARIOUS WWII SMALL ARMS	
	MK 3 PRAC BOMB	1
12 June 2000	M904	2
23 June 2000	SONOBUOYS	2
	155MM	1
	VARIOUS SECRET CDs	
23 August 2000	30MM PROJO	1
	PTTF	2
	37MM PROJO	1
	UNK FLARES	1
	MK 25 MARINE MARKER	1
	MN01 DOG SCENT KIT	1
27 September 2000	MK 25 MARINE MARKER	2
	MK 2 GRENADES	2
	PTTF	5
25 April 2001	WWII CANNON BALL	1
	MK 25 MARINE MARKER	25
	WC3 SMOKE, SIGNAL FLARES	1
	2.25-in. RKT MOTORS MK 3 MOD 2	1
	5-in. PROJO	2
1 October 2001	3LBS MIL DYNAMITE (6 STICKS)	6
3 April 2002	20MM ROUND	1
	7MM ROUND	33
	20 GA 2 3/4 SLUGS	5
	20 GA 2 3/4 ROUNDS	5
	WATER GEL	1
	MILC FIREWORKS COMMERCIAL	
	MK 25 MARINE MARKER	4
	MK 13 SIGNAL SMOKE	4
	MK 124 SIGNAL SMOKE	2
	30-06 ROUNDS	9

Date	Item	Quantity
1 August 2002	9MM BALL	135
	12 GA 3-in. 00 BUCK	10
	7.62MM BALL	20
	7.62MM BALL	420
	DYNAMITE NG 40%	6
2 February 2003	CLAYMORE	1
	CAD	1
	FLARES	50
	BLK C4	3
	FRAG GRENADE	1
	PROJO	1
30 July 2003	WATER GEL	6
	DET CORD	6
	CLAY FUZE	6
	TNT	6
	L598	1
	BLACK POWDER	2
	C4	3
	A363	6
	MU34	6
	MJ21	10
	MU02	17
	MH92	57
	A106	9
	A080	187
	A111	7

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Appendix C

Support Documentation for Sites 1 and 3

TABLE C-1 LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITES 1 AND 3

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/Impact to Remedy
Surface Water (State)	Natural Resources Protection Act Permit by Rule (06-096 CMR Chapter 305)	Applicable	Regulates activities in and adjacent to freshwater wetlands and streams. Soil disturbance in or adjacent to a freshwater wetland or surface waterbody requires erosion control measures to prevent erosion and sedimentation of the protected natural resources.	If it is determined that site topography does not preclude disturbed soil from being washed into Mere Brook, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.	06-096 CMR 305, Section 2 1 September 2002	No applicable changes found
(State)	Maine Standards for Classification of Minor Drainages	Applicable	All surface waters lying within the boundaries of the State that are in basins having a drainage area less than 100 mi^2 that are not classified as lakes or ponds are classified in this section.	This regulation will apply to classify the drainage surrounding the Sites 1 and 3 Landfill.	38 MRSA 468 PL 2003, Ch. 317, §20-22 (AMD)	No applicable changes found
Groundwater (State)	Maine Standards for Classification of Groundwater (38 MRSA, Section 470)	Applicable	This law requires the classification of the state's groundwater to protect, conserve, and maintain groundwater resources in the interest of the health, safety, and general welfare of the people of the state. Under the Maine standards, groundwater is classified as GW-A.	This regulation will apply if treated groundwater is discharged back to groundwater. The Navy's current discharge option is the Brunswick Publicly-Owned Treatment Works. If discharge to groundwater is employed, the classification and uses of groundwater will be evaluated during development of discharge limits.	38 MRSA 470 None	No applicable changes found
Groundwater (State)	Maine Site Location Development Law and Regulations (06-096 CMR Chapters 371-377)	Applicable	This act and associated regulations govern new developments, including those that handle hazardous waste. New developments cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality.	Those regulations concerning No Adverse Environmental Impact (i.e., Chapter 375) are applicable to implementation of the remedy. In particular, standards for protection of groundwater apply to construction and groundwater treatment activities. However, any licenses required, by reference, will not need to be obtained since permits are not required for actions conducted onsite at federal Superfund sites.	06-096 CMR371 4 May 1996 06-096 CMR372 4 May 1996 06-096 CMR373 4 May 1996 06-096 CMR374 25 July 1997 06-096 CMR375 22 September 2001 06-096 CMR376 4 May 1996 06-096 CMR377 4 May 1996	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

TABLE C-2 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITES 1 AND 3

Groundwater and Soil (Federal)	RCRA – General Facility Standards	Applicable	Specifies general facility standards for operation.	All relevant general facility standards must be met.	45 FR 33073 19 May 1980, unless otherwise noted	No applicable changes found
Soil (Federal)	RCRA – Releases from Solid Waste Management Units	Applicable	Regulates corrective action for releases of solid waste from solid waste management units at hazardous waste management facilities under RCRA.	If a release of solid waste occurs, 40 CFR Vol. 61 No. 85 will regulate the corrective action.	40 CFR Vol. 61 No. 85 1 May 1996	No applicable changes found
Soil (Federal)	RCRA – Closure and Post-Closure	Applicable	The purpose of this part is to establish minimum national standards that define the acceptable management of hazardous waste. The standards in this part apply to owners and operators of all facilities that treat, store, or dispose of hazardous waste, except as specifically provided otherwise in this part or Part 261 of this chapter.	All relevant closure and post-closure standards must be met.	40 CFR 264/265 45 FR 33221 19 May 1980, unless otherwise noted	No applicable changes found
Soil (Federal)	RCRA – Preparedness and Prevention (40 CFR 265 Subpart C)	Applicable	Facilities must be maintained and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.	All relevant preparedness and prevention standards must be met.	40 CFR 265 19 May 1980, unless otherwise noted	No applicable changes found
Soil (Federal)	RCRA – Contingency Plan and Emergency Monitoring (40 CFR 265 Subpart D)	Applicable	The owner or operator must have a contingency plan for his facility. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.	All relevant contingency plan and emergency monitoring standards must be met.	40 CFR 265 19 May 1980, unless otherwise noted	No applicable changes found

NOTE: RCRA = Resource Conservation and Recovery Act.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Soil (Federal)	RCRA Land Disposal Restrictions (40 CFR Part 268)	Applicable	Land disposal of RCRA hazardous waste is restricted without specified treatment. It must be determined that the waste meets the definition of one of the specified restricted wastes and the remedial action must constitute "placement" for the land disposal restrictions to be considered applicable. For each hazardous waste, the Land Disposal Restrictions specify that the waste must be treated either by a treatment technology or to a concentration level prior to disposal in a RCRA Subtitle C permitted facility.	Waste materials from Sites 1 and 3 were established as hazardous under RCRA definitions, therefore, are subject to 40 CFR 268.	40 CFR 268 64 FR 36488 6 July 1999	No applicable changes found
General (Federal)	RCRA – Miscellaneous Units	Applicable	Identify all miscellaneous units that treat, store, or dispose of hazardous waste at the facility, but do not fit the current definition of container, tank surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, underground injection well.	This regulation covers all other types of units that treat, store, or dispose of hazardous waste at the facility, but do not fit the current definition of container as defined in 40 CFR 264/265.	40 CFR 264 Subpart X 45 FR 33221 19 May 1980, unless otherwise noted	No applicable changes found
General (Federal)	OSHA – Recordkeeping, Reporting, and Related Regulations	Applicable	Specifies what recordkeeping and reporting are required by law for operation.	All relevant recordkeeping, reporting, and related regulations must be met.	29 CFR 1904 31 July 2000	No applicable changes found
Groundwater (State)	Maine Water Pollution Control Law, 38 MRSA Section 411, et seq., and Regulations at Chapters 580, 584, and 581	Relevant	This law regulates the discharge of waste to surface waterbodies.	Treated groundwater must achieve Federal Ambient Water Quality Criteria or site-specific numerical criteria.	38 MRSA Chapters 580, 584, and 581 Fall 2000	No applicable changes found
Groundwater (Federal)	Clean Water Act – Pretreatment Standards for POTW Discharge (40 CFR Part 403)	Applicable	This regulation specifies pretreatment standards for discharges to a POTW. If treated groundwater is discharged to a POTW, the POTW must have mechanisms available to meet the requirements of the National Pretreatment Program. Discharges must also comply with any local POTW regulations. If hazardous waste is discharged to the POTW, the POTW may be subject to RCRA permit-by-rule.	This regulation is applicable since the Navy's current discharge option is the Brunswick POTW. Because treated groundwater is discharged to a POTW, the treated water must meet all discharge limitations imposed by the POTW.	40 CFR 403 46 FR 9439 28 January 1981, unless otherwise noted	No applicable changes found

NOTE: OSHA = Occupational Safety and Health Act.
POTW = Publicly-Owned Treatment Works.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater and Surface Water (State)	Maine Hazardous Waste Management Rules (06-096 CMR, Chapters 800, 801, 850-857)	Relevant and Appropriate	The rules provide a comprehensive program for handling, storage, and recordkeeping at hazardous waste facilities to supplement the RCRA regulations.	Because these requirements supplement RCRA hazardous waste regulations, they are relevant and appropriate.	06-096 CMR800 4 May 1996 06-096 CMR801 4 May 1996 06-096 CMR850 20 July 2004 06-096 CMR851 5 March 2001 06-096 CMR852 4 May 1996 06-096 CMR853 3 November 2002 06-096 CMR854 27 January 2003 06-096 CMR855 4 May 1996 06-096 CMR856 3 November 2002 06-096 CMR857 5 March 2001	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found
Groundwater and Surface Water (State)	Maine Landfill Disposal Regulations	Applicable	These section regulates the disposal of solid waste into the landfill.	This regulation will be applicable and governs the disposal of solid waste into the landfill.	Title 38, Chapter 13 PL 1987, c. 517, @4 (rpr)	No applicable changes found
Groundwater and Surface Water (State)	Maine Water Pollution Control Law – Conditions of Licenses	Applicable	These regulations outline the conditions that require licensing of pollutant discharge.	This regulation will be applicable if treated groundwater is discharged back to groundwater.	Title 38, Chapter 3, 414-A PL 2003, Ch. 246, §10-13 (AMD)	No applicable changes found

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater and Surface Water (State)	Maine Water Pollution Control Law – Certain Deposits and Discharges Prohibited	Applicable	No person, firm, corporation, or other legal entity shall place, deposit, discharge, or spill, directly or indirectly, into the groundwater, inland surface waters, or tidal waters of this State, or on the ice thereof, or on the banks thereof so that the same may flow or be washed into such waters, or in such manner that the drainage therefrom may flow into such waters, any of the following substances: mercury; toxic or hazardous substances; or radiological, chemical, or biological warfare agents.	This regulation will be applicable if treated groundwater is discharged back to groundwater.	Title 38, Chapter 3, 420 PL 2003, Ch. 165, § 1 (AMD)	No applicable changes found
Groundwater (Federal)	Underground Injection Control Program (40 CFR 144, 146, 147)	Applicable	These regulations outline minimum program and performance standards for underground injection programs. Technical criteria and standards for siting, operation and maintenance, and reporting and recordkeeping as required for permitting are set forth in Part 146.	This regulation will be applicable if treated groundwater is discharged back to groundwater. Discharge of treated groundwater, by well injection, must be in accordance with all the criteria and standards in these federal regulations, as well as meet all state Underground Injection Control Program requirements. Treated groundwater must meet all Safe Drinking Water Act standards prior to well injection.	40 CFR 144 48 FR 14189 1 April 1983, unless otherwise noted 40 CFR 146 45 FR 42500 24 June 1980, unless otherwise noted 40 CFR 147 56 FR 9415, 6 March 1991	No applicable changes found No applicable changes found No applicable changes found
Groundwater (State)	Maine Rules to Control the Subsurface Discharge of Pollutants by Well Injection (06-096 CMR, Chapter 543)	Applicable	This regulation prohibits the injection of hazardous waste into or above water-bearing formations via a new Class IV well. The subsurface discharge into or through a Class IV well that would cause or allow the movement of fluid into an underground source of drinking water that may result in a violation of any Maine Primary Drinking Water Standard, or which may otherwise adversely affect public health, is prohibited.	These regulations will be applicable if treated groundwater is discharged back to groundwater. For discharge to the subsurface, groundwater must be treated to a target clean-up level less than or equal to the Maine Maximum Exposure Guidelines to be recharged to the aquifer.	06-096 CMR543 4 May 1996	No applicable changes found
Asbestos (Federal)	OSHA – Safety and Health Standards (29 CFR Part 1926)	Applicable	This regulation specifies the type of safety equipment and procedures for handling asbestos.	All appropriate safety equipment will be worn onsite. In addition, safety procedures will be followed during onsite activities.	29 CFR 1926 64 FR 18810 16 April 1999	No applicable changes found

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Asbestos (State)	Maine Solid Waste Management, Testing, and Disposal of Special Wastes (Maine Department of Environmental Protection Regulations Chapter 405)	Applicable	Section 405.4 sets forth requirements that apply to the storage, transport, and disposal of asbestos wastes.	These requirements will pertain to activities involving disposal of asbestos material at Sites 1 and 3.	Title 38, Chapter 13 PL 1987, c. 517, @4 (rpr)	No applicable changes found
Asbestos (State)	Maine Asbestos Abatement Regulations	Applicable	These regulations specify the minimum work practice requirements for asbestos abatement contractors.	These requirements will apply to remedial activities at Sites 1 and 3.	Title 38, Chapter 12A PL 1987, c. 448, @1-C (new)	No applicable changes found
Air (Federal)	Clean Air Act – National Emission Standards for Hazardous Pollutants (40 CFR Part 61)	Relevant and Appropriate	Emission of asbestos fibers are regulated Subpart M of 40 CFR Part 61. This regulation includes requirements for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations, for active waste disposal sites, and for waste disposal for demolition and renovation operations. It does not include requirements for inactive waste disposal sites like Sites 1 and 3. Therefore, the National Emission Standards for Hazardous Pollutants will not be applicable. However, the regulation is "relevant and appropriate" to the control of asbestos fiber emissions at an inactive waste disposal site for demolition and renovation operations because the situation is sufficiently similar.	The National Emission Standards for Hazardous Pollutants requirements for emission limits, and personnel training for the handling and disposal of asbestos (Subpart M) are relevant and appropriate to activities regarding the placement of asbestos material beneath the landfill cap at Sites 1 and 3. Actions taken at Sites 1 and 3 will meet these requirements.	40 CFR Part 61 38 FR 8826 6 April 1973, unless otherwise noted	No applicable changes found
Air (Federal)	OSHA – General Industry Standards (29 CFR Part 1910)	Applicable	These regulations specify the 8-hour time-weighted average concentration for various organic compounds. Training requirements for workers at hazardous waste, including asbestos, operations are specified in 29 CFR Part 1910.120.	Proper respiratory equipment will be worn if it is impossible to maintain the work atmosphere below the concentration. Workers performing activities at Sites 1 and 3 will be required to have completed specific training requirements.	29 CFR 1910 65 FR 46818 31 July 2000	No applicable changes found

TABLE C-3 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITES 1 AND 3

Groundwater/ Surface Water (Federal)	SDWA – MCLs (40 CFR 141.11 – 141.16)	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, MCLs are not applicable, but may be relevant and appropriate. To assess the potential risks to human health due to consumption of groundwater, contaminant concentrations were compared to their MCLs.	-66 FR 7061 22 January 2001 -66 FR 3776 16 January 2001	No applicable changes found No applicable changes found
Groundwater/ Surface Water (Federal)	SDWA – MCLGs (40 CFR 141.50 – 141.51)	Relevant and Appropriate	MCLGs are health-based criteria. As promulgated under the Superfund Amendments and Reauthorization Act, MCLGs are to be considered for drinking water sources. MCLGs are available for several organic and inorganic contaminants.	The 1990 National Contingency Plan states that non-zero MCLGs are to be used as goals. Because groundwater at NAS Brunswick is not a current source of drinking water, MCLGs are not applicable, but may be relevant and appropriate. Contaminant concentrations in groundwater were compared to their MCLGs.	-57 FR 31846 17 July 1992 -66 FR 7063 22 January 2001	No applicable changes found MCL for arsenic revised (the arsenic revision will be incorporated into the Long-Term Monitoring Plan)
Groundwater/ Surface Water (Federal)	RCRA – Subpart F Groundwater Protection Standards, Alternate Concentration Limits (40 CFR 264.94)	Relevant and Appropriate	This requirement outlines standards, in addition to background concentrations and MCLs, to be used in establishing cleanup levels for remediating groundwater contamination.	Most of the MCLs promulgated under RCRA are the same as SDWA MCLs. The standards set forth under RCRA do not reflect recent changes and additions to SDWA MCLs. Because groundwater is not a current source of drinking water, RCRA MCLs are not applicable, but may be relevant and appropriate.	-48 FR 14294 1 April 1983	No applicable changes found

NOTE: SDWA = Safe Drinking Water Act.
MCL = Maximum Contaminant Level.
MCLG = MCL goal.
RCRA = Resource Conservation and Recovery Act.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater/ Surface Water (Federal)	Clean Water Act, Federal AWQC (Section 304[a][1])	Applicable	Federal AWQC include: (1) health-based criteria developed for 95 carcinogenic and non-carcinogenic compounds, and (2) water quality parameters. AWQC for the protection of human health provide levels for exposure from drinking water and consuming aquatic organisms, and from consuming fish alone. Remedial actions involving contaminated surface water or groundwater must consider the uses of the water and the circumstances of the release or threatened release; this determines whether AWQC are relevant and appropriate.	AWQC will be applicable if treated groundwater is discharged to surface water. The Navy's preferred discharge option is to the Brunswick POTW, although the Navy has not yet received approval from the POTW. AWQC may be considered during development of pretreatment standards because the POTW discharges its effluent to the Androscoggin River.	Section 304[a]1 31 December 2003	No applicable changes found
Groundwater/ Surface Water/ Soil (Federal)	EPA Risk RfDs	To Be Considered	RfDs are the levels considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Because there are only a limited number of promulgated standards for contaminants in soil and water, EPA RfDs were used to characterize risks due to non-carcinogens in various media.	None	No applicable changes found
Groundwater/ Surface Water/ Soil (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects present the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	Because there are only a limited number of promulgated standards for contaminant in soil and water, EPA Cancer Slope Factors were used to compute the individual incremental cancer risk resulting from exposure to certain compounds.	None	No applicable changes found
Groundwater/ Surface Water (State)	Maine Drinking Water Rules (10-144A CMR Chapters 231-233)	Relevant and Appropriate	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, State Drinking Water Standards are relevant and appropriate. Contaminant concentrations in groundwater were compared to State standards to assess the potential risks to human health due to consumption of groundwater.	10-144CMR231 18 August 2003 10-144CMR232 5 May 2002 10-144CMR233 18 November 1994	No applicable changes found. No applicable changes found. No applicable changes found

NOTE: AWQC = Federal Ambient Water Quality Criteria.
POTW = Publicly-Owned Treatment Works.
RfD = Risk Reference Dose.
EPA = U.S. Environmental Protection Agency.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater/ Surface Water (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144A CMR Chapter 233, Appendix C)	To Be Considered	Appendix C outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	MEGs have been considered for chemical compounds for which there are no promulgated standards. MEGs may be considered if treated groundwater is discharged back to groundwater. The Navy's preferred discharge option is to the Brunswick POTW; however, the Navy has not yet received approval from the POTW. MEGs may potentially be considered during development of discharge limits for reinjection of treated groundwater.	10144CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next LTMP)
Air (Federal)	Clean Air Act – National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)	Applicable	Primary ambient air quality standards define levels of air quality to protect public health. Secondary ambient air quality standards protect public welfare from known or anticipated adverse effects from pollutants.	Particulate standard for matter less than 10 microns is 150 $\mu g/m^3$, 24-hour average concentration. This requirement is applicable to excavation and construction activities.	40 CFR 50 36 FR 22384 25 November 1971, unless otherwise noted	No applicable changes found
Air (State)	Maine Ambient Air Quality Standards (38 MRSA, Section 584; Maine Department of Environmental Protection Regulations, Chapter 110)	Applicable	This chapter establishes ambient air quality standards that are maximum levels of a particular pollutant permitted in the ambient air.	The standard for particulate matter is 150 $\mu g/m^3$, 24-hour average concentration. This standard is applicable to excavation and construction activities.	38 MRSA, 584; Chapter 110 None	No applicable changes found

NOTE: MEG = Maximum Exposure Guideline.

Appendix D

Support Documentation for Site 2

TABLE D-1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 2

Groundwater (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, MCLs are not applicable, but may be relevant and appropriate. To assess the potential risks to human health due to consumption of groundwater, contaminant concentrations in groundwater measured during long-term monitoring will be compared to their MCLs.	40 CFR 141.11 - 66 FR 7061 22 January 2001 40 CFR 141.12 66 FR 3776 16 January 2001 40 CFR 141.13 – 54 FR 27527 29 June 1989	No applicable changes found No applicable changes found No applicable changes found (editorial change)
Groundwater (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50-141.51)	Relevant and Appropriate	MCLGs are health-based criteria. As promulgated under the Superfund Amendments and Reauthorization Act, MCLGs are to be considered for drinking water sources. MCLGs are available for several organic and inorganic contaminants.	The 1990 National Contingency Plan states that non-zero MCLGs are to be used as goals. Because groundwater at NAS Brunswick is not a current source of drinking water, MCLGs are not applicable, but may be relevant and appropriate. Contaminant concentrations in groundwater measured during long-term monitoring will be compared to their MCLGs.	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Groundwater (State)	Maine Drinking Water Rules (10-144 CMR Chapters 231-233)	Relevant and Appropriate	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, state drinking water standards are not applicable but may be relevant and appropriate. Contaminant concentrations in groundwater will be compared to State standards to assess the potential future risks to human health due to consumption of groundwater.	10-144 CMR231 18 August 2003 10-144 CMR232 5 May 2002 10-144 CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found

NOTE: MCL = Maximum Contaminant Level.
NAS = Naval Air Station.
MCLG = Maximum Contaminant Level Goal.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144 CMR Chapter 233, Appendix C)	Relevant and Appropriate	Appendix C of this regulation outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, MEGs are not applicable but may be relevant and appropriate. Contaminant concentrations in groundwater will be compared to MEGs to assess the potential risks to human health due to consumption of groundwater.	10144 CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Groundwater and Surface Water (State)	Hazardous Waste Management Rules (06-096 CMR Chapters 850-857)	Relevant and Appropriate	Rules set forth requirements for hazardous waste disposal in Maine, including landfill contaminants, may not migrate beyond the waste management unit at levels which exceed background, MEGs, or SWQC.	Long-term monitoring results will be evaluated in comparison to MEGs and SWQC.	06-096 CMR850 20 July 2004 06-096 CMR851 5 March 2001 06-096 CMR852 4 May 1996 06-096 CMR853 3 November 2002 06-096 CMR854 27 January 2003 06-096 CMR855 4 May 1996 06-096 CMR856 3 November 2002 06-096 CMR857 5 March 2001	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

NOTE: MEG = Maximum Exposure Guideline.
SWQC = State Water Quality Criteria.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/ Impact to Remedy
Surface Water (State)	Natural Resources Protection Act Permit by Rule (06-096 CMR Chapter 305, Section 2)	Applicable	Regulates activities in and adjacent to freshwater wetlands and streams. Soil disturbance in or adjacent to a freshwater wetland or surface water body requires erosion control measures to prevent erosion and sedimentation of the protected natural resources.	If it is determined that site topography does not preclude disturbed soil from being washed into Mere Brook, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.	06-096 CMR305, Section 2 1 September 2002	No applicable changes found
Surface Water (State)	Surface Water Toxics Control Program (06-096 CMR Chapter 530.5)	Relevant and Appropriate	Except as naturally occurs, surface waters must be free of pollutants in concentrations which impart toxicity and cause those waters to be unsuitable for the existing and designated uses of the waterbody. This rule promulgates federal water quality criteria established by U.S. Environmental Protection Agency pursuant to Section 304(a) of the Clean Water Act.	Contaminant concentrations measured during long-term monitoring will be evaluated to assess whether Maine's SWQC are being met.	06-096 CMR530.5 13 August 1997	No applicable changes found

Appendix E

Support Documentation for Site 7

TABLE E-1 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 7

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Soil (Federal)	RCRA Identification and Listing of Hazardous Waste Toxicity Characteristics (40 CFR 261.24)	Relevant and Appropriate	This requirement identifies the maximum concentrations of contaminants for which the waste would be a RCRA characteristic waste because of its toxicity. The analytical test in Appendix II of 40 CFR Part 61 is referred to as the TCLP.	In the event that excavations are conducted that remove soil, the soil will be analyzed by the TCLP to determine whether they are characteristic hazardous wastes under RCRA. Excavated materials that are determined to exceed TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle C treatment, storage, or disposal facility. Excavated materials that are determined to be below TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle D or other appropriate treatment, storage, or disposal facility.	40 CFR 261.24 67 FR 11254 13 March 2002	No applicable changes found
Soil (State)	Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)	Relevant and Appropriate	This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.	This applicable or relevant and appropriate requirement will be met in the event that excavation is conducted at the site.	06-096 CMR 854 27 January 2003	No applicable changes found
Soil (State)	Maine Solid Waste Management Rules - Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405)	Relevant and Appropriate	Water quality monitoring, leachate monitoring, and the characterization of wastes stored or disposed of are tools used for the detection and analysis of potential threats to public health and safety or the environment. The applicable tools are required to be implemented at solid waste facilities where the Department identifies potential threats to public health and safety or the environment because of the nature of the wastes stored or disposed of and/or the type, location, design, or operation of the solid waste facilities.	The substantive requirements of these rules will be used in the monitoring of groundwater at the site.	06-096 CMR 405 6 September 1999	No applicable changes found

NOTE: RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity Characteristic Leaching Procedure.

SOURCE: U.S. Environmental Protection Agency (EPA). 1999. Integrated Risk Information System On-Line Database Maintained in Toxicology Data Network by the National Library of Medicine Bethesda, Maryland. EPA Environmental Criteria and Assessment Office, Cincinnati.

TABLE E-2 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 7

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	Safe Drinking Water Act – MCLs (40 Code of Federal Regulations 141.11–141.16)	Relevant and Appropriate	MCLs have been promulgated for many common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Under Alternative 2, the selected remedy, the MCLs will be attained through institutional controls and long-term monitoring.	40 CFR 141.11 – 66 FR 7061 22 January 2001 40 CFR 141.12 – 66 FR 3776 16 January 2001 40 CFR 141.13 - 54 FR 27527 29 June 1989	No applicable changes found No applicable changes found No applicable changes found (editorial change)
Groundwater (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50 – 141.51)	Relevant and Appropriate	MCLGs have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effects on the health effects of a person would occur, allowing for an adequate margin of safety. MCLGs are non-enforceable public health goals.	Under Alternative 2, the selected remedy, where Federal MCLs have not been established, non-zero MCLGs will be attained through institutional controls and long-term monitoring.	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Groundwater (Federal)	EPA Risk Reference Doses	To Be Considered	Risk Reference Doses are the concentrations considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Because there are only a limited number of promulgated standards for contaminants in water, EPA Risk Reference Doses will be used to characterize risks due to non-carcinogens in groundwater, as necessary, during the five-year reviews.	None	No applicable changes found

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
EPA = U.S. Environmental Protection Agency.

SOURCE: U.S. Environmental Protection Agency (EPA). 1999. Integrated Risk Information System On-Line Database Maintained in Toxicology Data Network by the National Library of Medicine Bethesda, Maryland. EPA Environmental Criteria and Assessment Office, Cincinnati.

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects presented the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	Because there are only a limited number of promulgated standards for contaminants in water, EPA Cancer Slope Factors will be used to characterize risks due to carcinogens in groundwater, as necessary, during the five-year reviews.	None	No applicable changes found
Groundwater (State)	Maine Department of Human Services (Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants [10-144A Code of Maine Regulations Chapter 233, Appendix C])	Relevant and Appropriate	MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Under Alternative 2, the selected remedy, the MEGs will be attained through institutional controls and long-term monitoring.	10144A CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Groundwater (State)	Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)	Relevant and Appropriate	This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.	Under Alternative 2, the selected remedy, the MEGs will be attained through institutional controls and long-term monitoring.	06-096 CMR854 27 January 2003	No applicable changes found
Groundwater (State)	Maine Department of Human Services Rules Relating to Drinking Water (10-144E, Chapters 231-233)	Relevant and Appropriate	Maine's primary drinking water standards are similar to Federal MCLs as drinking water standards under the Maine Safe Drinking Water Rules. When State standards are more stringent than Federal standards, and have been legally and constantly applied, the State levels will be used.	Under Alternative 2, the selected remedy, State drinking water standards that are more stringent than Federal standards will be attained through institutional controls and long-term monitoring.	10-144E CMR231 18 August 2003 10-144E CMR232 5 May 2002 10-144E CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found

Appendix F

Support Documentation for Site 9

TABLE F-1 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 9

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Soil (Federal)	RCRA Identification and Listing of Hazardous Waste Toxicity Characteristics (40 CFR 261.24)	Relevant and Appropriate	This requirement identifies the maximum concentrations of contaminants for which the waste would be a RCRA characteristic waste because of its toxicity. The analytical test set out in Appendix II of 40 CFR Part 61 is referred to as the TCLP.	In the event that the barracks or their foundations are removed, modified, or disturbed and/or the contents of the inactive ash landfill are disturbed, the landfill contents will be analyzed by TCLP to determine whether they are characteristic hazardous wastes under RCRA. Excavated materials that are determined to exceed TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle C treatment, storage, or disposal facility. Excavated materials that are determined to be below TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle D or other appropriate treatment, storage, or disposal facility.	40 CFR 261.24 67 FR 11254 13 March 2002	No applicable changes found
Surface Water (State)	Maine Surface Water Toxics Control Program (38 MRSA Sections 420, 464, 06-096 CMR-530)	Relevant and Appropriate	These rules set forth the ambient water quality criteria for toxic water pollutants and procedures necessary to control levels of toxic pollutants in surface waters.	Under Alternative 2, the selected remedy, surface water will be monitored under the Long-Term Monitoring Program to ensure that it meets the standards set out in these rules.	06-096CMR530, 13 August 1997	No applicable changes found.
Soil (State)	Maine Hazardous Waste Rules relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)	Relevant and Appropriate	This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.	This applicable or relevant and appropriate requirement will be met in the event that the inactive ash landfill is disturbed or excavated, or the barracks and its foundations were removed or modified.	06-096CMR854 27 January 2003	No applicable changes found
Soil (State)	Maine Solid Waste Management Rules - General Provisions (06-096 CMR 400)	Relevant and Appropriate	These rules regarding administrative matters and general standards concerning solid waste facilities and solid waste handling.	The substantive requirements of these rules will be met in the event that the inactive ash landfill is disturbed or excavated, or the barracks and its foundation are removed or modified.	06-096CMR400, 5 March 2001	No applicable changes found

NOTE: RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity Characteristic Leaching Procedure.

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Soil (State)	Maine Solid Waste Management Rules - Landfill Siting, Design and Operation (06-096 CMR 401)	Relevant and Appropriate	This establishes requirements for siting, design, and operation of landfills for the disposal of municipal solid waste, special wastes, construction/demolition debris, land clearing debris, and wood wastes.	The substantive requirements of the closure and post-closure provisions of these rules will be met in the event that the inactive ash landfill is disturbed or excavated, or the barracks and its foundation are removed or modified.	06-096CMR401 6 September 1999	No applicable changes found
Soil (State)	Maine Solid Waste Management Rules - Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405)	Relevant and Appropriate	Water quality monitoring, leachate monitoring and the characterization of wastes stored or disposed of are tools used for the detection and analysis of potential threats to public health and safety or the environment. The applicable tools are required to be implemented at solid waste facilities where the Department identifies potential threats to public health and safety or the environment because of the nature of the wastes stored or disposed of and/or the type, location, design or operation of the solid waste facilities.	The substantive requirements of these rules will be used in the monitoring of the inactive landfill.	06-096 CMR 405 6 September 1999	No applicable changes found

TABLE F-2 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 9

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date*	Modifications/ Impact to Remedy
Groundwater (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11–141.13)	Relevant and Appropriate	MCLs have been promulgated for many common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Under Alternative 2, the selected remedy, the MCLs will be attained through natural attenuation.	40 CFR 141.11 - 66 FR 7061 22 January 2001 40 CFR 141.12 66 FR 3776 16 January 2001 40 CFR 141.13 - 54 FR 27527 29 June 1989	No applicable changes found No applicable changes found No applicable changes found (editorial change)
Groundwater (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50 – 141.51)	Relevant and Appropriate	MCLGs have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effect on the health effect of a person would occur, allowing for an adequate margin of safety. MCLGs are non-enforceable public health goals.	Under Alternative 2, the selected remedy, where Federal MCLs have not been established, non-zero MCLGs will be attained through natural attenuation.	40 CFR 141.50 - 57 FR 31846 17 July 1992 40 CFR 141.51 - 66 FR 7063 22 January 2001	No applicable changes found MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Groundwater (Federal)	EPA Risk Reference Doses	To Be Considered	Risk Reference Doses are the concentrations considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Because there are only a limited number of promulgated standards for contaminants in water, EPA Risk Reference Doses will be used to characterize risks due to non-carcinogens in groundwater, as necessary, during the 5-year reviews.	None	No applicable changes found
Groundwater (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects presented the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	Because there are only a limited number of promulgated standards for contaminants in water, EPA Cancer Slope Factors will be used to characterize risks due to carcinogens in groundwater, as necessary, during the 5-year reviews.	None	No applicable changes found

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.

SOURCE: U.S. Environmental Protection Agency (EPA). 1999. Integrated Risk Information System On-Line Database Maintained in Toxicology Data Network by the National Library of Medicine Bethesda, Maryland. EPA Environmental Criteria and Assessment Office, Cincinnati.

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date*	Modifications/ Impact to Remedy
Groundwater (State)	Maine Department of Human Services (Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144A Code of Maine Regulations Chapter 233, Appendix C)	Relevant and Appropriate	Maximum Exposure Guidelines include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Under Alternative 2, the selected remedy, the Maximum Exposure Guidelines will be attained through natural attenuation.	10144CMR233, Appendix C, 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Soil (State)	Maine Hazardous Waste Rules relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)	Relevant and Appropriate	This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.	Under Alternative 2, the selected remedy, the Maximum Exposure Guidelines will be attained through natural attenuation.	06-096CMR854, 27 January 2003	No applicable changes found
Groundwater (State)	Maine Department of Human Services Rules Relating to Drinking Water (10-144E, Chapters 231-233	Relevant and Appropriate	Maine's primary drinking water standards are similar to Federal MCLs as drinking water standards under the Maine Safe Drinking Water Rules. When State standards are more stringent than Federal standards, and have been legally and constantly applied, the State levels will be used.	Under Alternative 2, the selected remedy, State drinking water standards that are more stringent than Federal standards will be attained through natural attenuation.	10-144CMR231, 18 August 2003 10-144CMR232, 5 May 2002 10-144CMR233, 18 November 1994	No applicable changes found No applicable changes found No applicable changes found

Appendix G

Support Documentation for Eastern Plume

TABLE G-1 LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE EASTERN PLUME

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (State)	Maine Standards for Classification of Groundwater (38 MRSA, Section 470)	Applicable	This law requires the classification of the state's groundwater to protect, conserve, and maintain groundwater resources in the interest of the health, safety, and general welfare of the people of the state. Under the Maine standards, groundwater is classified as GW-A.	This regulation will apply if treated groundwater is discharged back to groundwater. The Navy's current discharge option is the Brunswick Publicly-Owned Treatment Works. If discharge to groundwater is employed, the classification and uses of groundwater will be evaluated during development of discharge limits.	38 MRSA 470 None	No applicable changes found
Groundwater (State)	Maine Site Location Development Law and Regulations (06-096 CMR Chapters 371-377)	Applicable	This Act and associated regulations govern new developments, including those that handle hazardous waste. New developments cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality.	Those regulations concerning No Adverse Environmental Impact (i.e., Chapter 375) are applicable to implementation of the remedy. In particular, standards for protection of groundwater apply to construction and groundwater treatment activities. However, any licenses required, by reference, will not need to be obtained since permits are not required for actions conducted onsite at federal Superfund sites.	06-096CMR371 4 May 1996 06-096CMR372 4 May 1996 06-096CMR373 4 May 1996 06-096CMR374 25 July 1997 06-096CMR375 22 September 2001 06-096CMR376 4 May 1996 06-096CMR377 4 May 1996	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found
Surface Water (State)	Surface Water Toxics Control Program (06-096 CMR Chapter 530.5)	Relevant and Appropriate	Except as naturally occurs, surface waters must be free of pollutants in concentrations which impart toxicity and cause those waters to be unsuitable for the existing and designated uses of the water body. This rule promulgates federal water quality criteria established by the U.S. Environmental Protection Agency pursuant to Section 304(a) of the Clean Water Act.	Groundwater is to be managed such that Maine's water quality standards are met.	06-096CMR530.5 13 August 1997	No applicable changes found

TABLE G-2 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE EASTERN PLUME

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater/ Soil (Federal)	RCRA LDRs (40 CFR 268)	To be Determined	Land disposal of RCRA hazardous wastes is restricted without specified treatment. It must be determined that the waste, beyond a reasonable doubt, meets the definition of one of the specified restricted wastes and the remedial action must constitute "placement" for the land disposal restrictions to be considered applicable. For each hazardous waste, the LDRs specify that the waste must be treated either by a treatment technology or to a concentration level prior to disposal in a RCRA Subtitle C permitted facility.	During treatment of groundwater, sludge containing hazardous constituents will be generated. The selected remedy includes provisions for analysis of this sludge, including TCLP testing. LDRs are potentially applicable if the sludge fails TCLP. The selected remedy does address handling and disposal of the sludge as a hazardous waste, if necessary.	40 CFR 268 64 FR 36488 6 July 1999	No applicable changes found
Groundwater (Federal)	Underground Injection Control Program (40 CFR 144, 146, 147)	Applicable	These regulations outline minimum program and performance standards for underground injection programs. Technical criteria and standards for siting, operation and maintenance, and reporting and recordkeeping as required for permitting are set forth in Part 146.	This regulation will be applicable if treated groundwater is discharged back to groundwater. The Navy's current discharge option is the Brunswick POTW. Discharge of treated groundwater, by well injection, must be in accordance with all the criteria and standards in these federal regulations, as well as meet all state Underground Injection Control Program requirements. Treated groundwater must meet all Safe Drinking Water Act standards prior to well injection.	40 CFR 144 48 FR 14189 1 April 1983, unless otherwise noted 40 CFR 146 45 FR 42500 24 June 1980, unless otherwise noted 40 CFR 147 56 FR 9415 6 March 1991	No applicable changes found No applicable changes found No applicable changes found

NOTE: RCRA = Resource Conservation and Recovery Act.
LDR = Land Disposal Restriction.
TCLP = Toxicity Characteristic Leaching Procedure.
POTW = Publicly-Owned Treatment Works.

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	Clean Water Act – Pretreatment Standards for POTW Discharge (40 CFR Part 403)	Applicable	This regulation specifies pretreatment standards for discharges to a POTW. If treated groundwater is discharged to a POTW, the POTW must have mechanisms available to meet the requirements of the National Pretreatment Program. Discharges must also comply with any local POTW regulations. If hazardous waste is discharged to the POTW, the POTW may be subject to RCRA permit-by-rule.	This regulation is applicable since the Navy's current discharge option is the Brunswick POTW. Because treated groundwater is discharged to a POTW, the treated water must meet all discharge limitations imposed by the POTW.	40 CFR 403 46 FR 9439 28 January 1981, unless otherwise noted	No applicable changes found
Groundwater (State)	Maine Rules to Control the Subsurface Discharge of Pollutants by Well Injection (06-096 CMR, Chapter 543)	Applicable	This regulation prohibits the injection of hazardous waste into or above water-bearing formations via a new Class IV well. The subsurface discharge into or through a Class IV well that would cause or allow the movement of fluid into an underground source of drinking water that may result in a violation of any Maine Primary Drinking Water Standard, or which may otherwise adversely affect public health, is prohibited.	These regulations will be applicable if treated groundwater is discharged back to groundwater. The Navy's current discharge option is the Brunswick POTW. For discharge to the subsurface, groundwater must be treated to a target clean-up level less than or equal to the Maine Maximum Exposure Guidelines to be recharged to the aquifer.	06-096 CMR543 4 May 1996	No applicable changes found
Groundwater/ Soil (State)	Maine Underground Storage Tank Rules relating to standards for the installation, operation, and proper closure of underground storage tanks (06-096 CMR Chapter 691)	Applicable	The rules require the registration of all existing, new, and replacement underground storage facilities with the Maine Department of Environmental Protection and authorizes and provides direction for the Board of Environment Protection to develop rules for the design, installation, replacement, operation, and closure of underground oil storage tanks except for tanks used for the storage of propane. The requirements for corrective action specify that when a leak or discharge occurs, the contamination should be mitigated. These rules define contamination as applied to groundwater, soil, and surface water when one of the following is present: (1) the presence of free product or an oil sheen, (2) an exceedance of primary drinking water standards (i.e., Maine Maximum Contaminant Levels), (3) an exceedance of Maximum Exposure Guidelines (as set forth in Maine Department of Human Services memorandum dated 23 October 1992), or (4) a statistically significant increase in the concentration of measured parameters when compared to background.	Groundwater impacted by underground storage tanks will be mitigated.	06-096 CMR 691 14 March 2004	No applicable changes found

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater and Surface Water (State)	Maine Hazardous Waste Management Rules (06-096 CMR, Chapters 800, 801, 802, and 850-857)	Relevant and Appropriate	The rules provide a comprehensive program for handling, storage, and recordkeeping at hazardous waste facilities. They supplement the RCRA regulations.	Because these requirements supplement RCRA hazardous waste regulations, they are relevant and appropriate.	06-096 CMR800 4 May 1996 06-096 CMR801 4 May 1996 06-096 CMR850 20 July 2004 06-096 CMR851 5 March 2001 06-096 CMR852 4 May 1996 06-096 CMR853 3 November 2002 06-096 CMR854 27 January 2003 06-096 CMR855 4 May 1996 06-096 CMR856 3 November 2002 06-096 CMR857 5 March 2001	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

TABLE G-3 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE EASTERN PLUME

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/Impact to Remedy
Groundwater/Surface Water (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Primary MCLs have been set as the cleanup goals when the primary MCL is available and a more stringent State standard does not exist. Groundwater extraction and treatment of the Eastern Plume will continue to prevent further migration and to restore the aquifer. Monitoring of the Eastern Plume will continue to determine if cleanup goals have been met. It is estimated that cleanup goals will be attained throughout the plume over a time period between 14 and 72 years.	40 CFR 141.11 - 66 FR 7061 22 January 2001 40 CFR 141.12 66 FR 3776 16 January 2001 40 CFR 141.13 - 54 FR 27527 29 June 1989	No applicable changes found No applicable changes found No applicable changes found (editorial change)
Groundwater/Surface Water (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50-141.51)	Relevant and Appropriate	MCLGs are health-based criteria. As promulgated under the Superfund Amendments and Reauthorization Act, MCLGs are to be considered for drinking water sources. MCLGs are available for several organic and inorganic contaminants.	The 1990 National Contingency Plan states that non-zero MCLGs are to be used as goals. Because groundwater at NAS Brunswick is not a current source of drinking water, MCLGs are not applicable, but may be relevant and appropriate. Contaminant concentrations in groundwater were compared to their MCLGs.	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
Groundwater/Surface Water (State)	Maine Drinking Water Rules (10-144 CMR Chapters 231-233)	Relevant and Appropriate	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, State Drinking Water Standards are not applicable but may be relevant and appropriate. Contaminant concentrations in groundwater will be compared to State standards to assess the potential future risks to human health due to consumption of groundwater.	10-144 CMR231 18 August 2003 10-144 CMR232 5 May 2002 10-144 CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found
Groundwater/Surface Water (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144 CMR Chapter 233, Appendix C)	Relevant and Appropriate	Appendix C of this regulation outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water; therefore, MEGs are not applicable but may be relevant and appropriate. Contaminant concentrations in groundwater will be compared to MEGs to assess the potential risks to human health due to consumption of groundwater.	10144 CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
NAS = Naval Air Station.
MEG = Maximum Exposure Guideline.

Appendix H

Naval Air Station Brunswick Instruction 5090.1B

DEPARTMENT OF THE NAVY
NAVAL AIR STATION
BRUNSWICK, MAINE 04011-5000

IN REPLY REFER TO
NASBINST 5090.1B
18000
31 December 2000

NAS BRUNSWICK INSTRUCTION 5090.1B

From: Commanding Officer

Subj: RESTRICTION ON EXCAVATION ACTIVITIES AND GROUNDWATER USE

Ref: (a) DUSD(ES/CL) Memorandum, "Interim Policy on Land Use Controls Associated with Environmental Restoration Activities," 31 Aug 2000, with Attachments

Encl: (1) Hazardous waste and petroleum contaminated sites on NAS Brunswick and Topsham Annex, Maine
(2) Drawings of "No Digging Areas" and Groundwater Use Restrictions on NAS Brunswick and Topsham Annex, Maine
(3) NASB Excavation Clearance Permit, 25 September 2000

1. Purpose. To provide detailed information on the location of hazardous waste and petroleum sites on NAS Brunswick and Topsham Annex, and to enact internal land use restrictions—in the form of administrative controls—on soil excavation activities or groundwater use at these sites to prevent human exposure to hazardous chemicals. This instruction is intended to enact institutional controls that are legally specified in Records of Decision, the Federal Facility Agreement, consensus statements, and other documents signed by the Navy in teamwork with the U.S. Environmental Protection Agency (EPA) and Maine's Department of Environmental Protection (DEP).

2. Scope. This instruction applies to all military and civilian personnel assigned to NAS Brunswick, and civilian personnel working under contract with the Navy on NAS Brunswick and Topsham Annex. This instruction pertains to any soil digging, soil excavation, groundwater pumping, and groundwater reuse—for any reason—at any hazardous waste or petroleum site located on NAS Brunswick or at Topsham Annex.

3. Cancellation. NASBINST 5090.1A

4. Discussion

a. NAS Brunswick is currently on the Environmental Protection Agency's "Superfund" list of hazardous waste sites formally known as the National Priorities List (NPL). The Navy has conducted comprehensive investigations of the affected areas in close coordination with EPA and Maine DEP. Remedial actions have been completed or are in progress. Hazardous contaminants at all of the designated sites are located below ground surface and currently do not present an unacceptable risk to human health or the environment unless they are excavated, pumped, or otherwise disturbed. There will be no soil excavation allowed within any of the broad areas listed in enclosure (1) and shown in enclosure (2) without express written approval by the Public Works Officer or the Environmental Division Director prior to start of work activities. In addition, groundwater use will be restricted as necessary within these broad areas as long as it presents an

unacceptable risk to human health and the environment, and to ensure the proper and successful operation of remedial actions being implemented in response to requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

b. Work can be safely conducted on a hazardous waste or petroleum site but proper planning, coordination, preparation, and safety measures must be accomplished in accordance with federal and state laws. Hazardous waste site work requires strict adherence to a site-specific health and safety plan, proper training of site workers, correct use of personal protective equipment by site workers, assessment of risks to abutting/downwind/downgradient property users, and other protective actions. Each situation is different and requires project-specific planning.

c. Land use controls shall be incorporated into any potential leases of NASB or Topsham Annex properties that contain soil or groundwater contamination from these sites. Lease documents shall contain legal and administrative mechanisms that incorporate a review and approval process similar to what is described in paragraph 5 of this instruction. Because uses of leased properties may change, it is important that future land use activities by the lessee remain compatible with these restrictions to adequately protect human health and the environment. Transfers of contaminated property to other Federal agencies or out of Federal control must contain more protective covenants and more detailed property descriptions; therefore, DoD and Navy policies shall be followed for property transfers.

5. Action

a. Any unit or activity planning a project that requires digging, excavation, or groundwater use within any of the broad areas identified in enclosures (1) and (2) must obtain the express written permission of the Public Works Officer or the Environmental Division Director. This permission must be obtained prior to completion of planning work and prior to the commencement of any digging, excavating, or groundwater pumping actions.

b. The approval process for work at both contaminated and non-contaminated sites is initiated by completion of an Excavation Clearance Permit (enclosure 3) through the Public Works Department. Express permission for work at contaminated sites will be provided by the Public Works Officer or the Environmental Division Director in a separate memo.

c. Because work at contaminated sites is inherently more complex due to the safety and planning issues involved, more time is needed to coordinate with EPA and Maine DEP before work can proceed. Requesting units or activities must prepare and follow a Site-Specific Health and Safety Plan that complies with requirements of 29 CFR 1910.120. For non-reimbursable customers, Public Works will assist in the development of a Health and Safety Plan when required.

Keith F. Koon
KEITH F. KOON

Distribution:
NASBINST 5605.1T, List I

HAZARDOUS WASTE AND PETROLEUM SITES ON NAS BRUNSWICK & TOPSHAM ANNEX, MAINE

NO DIGGING OR GROUNDWATER USE AREAS

Sites 1 & 3 — Orion Street Landfill North and Hazardous Waste Burial Area (Figure 1)
These sites are co-located in the Weapons Storage Area and have restricted access. The sites are bounded by the landfill perimeter road on the north and east, and by Mare (Mere) Brook on the west and south. Digging is restricted anywhere on or adjacent to the landfill cap, or within the landfill's supporting stormwater management ditches and retaining basin. This approximate area is shown by the solid line circle on Figure 1. Groundwater use is restricted for the large area of the base shown that is bounded on the west by Orion Street, on the north by Huey Drive and the Picnic Pond, on the east by the base boundary, and on the south by Harpswell Cove shown and labeled on Figure 1 by the larger dashed & dotted line.

Eastern Plume (Figure 1)
Groundwater use is restricted for the Eastern Plume, a section of groundwater located mostly within the Weapons Storage Area and Picnic Pond Recreational Area that is contaminated with chlorinated solvents and chlorinated degradation by-products. Based on investigation data to date, the Eastern Plume is located within the area that is bounded on the west by Orion Street, on the north by Huey Drive and the Picnic Pond, on the east by the base boundary, and on the south by Harpswell Cove shown and labeled on Figure 1 by the larger dashed & dotted line.

Site 2 — Orion Street Landfill South (Figure 2)
This site is located in the Weapons Storage Area and has restricted access. The site is bounded by Orion Street on the west, by the New Gurnet Road on the south, by an unnamed creek along the east and southeast, and by Mare (Mere) Brook on the north. Digging is restricted anywhere on or adjacent to the landfill cap, or within the basin of the landfill area as shown and labeled on Figure 2 by the larger dashed & dotted line. Groundwater use is also restricted for Site 2 since the site is contained within the large Eastern Plume restriction zone described for Sites 1 & 3.

Site 4 — Acid/Caustic Disposal Pit (Figure 3)
This site is located in the new Public Works complex site, in soils beneath the east end foundation of Building 584. Digging is restricted only for soils that are located immediately beneath the foundation of Building 584. The contaminated soil area is shown by the solid line circle on Figure 3. Groundwater use is restricted for Site 4 as the site is contained within the large Eastern Plume restriction zone described for Sites 1 & 3.

Site 7 — Old Acid/Caustic Disposal Pit (Figure 4)
This site is located in a clearing that's northeast of the Old Fuel Farm, in the northeast corner of the base. The site is bounded by wooded areas on the west, north, and east sides and by a dirt access road and the northeast corner of the Old Fuel Farm to the south. A small area of soils are

suspected to be contaminated with cadmium and the cadmium leaches into the groundwater in the middle of the site. Digging is restricted within the central area shown by the solid line circle on Figure 4. Groundwater use is restricted for Site 7 in the area shown by dashed line circle on Figure 4.

Site 9 — Neptune Drive Disposal Area (Figure 5)
This site is located in the community support area of the base beneath the Bachelor Enlisted Quarters (Bldgs 216-220) and the Galley (Bldg 201). The site is bounded by Orion Street on the west, by the BEQ (Bldgs 212-215) on the north, by the Athletic Field House (Bldg 211) and Theater Sewage Lift Station (Bldg 538) on the west, and by the upper impoundment pond to the south. Digging is restricted anywhere within the area shown by the thick solid line as labeled on Figure 5. Groundwater use is restricted for Site 9 in the area as previously described and shown by the dashed line box on Figure 5.

Site 12 — Explosive Ordnance Disposal Training Area (Figure 6)
This site is located in the southeastern end of the base within the Weapons Storage Area. The area is bounded by woods on the east at the base property line, and wooded areas to the north, south, and west. Analytical results from soil samples taken in the early 1990s had levels less than federal or state soil screening standards; however, the site is still active. The site area has inherent explosive safety concerns and soils in the actual detonation pits have a propensity to accumulate metals (inorganics). Changes in land use and groundwater use are restricted for Site 12 in the area shown by the dashed circle on Figure 6.

Building 95 — Former Insecticide Storage Facility (Figure 7)
This site is located at the former building and cleanup area located on the northeast corner of the base. The site is located on both sites of Avenue B bounded by Fifth Street on the west, by Bldg 40 on the north, by Sixth Street on the east, and by Fitch Avenue on the south. Digging is restricted within the two separate areas shown by the thin solid lines as labeled on Figure 7. Groundwater use is restricted for the Bldg 95 site as described above and as shown by dashed line in Figure 7.

Old Navy Fuel Farm (Figure 8)
This site is located in the northeast section of the base, bounded on the south by Fitch Avenue, on the west by 6th Street, and by undeveloped land to the north and east. The Old Fuel Farm was used for bulk fuel storage as the terminus of the Casco Bay (Harpswell) Pipeline from 1952 to its demolition in 1993. A number of documented and undocumented releases occurred during the facility's operation. Approximately 15,000 tons of petroleum contaminated soils were removed in Aug-Oct 2000; however, the groundwater plume remains under study to verify petroleum concentration and extent. Until petroleum levels degrade to accepted regulatory standards, groundwater use is restricted for the Old Fuel Farm as shown by the dashed line in Figure 8.

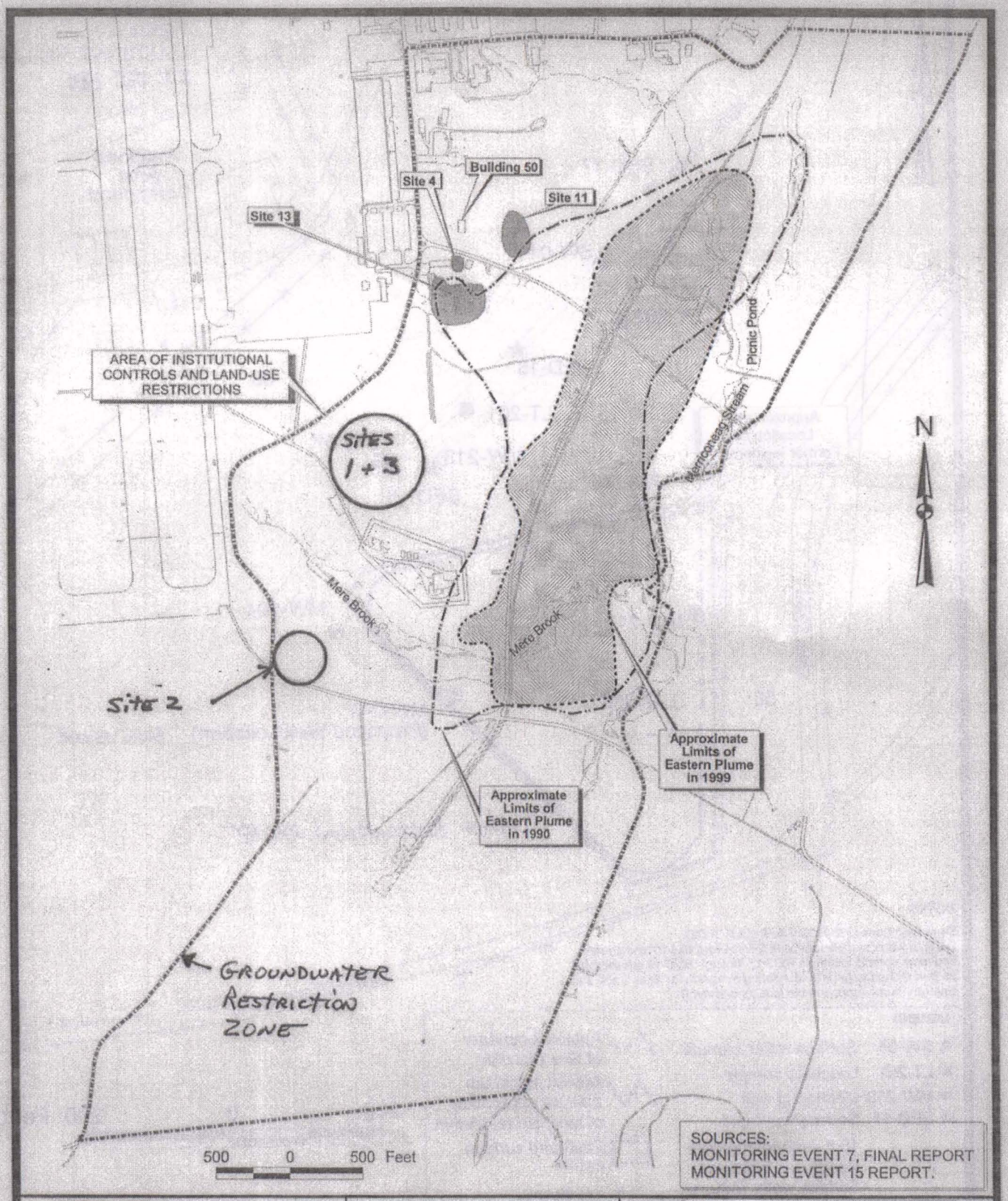
Navy Exchange (NEX) Service Station, Bldg 538 (Figure 9)

This site is located north of Burbank Avenue behind the Navy Exchange store. Former underground storage tanks released an undetermined quantity of petroleum into soils and groundwater around the tanks and downgradient beneath the station's asphalt driveway and the section of Burbank Avenue between the station and the Family Services Center, Bldg 27. Worker safety precautions are necessary for soil excavation work on utility lines in the area. Petroleum may have migrated into the backfill soils of utility trenches and along utility lines near the plume. Groundwater use is restricted in the area located along both sides of Burbank Avenue, south of Bldg 538 and north of the BEQ (Bldgs 212-215) as shown by dashed line in Figure 9.

Topsham Annex Housing Area (Figure 10)

- 238-244, 233-239, and 257-263 Parliament Circle, Bldgs 1099, 1114, and 1111 (Figure 10A)
- Housing Maintenance Facility, Bldg 378 (Figure 10A)
- Former Transmitter Facility, Bldg 374 (Figure 10B)

The Topsham Annex is a geographically separated section of NAS Brunswick located in the Town of Topsham on Main Street (US Route 201), about 4 miles northwest of the base. The Annex housing units previously used fiberglass underground heating oil tanks. Several documented releases from failed tank systems occurred from 1990 to 1994. Contaminated soils at these locations were removed during response actions. The housing maintenance facility is located across Canam Drive from a former vehicle refueling station that was demolished. The site of the former transmitter facility (Bldg 374) was used to spread out ("landfarm") petroleum-contaminated soils removed from other sites on the Annex. Digging of shallow soils is restricted in the area of the former Bldg 374 landfarm as shown by the solid line circle on Figure 10B. Worker safety precautions are necessary for soil excavation work on utility lines near the affected housing units as shown within the dashed line areas on Figures 10A. Heating oil may have migrated into the backfill soils of utility trenches and along utility lines near the release areas. Groundwater use is restricted in the entire housing area and around Bldg 378 due to elevated levels of petroleum constituents as shown by dashed lines in Figure 10A.

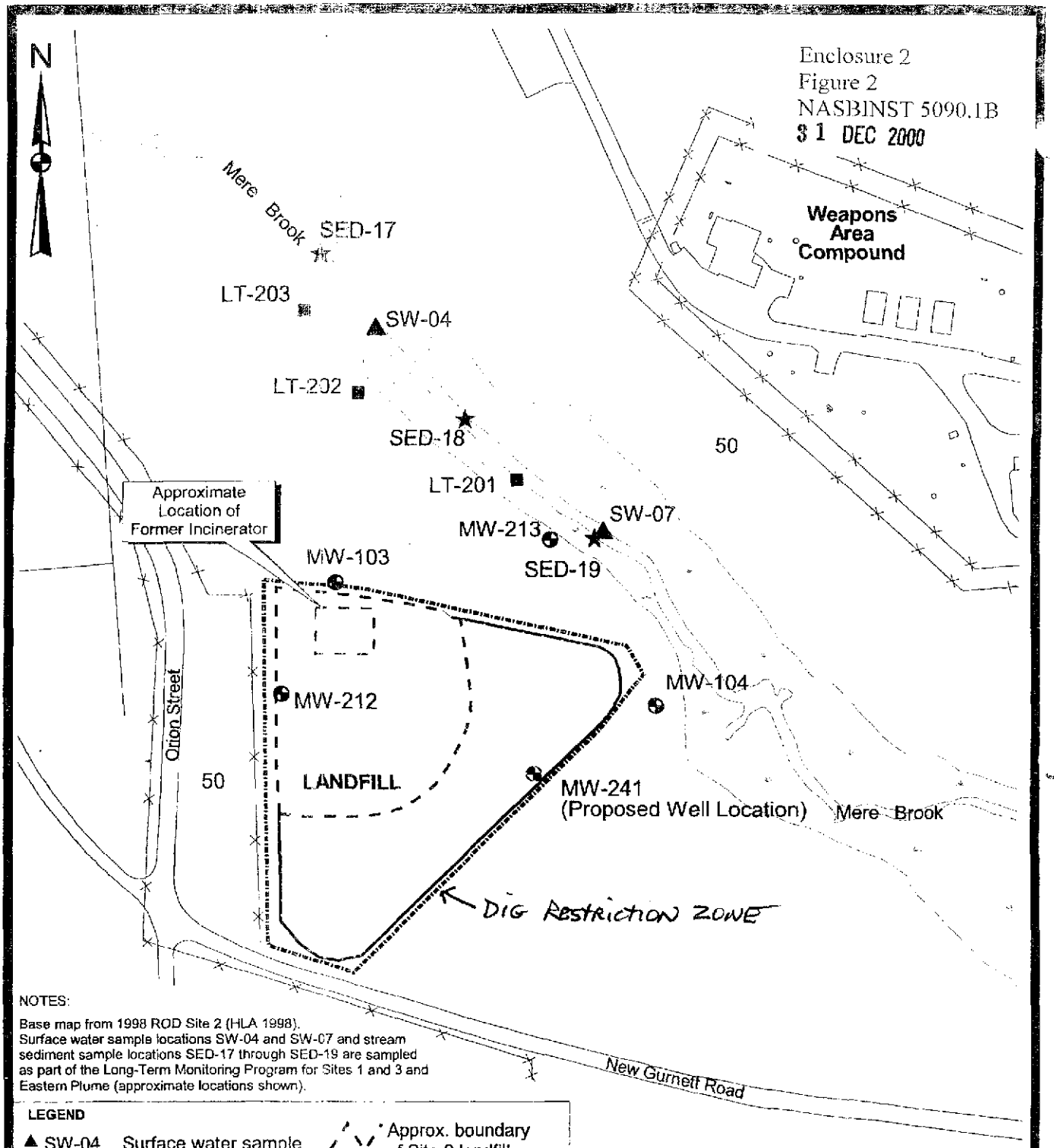


SOURCES:
MONITORING EVENT 7, FINAL REPORT
MONITORING EVENT 15 REPORT.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	NAVAL AIR STATION BRUNSWICK, MAINE				
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE
ACE	BT	BT	ACE	AS SHOWN	11 SEP

Enclosure 2
Figure 1
NASBINST 5090.1B
31 DEC 2000

Enclosure 2
Figure 2
NASBINST 5090.1B
31 DEC 2000



NOTES:

Base map from 1998 ROD Site 2 (HLA 1998).
Surface water sample locations SW-04 and SW-07 and stream sediment sample locations SED-17 through SED-19 are sampled as part of the Long-Term Monitoring Program for Sites 1 and 3 and Eastern Plume (approximate locations shown).

LEGEND

- ▲ SW-04 Surface water sample
- ■ LT-201 Leachate sample
- MW-213 Monitoring well
- ★ SED-17 Sediment sample
- 10 ft surface contours
- Roads and buildings
- Surface water features
- Approx. boundary of Site 2 landfill
- Approx. minimum area for application of land use restriction
- Scattered surface debris
- Fence line

200 0 200 Feet

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 2 SITE 2 SITE PLAN					
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE
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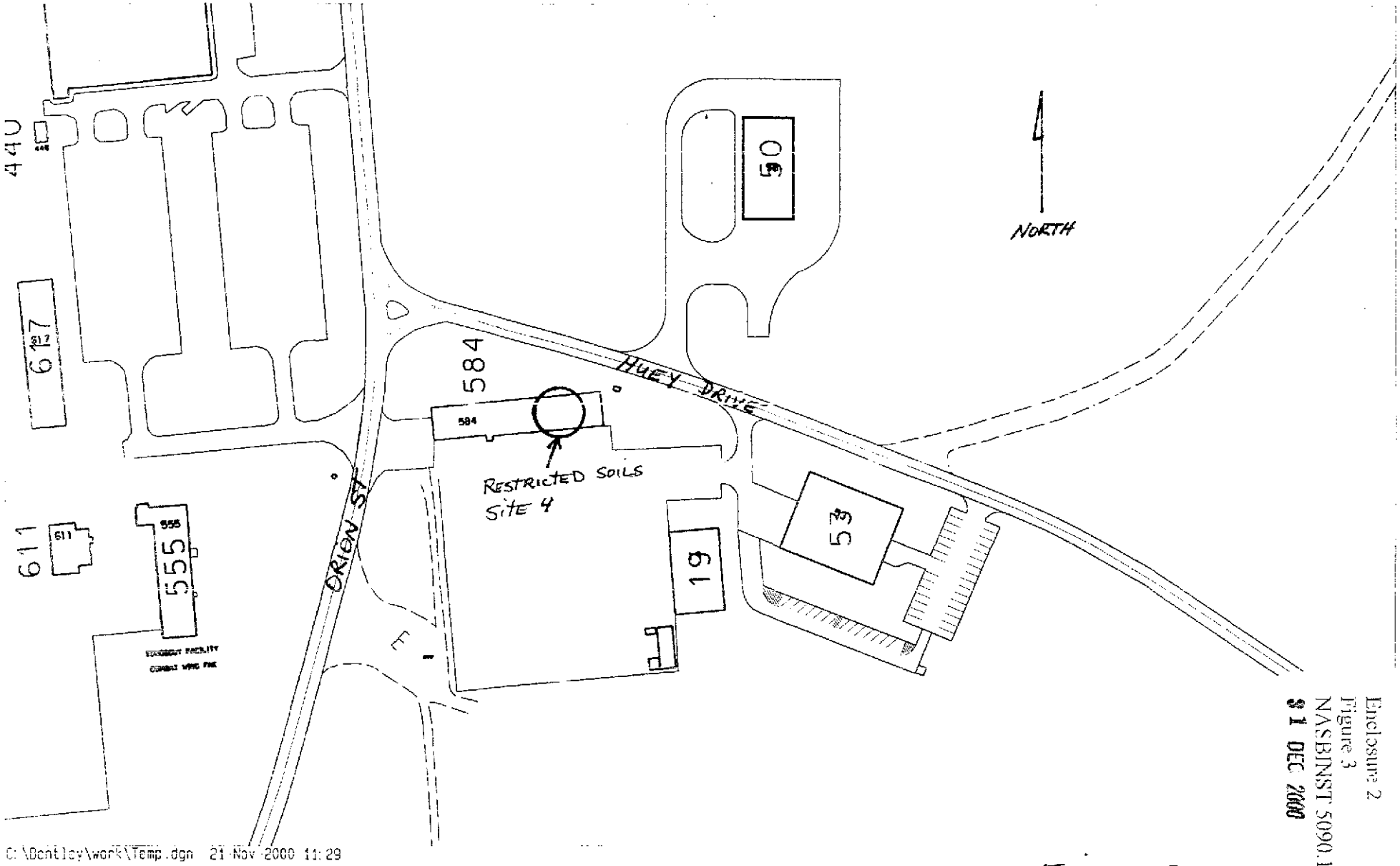


Enclosure 2
Figure 3
NASBINST 5090.1B
31 DEC 2000

FIGURE 3
SITE 4

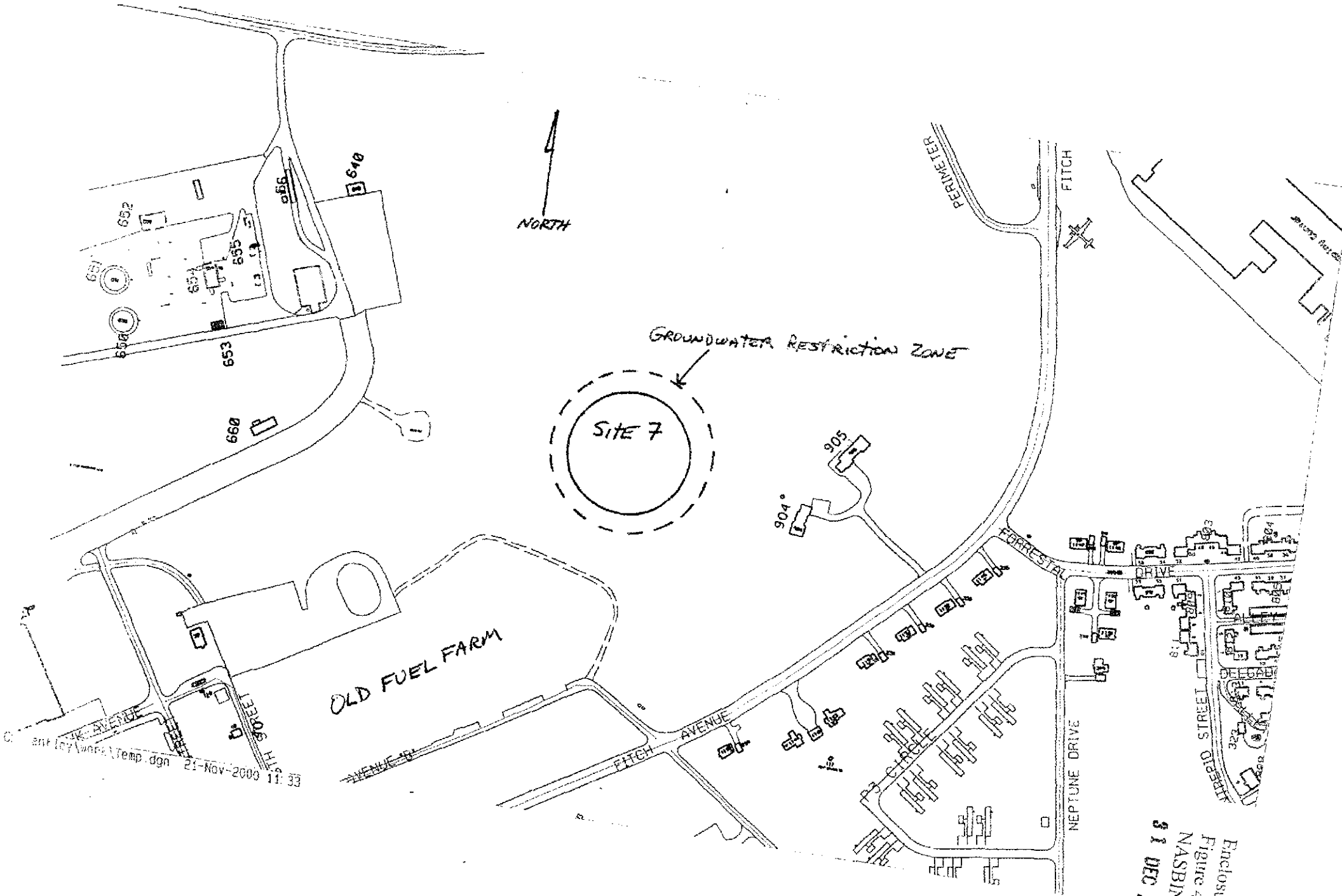
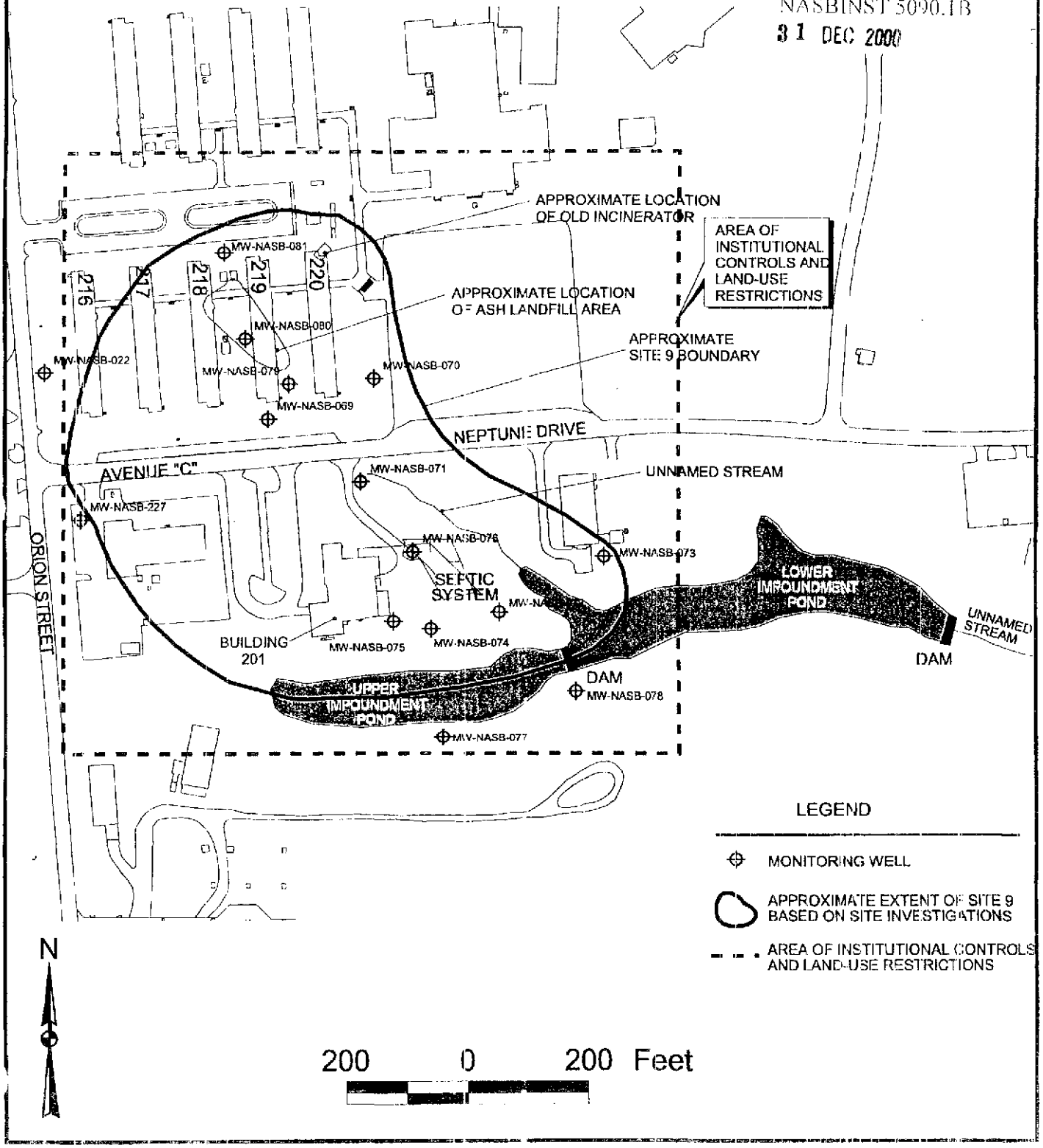


FIGURE 4
Site 7

Enclosure 2
Figure 4
NASBINST 5090.1
31 DEC 2000

FIGURE 5 - LOCATION OF SITE 9 INSTITUTIONAL CONTROLS

Enclosure 2
Figure 5
NASBINST 5090.1B
31 DEC 2000



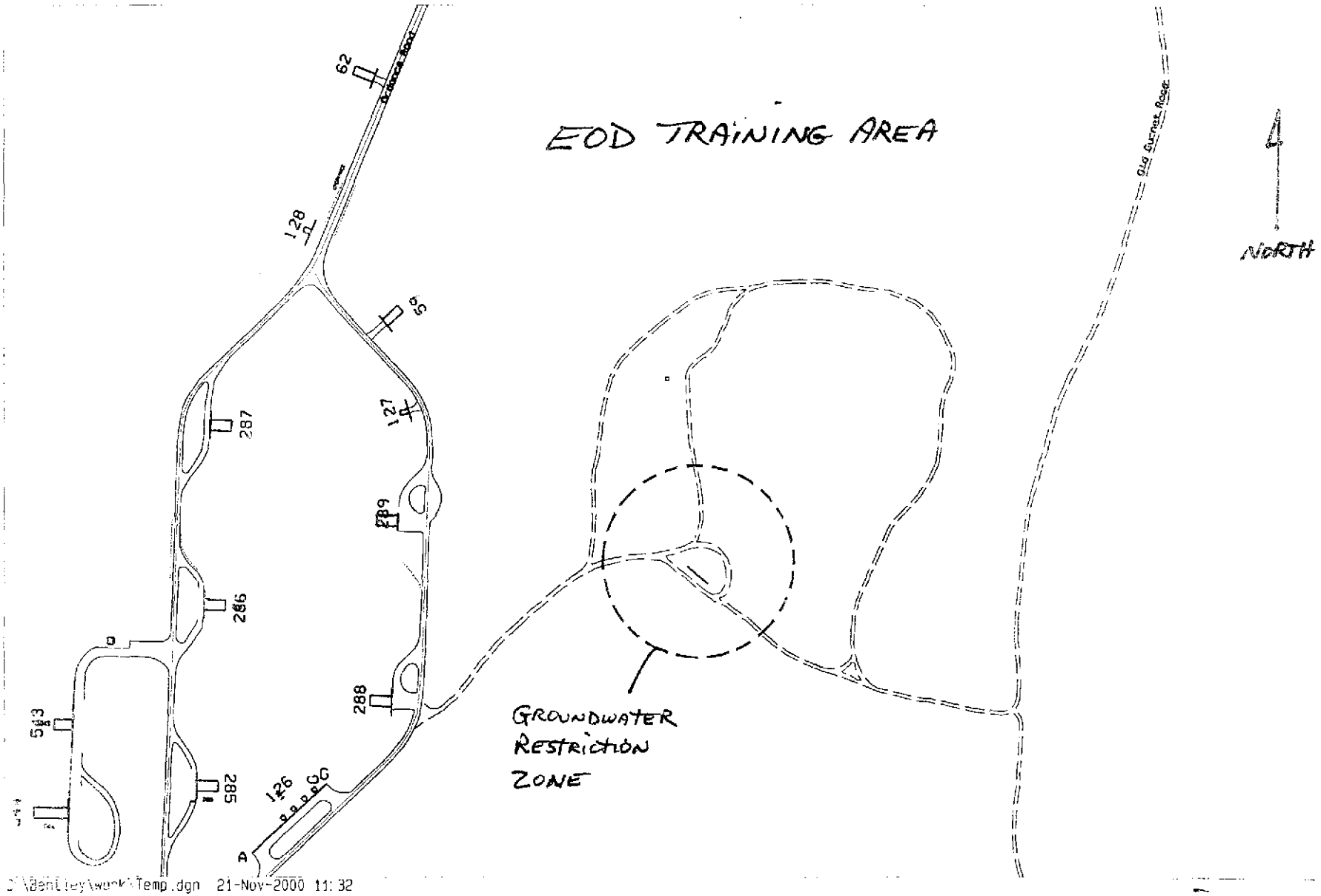
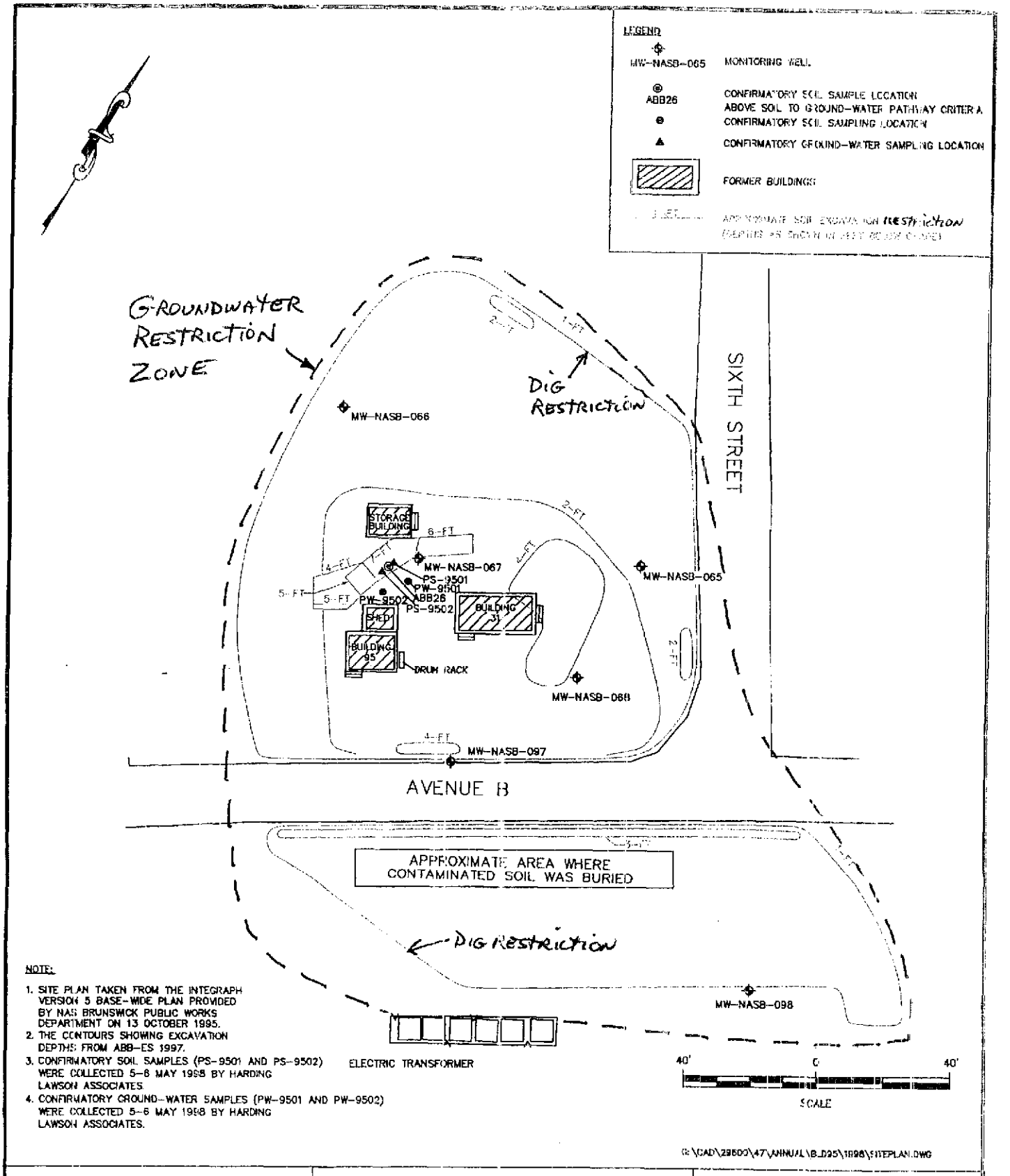


FIGURE 6
SITE 12

Enclosure 2
Figure 6
NASBINST 5090.1B
31 DEC 2000



NOTE:

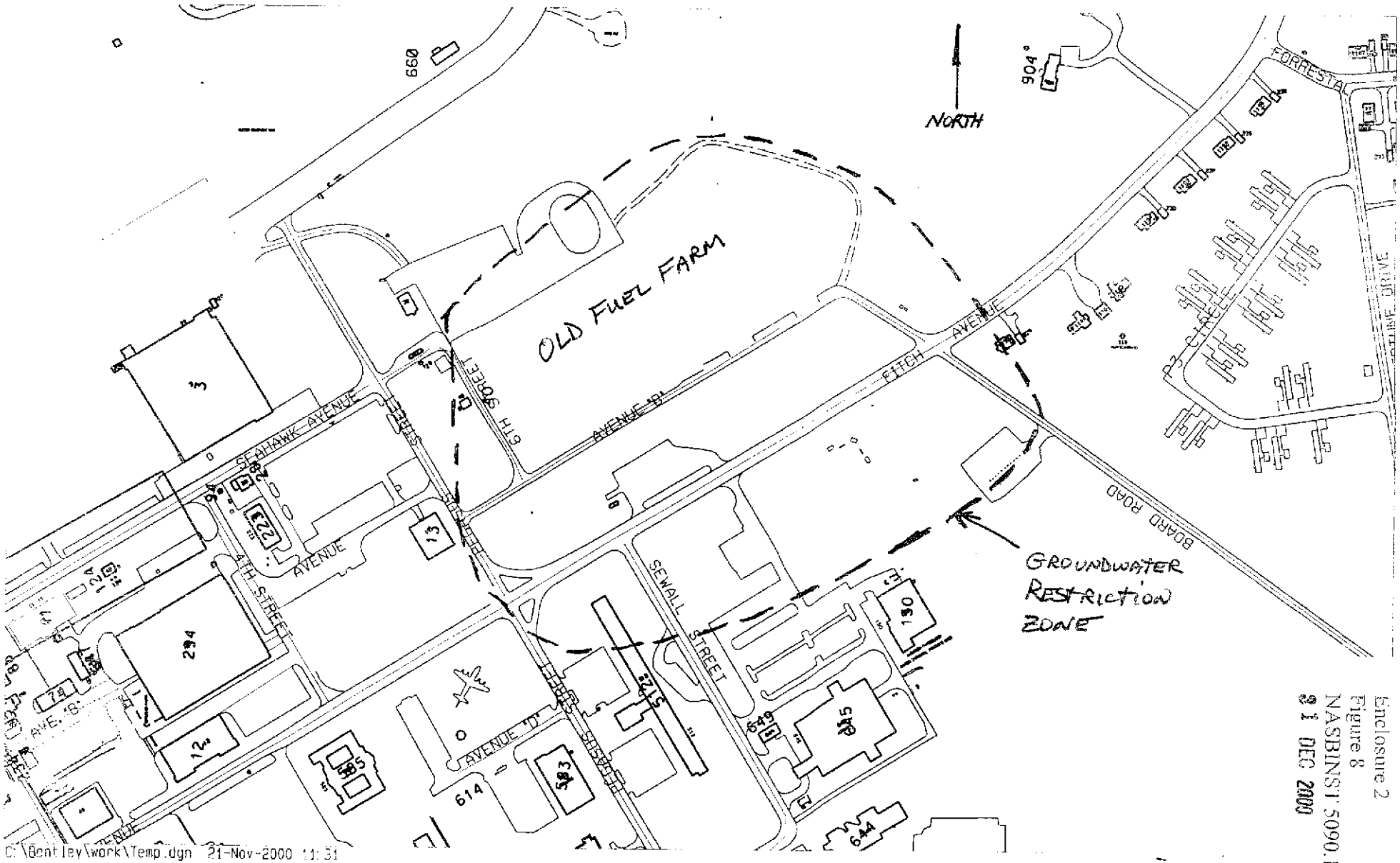
1. SITE PLAN TAKEN FROM THE INTEGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. THE CONTOURS SHOWING EXCAVATION DEPTHS FROM ABB-ES 1997.
3. CONFIRMATORY SOIL SAMPLES (PS-9501 AND PS-9502) WERE COLLECTED 5-6 MAY 1998 BY HARDING LAWSON ASSOCIATES.
4. CONFIRMATORY GROUND-WATER SAMPLES (PW-9501 AND PW-9502) WERE COLLECTED 5-6 MAY 1998 BY HARDING LAWSON ASSOCIATES.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

BUILDING 95
NAVAL AIR STATION
BRUNSWICK MAINE

Enclosure 2
Figure 7
NASBINST 5090.1B

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PRO.
CEM	SYC	SAP	PLN	AS SHOWN	16 MARCH 2000	31 DEC 2000



Enclosure 2
Figure 8
NASBINST 5090.1B
21 DEC 2000

FIGURE 8
OLD FUEL FARM

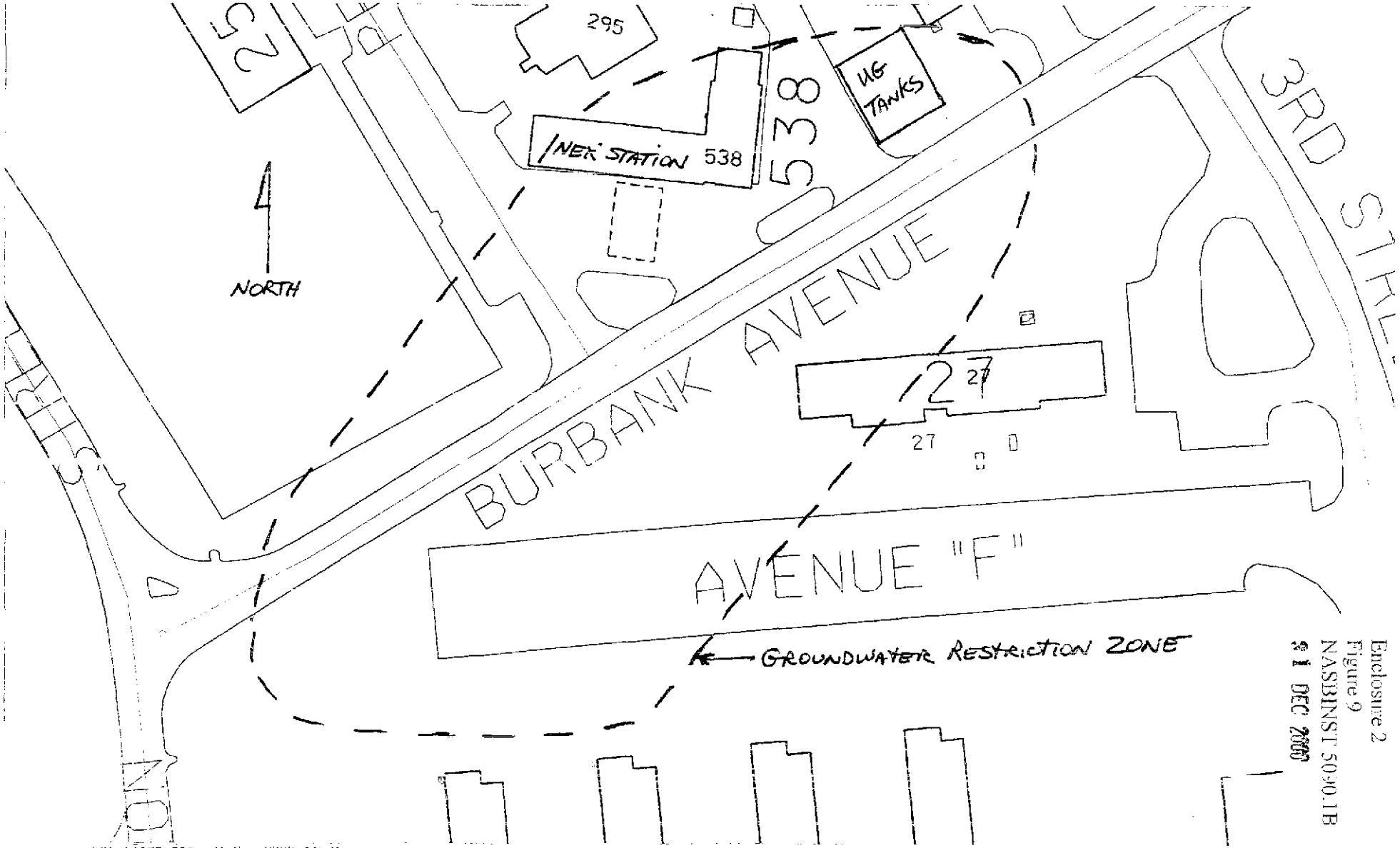
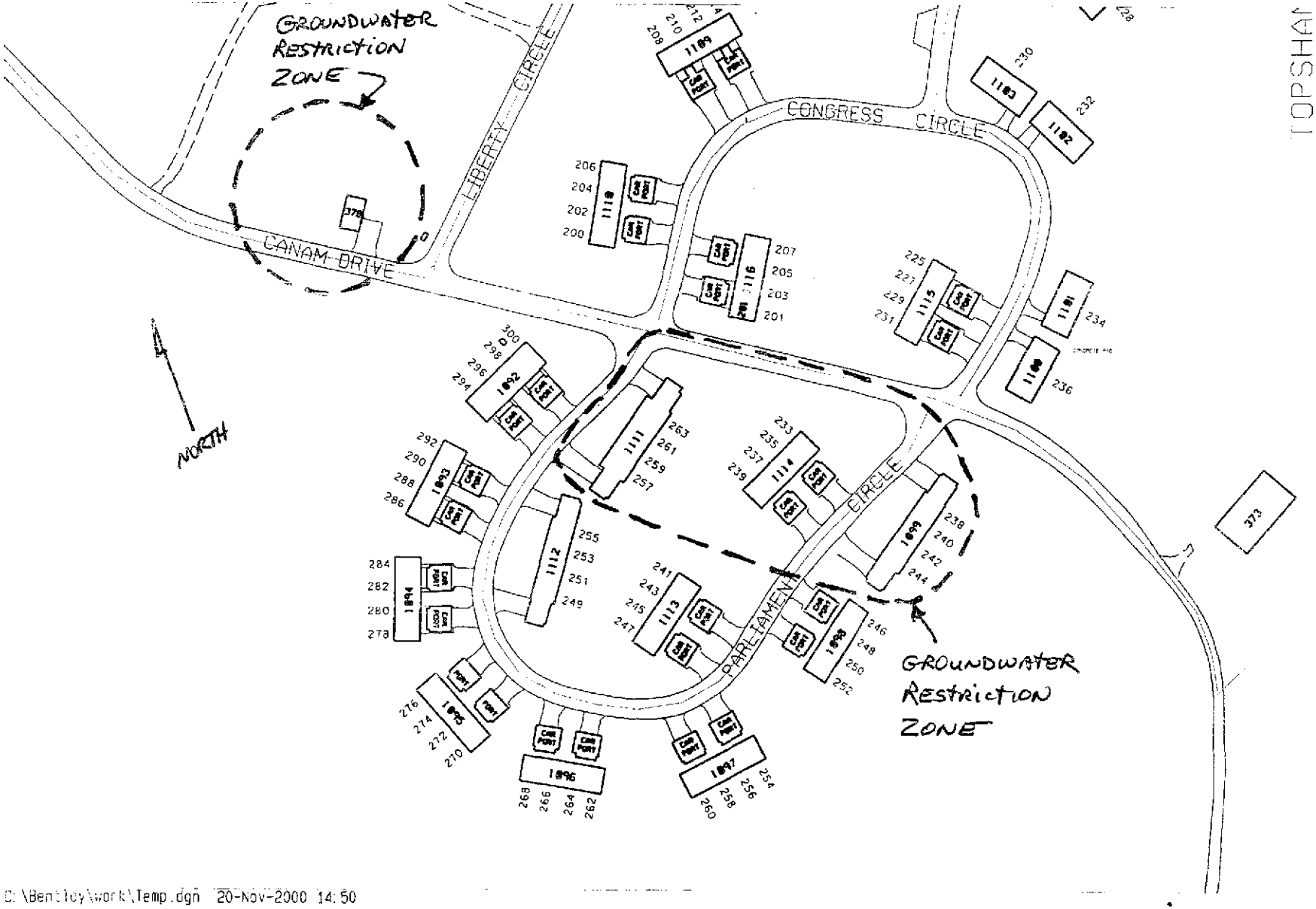


FIGURE 9
NEX SERVICE STATION

Enclosure 2
Figure 9
NASBINST 5090.1B
31 DEC 2000

TOPSHAM ANNEX



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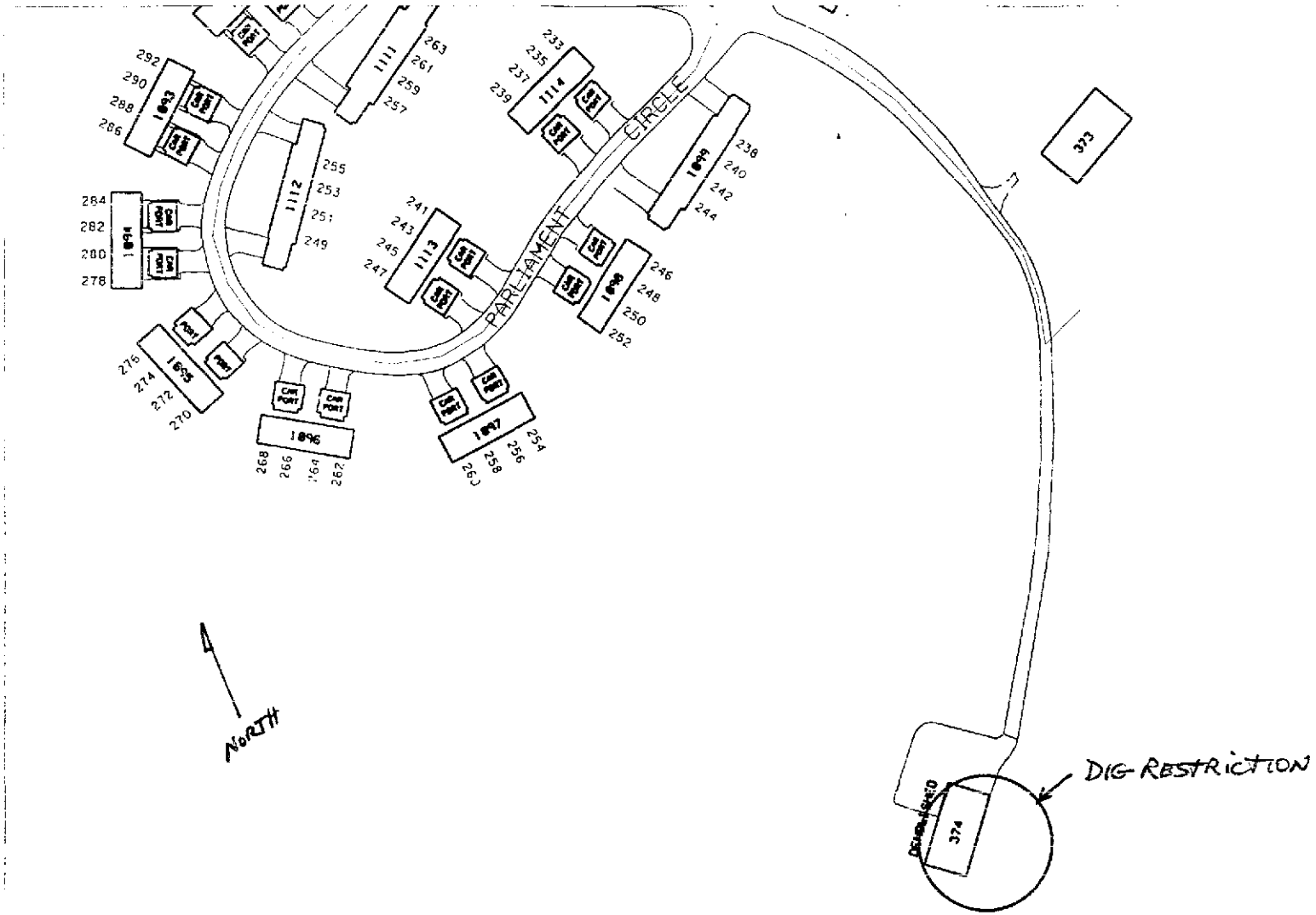
Enclosure 2
Figure 10A
NASBINST 5090.1B
31 DEC 2000

FIGURE 10A
PARLIAMENT CIRCLE HSG
BLDG 378

TOPSHAM ANNEX



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Enclosure 2
Figure 10B
NASBINST 5090.1B
31 DEC 2000

FIGURE 10B
BLDG 374

Enclosure 3
NASBINST 5090.1B

EXCAVATION CLEARANCE PERMIT

Updated 25 September 2000 **DATE:** 31 DEC 2000

1. CLEARANCE IS REQUESTED TO PROCEED WITH WORK AT _____
SERVICE CALL, WORK REQUEST OR CONTRACT NUMBER _____
INVOLVING EXCAVATION OR UTILITY DISTURBANCE.

2. INSTRUCTION:
THE EXCAVATION CLEARANCE REQUEST IS USED FOR ANY WORK THAT MAY DISRUPT BASE UTILITY SERVICES AND PROTECTION PROVIDED BY FIRE OR INTRUSION ALARM SYSTEM. THE EXCAVATION CLEARANCE IS PROCESSED **PRIOR** TO THE START OF WORK. IF DELAYS ARE ENCOUNTERED OR THE JOB SITE CONSTRUCTION CHANGES, THIS CLEARANCE MUST BE REPROCESSED.

NOTE: ANY DISCREPANCY BETWEEN ATTACHED DRAWING AND THE ACTUAL CONDITIONS MUST BE NOTED ON THE ATTACHED DRAWING AND RETURNED WITH THIS FORM TO PUBLIC WORKS FMED. CONTACT DAVID DANIELS (921-1705) WITHIN 24 HOURS OF EXCAVATION COMPLETION TO REPORT ALL CONDITIONS NORMAL OR ANY DISCREPANCIES.

3. ADDITIONAL INFORMATION & REQUIREMENTS:
A: ALL **KNOWN** UTILITIES ARE SHOWN ON ATTACHED DRAWING
B: HAND DIG WITHIN **FIVE FEET** OF ESTIMATED POSITION
C: REQUESTING PERSON(S) MUST CONTACT MECHANICAL SHOP (SHOP 42) AND ELECTRICAL SHOP (SHOP 41) TO SCHEDULE VISITS BY SHOP SUPERVISORS
D: REQUESTING PERSON(S) STAN NOCK (921-2467) OF MECHANICAL SHOP 24 HOURS PRIOR TO EXCAVATION
E: REQUESTING PERSON(S) MUST CONTACT DIG SAFE TO LOCATE PHONE LINES

4: DATE WORK SCHEDULED	5. REQUESTING SHOP/CONTRACTOR	6. PROJECT SUPERVISOR

7. PW FMED REP.
DAVID DANIELS 921-1705

8. PW ELECTRICAL SHOP SUP.
WAYNE BROWN 921-2626

9. PW MECHANICAL SHOP SUP.
STAN NOCK 921-2467

10. ASBESTOS PROGRAM MANAGER
CARLA SANDERS 921-921-1708

11. NATURAL RESOURCE MANAGER
KARI SCHANK 921-2772

12: RESTORATION PROGRAM MANAGER
ANTHONY WILLIAMS 921-1719

13. GROUND ELECTRONICS MAINTENANCE DIVISION 921-2692

14. DIG SAFE (1-800-225-4977) CALLED? YES OR NO (CIRCLE ONE)

CLEARANCE DATE: CLEARANCE NUMBER:

THE AREA BELOW IS FOR ANY OTHER SIGNATURES THAT MAY BE NEEDED DUE TO LOCATION OR NATURE OF WORK TO BE PREFORMED.

Appendix I

Response to Regulatory Comments

I.1 Comments from Maine Department of Environmental Protection

I.2 Comments from U.S. Environmental Protection Agency

I.3 Comments from Lepage Environmental Services

Appendix I.1

Comments from Maine Department of Environmental Protection

RESPONSE TO COMMENTS FROM THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION ON THE DRAFT SECOND FIVE-YEAR REVIEW REPORT NAVAL AIR STATION, BRUNSWICK, MAINE

Commentor: Claudia Sait	
Comment Issue Date: 30 November 2004	Navy Response Date: 7 February 2005
	Navy Response Date: 13 June 2005

The latest revisions to this Response to Comment document were completed on the basis of agreed to edits discussed during the 14 February 2005 Conference Call with the Navy, EA, ECC, EPA, and MEDEP. The sections and text that have been edited are highlighted in yellow.

The Maine Department of Environmental Protection (MEDEP) has reviewed the draft *Second Five-Year Review Report*, dated September 2004, prepared by EA Engineering, Science, and Technology/Environmental Chemical Corporation Based on that review, MEDEP has the following comments and issues.

GENERAL COMMENTS

1. MEDEP concurs with the U.S. Environmental Protection Agency's comments dated November 9, 2004 and attempted not to repeat those comments.

   Response—Comment noted.

2. As part of its review of this document MEDEP reviewed the Record of Decisions (RODs) for the sites with active remedies. MEDEP noted that all of the remedies and institutional control (IC) boundaries were based on the fact that BNAS was connected to the public water system (except for the golf course) and groundwater would not be used for potable uses. Therefore it came as a shock when the Navy informed the regulatory agencies that a bedrock well was installed within a couple hundred feet of the Site 2 institutional boundary. The installation of this well negates the crucial assumption in the RODs that the groundwater on the base would not be used. Therefore the Navy needs to implement a basewide groundwater restriction or develop new IC boundaries based on groundwater modeling.

   Response—This topic has been discussed at recent technical meetings and during several project conference calls. Further discussion with the project stakeholders is needed prior to the Navy determining its action regarding this topic. However, the Navy has agreed to identify all institutional control boundaries at each site as an "Issue" item within the Five-Year Review Report. If a resolution of this matter is determined prior to the finalization of the Second Five- Year Review Report, the resolution will be incorporated into the Five-Year Review Report. If not, this will topic will be included as an "issue" and as a "follow-up/action item" in the Second Five-Year Review Report.

3. MEDEP recently faxed EPA and the Navy letters from 1994 where the Navy requested and MEDEP accepted their proposal to include Building 95 under the CERCLA process rather than RCRA and to include Building 95 in the Five-Year Reviews. Obviously MEDEP, EPA, and the Navy will need to discuss how to resolve the remaining issues at Building 95 under CERCLA. A Consensus Statement should be developed which would outline the history of the site and lay out a plan to closeout Building 95. The development of the Consensus Statement has been pending for many years and the Navy needs to give it more priority.

   Response—The Building 95 site has been included as an appendix to the revised Five-Year Review Report, as was discussed and agreed to during the October and December 2004 Technical Meetings. A Consensus Statement for Building 95 is undergoing internal Navy review. Once the Navy has completed its review, it will be released as a draft to the project stakeholders for review and comment. It is expected that the draft Consensus Statement for Building 95 will be issued in 2005.

4. MEDEP has some overall general concerns with regard to institutional controls. The report does not provide enough information about the legal mechanism that establishes institutional controls, its enforceability, where the restrictions apply, the provision for notifying users, and who is responsible for oversight at the base level and Navy management level. The report would benefit greatly if a copy of the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use*, was attached to the report.

   Response—A copy of current Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use*, has been included as an appendix to the Five-Year Review Report. The base point-of-contact for the Base Operating Instruction is the Naval Air Station Brunswick Installation Restoration Program Coordinator. The Naval Air Station Brunswick Public Works Officer is responsible for regulating and enforcing the Base Operating Instruction. Additional text has been added to the draft final Second Five-Year Review Report to clarify who is responsible for enforcement and regulating the Base Operating Instruction.

5. This report fails to mention that the total monthly groundwater extraction rate has declined substantially during the second five years due to fouling of extraction wells and piping. This decline cannot be attributed to any long-term de-watering of the aquifer. The gradual decrease of total extraction rate to about one third the rate of the first five years has resulted in decreased plume capture, and therefore, the limited hydraulic control of the plume has also suffered. Consequently, the plume has continued to slowly migrate, basically eastward toward Mere Brook.

   Response—We agree that the groundwater extraction rate of the extraction well network has declined since pumping began in 1994; however, there are several other factors not mentioned in the comment that have contributed to the extraction rate decline, including:

1. Initially, the entire system operated with 7 extraction wells; 2 of 7 extraction wells, EW-6 and EW-7 for Sites 1 and 3, were operational from April 1995 to November 1997, a total of 32 months.

2. Extraction well EW-3 had a screen failure and was shut down in September 2000.

3. The replacement wells that have been installed targeted specific zones of contamination. The original extraction wells were screened across uncontaminated and contaminated zones, with each well having 78 ft of screen. Replacement wells EW-2A and EW-5A were installed to target the specific zone of contamination (the Lower Sand) in the Eastern Plume with 15 ft of well screen.

The LTMP data collected since 1995 have not shown evidence of the plume migrating into Mere Brook, except in the vicinity of MW-313. Recent LTMP groundwater data in the vicinity of MW-313 demonstrate that the plume has moved into this area; therefore, the Navy is including additional sampling to assess this condition.

6. Since all of the remedies at the active sites include Institutional Controls as part of the remedy to protection human health, the Navy should positively affirm that no excavation has taken place and no groundwater has been withdrawn as part of each site discussion, possibility in the Technical Assessment, Question A.

Response—The Navy has stated in each site report section that no unauthorized excavation has taken place and no groundwater has been withdrawn as part of the Technical Assessment, Question A for the Second Five-Year Review Report.

SPECIFIC COMMENTS

7. <u>Executive Summary, p. ES-1, last paragraph</u>:

"This Second Five-Year Review concludes that the remedies in place at NAS Brunswick are protective, or are expected to be protective, at the completion of the remedy timeframes, within a range of 10-20 years."

a. Statements in the site summaries in the body of this report state that the remedies are protective at this time, although for some sites, remedial action goals may not be accomplished for a number of years. This disagreement must be eliminated.

Response—The term "at this time" refers to short-term or currently, and "a number of years" refers to the "long-term" protectiveness of the remedies for the various sites at NAS Brunswick. Several of the site remedies are long-term remedies that will require several years to complete.

b. The estimated range for the Eastern Plume to met remedial goals is given as up to 72 years, thus 10-20 years does not accurately reflect the expected timeframe at this site.

Response—The text has been revised as follows:

> *This Second Five-Year Review Report concludes that there is not enough information available to determine if the remedies at NAS Brunswick are protective. They are expected to be protective once the institutional control boundaries are reevaluated and at the completion of remedy timeframes, with a range of 10-72 years.*

8. Five-Year Review Summary Form, Issues:

Please make the following changes:

- Sites 1 & 3-correct spelling error of "stand alone".

  Response—The sentence has been revised as follows:

  > *Finalize the Operation and Maintenance Plan for the Sites 1 and 3 Landfill.*

- Site 2-as part of finalizing the LTMP the potable bedrock well outside of the Site 2 boundary must be added to the monitoring network and include a plan for fish tissue sampling in Mere Brook rather than just continue discussions.

  Response—This section within the Summary Form is entitled "Issues" and presents a summation of the "Issues" identified in the five-year review process. The revised and updated LTMP for Site 2 was issued in January 2005. During the December 2004 Technical Meeting, the potable well to the northwest of the Site 2 boundary was discussed. The stakeholders agreed to continue collecting samples from the potable well for the next year and then evaluate if this well needs to be added to the Site 2 LTMP. Sample results from the potable well have not detected any Site 2 COCs. Currently there is no agreement for the need for additional fish tissue sampling from Mere Brook at this time, and that is why the fish tissue sampling is identified as an issue within the Five-Year Review Report.

  The following text edits have been made to the Five-Year Summary Form for Site 2:

  > *No project action levels for comparing sediment and leachate seep sediment sample LTMP data have been established. Finalize and issue updated QAPP. Potential source area located north of Site 2 Landfill. Second round of Mere Brook fish tissue sampling is needed as recommended by Naval Air Station Brunswick's First Five-Year Review Report and the 1998 Record of Decision (ROD). No LUCIP. Eliminate high turbidity in the leachate. Evaluate institutional control boundaries.*

- Site 7-delete the word "update" since Site 7 does not have a current LTMP. Please add develop Land Use Control Implementation Plan to this list.

  Response—The Site 7 LTMP was issued as a final document in December 2004. This sentence has been deleted from this section of the report. A Land Use Control Implementation Plan will be developed for Site 7 in order to limit the future use of the site, and has been included as a follow-up/action item in the Five-Year Review Report.

  The following text edits have been made to the Five-Year Review Summary Form for Site 7:

  > *Finalize and issue the QAPP and determine groundwater flow direction for the LTMP monitoring network. No institutional control monitoring has been implemented. No LUCIP has been developed. Evaluate institutional control boundaries. No current QAPP has been issued for the site. No institutional control monument marker has been installed to mark the physical boundary of the institutional control area.*

- Eastern Plume-add "determine VOC impact to Mere Brook" and change "Optimize the LTMP program and remedy." to "Optimize the LTMP and increase the overall contaminant mass-removal effectiveness of the Groundwater Extraction and Treatment System (GWETS) to treat and contain the plume."

  Response—The text has been revised as follows, as discussed during the project stakeholders conference calls in February and March 2005:

  - *Finalize and issue updated LTMP and QAPP. No LUCIP for Eastern Plume. Evaluate institutional control boundaries. Assess occurrence of 1,4-dioxane within and upgradient of the Eastern Plume. Install 2 replacement extraction wells in the Eastern Plume. Evaluate natural attenuation data during monitoring events and assess the effectiveness of natural attenuation within the Eastern Plume. Optimize the Long-Term Monitoring Program and hydraulic containment and contaminant mass removal. Conduct additional surface water sampling in Mere Brook to determine if plume is discharging to Mere Brook.*

  Site 9-add "Install monitoring well(s) along southern boundary." Also add to Protectiveness statement."

  Response—The text for the Site 9 "Issues" section of the EPA Summary Form has been revised as follows for the additional well in the southwestern corner of the institutional control boundary:

  > *Finalize and issue updated LTMP and QAPP. Finalize and issue the LUCIP. Evaluate institutional control boundary. Finalize the draft final Direct-Push Investigation Report for Site 9. Install an additional well in the southwestern corner of the current institutional control boundary to be included in the LTMP.*

The Protectiveness Statement for Site 9 has been revised as follows:

> *The remedy is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1999 ROD, which was expected to take 20 years to achieve. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict excavation of waste and utilization of the groundwater as a potable source. Current monitoring data indicate that the remedy is functioning as required; however, additional monitoring in the southwestern corner of the site is needed to ensure the remedy is protective in the long term and institutional controls will need to be refined.*

9. Five-Year Review Summary Form, Recommendations and Follow-Up Actions: [NOTE: The summary form will need to be revise to indicate that all the existing IC boundaries will need to be evaluated based on the potential for installation of water supply wells.] Please make the following changes:

The Five-Year Review Summary Form has been revised to indicate that all existing institutional control boundaries will need to be evaluated based on the potential for installation of water supply wells at each well.

- For Site 2: Item 5, please change the language to read "Develop Mere Brook …:

  Response—The text has been revised as follows:

  > 4. *Continue discussion amongst project stakeholders regarding Mere Brook fish tissue sampling (second sampling event).*

- For Site 7: Please change item 1 to read "Finalize and issue LTMP." Please delete "update" from item 2

  Response—The Final LTMP for Site 7 has been issued.

- For Site 9: Finalize workplan to install one or more additional monitoring wells to be included in the LTMP.

  Response—The text for Site 9 has been revised as follows:

  1. *Finalize revisions to the LTMP and issue updated and revised LTMP.*
  2. *Finalize draft QAPP and issue updated QAPP.*
  3. *Finalize and issue the LUCIP document.*
  4. *Finalize the draft final direct-push investigation reports for 2003 and 2004 for Site 9.*
  5. *Install a new monitoring well in the southwestern corner of the current institutional control boundary.*
  6. *Develop insitutional control boundary for the site.*

- For Eastern Plume-install bedrock well and optimize the effectiveness of the GWETS.

Response—The Recommendations and Follow-Up Actions in the EPA Summary Form include these items under No. 7:

Eastern Plume:

1. *Finalize revisions to the LTMP and issue updated and revised LTMP.*
2. *Finalize draft QAPP and issue updated QAPP.*
3. *Generate an LUCIP for Eastern Plume.*
4. *Continue assessment of occurrence of 1,4-dioxane in the Eastern Plume.*
5. *Install replacement extraction wells in the Eastern Plume.*
6. *Continue collection of natural attenuation data during monitoring events and assess the effectiveness of natural attenuation within the Eastern Plume.*
7. *Optimize the Long-Term Monitoring Program and remedy.*
8. *Develop institutional control boundary for site.*

10. Five-Year Review Summary Form, Protectiveness Statement(s):

See General Comment No. 2. The lack of a basewide groundwater institutional control and the new potable bedrock well near Site 2 call in question the protectiveness of the remedies which were developed with the assumption that the base would not be drilling wells since it was connected to the public water system.

Response—See response to Comment No. 2.

Site 7: The statement needs to include the possible future use of a Reserve Center. Also it cannot be determined if the remedy is protective because neither the Land Use Control Implementation Plan nor the Long Term Monitoring Plan has been developed for this site.

Response—The Site 7 LTMP was issued as final in January 2005. Since the Final LTMP has been finalized, LTMP sampling will begin at Site 7 during the Spring 2005 Long-Term Monitoring Program, along with all the other LTMP sites at NAS Brunswick. The base has identified an area to the northwest of Site 7, north of the former Old Navy Fuel Farm, and east of the new Fuel Farm as an area for a potential reserve center. No decision has been made, and there are no plans in place for construction. The preliminary planning by the activity identified this area only as a potential site; therefore, it is not appropriate to include this in the Protectiveness Statement for Site 7 until this potential development has been accepted by the base.

Site 9: There needs to be a discussion of the possible removal of the barracks at Site 9 since they act as a cover for the buried debris and the need for additional well(s) along the southern boundary.

Response—The Navy is only demolishing the barracks buildings to 1 ft bgs and leaving the foundations intact; therefore, there will still be a cover at the site. The only barracks buildings that may have the foundations removed are the barracks overlying the ash

landfill/dump area. The barracks building demolition is presented within the report text for Site 9. See responses to EPA Comment Nos. 64 and 65.

Eastern Plume: In addition to addressing items noted above, there appears to be some error in the second sentence. Please add a reference to containment of the plume which is a key element of the remedy and the phase "utilize the groundwater as a potable source" appears out of context.

Response—The Protectiveness Statement for the Eastern Plume has been revised as follows:

The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.

11. <u>Page 1-3, Section 1.1.2, Naval Air Station, Brunswick Location and Description, Para 2</u>:

"Forested areas, grassland, and paved areas comprise approximately 88 percent of the base with the remaining 12 percent of the base consisting of operations area, shrubland, marsh and open water."

If this sentence is correct as written it seems like an odd combination of land uses. MEDEP recommends dividing the land use into developed, paved areas and operations as one type and undeveloped forested areas, grassland, shrub land, marsh and open water as another type.

Response—This sentence has been revised as follows:

Forested areas, grassland, shrubland, marsh, and open water comprise approximately 83 percent of the base with the remaining 17 percent of the base consisting of an operations area and paved areas (primary flight ramps and runways).

12. Section 2.1.1, Site Description:

Section 2.1.1 states that Sites 1 and 3 "are located within a restricted portion of NAS Brunswick (Figure 2-1). However Figure 2-1 does not show the boundary of the restricted area. It should be added to the map or described, as the document refers to the protection afforded by the restriction.

Response—The boundary of the restricted area has not been shown on numerous previous reports and not described in previous documents. The restricted area(s) cannot be shown on public document figures due to security concerns.

13. Section 2.1.2, Site Chronology, bullet 8 & 28

Please change the verb from present tense to past tense in order to keep the bullets consistent.

Response—The text of the 8th and 28th bullets has been revised as follows:

- *In October 1990, the Navy entered into an FFA with EPA and MEDEP regarding the cleanup of environmental contamination at NAS Brunswick.*
- *In September 2002, EPA issued a Preliminary Close-Out Report for the NAS Brunswick NPL site that includes Sites 1 and 3 Landfill.*

14. Section 2.1.3, Background, subsections on pages 2-4 & 2-5:

All through these pages, Site 1 and Site 3 naming is reversed. Please change all Site 1 designations to Site 3, and all Site 3 designations to Site 1 to agree with historical reports and map figures presented in this report.

Response—The naming of Site 1 and Site 3 seems accurate in Section 2.1.3, Pages 2-4 and 2-5. Figure 2-2 has been revised for the draft final Second Five-Year Review Report.

15. Section 2.1.3.3, History of Contamination, p. 2-5, 3rd paragraph:

"Based on the proximity of the two sites, common historical land use, and hydrogeological characteristics, the impacts of past disposal practices from Sites 1 and 3 could not be distinguished."

MEDEP does not agree with this statement in its entirety. Disposal practices were different between Site 1 and Site 3 in that wastes were buried in two long trenches at Site 3, and much fewer waste types were reportedly disposed at Site 1 than at Site 3. Because some groundwater migrated from Site 3 to Site 1 (toward Mere Brook) under pre-remedy hydraulic conditions, contaminants found in groundwater at both landfills were (and may be yet) very similar. Therefore, because groundwater chemistry could not be readily

distinguished between the landfills, and not because the wastes were the same, impacts of each landfill has not been individually defined. Please re-word the above statement.

Response—The sentence does not present "disposal practices" as a factor as the comment states. Instead, the sentence presents the following factors: proximity, historical land use, and hydrogeological characteristics. This is the same language used in the final ROD (Page 9). A reference has been added to the end of this sentence, as follows:

Therefore, these areas of contamination were combined and have been presented as one site since the Final ROD was signed in June 1992 (U.S. Navy 1992).

16. Section 2.1.3.1, Physical Characteristics, page 2-4, para 4:

"A slurry wall was placed around the landfilled waste, with the exception of the Weapons Compound, that diverts clean groundwater flow around the landfill that ..."

Please check the syntax in this sentence and correct.

Response—The fourth paragraph has been revised as follows:

A slurry wall was placed around the landfilled waste, with the exception of the Weapons Compound. It diverts clean groundwater flow around the landfill, preventing the groundwater from coming into contact with the landfill waste material. The slurry wall was keyed into the underlying marine clay unit and has a permeability rating from 10^{-6} to 10^{-7} cm/sec. In addition to the slurry wall, a low permeability cap was placed over the landfill to reduce the amount of rainfall infiltration and the production of leachate within the landfill waste. The cap was extended over the slurry wall to prevent the infiltration of rainwater within the slurry wall limits. A small portion (less than 0.3 acres) of Site 1 is located within the Weapons Compound and was not included in the cover system due to security concerns for the Weapons Compound (U.S. Navy 1992).

17. Page 2-5, Section 2.1.3.2, Land and Resources, para 1:

a. "Groundwater at the site..."

Landfills 1 & 3 are also Sites 1 & 3. For consistency and clarity it may be better to refer to Landfills 1 & 3 as such.

Response—The text is correct as written. Historically, the two landfills have been referred to as Sites 1 and 3 Landfill in the 1992 ROD, the 1994 Explanation of Significant Difference (ESD), and monitoring event reports.

b. The Base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course."

This statement needs to be updated to include the newly installed well near Site 2.

Response—The third paragraph in Section 2.1.3.2 Land and Resource Use has been revised as follows:

Groundwater at the site is not used for potable purposes or any other uses. The base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course and Dyers Corner gate entrance guard station. The bedrock well is located approximately 200 ft west of Site 2 Landfill. This well, installed in 2002, is screened below a relatively impermeable marine clay and is not affected by Site 2 based on limited data. The base golf course is distant from Sites 1 and 3 Landfill and is not affected by groundwater flow from Sites 1 and 3 Landfill. Mere Brook, south of Sites 1 and 3 landfill, receives drainage from the runways, as well as runoff and leachate from the landfills. Since this area is restricted, the Brook is not used for recreational activities in the reaches of the Brook adjacent to the landfills. Mere Brook flows into the Atlantic Ocean at Harpswell Cove, which is designated as a potential aquacultural area by the State of Maine. Harpswell Cove supports various commercially important fish species (U.S. Navy 1994).

18. Page 2-7, Section 2.1.3.5, Basis for Taking Action:

The last line in the section (page 2-8, fifth paragraph) argues that mercury concentrations in leachate sediment will be reduced over time due to scour and sedimentation. It has been 12 years since the remedy was put into place. Please add a description of the trend in these sediments over time.

Response—The following sentence has been added to the end of the fifth paragraph in Section 2.1.3.5 Basis for Taking Action:

The trends of sediment samples since the remedy was initiated are presented in Section 2.1.6.4.

19. Page 2-9, Section 2.1.4 Remedial Actions, para 2:

"...when the water table was lowered below the bottom of the waste fills (with the exception of the area around monitoring well MW-234R) and did not rise during a subsequent 6-month period of monitoring water levels."

The potentiometric surface at MW-234R has not been high enough to invade the waste fill for at least several years. It has now been about 6 years since the pumping ceased. Please update and include the longer-term response.

Response—The text in the second paragraph within Section 2.1.4 (Remedial Actions) has been revised as follows:

Remedial measures were initiated in April 1995. Remedial activities undertaken at Sites 1 and 3 include the installation of a slurry wall around the western, northern, and eastern perimeters of the landfill footprint, and the installation of a low permeability cap (Figure 2-1). Contaminated soil was removed from Sites 5, 6, and 8 and was used as subgrade fill in Sites 1 and 3 Landfill cover as per the 1994 ESD. Two groundwater extraction wells (EW-6 and EW-7) were constructed and used to dewater the landfill within the slurry wall. After 3 years of operation, these extraction wells were deactivated in November 1997 when the water table was lowered below the bottom of the waste fill (with the exception of the area around monitoring well MW-234R) and did not rise during a subsequent 6-month period of monitoring water levels. Since July 1999, the water level at MW-234R has remained below the bottom of the waste.

The ROD stated one pore volume of groundwater within the slurry wall (estimated at 16 million gal) was to be removed by the extraction wells. Approximately 3.6 million gal were removed by extraction wells EW-6 and EW-7 from January 1996 to November 1997 when the wells were deactivated once water elevations stabilized below the majority of the waste. It is likely that a significant volume of water also migrated out of the landfill through the opening in the slurry wall, which contributed to the stabilized water elevations within the landfill. The calculation which was completed by E.C. Jordan Company in October 1991 in the Feasibility Study for Sites 1 and 3 (E.C. Jordon Company, October 1991.

The calculation of the total volume removed during operation of the extraction wells is provided as Attachment A to this response to comment letter.

20. Page 2-10, Section 2.1.4.2 System Operation/Operation and Maintenance, para 1:

"The revision of the LTMP is expected to be finalized by the end of 2004. The revised plan will include the operation and maintenance activities listed below:"

This statement contradicts the Summary of issues which states that a stand alone Operation and Maintenance plan will be developed. Please clarify.

Response—There is a stand-alone Operation and Maintenance Plan that has been issued for the site. The LTMP also describes certain operation and maintenance tasks. The sentence has been revised as follows:

2.1.4.2 System Operation/Operation and Maintenance

The Navy is conducting long-term monitoring and maintenance as per the current LTMP for Sites 1 and 3 Landfill (2000). The LTMP is currently undergoing revisions, and is expected to be finalized in mid-2005. The revised LTMP, as well as the stand-alone Operation and Maintenance Plan for the landfill, will include the operation and maintenance activities listed below:

21. Section 2.1.6.4, Data Review, Sediment Monitoring:

Please clarify this section, which currently contains both the following statements:

The inorganic sampling results have shown that the inorganic concentrations have remained within historical ranges for the COC. Mercury has not been detected in sediment samples since the 1999 monitoring event.

Response—The historic range of mercury includes non-detections. Clarification has been added to this section as follows:

The sediment sampling data are collected annually during the Fall sampling event from 6 sample locations (SED-9, SED-15, SED-16, SED-17, SED-18, and SED-19). The sediment samples are analyzed for inorganics. The inorganic sampling results have shown that the inorganic concentrations have remained within historical ranges for the COCs. The 1992 ROD had established a cleanup goal for mercury of 1.0 mg/kg, and mercury has not been detected in sediment samples at least since the September 1999 monitoring event (Monitoring Event 15).

22. Section 2.1.6.4, Data Review, Groundwater Monitoring, p. 2-12, last paragraph:

"No increases in inorganic concentrations have been noted which would indicate that additional groundwater or surface water is infiltrating the cover or slurry wall surrounding the Sites 1 and 3 Landfill."

a. The Navy must not portray an inaccurate view of the remedy by stating that the slurry wall surrounds Sites 1 and 3. The slurry wall was not installed on the south side, therefore is only a partial enclosure of the landfills. Please clarify in this statement.

Response—The last paragraph in Section 2.1.6.4 (Data Review, Groundwater Monitoring subsection) has been revised as follows:

The inorganic groundwater data from the monitoring wells generally show stable or decreasing trends with the exception of sodium, which has increased in concentration. No increases in inorganic concentrations have been noted which would indicate that additional groundwater or surface water is infiltrating the cover or slurry wall surrounding a majority of the Sites 1 and 3 Landfill.

b. Inorganic concentrations in groundwater immediately downslope of the landfills generally have not decreased, and some monitoring events results in relatively high concentrations for a few contaminants in the past 5 years. Furthermore, pre-1998 remedial pumping of EW-6 and EW-7 did not lower the water table within the walled area enough to create complete hydraulic capture, as the goal was to de-saturate the landfill waste volume. MEDEP has concerns that to date the remedy has not been performing as originally intended, and that dissolved metal contamination in groundwater and leachate seeps downgradient is excessive.

Response—Water elevations within the landfill are stable, and have remained at or below the majority of waste for several years. Additionally, VOC concentrations in seep samples have dropped significantly since the slurry wall was emplaced. These data strongly suggest the slurry wall is effective and is performing as planned. Inorganic data are more variable and, therefore, remaining concentrations should not be unexpected.

Specifically, groundwater samples are collected from 8 well locations (MW-202A, MW-203, MW-204, MW-217B, MW-218, MW-219, MW-240, and MW-2101) at Sites 1 and 3 Landfill. The most recent event data (Monitoring Event 23) demonstrate a continued overall trend of decreasing VOC contamination in the shallow and deep groundwater wells for Sites 1 and 3 Landfill. No VOCs have been detected above Maximum Contaminant Levels (MCLs) or Maximum Exposure Guidelines (MEGs) in the wells located downgradient or outside of the landfill. Vinyl chloride remains above the MEG (0.15 µg/L) in MW-217B (well located within the landfill), however, it has displayed a steady level trend over the past four monitoring events. In addition to vinyl chloride in well MW-217B, 1,4-dichlorobenzene has exceeded the applicable MEG (25 µg/L) within the five-year period (e.g., 79 µg/L in April 2001, 40 µg/L in April 2002, 38 µg/L in May 2003, and 17.3 µg/L in May 2004). However, total VOC concentrations have declined since 1999, and 1,4-dichlorobenzene has been below the MEG since 2003.

The inorganic groundwater data from the monitoring wells generally show stable or decreasing trends with the exception of sodium, which has increased in concentration. No increases in inorganic concentrations have been noted which would indicate that additional groundwater or surface water is infiltrating the cover or slurry wall surrounding a majority of the Sites 1 and 3 Landfill. Arsenic has been reported above MEGs/MCLs during this five-year review period. The review of groundwater quality results for Sites 1 and 3 indicate that arsenic has been persistent at concentrations above the MCL. The arsenic concentrations appear to be fairly stable ranging between approximately 100 and 300 µg/L. Arsenic has been reported at concentrations above the MCL in recent monitoring events at MW-15B, MW-303, MW-313, MW-338A, MW-NASB-212, MW-217B, and MW-218. The arsenic concentrations will continue to be tracked as part of the monitoring event reporting. The significance of the reported arsenic concentrations at Sites 1 and 3 will be evaluated as part of the next five-year review.

23. <u>Page 2-13, Section 2.1.6.4, Data Review, Sediment Monitoring, 1st paragraph</u>:

"The inorganic data for the leachate seep samples have demonstrated a stable contaminant trend within historical concentrations ranges."

The ROD objective was to minimize future negative impacts to Mere Brook and sediment in the leachate seeps resulting from the discharge of contaminated groundwater and reduce the concentrations of metals (iron and zinc) discharging to Mere Brook. If the contaminant

concentration trends have been stable since 1995, then the remedy to date has not been effective and this needs to be addressed in this report.

Response---The Navy believes the remedy is effective. Site data clearly note decreases in VOC concentrations at seeps, and that several seep locations are now dry due to the remedial measures at the Sites 1 and 3 Landfill. Concentrations of iron and zinc are considered to be highly affected by turbidity of samples and, to mitigate this issue, the Navy will be collecting samples in a manner which reduces turbidity in the future.

24. Page 2-13, Section 2.1.6.4, Data Review, Leachate Seep Monitoring:

a. "2nd & 4th sentences: please remove "however". (ED)

Response—"However" as been removed from the second sentence but its use in the fourth sentence is appropriate and will remain.

b. "The inorganic data for the leachate seep samples have demonstrated a stable contaminant trend within historical concentration ranges; however, aluminum, iron, and zinc continue to exceed their respective AWQC for most monitoring events."

Please address impacts to aquatic life from the leachate seeps.

Response—We agree that inorganic concentrations have not fallen consistently in the past 10 years of sampling. The ROD notes that a timeframe of 30 years may be required, and it is not unreasonable to think concentrations will further decrease in the next 20 years to meet the recommended Ambient Water Quality Criteria for these COCs. As discussed at recent technical meetings, inorganic concentrations may follow a similar trend, although they may take longer to react to remedial measures due to the increased retardation and slower travel times of these inorganic analytes. The Navy is scheduled to complete a statistical assessment of long-term monitoring trends at leachate sampling locations to quantitatively assess which inorganic analytes are increasing or decreasing. Leachate seep samples have turbidity issues that are likely to result in elevated concentrations of inorganic analytes and may not be the best representation of actual site conditions. Therefore, the Navy will be revising the sample collection methods in 2005 to minimize turbidity.

25. Page 2-14, Section 2.1.7, Technical Assessment, Question A:

a. The 1992 ROD (pg 48) states "The extraction well program will remove the volume of contaminated water remaining within the landfill area (i.e., one pore volume), which is estimated to the approximately 16 million gal. The pore volume of water removed as part of the extraction well program represents the most significantly contaminated portion of the groundwater system and will prevent this contamination from discharging to Mere Brook. The selected remedial alternative will both lower the water table to levels located below the waste and remove the estimated one pore volume of water contained within the confines of the slurry wall and landfill cap."

In 1997, the Navy proposed and the agencies concurred with the cessation of pumping of extraction wells 6 and 7 however it was never determined if the one pore volume of contaminated groundwater was removed or if the cessation of pumping had a deleterious effect on the leachate seeps. Since this was the goal of the ROD the Navy should determine the volume of contaminated water removed and the long-term effect of the cessation of pumping on the leachate seeps.

Response—The 16 million gal noted in the ROD were an estimated volume of one pore volume within the landfill. Approximately 4 million gal were extracted from the landfill via extraction wells. The volume of groundwater removed by extraction wells was also augmented by groundwater which moved outward through the open portion of the slurry. Together, these factors have been sufficient to reduce and stabilize water elevations below the majority of the waste. Several leachate seeps are no longer flowing, and the source of other seeps may be unrelated to the Sites 1 and 3 Landfill. We believe this section contains sufficient detail and is accurately written.

b. The response to Question A does not mention how the Base Operating Instruction NASBINST 5090.1B, *Restrictions on Excavation Activities and Groundwater Use* functions; how often it is reviewed, how the restrictions is passed to Navy staff, how Navy informs new managers of its purpose, etc. Please address.

Response—The base updates the Base Operating Instruction on an as-needed basis. The additional questions regarding training for managers and new employees would be best described by the Base Environmental Manager at the next technical meeting, or project conference call. During the April 2005 Technical Meeting, the Environmental Manager stated that the Activity is reviewing the Base Operating Instruction and expects to update the Instruction over the next couple of months. It is noted that the update to NASBINST 5090.1B will require site-specific figures depicting current Institutional Control boundaries for the main base and Topsham Annex. Once these are provided, the instruction can be fully revised.

c. "The cap and slurry wall were installed and remain in good condition."

To MEDEP' knowledge the condition of the slurry wall has not been verified in the last 5 years, as technically difficult and expensive subsurface testing would be involved nor has the hydraulic competency of the slurry wall has never been tested. Therefore, please provide the basis for this statement.

Response—See response to Comment No. 25a. The basis for this statement is that two of the leachate seeps are no longer flowing and that the groundwater level within the slurry wall has not rebounded to water elevations that existed prior to installation and operation of the extraction wells.

26. Page 2-15, Section 2.1.7, Technical Assessment, Question B, para 1:

"No unacceptable risks for ecological receptors were identified in earlier reviews at Sites 1 and 3 Landfill."

a. This statement contradicts the exceedances of the Ambient Water Quality Criteria. Please qualify this statement with an acknowledgement of the exceedances.

Response—The statement has been revised as follows:

No unacceptable risks for ecological receptors were identified in earlier reviews at Sites 1 and 3 Landfill. Since the first five-year review was completed, additional sampling data have reported exceedances in surface water samples collected at Sites 1 and 3 Landfill, which exceeded the AWQC.

b. This statement is also contradictory to statements made on page 2-8 with regards to the adverse impacts to the aquatic environment by elevated iron and zinc (and possibly mercury) in surface water of Mere Brook, a receptor of leachate that emanates from monitored springs downgradient of the landfills. If the current five-year review represents a change in assessment, this should be made clear. This report must be changed to be internally consistent as well as factual.

Response—The statement has been revised as shown below to provide consistency and factual information:

No unacceptable risks for ecological receptors were identified in earlier reviews at Sites 1 and 3 Landfill. Since the first five-year review was completed, additional sampling data have reported exceedances in surface water samples collected at Sites 1 and 3 Landfill, which exceeded the AWQC.

c. "Several of the COCs have had revisions to their toxicity values including arsenic, chromium, vinyl chloride, and xylene; however, none of these changes would affect the risk assessment for Sites 1 and 3 Landfill."

Response—The changes in toxicity values were reviewed by a risk assessor to determine if changes in the toxicity values would affect the outcome of the risk assessment. The results of that review are provided Attachment B.

d. Please provide the present-day basis supporting the above opinion of no affect on the prior risk assessment.

Response—See response to Comment No. 26c.

e. Please reconcile the following statements in response to Question B (page 2-15) "No unacceptable risks for ecological receptors were identified in earlier reviews at the Sites 1 and 3 landfill. No circumstances have changed that might alter this conclusion." with

the statement in the previous sections that project action limits for sediment should be developed.

Response—See response to Comment No. 26c.

27. Section 2.1.7, Technical Assessment, Question C:

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

See General Comment 2.

Response—See response to Comment No. 2.

28. Section 2.1.7, Technical Assessment Summary, para 3:

No other information has come to light that could call into question the protectiveness of the remedy.

See General Comment 2.

Response—See response to Comment No. 2.

29. Section 2.1.10, Protectiveness Statement, p. 2-17:

"The remedy is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1992 ROD, which is expected to take approximately 30 years of achieve."

The concentration of arsenic in samples from MW-218 has been consistently between 68 and 300 ug/L since sampling began in 1995. The arsenic concentrations have remained fairly stable over time since 1999, with an average value of approximately 100 ug/L. The concentration of aluminum in groundwater samples at MW-240 exceeded the MEG in 2001 and has remained well above both the MEG and MCL ever since. MW-218 and MW-240 are the key downgradient monitoring locations within 500 feet of Sites 1 and 3. Furthermore, chemical trend graphs for leachate seeps 1, 3, 4, and 9 show multiple occurrences of relatively high concentrations of either arsenic, chromium, cobalt, or lead during the past 5 years. It is apparent that landfill contaminants are continuing to migrate southward away from Sites 1 and 3, and that the effectiveness of the cap and slurry wall in reducing this escape may not be meeting ROD expectations. Therefore chemical trend data to date is not convincing that certain inorganic COC contamination has been reduced, or will diminish adequately over the projected timeframe given in the ROD. Please address this in the report.

Response—We agree that inorganic concentrations have not fallen consistently in the past 10 years of sampling. However, the ROD notes that an approximate timeframe of 30 years may be required, and it is not unreasonable to think concentrations may further decrease in

the next 20 years. Concentrations of VOCs have dropped significantly in groundwater and leachate seep samples at Sites 1 and 3 Landfill due to the slurry wall and cap emplacement. As discussed during Technical Meetings, inorganic concentrations may follow a similar trend although they may take longer to react to remedial measures due to the increased retardation and slower travel times of these analytes. The Navy is scheduled to complete a statistical assessment of long-term monitoring trends at leachate sampling locations to quantitatively assess which analytes are increasing or decreasing. Leachate seep samples have turbidity issues which are likely to result in elevated concentrations of inorganics which may not be representative of actual site conditions. Therefore, the Navy will be revising the sample collection methods in 2005 to minimize turbidity.

30. Section 2.2.2 and Figure 2:

Please provide a clearer description of the boundaries of Site 2 and the Site 2 institutional control boundary. The figure has a line that represents the "approximate minimum area for application of land use restrictions". This is also what is shown in the ROD for this Site. A definite boundary should be set for this site so that another situation like the installation of a potable well near by does not take place. Please add this to the tables in Sections 2.2.8 and 2.2.9.

Response—A clearer description of the boundaries of Site 2 and the Site 2 institutional control boundary has been presented on Figure 2-2, and the text has been revised to note the difference between the two boundary lines.

31. Section 2.2.2, para 2 and Section 2.2.3.2, para 1:

"The Site 2 landfill occupies approximately 2 acres of land that was covered with soil upon closure,..."

Please add the closure date (1955) to this statement.

Response—The second paragraph of Section 2.2.2 (Site Description) has been revised as follows:

The Site 2 landfill occupies approximately 2 acres of land that was covered with soil upon closure in 1955, and currently supports a dense stand of conifers on the top of the landfill. The face of the landfill is vegetated with tall meadow grass...

The first paragraph in Section 2.2.4.2 Land and Resource Use has been revised as follows:

2.2.4.2 Land and Resource Use

The Orion Street Landfill (Site 2) is an inactive landfill located south and across Mere Brook from Sites 1 and 3 Landfill within a restricted area in the central portion of NAS Brunswick. The Site 2 Landfill occupies approximately 2 acres of land that was closed

in 1955, which was covered with soil upon closure, and currently supports a dense stand of conifers. The site area has been left as open space.

32. Section 2.2.3.2, para 2:

"A bedrock well is located west of Site 2 at the guard entrance station at Dyers Corner. This well is screened below a relatively impermeable marine clay and is not affected by Site 2."

Please provide the basis for the statement that the bedrock well is not affected by Site 2.

Response—The sample results for this well from Monitoring Event 9 for Site 2, provided in the Monitoring Event 9 Report, Appendix H, Dyers Gate Wellhead Water Sampling, demonstrate that the well is not affected by Site 2. A sample was collected from the bedrock well on 19 March 2003 and submitted for laboratory analysis by the following methods: VOCs (EPA Method 8260B), PCBs (EPA Method 8081), and total and dissolved metals (EPA Methods 6010B/7470A). No VOCs or PCBs were detected in the groundwater sample. Several inorganic elements (total and dissolved) were identified in the sample. Iron, calcium, manganese, magnesium, sodium, and potassium were detected in the sample. Sodium (total concentration was 248,000 µg/L; dissolved concentration was 245,000 µg/L) was the only inorganic element identified in excess of Maine's MEG of 20,000 µg/L. Manganese was identified at a concentration (total concentration was 89.7 µg/L; dissolved concentration was 85.7 µg/L) that exceeded the National Secondary Drinking Water Regulation (50 µg/L).

33. Section 2.2.3.3, para 2:

MEDEP recommends moving this paragraph on risk to section 2.2.3.5.

Response—The second paragraph in Section 2.2.4.3 (formerly Section 2.2.3.3) has been moved to Section 2.2.4.5 (Basis for Taking Action) as requested by the MEDEP.

34. Section 2.2.3.3, para 3:

"VOCs detected in the leachate seep samples are suspected laboratory contaminants."

MEDEP does not agree that all benzene and xylenes detected at leachate stations LT-202 are due to laboratory contamination, however acetone detections may be lab artifacts. Almost every sample result for LT-202, including the RI samples in the late 1980s, contains xylenes in the range of 1 to 38 ug/L. Benzene was present at concentrations just under the MCL/MEG of 5 ug/L for the two highest xylene samples. The above statement must be deleted or modified.

Response—The third paragraph in Section 2.2.4.3 (History of Contamination) has been revised as follows:

The highest levels of contamination at Site 2 were detected in the leachate seep and seep sediment samples. Elevated concentrations of inorganics, including aluminum, calcium, magnesium, iron, arsenic, copper, cobalt, chromium, mercury, vanadium, and zinc, were detected. The 1990 RI Report stated that the VOCs detected in the leachate seep samples are suspected laboratory contaminants. No VOCs were detected in the seep sediment samples. SVOCs and polychlorinated biphenyls were not reported in any leachate seep or seep sediment samples. Low levels of 4,4'-dichlorodiphenyltrichloroethane, 4,4'-dichlorodiphenyltrichloroethane, and 4,4'-dichlorodiphenyldichoroethylene were reported in leachate seep samples LT-201 and adjacent surface soil.

35. Section 2.2.3.3, para 4:

"NAS Brunswick environmental staff have been conducting biological sampling of Mere Brook under the biological sampling program initiated in August 1994."

The Navy has not provided any information regarding this biological sampling program and therefore it cannot be assessed as to its appropriateness for evaluating impacts from Site 2 under the IR program. Please delete this sentence.

Response—This sentence has been deleted from Section 2.2.3.3, Paragraph 4.

36. Section 2.2.3.4 and Section 2.2.4.1:

MEDEP recalls unexploded ordnance being found during the debris removal at Site 2. This is important information and needs to be included in these paragraphs.

Response—The first paragraph in Section 2.2.5.1 (Remedy Implementation) has been revised as follows:

In August 1999, the Navy's Remedial Action Contractor, Foster Wheeler Environmental Corporation, removed and disposed of miscellaneous surface debris located south and east of the Site 2 Landfill and placed a soil cover on the landfill where none had existed. The miscellaneous surface debris (crushed empty drums, chairs, and miscellaneous metal debris) was removed and placed in roll-off containers for offsite disposal. During the 1999 removal action of the surface debris at Site 2, the Navy's contractor identified a potential unexploded ordnance (UXO) and immediately stopped work at the site. A UXO contractor was brought in to identify and dispose of the UXO. It was later determined by the UXO contractor to be a grenade fuse. No other UXO was found at Site 2 before or after the site work in 1999.

37. Section 2.2.4, Remedial Actions:

a. Please define the phrase "whole site remedy".

Response—The following text edit has been made to the first paragraph in Section 2.2.4 Remedial Actions:

2.2.5 Remedial Actions

Based upon the results of the RI/FS, and the community response to the Proposed Plan, the selected remedy for Site 2 was Minimal Action. A complete description of the selected alternative is presented in Section VIII of the ROD (U.S. Navy 1998). The selected remedial alternative is a site remedy, which was planned to be protective of human health and the environment.

b. Please clarify how the land use restrictions could be cited as effective in the first Five Year Review dated March 2000 when NASBINST 50901B was not signed until 12/21/00.

Response—NASBINST 50901B is an updated and revised version of Base Operating Instruction NASBINST 50901A.

38. Section 2.2.4.2:

A new bullet should be added that states: "Change of land use or new construction in the area."

Response—A bullet has been added to Section 2.2.4.2 System Operation/Operation and Maintenance as follows:

- *Change of land use or new construction in the area.*

39. Section 2.2.5, para 3, bullet 1:

"In February 2004, the LTMP was finalized."

Please change 2004 to 2000.

Response—The sixth bullet of Section 2.2.5 (Progress Since the Last Five-Year Review) has been revised as follows:

- *In February 2000, the LTMP was updated and finalized.*

A bullet has been added to the end of this section as follows:

- *During 2004, the Site 2 LTMP was updated and revised. The revised final LTMP was issued in January* 2005.

40. Section 2.2.5, Progress Since the Last Five-Year Review, bullet 6:

This bullet is a duplicate of the same statement on page 2-25. Please delete.

Response—Bullet 6 in Section 2.2.5 has been deleted.

41. Section 2.2.6.4, Data Review, Surface Water Sampling, p. 2-27:

a. "The maximum detected concentration of aluminum during the past eight monitoring events was 1,130 µg/l ..."

Please revise as follows: "The maximum detected concentrations of aluminum during the past eight monitoring events was 1,310 ug/L at sample location SW-7 (May 2001)."
Response—The sentence in Section 2.2.6.4, Page 2-27 under Data Review, Surface Water Sampling, has been revised as follows:

The maximum detected concentration of aluminum during the past eight monitoring events was 1,310 µg/L (State Water Quality Criteria for aluminum is 750 µg/L) at sample location SW-7 (May 2001).

b. Please add the State Water Quality Criteria for aluminum.

Response—The State Water Quality Criteria for aluminum is 750 µg/L, and has been added to Section 2.2.7.4 (Data Review, Surface Water subsection).

42. Section 2.2.6.4, Sediment Sampling:

"Concentration of aluminum, magnesium, and iron have ranged from 1,000 mg/Kg to 19,000 mg/Kg since 2000."

As written this sentence is meaningless please state the concentrations of each metal individually.

Response—The sentence was considered to be redundant and has been deleted.

43. Section 2.2.6.4, Data Review, Leachate Sediment Sampling, p. 2-28:

"The levels of contamination detected in the leachate sediment samples during the Long-Term Monitoring Program are consistent with the concentrations detected during the RI."

The trend graphs and BNAS database (on CD) does not show results of any leachate sediment sampling for Site 2 during the RI period (late 1980s to early 1990s). Please confirm and either delete the comment or reference the written RI report.

Response—The sentence has been deleted from the section.

44. Section 2.2.7, Question A:

MEDEP disagrees that the remedy is functioning as intended for two reasons. First it was assumed that the entire Base had access to public water and that no new potable wells would be constructed on the Base. Therefore it is unknown how large a buffer is needed around Site 2 to be protective and the institutional control boundary in the ROD is labeled as minimum. Secondly there is data that suggests that there may be a source area to the north of Site 2.

Response—See response to Comment Nos. 2, 45, and 46.

45. Section 22.7, Question B:

"As noted in the ROD, no remedial actions were proposed for groundwater at the site because the area is serviced by a public water supply."

Since a new well was installed adjacent to Site 2, this assumption is no longer valid and this needs to be revised in this section. The Navy needs to reassess whether there is now a need for remedial actions for groundwater and the bedrock well at Dyers Corner must be added to the Long Term Monitoring Program for Site 2.

Response—See response to Comment No. 2. Adjacent is a subjective term when describing an object in relationship to a site boundary. The bedrock well was installed approximately 200 ft beyond the northern site boundary for Site 2. During the April 2004 LTMP event, groundwater samples were obtained from the bedrock well for laboratory analysis of VOCs, PCBs, pesticides, and metals (total and dissolved). One VOC (toluene) was detected at a concentration of 10.4 µg/L, but at a concentration well below the State MEG (1,400 µg/L) and Federal MCL (1,000 µg/L). Six total metals (iron, calcium, manganese, magnesium, sodium, and potassium) were detected in the sample; however, only sodium (248,000 µg/L) was identified exceeding the State MEG (20,000 µg/L) and the federal drinking water equivalency level (20,000 µg/L). The Navy agreed to collect additional samples and evaluate the results prior to including this well in the formal Site 2 LTMP.

46. Section 2.2.7, Question C:

"There is no other information such as land use changes or ecological risks that call into question the protectiveness of the remedy."

Text should be added under Question C. to include the following items:

- new well adjacent to Site 2
- another potential source area
- protectiveness of the ICs

Response—The text for Question C in Section 2.2.7 (Technical Assessment) has been revised as follows:

> ***Question C:*** *Has any other information come to light that could call into question the protectiveness of the remedy?*
>
> *There is no information such as land use changes or ecological risks that calls into question the protectiveness of the remedy. The proposed investigation north of Site 2, due to increases of metal concentrations observed in the leachate seep sample locations, may identify a new site or alter the Minimal Action remedy of Site 2, depending on the results of the investigation of this area. The institutional control boundary for Site 2 was based on the assumption that the base was serviced by public water; however, a new bedrock well was installed for the Dyers Corner gate project; therefore, the institutional control boundary for Site 2 could be affected.*

47. Section 2.2.10, Protectiveness, p. 2-30:

"The remedy is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD."

The evidence to date does not indicate that the site is getting cleaner. Please provide the anticipated years that will be required to attain cleanup.

Response—The 1998 ROD states that monitoring will continue for a period of 30 years. Monitoring was initiated in April 2000, and the data collected to date do not indicate that the monitoring period can be changed at this time.

48. Section 2.2.8:

Two additional issues need to be added to this table. The installation of the nearby bedrock well and the effectiveness of the ICs.

Response—The table in Section 2.2.9 (Issues) for Site 2 has been revised as follows:

2.2.9 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
No project action levels for comparing sediment and leachate sediment sample LTMP data have been established	*No*	*Yes*
Finalize and issue updated QAPP for the Site 2 LTMP	*No*	*No*
Investigate area north of Site 2 Landfill	*No*	*Yes*
No agreement as to the need for Mere Brook fish tissue sampling as recommended by NAS Brunswick's First Five-Year Review Report and required by the ROD	*No*	*Yes*
No LUCIP	*No*	*Yes*
Bedrock well outside of Site 2 boundary located at Dyers Corner gate	*No*	*No*
Eliminate turbidity levels in leachate seep samples	*No*	*No*
Institutional control boundary for site	*Yes*	*Yes*

49. Section 2.2.9:

The following needs to be added to this list: Re-evaluate the effectiveness of the ICs. (See general comment 2.) Also instead of "continue discussion among project stakeholders regarding a second fish sample event ..." it should state "include the second fish sample event in the LTMP" as required by the ROD.

Response—Section 2.2.10 (Recommendations and Follow-Up Actions) for Site 2 has been revised as follows:

2.2.10 Recommendations and Follow-Up Actions

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Establish project action limits for sediment samples	*Establish appropriate standards to compare sediment and leachate sediment seep samples for LTMP data*	*Navy*	*EPA/ MEDEP*	*9/30/05*	*No*	*Yes*
Finalize Site 2 QAPP for the LTMP	*Issue the final updated QAPP for the LTMP for Site 2 Landfill*	*Navy*	*EPA/ MEDEP*	*5/30/05*	*No*	*No*
Investigate area north of Site 2 Landfill	*Conduct limited investigation in area north of Site 2 Landfill; investigation tasks may include magnetometer survey, soil borings, and hand installed piezometers*	*Navy*	*EPA/ MEDEP*	*8/30/05*	*No*	*Yes*

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Second fish sampling event for Mere Brook	*Continue discussions amongst the project stakeholders to reach consensus on the need for a second fish sampling event to benchmark the 1995 survey*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*No*
No institutional control monitoring	*Generate an LUCIP for the site*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Bedrock well at Dyers Corner gate	*Continue sampling well and report results to project stakeholders after each sampling event*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*No*
Elevated turbidity in leachate seep samples	*Install shallow well points*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*

50. Section 2.2.10:

a. MEDEP cannot agree that the ICs are protective since they were developed under the assumption that there would no wells installed on the Base. See general comment 2.

Response—See response to Comment No 2.

b. The protectiveness statement should reference the actual enforceable mechanism for controlling resource use, not the generic term institutional controls

Response—The Protectiveness Statement(s) Section in the Five-Year Summary Form for Site 2 and report Section 2.2.11 (formerly Section 2.2.10 in the draft) have been revised as follows:

2.2.11 Protectiveness Statement

The remedy (Minimal Action) is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls (Base Instruction) that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base limiting access only to authorized personnel. In the short term, current monitoring data indicate that the remedy is functioning as required; however, additional monitoring and refinement of institutional controls are needed to ensure the remedy is protective in the long term.

The Protectiveness Statement(s) Section in the Five-Year Summary Form for Site 2 and report Section 2.2.11 (formerly Section 2.2.10 in the draft) have been revised as follows:

Protectiveness Statement(s):
Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than one operable unit, include an additional and comprehensive protectiveness statement covering all of the remedies at the site.

For Site 2:
The remedy (Minimal Action) is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls (Base Instruction) that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base limiting access only to authorized personnel. In the short term, current monitoring data indicate that the remedy is functioning as required; however, additional monitoring and refinement of institutional controls are needed to ensure the remedy is protective in the long term.

51. Section 2.3.1, Site Introduction:

Please delete this and insert the Site Description.

Response—Section 2.3.1 has been renamed "Introduction" and "Site Description" becomes Section 2.3.2. The text for Section 2.3.2 Site Description is as follows:

2.3.2 Site Description

Site 7, the Old Acid Caustic Pit site, is located in the northern portion of the base, west of the main gate (Fitch Avenue) and northeast of the former Old Navy Fuel Farm. The site is a relatively flat, open clearing surrounded by woods to the west, north, and east. The south side of the site abuts the former Old Navy Fuel Farm (Figure 2-3). Site 7 was formerly the location of the old acid caustic pit used from 1952 to 1969 for liquid waste disposal. Wastes reportedly disposed of included transformer oils, battery acids, solvents, and miscellaneous liquids. In addition to the acid caustic pit, the area was used as an equipment laydown area and Defense Reuse and Marketing Office facility. Currently, the site is undeveloped.

At Site 7, the Navy will begin performing long-term monitoring and maintenance as specified in the ROD (EA 2002). The location of Site 7 is shown on Figure 2-3. In January 2005, the LTMP (EA 2005) was established pursuant to the ROD and issued as a final document. The purpose of the LTMP is to verify the effectiveness of the selected remedial action (institutional controls with groundwater monitoring) at Site 7.

52. Section 2.3.2, Site Chronology:

a. Bullet 1: "Ten sites, including Site 2, were ..."Do you mean Site 7? Please correct.

Response—Site 2 in the first bullet under Section 2.3.2 has been revised to "Site 7."

b. Bullet 11: Please add the following to this sentence "and the results were cadmium 18.3 ppb (MCL & MEG 5 ppb) and manganese 1290 ppb (MCL 50 ppb and MEG 200 ppb).

Response—The 11th bullet in Section 2.3.3 (Site Chronology) has been revised as follows:

- *In September 1999, based on the data from well MW-NASB-228, another groundwater well (MW-NASB-229) was installed at Site 7 within 5 ft of MW-NASB-094; cadmium was reported at 18.3 ppb (MCL and MEG equal 5 ppb) and manganese was reported at 1,290 ppb (MCL at 50 ppb and MEG at 200 ppb).*

c. Add new bullet that discusses the December 2000-2001-51 hour pump test.

Response—The following bullet has been added to Section 2.3.3 (Site Chronology):

- *In December 2000, a short duration pump test was conducted to assess the volume and extent of the cadmium plume at Site 7, and to determine whether groundwater extraction changed cadmium concentrations.*

d. Add a new bullet that discusses that after the installation of 4 temporary well that soil excavation (2001) was performed to locate a source of the cadmium in groundwater.

Response—The following bullet has been added to Section 2.3.3 (Site Chronology):

- *In July 2001, test pit excavations were completed in the vicinity of well MW-NASB-094 and included areas immediately upgradient and downgradient of well MW-NASB-094 (EA 2002).*

e. Bullet 17: Please add that of the 400 cubic yards excavated, 140 cubic was disposed as waste and 260 cubic yards were spread on site.

Response—The 17th Bullet in Section 2.3.3 (Site Chronology) has been revised as follows:

- *In April 2002, the Navy's Remedial Action Contractor removed the stockpiled soils at Site 7, which were excavated in an attempt to identify and remove the cadmium source area that could have been impacting the groundwater. As part of this removal action, 400 yd^3 of soil were excavated, 140 yd^3 of contaminated soil was disposed of offsite, and 260 yd^3 of clean soil was spread on the ground surface at*

Site 7 (approximate 6-in. layer) and may be covering soil identified during the RI as contaminated with DDT and PAHs (Foster Wheeler 2003).

f. Bullet 21: Please update to indicate the current status of the LTMP.

Response—The Site 7 LTMP was completed in 2004. The final LTMP was issued in January 2005. The bullet text has been revised as follows:

- *In January 2005, the final LTMP was issued.*

53. Section 2.3.3.4, Initial Response:

Please review this section and change the sentences that are not in the past tense to avoid confusion.

Response—Section 2.3.4.4 (Initial Response) (formerly Section 2.3.3.4 in the draft report) has been reviewed and the sentences have been changed to past tense, as suggested.

54. Section 2.3.3.4, para 6, bullets:

Please note that the first 3 of the 4 bullets on Page 2-35 are not "conservative assumptions" but a description of the current use scenario. The residential exposure was based on conservative assumptions. Please revise.

Response—This text is directly from the 2002 ROD for Site 7. These are assumptions that were used in the risk characterization for the site.

55. Section 2.3.3.5, Basis for Taking Action, Risk Characterization, p. 2-37:

"A hazard index <1 indicates that toxic non-carcinogenic effects are unlikely."

If a hazard index has been calculated, please provide the results; if not, state that no estimate has been made.

Response—The risk characterization is being reviewed by a risk assessor to determine if a hazard index was or was not calculated for Site 7. Once this review is completed, a response will be forwarded to MEDEP.

56. Section 2.3.4, Remedial Actions, p. 2-39, 2nd bullet:

"Reduction in toxicity and volume of contaminants will occur as a result of the remedy's reliance upon the natural attenuation process."

The toxicity of cadmium and manganese is unlikely to change over time. Please restate as follows: *"Reduction in contaminant mass is expected to occur over a period of years that is difficult to estimate at this time"*

Response—The third bullet in Section 2.3.5 (Remedial Actions) (formerly Section 2.3.4 in the draft report) has been revised as follows:

- *Reduction in contaminant mass is expected to occur over a period of years that is difficult to estimate at this time. However, natural attenuation is not considered active treatment, and an alternative that relies upon natural attenuation does not meet the statutory preference for treatment under CERCLA.*

57. Section 2.3.4.1:

a. This section should note that the Navy is currently in non-compliance with the Site 7 ROD because the LTMP has not been implemented and ICs while listed in its Base Instruction have never been formally reviewed and approved by MEDEP or EPA. Please include the fact that that the Navy is in non-compliance and revise the first sentence.

Response—The Navy has issued the Final Site 7 LTMP and will start long-term monitoring sampling and bi-annual site inspections in Spring 2005. However, for the time covered by this Five-Year Review, the Navy was in non-compliance with the 2002 ROD. See text revisions to this section in response to Comment No. 57b.

b. The ROD (pg. 2-32 & 2-33) states that "If, in the future, the site use were to change, (i.e., to residential use), the Navy would issue a memo to the RAB for review and comment, and to EPA and MEDEP for review, and comment, and finalization in accordance with the Federal Facilities Agreement detailing the tasks to be completed to remove the shallow soil that has PAHs and DDT. The removal..."

The change of use language is an important part of the remedy and needs to be included in this section.

Response—The following language has been added to Section 2.3.5.1 (Remedy Implementation):

2.3.4.1 Remedy Implementation

The Navy has implemented institutional controls to prevent the use of and contact with site groundwater and soil at Site 7, however, the current Operating Instructions will be revised based on stakeholder comments. These institutional controls consist of groundwater and soil use restrictions per the current NAS Brunswick Operating Instructions in effect. The Operating Instructions are used to identify and screen environmental areas for inappropriate construction or development activities. A copy of the Operating Instructions was placed in the Administrative Record for Site 7. The Operating Instructions will not be modified in any way that affects these use restrictions or the Site 7 remedy. The institutional controls will be inspected, noted, verified, and reported during the Long-Term Monitoring Program to be implemented at Site 7 in accordance with the FFA. The

monitoring and reporting of institutional controls will be described in the Site 7 LTMP, which has been submitted to regulators in draft format. In accordance with the 2002 Site 7 ROD, if in the future, the site use was to change, i.e., for residential use, the Navy will issue a memorandum to the RAB for review and comment and to EPA and MEDEP for their review, comment, and finalization in accordance with the FFA detailing the tasks to be competed to remove the shallow soil that has PAH and DDT impacts.

The Navy will institute a Long-Term Monitoring Program that will be adjusted based on sample results. A monitoring plan has been developed and was forwarded to the RAB for consultation as well....

58. Section 2.3.6.5, Site Inspections:

It is unclear what Section 2.2.4.2 which is Systems Operations/Operation and Maintenance for Site 2 which has an implemented LTMP has to do with Site Inspections for Site 7 which does not. Please correct to state that Site Inspections for this Site have not been implemented.

Response—The text in Section 2.3.5.2 (System Operation/Operation and Maintenance) has been revised as follows:

2.3.4.2 System Operation/Operation and Maintenance

The current remedy for the site is institutional controls with groundwater monitoring and groundwater sampling twice a year (during the Spring and Fall of each year). Active monitoring and site inspections began in Spring 2005.

59. Section 2.3.7, Technical Assessment:

Please cite Base Operating Instruction NASBINST 50901B, *Restrictions on Excavation Activities and Groundwater Use* instead of the generic "institutional controls".

Response—The Navy will revise the institutional control for the site based on project stakeholder comments. The text in Section 2.3.8 (Technical Assessment), Question A has been revised as follows:

2.3.7 Technical Assessment

Question A: *Is the remedy functioning as intended by the decision documents?*

The remedy is expected to function as intended by the 2002 ROD (institutional controls with groundwater monitoring). Institutional controls (the Base Operating Instruction NASBINST 50901B, Restrictions on Excavation Activities and Groundwater Use) will be implemented at the site per stakeholder's review and comments to restrict use of groundwater and excavation of site soils. Long-term monitoring will be initiated

during the first Long-Term Monitoring Program sampling event following finalization of the LTMP by the end of 2004. At that time, the site remedy will be fully in place and functioning.

60. Section 2.3.8:

The Table should be revised to reflect the following:

- That excavated soil was spread over the site covering the contaminated soil
- IC's need to be reviewed and approved by MEDEP & EPA,
- Installing two piezometers will likely affect protectiveness, as this effort will guide locating one or more new long-term monitoring wells that would potentially fill important data gaps. Therefore, please change the "No" to "Yes".

Response—Text has been revised and added to Section 2.3.3 as follows:

- *In April 2002, the Navy's Remedial Action Contractor removed the stockpiled soils at Site 7, which were excavated in an attempt to identify and remove the cadmium source area that could have been impacting groundwater. As part of this removal action, 400 yd^3 of soil were excavated, 140 yd^3 of contaminated soil was disposed of offsite, and 260 yd^3 of clean soil was spread on the ground surface at Site 7 (approximately 6-in. layer) and may be covering soil identified during the RI as contaminated with DDT and PAHs (Foster Wheeler 2003).*
- *In March 2002, as detailed in the Final Completion Report for Stockpiled Soil Removal at Site 7, prepared by Foster Wheeler Environmental Corporation (2 October 2002), Foster Wheeler conducted an inspection of the 5 soil stockpiles at Site 7 and determined that Stockpiles 1 and 2 should be merged into one pile. Foster Wheeler collected one composite soil sample from each of the four stockpiles and sent them to Analytics for laboratory analysis for waste characterization. Foster Wheeler evaluated the waste characterization results and determined that piles FW-2 and FW-5 required offsite disposal, while piles FW-1 and FW-3 could remain spread onsite. The soil remaining onsite was graded to match the existing ground surface. The waste characterization results are provided in Appendix A of the Foster Wheeler Final Completion Report.*

Note that the soil spread out over the site was identified as clean based on the sampling and laboratory analysis of the soil samples from the former stockpiles on the site. Institutional controls have been added to the table. The review and approval of institutional controls for this site and others is well documented in the 2002 ROD.

Based on other comments received, the table in Section 2.3.9 (Issues) (formerly Section 2.3.8 in the draft report) for Site 7 has been revised as follows:

2.3.9 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Implement LTMP	*No*	*Yes*
Finalize and issue the draft Site 7 QAPP	*No*	*No*
Install 2 piezometers and conduct quarterly gauging to assist with locating an additional well(s) for the Long-Term Monitoring Program	*No*	*Yes*
No institutional control monitoring	*No*	*Yes*
Spread stockpiled soils over site soil	*No*	*Yes*
Need to finalize institutional controls and incorporate into the Operating Instructions	*No*	*Yes*

61. Section 2.3.9

The table needs to reflect the issue of the spreading of the excavated soils, the finalization of the ICs, and change "No" to Yes under "Affects Protectiveness" for installing 2 piezometers.

Response—See response to Comment No. 60.

62. Section 2.3.10, Protectiveness Statement, p. 2-43, 1st sentence:

Given what is known about Site 7, any estimate of time to attain the cleanup goals is difficult to support. The total mass and distribution of cadmium is poorly known, as are factors controlling its dissolution into groundwater. Therefore either cite the source of the calculations for supporting the 10 years or if that is not possible provide a range of time.

Response—The text in Section 2.3.11 (Protectiveness Statement) (formerly Section 2.3.10 in the draft report) has been revised as follows:

2.3.10 Protectiveness Statement

The remedy at Site 7 is expected to be protective of human health and the environment upon attainment of the cleanup goals, as presented in the 2002 ROD, which is expected to take up to 10 years to achieve (U.S. Navy 2002). During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site is currently undeveloped. In order for the remedy to remain protective in the long term, institutional controls will need to be refined.

63. Section 2.4.1:

According to the Interim ROD for Site 9, other contaminants of concern were 1,2 DCA and DCE, which at that time exceeded their respective MEG, MCL, or MCLG. These historic COCs should be included in this section.

Response—See the response to Comment No. 64.

64. Section 2.4.1, Site Description, 2nd paragraph:

Trichloroethene is repeated within the second sentence. It is assumed that the Navy intended to say "...parent compounds trichloroethene and dichloroethene (or perhaps tetrachloroethene)...". Please correct, as appropriate. (ED)

Response—The second paragraph under Section 2.4.2 (Site Description) has been revised as follows:

The primary concern at Site 9 is VOCs in groundwater, particularly vinyl chloride which is the primary COC. Other VOC COCs at the site include 1,2-dichloroethane and dichloroethene. No source area has been identified for the groundwater vinyl chloride plume, and it appears likely this compound is generated due to favorable geochemical conditions at Site 9 which break down parent compounds tetrachloroethene and trichloroethene via anaerobic dechlorination.

65. Section 2.4.1, Site Description, p. 2-44, 4th paragraph:

After 1997, add the following phrase: "on the primary drainage bordering Site 9".

Response—The following text has been revised in Section 2.4.2 Site Description (formerly Section 2.4.1 in the draft report):

Impoundment ponds were constructed in 1997 on the primary drainage pathway bordering Site 9 and receive surface drainage from the majority of the operations (industrial) area of the base, including the flight line and hangar areas. The impoundment ponds are located to the south, southeast, and east of Building 201 (a dining facility).

66. Section 2.4.2:

Please fix the inconsistency between Bullet 20 that states that Building 216 was demolished in 2002 and Section 2.4.3.2, which states it was demolished in 2001.

Response—The 20th bullet in Section 2.4.3 Site Chronology (formerly Section 2.4.2 in the draft report) has been revised as follows:

- *During Summer 2001, the Navy demolished Barracks Building 216. The building foundation was left intact.*

67. Section 2.4.2, Site Chronology, p. 2-46, last bullet:

"No significant VOC were detected."

This is a judgment statement that serves no purpose. It is recommended that the following statement be substituted: "*The June 2004 groundwater sampling found TCE at the MCL/MEG concentration of 5 ug/L*". Although this finding may not change the selected remedy, it may be significant in assessing the mass of parent compound that ultimately degrades and adds to the more toxic vinyl chloride mass present and will necessitate the need for additional sentinel wells and possibly a revision to the Site boundary.

Response—The last bullet in Section 2.4.3 (Site Chronology), Page 2-46 has been revised as follows:

- *In June 2004, the Navy installed two additional direct-push borings south of Building 29 and collected groundwater samples for laboratory analysis for VOCs to assess whether an unidentified pocket of VOCs may be present along the top of the clay unit. The June 2004 groundwater sampling results indicated that trichloroethene was reported at the Federal MCL/State MEG concentration of 5 µg/L. This information has been presented in a Draft Final Direct-Push Groundwater and Ash Landfill/Dump Area Delineation Investigation Summary Report for Site 9, issued in November 2004.*

68. Section 2.4.3.2, Former Incinerator and Ash Landfill/Dump Area, para 1:

This section needs to be updated based on the work performed in 2003 because the ash landfill has been bounded.

Response—The following text has been added to the second paragraph in Section 2.4.4.2 Land and Resource Use, subsection entitled Former Incinerator and Ash Landfill/Dump Area:

Construction maps showing grading in the vicinity of the barracks (Buildings 212 through 220) indicated an oval "dump area" approximately 125 ft × 75 ft, underlying the current location of Buildings 218 and 219. The plans also show an old 42-in. diameter drain adjacent to the dump area. This drain ran from north of Orion Street, past the ash landfill area, under Neptune Drive, between Buildings 201 and 293 to the unnamed stream. This drain may have been a potential pathway for contaminant migration. The drain was reportedly removed during construction of the barracks, and no evidence that this drain is still in place has been found. Prior to 1953, the inactive

ash landfill was closed and a soil cover installed over it. In 1953, Buildings 218 and 219, which are currently military barracks, were constructed over the former landfill area. The extent of the ash landfill/dump area was defined by the draft final 2003 direct-push investigation of this area and detailed in the draft final report issued in November 2004.

69. Section 2.4.3.2, Land and Resource Use, p. 2-47, 2nd paragraph:

All but the last sentence is a repeat of the same information given under "Physical Characteristics". Delete the first two sentences and move the last sentence to the end of the 2nd paragraph of Section 2.4.3.1. (ED)

Response—Under Section 2.4.3.1 (Physical Characteristics), the following sentence has been added to the end of the second paragraph in the section:

Groundwater occurs at Site 9 at a depth of 10-14 ft bgs, and is unconfined. Based on groundwater elevation data gathered as part of the Long-Term Monitoring Program, groundwater flow direction is generally toward the unnamed stream and surface water impoundment ponds.

The first two sentences in the third paragraph in Section 2.4.3.2 (Land and Resource Use) have been deleted, and the following text remains:

Groundwater is believed to discharge to the unnamed stream and surface water impoundment ponds.

70. Section 2.4.3.5, Basis for Taking Action:

Please check paragraphs 10, 11 (pg 2-52), 17, 18, 19 (pg 2-53). The tables cited for the 1999 ROD do not have number designations. Please correct.

Response—The tables have been checked and the table citations corrected.

71. Section 2.4.4, Remedial Actions, p. 2-54, 2nd paragraph:

"The Navy has concluded that the selected remedial action is protective of human health and the environment."

This statement is out of place in this section, as Section 2.4.7 addresses this subject in detail. Please delete from Section 2.4.4.

Response—The above sentence has been deleted from Section 2.4.4 (Remedial Actions).

72. Section 2.4.4, Remedial Actions, p. 2-55, Natural Attenuation:

"This remedy is being used to degrade the contaminants in the groundwater…"

Please re-word as follows: *"The remedy relies on natural flushing and dispersion processes and in situ natural degradation processes to slowly dilute and degrade the mass of contaminants in the groundwater…"*

Response—The referenced sentence in the fifth bullet of Section 2.4.5 (Remedial Actions), Page 2-55, Natural Attenuation:

> **Natural Attenuation**—This remedy is being used to degrade the contaminants in the groundwater…

has been re-word as follows:

> ***Natural Attenuation***—*This remedy relies on in situ biological systems to degrade the organic contaminants and on recovery of redox conditions to reduce the mobility of inorganic constituents. The goal is to reduce COCs to concentrations sustained at, or below, MCLs and MEGs. Groundwater monitoring results showing contaminant concentrations will be compared to these remediation goals, and the selected remedy will continue until the site goals are achieved.*

73. Section 2.4.4, Remedial Actions, p. 2-55, Long-Term Monitoring, 2nd item:

a. "Assess whether groundwater downgradient of the ash landfill/dump area is impacted by inorganics form the site."

The RI furnished data that showed that there was an impact, which is why inorganic analyses are still run for three monitoring wells. Please delete this item.

Response—These are the components of the 1999 ROD and have been included as they were presented in the Final ROD. We believe the text should remain, since the sentence introducing these bullets states:

> *To accomplish these objectives within the 20-year time period stated in the 1999 ROD, the following components were implemented:*

b. "Monitor the structural integrity of the groundwater monitoring wells."

Please change to "Perform site inspections to document changes, including well casing security"

Response—See response to Comment No. 73a.

74. Section 2.4.4, Remedial Actions, p. 2-55, Institutional Controls, 1st sentence:

Delete "from EPA and MEDEP".

Response—The following revision has been made to the seventh bullet text in Section 2.4.5 Remedial Actions:

> ***Institutional Controls—****Institutional controls are being used to prevent use of and contact with impacted groundwater, and prevent the disturbance of or contact with the contents of the ash landfill/dump area. These controls....*

75. Section 2.4.4.1, Remedy Implementation, p. 2-56:

This paragraph has a significant gap in reporting important events that occurred between the finalization of the ROD in 1999 and the present. In particular, the direct-push investigations performed in 2003 and 2004 are not mentioned, and how their findings affect remedy implementation (need for additional monitoring well). Also, the long-term monitoring results have shown that the septic system at building 201 was not a primary source of the vinyl chloride. The major pocket of vinyl chloride is in the MW-NASB-069 area, which is upgradient of the septic system but downgradient of the landfill/dump. The section needs to be expanded and edited.

Response—This section has been edited as shown below:

> *The 1994 Interim ROD stipulated remedial action of groundwater remediation through natural attenuation, institutional controls, and long-term monitoring at Site 9. In January 1995, the Navy finalized the first LTMP for Site 9. The first monitoring event (Monitoring Event 1) was completed in March 1995. Results of investigations completed in 1995-1996, failed to identify a specific source for the vinyl chloride. In September 1999, the ROD was finalized. Subsequent direct-push investigations were completed in 2003 and 2004 which further defined the extent of groundwater impacts, and the limit of the ash landfill. As of December 2004, 25 monitoring events have been completed at the site.*

76. Section 2.4.5, Progress Since the last Five-Year Review, p. 2-56, 1st bullet:

"EPA and MEDEP will be consulted to establish a specific trigger level of this action."

> MEDEP does not recall that a "trigger level" for vinyl chloride has been established, however, this concept is sound and needs to be included Sections 2.4.8 and 2.4.9.

Response—The trigger level is assumed to be the Maine MEG of 0.15 µg/L. This sentence has been deleted.

77. Section 2.4.5, Progress Since the last Five-Year Review, p. 2-57, 4th bullet:

"Based on the 2004 data collected and reviewed, 2 additional direct-push borings were completed in June 2004."

Please correct the first date from 2004 to 2003.

Response—The date has been changed from 2004 to 2003.

78. Section 2.4.6.4, Surface Water Monitoring:

The most recent monitoring event data (Monitoring Event 23) reported show that…"

Please delete the word "show".

Response—The sentence has been revised as follows:

Historically, total VOC and vinyl chloride concentrations have remained consistently low, ranging between non-detect and approximately 3 µg/L, with the exception of one spike in the total VOC concentrations in 1996.

79. Section 2.4.6.4, Data Review, Groundwater Monitoring, p. 2-58, 2nd paragraph:

"However, overall the data demonstrates that concentrations of 1,2-dichloroethene and vinyl chloride have leveled off or have decreased over the last 2-3 years."

This statement should be more definitive, and reflect the diversity of change at Site 9. MEDEP's suggests the following language: "*Based primarily on low-flow data, both 1,2-dichloroethene and vinyl chloride concentrations have declined slightly at the hot-spot (MW-NASB-069) in the past five years, but remained well above pre-1999 levels. At two other locations (MW-NASB-080 and MW-NASB-227) concentrations of 1,2-dichloroethene have been relatively consistent. Vinyl chloride concentrations fluctuated at MW-NASB-080; and continued to be non-detect at MW-NASB-227, where parent VOC compounds are routinely detected below MCLs/MEGs.*"

Response—The following text revision has been made to the second sentence, second paragraph in Section 2.4.7.4 (Data Review, Groundwater):

Vinyl chloride continues to be reported at concentrations greater than the corresponding Federal MCL and State MEG. Based primarily on low-flow data, 1,2-dichloroethene and vinyl chloride have declined slightly at the hot-spot (MW-NASB-069) in the past 5 years, but remained well above pre-1999 levels. At two other locations (MW-NASB-080 and MW-NASB-227), concentrations of 1,2-dichloroethene have been relatively consistent. Vinyl chloride concentrations fluctuated at MW-NASB-080; and continued to be non-detect at MW-NASB-227, where parent VOCs are routinely detected below MCLs/MEGs. The maximum concentration of vinyl chloride,

particularly noted at MW-NASB-069, appears to have reached a maximum in 2001, and has subsequently been stable or is decreasing. Assessed indicators of natural attenuation include vinyl chloride trends in the Long-Term Monitoring Program and the ratio of vinyl chloride to 1,2-dichloroethene with time.

80. Section 2.4.6.4, Data Review, Groundwater Monitoring, p. 2-58, 3rd paragraph:

"Therefore, if elevated concentrations of vinyl chloride were to occur in areas downgradient of MW-NASB-069, the existing monitoring well network is likely to effectively track changes in groundwater concentrations of VOCs."

Elevated concentrations of vinyl chloride were documented in the downgradient area by the existing monitoring wells, primarily between 1995 and 1997 prior to filling of the impoundment ponds. In June 2003, direct-push S9-B8 found vinyl chloride at 7.1 ug/L between 14 and 26 feet bgs. The closest long-term monitoring well (MW-NASB-076), located approximately 40 feet downgradient, has its screen bottom at 17 feet bgs. At this well vinyl chloride was not detected in either the spring or fall sampling in 2003, and has been below 2 ug/L since the fall of 2000. The above statement needs to be revised to reflect this pertinent data.

Response—This sentence has been revised as shown below:

The monitoring well network has been designed to track changes in groundwater concentrations of VOCs in the main portion of the vinyl chloride plume (near MW-NASB-069) and in other areas of Site 9 where vinyl chloride has been detected. The LTMP will be revised as necessary to monitor the natural attenuation.

81. Section 2.4.6.4, Data Review, Surface Water, Sediment, and Seep Monitoring:

The emphasis of concentration summaries for this report should be on the last five years, and not on the most recent event data. Please modify all three subsections.

Response—These sections have been revised to read as follows:

Surface Water Monitoring

Historically, total VOC and vinyl chloride concentrations have remained consistently low, ranging between non-detect and approximately 3 µg/L, with the exception of one spike in the total VOC concentrations in 1996.

Sediment Monitoring

Since 1995, total VOC concentrations have ranged from non-detect to approximately 64 µg/kg. Historically, the concentration of vinyl chloride has remained consistently low (<2 µg/kg) in sediment samples.

Seep Monitoring

Historically, the concentration of vinyl chloride has remained at non-detect levels since 1995. The concentration of total VOCs generally ranges from non-detect to approximately 2 µg/L, although three spikes were noted in 1995, 1997, and 1998.

82. Section 2.4.6.5, Site Inspections:

Please identify exactly what is inspected include the aspects of the institutional controls.

Response—The text has been modified in the first sentence of Section 2.4.7.5 (Site Inspections) as follows:

Site inspections of monitoring wells, staff gauges, and overall site conditions are conducted...

83. Section 2.4.7:

Question A: MEDEP recommends the following changes: "Monitoring of groundwater beneath the site and the sediment/surface water will continue to provide data to ensure contaminated groundwater from the site continues to pose no unacceptable risk to human health or the environment *and to monitor the natural attenuation.*

Response—The sentence has been changed as suggested.

84. Section 2.4.7, Technical Assessment, Question B, p. 2-61, 4th paragraph:

"The results of the Second Five-year review indicate that Site 9 would not have any potential risks addressed by the selected remedy. Therefore, no additional revisions to the final selected remedy are warranted at this time."

The meaning and intent of these statements are unclear. MEDEP suggests eliminating the negatives and making the statements positive, if possible

Response—The text has been revised to read as follows:

The results of the Second Five-Year Review indicate that the Site 9 selected remedy limits potential risks to human health and the environment. Therefore, no revisions to the final selected remedy are warranted at this time.

85. Section 2.4.7, Technical Assessment, Question C, p. 2-61, 2nd paragraph:

Remedial activities have occurred at the Base's NEX immediately upgradient of Site 9 during this five-year review period and recent Site 9 annual reports have acknowledged that air sparging and possibly in-situ oxidation treatments to fuel-contaminated groundwater have altered subsurface conditions in part of Site 9. The migration travel time

between sites favors the inducement of increased reductive degradation of TCE to DCE to vinyl chloride beginning about 2000. The apparent gradual decline in vinyl chloride concentrations at several locations may signal that any upgradient impacts are dissipating. This likely scenario must be discussed under Question C.

Response—We do not agree that this issue calls into question the protectiveness of the remedy. We believe this section is accurate as written.

86. Section 2.4.7, Technical Assessment Summary, p. 2-61, 2nd paragraph:

"The toxicity data for some of the COCs have changed."

Please specify the changes have occurred.

Response—The last two sentences of this paragraph were not accurate, and have been deleted.

87. Section 2.4.10, Protectiveness Statement, p. 2-62:

"The remedy is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1999 ROD, which is expected to take up to 20 years to achieve."

During the past five years, vinyl chloride tripled in concentrations before beginning to decline, and TCE was found to be more widely distributed than known when the ROD was signed. Significant progress has been made in gaining a better understanding of Site 9, including contamination beneath the buried landfill/dump. However, the new information appears not to favor a rapid attainment of cleanup goals. (NR)

Response—Concentrations of vinyl chloride are less than 50 µg/L and total VOC concentrations are below 100 µg/L. It is reasonable to assume that these concentrations of contaminants can be naturally degraded in the next 15 years, if not sooner.

88. Section 2.5.2, para 2:

Please address what happened to EW-2 and how many extraction wells are currently operating.

Response—The following sentence has been added to the second paragraph after the bullets in Section 2.5.2 (Site Description):

> *...VOCs from groundwater. Extraction well EW-2 was installed across the shallow and lower water-bearing units, but was not removing significant VOC concentrations. Therefore, A-a sixth extraction well (EW-2A)....*

The following sentence has been added to the end of this paragraph.

One extraction well (EW-3) has been removed from service due to well collapse. As of December 2004, a total of 4 active extraction wells are in operation (EW-1, EW-2A, EW-4, and EW-5A).

89. Section 2.5.3, Site Chronology:

a. Please add the 1998 ROD and the 1998 installation of EW 2A to the chronology.

Response—The following bullet has been added into Section 2.5.3 (Site Chronology):

- *In 1998, the ROD for the Eastern Plume was signed for hydraulic containment, recovery, and treatment to remediate groundwater.*

- *In 1998, a new extraction well was installed (EW-2) to remove a hotspot of VOC contamination near MW-311. Concentrations at this well have decreased approximately 3 orders of magnitude since the well was installed.*

b. "In April 1995, the GWETS began operating."

The acronym "GWETS" must be spelled out upon first usage. Secondly, on page 2-63 the start-up date was given as June 1995. Please reconcile these problems. (ED)

Response—The acronym GWETS was spelled out in its first usage in Section 2.1.2. The startup date has been corrected to June 1995 in Section 2.1.2 and Section 2.5.3.

d. Please add: "In 1999 a Department of Defense assessment team studied the Eastern Plume remediation data and issued a technical recommendations report (Radian, 1999)."

Response—This bullet has been added in chronological order.

e. Please add: "In July 1998, extraction well EW-02A began remedial pumping in a deep-seated downgradient contaminant hotspot close to Mere Brook."

Response—This bullet has been added in chronological order.

90. Section 2.5.3, Page 2-65, Bullet 13:

Please identify the rationale (and the results) for the 1,4 dioxane sampling.

Response—The following revision has been to the bullet text:

- *During the April 2004 Long-Term Monitoring Program sampling event, in addition to the standard LTMP sampling and analysis, the Navy collected samples from 5 monitoring wells for analysis of 1,4-dioxane. Samples were collected to*

assess whether this compound may be present, and to compare concentrations to current guidance. This compound was detected in the 5 monitoring wells sampled in the Eastern Plume.

91. Section 2.5.3, Site Chronology, p. 2-65, bottom bullet:

"In June 2004, the Navy completed 3 direct-push borings in the vicinity of monitoring well MW-313. Three direct-push borings were logged…"

Please add to the end of the first sentence: *", in response to steadily increasing VOC concentrations at this sentinel monitoring well."*

Response—The sentence has been revised as requested.

92. Section 2.5.4.1, Physical Characteristics, p. 2-66:

a. "The plume extends north-south along the Weapons Compound Road for approximately 0.2 mi."
Maps in the site reports show that the plume extends 3000 feet south from Old Gurnett Road to just past New Gurnet Road along the Weapons Compound Road. Please change "0.2 mi." to "*0.6 mi.*"

Response—The sentence has been revised as suggested.

b. "The land in the southern two-thirds of the plume is comprised of woodland, munitions bunkers, and paved access roads."

Please change to read: "*The land in the southern two-thirds of the plume is comprised of woodland, wetlands, and paved access roads.*"

Response—The sentence has been revised as suggested.

93. Section 2.5.4.2, Land and Resource Use, para 1:

a. "The lower sand which lies between the transition and the clay is the focus of the remediation efforts at the Eastern Plume."

To be more accurate please revise as follows: "The lower sand which lies within the lower part of the transition unit and close to the underlying clay has been the primary focus of recent-year remediation efforts at the Eastern Plume."

Response—The sentence has been revised as suggested.

b. "The top surface of the clay and bedrock have variable elevations which are inferred to influence VOC concentrations as noted with higher concentrations being observed in the clay troughs."

Please change as follows: *"The top surface of the clay and bedrock have variable topography which are inferred to influence VOC migration downgradient, with higher concentrations occurring in sand beds within the clay troughs."*

Response—The sentence has been revised as suggested.

c. "Deep groundwater flow is generally to the south-southeast and may discharge to surface water, although this relationship is not fully understood."

A more up-to-date revision should be substituted, as follows: *"Deep groundwater flow is generally to the south-southeast and may discharge to specific reaches of Mere Brook or its adjacent wetlands. The nature of any discharge is not currently understood, however, groundwater sampling near the stream was expanded in 2004."*

Response—The sentence has been revised as suggested.

94. Section 2.5.4.2, para 4:

"The Base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course."

Please update this statement in regards to the bedrock well at Dyers Corner.

Response—The text has been revised as follows:

Groundwater associated with the site is not used for potable purposes or any other uses. The base is connected to a public water supply administered by the Brunswick-Topsham Water District, with the exception of the golf course and Dyers Corner gate entrance guard station. A bedrock well is located approximately 200 ft west of Site 2 Landfill at the gate that serves the guard station. This well was installed in 2002 and is screened below a relatively impermeable marine clay and is not affected by Site 2. The base golf course is distant from the Eastern Plume and is not affected by groundwater flow from the Eastern Plume. Mere Brook,...

95. Section 2.5.4.3, History of Contamination, p. 2-67:

This single paragraph does not adequately address this subject. This section for Site 9 was longer, and its history is less complex. More details are needed that describe the areal and temporal distribution of each COC. The vertical extent and variability within the plume must be addressed. Any major changes in concentration patterns over time is pertinent. In particular, discuss the prevalence of fuel hydrocarbon compounds in the Upper Sand when the RI was performed, its migration into the Transition Unit/Lower Sand over time, and the

nearly total disappearance of all BTEX compounds in current sampling results. Also, the spread and increasing concentrations of chlorinated hydrocarbon break-down compounds (1,1-DCA, 1,1-DCE, and 1,2-DCE) is important to mention, as well as the apparent absence of vinyl chloride.

Response—The Navy believes this section is sufficient as written and accurately describes the site impacts [NOTE: This section was supposed to be a summary of the Eastern Plume not Site 9. That was only for comparison.] The following text has been added to this section to provide a summary of the Eastern Plume:

Based on data collected during the RI and Long-Term Monitoring Program, the following interpretations are made regarding contaminant transport and distribution within the Eastern Plume:

- *Sites 4, 11, and 13 have been identified as source areas of the Eastern Plume, and are located to the north-northwest of the current plume. These sites have been investigated, and source removal occurred in the early 1990s; subsequently, natural attenuations have occurred. These events appear to have effectively depleted nearly all the residual fuel and solvents in the source areas. Chlorinated solvents released at these sites entered the upper sand, migrated around or through the upper transition unit, and eventually reached the lower sand deep within the transition unit. Within the Eastern Plume historic footprint, the upper sand unit is nearly remediated of contaminants. Some limited impacts have been observed in the shallow interval, near monitoring wells MW-1104 and MW-332. Near the source area at Site 11 MW-1104), some residual concentrations of VOCs remain at or above State MEGs or Federal MCLs (EA 2000), although concentrations have been decreasing since 1995 following source removal. Shallow groundwater contamination near MW-332 is believed to have resulted from unrestricted artesian flow of contaminated groundwater from MW-311 from 1990 to 1995.*

- *The majority of the groundwater plume is located within the lower sand near the base of the transition unit. Based on existing data, the Eastern Plume extends to the vicinity of New Gurnett Road. The Eastern Plume and the lower sand unit are not present immediately east of Mere Brook along the eastern base boundary. The clay unit underlying the transition forms a clay trough whose eastern slope rises toward the southeast and western slope rises toward the southwest where the lower sand unit pinches out. The lack of lower sand the presence of this clay unit along the eastern and southern plume boundary acts to retard movement of the Eastern Plume.*

- *No permeable pathways for contaminants have been identified along the southwestern boundary of the base where overburden consists of low permeability units such as silt and clay. These units do not conduct significant amounts of groundwater. Along the southern base boundary, overburden has been measured to be approximately 50-ft thick.*

- *The 6 monitoring wells located in bedrock have not shown concentrations of VOCs above State MEGs or Federal MCLs. Several detections of 1 µg/L were recorded in the 1990s at estimated concentrations.*

- *Shallow diffusion samplers placed in Mere Brook and associated wetland showed concentrations of Eastern Plume VOCs in upwelling groundwater north of New Gurnett Road, but not south of this road. Upwelling of the Eastern Plume at low concentrations has also been confirmed in Merriconeag Stream just north of Picnic Pond in and in Picnic Pond (Gannett Fleming 2003).*

In summary, the Eastern Plume has been slowly migrating to the south and southeast, with minor diffusion into Picnic Pond. One monitoring well (MW-313) has noted concentrations in excess of the State MEGs and Federal MCLs beginning in 2003. Eastern Plume VOCs have been detected in the past 2 years at concentrations below the State MEGs and Federal MCLs in MW-230A, MW-333, and MW-334, indicating minor migration on base to the south and east of the junction of New Gurnett and Merriconeag roads (Conceptual Model of the Eastern Plume [EA 2003]).

96. Section 2.5.4.5, Basis for taking Action, p. 2-69, 3rd paragraph:

"Since sampling from both the RI and current Long-Term Monitoring Program has determined that the Eastern Plume has not migrated beyond the most downgradient wells wells[sic], exposure to aquatic receptors in Harpswell Cove were not evaluated."

The past two years of increasing concentrations at MW-313 is suggesting that the plume has migrated beyond a sentinel well, and that perhaps aquatic receptors in Mere Brook are being threatened, and an investigation is now in progress. Thus, it is not appropriate to say that the current LTMP shows that "the Eastern Plume has not migrated beyond the most downgradient wells". Please modify the above statement.

Response—The 9th paragraph in Section 2.5.4.5 (Page 2-69) has been revised as follows:

An ecological risk assessment evaluated the potential risks to terrestrial organisms from contaminant exposure at Sites 4, 11, and 13. Since sampling from both the RI and the current Long-Term Monitoring Program has determined that the Eastern Plume has not migrated beyond the most downgradient wells (the 300 series wells, i.e., MW-338A, MW-338B, and MW-338C), exposure to aquatic receptors in Harpswell Cove were not evaluated. If the Eastern Plume does migrate and discharge to surface water, potential exposure may result. In June 2004, the Navy completed a limited direct-push investigation (3 direct-push borings) in the vicinity of monitoring well MW-313 to assess the extent of contamination in this area of the Eastern Plume. Concentrations of Eastern Plume constituents, including 1,1-dichloroethene and 1,1-dichloroethane, were identified in several of the direct-push groundwater sample intervals collected at each direct-push boring location. These results indicate that the

leading edge of the Eastern Plume appears to be present in the vicinity of MW-313 and confirms the previously collected LTMP data from MW-313. The Navy will be monitoring the surface water in Mere Brook to determine if the Eastern Plume is discharging to the Brook in the vicinity of MW-313. This surface water sampling program is expected to occur during the Summer of 2005.

97. Section 2.5.5, para 1:

Under paragraph the following bullets should be added to summarized the remedial components of the 1992 Interim ROD.

- Extraction, treatment & discharge of treated groundwater,
- Maximize the collection of the contaminated groundwater,
- Contain the southern end of the plume,
- Collection contaminated groundwater from the northern part of the plume, and
- Develop a monitoring program

Response—The bullets have been added to this section as requested.

98. Section 2.5.5, Monitoring:

a. Please change the subtitle "Monitoring" to "Long-Term Monitoring" to be consistent with Site 9 (p. 2-55). The contents of these two subsections should use the same language.

Response—The section headings have been changed as requested.

b. Please check the bullets for inadvertent spaces in some words.

Response—The typos have been removed.

99. Section 2.5.5, Remedial Actions, p. 2-71, 1st item:

"Monitor the effectiveness of the remedial action for the protection of human health and the environment"

Please add to the end of the above statement "*by assessing temporal trends in the concentrations of contaminants of concern.*"

Response—This sentence has been revised as requested.

100. Section 2.5.5.1, Remedy Implementation, p. 2-71, 1st sentence:

a. "Groundwater within the Eastern Plume is being remediated by a treatment system that consists of 4 active extraction wells (...) that were designed to provide hydraulic control of the aquifer, and a treatment plant to... The extraction system has been operational since June 1995, and has undergone changes to improve the operational efficiency."

The extraction system was designed and constructed with five active extraction wells that removed water at a combined rate of approximately 100 gallon/minute in 1996 and 1997. In 1998 that rate dropped to approximately 85 gallons/minute. In the preceding years the rate continued to decline, and now is approximately 50 gallon/minute. Potentiometric contours maps have shown that hydraulic control was only partially achieved at the highest historical rate of pumping. The recent migration of the plume to Mere Brook at its leading edge serves as testimony that hydraulic control is yet lacking. Remedial efficiency has not been improved, as evidenced by continued downgradient contaminant migration and a decrease in contaminant mass removal from 8.3 kg/month in 1996-97 to 1.7 kg/ month in 2003. It is recognized that the replacement of EW-02 with EW-02A and EW-05 with EW-05A were improvements in addressing residual groundwater contamination hotspots. However, the Navy must appropriately define "operational efficiency" and draw conclusions concerning "operational efficiency" that are supported by the data; or use another measure of long-term system performance.

Response—The remedial system has been very effective in reducing concentrations in the Eastern Plume. Average total VOC concentrations have decreased by 630 percent and maximum total VOC concentrations have decreased by 1,300 percent. The current extraction system has apparently reached an asymptotic influent concentration and, therefore, new extraction wells are planned. To address this comment, the text of the last sentence of Section 2.5.5.2 (Remedy Implementation) has been changed as noted below:

> *The extraction system has been operational since June 1995, and has been successful in reducing hot-spot concentrations of VOCs and total VOC concentrations in the Eastern Plume. The current system is extracting less groundwater now than when it was originally activated due to well failures. Therefore, two replacement extraction wells are proposed to be added to the system. In general, total VOC concentrations at extraction wells in the network have reached asymptotic influent conditions and, therefore, system improvements are planned to increase the mass of VOCs being removed. Institutional control boundary was documented in the December 2000 ESD for the Eastern Plume.*

b. "Groundwater within the Eastern Plume is being remediated by a treatment system that consists of 4 active extraction wells (...) that were designed to provide hydraulic control of the aquifer, and a treatment plant to..."

Please revise the first sentence as follows: "Groundwater within the Eastern Plume is *currently* being remediated..." Also add that the extraction system was also designed to maximize recovery of dissolved contaminant mass.

Response—This sentence has been revised as follows:

Groundwater within the Eastern Plume is currently being remediated by a treatment system that consists of 4 active extraction wells...that were designed to provide hydraulic control of the aquifer, maximize recovery of dissolved contaminant mass, and a treatment plant...

c. Please add a paragraph on the conversion of the GWETS treatment system from ultraviolet-oxidation to an air stripper with carbon polishing.

Response—The following revisions have been made to Section 2.5.5.2 (System Operation/Operation and Maintenance):

2.5.5.2 System Operation/Operation and Maintenance

The extraction system has been operational since June 1995 and has undergone changes to improve operational efficiency. Extraction well EW-02A, located within the Eastern Plume in the vicinity of monitoring well MW-311, was activated on 12 June 1998 to provide additional VOC removal and hydraulic control in this area. On 27 September 2000, extraction well EW-02 was removed from service and decommissioned. Extraction well EW-03 is no longer operational and was removed from service in December 1998 and decommissioned on 27 September 2000. One replacement extraction well (EW-05A) was installed during September 2000 and brought on-line on 10 January 2001. EW-05 was removed from service and decommissioned on 17 January 2001. The following table summarizes the installation and status of all the extraction wells at NAS Brunswick for the Eastern Plume and Site 1 and 3 Landfill:

Extraction Well No.	*Date Installed*	*Status*
EW-1	*October 1994*	*Active*
EW-2	*October 1994*	*Decommissioned – 27 September 2000*
EW-2A	*April 1998*	*Active*
EW-3	*October 1994*	*Decommissioned – 27 September 2000*
EW-4	*October 1994*	*Active*
EW-5	*October 1994*	*Decommissioned – 17 January 2001*
EW-5A	*September 2000*	*Active*
EW-6[(a)]	*November 1994*	*Not Active – 19 November 1997*
EW-7[(a)]	*November 1994*	*Not Active – 19 November 1997*
(a)EW-6 and EW-7 are for Sites 1 and 3 and the others are for the Eastern Plume.		

On 11 September 2001, the extraction well network and treatment plant were ordered shut down by the Commanding Officer of NAS Brunswick. During the 1 October 2001 project conference call between the Navy, MEDEP, and EPA Remedial Project Managers, it was agreed that the extraction well network and treatment plant would remain off-line until completion of the Fall 2001 Long-Term Monitoring Program. The extraction well network and treatment plant were placed back in service on 13 November 2001. The extraction well network and treatment plant had been off-line for a total of 63 days.

On 9 November 2003, the pump and motor controller for extraction well EW-4 were damaged beyond repair due to an electrical surge in the base's power grid. In May 2004, a new pump and motor controller were installed and EW-4 was returned to normal operation. During this period, extraction well EW-4 was out of service for 176 days.

Between 2000 and 2001, the GWETS was changed to improve VOC removal efficiencies. The original ultraviolet oxidation system was replaced with an air stripper with carbon polishing system. The new treatment system became operational in early 2002.

101. Section 2.5.5.2, para 2:

"Monthly GWETS operations reports were provided to the Brunswick Sewer District summarizing additional ..."

Please add EPA and MEDEP as recipients of the monthly reports.

Response—The sentence has been revised as noted below:

Monthly GWETS operations reports were provided to the Brunswick Sewer District, EPA, and MEDEP summarizing additional...

102. Section 2.5.6, Progress Since the Last Five-year review, para 2, bullet 6:

"Groundwater at the Eastern Plume is not a drinking water source, thus cleanup to MCL or State of Maine standards is not necessary for the remedy to remain protective of human health."

For this statement to be true, it is imperative that the institutional controls (ICs) restrict all extraction of groundwater and to remain in effect for the foreseeable future. Also since the basis for the IC was that no wells would be installed the Navy must decide whether to implement a basewide groundwater restriction or model an new IC boundary.(See General Comment 2.)

Response—See response to Comment No. 2.

103. Section 2.5.6, para 3, bullet 4:

MEDEP recommends the following revision: "Beginning with the April 2002 Long-Term Monitoring Program reports, the reporting format was changed from a data presentation to a *semi-annual* report…"

Response—The text has been changed as suggested.

104. Section 2.5.7.4, Data Review, Groundwater Monitoring, p. 2-74:

"Concentration trends form monitoring wells located within the body of the Eastern Plume appear to be relatively stable, suggesting limited migration of the VOC plume during the period in which the five-year review has been conducted."

"These increases suggest an area of increased VOC contamination is moving south; and, during 2003, the center of mass of the Eastern Plume moved from P-106 to MW-331."

It is not apparent to MEDEP that a center of contaminant mass moving has actually moved. However, if physical migration has occurred from P-106 to MW-331, a distance of 1200 feet, the above statements are contradictory – that is, the above description of "limited migration" is misleading. An apparent movement of mass could be falsely interpreted if the historic plume hotspot at P-106 in the north basin of the Eastern Plume shifted *laterally* away from this well, while an opposite shift occurred in the MW-331 vicinity. Such a change in the south basin might occur because in 2002 the extraction rate of EW-04 increased substantially, while the extraction rate at EW-02A was steadily declining. Thus, a plume center of mass in the south basin may have reformed near MW-331, which is approximately half way between EW-04 and EW-02A, but a long way from P-106. Regardless of what actually happened in the plume, one or both of the above statements must be modified.

Response—The first sentence noted has been revised as shown below; the second noted has been deleted:

Concentration trends from monitoring wells located within the body of the Eastern Plume appear to be relatively stable, suggesting limited migration of the VOC plume during the period in which the five-year review had been conducted. Although, in general, VOC concentrations have been stable, the highest concentrations of the Eastern Plume are now noted at monitoring well MW-331 when they were previously recorded at P-106, approximately 1,000 ft to the north.

105. Section 2.5.7.4, Data Review, Surface Water Monitoring, p. 2-75:

The COCs that have been detected in surface water in the past 5 years need to be identified. In particular, the finding of 2003, 4 ug/L of trichloroethene in the spring of 2003 at surface water sampling station SW-12 (close to MW-313) has to be added to this section.

Response—The following text edit has been added to the surface water monitoring section:

> ... VOCs since the late 1990s, *although one surface water sample in Spring 2003 noted 4 µg/L of trichloroethene at surface water sampling station SW-12 (close to MW-313).*

106. Section 2.5.7.4, Data Review, Sediment Monitoring, p. 2-75:

"The sediment samples are analyzed for VOCs". VOCs have been detected in the sediment samples, however, at concentrations ranging from non-detect to 24 ug/L. Overall, VOCs concentrations have demonstrated a generally stable concentration trend."

These statements do not pertain to the Eastern Plume. Sediment samples for the Eastern Plume (station SW-11) are only analyzed for TAL metals and pesticides. Please rewrite this paragraph.

Response—This paragraph has been re-written as follows:

> *The sediment sample is analyzed for inorganics and pesticides. Analytical results have shown nominal concentrations of these analytes in long-term monitoring samples.*

107. Section 2.5.7.4, Data Review, Leachate Seep Monitoring, p. 2-75:

"Since the mid-1990s, VOCs have been detected in the seep samples, however, at concentrations ranging from non-detect to 33 ug/L. Overall, VOCs concentrations have demonstrated a generally stable or decreasing concentration trend."

At SEEP-11 significant levels of chlorinated hydrocarbons were found in the fall of 2002, whereas all prior (five) sampling events (2000-2002) were non-detect. The fall 2002 event showed 31 ug/L of chlorinated hydrocarbons, the spring 2003 event 3 ug/L, and the fall 2003 event 16 ug/L. Both PCE and TCE were slightly above drinking water MEGs/MCLs, for reference. The three consecutive detections of VOCs at SEEP-11 show no clear trend on the Monitoring Event 23 graph. The Navy must report the facts in more detail, and not give a trend analysis based on three varied data points.

Response—This sentence has been revised as follows:

> *Since the mid-1990s, VOCs have been detected in the seep samples at concentrations ranging from non-detect to 33 µg/L, although no clear trend has been established.*

108. Section 2.5.7.5:

To make this statement more meaningful please define what is being inspected (i.e., the monitoring wells and extraction wells, and effectiveness of the ICs, etc).

Response—This sentence has been revised as follows:

Site inspections of monitoring wells, extraction wells, and the GWETS are conducted during each…

109. Section 2.5.8, Question A:

a. The RODs for the Eastern Plume are dated 1992 and 1998. Please correct.

Response—The dates of the RODs have been corrected.

b. "Is the remedy functioning as intended by the decision documents?"

MEDEP's answer to Technical Assessment Question B is "no". The 1992 ROD which deals with groundwater states that the selected remedy will provide "containment of the plume to prevent the migration of contaminated groundwater to currently uncontaminated areas" (p 39). Monitoring data from the 2002-2004 events show that concentrations are rapidly increasing in MW-313, at a downgradient point outside the original mapped plume. Prior to 2000, only trace levels of 1,1 –DCA had been measured during long-term monitoring events at MW-313. This well is approximately 100 feet from Mere Brook, and was designated as a sentinel well. Total VOC concentration surpassed 55 ug/L in 2002. 1,1-DCE has exceeded its MCL/MEG the last four events. It is apparent that the Eastern Plume has migrated into a previously uncontaminated downgradient area, which violates a remedial objective of the ROD. Furthermore, trichloroethene (4 ug/L) was detected at surface water monitoring station SW-12 in 2003, which is located near MW-313. Data are not currently available to confirm that the plume is losing significant VOC mass to the stream. The implication of the recent-year detections needs to be discussed in detail at the December 2004 technical meeting to best answer Question B. The Navy should also add the optimization of the extraction system to the tables in sections 2.5.9 and 2.5.10.

Response—The maximum concentrations of the Eastern Plume have been reduced by over 1,300 percent, and the use of extraction wells to remediate high concentration hot-spots has been very effective. As noted in the RI, VOCs were present in the Southern Boundary region of the Eastern Plume, and there are no data that indicate the plume boundary has increased. On the contrary, a comparison of the plume boundary in the RI and based on 2004 data clearly shows the plume boundary is much smaller. The detection of TCE at SW-12 has not been replicated in subsequent sampling events; however, the Navy is planning on further investigating this area to assess if the Eastern Plume is discharging to Mere Brook.

The tables in Sections 2.5.9 and 2.5.10 have been updated to include the Optimization of the Extraction System as shown in the response to Comment No. 112.

110. Section 2.5.8, Technical Assessment, Question B, p. 2-76:

a. "Are the exposure assumptions, toxicity data, cleanup values and RAOs used at the time of the remedy selection still valid?"

Page 2-69 states " If the Eastern Plume does migrate and discharge to surface water, potential exposure may result. If it appears that the plume has migrated beyond the most downgradient points, the Navy will institute additional downgradient monitoring wells and/or conduct monitoring in surface water." At the time of ROD selection, the primary concern was to prevent the plume from reaching Harpswell Cove, and a travel time of 5 years was predicted. Upon completion of additional subsurface investigations and LTMP data trends, it is becoming apparent that the plume contaminants can only reach the cove via transport in Mere Brook water or eroded sediment. It appears that the Eastern Plume has migrated to or very close to Mere Brook therefore it is likely that the impact of the plume on Mere Brook will need to be investigated. Please discuss this further and add to the tables in sections 2.5.9 and 2.5.10.

Response—The potential for the plume discharging to surface water is already included in the sampling program. One surface water sampling location (SW-12) is located immediately downgradient of MW-313, within the area of the suspected plume discharge region. Significant impacts have not been noted at this location, with the exception of one detection of TCE at 4 ppb in May 2003. Subsequent sampling has not detected VOCs. Surface water data support the hypothesis that the plume is present in subsurface units near the brook but plume constituents are not present at detectable concentrations within Mere Brook. The following text has been added to this section:

> *One surface water sampling location (SW-12) is located immediately downgradient of MW-313, within the area of the suspected plume discharge region. Significant impacts have not been noted at this location, with the exception of one detection of TCE at 4 ppb in May 2003. Subsequent sampling has not detected VOCs. Surface water data support the hypothesis that the plume is present in subsurface units near the brook but plume constituents are not present at detectable concentrations within Mere Brook.*

The tables in Section 2.5.9 and 2.5.10 have been updated to note additional investigations near MW-313 as shown in the response to Comment No. 112.

b. "Federal MCLs and Maine MEGs were also reviewed to determine whether the MCLs have been revised since the ROD.

Please address whether the MEGs have been revised.

Response—A review will be completed, and if the MEGs have been revised, the new values will be noted in the final Second Five-Year Review Report.

111. Section 2.5.8, Question C:

a. Please address the reduction in extraction wells and the migration of the plume toward Mere Brook.

Response—This sentence has been replaced with the following text:

The overall pumping rate of the extraction network has decreased since 1995 due to extraction well failure and other considerations. New extraction wells are planned to increase pumping rates and speed remediation of the plume. Overall, the extraction network has been successful in decreasing VOC concentrations within the Eastern Plume. Increasing concentrations of VOCs have been noted at monitoring well MW-313, located adjacent to Mere Brook in the southern boundary of the Eastern Plume. This area is under investigation at this time.

b. Also regarding the potential contamination under Building 584, the ROD (pg 9) states "In the event that Building 584 is ever demolished, the Navy in consultation with the U.S. Environmental Protection Agency (USEPA), Maine Department of Environmental Protection (MEDEP), and the public, will assess the need for additional soil sampling at Site 4." A statement to this affect needs to be included the ICs for Site 4.

Response—Please see the response to Lepage Comment No. 55. Text regarding this issue has been added to Section 2.5.5.

112. Section 2.5.9 & 2.5.10:

Please add "Assess ways to optimize the extraction system" and "Develop ICs for Building 584" to the tables.

Response—The tables have been revised as shown below:

2.5.9 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Finalize and issue the LTMP	*No*	*Yes*
Finalize and issue the QAPP	*No*	*Yes*
Generate a Land Use Control Implementation Plan document for the Eastern Plume	*No*	*Yes*
Complete assessment of 1,4-dioxane in the Eastern Plume and report findings of the initial sampling program (minimum of three rounds of sampling data)	*No*	*Yes*
Complete field work to install 2 replacement extraction wells in the Eastern Plume	*No*	*Yes*
Continue collection of monitored natural attenuation parameters	*No*	*Yes*
Expedite assessment to optimize the Long-Term Monitoring Program and remedy	*No*	*Yes*

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Eastern Plume not contained by current extraction well network	*No*	*Yes*
Optimize the extraction well network	*No*	*Yes*
Additional investigation near monitoring well MW-313	*No*	*Yes*
Develop institutional controls for Building 584	*No*	*Yes*
Conduct the additional surface water sampling in Mere Brook in the vicinity of MW-313 as recommended in recent monitoring event reports	*No*	*Yes*
Develop institutional control boundary for the site	*No*	*Yes*

2.5.10 Recommendations and Follow-Up Actions

Issue	*Recommendations/Follow-up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Finalize updated LTMP	*Finalize the LTMP and issue updated LTMP*	*Navy*	*EPA/ MEDEP*	*04/2005*	*No*	*Yes*
Finalize updated QAPP	*Finalize the QAPP and issue the updated QAPP*	*Navy*	*EPA/ MEDEP*	*04/2005*	*No*	*Yes*
Generate an LUCIP	*Generate an LUCIP for the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*10/31/05*	*No*	*Yes*
Assess occurrence of 1,4-dioxane	*Continue assessment of 1,4-dioxane in the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Install 2 replacement extraction wells	*Install 2 replacement extraction wells in the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Collect monitored natural attenuation parameters	*Continue collection of monitored natural attenuation parameters*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Long-Term Monitoring Program and remedy optimization	*Assess ways to optimize the Long-Term Monitoring Program and remedy*	*Navy*	*EPA/ MEDEP*	*2005-2008*	*No*	*Yes*
Optimize the extraction well network	*Install up to 3 new extraction wells to replace/augment existing wells*	*Navy*	*EPA/ MEDEP*	*2005-2008*	*No*	*Yes*
Additional Investigation near monitoring well MW-313	*Assess migration of Eastern Plume into this area, assess degree of upwelling into Mere Brook*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Develop institutional controls for Building 584	*Develop appropriate actions if building is demolished*	*Navy*	*EPA/ MEDEP*	*2005-2009*	*No*	*Yes*
Collect additional surface water samples in Mere Brook in the vicinity of MW-313	*Collect three additional surface water samples as recommended in Monitoring Event 23 Report*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*

113. Section 2.5.10, Recommendations and Follow-up Actions, p. 2-78, table:

a. Under "Milestone Date" for the Issue "Install 2 replacement extraction wells", the timetable reads 2005-2006. The Navy has an obligation to maintain its existing extraction system and to replace ineffective extraction wells in order to prevent further migration, therefore the Navy should commit to replacing the extraction wells in 2005 rather than to be out of compliance for another year.

Response—The Navy intends to replace the extraction wells, as noted in this comment. Due to funding uncertainties, the timeframe of 2005-2006 was included on the table.

b. Under "Affects Protectiveness" for the Issue "Collect monitored natural attenuation parameters", the answer should be "no", as the data will not change any occurring natural attenuation benefits.

Response—The table has been revised as suggested. See response to Comment No. 112.

114. Section 2.5.11, Protectiveness Statement, p. 2-78, last sentence:

"Current monitoring data indicate that the remedy is functioning as required."

MEDEP questions the validity of this statement in light of the monitoring results that suggest that contaminated groundwater is moving into previously uncontaminated areas and threatening Mere Brook water quality. Institutional controls will not stop contaminated surface water or stream sediment from being transported off-base. See Comment 109.b. for more discussion.

Response—Please see the response to Comment No. 109b.

115. Figure 1-1, Location Map of Naval Air Station Brunswick:

a. The thick, black, base boundary line does not properly overlie the base boundary shown on the topographic base map. In places, the offsets are 100s of feet. This problem also occurs on Figures 1-2 and 1-3. On Figure 1-2, the poor registration results in the Eastern Plume crossing Mere Brook. Please correct.

Response—The base boundary line has been corrected.

b. Also please check the Base Boundary arrow as it appears to be pointing at Route 24.

Response—The base boundary arrow has been corrected.

116. Figure 2-1, Site Plan, Sites 1 and 3 Landfill:

The Site 1 and Site 3 labels on the map are reversed from older reports, and the print type is too small. These sites should be highlighted in color, not the Eastern Plume. Please make the appropriate changes.

Response—The labels for Sites 1 and 3 locations have been switched and are now correct. The font size has been increased. Sites 1 and 3 are now shown in color and the Eastern Plume is shown only as an outline.

APPENDIX A

117. Contents:

In addition to those sites requested by EPA to be added to this list also include Sites 4, 11, & 13. These sites will also need to be included in the introduction.

Response—The introduction has been edited to indicate Sites 4, 11, and 13 are discussed, as shown below:

...investigations or removal actions (Sites 4, 5, 6, 8, 11, 13, 14, 15, 16, and 18).

118. Appendix A, Site 14, Section 5.4, Remedy Selected, p. 6 of 9:

"Based on the results of the magnetic data, no test pits or monitoring wells were installed, and no further investigations were conducted. It was concluded that the former dump does not exist or, if it did, it was probably removed during the runway and taxiway construction activities."

This investigation may not have been adequate, as a number of contaminants would not be detected by a magnetometer. Liquid hazardous waste that might contaminate shallow groundwater is one example. According to a 1945 topographic base map, Site 14 was situated in the headwater basin of a small drainage that flowed into what is now the Upper Retention Pond along the southern boundary of Site 9. The map shows an old roadway crossing this drainage close to Site 14. The drainage used to flow to the vicinity of Site 9 monitoring well MW-NASB-227, before bending southward toward the retention pond. It is now non-existent due to the construction of the base runway, however, a buried culvert was installed. Given all the unknowns about the Site 14 dump, it is possible that chlorinated solvents found in groundwater samples from MW-NASB-227 and other nearby direct-push sampling locations (low levels of PCE and TCE) historically migrated northeastward from Site 14. However, concentrations are just under the MCLs/MEGs, and also because of runway traffic, investigation at Site 14 is not warranted. However, if the base is ever closed or land use changes the site may be re-investigated.

Response—This site is most likely to be similar to other farm-type dumps observed on the base that commonly included metal debris and other non-hazardous material. There is no record of any hazardous material being disposed of at this site, and the dump may have been removed during runway construction. Solvent production and use was not common until the 1950s, after Site 14 was covered by the runways. For these reasons, the Navy believes the discussion provided in the Second Five-Year Review Report is adequate and complete. If ever closed, NAS Brunswick would follow the Navy's Base Closure Process and Site 14 would be re-assessed.

119. Appendix A, Site 16, Section 7.1, Site Location and Description, p. 8 of 9:

The unnamed stream is barely visible in Figure 1-2, and does not connect with any downslope drainage courses. However, the USGS 1:24000 map does suggest a downstream connection to a small pond. These maps and site inspections indicate that little if any water flows during dry summer months. Therefore the connotation that Site 16 borders a stream needs explanation in this section.

Response—A review of the Brunswick and Orrs Island quadrangles clearly shows a stream running through the area of Site 16. We believe the text is accurate as written.

120. Appendix A, Site 18, Section 8.3, Summary of Risk Assessment, p. 9 of 9:

"Reported concentrations of contaminants in soil, seep water, surface water and sediment were compared to state and federal standards and did not indicate a need for remediation."

Please state what compounds or constituents were found in the media named above. If none of these exceeded standards, they should be referred by terms other than "contaminants." Also, please add "*laboratory*" after "Reported" if this is correct.

Response—The text has been changed as requested.

Attachment A

Calculation of the Total Groundwater Volume Removed from Extraction Wells EW-6 and EW-7 between January 1996 and November 1997

CALCULATION OF THE TOTAL GROUNDWATER VOLUME REMOVED FROM EXTRACTION WELLS EW-6 AND EW-7 BETWEEN JANUARY 1996 AND NOVEMBER 1997

Date	Monthly Treatment Plant Influent from Sites 1 and 3 (gal)	Monthly Treatment Plant Influent from Sites 1 and 3 (liters)
January 1996	286,436	1,084,160
February 1996	221,407	838,025
March 1996	158,813	601,107
April 1996	183,199	693,408
May 1996	200,126	757,477
June 1996	213,142	806,742
July 1996	233,435	883,551
August 1996	222,971	843,945
September 1996	200,749	759,835
October 1996	180,463	683,052
November 1996	194,608	736,591
December 1996	173,410	656,357
January 1997	161,053	609,586
February 1997	131,266	496,842
March 1997	113,629	430,086
April 1997	151,250	572,481
May 1997	158,510	599,960
June 1997	139,101	526,497
July 1997	107,429	406,619
August 1997	83,720	316,880
September 1997	75,941	287,437
October 1997	63,998	242,232
November 1997	30,053	113,751
TOTAL	3,684,709	13,946,624

Attachment B

Review of Toxicity Values

EA Engineering, Science, and Technology, Inc.

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12 May 2005

MEMORANDUM

TO: Gina Calderone, C.P.G. **LOCATION:** EA–Newburgh

FROM: Dan Hinckley, Ph.D. **LOCATION:** EA–Loveton

SUBJECT: Review of Toxicity Values, Maximum Contaminant Levels, and Maximum Exposure Guidelines for Groundwater Contaminants, Naval Air Station Brunswick, Maine

We have reviewed the toxicity, Maximum Contaminant Level (MCL), and Maine's Maximum Exposure Guideline (MEG) values for chemicals of concern associated with groundwater at Naval Air Station, Brunswick, Maine. The approach taken was to examine the 1990 Human Health Risk Assessment (HHRA), determine the reference oral dose (RfDo) or slope factor applied during the performance of the HHRA, and determine if there were any differences between then and 2005. In addition, MCLs and MEGs were compared between 1990 and 2005. The results of this review are shown in Table 1. Chemicals for which changes were noted have been shaded. As can be seen, there have been many changes over the years.

Due to the method of calculating risks, and assuming the same exposure parameters as were performed during the 1990 HHRA, the change in risks will be linear to the change in toxicity values. Because hazard indexes for non-cancer endpoints are calculated by dividing the chemical dose by the RfDo, the smaller the RfDo, the larger the risk. For example, for arsenic, the RfDo decreased from 0.001 mg/kg/day to 0.0003 mg/kg/day, which is a 70 percent decrease. Consequently, non-cancer risks calculated in 1990 would be increased 70 percent using 2005 toxicity values. Alternatively, cancer risks are calculated by multiplying the lifetime chemical dose by the slope factor. Therefore, the larger the slope factor, the larger the cancer lifetime risk. Keeping with arsenic, the slope factor has decreased from 1.75 $(mg/kg/day)^{-1}$ to 1.5 $(mg/kg/day)^{-1}$ since the 1990 HHRA. This amounts to a 14 percent decrease in slope factor and, consequently, a 14 percent decrease in lifetime cancer risks.

The changes in toxicity values of trichloroethene were mentioned in the comment. Using the above as the method for calculation, we find that, based on non-cancer endpoints, the RfDo has decreased and risks increased by 97 percent. The cancer slope factor and cancer risks have increased by 35 percent.

Finally, as discussed in the comment, the arsenic MCL has decreased from 50 to 10 µg/L since the 1990 HHRA. None of the MCLs or MEGs for volatile organics shown in the Brunswick Record of Decision have changed since production of the Record of Decision.

DH/mkp

cc: P. Nimmer

TABLE 1 COMPARISON OF TOXICITY VALUES FOR GROUNDWATER CHEMICALS OF CONCERN, 1990 HHRA TO 2005, NAVAL AIR STATION BRUNSWICK, MAINE

Chemicals of Concern	RfDo (mg/kg/day)		SFo ([mg/kg/day]$^{-1}$)		MCL (µg/L)			MCLG (µg/L)		
					1990 HHRA			1990 HHRA		
	1990 HHRA	2005	1990 HHRA	2005	Final	Proposed	2005	Final	Proposed	2005
Aluminum	---	1[a]	---		---	---		---	---	---
Arsenic	0.001	0.0003	1.75	1.50	50	---	10	0	---	0
Barium	0.05	0.07	---	---	---	5,000	2,000	---	---	---
Benzene	0.00014	0.004	0.029	0.055	5	---	5	0	---	0
Cadmium	0.0005	0.0005	---	---	10	5	5	---	---	---
Chlorobenzene	0.02	0.02	---	---	---	100		---	---	---
Chromium	0.005	0.003	---	---	50	100	100	---	---	---
1,1-Dichloroethane	0.1	0.2[b]	9.10E-02	---	---	---		---	---	---
1,1-Dichloroethene	0.009	0.05	6.00E-01	---	7	---	7	---	---	---
cis-1,2-Dichloroethene		0.01	---	---	---	70	70	---	---	---
trans-1,2-Dichloroethene	0.02	0.02	---	---	---	100	100	---	---	---
Ethylbenzene	0.1	0.1	---	---	---	700	700	---	---	---
Lead	0.00014	---	---	---	50	5	0	---	0	TT
Manganese	0.2	0.02[c]	---	---	---	---	---	---	---	---
Mercury	0.0003		---	---	2	2	2	---	---	---
Methylene chloride	0.06	0.06	0.0075	0.0075	---	---		---	---	---
Naphthalene	---	0.02	---	---	---	---	---	---	---	---
Nickel	0.02	0.02	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	0.09	0.28[d]	---	---	200	---	200	---	---	---
Trichloroethene	0.009	0.0003[d]	0.011	0.4[d]	5	---	5	0	---	0
Tetrachloroethene	0.01	0.01	0.051	0.54[d]	---	5	5	---	0	0
Toluene	0.3	0.2	---	---	---	2,000	1,000	---	---	---
Vinyl chloride	0.00006	0.003	2.3	1.4[e]	2	---	2	0	---	0
Xylene, Total	2	0.2	---	---	---	10,000	10,000	---	---	---
Zinc	0.2	0.3	---	---	---	---	---	---	---	---

(a) U.S. Environmental Protection Agency provisional peer-reviewed value.
(b) Health Effects Assessment Summary Tables value.
(c) Based on non-food intake.
(d) U.S. Environmental Protection Agency/National Center for Environmental Assessment provisional value.
(e) Based on exposure from birth.

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
RfDo = Reference oral dose.
SFo = Slope factor.
HHRA = Human Health Risk Assessment.
TT = Treatment technology.
Shading indicates areas that have changed.
Dashes (---) indicate not applicable or not available.

RESPONSE TO COMMENTS FROM THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION ON APPENDIX B, DRAFT SECOND FIVE-YEAR REVIEW REPORT NAVAL AIR STATION, BRUNSWICK, MAINE

Commentor: Claudia Sait	
Comment Issue Date: 26 May 2005	**Navy Response Date: 21 June 2005**

The Maine Department of Environmental Protection (MEDEP) has reviewed Appendix B of the Second Five Year Review Report, dated May 2005, prepared by EA Science and Technology. Based on that review, MEDEP has the following editorial revisions.

Site 12 (Explosive Ordnance Disposal Area)

1. Section 1.3.2, Land and Resource Use, para 2:

   "The base is connected to a public water supply administered by the Brunswick-Topsham Water District."

   This sentence needs to be deleted or revised to reflect the situation at Site 12.

   Response—This sentence has been deleted.

2. Section 1.3.3, History of Contamination, para 1:

   "A list of materials detonated between 1991 and 2003 is provided in Table 1.

   Table 1 was not attached.

   Response—Table 1 has been included in Appendix B.

Site 17 (Former Building 95)

3. Section 2.1, Site Description, para 1, item 1:

   A heated storage shed with a plywood floor was added to the north side of Building 95 that measured approximately 8 ft x 11 at a later date.

   MEDEP suggests the following language: *At a later date, a* heated storage shed with a plywood floor was added to the north side of Building 95 that measured approximately 8 ft x 11 ~~at a later date~~.

Response—The sentence in Section 2.1, Paragraph 1, Item 1 has been reworded as follows:

> *At a later date, a heated storage shed with a plywood floor was added to the north side of Building 95 that measured approximately 8 ft × 11.*

4. Section 2.1, Site Description, para 4 & 5:

   These two paragraphs do not belong in the site description and should be put in appropriate sections.

   Response—The second to the last paragraph in Section 2.1 has been moved to the end of Section 2.3.3. The last paragraph in Section 2.1 has been deleted as it is also stated at the end of Section 2.3.2 under Land and Resource Use.

5. Section 2.2, Site Chronology, bullets:

   a. Bullets 6 & 7: Please switch these bullets to maintain the chronology.

      Response—Bullets 6 and 7 have been switched as suggested by MEDEP.

   b. Bullet 17 (p. 9-19) Please add the groundwater contaminants to this bullet; these include 4,4, DDE, 4,4,-DDT, endrin, alpha chlordane, gamma chlordane, and heptachlor epoxide.

      Response—Under Section 2.2 Site Chronology, Bullet 17 has been changed as follows:

      > *In April 1992, the Navy issued an Action Memorandum. The Action Memorandum served as the primary decision document to sustain the removal action. The primary groundwater contaminants at Building 95 include 4,4, DDE, 4,4,-DDT, endrin, alpha chlordane, gamma chlordane, and heptachlor epoxide.*

   c. A new bullet needs to be added regarding the burial of contaminated material south of Avenue B.

      Response—During the remediation, soil containing pyrethrins at concentrations below human health PRGs but above ecological PRGs was buried 2 ft bgs south of Avenue B.

   d. A new bullet needs to be added regarding the pesticides in exceedance of the MEGs/MCLs.

      Response—The following text has been added to Section 2.2 under Site Chronology:

      - *Pesticides, rotenone, heptachlor epoxide, and alpha-chlordane have been reported in groundwater samples collected from monitoring wells MW-NASB-068 and MW-NASB-097 at Building 95 at concentrations exceeding the MEGs/MCLs.*

e. Bullet 35 (p. 11-19) "In December 2000, the Navy updated the Base Operating Instructions..."

Since there is no Record of Decision for this Site, there is no official definition of the Building 95 boundaries, so it is impossible to establish restrictions. Also the Institutional Controls for Building 95 were never approved by the regulators, therefore this bullet must be heavily qualified because it must not give the impression that these restrictions are protective.

Response—Bullet 35 on Page 11 has been revised as follows:

- *In December 2000, the Navy updated the Base Operating Instruction NASBINST 5090.1B, Restrictions on Excavation Activities and Groundwater Use. This version of the Operating Instruction includes groundwater use restrictions and excavation restriction for the Building 95 site. The Navy, with input from the regulators, is in the process of updating the Base Operating Instruction to ensure that the regulators are notified of any potential future groundwater use prior to installation (except in matters relating to National security). The regulators will be given the opportunity to comment on future revisions of the Base Operating Instruction NASBINST 5090.1B, Restrictions on Excavation Activities and Groundwater Use.*

6. Section 2.3.1, Physical Characteristics, para 2:

"Excavation activities resulted in the removal of 1-4 ft of soil from the surface of the site."

According to the Draft Final Closure Report (Aug 98) excavation was as deep as 7 feet (Figure 4-3). Please revise.

Response—The sentence in Section 2.3.1, Paragraph 2 has been revised as follows:

Excavation activities resulted in the removal of up to 7 ft of soil from the site.

7. Section 2.3.2, Land and Resource Use, para 3:

"Groundwater at the site is not used for potable purposes or any other uses. The base is connected..."

As proven by the incident at Site 2 the fact some of the base has access to public water is not adequate protection. This section must be deleted or heavily qualified.

Response—The sentence shown below has been deleted from the text:

Groundwater at the site is not used for potable purposes or any other uses.

8. Section 2.3.2, Land and Resource Use, para 4:

   "Currently, there are land use restrictions for Building 95 ..."

   The boundaries for Building 95 have never been established nor approved by the stakeholders therefore the Base Operating Instruction provide limited protection. Please delete this section or heavily qualify it.

   Response—The 4th paragraph has been deleted.

9. Section 2.3.3, History of Contamination, p. 13&14-19:

   Please check the spelling of carbwyl in paragraph 2 and the verb tense in paragraph 3 (first sentence.).

   Response—"Carbwyl" has been changed to "Carbaryl" on Pages 13 and 14.

10. Section 2.3.5, Basis for Taking Action, para 4:

    "This concentration is at a level that is below protection of human health exposures, although slightly above the ecological PRG of 135 mg/kg that would have destroyed the forested habitat along the northern section of the site."

    Although this statement was taken out of the Action Memorandum, taken out of context it is illogical. MEDEP suggests the following language: "This concentration is at a level that is below protection of human health exposures, although slightly above the ecological PRG of 135 mg/kg that would have destroyed the forested habitat along the northern section of the site *in the process of removing the contaminated soil.*" (ED)

    Response—The referenced sentence in Section 2.3.5 has been changed as follows:

    This concentration is at a level below protection of human health exposures, although slightly above the ecological PRG of 135 mg/kg that would have destroyed the forested habitat along the northern section of the site in the process of removing the contaminated soil.

11. Section 2.8, Issues:

    Please add "New institutional controls for soil or groundwater needed".

    Response—Under Section 2.8, the following issue has been added:

    New institutional controls for soil or groundwater

12. Section 2.9, Recommendations and Follow-Up Actions:

    a. Please add revise base instructions for institutional controls after developing site boundaries and performing groundwater modeling.

    Response—The following action has been added to Section 2.9:

    Please note: There is no groundwater modeling planned for NAS Brunswick, rather, the Base Operating Instructions shall be modified as described in the response to Comment No. 5e, above.

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Development of institutional controls	*Revise the NAS Brunswick Base Instructions for institutional controls after developing site-specific boundaries.*	*Navy*	*EPA/MEDEP*	*2006*	*No*	*Yes*

    b. There is a spelling mistake in Row 1 column 2.

    Response—The word "form" has been changed to "from" in Row 1, Column 2, in Section 2.9.

RESPONSE TO RESPONSE TO COMMENTS FROM THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION ON THE EVALUATION OF SECOND FIVE-YEAR REVIEW RESPONSE TO COMMENTS NAVAL AIR STATION, BRUNSWICK, MAINE

Commentor: Claudia Sait	
Comment Issue Date: **Initial: 30 November 2004**	**Navy Response Date:** **7 February 2005** **13 June 2005**
Comment Issue Date: **Evaluation: 15 July 2005**	**Navy Response Date:** **24 August 2005**

The Maine Department of Environmental Protection (MEDEP) has reviewed the revisions to Response to Comments (RTCs) dated 13 June 2005, for the Second Five-Year Review for Naval Air Station, Brunswick, prepared by EA Science and Technology/Environmental Chemical Corporation. Based on that review, MEDEP has the following outstanding comments and issues. MEDEP revisions to the RTCs were sent via email to the technical stakeholder group.

- ***Comment 57 (Section 2.3.4.1, Remedy Implementation)***—The Record of Decision (ROD) signed September 2002 states "Long Term Monitoring will be conducted. A Long-Term Monitoring Plan will be developed and implemented by the end of 2003." The ROD also states "The Navy will generate and provide a draft version of these groundwater and soil use restrictions to the RAB for review and comment, and to the EPA and MEDEP for review, comment, and finalization in accordance with the Federal Facility Agreement within 15 months after the signature of this ROD." Neither of these requirements was fulfilled within the time period covered by this Five-Year Review. While MEDEP acknowledges that the Navy initiated the first phase of Long Term Monitoring Program this spring and submitted draft ICs for review June 2004. However, the Navy had not implemented the remedy during the time period covered by this review and this must be acknowledged in Section 2.3.4.1.

  Response—This comment has been addressed in the draft final version of the Second Five-Year Review Report.

- ***Comment 95 (Section 2.5.4.3, History of Contamination)***—Obviously there was a misunderstanding. This should be the history of the Eastern Plume not Site 9. Please resubmit the brief history of the Eastern Plume to be included in the report.

  Response—A brief history of the Eastern Plume has been inserted into Section 2.5.4.3 for the draft final version of the Second Five-Year Review Report.

Appendix I.2

Comments from U.S. Environmental Protection Agency

RESPONSE TO COMMENTS FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY ON THE BRUNSWICK NAVAL AIR STATION DRAFT SECOND FIVE-YEAR REVIEW REPORT

Commentor: Christine Williams	
Comment Issue Date: 1 November 2004	**Navy Response Date: 4 February 2005** **Navy Response Date: 16 May 2005**

The latest revisions to this Response to Comment letter (16 May 2005) were completed on the basis of agreed-to edits discussed during the 14 February 2005 conference call with the Navy, EA, Environmental Chemical Corporation (ECC), U.S. Environmental Protection Agency (EPA), and Maine Department of Environmental Protection (MEDEP). The sections and text that have been edited are highlighted in yellow.

GENERAL COMMENTS

1. This document does not mention two sites that should be included. The inactive EOD range (site 12) and Building 95 Pesticide Mixing Area (site 17). This areas were mentioned in the first 5-yr review in Table 1 (Active Sites not included in the Five Year Review).

   It has come to the attention of the EPA that the Site 17 Action Memorandum, dated April 1993, stated that the Navy would include site 17 in 5-year reviews since the CERCLA removal action was not designed to clean up the site to unrestricted use. The Navy continues to monitor the groundwater at site 17 and has implemented institutional controls to ensure the site soils are not disturbed nor the groundwater used as drinking water. EPA believes this site should be included in 5-yr reviews until such time as the site is cleaned up and is suitable for unrestricted use.

   Site 12 is also not suitable for unrestricted use due to safety concerns. The Navy has also implemented institutional controls at this site and as such the site should be mentioned in the Site-wide Five Year Review.

   Response—Both of these sites have been included in the revised Five-Year Review Report. The text for each of these sites has been provided as an appendix to the report. The draft text for these sites will be forwarded under separate cover for review by project stakeholders.

2. All of the issues sections need to be re-written. Most of the issues stated are actually the follow up actions needed to address the issue of the lack of up to date long-term monitoring (LTM) documents (quality assurance project plans, long term groundwater monitoring plans, and institutional control monitoring plans) that reflect current agreements with the EPA and MeDEP.

Response—See responses to Comment Nos. 7 through 13.

3. Institutional Control (IC) monitoring and reporting is not mentioned in either the issue section nor the recommendations and follow-up action sections. Please revise to include both the monitoring and the reporting of the implemented ICs for this Site.

   Response—See response to Comment No. 14.

4. On recent Navy RODs the statement has been added, in regards to relying on the Operating Instruction for the ICs, that if DOD ever transfers ownership or a leasehold of the property, DOD will be responsible for filing deed or lease restrictions that will carry over the land use restrictions required under the ROD. Is this currently included in the BNAS Base Operating Instruction? If not, it should be added as a follow-up item in this 5-yr review.

   Response—The text below is from a recent ROD and is the language that the comment refers to:

   > *Should the Navy transfer or lease any real property affected by Site 7, whether or not as a result of base closure, the Navy will notify EPA and MEDEP in accordance with the Federal Facilities Agreement, and the RAB at least 60 days prior to the transfer of lease. In consultation with EPA and MEDEP, the Navy will include appropriate provisions (i.e., restrictive covenants or other land use restrictions such as institutional controls) in all documents that evidence the transfer or lease to prevent the use of and contact with site groundwater and soil. If the property is transferred, or the lease allows capital improvements, a technical evaluation of the effectiveness and appropriateness of the remedy will be undertaken considering long-term monitoring results to date, the proposed land use, and the fact that the Navy may no longer actively own or operate the property.*

   Institutional controls for a site are documented in the Record of Decisions for various sites, or a subsequent Explanation of Significant Difference. The Base Operating Instruction for Naval Air Station Brunswick is referred to as "NAS Brunswick Instruction 5090.1B." The following text has been inserted into Section 1.1.2, as follows:

   > *Remedies that include institutional controls are noted in the base instruction. Geographic institutional control boundaries and the specific restrictions are included for each site. In addition, requirements to include institutional controls in transfer by lease or deed documents are included. The full instructions are provided in Appendix H.*

5. The risk assessments for the sites included in this document were completed between 1990 and 1994. The RODs for these sites were finalized between 1992 and 2002. As noted in this document, toxicity values have changed over the 10 to 14 years which have elapsed since the human health risk assessments for these sites were completed. In general, most

changes to toxicity values for the COCs discussed in this document over the past 15 years have been minor with values changing less than one order of magnitude. However, for several VOCs including trichloroethylene (TCE), and tetrachloroethylene (PCE), the toxicity values have changed to values which are 10 to 100 times more conservative than earlier values. In addition, in the past 15 years toxicity values have been promulgated for chemicals which lacked toxicity values for constituents such as arsenic (oral slope factor), and several VOCs (inhalation RfCs). Specific comments have been included for Sites where a more rigorous evaluation of past versus current toxicity values is needed to ensure that these changes would not alter any risk-based decisions made in the past.

Response—The toxicity values for the compounds of concern at each site have been reviewed and compared to the values used in the initial risk assessments to determine if the risk assessments must be updated to ensure that the change in toxicity values for certain compounds or metals has not impacted risk assessment conclusion with regards to exposure at each of the sites. This information is included as Attachment B of the MEDEP comments dated 30 November 2005.

6. Generally, for the sites reviewed, the potential for ecological exposures to site contaminants was adequately explained and rationale was provided for conducting or not conducting ecological risk assessments. Exceptions that should be further clarified are the following:

- For Site 2, the report notes in Section 2.2.4 that "there was no risk to human health or ecological receptors", but only the human health risk assessment was reviewed in the previous section. Potential ecological pathways were identified for the site (e.g., Mere Brook) and the USFWS fish monitoring was summarized. For completeness, please summarize results of the ecological risk assessment conducted for Site 2 or explain why none was conducted.

  Response—The following text has been added to the end of Section 2.2.4.5, Basis for Taking Action:

  An ecological risk assessment was completed for Site 2 during the 1990 RI. Contaminant concentrations detected in surface water and sediments from Mere Brook beaver marsh and leachate seeps were compared to AWQC or incorporated into a food chain analysis to determine potential risks to aquatic and terrestrial organisms. All contaminants detected in these media were evaluated in the baseline risk assessment (E.C. Jordan 1992).

  Chronic or acute effects to terrestrial organisms are not predicted from exposure to contaminants detected in the soils and leachate seeps at Site 2. Risks associated with wildlife drinking from the leachate seeps were determined to be insignificant. A food chain analysis was conducted to simulate the uptake and bioaccumulation of mercury in terrestrial organisms. Of all contaminants detected in the leachate seeps and sediments, mercury has the greatest propensity to bioaccumulate within

a food chain and, therefore, is considered the contaminant posing the greatest risk to ecological receptors. The calculations used in the food web analysis are provided in Appendix A of the 1990 RI report. Based on the predicted concentrations of mercury in various trophic levels organisms, it was concluded that the concentrations of mercury in the seeps and sediments did not present an environmental risk.

Potential ecological risks are associated with exposure to mercury at Sites 1 and 3; however, the concentration of mercury at Site 2 was lower than detected at Sites 1 and 3, and the area potentially impacted by mercury contamination at Site 2 is much smaller than at the Sites 1 and 3 Landfill. Therefore, the potential for contaminant exposure is less at Site 2 because terrestrial organisms would be receiving a smaller fraction of their total food and/or water intake from the contaminated area. These factors account for the different conclusions reached for Site 2 and Sites 1 and 3 (E.C. Jordan 1992).

The baseline risk assessment evaluated the potential impacts of Sites 1, 2, and 3 on the Mere Brook beaver marsh ecosystem. Sites 1, 2, and 3 border a portion of this ecosystem. Iron and zinc in surface water, and phenanthrene (a PAH compound) and iron in sediment were selected as contaminants of concern for this area. These contaminants are found at elevated levels throughout NAS Brunswick, including upgradient locations. However, exceedances of criteria were minimal, indicating minimal risk to potentially exposed aquatic receptors. Several VOCs; DDT; and arsenic, cadmium, chromium, lead, mercury, and nickel were selected as contaminants of concern in the seeps associated with Sites 1 and 3. Based on the assumptions of the drinking water model, little risk is expected for this exposure pathway. For Site 2, DDT and the same group of metals were selected as contaminants of concern and, again, potential risks associated with wildlife drinking from these seeps were determined to be minimal (E.C. Jordan 1992).

Contaminants selected for soils (e.g., adjacent to leachate seeps) at Sites 1, 2, and 3 included eight PAHs, DDT, and mercury. The potential risks from PAHs were not evaluated in the terrestrial food web model due to the lack of information regarding the potential class of compounds to bioaccumulate. For DDT and mercury, a comparison of expected exposure levels with toxicological data suggests that only mercury levels in the soil at Sites 1 and 3 may be sufficient to represent some long-term impact on populations of terrestrial organisms in this area.

- For Site 7, the report states in a couple locations (e.g., top of Page 2-35) that the Baseline Risk Assessment was completed to evaluate risk to human health and the environment. If an ecological risk assessment was conducted, please summarize the results. Otherwise, please enhance the site description to explain why no ecological risk assessment was needed to evaluate soil contamination.

Response—The following text has been added to the end of Section 2.3.4.5, Basis for Taking Action:

As part of the RI, an ecological risk assessment was completed for Site 7. The complete risk assessment is provided in Appendix Q in the 1990 Draft Final RI report. No environmental risks are associated with the contaminants detected in surface soils or groundwater for Site 7. Since there are no streams or wetland areas associated with this site, environmental risks were estimated for terrestrial organisms. Levels of PAHs and DDT in the soils from this area were below levels considered to pose an environmental risk (E.C. Jordan 1990).

- For the Eastern Plume, the report notes on Page 2-69 that an ecological risk assessment for terrestrial exposure at sites 4, 11, and 13 and states that groundwater probably has not reached Harpswell Cove. Please clarify if the more proximate surface water bodies that are mentioned in Section 2.5.4 (Picnic Pond, Merriconeag Stream, and Mere Brook) were evaluated or explain why they were not included in an ecological risk assessment.

  Response—The waterbodies stated above were evaluated in the 1990 Remedial Investigation Risk Assessment Report. The ecological risk assessment is included in Appendix Q, Section Q.3, Environmental Risk Assessment, Page Q-82. This reference has been added to Section 2.5.4.

SPECIFIC COMMENTS

7. Five-Year Summary Form and §2.1.8, 2.2.8, 2.3.8, 2.4.8, and 2.5.9: The issues stated are actually the follow up actions needed to address the issue of the lack of up to date LTM documents (quality assurance project plans, long term groundwater monitoring plans, and institutional control monitoring plans) at these sites. Please revise to state: "no current LTM documents (quality assurance project plans, long term groundwater monitoring plans, and institutional control monitoring plans)."

   Response—A draft Operations and Maintenance Plan was issued to the regulators for review in January 2005. The Navy is in the process of responding to MEDEP comments received to date on the draft Operations and Maintenance Plan for the Sites 1 and 3 Landfill. The revised and updated Long-Term Monitoring Plan for Site 2 was issued in December 2004.

   The Issues Section of the Five-Year Summary Form has been revised as follows:

   For Sites 1 and 3:
   Finalize the Operations and Maintenance Plan for the Sites 1 and 3 Landfill. No project action levels for comparing sediment and leachate seep sediment sample Long-Term Monitoring Plan (LTMP) have been established. Finalize and issue updated

Quality Assurance Project Plan (QAPP). No Land Use Control Implementation Plan (LUCIP). Institutional control monitoring (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and disturbance of the ground surface). Institutional control boundary for site.

For Site 2:
No project action levels for comparing sediment and leachate seep sediment sample LTMP data have been established. Finalize and issue updated QAPP. Potential source area located north of Site 2 Landfill. Second round of Mere Brook fish tissue sampling is needed as recommended by Naval Air Station Brunswick's First Five-Year Review Report and the 1989 Record of Decision (ROD). No LUCIP. Eliminate high turbidity in the leachate. Evaluate institutional control boundaries.

For Site 7:
Finalize and issue the QAPP and determine groundwater flow direction for the LTMP monitoring network. Long-Term Monitoring Program sampling began with the Spring 2005 event. No institutional control monitoring has been implemented. No LUCIP has been developed. Evaluate institutional control boundaries. No current QAPP has been issued for the site. No institutional control monument marker has been installed to mark the physical boundary of the institutional control area.

For Site 9:
Finalize and issue updated LTMP and QAPP. Finalize and issue the LUCIP. Evaluate institutional control boundary. Finalize the draft final Direct-Push Investigation Report for Site 9. Install an additional well in the southwestern corner of the current institutional control boundary to be included in the LTMP.

For the Eastern Plume:
Finalize and issue updated LTMP and QAPP. No LUCIP for Eastern Plume. Evaluate institutional control boundaries. Assess occurrence of 1,4-dioxane within and upgradient of the Eastern Plume. Install 2 replacement extraction wells in the Eastern Plume. Evaluate natural attenuation data during monitoring events and assess the effectiveness of natural attenuation within the Eastern Plume. Optimize the Long-Term Monitoring Program hydraulic containment and contaminant mass removal. Conduct additional surface water sampling in Mere Brook to determine if plume is discharging to Mere Brook.

The table in Section 2.1.8 (Sites 1 and 3 Landfill) has been revised as follows:

2.1.8 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill	*No*	*Yes*
No project action levels for comparing sediment and leachate seep sediment sample LTMP data have been established	*No*	*Yes*
Finalize and issue updated LTMP and QAPP	*No*	*Yes*
No LUCIP	*No*	*Yes*
Institutional control monitoring (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and disturbance of the ground surface)	*No*	*Yes*
Institutional control boundary for site	*Yes*	*Yes*

The table in Section 2.2.9 (Site 2) has been revised as follows:

2.2.9 Issues

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Operation and Maintenance Plan for site	*Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
No project action limits for sediment samples	*Establish appropriate standards to compare sediment and leachate sediment seep samples for LTMP data*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
No LUCIP	*Generate an LUCIP for review by project stakeholders, respond to comments, and finalize document.*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Construction or ground disturbance within the Weapons Compound	*Expand bi-annual institutional control checklist to include noting construction activities or ground disturbances within the Weapons Compound area*	*Navy*	*EPA/ MEDEP*	*Not applicable*	*No*	*Yes*
Updated LTMP and QAPP	*LTMP to be updated to current conditions and QAPP to be finalized*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Development of institutional control boundary for site	*Generate an LUCIP for the site*	*Navy*	*EPA/ MEDEP*	*Not applicable*	*No*	*Yes*

The table in Section 2.3.9 Issues (formerly Section 2.3.8 in the draft report) for Site 7 has been revised as follows:

2.3.9 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Implement LTMP	*No*	*Yes*
Finalize and issue the draft Site 7 QAPP	*No*	*No*
Install two piezometers and conduct quarterly gauging to assist with locating an additional well(s) for the Long-Term Monitoring Program	*No*	*No*
No institutional control monitoring	*No*	*Yes*
Spread stockpiled soils over site soil	*No*	*Yes*
Need to finalize institutional controls and incorporate into the Operating Instructions	*No*	*Yes*

The table in Section 2.4.9 Issues (formerly Section 2.4.8 in the draft report) for Site 9 has been revised as follows:

2.4.8 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Finalize revisions to the LTMP and issue the updated and revised LTMP	*No*	*Yes*
Finalize the draft QAPP and issue the updated QAPP	*No*	*Yes*
Finalize the Land Use Control and Implementation Plan document	*No*	*Yes*

The table in Section 2.5.9 (Eastern Plume) has been revised as follows:

2.5.9 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Finalize and issue the LTMP	*No*	*Yes*
Finalize and issue the QAPP	*No*	*Yes*
Generate a Land Use Control Implementation Plan document for the Eastern Plume	*No*	*Yes*
Complete assessment of 1,4-dioxane in the Eastern Plume and report findings of the initial sampling program (minimum of three rounds of sampling data)	*No*	*Yes*
Complete field work to install 2 replacement extraction wells in the Eastern Plume	*No*	*Yes*
Continue collection of monitored natural attenuation parameters	*No*	*Yes*
Expedite assessment to optimize the Long-Term Monitoring Program and remedy	*No*	*Yes*
Eastern Plume not contained by current extraction well network	*No*	*Yes*

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Optimize the extraction well network	*No*	*Yes*
Additional investigation near monitoring well MW-313	*No*	*Yes*
Develop institutional controls for Building 584	*No*	*Yes*
Additional assessment of surface water in the vicinity of MW-313	*No*	*Yes*
Conduct the additional surface water sampling in Mere Brook in the vicinity of MW-313 as recommended in recent monitoring event reports	*No*	*Yes*

8. Five-Year Summary Form and §2.1.8: Change the last issue to state: "No project action levels for sediment and leachate seep sediment sample LTMP data."

   Response—See response to Comment No. 7.

9. Five-Year Summary Form and §2.2.8: Change the last 2 issues to state: 1. Monitoring has indicated that there may be unknown contamination north of the Site 2 landfill. 2. No agreement with EPA and MEDEP as to the need for Mere Brook fish tissue sampling as recommended by the first Brunswick NAS 5-yr review.
   Response—See response to Comment No. 7.

10. Five-Year Summary Form and §2.3.8: Change the last 2 issues to state: 1. No groundwater contaminant and flow direction monitoring and 2. No institutional control monitoring.

    Response—See response to Comment No. 7.

11. Five-Year Summary Form and §2.4.8: Add another issue to state: Navy's 2003 and 2004 field work is not documented and recommendations for follow on work have not been made.

    Response—See response to Comment No. 7.

12. Five-Year Summary Form and §2.5.9: Change the last 3 issues to state: 1. Evaluation not performed and follow on field work recommendations not made for 1,4-dioxane detections; 2. Field work not completed to locate 2 additional extraction wells; 3. Remedy and LTM not optimized

    Response—See response to Comment No. 7.

13. Five-Year Summary Form and §2.5.9: Add a fourth issue: Plume not contained by extraction well network

    Response—See response to Comment No. 7.

14. Five-Year Summary Form and §2.1.9, 2.2.9, 2.3.9, 2.4.9, & 2.5.10: Include the creation and finalization of institutional control monitoring and annual reporting plans for each site.

Response—The recommendation and follow-up actions suggested in the comment have been added to the following tables in Sections 2.1.9, 2.2.10, 2.3.9, 2.4.9, and 2.5.10.

The Recommendation and Follow-Up Actions section of the Five-Year Summary Form has been revised as follows:

Recommendations and Follow-Up Actions:
Summarize recommendations and follow-up actions.

For Sites 1 and 3:
1. *Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill.*
2. *Establish appropriate standards to compare sediment and sediment seep samples for LTMP data.*
3. *Generate an LUCIP.*
4. *Develop institutional control boundary for site.*

For Site 2:
1. *Establish project action levels for comparing sediment and leachate sediment sample LTMP data.*
2. *Finalize and issue updated QAPP for the Site 2 LTMP.*
3. *Investigate the area north of Site 2 Landfill.*
4. *Continue discussion amongst project stakeholders regarding Mere Brook fish tissue sampling (second sampling event).*
5. *Generate an LUCIP.*
6. *Develop institutional control boundary for site.*

For Site 7:
1. *Finalize and issue updated QAPP.*
2. *Install two piezometers and conduct quarterly gauging to assist with locating an additional well(s) for the Long-Term Monitoring Program.*
3. *Initiate Long-Term Monitoring Program sampling after finalizing the LTMP and QAPP.*
4. *Install new groundwater monitoring wells pending completion of the quarterly gauging program and concurrence from the regulators.*
5. *Generate an LUCIP.*
6. *Develop institutional control boundary for site.*

For Site 9:
1. *Finalize revisions to the LTMP and issue updated and revised LTMP.*
2. *Finalize draft QAPP and issue updated QAPP.*
3. *Finalize and issue the LUCIP.*
4. *Finalize draft final direct-push investigation reports for 2003 and 2004 for Site 9.*
5. *Install new monitoring well in southwestern corner of the institutional control boundary.*
5. *Develop institutional control boundary for site.*

For the Eastern Plume:
1. *Finalize revisions to the LTMP and issue updated and revised LTMP*
2. *Finalize draft QAPP and issue updated QAPP*
3. *Generate a LUCIP for Eastern Plume.*
4. *Continue assessment of occurrence of 1,4-dioxane in the Eastern Plume.*
5. *Install replacement extraction wells in the Eastern Plume.*
6. *Continue collection of natural attenuation data during monitoring events and assess the effectiveness of natural attenuation within the Eastern Plume.*
7. *Optimize the Long-Term Monitoring Program and remedy.*
8. *Develop institutional control boundary for site.*

Section 2.1.9 (Site 1 and 3 Landfill) has been revised as follows:

2.1.9 Recommendations and Follow-Up Actions

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Operation and Maintenance Plan for site	*Finalize the draft Operation and Maintenance Plan for the Sites 1 and 3 Landfill*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
No project action limits for sediment samples	*Establish appropriate standards to compare sediment and leachate sediment seep samples for LTMP data*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
No LUCIP	*Generate an LUCIP for review by project stakeholders, respond to comments, and finalize document.*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Construction or ground disturbance within the Weapons Compound	*Expand bi-annual institutional control checklist to include noting construction activities or ground disturbances within the Weapons Compound area*	*Navy*	*EPA/ MEDEP*	*Not applicable*	*No*	*Yes*
Updated LTMP and QAPP	*LTMP to be updated to current conditions and QAPP to be finalized*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Development of institutional control boundary for site	*Generate an LUCIP for the site*	*Navy*	*EPA/ MEDEP*	*Not applicable*	*No*	*Yes*

Section 2.2.9 (Site 2) has been revised as follows:

2.2.9 Recommendations and Follow-Up Actions

Issue	*Recommendations/ Follow-up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Establish project action limits for sediment samples	*Establish appropriate standards to compare sediment and leachate sediment seep samples for LTMP data*	*Navy*	*EPA/ MEDEP*	*9/30/05*	*No*	*Yes*
Finalize Site 2 QAPP for the LTMP	*Issue the final updated QAPP for the LTMP for Site 2 Landfill*	*Navy*	*EPA/ MEDEP*	*5/30/05*	*No*	*No*

Issue	*Recommendations/ Follow-up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Investigate area north of Site 2 Landfill	*Conduct limited investigation in area north of Site 2 Landfill; investigation tasks may include magnetometer survey, soil borings, and hand installed piezometers*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Second fish sampling event for Mere Brook	*Continue discussions among the project stakeholders regarding a second fish sampling event to benchmark the 1995 survey against current conditions.*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*No*
No institutional control monitoring	*Generate an LUCIP for the site*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Elevated turbidity in leachate seep samples	*Install shallow well points*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*

Section 2.3.10 (formerly Section 2.3.9 in the draft report) for Site 7 has been revised as follows:

2.3.10 Recommendations and Follow-Up Actions

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Finalize the LTMP	*Submit the final LTMP for Site 7*	*Navy*	*EPA MEDEP*	*12/31/2004*	*No*	*Yes*
Finalize the QAPP for Site 7	*Submit the final Site 7 QAPP*	*Navy*	*EPA/ MEDEP*	*12/31/04*	*No*	*No*
Install 2 piezometers and a staff gauge within drainage ditch	*Install 2 piezometers to refine the understanding of localized groundwater flow conditions at the site; once the piezometers are installed, quarterly gauging will be conducted for a period of 12 months.*	*Navy*	*EPA/ MEDEP*	*4/30/05*	*No*	*No*
Install additional monitoring well(s)	*Pending outcome of the piezometer gauging data, install a monitoring well(s) to incorporate into the LTMP*	*Navy*	*EPA/ MEDEP*	*5/30/06*	*No*	*Yes*

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Revise and update the LTMP	*Revise the LTMP to include the new groundwater monitoring points*	*Navy*	*EPA/ MEDEP*	*7/31/06*	*No*	*Yes*

Section 2.4.10 (formerly Section 2.4.9 in the draft report) for Site 9 has been revised as follows:

2.4.9 Recommendations and Follow-Up Actions

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Finalize revised LTMP	*Complete updated and revisions to draft LTMP and issue final LTMP*	*Navy*	*EPA/ MEDEP*	*7/30/05*	*No*	*Yes*
Finalize QAPP	*Issue the QAPP for Site 9*	*Navy*	*EPA/ MEDEP*	*7/30/05*	*No*	*Yes*
Finalize LUCIP	*Issue final LUCIP*	*Navy*	*EPA/ MEDEP*	*9/30/05*	*No*	*Yes*
Finalize the draft final direct-push investigation report	*Generate and issue a final direct-push investigation report after addressing comments from regulators on the draft final report*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Install new monitoring well in southwest area of site	*Install monitoring well in southwest area of site to determine groundwater quality in this area*	*Navy*	*EPA/ MEDEP*	*2006*	*No*	*Yes*
Development of institutional control boundary for site	*Generate an LUCIP for the site*	*Navy*	*EPA/ MEDEP*	*Not applicable*	*No*	*Yes*

Section 2.5.10 for the Eastern Plume has been revised as follows:

2.5.10 Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Finalize updated LTMP	*Finalize the LTMP and issue updated LTMP*	*Navy*	*EPA/ MEDEP*	*4/2005*	*No*	*Yes*
Finalize updated QAPP	*Finalize the QAPP and issued the updated QAPP*	*Navy*	*EPA/ MEDEP*	*4/2005*	*No*	*Yes*
Generate a LUCIP	*Generate a LUCIP document for the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*10/31/05*	*No*	*Yes*

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Assess occurrence of 1,4-dioxane	*Continue assessment of 1,4-dioxane in the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Install 2 replacement extraction wells	*Install 2 replacement extraction wells in the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Collect monitored natural attenuation parameters	*Continue collection of monitored natural attenuation parameters*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Long-Term Monitoring Program and remedy optimization	*Assess ways to optimize the Long-Term Monitoring Program and remedy*	*Navy*	*EPA/ MEDEP*	*2005-2008*	*No*	*Yes*
Optimize the extraction well network	*Install up to 3 new extraction wells to replace/augment existing wells*	*Navy*	*EPA/ MEDEP*	*2005-2008*	*No*	*Yes*
Additional Investigation near monitoring well MW-313	*Assess migration of Eastern Plume into this area, assess degree of upwelling into Mere Brook*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Develop institutional controls for Building 584	*Develop appropriate actions if building is demolished*	*Navy*	*EPA/ MEDEP*	*2005-2009*	*No*	*Yes*
Collect additional surface water samples in Mere Brook in the vicinity of MW-313	*Collect three additional surface water samples as recommended in Monitoring Event 23 Report*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*

15. Five-Year Summary Form and §2.4.9, include the finalization of the direct-push investigation at the ash landfill and the southern edge of the plume.

    Response—See response to Comment No. 14.

16. Five-Year Summary Form Protectiveness Statement for site 2 and §2.2.10, change the last sentence to state: "Current monitoring data indicate that the remedy is not functioning as required. Follow-up actions are required to address the long-term protectiveness."

    Response—The Protectiveness Statement(s) Section in the Five-Year Summary Form for Site 2 and report Section 2.2.11 (formerly Section 2.2.10 in the draft) have been revised as follows:

Protectiveness Statement(s):
Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than one operable unit, include an additional and comprehensive protectiveness statement covering all of the remedies at the site.

For Site 2:
The remedy (Minimal Action) is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls (Base Instruction) that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base limiting access only to authorized personnel. In the short term, current monitoring data indicate that the remedy is functioning as required; however, additional monitoring and refinement of institutional controls are needed to ensure the remedy is protective in the long term.

2.2.11 Protectiveness Statement

The remedy (Minimal Action) is expected to be protective of human health and the environment upon attainment of the cleanup goals as presented in the 1998 ROD. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls (Base Instruction) that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base limiting access only to authorized personnel. In the short term, current monitoring data indicate that the remedy is functioning as required; however, additional monitoring and refinement of institutional controls are needed to ensure the remedy is protective in the long term.

17. Five-Year Summary Form Protectiveness Statement for site 7, change the last sentence to state: "In addition, the site is currently undeveloped."

Response—The last sentence of Protectiveness Statement(s) Section in the Five-Year Summary Form and report Section 2.3.10 for Site 7 have been revised as follows:

Protectiveness Statement(s):
Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than one operable unit, include an additional and comprehensive protectiveness statement covering all of the remedies at the site.

For Site 7:
The remedy at Site 7 is expected to be protective of human health and the environment upon attainment of the cleanup goals, as presented in the 2002 ROD, which is expected to take up to 10 years to achieve (U.S. Navy 2002). During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site is currently undeveloped. In order for the remedy to remain protective in the long-term, institutional controls will need to be refined.

2.3.10 Protectiveness Statement

The remedy at Site 7 is expected to be protective of human health and the environment upon attainment of the cleanup goals, as presented in the 2002 ROD, which is expected to take up to 10 years to achieve (U.S. Navy 2002). During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site is currently undeveloped. In order for the remedy to remain protective in the long-term, institutional controls will need to be refined.

18. Five-Year Summary Form Protectiveness Statement for the Eastern Plume, change the last sentence to state: "Current monitoring data indicate that the remedy is not functioning as required. Follow-up actions are required to address the long-term protectiveness."

Response—The last sentence of Protectiveness Statement(s) Section in the Five-Year Summary Form and report Section 2.5.11 for the Eastern Plume have been revised as follows:

> ***Protectiveness Statement(s):***
> *Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than one operable unit, include an additional and comprehensive protectiveness statement covering all of the remedies at the site.*
>
> ***For the Eastern Plume:***
> *The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.*

2.5.11 Protectiveness Statement

The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-

on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.

19. The Five-Year Summary Form does not include the required site-wide protectiveness statement. Add: "The remedies are in place and are considered protective in the short term because there are ICs in place and therefore there are no current exposures. Follow-up actions are necessary to address long-term protectiveness."

    Response—The following statement has been added to end of the Protectiveness Statement(s) Section in the Five-Year Summary Form:

Protectiveness Statement(s): *Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than one operable unit, include an additional and comprehensive protectiveness statement covering all of the remedies at the site.* ***Site-Wide:*** *The remedies and institutional controls are in place at the known Installation Restoration sites and are considered protective in the short term; therefore, there are no current exposures. Follow-up actions (such as optimizing the extraction system and refining the institutional controls) are necessary to address long-term protectiveness.*

20. §1.1.1, revise to reflect the current status of the Navy's community involvement.

    Response—Section 1.1.1 has been revised as follows:

    1.1.1 Community Involvement

    During the April (October 2004) Restoration Advisory Board (RAB) meetings, the community was informed of the five-year review process for NAS Brunswick and copies of a related EPA handout were provided by the Navy entitled Focus on Five-Year Reviews and Involving the Community, Checking Up on Superfund Sites (U.S. EPA 2001). Persons with related comments and/or information were asked to contact the EPA Remedial Project Manager (RPM) and/or the Navy RPM. A copy of the EPA handout was included with the RAB meeting minutes.

    Upon completion of the second five-year review, a summary of the findings of this report is scheduled to be presented to the public during the Spring 2005 RAB meeting. The summary will include a description of remedial actions, deficiencies, recommendations, and follow-up actions that are directly related to protectiveness of the remedies, and the determination(s) of whether the remedies are or are expected to be protective of human health and the environment. The summary will also provide the

location of where a copy of the complete report can be reviewed, and provide the date of the next five-year review or notify the community that five-year reviews will no longer be necessary. Five-year reviews are not Administrative Record material and are not to be included therein. However, the Navy will ensure that the signed Five-Year Review Report is placed in the site information repository.

21. Page 2-9, Section 2.1.4, last para.: *typo:* The text refers the reader to Figure 2-2 for a map of Sites 1 and 3. It appears that the reference should be to Figure 2-1. Please check.

Response—The following edit has been made to the second sentence of the last paragraph in Section 2.1.4:

Remedial activities undertaken at Sites 1 and 3 include the installation of a slurry wall around the western, northern, and eastern perimeters of the landfill footprint, and the installation of a low permeability cap (Figure 2-1). Contaminated soil was removed from Sites 5, 6, and 8...

22. §2.1.4.3 and 2.2.4.2, revise to include the inspection of ICs with respect to the disturbance of the area included in the IC boundary and installation of drinking water wells also within the IC boundary.

Response—There is no Section 2.1.4.3 in the draft report. However, the following bullets have been added to Section 2.1.4.2 System Operation/Operation and Maintenance for Site 1 and 3 Landfill:

- *Inspection for drinking water wells and any ground disturbance within the institutional control boundary.*
- *Inspection of required signage around the landfill and near the seep sample locations.*
- *Inspection of the institutional control boundary (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and any ground disturbance of the ground surface).*

The following bullets have been added to Section 2.3.5.2 System Operation/Operation for Site 7:

- *Inspection for drinking water wells within the institutional control boundary.*
- *Inspection of the site area to determine if construction (including new or renovations) or disturbance of the ground surface has occurred at the site.*

23. Sec. 2.1.5 – In the fourth bullet, does the Base Operating Instruction also limit disturbance to the landfill cap? If not include as an issue and add a fallow up action to include a restriction to limit disturbance to the landfill cap.

    Response—The Base Operating Instruction limits the disturbance to the landfill cap with the following text in the instruction:

    Digging is restricted anywhere on or adjacent to the landfill cap, or within the landfill's supporting stormwater management ditches and retaining basin.

24. Page 2-11, Section 2.1.5, "... changes ...," fifth bullet: The bullet describes the October 2003 resolution of issues with respect to groundwater gauging at Sites 1 and 3. Should this item also note that new monitoring criteria (i.e., critical water levels relative to the overlying waste material) were established?

    Response—A revision to the eighth bullet has been made in Section 2.1.5 as follows:

    - *In October 2003, as a result of non-compliance issue with groundwater gauging at Sites 1 and 3 landfill, the project stakeholders formalized a schedule, procedure, revised trigger elevations, and reporting deadlines for the quarterly gauging data after MEDEP notified the Navy that they were not in compliance with previous agreements to monitor and report the gauging data at Sites 1 and 3 Landfill (Department of the Navy 2003b).*

25. Page 2-12, Section 2.1.6.4, Groundwater Monitoring: *typo:* Please change "... *deceasing* VOC contamination ..." to "... *decreasing* VOC contamination ... ."

    Response—The following edit has been made to the second sentence of the first paragraph in Section 2.1.6.4:

    ...Sites 1 and 3 Landfill. The most recent event data (Monitoring Event 23 data) demonstrate a continued overall trend of decreasing VOC contamination in the shallow and deep groundwater wells for Sites 1 and 3 Landfill.

26. Page 2-12, Section 2.1.6.4, Groundwater Monitoring: This section acknowledges that there are persistent exceedances of vinyl chloride at MW-217B. It might also be noted that there have been exceedances of the MEG for 1,4-DCB at this well within the five-year period (e.g., ~100 micrograms per liter in 2001). However, total VOCs have declined since 1999, and 1,4-DCB has been below the MEG since 2003.

Response—The following text has been added to the end of the first paragraph in Section 2.1.6.4:

...level trend over the past four monitoring events. In addition to vinyl chloride in well MW-217B, 1,4-dichlorobenze has exceeded the applicable MEG (25 µg/L) within the five-year period (e.g., 79 µg/L in April 2001, 40 µg/L in April 2002, 38 µg/L in May 2003, and 17.3 µg/L in May 2004). However, total VOC concentrations have declined since 1999, and 1,4-dichlorobenze has been below the MEG since 2003.

27. Page 2-12, Section 2.1.6.4, Groundwater Monitoring: The text states that "... inorganic groundwater data ... generally show stable or decreasing trends." An exception to this statement is sodium, which has shown an increasing trend at wells within the slurry wall. While it is agreed that this does not "... indicate that ... groundwater or surface water is infiltrating the cover or slurry wall ...," as stated (i.e., this trend likely represents the upward seepage of pore water from the underlying marine clay), the text might acknowledge this exception to the broad statement concerning trends in inorganics.

Response—The following edit has been made after the first sentence of the second paragraph in Section 2.1.6.4:

The inorganic groundwater data from the monitoring wells generally show stable or decreasing trends with the exception of sodium, which has increased in concentrations. No increases in inorganic concentrations...

28. Page 2-12, Section 2.1.6.4, Groundwater Monitoring: The review of monitoring results for Sites 1 and 3 wells might acknowledge that arsenic has been persistent at concentrations well above the MCL (both that in force at the time of the ROD, 50 micrograms per liter, and that in force at present, 10 micrograms per liter). Concentrations at this well appear to have been fairly stable, in the range ~100-300 micrograms per liter. On an encouraging note, arsenic at MW-217B, within the slurry wall, have fallen from ~30 micrograms per liter in 1996 to ND in recent sampling rounds.

Response—The following text edits have been made to the Groundwater Monitoring subsection (2nd paragraph) in Section 2.1.6.4:

Specifically, groundwater samples are collected from 8 well locations (MW-202A, MW-203, MW-204, MW-217B, MW-218, MW-219, MW-240, and MW-2101) at Sites 1 and 3 Landfill. The most recent event data (Monitoring Event 23) demonstrate a continued overall trend of decreasing VOC contamination in the shallow and deep groundwater wells for Sites 1 and 3 Landfill. No VOCs have been detected above Maximum Contaminant Levels (MCLs) or Maximum Exposure Guidelines (MEGs) in the wells located downgradient or outside of the landfill. Vinyl chloride remains above the MEG (0.15 µg/L) in MW-217B (well located within the landfill), however, it has displayed a steady level trend over the past four monitoring events. In addition to vinyl chloride in

well MW-217B, 1,4-dichlorobenze has exceeded the applicable MEG (25 µg/L) within the five-year period (e.g., 79 µg/L in April 2001, 40 µg/L in April 2002, 38 µg/L in May 2003, and 17.3 µg/L in May 2004). However, total VOC concentrations have declined since 1999, and 1,4-dichlorobenze has been below the MEG since 2003.

The inorganic groundwater data from the monitoring wells generally show stable or decreasing trends with the exception of sodium, which has increased in concentrations. No increases in inorganic concentrations have been noted which would indicate that additional groundwater or surface water is infiltrating the cover or slurry wall surrounding a majority of the Sites 1 and 3 Landfill. Arsensic has been reported above MEG/MCLs during this 5-year review period. The review of groundwater quality results for Sites 1 and 3 indicate that arsenic has been persistent at concentrations above the MCL. The arsenic concentrations have been fairly stable, ranging between approximately 100 and 300 µg/L. Arsenic has been reported at concentrations above the MCL in recent monitoring events at wells MW-15B, MW-303, MW-313, MW-338A, MW-NASB-212, MW-217B, and MW-218. The arsenic concentrations will continue to be tracked as part of the monitoring event reporting. The significance of the reported arsenic concentrations at Sites 1 and 3 will be evaluated as part of the next 5-year review.

29. §2.1.6.4, revise to include a discussion of the arsenic and manganese at seeps 09 and 05.

Response—Section 2.1.6.4, Data Review for seep samples for Site 1 and 3 Landfill, has been revised as follows:

Leachate Seep Monitoring

The leachate seep sampling data are collected during each bi-annual sampling event from 5 sampling locations (SEEP-1, SEEP-3, SEEP-4, SEEP-5, and SEEP-9) for VOCs and inorganic analyses. Since the mid-1990s, VOCs have been detected in the seep samples at concentrations ranging from non-detect to 40 µg/L. Overall, VOC concentrations have demonstrated a generally stable or decreasing concentration trend. The inorganic data for the leachate seep samples have demonstrated a stable contaminant trend within historical concentration ranges; however, aluminum, iron, and zinc continue to exceed their respective AWQC for most monitoring events. It is noted that arsenic and manganese concentrations have exhibited fluctuations and exceedances above their respective AWQC at leachate seep locations SEEP-05 and SEEP-09.

The 1992 ROD noted mercury was the only contaminant identified in the baseline risk assessment to present a propensity to bioaccumulate and biomagnify in terrestrial food chains. Other contaminants (e.g., VOCs and inorganic metals) do not exhibit the same behavior and, therefore, were not considered to present a risk to terrestrial receptors (Department of the Navy 1992).

Leachate Seep Sediment Monitoring

The leachate seep sediment sampling data are collected during each bi-annual sampling event from 5 sampling locations (LT-1, LT-3, LT-4, LT-5, and LT-9) for VOCs and inorganic analyses. As of September 2004, VOCs in the leachate seep sediments have ranged from non-detect to less than 100 mg/kg over the last 23 monitoring events. Inorganic concentrations remain within historical concentration ranges for the COCs with occasional spikes above the concentration range.

Note that project action limits have not been developed for sediment samples, and should be developed after discussions between the Navy and the regulators to determine appropriate standards/benchmarks to compare the sediment sample data against.

30. Page 2-14, Section 2.1.6.4, Top of Page: The document notes that in leachate seep sediment, COCs were detected generally within the historical concentration ranges with occasional spikes. Please elaborate. Did these spikes merit further scrutiny such as increased monitoring frequency to ensure that spikes weren't occurring regularly?

    Response—See response to Comment No. 29. The following text has been added to Section 2.1.6.4, Leachate Seep Sediment Monitoring:

    Inorganic concentrations remain within historical concentrations ranges from the COCs with occasional spikes (of VOCs, manganese, and arsenic) above the concentration range, in primarily SEEP-04, SEEP-05, and SEEP-09. The leachate seep sediment samples will continue to be monitored and tracked in the monitoring event reports.

31. Page, 2-15, Site 1 and 3: Review of historical toxicity values indicates that no oral cancer slope factor for arsenic was published in 1992. Please confirm whether arsenic was evaluated as an oral carcinogen in the risk assessments for these sites. If it were not, please provide information on how the risk results would change if arsenic were considered to be an oral carcinogen and whether this change would impact the any risk-based decisions made for these Sites.

    Response—A risk assessor reviewed the values to see if changes to the values of the site's contaminants of concern may have impacted the outcome of the risk assessment. This is included as Attachment B to the Response to Comments from MEDEP dated 30 November 2004.

32. Sec. 2.1.10 - The statement that the cleanup goals will be achieved in 30 year isn't accurate. For budgeting purposes the life of the landfill maintenance was set at 30 years, but there's natural attenuation remedy in the ROD that indicates that states that the landfill material will no longer be hazardous after 30 years. The ROD indicates that monitoring

will continue for a minimum of 30 years. Check throughout the document whether this inaccurate statement is used elsewhere.

Response—Section 2.1.10 has been replaced with the following text:

2.1.10 Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of the clean up goals as presented in the 1992 ROD, which is expected to take 30 years to achieve. During the period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restrictive area of the base limiting access only to authorized personnel. Current monitoring data indicate that the remedy is functioning as required. In order for the remedy to remain protective in the long-term, institutional controls will need to be refined.

33. Sec. 2.1.10 – included that the land use restrictions are in place as part of the Base Operating Instructions, if they are, if not create and issue and follow up action to include them.

Response—Land use restrictions are included in the Base Operating Instruction. See response to Comment No. 32.

34. Page 2-19, Section 2.2.2: *text editing:* Please note what appears to be an unintended page break.

Response—The page break has been removed in the final report.

35. Sec. 2.2.3.5 – There is no discussion of eco-risk assessment, please add.

Response—Section 2.2.4.5 (formerly Section 2.2.3.5 in the draft) has been revised as follows:

2.2.4.5 Basis for Taking Action

During the RI/FS, environmental impacts were reported in the surface water, stream sediment, leachate seep, and surface soil associated with these seeps at Site 2. The COCs at Site 2 in different media include:

Leachate Seeps	
4,4'-dichlorodiphenyltrichloroethane	*Cadmium*
4,4'-dichlorodiphenyltrichloroethane	*Lead*
4,4'-dichlorodiphenyldichoroethylene (low levels)	*Mercury*
Arsenic	*Nickel*

Surface Water	*Stream Sediment*	*Surface Soils*
Iron *Zinc*	*PAHs* *Phenanthrene (PAH)* *Iron*	*Mercury*

Although no COCs for groundwater have been formally identified, concentrations of inorganic compounds have been detected in site groundwater at concentrations that exceed the State MEG and Federal MCL.

A Baseline Risk Assessment was completed as part of the RI at Site 2 to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with Site 2, assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The HHRA followed a 4-step process:

1. ***Contaminant Identification**—Identified those hazardous substances which, given the specifics of the site, were of significant concern*

2. ***Exposure Assessment**—Identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure*

3. ***Toxicity Assessment**—Considered the types and magnitude of adverse health effects associated with exposure to hazardous substances*

4. ***Risk Characterization**—Integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.*

The HHRA was completed in 1990 (E.C. Jordan 1990) for Site 2 surface soils and surface water.

An ecological risk assessment was completed for Site 2 during the 1990 RI. Contaminant concentrations detected in surface water and sediments from Mere Brook beaver marsh and leachate seeps were compared to AWQC or incorporated into a food chain analysis to determine potential risks to aquatic and terrestrial organisms. All contaminants detected in these media were evaluated in the baseline risk assessment (E.C. Jordan 1992).

Chronic or acute effects to terrestrial organisms are not predicted from exposure to contaminants detected in the soils and leachate seeps at Site 2. Risks associated with wildlife drinking from the leachate seeps were determined to be insignificant. A food chain analysis was conducted to simulate the uptake and bioaccumulation of mercury in terrestrial organisms. Of all contaminants detected in the leachate seeps and

sediments, mercury has the greatest propensity to bioaccumulate within a food chain and, therefore, is considered the contaminant posing the greatest risk to ecological receptors. The calculations used in the food web analysis are provided in Appendix A of the 1990 RI report. Based on the predicted concentrations of mercury in various trophic levels organisms, it was concluded that the concentrations of mercury in the seeps and sediments did not present an environmental risk.

Potential ecological risks associated with exposure to mercury at Sites 1 and 3; however, the concentration of mercury at Site 2 was lower than detected at Sites 1 and 3 and the area potentially impacted by mercury contamination at Site 2 is much smaller than at Sites 1 and 3 Landfill. Therefore, the potential for contaminant exposure is less at Site 2 because terrestrial organisms would be receiving a smaller fraction of their total food and/or water intake from the contaminated area. These factors account for the different conclusions reached for Site 2 and Sites 1 and 3 (E.C. Jordan 1992).

The baseline risk assessment evaluated the potential impacts of Sites 1, 2, and 3 on the Mere Brook beaver marsh ecosystem. Sites 1, 2, and 3 all border a portion of this ecosystem. Iron and zinc in surface water, and phenanthrene (a PAH compound) and iron in sediment, were selected as contaminants of concern for this area. These contaminants are found at elevated levels throughout NAS Brunswick, including upgradient locations. However, exceedances of criteria were minimal, indicating minimal risk to potentially exposed aquatic receptors. Several VOCs, DDT, and arsenic, cadmium, chromium, lead, mercury, and nickel were selected as contaminants of concern in the seeps associated with Sites 1 and 3. Based on the assumptions of the drinking water model, little risk is expected for this exposure pathway. For Site 2, DDT and the same group of metals were selected as contaminants of concern, and again, potential risks associated with wildlife drinking from these seeps were determined to be minimal (E.C. Jordan 1992).

Contaminants selected for soils (e.g., adjacent to leachate seeps) at Sites 1, 2, and 3 included eight PAHs, DDT, and mercury. The potential risks from PAHs were not evaluated in the terrestrial food web model due to the lack of information regarding the potential class of compounds to bioaccumulate. For DDT and mercury, a comparison of expected exposure levels with toxicological data suggests that only mercury levels in the soil at Sites 1 and 3 may be sufficient to represent some long-term impact on populations of terrestrial organisms in this area.

36. Sec. 2.2.4.1 and 2.2.5 (9th bullet) – Does the Operting Instruction also limit disturbance to the "cover"?, if not add as an issuce and add a follow up item to inc,ude it.

Response—The Base Operating Instruction restricts "digging" anywhere on the cap, or adjacent to the cap. See response to Comment No. 23.

37. §2.2.5, include the proposal for investigation of the northern portion of the site and the piezometer installation due to the increases in inorganics & BTEX in the turbid seep samples.

Response—The following bullet text has been added to Section 2.2.6:

- *In Fall 2004, the Navy submitted a proposal for the investigation of the northern portion of the site and the installation of shallow piezometers to evaluate inorganic and VOC concentrations in the leachate seeps associated with Site 2.*

38. Page, 2-22, Site 2: Review of historical toxicity values indicates that no oral cancer slope factor for arsenic was published in 1992. Please confirm whether arsenic was evaluated as an oral carcinogen in the risk assessments for this site. If it were not, please provide information on how the risk results would change if arsenic were considered to be an oral carcinogen and whether this change would impact the any risk-based decisions made for this Site.

Response—A risk assessor reviewed the values to see if changes to the values of the site's contaminants of concern may have impacted the outcome of the risk assessment. This is included as Attachment B to the Response to Comments from MEDEP dated 30 November 2004.

39. Page 2-26, Section 2.2.6.4, Groundwater Sampling: The text acknowledges detection of TCE above the MCL at MW-NASB-241 and -242. It may be appropriate to note as well that these proved to be one-time detections, and that subsequent monitoring did not verify the results.

Response—The following addition has been made to "Groundwater Sampling" subsection in Section 2.2.7.4 Data Review (formerly Section 2.2.6.4 in the draft report):

Groundwater Sampling

Five groundwater monitoring wells (MW-103, MW-104, MW-241, MW-242, and MW-243) are sampled bi-annually at the Site 2 Landfill. The wells are sampled for VOCs and inorganic analyses. The general trend of VOCs at the Site 2 Landfill monitoring wells has been stable at non-detected concentrations since 2000. The exception to this is the detection of trichloroethene in wells MW-NASB-241 and MW-NASB-242 at concentrations of 13 µg/L and 12 µg/L, respectively, that exceeded both the Federal MCL and State MEG of 5 µg/L. The trichloroethylene detections above the MCL and MEG at MW-NASB-241 and MW-NASB-242 proved to be one-time detections and subsequent monitoring rounds have not verified the results.

Inorganics detected in the Site 2 Landfill wells above MCLs and/or MEGs include: aluminum, arsenic, chromium, iron, manganese, nickel, selenium, and thallium. Two inorganic elements, nickel and selenium, were detected for the first time in excess of Federal MCL and State MEG standards during Monitoring Event 8 (September 2003). Nickel was detected in well MW-103 (171 µg/L) and selenium was detected in well MW-242 (11.5 µg/L). Nickel concentrations have ranged from non-detected to 15.8 µg/L between 2000 and Monitoring Event 7. Selenium has ranged from non-detected to 4.1 µg/L between 2000 and Monitoring Event 7.

Overall, inorganic concentrations have remained similar to the concentrations detected during the RIs. The inorganic concentrations are likely related to leachate originating from the Site 2 Landfill. The primary components of leachate appear to be magnesium, iron, and aluminum, which is not unusual considering the materials present in the Site 2 Landfill that consist of municipal waste, which may include bulk metal items. In addition, the Landfill has a cover that allows surface water and precipitation (snow and rain) to infiltrate the cover material (sand) into the landfilled material at Site 2.

It is noted that metal exceedances (i.e., aluminum, arsenic, chromium, iron, lead, manganese, and nickel) have been reported in the more recent groundwater data at Site 2. In order to further evaluate the possibility of corrosion occurring within the monitoring wells, ECC will employ the use of a corrosion meter to determine the degree of corrosivity occurring within the well.

40. Page 2-26, Section 2.2.6.4, Groundwater Sampling: The text omits any discussion of an increasing trend in trace metals observed at MW-242 over a period of several years, including an exceedance of the MCL for chromium in Monitoring Event 7, as well as elevated levels of Co, Ni, and V. While it was surmised that this may have been the result of corrosion of the stainless steel submersible pump, and sampling subsequent to replacement of the pump in 2004 did not reproduce the high metals detections, the concern and its resolution should be acknowledged in the five-year review. Because the concern for metals at MW-242 is well documented, the concerned public will seek some assurance that the issue is not being ignored.

    Response—The LTMP data, along with observations, conclusions, and recommendations, are presented in the bi-annual monitoring event reports that are available to the public for review. In addition, the Navy has submitted a proposal for additional investigation at Site 2 in the northern area of the site. Chromium has been added to the text of Section 2.2.7.4, see response to Comment No. 39. LTMP monitoring continues at this Minimal Action site and, as noted in Monitoring Event 9 Report, inorganic concentrations remain similar to previous monitoring events (stable or non-detect).

41. Sec. 2.2.6.4, p 2-27 and 2-28 – In the second paragraphs under both "Sediment Sampling" and "Leachate Sediment Sampling" it implies that no sediment or leachate sediment standards have been developed yet. If not, how can the remedy be deemed protective? Please include trend analysis and comparison to pre-remedial action concentration levels.

Response—The issue of appropriate sediment standards is currently being investigated by the Navy. During 2005, the Navy completed a statistical assessment of trend data and comparisons to before and after the remedy was implemented. This document is currently being reviewed. While no comparison to appropriate standards can be offered in this five-year review, VOC concentrations in general have decreased while metals data have remained consistent. Based on the existing long-term monitoring data for the site, the Navy considers the remedy to be protective.

42. While there is a discussion of eco-risk issues for leachate sediment there is no discussion of eco-risk from sediments in Mere Brook.

Response—See response to Comment No. 35.

43. Page 2-28, Section 2.2.6.4, Leachate Seep Sampling: The review dismisses analytical results for the leachate seeps as "... consistent with the concentrations detected during the RI." While this may be the case, it is noted that some rather extraordinary results have been recorded (e.g., arsenic at 15,000 micrograms per liter in Monitoring Event 8 (October 2003)). While it is readily acknowledged that such results are not particularly meaningful (i.e., the high arsenic is almost certainly associated with high turbidity due to the presence of iron floc), they can raise concerns unless confronted and explained.

Response—We agree that the most likely cause of elevated metals is the high turbidity noted in the leachate samples. Therefore, new sampling methods are being proposed for 2005 at the leachate seeps. Please see response to Comment No. 41. This topic has been added as an Issue in Section 2.2.9 (Site 2).

44. §2.2.7, Question A, include cap maintenance in the second sentence.

Response—The following edit has been made to the second sentence of Section 2.2.8 Technical Assistance (formerly Section 2.2.7 in the draft report), "Question A:"

> *...the remedy is functioning as intended by the 1998 ROD. The effective implementation of institutional controls and cover maintenance have prevented exposure to soil, debris, and groundwater.*

45. §2.2.7,Question B, since there were no chemical specific ARARs documented in the ROD and therefore no cleanup levels agreed to for this site, the RAOs of minimizing risk by maintaining the landfill cap are still valid.

Response—Comment noted.

46. §2.2.7, Question C, it is necessary to investigate the northern portion of the site due to an increase in seep contaminants and therefore this new information may require a change to the remedy. Please revise this answer to reflect this required investigation.

Response—The following edit has been made Section 2.2.7 "Technical Assistance" "Question C:"

There is no information such as land use changes or ecological risks that calls into question the protectiveness of the remedy. The proposed investigation north of Site 2, due to increases of metal concentrations observed in the leachate seep sample locations, may identify a new site or alter the Minimal Action remedy of Site 2, depending on the results of the investigation of this area. The institutional control boundary for Site 2 was based on the assumption that the base was serviced by public water; however, a new bedrock well was installed for the Dyers Corner gate project; therefore, the institutional control boundary for Site 2 could be affected.

47. Page 2-31, Section 2.2.11: *Typo*. Please correct the Section number from 2.3.11 to 2.2.11.

Response—The correction has been made to Section 2.2.12 (formerly Section 2.2.11 in the draft report).

48. Sec. 2.3.2, p 2-32 – The ninth bullet should explain what the selected remedy is.

Response—The 22nd bullet in Section 2.3.3 Site Chronology (formerly Section 2.3.2 in the draft report) has been revised as follows:

- *On 27 September 2002, the ROD for Site 7 was finalized. The remedy selected is institutional controls with groundwater monitoring.*

49. Page 2-36, Section 2.3.3.5: This section presents a thorough discussion of the approach to the risk assessment performed for Site 7. However, the discussion does not summarize the outcome with respect to specific COCs that may have emerged as the principal risk drivers. This bears directly on the following section (2.3.4 Remedial Actions); i.e., this is, presumably, the motivation for the focus on cadmium. Please expand Section 2.3.3.5 to discuss the results of the risk assessment with respect to the identification of the COCs that must be addressed at the site by remediation, monitoring, etc.

Response—See response to Comment No. 6, bullet No. 2.

50. Page 2-38, third paragraph – Charge *"remedial"* to *"removal"* in the first sentence.

Response—The following edit has been made to the first sentence of the seventh paragraph in Section 2.3.5 Remedial Action (formerly Section 2.3.4 in the draft report):

Between March and April 2002, Foster Wheeler was tasked with conducting a removal action at Site 7 to remove the stockpiled soils.

51. Page 2-38, Section 2.3.4, para. 4: *text editing:* The text states, "The selected remedy for the site was cover and slurry wall and recovery of contaminated groundwater." This appears to be text that is carried over unintentionally from the discussion of Sites 1 and 3, and does not apply to Site 7. Please check.

    Response—The following edit has been made to the eighth paragraph in Section 2.3.5 (formerly Section 2.3.4 in the draft report):

    In September 2002, the ROD was signed for Site 7 and presents the remedy for the site. The selected remedy for the site was institutional controls with groundwater monitoring. The selected remedial action will be protective of human health and the environment as soon as the LTMP is implemented beginning in 2005.

52. Section 2.3.4.1, add "Ensure ICs are not violated" to the goals of the LTMP.

    Response—The first bullet in Section 2.3.5 (formerly Section 2.3.4.1 in the draft report) has been revised as follows:

    - *Implement institutional controls, such as land use restrictions, to prevent human contact with and use of the soil and groundwater at the site and ensure that there are no violations of the institutional controls.*

53. §2.3.7, Page 2-41, Question B – There is no discussion of eco-risk, please add.

    Response—The following paragraph has been added after the third paragraph in Section 2.3.8 Technical Assessment, Question B:

    As part of the RI, an ecological risk assessment was completed for Site 7. The complete risk assessment is provided in Appendix Q of the 1990 Draft Final RI Report. No environmental risks are associated with the contaminants detected in surface soils or groundwater for Site 7 because there are no streams or wetlands areas associated with this site; environmental risks were estimated for terrestrial organisms. Levels of PAHs and DDT in the soils from this area were below levels considered to pose on environmental risk (E.C. Jordan 1990).

54. §2.3.10, change the last sentence to "In addition, the site remains undeveloped." It was mentioned that there has been discussion, but no definitive plans, for development of this area.

    Response—The following edit has been made to the last sentence in Section 2.3.11 Protectiveness Statement (formerly Section 2.3.10 in the draft report):

    The remedy at Site 7 is expected to be protective of human health and the environment upon attainment of the cleanup goals, as presented in the 2002 ROD, which is expected to

take up to 10 years to achieve (U.S. Navy 2002). During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site -is currently undeveloped. In order for the remedy to remain protective in the long-term, institutional controls will need to be refined.

55. §2.4.2, add bullet, " On July 7, 2004 the Navy submitted an updated IC implementation plan for regulator comment. The Navy is currently addressing the regulator's comments and plans on finalizing the plan in 2005."

Response—The following bullet has been added after the last bullet in Section 2.4.3 Site Chronology (formerly Section 2.4.2 in the draft report):

- *On 7 July 2004, the Navy submitted a draft LUCIP for regulator review and comment. The Navy is currently addressing the regulator comments and intends to finalize the plan in 2005.*

56. Sec. 2.4.2, p 2-45 – In the eleventh bullet, should explain what the final selected remedy is, were the standards set by the interim ROD met. Was the remedy changed between the interim and final RODs? If so please explain.

Response—The following addition has been made to the 17th bullet in Section 2.4.3 Site Chronology (formerly Section 2.4.2 in the draft report):

- *In September 1999, the final ROD was signed for Site 9. The Site 9 remedy is monitored natural attenuation with long-term monitoring and institutional controls.*

57. §2.4.3.2, last paragraph first sentence, change to "NAS Brunswick will be demolishing the buildings over the landfill. It is planned to take the buildings down to two feet below the foundations. An EECA is being developed to determine if the ash landfill will be removed prior to new buildings being constructed above the ash landfill."

Response—The following edit has been made to the first sentence in the last paragraph in Section 2.4.3.2:

NAS Brunswick will be demolishing the Barracks buildings located over the landfill. It is planned to take the buildings down 1 ft bgs. An Engineering Evaluation/Cost Analysis is being developed to determine if the ash landfill/dump area will be removed prior to new buildings being constructed over the area of the ash landfill/dump area. NAS Brunswick has no plans to cease active base status. Groundwater for use as a potable or domestic source is not expected to occur.

58. Page 2-49, Section 2.4.3.3: *text editing:* Please note what appears to be an unintended page break.

    Response—The page break has been removed in the report.

59. P. 2-53, last paragraph – The NPDES program does not address remediation of stream sediments. It just controls discharges from permitted point sources. Sediment contamination from CERCLA sources needs to be addressed under CERCLA. Please remove last sentence.

    Response—The last sentence in the Stream Sediment paragraph within Section 2.4.4.5 (formerly Section 2.4.3.5 in the draft report) has been deleted as requested.

60. Page 2-55, Section 2.4.3.3, Natural Attenuation: As noted in previous reviews of Site 9 monitoring reports, "degrade" seems like an inappropriate term to apply to the inorganic COCs. It may be more precise to state something to the effect that, "The remedy is being used to verify that the organic contaminants degrade to concentrations sustained at or below Federal MCLs and State MEGs." Metals concentrations may also decline if the redox state shifts toward more oxidizing conditions as the organics are consumed, and this might be regarded as a form of "natural attenuation."

    Response—The fifth bullet text in Section 2.4.5 Remedial Actions has been revised as follows:

    - ***Natural Attenuation****—This remedy relies on in situ biological systems to degrade the organic contaminants and on recovery of redox conditions to reduce the mobility of inorganic constituents. The goal is to reduce COCs to concentrations sustained at, or below, MCLs and MEGs. Groundwater monitoring results showing contaminant concentrations will be compared to these remediation goals, and the selected remedy will continue until the site goals are achieved.*

61. §2.4.4, add a bullet to the LTM section to include IC monitoring and reporting.

    Response—The following bullet has been added to Section 2.4.5 Remedial Actions, Long-Term Monitoring subsection:

    – *Monitoring and reporting of institutional controls.*

62. §2.4.5, add a bullet indicating the contract let to demo the buildings to two feet below the foundations above the ash landfill.

    Response—The Navy has issued a contract to demolish the barrack buildings that overlie the footprint of the ash landfill/dump area. The contract was for removal of the barracks to 1 ft bgs yet leave the building foundations in place. No additional bullet text has been added to the report.

63. §2.4.6.4, third paragraph, revise to include the results of the direct-push investigation beyond the VC to include the TCE at the southern edge of the site.

Response—The following subsection has been added to Section 2.4.7.4, Data Review:

During 2003, a total of 30 groundwater samples were collected from the upgradient/crossgradient area west of Site 9 utilizing direct-push methods. Analytical results from 25 of 30 samples did not contain VOCs at concentrations above State MEGs or Federal MCLs. A total of 5 samples were reported with VOC concentrations in excess of the MEGs or MCLs. Vinyl chloride, trichlororethene, and methylene chloride were reported in direct-push groundwater samples at concentrations above the MEGs (or MCLs).

Following a review of the findings and analytical results of the Site 9 2003 and 2004 direct-push soil boring and groundwater investigation, and the ash landfill/dump area delineation investigation at Barracks Buildings 218 and 219, the following general conclusions were provided:

- *The analytical results from these direct-push investigations suggest that significant concentrations of VOCs (i.e., above State MEG or Federal MCL) do not appear to be originating from the aircraft hangars and maintenance facilities located along Orion Street (west of Site 9). Based on these data, the extent of the VOC plume appears to be adequately delineated.*

- *The monitored natural attenuation remedy in place at Site 9 remains protective, and natural attenuation appears to be ongoing at Site 9*

- *The geometry of the Presumpscot clay along the western boundary of Site 9 and through the center of Site 9 does not indicate the presence of a preferential pathway along the top of the clay unit.*

- *The detection of trichloroethene at 5 µg/L in S9-B10 at 41.6-45.1 ft bgs is located near the boundary of the institutional control for groundwater use at Site 9.*

- *On the basis of the 2003 and 2004 investigations, it is proposed that one additional monitoring well be installed in the southwestern area at Site 9 in order to fully define the extent of groundwater impact near the boundary of the site.*

64. Page 2-61, Section 2.4.7: The review states, "There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy." Please discuss the Navy's current program of demolition and construction on the site and its implications for the remedy.

Response—The fifth paragraph in Section 2.4.8 Technical Assessment Summary has been revised as follows:

> *There have been ~~no~~ changes in the physical conditions of the site; however, these changes do not affect the protectiveness of the remedy. Barracks Building 216 has been demolished down to the foundation and a paved parking area constructed over the footprint of a former Barracks Building 216. The Navy is planning to demolish the remaining barracks buildings at Site 9 down to the foundations, approximately 1 ft bgs. These physical changes may not affect the remedy (natural attenuation with long-term monitoring and institutional controls) since there is no significant intrusion into the ground surface. In addition, the Navy is in the process of completing an Engineering Evaluation/Cost Analysis to address the ash landfill/dump area. They expect to complete the Engineering Evaluation/Cost Analysis in early 2005 and proceed with the approved alternative for addressing the ash landfill/dump area at Site 9. This action is expected to positively affect the remedy since this potential source is going to be addressed. The LTMP data will then provide information to determine the effect on the groundwater at Site 9, especially in areas downgradient of the ash landfill/dump area. The ARARs related to implementation of the remedy were met.*

65. §2.4.7, Question C, revise to include the results of the TCE direct-push investigation. Also, state: "Since the institutional controls are implemented at this site, there is no risk to human health and therefore, in the short term the remedy is protective. Follow-up actions are needed to address the long-term protectiveness of this remedy."

Response—The text in Section 2.4.8 Technical Assessment, Question C (formerly Section 2.4.7 in the draft report) has been revised as follows:

> **Question C:** *Has any other information come to light that could call into question the protectiveness of the remedy?*
>
> *From 2003 to 2004, the Navy completed additional direct-push investigations at Site 9 to assess the potential for a source of 1,2-dichloroethene in groundwater that had been detected in well MW-NASB-227 (EA 2004). A total of 11 direct-push borings were completed along the western and southwestern areas of Site 9. As a result of the 2003-2004 direct-push investigation, the Navy has recommended that a new monitoring well be installed near the southwestern boundary of the institutional control for groundwater use. The purpose of this monitoring well will be to ensure that the groundwater restriction boundary, noted in the institutional controls, remains protective.*
>
> *No other information has come to light that could call into question the protectiveness of the remedy.*

66. §2.5.5, add the RAOs for the final ROD.

Response—The following text has been inserted after the fourth bullet and before the third paragraph in Section 2.5.5 Remedial Actions:

Based on the types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed for the Eastern Plume to mitigate existing and future potential threats to human health and the environment. These remedial action objectives are to:

1. *Minimize further migration of the Eastern Plume*
2. *Minimize any future negative impact to surface water resulting from discharge of contaminated groundwater*
3. *Reduce the potential risks associated with ingestion of contaminated groundwater to acceptable levels*
4. *Restore the aquifer.*

67. Page 2-68. Eastern Plume: The text indicates that the COCs for this plume are VOCs. In the past several years, two of the listed COCs (TCE and PCE) have had revisions to their cancer slope factors, making them more conservative by one to two orders of magnitude. In addition, five of the listed VOCs have had RfCs developed and two have had revisions to their oral RfDs reducing these values by about one order of magnitude. These changes would impact the historical risk assessments for this site. However, if MCLs and MEGs are being used as the clean goals for this plume then the changes in the toxicity values may not result in a need for altering the actions selected for this site. Please confirm that the groundwater cleanup goals selected in the ROD are still applicable in light of the revisions made to the toxicity values for VOCs in the past several years.

Response—The groundwater cleanup goals selected in the 1998 ROD are still applicable even though the toxicity values for VOCs, specifically TCE and PCE, have changed since the cleanup goals for the site are the Federal MCLs and State MEGs as presented in Table 2 Groundwater Remediation Goals of the 1998 ROD. Institutional controls are in place to protect human heath.

68. §2.5.5.1, add that the ICs were implemented in 2000.

Response—The following edit has been made after the last sentence of the first paragraph in Section 2.5.5.1:

2.5.5.1 Remedy Implementation

Groundwater within the Eastern Plume is currently being remediated by a treatment system that consists of 4 active extraction wells (EW-1, EW-2A, EW-4, and EW-5A) that were designed to provide hydraulic control of the aquifer, maximize recovery of dissolved contaminant mass, and a treatment plant to remove the volatile organic contamination from the groundwater prior to discharge. The Navy is currently in the process of assessing two areas within the Eastern Plume to install replacement extraction wells. One area is in the vicinity of MW-331 and the other in the area of P-106. The new extraction well near MW-331 will be a replacement for former extraction well EW-3. The extraction system has been operational since June 1995, and has been successful in reducing hot-spot concentrations of VOCs and total VOC concentrations in the Eastern Plume. The current system is extracting less groundwater now than when it was originally activated due to well failures. Therefore, two replacement extraction wells are proposed to be added to the system. In general, total VOC concentrations at extraction wells in the network have reached asymptotic influent conditions and, therefore, system improvements are planned to increase the mass of VOCs being removed. Institutional control boundary was documented in the December 2000 ESD for the Eastern Plume. The institutional control boundary was documented in the December 2000 Explanation of Significant Difference for the Eastern Plume.

69. Page 2-71, Section 2.5.5.2: This section presents a fairly detailed summary of the operational history of the extraction system, but does not mention the operational difficulties with EW-4 in 2004. Please expand to include this for completeness.

Response—The text in Section 2.5.5.2 System Operation/Operation and Maintenance has been revised as follows:

2.5.5.2 System Operation/Operation and Maintenance

The extraction system has been operational since June 1995 and has undergone changes to improve operational efficiency. Extraction well EW-02A, located within the Eastern Plume in the vicinity of monitoring well MW-311, was activated on 12 June 1998 to provide additional VOC removal and hydraulic control in this area. On 27 September 2000, extraction well EW-02 was removed from service and decommissioned. Extraction well EW-03 is no longer operational and was removed from service in December 1998 and decommissioned on 27 September 2000. One replacement extraction well (EW-05A) was installed during September 2000 and brought on-line on 10 January 2001. EW-05 was removed from service and decommissioned on 17 January 2001. The following table summarizes the installation and status of all the extraction wells at NAS Brunswick for the Eastern Plume and Site 1 and 3 Landfill:

Extraction Well No.	*Date Installed*	*Status*
EW-1	*October 1994*	*Active*
EW-2	*October 1994*	*Decommissioned – 27 September 2000*
EW-2A	*April 1998*	*Active*
EW-3	*October 1994*	*Decommissioned – 27 September 2000*
EW-4	*October 1994*	*Active*
EW-5	*October 1994*	*Decommissioned – 17 January 2001*
EW-5A	*September 2000*	*Active*
EW-6[(a)]	*November 1994*	*Not active – 19 November 1997*
EW-7[(a)]	*November 1994*	*Not active – 19 November 1997*
(a) EW-6 and EW-7 are for Sites 1 and 3 and the others are for the Eastern Plume.		

On 11 September 2001, the extraction well network and treatment plant were ordered shut down by the Commanding Officer of NAS Brunswick. During the 1 October 2001 project conference call between the Navy, MEDEP, and EPA RPMs, it was agreed that the extraction well network and treatment plant would remain off-line until completion of the Fall 2001 Long-Term Monitoring Program. The extraction well network and treatment plant were placed back in service on 13 November 2001. The extraction well network and treatment plant had been off-line for a total of 63 days.

On 9 November 2003, the pump and motor controller for extraction well EW-4 were damaged beyond repair due to an electrical surge in the base's power grid. In May 2004, a new pump and motor controller were installed and EW-4 was returned to normal operation. During this period, extraction well EW-4 was out of service for 176 days.

70. Page 2-72, Section 2.5.6, last bullet: This bullet asserts that, "Groundwater monitoring results indicate that the downgradient extent of the plume apparently has not changed since at least 1995... ." While this may be the case if the "extent" of the plume is defined by the MCL, it has also been recognized that the leading-edge area of the plume continues to evolve (e.g., rising concentrations of VOCs at MW-313). Establishment of a "stable" plume configuration will require further discussion.

Response—The last bullet in Section 2.5.6 on Page 2-72 is summarizing the First Five-Year Review completed in 1999. The information presented in this section is correct. In 1999, the "Groundwater monitoring results indicate that the downgradient extent of the plume apparently has not changed since at least 1995...." Since 1999, in the Eastern Plume, it has "been recognized that the leading edge area of the plume continues to evolve (e.g., rising concentrations of VOCs at MW-313).

71. §2.5.6, add the field work at MW-313, Southern Boundary, Extraction Well location investigation at P-16 and MW331, and 1,4-dioxane sampling and detections.

Response—The following bullets have been added to the end of Section 2.5.6, Progress Since the Last Five-Year Review:

- *During the field work season in 2004, the Navy completed additional direct-push investigation work in the vicinity of MW-313, advanced borings to assist with the locating replacement extraction wells in the Eastern Plume, and began collecting groundwater samples to assess the presence of 1,4-dioxane within the Eastern Plume as a potential COC.*

- *Beginning in May 2001, the Navy conducted a direct-push electrical conductivity and membrane interface probe investigation in order to address the data gaps identified during the Technical Meeting held in December 2000. The investigation activities were conducted in the Southern Boundary of the Eastern Plume, in the vicinity of Old Gurnet Road (now called Huey Drive). The objectives of these investigations were to determine the presence of the Eastern Plume and the terminus of the lower sand unit, in addition to determining the groundwater flow patterns in the Southern Boundary.*

- *During June and November 2003, 7 soil borings were completed in the Southern Boundary (SB-B-1 through SB-B-7) in order to fill data gaps identified following the 2001 investigation. A total of 7 monitoring wells were installed at selected boring locations (i.e., MW-335, MW-336, MW-337, MW-338A, MW-338B, MW-338C, and MW-339). One of the monitoring well locations (MW-338) was located within a clay trough which was considered to be the most likely point for discharge of the Eastern Plume and was, therefore, constructed with 3 well screens to monitor separate intervals. The 2001 and 2003 investigation data were used to provide additional subsurface geological data, further evaluate the lateral and vertical distribution of VOC impacts in the Southern Boundary, and assess groundwater flow patterns in the Southern Boundary.*

- *These investigations indicate that the Southern Boundary is not a migration pathway for the Eastern Plume. This conclusion is based on the geological and analytical groundwater data obtained during the investigations conducted between 2001 and 2003.*

72. Page 2-73, Section 2.5.6: The bullets summarizing progress since the previous Five-Year Review does not include the diffusion sampling program in the streams or recent (2004) characterization to support possible modifications to the extraction system. Please expand.

Response—The following bullets have been added to this section:

- *In 1999, EPA completed an investigation using diffusion samplers to assess how the Eastern Plume may be expressed in surface water. The results of this investigation indicated that low concentrations of Eastern Plume contaminants are upwelling into Picnic Pond and along some limited areas of Mere Brook.*

- *In 2004, additional direct-push sampling of groundwater was completed to assess the potential for upwelling of the Eastern Plume near monitoring well MW-313. The results of this investigation indicate the Eastern Plume is slowly migrating into this region, and may begin to discharge to surface water in the future. Surface water sampling results do not indicate the plume is currently discharging to Mere Brook. Elevated total VOCs were reported in surface water sample SW-12 in November 1998 and May 2003. The total VOC concentration in November 1998 (9.5 µg/L) was comprised of xylenes, TCE, PCE, and ethylbenzene. The total VOC concentration in May 2003 (4 µg/L) was comprised of TCE.*

73. §2.5.7.4, the ROD required the hydraulic containment of the plume. The Navy states, "...continued increases in concentrations at MW-331 in 2003 have been noted and this well is currently the monitoring point with the highest total VOC concentrations. These increases suggest an area of increased VOC contamination is moving south; and during 2003, the center of mass of the Eastern Plume moved from P-106 to MW-331." Therefore, the first part of the Groundwater Monitoring paragraph should be revised. If the center of mass has moved, how can the concentration trends be relatively stable?

    Response—See response to Comment No. 74.

74. §2.5.7.4, add also discussion of increases of VOC in MW-313 and potential discharge to Mere Brook.

    Response—Section 2.5.7.4 Groundwater Monitoring has been revised as follows:

    Groundwater Monitoring

    Concentration trends from monitoring wells located within the body of the Eastern Plume appear to be relatively stable, suggesting limited migration of the VOC plume during the period in which the five-year review has been conducted. Although, in general, VOC concentrations have been stable, the highest concentrations of the Eastern Plume are now noted at monitoring well MW-331 when they were previously recorded at P-106, approximately 1,000 ft to the north However, continued increases in concentrations at MW-331 in 2003 have been noted, and this well is currently the monitoring point with the highest total VOC concentrations.

    Elevated VOC concentrations (1,1-dichloroethene) have been reported in the deep diffusion sample collected from MW-313 in April 2002 and May and October 2003. Vinyl chloride (0.4J) was reported in the mid-depth diffusion sample collected from MW-313 in October 2002. In addition, 1,4-dioxane was reported in the low-flow groundwater samples collected at MW-313 during the April (84 ppb) and September (93.8 ppb) 2004 monitoring events.

Beginning with Monitoring Event No. 23, the Navy initiated additional groundwater sampling to assess whether geochemical conditions may be favorable for natural attenuation of chlorinated VOCs at selected wells in the Eastern Plume and were analyzed for natural attenuation parameters. This sampling was not required by the LTMP but was collected to provide initial data regarding the likelihood of natural degradation of chlorinated VOCs.

A subset of monitoring wells at the Eastern Plume was selected and sampled during the October 2003 monitoring event for natural attenuation parameter analysis. Eight shallow wells and 13 deep wells were sampled in order to provide initial information on the occurrence of natural attenuation within the Eastern Plume. The wells were selected to provide a general overview of natural attenuation conditions, and included shallow and deep wells located in mid-plume, downgradient, and sentinel locations.

A natural attenuation assessment groundwater study was conducted to provide data that can be used to assess whether evidence is present which suggests chlorinated VOC degradation by reductive dechlorination. Groundwater sampling activities for select natural attenuation parameters were performed at 21 locations from the shallow and deep aquifer zones at the Eastern Plume. A background groundwater sample was collected from location MW-1104.

Findings related to individual natural attenuation parameters (methane, dissolved oxygen, Eh, and the distribution of the chlorinated VOC breakdown products), and results of an initial quantitative weighted scoring, provide adequate evidence that conditions are favorable for reductive dechlorination of chlorinated VOCs in certain areas of the Eastern Plume. This evidence is particularly strong in the southern boundary region of the Eastern Plume, where groundwater sample data define the edge of the plume (MW-313, MW-333, and MW-334). These data suggest that the deeper saturated zones in the southern portion of the Plume are most likely to have conditions favorable for natural attenuation.

Surface Water Monitoring

The surface water sampling data collected during each bi-annual sampling event from 5 sample locations have shown stable and/or decreasing concentration trends for VOCs since the late 1990s, although one surface water sample in Spring 2003 noted 4 µg/L of trichloroethene at surface water sampling station SW-12 (close to MW-313).

The increasing concentrations of VOCs in the shallow and deep intervals (noted at monitoring wells MW-333 and MW-313) over the last 1-3 years suggest the Eastern Plume is slowly migrating into the vicinity of New Gurnet Road. The VOC migration is suspected from the diffusion and/or dispersion, in addition to groundwater movement to the south-southeast. Surface water sample SW-12 noted a low concentration detection of trichloroethene for the first time in May 2003, which coincides with an increase in total VOC concentrations at nearby well MW-313. No VOCs were

detected at SW-12 during the October 2003 monitoring event. The combination of possible increasing VOCs at these locations suggests that the Eastern Plume may be flowing upward into Mere Brook near this location. The EPA investigation in 2000 did not indicate that chlorinated VOCs were present at this location. This location appears to be only recently affected by chlorinated VOCs in deep groundwater, although data from Monitoring Event 23 did not show continued surface water impacts. Based on observations noted above, the Navy has planned for additional sampling in the vicinity of SW-12 to assess the water quality beginning in 2005.

75. Page 2-77, Section 2.5.8, Technical Assessment Summary: The report states, "One MCL (arsenic) was changed and has, accordingly, been updated in the LTMP, and it is not expected to have a negative impact on the remedy." It is noted, however, that arsenic was detected in Monitoring Event 23 (October 2003) at four wells at concentrations above the new MCL (10 micrograms per liter), but below the former MCL (50 micrograms per liter). The four wells showed arsenic from 11 to 26 micrograms per liter. While these results may not call into question the effectiveness of the remedy, they certainly imply that the change in the MCL has an impact on any assessment of the recovery of the aquifer to drinking-water standards.

Response—The following edit has been made to the first sentence of the second paragraph in Section 2.5.8 "Technical Assessment":

One MCL (arsenic) was changed and has, accordingly, been updated in the LTMP, and it is not expected to have an impact on the remedy. The revised MCL for arsenic will impact the recovery of the aquifer to drinking water standards. The cause of the elevated arsenic levels is unknown and may be a result of natural conditions (i.e., pervasively high background arsenic concentrations are known to exist in many areas of the State of Maine). The mobilization of arsenic may be due to degradation of the organic contaminants and changes in the redox conditions within the plume. The toxicity data for some of the COCs have changed. However, assessment of those changes indicates that it is not necessary to derive new cleanup values for the Eastern Plume.

76. §2.5.8, Question A, the ROD required the hydraulic containment of the plume. The Navy states in §2.5.7.4, "...continued increases in concentrations at MW-331 in 2003 have been noted and this well is currently the monitoring point with the highest total VOC concentrations. These increases suggest an area of increased VOC contamination is moving south; and during 2003, the center of mass of the Eastern Plume moved from P-106 to MW-331." Therefore, the remedy is not functioning as intended by the decision documents. However, since institutional controls are implemented the remedy is protective in the short term.

Response—See response to Comment No. 73.

77. §2.5.8, Question C and §2.5.8, Technical Assessment Summary, third paragraph, The Navy has recently begun analyzing groundwater samples for 1,4-dioxane at select wells. The current treatment train does not clean-up 1,4-dioxane. However, since groundwater restrictions are in place, the remedy is still protective in the short term. Navy, EPA and MeDEP will continue to evaluate the plume to determine if changes are needed to the ROD or to the treatment system in order to maintain protectiveness in the long term.

    Response—The Navy agrees with this comment; however, notes that 1,4-dioxane has not been formerly identified as a COC for the Eastern Plume; rather, it has been identified as a potential COC. Currently, 1,4-dioxane has no promulgated Federal MCL; however, the State MEG is 32 ppb. The Navy will continue to evaluate the plume to determine if changes are needed to the ROD, or to the treatment system, in order to maintain protectiveness in the long-term.

    In response to Question C, in Technical Assessment, Section 2.5.8, the following text will be added:

    Data indicate the protectiveness of the remedy, with the exception of 1,4-dioxane in the low flow samples collected from MW-313, MW-331, MW-333, MW-338A, and P-106 and the Eastern Plume combined effluent grab sample collected during Monitoring Events 24 and 25 (April and September 2004). The Navy shall continue to monitor this potential COC for at least one more sampling round.

78. §2.5.8, Technical Assessment Summary, first sentence and fourth paragraph, re-write to state that "the remedy is not functioning as intended" due to the rationale noted above.

    Response—See response to Comment No. 74. The following text has been added to the Technical Assessment, Section 2.5.8:

    > *However, it is noted that the current extraction system is not considered to fully contain the plume hydraulically.*

79. §2.5.8, Technical Assessment Summary, last paragraph, one of the ROD RAOs (§VII.A.) is "to restore the aquifer" since the treatment system does not cleanup arsenic and the plume does contain arsenic above the new MCL at a few locations, the Navy should discuss how this does not negatively impact the remedy. Perhaps the Navy is relying on the pervasively high background arsenic levels and the implementation of groundwater use restrictions.

    Response—See response to Comment No. 75.

80. §2.5.11, change the last sentence to state that "the remedy is not functioning as required. Therefore, follow-on activities are required to address long term protectiveness."

Response—See response to Comment No. 73. The Protectiveness Statement and report Section 2.5.11 for the Eastern Plume have been revised as follows:

> ***For the Eastern Plume:***
> *The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.*

2.5.11 Protectiveness Statement

The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.

81. Appendices B through F:

    A.) Site 2, 7 & EP part of a chemical specific ARAR was missing (40 CFR 141.14-141.16), please clarify.

    B.) EP & sites 1&3 also part of an Action specific ARAR was missing (40 CFR 1000), please clarify.

    C.) EP - Action Specific 06-096 Chapter 802 for Maine was missing, please clarify.

D.) Sites 1&3: Maine reg chapter 584 Relating to water quality was missing from the chemical specific ARARs, please clarify.

E.) Sites 1,&3: Maine Natural Resouces Protection Act Permits by Rule (06-096 CMR Chapter 305 is listed in the ROD, but 06-096 CMR Chapter 305 Section 2 is list in the 5-yr) as a location specific ARARs, please clarify.

F.) Sites 1&3: some other action specific ARARS (RCRA Preparedness and Prevention and RCRA Contingency Plan and Emergency Procedures) related to the construction of the landfill cover or installation of monitoring wells in a landfill were also missing, please clarify.

Response—The ARARs listed in the comment above will be reviewed and added if they were inadvertently omitted from the appendix tables for ARARs.

EPA EVALUATION OF NAVY RESPONSES TO EPA COMMENTS ON THE DRAFT SECOND 5-YEAR REVIEW FOR THE NAVAL AIR STATION BRUNSWICK, MAINE

Commentor: Christine Williams	
Comment Issue Date: 13 June 2005	**Navy Response Date: 14 June 2005**

Pursuant to ' 6 of the Naval Air Station Brunswick, Maine Federal Facility Agreement, dated 19 October 1990, as amended (FFA), the Environmental Protection Agency has reviewed the subject documents and comments are enclosed.

GENERAL COMMENT

4. EPA must evaluate the Base Operating Instruction prior to accepting this response. The Navy, EPA and State project managers have agreed that the previous institutional control boundaries were developed with the assumption that no potable wells would be installed across the entire facility. That assumption has failed with the installation of the Dyer's Gate drinking water well. Since the Navy has stated it will not restrict the installation of groundwater wells across the entire facility, IC boundaries must be evaluated at each site and expanded to include possible drawdown from installation of public water supply wells. This calls into question the short-term and long-term protectiveness of all the remedies and must be addressed in a timely manner.

   Response—Comment noted. It is recommended that this topic be further discussed during an upcoming conference call meeting.

5. These (Comments number 5, 31 and 38) comments pointed out the need to compare current toxicity values to those used in the risk assessments performed in 1992 to ensure that no additional constituents of concern need to be identified for these sites. The responses indicate that a risk assessor will review the toxicity values and text will be added to the document if changes in toxicity values result in changes in the risk assessment. In addition to the text changes proposed in order to confirm the results of the toxicity value analysis, any tables generated to compare historical to current toxicity results should be included in both the RTC document and the draft-final document (not just in the final document).

   Response—The toxicity value analysis has been included as a table in both the MEDEP RTCs dated 30 November 2004 and in the draft final Second Five-Year Review Report as Table 2-1.

6. The original comment requested clarification on the evaluation of ecological risk at some of the sites addressed in the Draft Second Five-Year Review.

The first bullet requested a summary of the results of the ecological risk assessment conducted for Site 2. The response provides a useful description of ecological risks associated with Site 2, indicating that the 1990 Ecological Risk Assessment addressed "surface water and sediments from Mere Brook beaver marsh and leachate seeps". The results summarized were: risk to terrestrial organisms was not predicted from exposure to contaminants in the soils and leachate seeps at Site 2; risks associated with wildlife drinking from the leachate seeps was determined to be insignificant; concentrations of mercury in the seeps and sediments did not present an environmental risk; and COCs were identified for the Mere Brook beaver marsh ecosystem surface water and sediment but risk to aquatic receptors was considered minimal. The only missing piece is a summary of risk to wildlife receptors exposed directly or indirectly to chemicals in the Mere Brook marsh sediments.

Please explain if a food chain model was conducted for wildlife receptors exposed to Mere Brook sediments and summarize any results.

Response—A food chain model assessment for wildlife receptors exposed to Mere Brook sediments has not been conducted to date.

The second bullet requested a summary of ecological risks at Site 7. The response provides an adequate summary.

Response—Comment noted.

The third bullet of this comment requested clarification in the summary of risk associated with the Eastern Plume, and specifically asked for clarification on risk in the surface water bodies discussed in Section 2.5.4 (Picnic Pond, Merriconeag Stream, and Mere Brook). The response indicates that these water bodies were evaluated in the 1990 Remedial Investigation Risk Assessment but does not summarize any results.

In the five-year review text, Section 2.5.4, please clarify if any risk was identified for Picnic Pond, Merriconeag Stream, and Mere Brook.

Response—The following paragraph has been added to Section 2.5.4 regarding risk evaluation in the surface water bodies (Picnic Pond, Merriconeag Stream, and Mere Brook) which was conducted as part of the 1990 Remedial Investigation Risk Assessment:

> *As stated in the 1990 Remedial Investigation Risk Assessment (E.C. Jordan), the routes of exposure evaluated included dermal contact and incidental ingestion of soils, surface water, sediment, leachate, and leachate sediment at Sites 7, 8, 9, and Picnic Area Pond. Exposure scenarios were developed for younger and older children based on land use, accessibility, and potential recreational activities at these sites. The potential for adult non-worker exposure at these sites was not considered to be significant. Risks were evaluated in the Picnic Area Pond, at downstream locations on the Merriconeag Stream, and at Harpswell Cove. In general, aquatic organisms were found to have minimal risk*

with the levels of inorganic or organic compounds measured in the environment. The sites considered to present a public health risk included: Sites 1 and 3 and Sites 4, 11, and 13 (the Eastern Plume) for groundwater contamination. Sites or areas considered to present an ecological risk included: Sites 1 and 3 (Mere Brook Beaver Marsh/Beaver Marsh Area). For the complete risk assessment, refer to Chapter 15 of 1990 Remedial Investigation Report (E.C. Jordan 1990).

SPECIFIC COMMENTS

7. The Navy has added (or needs to add) the development of an IC boundary at each operable unit (OU) with waste left in place as an issue; however, this action must have a milestone date for each OU. EPA suggests summer of 2006. In addition, since the current boundary is not based on the withdrawal of groundwater near the site contamination, the lack of such an updated boundary is a current protectiveness question.

   Please change the No to Yes in the Affects Protectiveness Current column for each OU. Please see Section 2.1.9, 2.2.9, 2.3.10, 2.4.10, and 2.5.10.

   Response—A milestone of 2006 has been added for the development of IC boundaries at each operable unit with waste left in place. Additionally, the "No" in the Affects Protectiveness Current column has been changed to "Yes" for each OU, as requested.

   Section 2.2.9: Site 2, Dyers Gate Well should be added to the LTMP as was agreed. This doesn't affect the protectiveness of the remedy in the current configuration, however may in the future if the well is pumped at a higher rate. The milestone date should be 2005.

   Response—Section 2.2.9 has been revised to include Dyers Gate Well to the LTMP. The milestone date is 2005-2006.

   Section 2.4.10: Site 9; add the new MW at the southwestern corner and the new MW at a more representative depth near MW 076 both with a milestone date of 2006.

   Response—The new monitoring well at the southwestern corner of Site 9 and the new monitoring well to be installed near MW-076 has been added to the LTMP with a milestone date of 2006.

16-18.

   Protectiveness Statements for Sites 2, 7, and Eastern Plume and new comments for sties 1&3, and 9. Since all of the IC boundaries are not currently established with the assumption of possible groundwater withdrawal near the contamination, the remedies are not protective since IC boundaries were not established to take this assumption into account.

Each of the OU protectiveness statements need to be changed to state, "The remedy is not functioning as required. Follow-up actions are required to address both the short-term and long-term protectiveness."

Response—Recommend that the project stakeholders schedule a conference call as soon as possible to discuss the response and resolution to this comment. The resolution of this comment would be documented in conference call minutes.

19. The overall Site-Wide Protectiveness Statement needs to be changed also. Please change the statement to: "Protectiveness cannot be determined until further information on the IC boundaries of each site is obtained. The Navy will provide that information prior to the summer of 2006. The Base Instruction will be updated to contain the new boundaries."

    Response—The overall Site-Wide Protectiveness Statement has been revised as follows:

    The remedies and institutional controls are in place at the known Installation Restoration sites and are considered protective in the short term; therefore, there are no current exposures. Follow-up actions (such as optimizing the extraction system and refining the institutional controls) are necessary to address long-term protectiveness.

39. In the yellow shaded section, please change the name ECC to "the Navy", or to "the Navy's contractor (ECC)."

    Response—ECC has been changed to " the Navy" as requested.

42. The original comment noted that there was no discussion of eco-risk from sediments in Mere Brook. The response states, "See response to EPA Comment Number 35." As was the case for the first bullet in General Comment 6, the summary of the ecological risk assessment for Mere Brook indicated that risk was minimal to aquatic organisms but did not include a summary of risk to wildlife receptors exposed to brook sediments. Please explain if a food chain model was conducted for wildlife receptors exposed to Mere Brook sediments and summarize any results.

    Response—A food chain model assessment for wildlife receptors exposed to Mere Brook sediments has not been conducted to date.

44. New Comment from EPA

    Question A for each OU asks if the remedy is functioning as intended. The answer to each of these questions must indicate that the IC boundaries have been called into question because the assumption in the ROD that no potable wells will be installed across the site has failed. This portion of each of the remedies is not functioning as intended.

Response—Recommend that the project stakeholders schedule a conference call as soon as possible to discuss the response and resolution to this comment. The resolution of this comment would be documented in conference call minutes.

81. The ARAR comments have not yet been addressed.

Response—The ARAR tables have been revised and will be included in the Second Five-Year Review Report.

RESPONSE TO COMMENTS FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY ON THE ARAR TABLES FOR THE DRAFT SECOND 5-YEAR REVIEW NAVAL AIR STATION BRUNSWICK, MAINE

Commentor: Christine Williams	
Comment Issue Date: 15 July 2005	**Navy Response Date: 16 August 2005**

Pursuant to ' 6 of the Naval Air Station Brunswick, Maine Federal Facility Agreement, dated 19 October 1990, as amended (FFA), the Environmental Protection Agency has reviewed the subject document and comments are as follows.

1. The Groundwater at NAS Brunswick is a current source of drinking water as demonstrated by the installation of a drinking water well at the Dyer's Gate. MCLs may need to become Applicable, Chemical Specific ARARs at the Eastern Plume, Site 7, & Site 9 rather than the relevant and appropriate standards they are designated as currently.

   Response—This comment is noted and it is recommended that this issue be further discussed during the next technical meeting or during a conference call. This issue requires resolution prior to issuing the draft final version of the Second Five-Year Review Report.

2. ARAR Tables B-1 Location Specific and B-2 Action Specific for Sites 1&3:
   Applicable: Maine Natural Resources Protection Act (38 MRSA Section 480A-S) was included in the 1992 ROD. Why was it not included in the 5-yr review?

   Response—This act has been added to the appropriate ARAR tables in the draft final version of the Second Five-Year Review Report.

3. ARAR Tables B-1 Location Specific and B-2 Action Specific for Sites 1&3 and Table F-2 Action Specific for the Eastern Plume:

   UIC program 40 CFR 144, 146 &147), CWA: 40CFR403, Main Rules to Control the Subsurface Discharge of Pollutants by Well Injection Maine Water Pollution Control Law (38 MRSA, Section 411), Maine Standards for Classification of Groundwater (38 MRSA, Section 470), The action to be taken should be updated with the implementation of the infiltration gallery most of the time and the POTW only on an overflow basis.

   Response—Comment noted.

4. ARAR Tables B-1 Location Specific and B-2 Action Specific for Sites 1&3:

   In general OSHA regulations are not ARARs, however, they may be "to be considered"

   Response—Comment noted.

Appendix I.3

Comments from Lepage Environmental Services

RESPONSE TO COMMENTS FROM LEPAGE ENVIRONMENTAL SERVICES ON THE SEPTEMBER 2004 DRAFT SECOND FIVE-YEAR REVIEW REPORT

Commentor: Carolyn Lepage	
Comment Issue Date: 28 November 2004	**Navy Response Date: 28 January 2005**
	Navy Response Date: 24 June 2005

The latest revisions to this Response to Comment letter have been completed on the basis of agreed to edits discussed during the 14 February 2005 Conference Call with the Navy, EA, ECC, EPA, and MEDEP.

The following comments on the September 2004 Draft *Second Five-Year Review Report* are submitted on behalf of the Brunswick Area Citizens for a Safe Environment (BACSE).

1. **General Comment.** BACSE concurs with the U.S. Environmental Protection Agency's (USEPA) comments dated November 9, 2004, and will not repeat those comments below except where particular emphasis is desired. The Maine Department of Environmental Protection's (MEDEP) comments will be forthcoming in the next few days; BACSE may have additional comments once MEDEP comments have been reviewed.

   Response—Comment noted.

2. **Page ES-1, EXECUTIVE SUMMARY.** *"This Second Five-Year Review concludes that the remedies in place at NAS Brunswick are protective, or are expected to be protective, at the completion of the remedy timeframes, within a range of 10-20 years."*

   BACSE points out that the remedy for Site 7 has not been completely implemented. BACSE also questions in comments below the potential impact of Eastern Plume groundwater migration and discharge in the vicinity of monitoring wells MW-313 and MW-331. Finally, what is the basis for the 10-20 year range for completion of remedies? For instance, the *Second Five-Year Review Report* states on page 2-78 that the attainment of cleanup goals for the Eastern Plume will take between 17 and 70 years. Please clarify.

   Response—The Site 7 Long-Term Monitoring Plan was issued as a final plan in January 2005. Since the Plan has been finalized, Long-Term Monitoring Program sampling will begin at Site 7 during the Spring 2005 Long-Term Monitoring Program, along with all the other Long-Term Monitoring Program sites at NAS Brunswick. The Navy is currently collecting data in the areas of MW-313 and MW-331 to assess changes to the Eastern Plume in these areas. The range of the cleanup goals was presented for all the remedies at NAS Brunswick and the maximum value (20 years) was incorrect. The last sentence of the fifth paragraph in the Executive Summary has been revised as follows:

This Second Five-Year Review concludes that the remedies in place at NAS Brunswick are protective, or are expected to be protective, at the completion of remedy timeframes, within a range of 10-70 years.

3. **EPA's Five-Year Review Summary Form.** Sites 4, 11, and 13, the source areas of the Eastern Plume, are not listed on this Summary Form, nor are they included in Appendix A where the No Further Action Sites are summarized. BACSE notes that page 34 of the February 1998 Final *Record of Decision* [ROD] *for No Further Action at Sites 4, 11, and 13 and a Remedial Action for the Eastern Plume* states that "... conditions at Sites 4, 11, and 13 will be evaluated to determine whether additional actions may be necessary at those sites." These three sites must be added to the *Five-Year Review Report.*

   Response—These No Further Action Sites (4, 11, and 13) have been added to the EPA Summary Form and Appendix A "No Further Action Sites" of the Second Five-Year Review Report. The revised text for Appendix A for these sites is provided in Attachment A to this Response to Comment document.

4. **Page 2-1, Section 2.1.1, Site Description.** Waste oil, rather than oil, should be included in the list of wastes disposed at the Sites 1 and 3 landfills.

   Response—Agree. The sentence has been revised as follows:

   These landfills were used to dispose of wastes, including garbage, food, waste oil, solvents, pesticides,...

5. **Pages 2-1 & 2-2, Site 2.1.2, Site Chronology.** The 1990 Phase 1 Feasibility Study (FS) and the 1991 Focused FS for Sites 1 and 3 should be added. There are typos in the dates for the 1992 ROD, the 1993 Remedial Design Summary Report, and the 1995 initial monitoring event entries.

   Response—The typos in the dates for the above referenced bullets have been corrected. The following bulleted text from the Site Chronology section of the Five-Year Review report has been revised as follows:

   Seventh bullet in Section 2.1.2:

   - *In August 1990, the Draft Final RI Report and Draft Final Phase I FS were completed that included Sites 1 and 3 Landfill.*

   Between the existing ninth and tenth bullets in Section 2.1.2:

   - *In October 1991, the Final Focused FS was completed for the Sites 1 and 3 Landfill.*

6. **Page 2-3, Site 2.1.2, Site Chronology.** In the first bullet, the reason for deactivating the two extraction wells should be amended to clarify that water levels had dropped to below the bottom of the landfilled waste in all but one well.

Response—The following has been added to the end of the bullet text in Section 2.1.2:

On 19 November 1997, the 2 extraction wells (EW-06 and EW-07) were deactivated at the Sites 1 and 3 Landfill. Operation of the extraction wells was no longer required due to decreasing yields and stabilized water levels within the confines of the slurry wall. The groundwater levels had dropped below the bottom of the landfilled waste in all but 1 well.

7. **Page 2-4, Section 2.1.3.1 Physical Characteristics.** The description of the extent of the cap at the end of the fourth paragraph should also state that the cap was not installed over the waste in the Weapons Compound. In the fifth paragraph, the sentence regarding the deactivation of the extraction wells should also state that water levels had dropped to below the bottom of the landfilled waste in all but one well.

Response—The fourth and fifth paragraphs in Section 2.1.3.1 (Physical Characteristics) have been revised as follows:

A slurry wall was placed around the landfilled waste, with the exception of the Weapons Compound. It diverts clean groundwater flow around the landfill, preventing the groundwater from coming into contact with the landfill waste material. The slurry wall was keyed into the underlying marine clay unit and has a permeability rating from 10^{-6} to 10^{-7} cm/sec. In addition to the slurry wall, a low permeability cap was placed over the landfill to reduce the amount of rainfall infiltration and production of leachate within the landfill waste. The cap was extended over the slurry wall to prevent the infiltration of rainwater within the slurry wall limits. A small portion (less than 0.3 acres) of Site 1 is located within the Weapons Compound and was not included in the cover system due to security concerns for the Weapons Compound (U.S. Navy 1992).

There are 2 extraction wells within the Sites 1 and 3 Landfill (EW-6 and EW-7) located within the slurry wall, which are currently off-line. These extraction wells operated since June 1995 and ran intermittently from 1 to 18 November 1997. The extraction wells were deactivated on 19 November 1997, with the approval of MEDEP and EPA, due to: (1) decreasing yields; (2) stabilized water levels within the confines of the slurry wall; and (3) water levels measured inside the Sites 1 and 3 were 0.9 ft above the lowest reported depth of waste material with the exception of MW-234R, thus achieving the design intent of the low permeability cap, slurry wall, and landfill extraction wells. *Currently, there are 28 wells and piezometers that are gauged twice a year as part of the Long-Term Monitoring Program for this site. Of the 28 wells and piezometers, only 8 wells are currently sampled as part of the Long-Term Monitoring Program.*

8. **Page 2-6, Section 2.1.3.5 Basis for Taking Action.** The table of contaminants of concern (COCs) presented in Section 2.1.3.5 is missing several of the COCs listed in Table 1 on page 18 of the Sites 1 and 3 ROD: Chlorobenzene for groundwater, DDT for Leachate, and PAHs for Sediment. Please add these COCs.

Response—The COCs listed above have been added to the table in Section 2.1.3.5.

9. **Page 2-7, Section 2.1.3.5 Basis for Taking Action.** *"In addition, exposure to groundwater is not considered likely as this area of NAS Brunswick is serviced by a public water supply system."*

   As has been discussed in several recent meetings and conference calls, the assumption in all the RODs that groundwater exposure would not occur because the base was supplied by a public water system is not longer valid. The recent installation of a water supply well immediately adjacent to Site 2 demonstrates that supply wells can and will be installed at NAS Brunswick under current policies and controls. As stated on previous occasions, BACSE supports consideration of a base-wide institutional control for groundwater.

   Response—This topic has been discussed at recent technical meetings and during a few project conference calls. The Navy is considering the feasibility of a base-wide institutional control on groundwater, although no decision has been reached at this time. Further discussion with the project stakeholders is needed prior to the Navy determining its action regarding this topic. If a resolution of this matter is determined prior to finalization of the Second Five-Year Review Report, the resolution will be incorporated into the Second Five-Year Review Report. If not, this will topic will be included as a "follow-up/action item" in the Second Five-Year Review Report.

10. **Page 2-8, Section 2.1.4 Remedial Action.** In accordance with page 1 of the ROD for Sites 1 and 3, the following should be added to the end of the second sentence in the first paragraph: "... to prevent further migration of contaminants to Mere Brook."

    Response—The paragraph has been revised as follows:

    The ROD was signed on 16 June 1992 and presents the remedy for Sites 1 and 3 Landfill. The selected remedy for the site includes containment by constructing a cap over the landfills and a slurry wall around the waste to divert clean water away from the landfills. Contaminated groundwater contained by the cap and slurry wall will be pumped from the landfill using extraction wells and treated. Eliminating leachate seeps will mitigate surface water and sediment contamination in Mere Brook (U.S. Navy 1992). The Navy concluded that the selected remedial action was, and continues to remain, protective of human health and the environment.

11. **Page 2-8, Section 2.1.4 Remedial Action.** The first paragraph ends with the statement that the remedy was and continues to be protective of human health and the environment. However, the ROD for Sites 1 and 3 (see page 2) states that eliminating the leachate seeps will mitigate contamination in Mere Brook. Please clarify the current situation regarding seeps discharging to Mere Brook.

    Response—Page 2 of the 1992 ROD states, *Eliminating leachate seeps will mitigate surface water and sediment contamination in Mere Brook.* We interpret this statement in the ROD to indicate that by removing the seeps, there will be less (mitigate) surface water and sediment contamination in Mere Brook. This statement within the ROD does not indicate contamination will be completely eliminated from the brook, as suggested by the comment.

The 1992 ROD states that environmental monitoring will be required for a minimum of 30 years, 11 years of which have passed since the slurry wall was installed and monitoring was initiated in 1995. During the 30-year time period, it is expected that the seeps will decrease in frequency and level of contamination as clean water continues to pass around the slurry wall and discharge into the Brook. Sampling data from the Long-Term Monitoring Program for the sediment and surface water show that VOC concentrations have decreased significantly since the slurry wall was installed. Metals concentrations in seeps show a less definitive trend, which is not unexpected as metals are often bound to organic material and, therefore, require a longer time for remediation. Based on the data, we believe the remedy continues to be protective of human health and the environment.

12. **Page 2-9, Section 2.1.4 Remedial Action.** According to the Remedial Action Objectives (RAOs) on page 24 of the Sites 1 and 3 ROD, the second bullet should also cover discharge of leachate. The bulleted goals of the long-term monitoring should also include monitoring of institutional control (IC) measures, such as signs (see page 52 of the ROD). The description of the slurry wall and cap in the final paragraph should specify that the cap and slurry wall do not extend into the Weapons Compound. The ROD (pages 47-48) states that one pore volume of groundwater (an estimated 16 million gallons) was to be removed by the extraction wells. Was this volume attained before the extraction wells were shut down? Please add to the discussion.

Response—The remedial action objective bullets presented in Section 2.1.4 are the same bullets presented in the 1992 ROD. The text of the second bullet on Page 24 of the 1992 ROD is as follows:

- *Minimize future negative impacts to Mere Brook and sediment in the leachate seeps resulting from the discharge of contaminated groundwater, leachate, and sediment.*

...to reduce the potential risk associated with ingestion of contaminated groundwater.

The long-term monitoring goals presented in Section 2.1.4 are from the most current Long-Term Monitoring Plan for Sites 1 and 3 and the Eastern Plume. Note that institutional controls (fencing and signs) have been added to this section. The following text has been added regarding volume of extracted groundwater:

The ROD stated one pore volume of groundwater within the slurry wall (estimated at 16 million gal) was to be removed by the extraction wells. Approximately 3.6 million gal were removed by extraction wells EW-6 and EW-7 from January 1996 to November 1997 when the wells were deactivated once water elevations stabilized below the majority of the waste. It is likely that a significant volume of water also migrated out of the landfill through the opening in the slurry wall, which contributed to the stabilized water elevations within the landfill.

13. **Page 2-10, Section 2.1.4.2 System Operation/Operation and Maintenance.** BACSE agrees with EPA Comment Number 22, dated November 9, 2004, that inspection should cover any drinking water well installation or other disturbance within the IC boundary. The inspection should also check required signage (page 52 of the ROD).

    Response—The following bullets have been added to Section 2.1.4.2:

    - *Inspection for drinking water wells and any ground disturbance within the institutional control boundary.*
    - *Inspection of required signage around the landfill and near the seep sample locations.*
    - *Inspection of the institutional control boundary (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and any ground disturbance of the ground surface).*

14. **Page 2-10, Section 2.1.4.2 System Operation/Operation and Maintenance.** The reference for the Navy's response to the MEDEP's October 2003 letter should also be provided in the text in the last paragraph in this section and in the references section.

    Response—The appropriate reference has been added to the end of this paragraph in Section 2.1.4.2 and to the reference section of the report.

15. **Page 2-14, Section 2.1.6.6 Interviews.** The statement regarding notes of RAB meetings being distributed to all meeting attendees is a bit confusing. Does "notes" mean minutes of the meeting or handouts outlining the evening's presentation? Please clarify in the text. This comment also pertains to Sections 2.2.6.6, 2.3.6.6, 2.4.6.6, and 2.5.7.6.

    Response—The fourth sentence in Sections 2.1.6.6, 2.2.6.6, 2.3.6.6, 2.4.6.6, and 2.5.7.6 has been revised as follows:

    Meeting minutes of the RAB meetings were prepared and distributed to all meeting attendees.

16. **Page 2-15, Section 2.1.7 Technical Assessment.** The last sentence in the response to Question B states that none of the changes in the toxicity values for several COCs would affect the risk assessment. Please add to the text why this is so.

    Response—The changes in toxicity values were reviewed by a risk assessor to determine if changes in the toxicity values would affect the outcome of the risk assessment. The results of that review are provided in Attachment B and as Table 2-1 of the report.

17. **Page 2-16, Section 2.1.9 Recommendations and Followup Actions.** An IC or other appropriate measure is needed to address the future closure of the Weapons Compound. Page 46 of the ROD states that should the Weapons Compound close, the Navy would evaluate the need to extend the cap to include the portion of the Weapons Compound that is also part of the landfill area. BACSE also believes that the measure should address construction or any other ground disturbance in this area of the Weapons Compound. An appropriate issue should be added to Section 2.1.8, and an appropriate statement to Section 2.1.10 as well.

Response—There is no indication that the Weapons Compound will close within the near future; however, the Base Realignment and Closure 05 list will become final by the end of 2005. Page 46 of the 1992 ROD notes that this area (the area within the Weapons Compound not covered by the cap) is less than 0.3 acres; and although waste was uncovered in this area, much of it is assumed to have been removed during construction. Only a small area within the Weapons Compound is believed to contain waste, and computer simulations of groundwater flow did not show a difference between the effects of a cap including or excluding this area. Incorporating a requirement during the bi-annual inspections of the landfill to note any construction activities or ground disturbance in the Weapons Compound will provide further assurances that the institutional controls are effective as stated in the 1992 ROD.

The following has been added to the table in Section 2.1.8:

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Institutional control monitoring (construction tasks within the Weapons Compound to include decommissioning, new construction, demolition of existing structures, and disturbance of the ground surface)	*No*	*Yes*

The following has been added to the table in Section 2.1.9:

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Construction or ground disturbance within the Weapons Compound	*Expand bi-annual institutional control inspection checklist to include noting construction activities or ground disturbances within the Weapons Compound area*	*Navy*	*EPA/ MEDEP*	*Not applicable*	*No*	*Yes*

The following sentence has been added between the third and fourth sentences of the paragraph in Section 2.1.10:

...limiting access only to authorized personnel. If, in the future, the Weapons Compound should be decommissioned, the Navy would evaluate the need to extend the cap to include that portion of the Weapons Compound, which is also part of the landfill area. Current monitoring data indicate that the remedy...

18. **Page 2-18, Section 2.2.2 Site Chronology.** The tenth bullet should also contain the information from page 12 of the Site 2 ROD that the report does note the presence of elevated concentrations of some pesticide-related compounds, but that the source of these compounds was not determined as a part of this study.

    Response—The following sentence has been added after the last sentence of the tenth bullet in Section 2.2.2:

    ... no adverse effects were identified resulting from inorganic contamination. The report did note the presence of elevated concentrations of some pesticide-related compounds, however, the source of these compounds was not determined as a part of this study.

19. **Page 2-20, Section 2.2.3.1 Physical Characteristics.** The sand thickness should be corrected to range from 5 to 11 feet.

    Response—The first sentence in Section 2.2.4.1 (Physical Characteristics) has been revised as follows:

    ... a transitional layer of interbedded silts and sand ranging in thickness from 5 to 11 ft.

20. **Page 2-21, Section 2.2.3.2 Land and Resource Use.** Information regarding when the bedrock well was installed and how far to the west it is from Site 2 should be added. The two sentences that state that the well is not impacted or affected by Site 2 should be revised to state that the well does not appear to be affected or impacted at the current time.

    Response—The second paragraph of Section 2.2.4.2 has been revised as follows:

    Groundwater associated with the site is not used for potable purposes or any other uses. The Base is connected to a public water supply administered by the Brunswick Topsham Water District, with the exception of the golf course and one bedrock well located to the west of Site 2. The base golf course is distant from Site 2 Landfill and is not affected by groundwater flow from the Site 2 Landfill. A bedrock well is located approximately 200 ft west of Site 2 at the guard entrance station at Dyers Corner. This well was installed in 2002, is screened below a relatively impermeable marine clay, and is not affected by Site 2. This well has been sampled for Site 2 COCs and no compounds or elements were detected in the samples collected to date, therefore, it appears that it is not impacted based on the current data. Mere Brook, north-northeast of the Site 2 Landfill, receives drainage from the runways, as well as runoff and leachate from the landfills.

Since this area is restricted, the Brook is not commonly used for recreational activities in the reaches of the Brook adjacent to the landfill. Mere Brook flows into the Atlantic Ocean at Harpswell Cove, which is designated as a potential aquacultural area by the State of Maine. Harpswell Cove supports various commercially important fish species (U.S. Navy 1994).

21. **Page 2-22, Section 2.2.3.3 History of Contamination.** This section ends with a statement about a biological sampling program conducted at Mere Brook since 1994. Please add information regarding what the program is, what sampling is performed, what the results have indicated to date, and how the information and data are shared with project stakeholders and used in decision-making for Site 2.

    Response—The biological sampling program is completed under the Base's NPDES permit, and is not part of the Navy's Installation Restoration Program or as a requirement of CERCLA; therefore, the text describing this program has been deleted from the Five-Year Review Report. The Activity has collected this information under a State program and forwards the collected data to the State. Note that the Activity merely collects the data and forwards it to the State; the Activity does not interpret the data.

22. **Page 2-22, Section 2.2.3.4 Initial Response.** The report that documents the removal and disposal of surface debris and addition of a soil cover should be cited. The section should also explain why Site 16 suddenly crops up in a discussion of Site 2.

    Response—The reference has been added to the first sentence of Section 2.2.4.4. The sentence has been revised as follows:

    In August 1999, Foster Wheeler removed and disposed of miscellaneous surface debris located immediately south and east of Site 2 Landfill and placed a soil cover on the landfill where none had existed (Foster Wheeler 1999).

    The weight of 3,980 lb is a combined total weight from both Site 2 and Site 16. The weight of metal removed at each site was not recorded.

23. **Page 2-22, Section 2.2.3.5 Basis for Taking Action.** The first sentence is a bit confusing; please revise. Chromium should be added to the COCs for Leachate Seeps per page 14 of the Site 2 ROD. For stream sediment, the ROD lists "the PAH phenanthrene."

    Response—The first sentence of Section 2.2.4.5 has been revised as follows:

    During the RI/FS, environmental impacts were reported in the surface water, stream sediment, leachate seep, and surface soil associated with these seeps at Site 2.

The following additions have been made to the table in Section 2.2.3.5:

Leachate Seeps		
4,4'-dichlorodiphenyltrichloroethane		*Chromium*
4,4'-dichlorodiphenyltrichloroethane		*Lead*
4,4'-dichlorodiphenyldichoroethylene (low levels)		*Mercury*
Arsenic		*Nickel*
Cadmium		
Surface Water	*Stream Sediment*	*Surface Soils*
Iron	*PAHs*	*Mercury*
Zinc	*Phenanthrene (PAH)*	
	Iron	

24. **Page 2-23, Section 2.2.4 Remedial Actions.** The sentence from the top of page 2 of the ROD regarding "Should NAS Brunswick close and/or transfer..." should be added to the first bullet.

    Response—The following sentence has been added to the end of the first bullet in Section 2.2.4 as stated on Page 2 of the 1998 ROD:

    Should NAS Brunswick close and/or transfer this property, EPA and MEDEP will be notified and appropriate wording will be included in the necessary real estate documents.

25. **Page 2-24, Section 2.2.4.1 Remedy Implementation.** Please clarify if there was some unexploded ordnance or similar material retrieved from Site 2.

    Response—The first paragraph in Section 2.2.5.1 (Remedy Implementation) has been revised as follows:

    In August 1999, the Navy's Remedial Action Contractor, Foster Wheeler Environmental Corporation, removed and disposed of miscellaneous surface debris located south and east of the Site 2 Landfill and placed a soil cover on the landfill where none had existed. The miscellaneous surface debris (crushed empty drums, chairs, and miscellaneous metal debris) was removed and placed in roll-off containers for offsite disposal. During the 1999 removal action of the surface debris at Site 2, the Navy's contractor identified a potential unexploded ordnance (UXO) and immediately stopped work at the site. A UXO contractor was brought in to identify and dispose of the UXO. It was later determined by the UXO contractor to be a grenade fuse. No other UXO was found at Site 2 before or after the site work in 1999.

26. **Page 2-25, Section 2.2.5 Progress Since the Last Five-Year Review.** The sixth bullet should be corrected to state that the LTMP has been finalized by the end of 2004.

    Response—The sixth bullet of Section 2.2.6 (Progress Since the Last Five-Year Review) has been revised as follows:

- *In February 2000, the LTMP was updated and finalized.*

A new bullet has been added to the end of this section as follows:

- *During 2004, the Site 2 LTMP was updated and revised. The revised final LTMP was issued in January* 2005.

27. **Page 2-27, Section 2.2.6.4 Data Review, Groundwater Sampling.** "*In addition, the landfill has a previous cover that allow surface water and precipitation...to infiltrate...*" This statement implies that the current cover does not allow infiltration. Please revise.

    Response—The last sentence of the first paragraph in Section 2.2.7.4 (Groundwater Sampling) has been revised as follows:

    In addition, the landfill has a cover that allows surface water and precipitation (snow and rain) to infiltrate the cover material (sand) into the landfilled material at Site 2.

28. **Page 2-28, Section 2.2.6.6 Interviews.** The verbs in the sentences regarding the October 2004 RAB meeting should be revised to past tense. This comment also applies to Sections 2.3.6.6 (p.2-40), 2.4.6.6 (p.2-59), and 2.5.7.6 (p. 2-75).

    Response—The second sentence in Sections 2.2.7.6, 2.3.7.6, 2.4.7.6, and 2.5.7.6 has been revised as follows:

    However, during the October 2004 RAB meeting, the community was informed of the five-year review process for NAS Brunswick, and copies of a related EPA handout were provided by EPA entitled..."

29. **Page 2-31, Section 2.3.2 Site Chronology.** This section contains a bullet regarding the 1994 adoption of risk-base MEGs by the MEDEP. BACSE suggests that a similar bullet be added to the Site Chronology sections for the other sites.

    Response—The ninth bullet of Section 2.3.2, as shown below, has been added to Sections 2.1.2, 2.2.3, 2.3.3, 2.4.2, and 2.5.3:

    - *In 1994, MEDEP adopted the risk-based MEGs for groundwater by reference as part of the Maine Hazardous Waste Rules Relating to Performance Standards for Establishing Construction, Altering, and Operation of Certain Types of Hazardous Waste Units.*

30. **Page 2-32, Section 2.3.2 Site Chronology.** Bullets regarding the December 2000 pump test and the July 2001 excavation (see page 2-5 of the Site 7 ROD) should be added to this section. One of the 9 April 2002 bullets should be removed. The April 2002 removal of stockpiled excavated soils is listed, but not the spreading of excavated materials. Please revise.

Response—The following bullets have been added to Section 2.3.3:

- *In December 2000, a short duration pump test was conducted to assess the volume and extent of the cadmium plume at Site 7, and to determine whether groundwater extraction changed cadmium concentrations.*

- *In July 2001, test pit excavations were completed in the vicinity of well MW-NASB-094 and included areas immediately upgradient and downgradient of well MW-NASB-094 (EA 2002).*

The following addition has been made to Bullet 17 in Section 2.3.3:

- *In April 2002, the Navy's Remedial Action Contractor removed the stockpiled soils at Site 7, which was excavated in an attempt to identify and remove the cadmium source area that could have been impacting groundwater. As part of this removal action, 400 yd^3 of soil were excavated, 140 yd^3 of contaminated soil was disposed of offsite, and 260 yd^3 of clean soil was spread on the ground surface at Site 7 (approximately 6-in. layer) and may be covering soil identified during the RI as contaminated with DDT and PAHs (Foster Wheeler 2003).*

31. **Page 2-33, Section 2.3.3.2 Land and Resource Use.** "*Future land use at Site 7 is likely to remain undeveloped....and there are no plans to extract site groundwater for potable and/or domestic use.*"

BACSE has expressed concern that a possible major development (a National Guard center with large paved parking area) in the immediate vicinity of Site 7 could potentially disrupt groundwater chemistry and flow, which could in turn disrupt remediation of groundwater at Site 7. BACSE believes there should be additional discussion of the dimensions of the Site 7 IC boundary to ensure that nearby development does not hamper remediation of Site 7 groundwater. Regarding the second half of the passage quoted above, please see Comment Number 9 above regarding BACSE's position on the potential for groundwater use and the need for an appropriate IC.

Response—The base has identified an area to the northwest of Site 7, north of the former Old Navy Fuel Farm, and east of the new Fuel Farm as a potential area for a reserve center. No decision has been made, and there are no plans in place for construction. The preliminary planning by the Activity identified this area only as a potential site; therefore, it would not be prudent to enter into discussions about adjusting the size of the institutional control boundary at Site 7 until this potential development has been accepted by the Base. The Navy will inform the project stakeholders of any development that would potentially affect the Site 7 remedy or any other CERCLA remedy.

See the response to BACSE Comment No. 9 regarding a base-wide restriction on groundwater use.

32. **Page 2-33, Section 2.3.3.2 Land and Resource Use.** Either the depth or the thickness range for the fine to medium sand should be provided. Please revise. The second sentence in the final paragraph should be deleted as it duplicates information in the previous paragraph.

Response—The third and fourth paragraphs of Section 2.3.4.2 have been revised as follows:

The Site 7 area is underlain by fine to medium sand at depths ranging up to 20 ft. A transitional unit, common elsewhere at NAS Brunswick, was not identified underlying the sand at Site 7. Underlying the sand is a clay unit. The depth to bedrock at the site has been inferred based upon refusal depth to range from 11.7 to 20.6 ft below ground surface (bgs).

Hydrogeology at Site 7 is characterized by shallow groundwater in the overburden soil, and the water table varies in depth between 4 and 7 ft bgs. There are no wetland areas, ponds, or streams located at Site 7; however, there is a drainage ditch within the institutional control boundary.

33. **Page 2-33, Section 2.3.3.3 History of Contamination.** Miscellaneous liquids should be added to the list of materials reported to be disposed at Site 7. The site use in the second sentence should also include equipment laydown area. The last two lines in the section should be deleted as they duplicate information presented earlier.

Response—The first and second sentences of the first paragraph in Section 2.3.4.3 (History of Contamination) has been revised as follows:

From 1952 to 1969, Site 7 was used to dispose of transformer oils, battery acids, solvents, and miscellaneous liquids. In addition to the acid caustic pit, the area was used as an equipment laydown area and Defense Reuse and Marketing Office facility.

The last two sentences in Section 2.3.3.3 should remain since the section is describing the "History of Contamination" and aids the reader.

34. **Page 2-34, Section 2.3.3.5 Basis for Taking Action.** Section VII.C. on page 2-22 of the Site 7 ROD is entitled "Basis for Response Action." The three bullets listed in that section should also be listed here in Section 2.3.3.5. Of particular note is the additional risk estimates reported in 1992 identified risks that exceeded the State of Maine risk threshold. A summary of the 1992 report should be included in this section as well.

Response—The reference bullets have been added to Section 2.3.4.5 Basis for Taking Action that were presented in 2002 ROD. The following text has been inserted into Section 2.3.4.5 after the table of COCs:

The response action at Site 7 was based on the following:

- *Residential use of the site in the future may present an unacceptable risk to human health.*

- *The baseline human health risk assessment revealed that children who may trespass or play in this area are not potentially at risk if exposed to COCs via repetitive dermal contact or accidental ingestion (E.C. Jordan 1990). However, additional risk estimates (E.C. Jordan 1992) identified risks that exceed the State of Maine risk threshold.*

- *If not addressed by implementing the selected remedy in the ROD, these factors may present an unacceptable risk to human health or the environment.*

A summary of the identified risks noted in the 1992 report have been added at the end of Section 2.3.4.5, as shown below:

In 1992, additional risk estimates were generated for Site 7 based on a standardized future residential exposure scenario developed by EPA (E.C. Jordan 1992). This guidance was not available at the time the risk assessment was conducted during the Draft Final RI. The incremental carcinogenic risks associated with exposure under a future potential residential land use scenario is 3×10^{-5}, assuming exposure to average concentration and 1×10^{-4} assuming exposure to the maximum concentration (E.C. Jordan 1992). While both risk estimates are within EPA's target risk range of from 10^{-6} to 10^{-4}, they exceed the State of Maine's target risk threshold of 1×10^{-5}.

35. **Page 2-42, Section 2.3.7 Technical Assessment.** The date of the ROD listed under the Technical Assessment Summary should be corrected to 2002.

Response—The first sentence in Section 2.3.8 (Technical Assessment Summary) has been revised as follows:

Based on the data reviewed and site inspections, the remedy is functioning as intended by the 2002 ROD...

36. **Page 2-43, Section 2.3.10 Protectiveness Statement.** Please provide the basis for the 10-year timeframe to attain cleanup goals.

Response—This was the timeframe presented in the 2002 ROD. The text has been revised to note the basis of the 10-year timeframe.

37. **Page 2-44, Section 2.4.2 Site Chronology.** The Baseline Risk Assessment should be listed

Response—Note that the baseline risk assessment was completed as part of the Remedial Investigation. The fifth bullet in Section 2.4.2 (Site Chronology) has been revised as follows:

- *In August 1990, a Draft Final RI/FS was completed at Site 9 (E.C. Jordan 1990). Vinyl chloride contamination was identified in groundwater, however, test pit and soil borings found no source of the contamination. The RI/FS included a risk assessment for the site.*

38. **Pages 2-46 &- 2-47, Section 2.4.3.2 Land and Resource Use.** The first sentence should be deleted as it duplicates the first sentence in Section 2.4.3.1. The date of Building 216 demolition is Summer 2002 on page 2-45 and 2001 on page 2-46. Please correct as necessary. The depth of groundwater is given as 10-14' bgs in the ROD (pages 2-2 and 2-12). Why is the depth to groundwater a less-precise "less than 20 feet" on page 2-47 in Section 2.4.3.2?

    Response—The first sentence of the first paragraph in Section 2.4.3.2 (Land and Resource Use) has been removed. The correct date regarding the demolition of Building 216 is 2002; therefore, the last sentence of the first paragraph in Section 2.4.3.2 has been revised as follows:

    Barracks Building 216 was demolished in 2002.

    The first sentence of the second paragraph in Section 2.4.3.1 (Physical Characteristics) has been revised as follows:

    Groundwater occurs at the site at a depth of 10-14 ft bgs, and is unconfined.

39. **Pages 2-48, Section 2.4.3.2 Land and Resource Use.** The last paragraph in the section on page 2-48 should be under a separate heading or moved to another section. Please see Comment Number 9 above regarding BACSE's position on the potential for groundwater use and the need for an appropriate IC.

    Response—The sentence has been revised as per EPA Comment No. 57. See response to BACSE Comment No. 9 regarding the base-wide restriction on groundwater use.

    The last paragraph of Section 2.4.3.2 Land and Resource Use has been revised as follows:

    NAS Brunswick will be demolishing the barrack buildings located over the landfill. It is planned to take the buildings down to 1 ft bgs. An Engineering Evaluation/Cost Analysis is being developed to determine if the ash landfill/dump area will be removed prior to new buildings being constructed over the area of the ash landfill/dump area. NAS Brunswick has no plans to cease active base status. Groundwater for use as a potable or domestic source is not expected to occur.

40. **Page 2-50, Section 2.4.3.5 Basis for Taking Action.** Please explain why Carcinogenic PAHs, which are listed in the table on page 2-2 of the Site 9 ROD are not also listed in Section 2.4.3.5. The bullets at the bottom of page 2-50 and top of page 2-51 should be renumbered.

Response—The table in Section 2.4.3.5 has been revised as follows:

Sediment	*Groundwater*	
Benz(a)anthracene	*Vinyl chloride*	*Barium*
Chrysense	*1,1-dichloroethane*	*Cadmium*
Benzo(b)fluoranthene	*1,2-dichloroethylene*	*Chromium*
Benzo(k)fluoranthene	*2-butanone*	*Manganese*
Benzo(a)pyrene	*Toluene*	*Mercury*
Indeno(1,2,3-cd)pyrene	*PAHs (total)*	*Vanadium*
Dibenzo(a,h)anthracene	*Aluminum*	
Carcinogenic PAHs		

The bullets in Section 2.4.3.5 have been renumbered as follows:

1. ***Contaminant Identification***—*Identified those hazardous substances which, given the specifics of the site, were of significant concern*

2. ***Exposure Assessment***—*Identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure*

3. ***Toxicity Assessment***—*Considered the types and magnitude of adverse health effects associated with exposure to hazardous substances*

4. ***Risk Characterization***—*Integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.*

41. **Page 2-51, Section 2.4.3.5 Basis for Taking Action.** It would be more realistic to state that there are currently no plans to close the base in the near future in the bullet at the bottom of page 2-51.

Response—The third bullet of Section 2.4.3.5 has been revised as follows:

It is predicted that land and groundwater use will remain the same, as there are no plans to close the base in the near future; however, the Base Realignment and Closure 05 list will become final by the end of 2005.

42. **Page 2-55, Section 2.4.4 Remedial Actions.** There are some words missing from the IC bullet. The first sentence should end "...contents of the ash landfill/dump area at Site 9 without prior written approval from EPA and MEDEP" to be consistent with page 2-39.

Response—The seventh bullet in Section 2.4.4 (Institutional Controls) has been revised as follows:

- ***Institutional Controls***—*Institutional controls are being used to prevent the use of and contact with impacted groundwater, and prevent the disturbance of or contact with the contents of the ash landfill/dump area at Site 9 without prior written approval from EPA and MEDEP. These controls primarily consist of groundwater and land use restrictions.*

43. **Page 2-56, Section 2.4.4.1 Remedy Implementation.** According to page 2-5 of the 1999 ROD, ICs were not part of the 1994 Interim ROD. Please correct the first sentence.

    Response—Please refer to Page 1, first sentence of the September 1994 Interim ROD. The sentence will remain as written.

44. **Pages 2-58 & 2-59, Section 2.4.6.4 Data Review.** Please clarify the number of wells currently being sampled. There are 12 required wells per page 3 of the Monitoring Event 23 Report, and 10 wells in the first paragraph under the Groundwater Monitoring heading on page 2- 58. Information regarding the number of wells and surface water locations gaged should also be added. The last sentence in the Surface Water Monitoring heading should note the exception for concentrations measured in 1996.

    Response—Currently, there are 17 wells that are gauged as part of the Long-Term Monitoring Program; 11 wells are sampled for VOCs. Three of 11 wells are also sampled for SVOCs and TAL metals. The first paragraph of Section 2.4.6.4 (Groundwater Monitoring) has been revised as follows:

    Currently, 17 monitoring wells and 2 stream gauges are gauged prior to sampling activities at Site 9. Groundwater is collected from 10 wells at Site 9 for volatile organic analysis per EPA Method 8260B using passive diffusion samplers. In addition to VOC analysis, 3 of 10 wells are sampled for SVOCs and TAL metals via the low-flow method.

    The last sentence of Section 2.4.6.4 (Surface Water Monitoring) will be revised as follows:

    Historically, total VOC and vinyl chloride concentrations have remained consistently low, ranging between non-detect and approximately 3 µg/L, with the exception of one spike in the total VOC concentrations in 1996.

45. **Pages 2-60 - 2-61, Section 2.4.7 Technical Assessment.** The fourth paragraph of the response to Question B on page 2-60 should also provide a comparison with the State of Maine risk threshold. The response to Question B on page 2-61 notes that the MEG for lead has been lowered, but this is not discussed in the Technical Assessment Summary. Please clarify what effect, if any, the lower MEG for lead had on the remedy for this and the other sites.

    Response—The lowering of the State MEG for lead has no impact to the Site 9 remedy since lead is not a COC at Site 9, and lead has not been identified in the groundwater exceeding the MEG or MCL at Site 9.

46. **Page 2-63, Section 2.5.2 Site Description.** The fourth sentence in the first paragraph should be deleted as it duplicates the first sentence in the first bullet.

Response—The fourth sentence in the first paragraph of Section 2.5.2 (Site Description) has been removed from the paragraph. The revision is as follows:

...The Eastern Plume has been attributed to past solvent disposal practices from Site 4, Site 11, and Site 13, which leached into groundwater. A description of each of the sites that are suspected source areas for the contaminated groundwater of the Eastern Plume is provided below: ...

47. **Page 2-65, Section 2.5.3 Site Chronology.** The 2/13/00 Post-ROD change (see pages 32 and 34 of the ROD) should be listed.

Response—The following bullet text has been revised to address the post-ROD changes presented in the 2000 Explanation of Significant Difference, specifically the treatment plant equipment, as follows:

- *In December 2000, the Navy finalized an ESD for the Eastern Plume. The ESD included documenting the institutional control boundary of the Eastern Plume and changes to the treatment equipment for the GWETS. The institutional control boundary includes Sites 1 and 3 Landfill.*

48. **Page 2-67, Section 2.5.4.3 History of Contamination.** The highest VOC concentration reported in the Eastern Plume is 19,000 ug/L, not 12,000 ug/L, according to page 20 of the Monitoring Event 23 Report. Please correct.

Response—The fourth sentence in Section 2.5.4.3 has been revised as follows:

Total VOC concentrations within the Eastern Plume vary from low levels near the plume boundary to concentrations as high as 19,000 µg/L within the center of the plume.

49. **Page 2-67, Section 2.5.4.4 Initial Response.** As currently written, this section misses a (the) major driver of the Interim Action, which was "intended to control and prevent further migration of contaminated groundwater toward Harpswell Cove...," see page 11 of the ROD. Please revise this section.

Response—Section 2.5.4.4 (Initial Response) has been revised as follows:

The RI conducted during the early 1990s identified contaminated groundwater that originated from Sites 4, 11, and 13 exceeded the target risk levels, Federal MCLs, and State MEGs. Therefore, the Navy completed and finalized an Interim ROD in 1992 to allow the Navy to begin to extract, treat, and discharge the Eastern Plume groundwater to address the dissolved-phase solvent contaminated groundwater. The interim remedial

action was intended to control and prevent further migration of contaminated groundwater toward Harpswell Cove and to begin to reduce the amount of contamination within the Eastern Plume (U.S. Navy 1998).

50. **Page 2-67, Section 2.5.4.5 Basis for Taking Action.** The table at the bottom of page 2-67 is missing 1,2-DCA and 1,1,2-TCA which are included in Table 2, Groundwater Remediation Goals, on page 33 of the ROD. Please correct.

    Response—This table lists the site's COCs, which are presented on Page 24, Table 1, of the 1998 ROD. Table 2 on Page 33 of the 1998 ROD is entitled "Remediation Goals." The text is correct as presented in the draft report.

51. **Page 2-70, Section 2.5.5 Remedial Actions.** The first full paragraph on page 2-70 must be revised to clearly state that the no further action for Sites 4, 11, and 13 is for soils at those locations.

    Response—The second paragraph of Section 2.5.5 (Remedial Action) has been revised as follows:

    In February 1998, the ROD for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume groundwater monitoring was finalized. No Further Action for soils was determined to be appropriate for Sites 4, 11, and 13 since the soils did not pose an unacceptable risk from direct contact or incidental ingestion.

52. **Page 2-70, Section 2.5.5 Remedial Actions.** The paragraph beneath the first four bullets on page 2-70 identifies the bullets as "objectives" when they are actually components of the remedy. The paragraph should be revised and the RAOs listed on page 26 of the ROD should be added as well.

    Response—A new paragraph has been inserted into the text after the fourth bullet and before the third paragraph. The new text eliminates the need for a revision to the text of the third paragraph.

    Based on the type of contaminants, environmental media of concern, and potential exposure pathways, RAOs were developed to mitigate existing and future potential threats to human health and the environment (U.S. Navy 1998). These RAOs are to:

    1. *Minimize further migration of the Eastern Plume*

    2. *Minimize any future negative impact to surface water resulting from discharge of contaminated groundwater*

    3. *Reduce the potential risk associated with ingestion of contaminated groundwater to acceptable levels*

    4. *Restore the aquifer.*

To accomplish these objectives within a 17- to 72-year timeframe as specified in the ROD, the following components were implemented:

53. **Page 2-70, Section 2.5.5 Remedial Actions.** The second sentence in the Groundwater Extraction and Treatment bullet should state that the Interim ROD was signed for containment, as well as extraction and treatment. The location of the discharge is no longer the POTW (except in an emergency situation) - please update the discharge location.

Response—The fifth bullet in Section 2.5.5 (Remedial Action) has been revised as follows:

> ***Groundwater Extraction and Treatment***—*Continuance of the existing extraction system. In 1992, an Interim ROD was signed ~~for~~ to initiate control and prevent further migration of the contaminated groundwater toward Harpswell Cove and to begin reducing the amount of contamination within the Eastern Plume. The system, operating since May 1995, provides pretreatment to remove turbidity and inorganics, ultraviolet oxidation to destroy VOCs, discharge of treated water to the local publicly-owned treatment works, and periodic disposal of filter press sludge from the inorganics treatment process. An additional extraction well (EW-2A) was added to the extraction system in July 1998. EW-2A was designed to prevent further movement of migration toward surface water, and recover more mass of contaminants located in an area of the plume found to have a greater accumulation of VOCs. In late 2000, Foster Wheeler removed the ultraviolet oxidation system and installed an air stripper system with carbon polishing. In January 2001, the air stripper and carbon went through a prove-out period; and, on 11 January 2001, the ultraviolet oxidation system was taken offline. The GWETS continued to discharge to the Brunswick Sewer District with the new treatment equipment. During 2001, Foster Wheeler designed and installed an infiltration gallery over Site 11. In January 2002, discharge of the GWETS effluent changed from the Brunswick Sewer District to the infiltration gallery that was constructed during 2001 at Site 11.*

54. **Page 2-70, Section 2.5.5 Remedial Actions.** The purpose of the groundwater monitoring, as identified on page 32 of the ROD, should be added to the beginning of the Monitoring bullet. The purpose is to measure the performance of the groundwater extraction system and to ensure that contamination currently in the groundwater does not continue migrating toward the surface water.

Response—The text on Page 32 of the 1998 ROD states that, *This long-term monitoring program is designed to measure the performance of the groundwater extraction and treatment system, and ...* and on Page 34 of the 1998 ROD states that, *The goals of the plan are as follows: provide a tiered approach to attain ....* The text is correct as presented for this bullet since these are the goals presented in the 1998 ROD.

The following text has been inserted into Section 2.5.5 (Remedial Actions) after the bullet entitled "Groundwater Monitoring:"

The purpose is to measure the performance of the groundwater extraction system and to ensure that contamination currently in the groundwater does not continue migrating toward the surface water.

55. **Page 2-71, Section 2.5.5 Remedial Actions.** The Five-Year Reviews bullet states that "conditions at Sites 4, 11, and 13 will be evaluated to determine whether additional response actions may be necessary at those sites." Where is that evaluation documented in the Second Five-Year Review Report?

    Response—This text was taken from the 1998 ROD (Page 34) and is meant to present the components of the RAOs. A sentence has been added to the text that was included in the 1998 ROD to clarify what is meant by changed conditions. The text has been revised as follows:

    Five-Year Reviews—*Since the remedy will result in hazardous substances (COCs listed in the Final 1998 ROD) remaining in place, five-year reviews will continue to be conducted. In addition, conditions at Sites 4, 11, and 13 will be evaluated to determine whether additional response actions may be necessary at those sites. For example, if Building 538 was removed, the need for additional sampling in that area will be assessed. Conditions at Sites 4 and 13 have not changed since the last five-year review. However, the physical conditions at Site 11 have changed since the infiltration gallery was installed at Site 11. The area downgradient of the infiltration gallery is monitored as part of the Long-Term Monitoring Program for the Eastern Plume. Further details of the Second Five-Year Review evaluation regarding Sites 4, 11, and 13 have been included in Appendix A of final Second Five-Year Review Report.*

56. **Page 2-71, Section 2.5.5.1 Remedy Implementation.** The first sentence of this section states that the treatment system consists of 4 extraction wells. However, on page 2-63, the system is described as 5 wells. The ROD specifies 5 wells on page 28. The report text should be clear and consistent regarding what is currently in place and operating, as well as what is required under the ROD with regard to the extraction well system.

    Response—Currently, the Eastern Plume groundwater extraction system has 4 operating extraction wells: EW-1, EW-2A, EW-4, and EW-5A, and is stated in the report text on Page 2-71. Page 28 of the 1998 ROD states, *The extraction system consists of five groundwater extraction wells that are designed to hydraulically contain the plume and reduce contamination throughout the plume (U.S. Navy 1998).* The ROD language does not state that the extraction system is "required" to have five extraction wells, but states that the system will be developed during the remedial design. The Navy is currently in the process of assessing two areas within the Eastern Plume to install replacement extraction wells. One area is in the vicinity of MW-331 and the other in the area of P-106. The new extraction well near MW-331 will be a replacement for former extraction well EW-3. The current report text states there are four extraction wells that are "**active**" (Page 2-71), and the other reference (Page 2-63) to the extraction system wells used the word "**consisted**" to describe the system in the past tense. Both sentences are provided below:

Section 2.5.5.1 (Remedy Implementation), first paragraph, first sentence:

Groundwater within the Eastern Plume is currently being remediated by a treatment system that consists of 4 active extraction wells (EW-1, EW-2A, EW-4, and EW-5A).

Insert after the second sentence of the first paragraph:

The Navy is currently in the process of assessing two areas within the Eastern Plume to install replacement extraction wells. One area is in the vicinity of MW-331 and the other in the area of P-106. The new extraction well near MW-331 will be a replacement for former extraction well EW-3.

Section 2.5.2 (Site Description), second paragraph, second sentence:

A groundwater treatment system, which consisted of 5 groundwater extraction wells screened through the shallow and deep zones of the overburden aquifer, and ....."

57. **Pages 2-74 & 2-75, Section 2.5.7.4 Data Review.** This section should be updated to include information and recommendations from the latest monitoring event reports. The issue of potential impact and discharge to Mere Brook from page 36 of Monitoring Event (ME) 23 Report and the natural attenuation information summarized on page 35 of the same ME report should be added under the Groundwater Monitoring heading. The concern with apparent southward migration of the plume and increases of contaminants at wells 331 and 313 prompted the recommendation on page 36 of the ME 23 Report for more surface water sampling. This information should be added under the Surface Water Monitoring heading.

Response—The text in this section has been updated to include the recent data from the Monitoring Event 23 report as shown below:

Groundwater Monitoring

Concentration trends from monitoring wells located along the edges of the Eastern Plume appear to be relatively stable, with the exception of MW-313, suggesting limited migration of the VOC plume boundary during the period in which the five-year review has been conducted. Although, in general, VOC concentrations have been stable, the highest concentrations of the Eastern Plume are now noted at monitoring well MW-331 when they were previously recorded at P-106, approximately 1,000 ft to the north However, continued increases in concentrations at MW-331 in 2003 have been noted and this well is currently the monitoring point with the highest total VOC concentrations.

Elevated VOC concentrations (1,1-dichloroethene) have been reported in the deep diffusion sample collected from MW-313 in April 2002 and May and October 2003. Vinyl chloride (0.4J) was reported in the mid-depth diffusion sample collected from MW-313 in October 2002. In addition, 1,4-dioxane was reported in the low-flow groundwater samples collected at MW-313 during the April (84 ppb) and September (93.8 ppb) 2004 monitoring events.

Beginning with Monitoring Event No. 23, the Navy initiated additional groundwater sampling to assess whether geochemical conditions may be favorable for natural attenuation of chlorinated VOCs at selected wells in the Eastern Plume and were analyzed for natural attenuation parameters. This sampling was not required by the LTMP but was collected to provide initial data regarding the likelihood of natural degradation of chlorinated VOCs.

A subset of monitoring wells at the Eastern Plume was selected and sampled during the October 2003 monitoring event for natural attenuation parameter analysis. Eight shallow wells and 13 deep wells were sampled in order to provide initial information on the occurrence of natural attenuation within the Eastern Plume. The wells were selected to provide a general overview of natural attenuation conditions, and included shallow and deep wells located in mid-plume, downgradient, and sentinel locations.

A natural attenuation assessment groundwater study was conducted to provide data that can be used to assess whether evidence is present which suggests chlorinated VOC degradation by reductive dechlorination. Groundwater sampling activities for select natural attenuation parameters were performed at 21 locations from the shallow and deep aquifer zones at the Eastern Plume. A background groundwater sample was collected from location MW-1104.

Findings related to individual natural attenuation parameters (methane, dissolved oxygen, Eh, and the distribution of the chlorinated VOC breakdown products), and results of an initial quantitative weighted scoring, provide adequate evidence that conditions are favorable for reductive dechlorination of chlorinated VOCs in certain areas of the Eastern Plume. This evidence is particularly strong in the southern boundary region of the Eastern Plume, where groundwater sample data define the edge of the plume (MW-313, MW-333, and MW-334). These data suggest that the deeper saturated zones in the southern portion of the Plume are most likely to have conditions favorable for natural attenuation.

Surface Water Monitoring

The surface water sampling data collected during each bi-annual sampling event from 5 sample locations have shown stable and/or decreasing concentration trends for VOCs since the late 1990s, although one surface water sample in Spring 2003 noted 4 µg/L of trichloroethene at surface water sampling station SW-12 (close to MW-313).

The increasing concentrations of VOCs in the shallow and deep intervals (noted at monitoring wells MW-333 and MW-313) over the last 1-3 years suggest the Eastern Plume is slowly migrating into the vicinity of New Gurnet Road. The VOC migration is suspected from the diffusion and/or dispersion, in addition to groundwater movement to the south-southeast. Surface water sample SW-12 noted a low concentration detection of trichloroethene for the first time in May 2003, which coincides with an increase in total VOC concentrations at nearby well MW-313. No VOCs were detected at SW-12 during the October 2003 monitoring event. The combination of possible increasing

VOCs at these locations suggests that the Eastern Plume may be flowing upward into Mere Brook near this location. The EPA investigation in 2000 did not indicate that chlorinated VOCs were present at this location. This location appears to be only recently affected by chlorinated VOCs in deep groundwater, although data from Monitoring Event 23 did not show continued surface water impacts. Based on observations noted above, the Navy has planned for additional sampling in the vicinity of SW-12 to assess the water quality beginning in 2005.

Sediment Monitoring

The sediment sampling data are collected bi-annually from 1 sample location (SED-11). The sediment sample is analyzed for inorganics and pesticides. Analytical results have shown nominal concentrations of these analytes in long-term monitoring samples. Note that project action limits have not been developed for sediment samples, and should be developed after discussions between the Navy and regulators to determine appropriate standards/benchmarks to compare sediment sample data against.

Leachate Seep Monitoring

The leachate seep sampling data are collected during each bi-annual sampling event from 2 sampling locations (SEEP-10 and SEEP-11) for VOCs analysis. Since the mid-1990s, VOCs have been detected in the seep samples at concentrations ranging from non-detect to 33 µg/L, although no clear trend has been established.

58. **Page 2-76, Section 2.5.8 Technical Assessment.** The conclusion presented on pages 36 and 37 of the ME 23 Report is that the extraction well network appears to have limited effectiveness at maintaining hydraulic control of the plume. Rather, site geology and hydrogeology appears to control the plume. Assuming this is correct, since hydraulic containment of the plume was one of the two primary goals of the extraction system according to the ROD, it would be appropriate to discuss how to update the ROD to reflect current understanding of just what the extraction well network can and cannot accomplish. BACSE believes this topic should be discussed at the December 2004 technical meeting. In the meantime, statements in the Second Five-Year Review Report regarding the effectiveness of the remedy, or that the remedy is functioning as intended or designed, require further scrutiny and appropriate wording to qualify the statements.

Response—We agree this topic should be discussed further at the next technical meeting. A new paragraph has been added to the end of Section 2.5.5.2 (System Operation/Operation and Maintenance), as follows:

Based on the LTMP data collected during the Long-Term Monitoring Program, the extraction well network appears to have limited effectiveness at maintaining hydraulic control of the Eastern Plume (which appears to be contained due to hydrogeologic/ geological conditions at the Eastern Plume). The extraction well network has been effective at reducing VOC concentrations in specific areas. Consideration should be given to changing the remedial approach for the Eastern Plume from pump-and-treat to

hot-spot reduction, with an emphasis on natural attenuation for lower concentration areas such as plume margins. If it becomes necessary to change the remedy, an ESD or ROD amendment will be required. It may be possible to increase pumping effectiveness at areas with relatively high VOC concentrations (i.e., MW-331 and P-106) while reducing pumping where concentrations are lower (i.e., EW-1).

59. **Page 2-76, Section 2.5.8 Technical Assessment.** The second paragraph in the response to Question B states that no unacceptable risks were identified earlier for the Eastern Plume and that circumstances have not changed to alter that conclusion. BACSE points out that the center of the plume has apparently shifted to the south with potential increased discharge to Mere Brook. The need to further evaluate this situation should be acknowledged here and under the Technical Assessment Summary heading.

    Response—Although the center of the plume has shifted slightly to the south (highest concentrations noted at well MW-331), the plume boundaries have also moved slightly to the south, although impacts to surface water have not been measured. Therefore, although conditions within the plume have shifted, these changes have not impacted the exposure assumptions that comprise Question B including toxicity data, cleanup values, and RAOs for the Eastern Plume. The Navy is assessing the area around MW-313, and recommendations were made in the last monitoring event report to collect three additional surface water samples in the area of monitoring well MW-313 to assess any potential groundwater to surface water discharge of the plume to Mere Brook in the vicinity of MW-313. Based on site data, no text changes are warranted at this time.

60. **Page 2-77, Section 2.5.9 Issues.** EPA (Comments 12 and 13, dated November 9, 2004) has identified several issues to add to the table in Section 2.5.9. BACSE suggests that the issue of evaluating the discharge and potential impacts to Mere Brook (see Comments 57 and 59, above) also needs to be added to both Section 2.5.9 and 2.5.10.

    Response—This issue has been added to Sections 2.5.9 (Issues) and 2.5.10 (Recommendations and Follow-Up Actions).

2.5.9 Issues

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Finalize and issue the LTMP	*No*	*Yes*
Finalize and issue the QAPP	*No*	*Yes*
Generate a Land Use Control Implementation Plan document for the Eastern Plume	*No*	*Yes*
Complete assessment of 1,4-dioxane in the Eastern Plume and report findings of the initial sampling program (minimum of three rounds of sampling data)	*No*	*Yes*
Complete field work to install 2 replacement extraction wells in the Eastern Plume	*No*	*Yes*
Continue collection of monitored natural attenuation parameters	*No*	*Yes*

Issue	*Currently Affects Protectiveness*	*Affects Future Protectiveness*
Expedite assessment to optimize the Long-Term Monitoring Program and remedy	*No*	*Yes*
Eastern Plume not contained by current extraction well network	*No*	*Yes*
Optimize the extraction well network	*No*	*Yes*
Additional investigation near monitoring well MW-313	*No*	*Yes*
Develop institutional controls for Building 584	*No*	*Yes*
Conduct the additional surface water sampling in Mere Brook in the vicinity of MW-313 as recommended in recent monitoring event reports	*No*	*Yes*
Develop institutional control boundary for the site	*No*	*Yes*

2.5.10 Recommendations and Follow-Up Actions

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Finalize updated LTMP	*Finalize the LTMP and issue updated LTMP*	*Navy*	*EPA/ MEDEP*	*4/2005*	*No*	*Yes*
Finalize updated QAPP	*Finalize the QAPP and issued the updated QAPP*	*Navy*	*EPA/ MEDEP*	*4/2005*	*No*	*Yes*
Generate a Land Use Control Implementation Plan	*Generate a Land Use Control Implementation Plan document for the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*10/31/05*	*No*	*Yes*
Assess occurrence of 1,4-dioxane	*Continue assessment of 1,4-dioxane in the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*
Install 2 replacement extraction wells	*Install 2 replacement extraction wells in the Eastern Plume*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Collect monitored natural attenuation parameters	*Continue collection of monitored natural attenuation parameters*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*
Long-Term Monitoring Program and remedy optimization	*Assess ways to optimize the Long-Term Monitoring Program and remedy*	*Navy*	*EPA/ MEDEP*	*2005-2008*	*No*	*Yes*
Optimize the extraction well network	*Install up to 3 new extraction wells to replace/augment existing wells*	*Navy*	*EPA/ MEDEP*	*2005-2008*	*No*	*Yes*
Additional investigation near monitoring well MW-313	*Assess migration of Eastern Plume into this area, assess degree of upwelling into Mere Brook*	*Navy*	*EPA/ MEDEP*	*2005-2006*	*No*	*Yes*

Issue	*Recommendations/ Follow-Up Actions*	*Party Responsible*	*Oversight Agency*	*Milestone Date*	*Affects Protectiveness?*	
					Current	*Future*
Develop institutional controls for Building 584	*Develop appropriate actions if building is demolished*	*Navy*	*EPA/ MEDEP*	*2005-2009*	*No*	*Yes*
Collect additional surface water samples in Mere Brook in the vicinity of MW-313	*Collect three additional surface water samples as recommended in Monitoring Event 23 Report*	*Navy*	*EPA/ MEDEP*	*2005*	*No*	*Yes*

61. **Page 2-77, Section 2.5.9 Issues.** BACSE wants to ensure that a number of items/issues identified in the ROD have been or will be addressed, and that results have been or will be properly documented as well. In no particular order, these include:

- In the event Building 584 is ever demolished, the Navy will assess the need for additional soil sampling at Site 4 (pages 9 and 13 of the ROD). What is the mechanism for ensuring that this will occur when the building is removed?

  Response—This topic was discussed during the December 2004 Technical Meeting. The Base Environmental Manager will be made aware of the need to report to the project stakeholders any plans to demolish Building 584. In addition, the Navy has committed to generate an ESD to document a use restriction on the soils at Sites 4, 11, and 13.

- Page 15 of the ROD states that additional groundwater sampling would be needed in the area downgradient of Site 4 to confirm the findings that low concentrations of TCE at or near the source are diluted to below detection. Was this sampling task performed and the findings confirmed? If so, where is the information documented? If not, how and when will this issue be put to rest?

  Response—Site 4 groundwater has not been investigated since the RI was completed. Site records indicate that three monitoring wells are present near Site 4 (MW-404, MW-407, and MW-1303). This topic should be included on the next project stakeholders meeting agenda to determine a course of action and develop a preliminary schedule.

- With regard to reports, page 34 of the ROD states that a report will be issued after each monitoring event and an annual report will also be issued. Since an annual report is no longer being issued, this deviation from the ROD should be documented. Has this already been done?

  Response—The Navy has committed to generating an ESD for the Eastern Plume operable unit and this minor change regarding annual reporting would be documented in the ESD.

- As noted in Comment Number 55 above, conditions at Sites 4, 11, and 13 are to be evaluated at the Five-Year Review to determine whether additional actions may be necessary at those sites. BACSE was unable to find such a review in the subject document.

  Response—Please see response to Comment No. 55. No review is warranted since the site conditions have not changed. In addition, the further assessment activities have been completed at Site 11 and were presented in the draft report entitled *Summary Report of the Direct-Push Investigation of the Southern Boundary of the Eastern Plume and Site 11*, issued in September 2001. Additional investigation work is still being executed at Site 11 and, once this work is completed, the Navy will issue an updated draft final report for review by project stakeholders.

- The ROD states there is potential that contaminated soils still exist at Site 11 below the groundwater table with continuing impact to groundwater, and that the groundwater pathway would be assessed under the groundwater monitoring program and additional groundwater investigation at Site 11. Has this issue been specifically addressed in the Long-Term Monitoring Reports?

  Response—Please see response to Comment No. 61, fourth bullet.

- Page 13 of the ROD states that the No Further Action decision for soils at Sites 4, 11, and 13 can be revisited if conditions indicate unacceptable risk, or there is a change in land use. BACSE does not recall that the latter possibility has been addressed by measures such as the Base Operating Instruction, deed restrictions, etc. Please identify the mechanism for ensuring that the NFA decision would be revisited.

  Response—The Navy has committed to generating an ESD to document the institutional control(s) for soils at these sites, which was not documented in the 1998 ROD. Once the ESD has been finalized, the Base Operating Instruction will be updated to reflect the institutional controls documented in the ESD. The Five-Year Review is the vehicle for review of these No Further Action sites and active sites.

62. **Page 2-78, Section 2.5.11 Protectiveness Statement.** The section concludes with the statement that current monitoring data indicate that the remedy is functioning as required. As noted in several comments above (see Comment Number 58, for example), BACSE believes that this statement requires qualification.

    Response—The Protectiveness Statement has been revised as follows:

    The remedy (hydraulic containment with recovery and treatment) is expected to be protective of human health and the environment by achieving the cleanup goals as presented in the 1998 ROD, which is expected to take between 14 and 72 years. During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls that restrict soil excavation and the usage of

the groundwater as a potable source. In addition, the site remains within a restricted area of the base, limiting access only to authorized personnel. Current monitoring data indicate that the Eastern Plume remedy is protective in the short term; however, follow-on activities are required to ensure that the remedy is protective in the long term. These follow-on activities are: (1) evaluating the extent of 1,4-dioxane within the plume due to Navy activities, (2) determining if the plume is contained or discharging to Mere Brook in the vicinity of monitoring well MW-313, (3) institutional control boundary determination, (4) optimize the extraction system to provide hydraulic containment and mass removal, and (5) refine the institutional controls.

Attachment A

Revised Text
for Appendix A

1. INTRODUCTION

This appendix has been included in the second five-year review of Naval Air Station (NAS) Brunswick to document the status of the 10 sites for which "No Further Action" has been determined through investigations or removal actions (Sites 4, 5, 6, 8, 11, 13, 14, 15, 16, and 18). Their locations are shown on Figure 1. These sites are considered to have completed remedies and do not require additional investigation or environmental monitoring. Therefore, discussions of these sites are limited to the overview provided below.

2. SITE 4 – ACID/CAUSTIC PIT

2.1 SITE LOCATION AND DESCRIPTION

Site 4 is located off Old Gurnet Road between the intersection of Orion Street and Sandy Road. The location of the former acid/caustic pit is under the eastern portion of Building 584 (which currently houses the NAS Brunswick Public Works maintenance shops). Between 1969 and 1974, liquid waste was poured into the acid/caustic pit for disposal. The pit was approximately 4 ft long × 4 ft wide × 3 ft deep. Site 4 is one of three sources of groundwater contamination of the Eastern Plume.

2.2 HISTORY OF CONTAMINATION

From 1969 to 1974, liquid waste was disposed into the pit at this site. Wastes reportedly disposed of into the pit included transformer oil, battery acid, caustics, solvents (including trichloroethene), and paint thinners. Quantities of wastes disposed of are unknown.

During the late 1980s, the Navy completed a remedial investigation/feasibility study (RI/FS) at Site 4 that included a gas survey, soil borings, and soil and groundwater sampling that were analyzed for Target Compound List organic and inorganic compounds. Halocarbon soil gases were detected in the subsurface around Building 584, but below detection limits in all other samples. Trichloroethene was detected in groundwater adjacent to Building 584 ranging in concentrations from 6 to 23 µg/L. Volatile organic compounds (VOCs) were not detected in the subsurface soil samples; however, these samples were not collected directly from the source area due to obstruction caused by the footprint of Building 584. Air monitoring samples collected outside the building did not indicate the presence of VOCs.

2.3 SUMMARY OF RISK ASSESSMENT

As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment. Minimal health risks were associated with exposure to surface soils at Site 4 since the former pit is located beneath the eastern portion of Building 584, effectively limiting any potential exposure. If Building 584 is ever removed, an additional investigation and remedial action may be required (ABB-ES 1998[1]). Ingestion of groundwater was identified as a human health risk at Site 4; however, groundwater within this area of the site is not presently used for potable purposes and is, therefore, considered a minimal risk. An ecological risk assessment was completed during the RI and concluded that there is no significant risk to terrestrial receptors from soil and groundwater contamination at the site.

1. ABB-Environmental Services (ABB-ES). 1998. Final Record of Decision for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume. February.

2.4 REMEDY SELECTED

In February 1998, a Record of Decision was finalized for Site 4, and the selected remedial alternative for soils at Site 4 was No Further Action. This alternative was selected since the soils did not pose an unacceptable risk from direct contact or incidental ingestion. The No Further Action decision was supported by the results of the 1990 FS, which concluded that the only risk at this site was for the potential of continuing impacts to groundwater from soils at Sites 11 and 13. The 1998 Record of Decision noted that if, in the future, Building 584 is removed, further investigations and remedial action may be required (ABB-ES 1998). The groundwater contamination is addressed by the continued operation of the groundwater remedy for the Eastern Plume.

3. SITE 5 – ORION STREET ASBESTOS DISPOSAL SITE

3.1 SITE LOCATION AND DESCRIPTION

Site 5 is an overgrown area of approximately 0.25 acre located off Merriconeag Road south of the main runway. Site 5 is relatively flat with the exception of an embankment that drops off southeast of the site. The site is posted with signs that note this site is an asbestos disposal area.

3.2 HISTORY OF CONTAMINATION

In 1979, Site 5 was reportedly used by a contractor to dispose of asbestos-lined pipes from a demolished base building. The pipes were placed in two trenches. One of the trenches was 3 ft wide × 20 ft long × 7 ft deep and contained six 1-in. diameter asbestos pipes that ranged in length from 4 to 12 ft. The second parallel trench measured 15 ft wide × 30 ft long × 10 ft deep and contained up to eight pieces of corrugated pipe of varying lengths that had smaller asbestos pipe inside.

3.3 SUMMARY OF RISK ASSESSMENT

In the early 1990s, the Navy completed an RI/FS at Site 5. The investigation assessed the distribution of contamination at the site and evaluated the most feasible cleanup alternatives. The RI/FS activities included a geophysical survey, surface soil sampling, and a physical inspection of the site. Based on the results of the RI, and the baseline risk assessment, no asbestos was detected in the surface soil samples; therefore, there is no current risk to human health and the environment from exposure to asbestos. As a result, target cleanup levels for asbestos were not calculated.

3.4 REMEDY SELECTED

In August 1993, a Record of Decision was finalized for Site 5 and the selected remedial alternative chosen was a comprehensive remedy that included excavation of the asbestos-containing material and construction debris and disposal of the material as necessary subgrade fill for the Sites 1 and 3 Landfill cover. The remedy was designed to remove the buried wasted and place it beneath a permanent, low permeability cap at the Sites 1 and 3 Landfill. The excavated material provided the necessary subgrade material beneath the low permeability cap for the Sites 1 and 3 landfill cover. After excavation, soil samples were collected to confirm that the removal of asbestos was complete, and the site was regraded to minimize erosion and seeded to re-establish vegetation.

Based on the results of the confirmatory sampling, no further action is recommended under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for Site 5. Since the contaminated soil was removed from the site, no institutional controls were necessary and the five-year review process would not apply to this site.

4. SITE 6 – SANDY ROAD RUBBLE AND ASBESTOS DISPOSAL SITE

4.1 SITE LOCATION AND DESCRIPTION

Site 6 is bordered by Sandy Road to the southeast and by a stream behind Building 516 to the north. Reportedly, the site originally had a small depression that was filled with construction debris, aircraft parts, and asbestos-lined pipes. The site is approximately 1 acre and is nearly flat.

4.2 HISTORY OF CONTAMINATION

Site 6 originally had a small depression that was later filled with construction debris until the late 1970s. Aircraft parts reportedly were disposed of at this site and asbestos-covered pipes were seen protruding from the surface soil during a site inspection in 1980. It was estimated that approximately 250 yd^3 of the fill material at Site 6 contained asbestos.

4.3 SUMMARY OF RISK ASSESSMENT

In the early 1990s, the Navy completed an RI/FS at Site 6. The investigation assessed the distribution of contamination at the site and evaluated the most feasible cleanup alternatives. The RI/FS activities included a geophysical survey, surface soil sampling, and a physical inspection of the site. Based on the RI and baseline risk assessment results, no asbestos was detected in the surface soil samples; therefore, there was no current risk to human health and the environment from exposure to asbestos. As a result, target cleanup levels for asbestos were not calculated.

4.4 REMEDY SELECTED

In August 1993, a Record of Decision was finalized for Site 6. The selected remedial alternative for Site 6 included excavation of the asbestos-containing material and construction debris and disposal of the material as necessary subgrade fill for the Sites 1 and 3 Landfill cover. The remedy was designed to remove the buried waste and place it beneath a permanent, low permeability cap at Sites 1 and 3 Landfill. The excavated material provided the necessary subgrade material beneath the low permeability cap at Sites 1 and 3 Landfill. After excavation, soil samples were collected to confirm the removal of asbestos was complete. After receipt of the confirmatory sampling data, Site 6 was re-graded to minimize erosion and seeded to re-establish vegetation.

Based on the results of the confirmatory sampling, no further action is recommended under CERCLA for Site 6. Since the contaminated soil was removed from the site, no institutional controls were necessary and the five-year review process would not apply to this site.

5. SITE 8 – PERIMETER ROAD DISPOSAL AREA

5.1 SITE LOCATION AND DESCRIPTION

Site 8 covers approximately 0.5 acre and is located north of Perimeter Road. The site is a flat, open area with steep, wooded embankments down to two small tributaries bordering the site, which discharge to the Androscoggin River. The Jordan Avenue Wellfield, a municipal drinking water supply for the Town of Brunswick, is located approximately 1,800 ft northwest of Site 8.

5.2 HISTORY OF CONTAMINATION

From 1964 to 1974, the site was reportedly a disposal area for rubble, debris, and trash. Soil sampling conducted during the RI/FS indicated that surface and shallow soils were contaminated with polycyclic aromatic hydrocarbons (PAHs).

5.3 SUMMARY OF RISK ASSESSMENT

During the early 1990s, the Navy completed RI/FS activities for Site 8, which included extensive sampling and analysis of surface and subsurface soils, groundwater, leachate and sediments, and surface water and sediments. Results showed PAHs in surface and shallow soils. As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment. The risk associated with exposure to contaminants was calculated assuming both current use and future residential use of the site, which is the most conservative scenario. The estimated incremental cumulative, carcinogenic risks to an individual under the current exposure scenarios were within or below the U.S. Environmental Protection Agency's target risk range. The non-carcinogenic Hazard Index was below 1.0. The assumed worst-case scenario resulted in a slightly higher carcinogenic risk. While this scenario is unlikely, excavation of the PAH-contaminated soil at Site 8 would address this potential risk. No other contaminants were found to pose a risk to human health or the environment. The RI also established that Site 8 does not impact the Jordan Avenue wellfield due to the limited groundwater contamination at the site, the considerable distance between Site 8 and the wellfield, and groundwater patterns which flow to the tributaries rather than the wellfield.

5.4 REMEDY SELECTED

In August 1993, a Record of Decision was finalized for Site 8. The selected remedial alternative for Site 8 included excavation of PAH-contaminated soil, construction rubble, and debris, and disposal of the material as necessary subgrade fill for the Sites 1 and 3 Landfill cover. The remedy was designed to remove the buried waste and place it beneath a permanent, low permeability cap at Sites 1 and 3 Landfill. After excavation of the rubble and debris, soil samples were collected to confirm removal of waste was complete. After the confirmatory sampling data were received and reviewed, Site 8 was re-graded to minimize erosion and seeded to re-establish vegetation.

Based on the results of the confirmatory sampling, no further action is recommended under CERCLA for Site 8. Since the contaminated soil and debris were removed from the site, no institutional controls were necessary and the five-year review process would not apply to this site.

6. SITE 11 – FIRE TRAINING AREA

6.1 SITE LOCATION AND DESCRIPTION

Site 11 is located off Old Gurnet Road between the intersection of Orion Street and Sandy Road. Site 11 is the location of a former Fire Training Area that was used regularly over a 30-year period ending in the Fall of 1990. Waste liquids (fuels, oils, and degreasing solvents) were used as fuels for the fire training exercises, resulting in the contamination of soil and groundwater at the site. Originally, the training exercises introduced the various combustible materials directly onto the ground surface at the site. In 1987, a circular concrete liner, berm, and 6,000-gal underground storage tank (UST) (located north of the pit) were installed at the site. The concrete pad and UST were removed from the site in 1995. Site 11 is one of three sources of the groundwater contamination of the Eastern Plume.

6.2 HISTORY OF CONTAMINATION

From the 1950s to the Fall of 1990, the former Fire Training Area was used to train Navy personnel in firefighting techniques. Firefighting exercises introduced various combustible materials into the soil at the site including waste oils, fuels, solvents, and other miscellaneous liquids. Beginning in 1987, the various combustibles were introduced onto the concrete pad for fire training exercises. Quantities of combustible materials used in the former Fire Training Area are unknown.

During the late 1980s, the Navy completed an RI/FS at Site 11 that included a gas soil survey, installation of monitoring wells and test pits, soil and groundwater sampling, and aquifer permeability testing. In August 1991, a supplemental RI was completed. The RI and supplemental RI found that contamination was consistent with the past use of the area and VOCs, semivolatile organic compounds (SVOCs), and inorganics were detected in the subsurface soil and groundwater at the site.

The Site 11 contamination consisted of groundwater contaminated with 1,1-dichloroethane, 1,2-dichloroethene, trichloroethane, and trichloroethene, and soil contaminated with chlorinated solvents and fuel-related products that included PAHs. No soil samples were collected from beneath the former Fire Training Area at the time of the RI or supplemental RI due to the presence of a concrete pad. Test pit excavations and subsurface soil sampling completed during the RI around the former Fire Training Area pad identified the presence of VOCs and SVOCs in the shallow subsurface and VOCs in the deeper soils. Surface soil contamination was identified at one test pit location where total PAH concentrations were 1.8 mg/Kg. Based on the test pit sampling result, a 50-ft × 100-ft area of contaminated soil was assumed, extending from the southern end of the pit north to well MW-1102 (former). Residual contamination was detected in monitoring wells in subsequent groundwater monitoring rounds. The Navy implemented two removal actions at Site 11. The first removal action occurred in December 1994, and buried drums and metallic debris from several locations were excavated and removed around Site 11.

The second removal action occurred in June 1995, and consisted of the removal of the concrete pad and between 6-10 ft of soil from below the 0.5-acre site. Confirmation soil samples were collected to document the condition of the soil left in place. Laboratory analysis of the soil samples identified trichloroethene at concentrations ranging from not detected to 6.5 mg/Kg. The excavation at Site 11 was backfilled with clean soil and planted with grass.

6.3 SUMMARY OF RISK ASSESSMENT

As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment. The distribution of contamination is characterized by minimal surface contamination with increased contamination in deeper soils. The non-carcinogenic hazard index was less than 1.0. The lifetime incremental carcinogenic risk for direct contact and incidental ingestion exposure was 6.7×10^{-5}, which is within the U.S. Environmental Protection Agency target risk range but slightly exceeds the Maine Department of Environmental Protection maximum acceptable risk of 1×10^{-5}. Ingestion of groundwater was identified as a human health risk at Site 11. Currently, groundwater within the area of the site is not used for potable purposes and, therefore, no significant risk exists. An ecological risk assessment was completed during the RI, and found that the ecological risk to terrestrial receptors from soil and groundwater contamination was minimal.

6.4 REMEDY SELECTED

In February 1998, a Record of Decision was finalized for Site 11 and the selected remedial alternative for soil at Site 11 was No Further Action. This alternative was selected since the soil did not pose an unacceptable risk from direct contact or incidental ingestion. The No Further Action decision was supported by the results of the 1990 FS, which concluded that the only risk at this site was for the potential of continuing impacts to groundwater from soil at Sites 11 and 13. The groundwater contamination is addressed by the continued operation of the groundwater remedy for the Eastern Plume.

7. SITE 13 – DEFENSE REUTILIZATION AND MARKETING OFFICE AREA

7.1 SITE LOCATION AND DESCRIPTION

Site 13, the Defense Reutilization and Marketing Office Area, is located off Old Gurnet Road between the intersection of Orion Street and Sandy Road, immediately south of Building 584 (NAS Brunswick Public Works maintenance shops) and Site 4. The Defense Reutilization and Marketing Office Area storage yard was a paved, fenced enclosure, approximately 280 ft × 300 ft. Buildings 584, 93, and 19 abut the enclosure on the north, northeast, and east, respectively. Orion Street borders the Defense Reutilization and Marketing Office Area yard to the west. Site 13 is the former location of three USTs (a 10,000-gal fuel oil tank, a 5,000-gal waste oil tank, and a 5,000-gal solvent storage tank). All three USTs were removed in the late 1980s. The 10,000-gal fuel oil UST was initially replaced with a fiberglass UST that was later removed and replaced by an aboveground storage tank. The 5,000-gal USTs were removed and not replaced. No soil was removed with the USTs.

7.2 HISTORY OF CONTAMINATION

In the late 1980s when the USTs were pulled, surrounding soil was not removed. During the late 1980s, the Navy completed an RI/FS. Contamination was detected in the shallow soil, subsurface soil, and groundwater. Fuel-related SVOCs were detected in subsurface soil at one location at Site 13. Dichlorodiphenyltrichloroethane (DDT) was detected in two shallow soil samples from test pits. The RI report states that the DDT concentrations are relatively low and probably related to historic use and storage of DDT in this site area. Groundwater contamination detected in monitoring wells was restricted to VOCs. Since the removal of the tanks, the concentrations of VOCs in groundwater have decreased significantly. No removal actions have occurred at Site 13.

7.3 SUMMARY OF RISK ASSESSMENT

As part of the RI, a risk assessment was completed to evaluate the potential effects of the site on human health and the environment at Site 13. Minimal health risks are associated with exposure to soil at Site 13 due to the paved parking area surrounding Building 584. The quantitative risk estimates calculated for the site are below the U.S. Environmental Protection Agency target risk range and the Maine Department of Environmental Protection maximum incremental risk. Currently, groundwater within the area of the site is not used for potable purposes and, therefore, no significant risk exists. An ecological risk assessment was completed during the RI, and only DDT in soil was selected as a contaminant of concern for the site. The maximum detected concentration of DDT was below levels considered to present a health risk. The ecological risk to terrestrial receptors from soil and groundwater contamination appears to be minimal.

7.4 REMEDY SELECTED

In February 1998, a Record of Decision was finalized for Site 13 and the selected remedial alternative for soil at Site 13 was No Further Action. This alternative was selected since the soil did not pose an unacceptable risk from direct contact or incidental ingestion. The No Further Action decision was supported by the results of the 1990 FS that concluded the only risk at this site was for the potential of continuing impacts to groundwater from soil at Sites 11 and 13. The groundwater contamination is addressed by the continued operation of the groundwater remedy for the Eastern Plume.

8. SITE 14 – OLD DUMP NO. 3

8.1 SITE LOCATION AND DESCRIPTION

The location of Old Dump No. 3 is based on a 1946 base map of NAS Brunswick. The site is located east of the main runways and is bordered by Runway I-19 and Taxiways A and D. Runway I-19 and the taxiways were constructed in 1951.

8.2 HISTORY OF CONTAMINATION

Military operations at NAS Brunswick were suspended during the late 1940s until the base was recommissioned in 1951. In 1951, the existing runways were constructed. Runway construction would have ended any further use of Site 14, and the construction activities may have resulted in removal of the dump material. Based on the station's history, it is anticipated that most of the potential disposal activities at Site 14 occurred prior to and during World War II.

8.3 SUMMARY OF RISK ASSESSMENT

To assess the presence or absence of refuse material at Site 14, and potential soil and groundwater contamination in the area, a magnetometer survey was conducted over approximately 6 acres of terrain. Observed magnetic anomalies were the result of runway and taxiway lights and drainage structures. No unexplained anomalies were detected. Based on the absence of unexplained anomalies, no further investigations were conducted.

8.4 REMEDY SELECTED

Based on the results of the magnetic data, no test pits or monitoring wells were installed, and no further investigations were conducted. It was concluded that the former dump does not exist or was probably removed during the runway and taxiway construction activities. Therefore, no further action is recommended under CERCLA for Site 14.

9. SITE 15 – MERRICONEAG EXTENSION DEBRIS SITE

9.1 SITE LOCATION AND DESCRIPTION

The Merriconeag Extension Debris site is located southeast of the NAS Brunswick golf course near Harpswell Cove.

9.2 HISTORY OF CONTAMINATION

The Merriconeag Extension Debris site was reported in 1990 by an NAS employee and consists of a concrete rubble and soil dam that creates a 0.75-acre pond on a small, unnamed stream. Miscellaneous debris items were visible on the face of the dam and on the ground surface near its eastern end. There are no Navy records regarding historical dumping at Site 15.

A site inspection was conducted in November 1992. The investigation included a magnetometer survey; test pits; and the collection of soil, surface water, and sediment samples. The magnetometer survey indicated the presence of ferrous debris at the site, and was used to identify three locations for test pits. The test pits encountered few or no debris items. Two soil samples were collected from the test pits and five additional surface soil samples were collected from areas that contained the greatest number of debris items. Four surface water and sediment samples were also collected from the unnamed stream and pond. All asbestos cement pipe sections and scrap metal debris items encountered were removed from the site and disposed in 1999. A hand-held magnetometer survey in 1999 confirmed that no additional metallic items remained after debris items were removed.

9.3 SUMMARY OF RISK ASSESSMENT

A formal risk assessment was not conducted for Site 15. Debris was found on the ground surface with no indications of a substantial area of buried waste. Reported concentrations of contaminants in soil, surface water, and sediment were compared to state and federal standards and did not indicate a need for remediation.

9.4 REMEDY SELECTED

Based on the results of the site investigation, no further action is recommended under CERCLA for Site 15.

10. SITE 16 – SWAMPY ROAD DEBRIS SITE

10.1 SITE LOCATION AND DESCRIPTION

The Swampy Road Debris site is located along the west bank of an unnamed stream on the NAS Brunswick golf course.

10.2 HISTORY OF CONTAMINATION

Site 16 was brought to the Navy's attention in 1990 by an NAS employee who observed refuse along its banks. Surface debris was visible at various locations in a 1,700-ft section of the stream. There are no Navy records regarding historical dumping at Site 16. A site inspection was conducted in November 1992. The inspection included a magnetometer survey; test pits; and the collection of soil, surface water, and sediment samples. The magnetometer survey indicated the presence of ferrous debris items at the site and was used to identify five locations for test pits. Test pits showed shallow debris over native soil. Soil samples were collected from the test pits and surface soil was collected in areas that contained the greatest number of debris items. Surface water and sediment samples were also collected from the unnamed stream. One surface soil sample was initially found to have a lead concentration of 1,250 mg/kg. A confirmation sample taken at the same location in 2000 verified the lead concentration to be 84 mg/kg. A hand-held magnetometer was used to locate, remove for disposal, or assess additional debris.

10.3 SUMMARY OF RISK ASSESSMENT

A formal risk assessment was not conducted for Site 16. Debris was found primarily at the ground surface with no indications of buried waste having environmental significance. Reported concentrations of contaminants in soil, surface water, and sediment were compared to state and federal standards and did not indicate a need for remediation.

10.4 REMEDY SELECTED

Based on the results of the site investigation, no further action is recommended under CERCLA for Site 16.

11. SITE 18 – WEST RUNWAY STUDY AREA

11.1 SITE LOCATION AND DESCRIPTION

The West Runway Study Area is a seep located approximately 650 ft west of Runway I-19 between Mere Brook and Ordnance Road No. 3. The seep is near the former location of an ordnance bunker that was dismantled in the mid-1970s.

11.2 HISTORY OF CONTAMINATION

Site 18 was brought to the Navy's attention in 1992 during runway setback clearance activities by an NAS employee. The employee observed water containing a surface sheen seeping from a hillside along Ordnance Road No. 3. The employee collected a water sample of the seep in a soda bottle. The seep water sample was then analyzed by a field chemist using a portable gas chromatograph that was operating at the Building 95 site at the time, and was found to contain elevated levels of several VOCs. The seep was sampled an additional three times and failed to reproduce the elevated VOC concentrations of the soda bottle sample. There are no records regarding historical dumping at this site. Several aerial photographs did not show any indications of active dumping at this site. A site inspection was conducted in 1993. The investigation included a geophysical survey using a magnetometer and ground penetrating radar; test pits; and the collection of soil, seep water, surface water, and sediment samples. The geophysical survey revealed a small number of anomalous areas that potentially indicated buried debris. These results were used to select 7 test pit locations. The test pits revealed fill soils and innocuous metallic objects. Five soil samples were collected from the test pits. Surface water and sediment samples were collected from 2 locations within Mere Brook and at 2 seep locations. An additional sediment sample was collected from a third seep location that was dry at the time of the site inspection. In response to comments from the citizen's group, an additional round of aqueous samples was collected from the three seep locations in 1994.

11.3 SUMMARY OF RISK ASSESSMENT

A formal risk assessment was not conducted for Site 18. Reported laboratory concentrations of analytes/compounds in soil, seep water, surface water, and sediment were compared to state and federal standards and did not indicate a need for remediation.

11.4 REMEDY SELECTED

Based on the results of the site investigation, no further action is recommended under CERCLA for Site 18.

Attachment B

Review of Toxicity Values

EA Engineering, Science, and Technology, Inc.

15 Loveton Circle
Sparks, MD 21152
Telephone: 410-771-4950
Fax: 410-771-4204
www.eaest.com

12 May 2005

MEMORANDUM

TO: Gina Calderone, C.P.G. **LOCATION:** EA–Newburgh

FROM: Dan Hinckley, Ph.D. **LOCATION:** EA–Loveton

SUBJECT: Review of Toxicity Values, Maximum Contaminant Levels, and Maximum Exposure Guidelines for Groundwater Contaminants, Naval Air Station Brunswick, Maine

We have reviewed the toxicity, Maximum Contaminant Level (MCL), and Maine's Maximum Exposure Guideline (MEG) values for chemicals of concern associated with groundwater at Naval Air Station, Brunswick, Maine. The approach taken was to examine the 1990 Human Health Risk Assessment (HHRA), determine the reference oral dose (RfDo) or slope factor applied during the performance of the HHRA, and determine if there were any differences between then and 2005. In addition, MCLs and MEGs were compared between 1990 and 2005. The results of this review are shown in Table 1. Chemicals for which changes were noted have been shaded. As can be seen, there have been many changes over the years.

Due to the method of calculating risks, and assuming the same exposure parameters as were performed during the 1990 HHRA, the change in risks will be linear to the change in toxicity values. Because hazard indexes for non-cancer endpoints are calculated by dividing the chemical dose by the RfDo, the smaller the RfDo, the larger the risk. For example, for arsenic, the RfDo decreased from 0.001 mg/kg/day to 0.0003 mg/kg/day, which is a 70 percent decrease. Consequently, non-cancer risks calculated in 1990 would be increased 70 percent using 2005 toxicity values. Alternatively, cancer risks are calculated by multiplying the lifetime chemical dose by the slope factor. Therefore, the larger the slope factor, the larger the cancer lifetime risk. Keeping with arsenic, the slope factor has decreased from 1.75 $(mg/kg/day)^{-1}$ to 1.5 $(mg/kg/day)^{-1}$ since the 1990 HHRA. This amounts to a 14 percent decrease in slope factor and, consequently, a 14 percent decrease in lifetime cancer risks.

The changes in toxicity values of trichloroethene were mentioned in the comment. Using the above as the method for calculation, we find that, based on non-cancer endpoints, the RfDo has decreased and risks increased by 97 percent. The cancer slope factor and cancer risks have increased by 35 percent.

Finally, as discussed in the comment, the arsenic MCL has decreased from 50 to 10 µg/L since the 1990 HHRA. None of the MCLs or MEGs for volatile organics shown in the Brunswick Record of Decision have changed since production of the Record of Decision.

DH/mkp

cc: P. Nimmer

TABLE 1 COMPARISON OF TOXICITY VALUES FOR GROUNDWATER CHEMICALS OF CONCERN, 1990 HHRA TO 2005, NAVAL AIR STATION BRUNSWICK, MAINE

Chemicals of Concern	RfDo (mg/kg/day)		SFo ([mg/kg/day]$^{-1}$)		MCL (µg/L)			MCLG (µg/L)		
					1990 HHRA			1990 HHRA		
	1990 HHRA	2005	1990 HHRA	2005	Final	Proposed	2005	Final	Proposed	2005
Aluminum	---	1[a]	---		---	---		---	---	---
Arsenic	0.001	0.0003	1.75	1.50	50	---	10	0	---	0
Barium	0.05	0.07	---	---	---	5,000	2,000	---	---	---
Benzene	0.00014	0.004	0.029	0.055	5	---	5	0	---	0
Cadmium	0.0005	0.0005	---	---	10	5	5	---	---	---
Chlorobenzene	0.02	0.02	---	---	---	100		---	---	---
Chromium	0.005	0.003	---	---	50	100	100	---	---	---
1,1-Dichloroethane	0.1	0.2[b]	9.10E-02	---	---	---		---	---	---
1,1-Dichloroethene	0.009	0.05	6.00E-01	---	7	---	7	---	---	---
cis-1,2-Dichloroethene		0.01	---	---	---	70	70	---	---	---
trans-1,2-Dichloroethene	0.02	0.02	---	---	---	100	100	---	---	---
Ethylbenzene	0.1	0.1	---	---	---	700	700	---	---	---
Lead	0.00014	---	---	---	50	5	0	---	0	TT
Manganese	0.2	0.02[c]	---	---	---	---	---	---	---	---
Mercury	0.0003		---	---	2	2	2	---	---	---
Methylene chloride	0.06	0.06	0.0075	0.0075	---	---		---	---	---
Napthalene	---	0.02	---	---	---	---	---	---	---	---
Nickel	0.02	0.02	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	0.09	0.28[d]	---	---	200	---	200	---	---	---
Trichloroethene	0.009	0.0003[d]	0.011	0.4[d]	5	---	5	0	---	0
Tetrachloroethene	0.01	0.01	0.051	0.54[d]	---	5	5	---	0	0
Toluene	0.3	0.2	---	---	---	2,000	1,000	---	---	---
Vinyl chloride	0.00006	0.003	2.3	1.4[e]	2	---	2	0	---	0
Xylene, Total	2	0.2	---	---	---	10,000	10,000	---	---	---
Zinc	0.2	0.3	---	---	---	---	---	---	---	---

(a) U.S. Environmental Protection Agency provisional peer-reviewed value.
(b) Health Effects Assessment Summary Tables value.
(c) Based on non-food intake.
(d) U.S. Environmental Protection Agency/National Center for Environmental Assessment provisional value.
(e) Based on exposure from birth.

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
RfDo = Reference oral dose.
SFo = Slope factor.
HHRA = Human Health Risk Assessment.
TT = Treatment technology.
Shading indicates areas that have changed.
Dashes (---) indicate not applicable or not available.

RESPONSE TO COMMENTS FROM LEPAGE ENVIRONMENTAL SERVICES ON APPENDIX B, SECTION 1 OF THE DRAFT SECOND FIVE-YEAR REVIEW REPORT

Commentor: Carolyn Lepage, C.G.	
Comment Issue Date: 23 June 2005	**Navy Response Date: 24 June 2005**

The following comments on Section 1 of the May 2005 Appendix B for the *Second Five-Year Review Report* are submitted on behalf of the Brunswick Area Citizens for a Safe Environment (BACSE).

GENERAL COMMENTS

1. BACSE concurs with the Maine Department of Environmental Protection's (MEDEP) comments dated May 26, 2005, and will not repeat those comments below except where particular emphasis is desired.

   Response—Comment noted.

2. The comments below are limited to Section 1 of Appendix B, which addresses Site 12, and are a result of a side-by-side comparison with the August 1991 Draft Final *Supplemental Remedial Investigation Report* (Supplemental RI Report) and the March 1992 *Feasibility Study* (FS). A similar comparison of Section 2 text with relevant Building 95 documents was not performed by Lepage in order to get these Site 12 comments to the Navy in a more timely manner. Given the nature of the errors and omissions in Section 1, BACSE suggests that the Navy check the text of Section 2 to ensure that it is complete and accurate.

   Response—Comment noted.

3. Applicable references should be cited at appropriate places in the text of Section 1. Several comments below address specific instances where these citations should be added.

   Response—References have been added to Appendix B (Section 1) as suggested, in the specific comments below.

SPECIFIC COMMENTS

4. **Page 1, Section 1.1 SITE DESCRIPTION—**The fifth sentence (begins *AIn 1991, 2 small dumpsters...*) should be corrected. The observations were made during the March 1989 site visit, not in 1991. The use of the term "dispose" in the sixth sentence to describe the dumpster use conjures an image of >normal= solid waste disposal. However, the 1991 Supplemental RI Report (page 9-1) uses the term "flashing", which implies a more

explosive or incendiary action. BACSE suggests that "flashing" be substituted for "dispose" to better describe how the dumpsters were used. A brief description of the activities conducted at the site should be added at the end of the paragraph. BACSE suggests the passage from page 9-3, Section 9.2 of the August 1991 Supplemental RI Report: "*This area has been used since 1981 for disposal of small quantities of ordnance, pyrotechnics, privately manufactured explosive devices, and war souvenirs.*"

Response—In the fifth sentence of Section 1.1 of Appendix B, the date of 1991 has been changed to March 1989. The term "dispose" in the sixth sentence has been replaced with the term "flashing," to be consistent with the Supplemental RI Report (1991). A brief statement from Page 9-3, Section 9.2 of the August 1991 Supplemental RI Report has been added to the text as follows:

This area has been used since 1981 for disposal of small quantities of ordnance, pyrotechnics, privately manufactured explosive devices, and war souvenirs. Based on the quantities involved, low-level contamination of unburned explosive residues and elevated concentrations of lead, cadmium, chromium, and mercury might be expected in the surface soils. Elevated levels of aluminum (from aluminum perchlorate) could also be present. Base on the quantities of ordnance and explosives involved, and the migration potential of he chemicals involved, no groundwater contamination is expected (Supplemental RI Report, 1991, E.C. Jordan).

5. **Page 1, Section 1.2 SITE CHRONOLOGY**—In the seventh bullet, which begins at the bottom of page 1 and continues to the top of page 2, low levels of chromium and lead are described as being consistent with limited EOD activity. In fact, the 1991 Supplemental RI Report (page 9-5) states that these two metals are believed to represent background conditions, not site activities. Please correct.

Response—The referenced bullet has been reworded as follows:

- *In August 1991, the Draft Final Supplemental RI Report was completed for Site 12. The Supplemental RI found low levels of explosive related compounds (nitrate/nitrite, nitrogen and phosphorus) and metals (chromium, lead and mercury) in near surface shallow soils. The low levels and limited distribution of mercury and nitrate/nitrite in the near surface soils are consistent with minor EOD activities at Site 12 (E.C. Jordon 1991). According to the 1991 Supplemental RI Report, chromium, lead, and phosphorus are suspected to represent background conditions.*

6. **Page 2, Section 1.2 SITE CHRONOLOGY**—The reference for the 2003 activity by the EPA's consultant should be cited in the second complete bullet on page 2, and added to the references section.

Response—The reference for the bedrock investigation conducted at Site 12 by EPA's consultant has been added to the text and reference list:

- *Geophysical Investigation of Bedrock Fracture Zones at Site 11 and Areas Downgradient. Hager GeoScience, Inc. January 2004.*

7. **Page 2, Section 1.2 SITE CHRONOLOGY**—The approximate distances of the navigation system and the magazines to Site 12 should be added to the last two bullets in Section 1.2.

   Response—The approximate distance of 850 ft between the navigation system and magazines and Site 12 has been added to the last two bullets in Section 1.2.

8. **Page 2, Section 1.3.1 Physical Characteristics**—This section is taken almost verbatim from pages 9-3 and 9-4 of the 1991 Supplemental RI Report, which is acceptable. However, a proper reference citation must be added. Information regarding the horizontal separation of the three test pits should also be added because it appears that the geology varies significantly over relatively short distances. The term "surficial bedrock unit" used in the second paragraph should be defined.

   Response—The reference to the 1991 Supplemental RI Report has been added to the text of the Five-Year Review. The known information regarding horizontal distances between the test pits has been added to the text. The term "surficial bedrock unit" in the second paragraph of Section 1.3.1 has been changed to "upper portion of the bedrock unit."

9. **Page 3, Section 1.3.3 History of Contamination**—MEDEP has already commented that Table 1 was not attached for review. The text in section 1.3.3 identifies Table 1 as being a list of materials detonated between 1991 and 2003. Information is also needed for materials detonated between 1981 and 1991. According to the March 1992 FS (page 9-1), 300 lbs. of material were destroyed since 1984.

   Response—A list of materials detonated between 1991 and 2003 has been added to the Appendix B text as Table 1.

10. **Page 3, Section 1.3.5 Basis for Taking Action**—Since virtually all of this section was taken from the March 1992 FS, an appropriate reference citation must be made. Furthermore, BACSE is confused by the use of "Draft Final Supplemental RI/FS" and "Draft Final Supplemental FS" in this section. The two documents Lepage used in this review were the August 1991 Draft Final *Supplemental Remedial Investigation Report* (Supplemental RI Report) and the March 1992 *Feasibility Study* (FS). Lepage did not have a copy of a Draft Final Supplemental FS. What is the date of this document and does it supercede the March 1992 FS? Please clarify and/or correct the text if necessary.

Response—The March 1992 FS has been referenced in the text. The two documents cited in the text have been referenced as the August 1991 *Draft Final Supplemental Remedial Investigation Report (Supplemental RI Report) and the March 1992 Feasibility Study (FS).*

11. **Page 4, Section 1.3.5.1 Exposure Assessment**—This section was taken from page 9-4 of the March 1992 FS, so a proper reference citation must be added. However, there are several errors and omissions in this section (when compared with the FS) that must be corrected so that the extent and limits of the 1992 risk assessment are clear to the reader. The second sentence should end with the statement that exposure to children under a current land-use scenario was not evaluated. The basis for the "limited frequency of exposure" in the fourth sentence should be added. According to the FS, it was because there was only one "burn" per year from 1984 through 1989. The fourth sentence should also state that dermal absorption and incidental ingestion of soils were not evaluated for current land use. In the residential scenario, the maximum concentration, not the mean concentration, was used as a worst-case estimate of future exposures. Please correct. Please add that exposure by both children and adults were evaluated as part of the residential scenario.

Response—The March 1992 FS has been cited in the text. The second sentence in Section 1.3.5.1 of Appendix B has been revised to end with the statement that exposure to children *under a current land-use scenario* was not evaluated. The basis for the limited frequency of exposure in the fourth sentence has been added as follows:

There is a very limited exposure in this area to contaminated soil during work-related activities due to its remote location and limited frequency of human access into the site area. Historically, there was only one burn per year at the Site from 1984 through 1989 (E.C. Jordan 1992).

The fourth sentence in Section 1.3.5.1 has been revised to end with the statement that that dermal absorption and incidental ingestion of soils were not evaluated *for the current land use.*

The last sentence in Section 1.3.5.1 of Appendix B has been revised as follows:

A residential scenario, using the maximum concentrations of contaminants in soils, was used as a worst-case estimate of future exposures through dermal absorption and inadvertent ingestion.

12. **Page 4, Section 1.3.5.2 Human Health Risk Characterization**—In the third sentence in the first paragraph, "mean" must be changed to "maximum", and "carcinogenic" to Anon-carcinogenic". Please clarify the reference to the 1991 Draft Final Supplemental FS in the second paragraph. As noted in a comment above, Lepage referred to the 1992 FS for this review. The section ends with a statement regarding the MEDEP's request for additional investigation. A sentence regarding the Navy's response to this request should be added. ***Response***—The third sentence in Section 1.3.5.2 has been revised as follows:

Lifetime residential exposure to maximum contaminant concentrations in soils at Site 12 results in insignificant non-carcinogenic risks.

The March 1992 Feasibility Study (FS) report has been cited in the text.

The following sentence has been added to the end of Section 1.3.5.2 in Appendix B:

The Navy currently planning to further investigation Site 12 to define and determine the nature and extent of contamination associated with the historic activities at the site.

13. **Page 4, Section 1.4**—There seems to be a gap in the timeline and information presented in this report. Page 9-5 of the March 1992 FS states "A No Action Proposed Plan and ROD are appropriate for this site". However, neither of these documents was prepared. Why? Was it because the site was active and might be closed under RCRA? What happened since 1992? Responses to the questions in Section 1.7 Technical Assessment state that the site is still under investigation. When did the investigation start? What are the objectives and results? Text must be added to clarify what has happened since 1992 and what the Navy intends to do going forward with regard to additional investigation and possible remediation. The latter would provide the basis for the third five-year review evaluation. Sections 1.4.1 and 1.4.2 should also state, in general, where the additional investigation fits in the timeframe of the ROD/remedy implementation and system operation/operation and maintenance, respectively.

    Response—No remedial actions have been taken at Site 12.

14. **Page 5, Section 1.6.6**—Did Tony Williams conduct any interviews prior to 2005 when he was collecting information on the EOD activities? If so, that information should be added to this section.

    Response—The Navy will check with Mr. Anthony Williams to see if formal interviews were conducted prior to 2005. If interviews were conducted, a summary of those interviews will be added to this section of Appendix B.

15. **Pages 5 & 6, Section 1.7 TECHNICAL ASSESSMENT**—Please see Comments 11 and 12, above. There is a leap from the 1992 FS (No Further Action) through the MEDEP's request for additional investigation to the site <u>still</u> being under investigation. Text must be added to clarify the decision process and timeframes.

    Response—Comment Nos. 11 and 12 will be discussed at an upcoming technical meeting.

16. **Page 6, Section 1.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS**—A milestone date of 12/30/05 is listed in the table. What is the milestone? Is it a work plan for the additional investigation? Completion of the investigation and report? Please provide additional information in the table or as a footnote.

    Response—Milestone is a used to represent a set date where an action will be taken to address a particular issue. A footnote has been added to the text to clarify the meaning of the term.

Appendix J

Comments Received on Draft Final Second Five-Year Review (Addressed during 22 September 2005 Web Conference)

J.1 Comments from Maine Department of Environmental Protection (21 September 2005)
J.2 Comments from Naval Air Station Brunswick (19 September 2005)
J.3 Comments from U.S. Environmental Protection Agency (14 September 2005)
J.4 Comments from Lepage Environmental Services (21 September 2005)
J.5 Comments from U.S. Environmental Protection Agency on ARAR Tables (Currently Under Navy Review)

Appendix J.1

Comments from Maine Department of Environmental Protection (21 September 2005)

Calderone, Gina

From: Sait, Claudia B [Claudia.B.Sait@maine.gov]
Sent: Wednesday, September 21, 2005 2:52 PM
To: Evans, Chris (Gordon.C.Evans@maine.gov); gainer, darren; joy, lisa; LePage, Carolyn; monaco, lonnie; williams, christine
Cc: Alexander Easterday (E-mail)
Subject: 2nd 5-Year Review-final comments

BNAS321_2nd5yrreview5.doc (63 ... gee.txt (284 B)

Hi,

Since Christine and Carolyn have submitted their comments in writing I will too. Attached are MEDEP's comments most of which are editiorial in nature.
MEDEP still has concerns regarding the IC and how they will be handled in the future but I have some ideas. CBS

September 21, 2005

Mr. Orlando Monaco
Department of Navy
Engineering Field Activity-Northeast
Code 1823/OM
10 Industrial Highway, Mailstop 82
Lester, PA 19113-2090

Re: Draft Final Second Five-Year Review Report
Naval Air Station, Brunswick, Maine

Dear Mr. Monaco:

The Maine Department of Environmental Protection (MEDEP) has reviewed the draft final "Second Five-Year Review Report, dated August 2005, prepared by Environmental Chemical Corporation. Based on that review MEDEP has the following comments and issues.

General Comments:

1. MEDEP still has serious concerns regarding the protectiveness of the remedies at the all the sites requiring institutional controls for groundwater as part of their remedy. The email provided by Greg Apraham (April 12, 2005) indicated that the base would only provide information to the Restoration Advisory Board as an FYI and the Navy has not committed to performing groundwater drawdown models for each site to establish buffers. Therefore, MEDEP cannot agree that the remedies are protective. The documented institutional control boundaries for Sites 1, 2, 3, 7, 9, and the Eastern Plume were based on the assumption that the Base was connected to public water, therefore groundwater would not be withdrawn. The situation at Dyer's Gate has shown this to be a false assumption. The Navy must commit to either establishing a basewide institutional control (or permit process) for groundwater or perform groundwater drawdown modeling for each site to establish appropriate buffers. If the Navy opts for the basewide groundwater restriction/permit process and water is needed in a remote location of the base the Navy would have the option of laying water lines or performing a site specific groundwater drawdown modeling. Whichever alternative the Navy chooses it must be legally binding to be considered protective.

2. Please check the scale on the figure for the entire base (i.e., 1-1, 1-2, 1-3, Appendices A and B, figure 1). MEDEP understands that the runways are approximately 8000 feet therefore the scale must be in error. Please revise.

3. Since the Record of Decision (1992) for Sites 1 and 3 stated that the groundwater extractions system would remove approximately one pore volume (16 million gallons) and only 3,685,000 were removed before the extraction system was shut down an EDS or an amendment to the ROD must be developed for Sites 1 & 3.

Specific Comments:

4. The document should be scanned for milestone dates that have been missed. The following is a number of outdated items that MEDEP found that need to be revised.

   Section 1.1.1, para 1, 1st sentence
   Section 1.1.1, para 2, 1st sentence
   Section 2.1.2 bullet 33, 2nd sentence
   Section 2.1.4.2, para 1, 2nd sentence
   Section 2.1.6.5, para 1, 1st sentence
   Section 2.2.3, bullets 21 & 22
   Section 2.2.10, table (Item 2 & 3)
   Section 2.4.2, 2nd sentence
   Section 2.4.5, Bullets 8-11
   Section 2.4.9, Table (items 1-3)
   Section 2.5.3, bullet 31
   Section 2.5.5.1, para 3, 3rd sentence
   Section 2.5.6, bullet 14
   Section 2.5.10, Table, (item 1 & 2)

5. Five Year Review Summary Form-Protectiveness Statements, Site 2:

   "During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional control (Base Instruction) that restrict soil excavation and the usage of the groundwater as a potable source."

   Please delete the phase "as a potable source" since any use of the groundwater must be prohibited as there are other exposure pathways.

6. Section 2.1.3.1, page 2-4, para 4:

   Please revise per the RTC #16 (RTC letter 2/8/05-it was a revised in the June letter but not highlighted as such.)

7. Section 2.1.4, Remedial Actions, para 4:

   The additional paragraph on the removal of the pore water sample as revised in RTC 19 letter 06/13/05 was not added. Please add as written in the letter except please delete the 13.9 liters since it a distraction from the true comparison in gallons.

8. Section 2.1.7, Technical Assessment, Question C:

   The Navy must acknowledge that the assumption that all of the Base was attached to the public water supply was incorrect and therefore the institutional controls are not protective.

9. Section 2.2.4., Land And Resource Use, para 2:

   "The Base is connected to a public water supply administered..."

   Since this statement is misleading it must be qualified or deleted. The statement regarding the well adjacent to Site 2 must also note that it is a new well.

10. Section 2.2.4.3, History of Contamination, para 2:

    This paragraph on human health risk needs to be moved to section 2.2.4.5 per RTC 33.

11. Section 2.2.8, Technical Assessment Question B, para 3:

    "As noted in the ROD, no remedial actions were proposed for groundwater at the site because the water is serviced by a public water supply."

    Based on the question asked and the installation of the well at Dyer's Gate this statement is inappropriate and must be revised to acknowledge that the assumption was wrong and that the remedy is not protective.

12. Section 2.2.10, Recommendations and Follow-Up Actions-Table:

    The issue of establishing a new IC boundary needs to be added.

13. Section 2.3.5, Remedial Actions, para 8:

    "The selected remedial action will be protective of human health and the environment as soon as the LTMP is implemented beginning in 2005.

    The selected remedial action can not be protective until the LTMP is implemented and the IC are finalized. MEDEP provided comments on the IC's in the current Base Instructions in a letter dated February 17, 2005. To date the Navy has not responded. Therefore the remedy has not been implemented and is not protective and the Navy is in non-compliance.

14. Section 2.3.5.1, Remedy Implementation, para 1:

    "The Navy has implemented institutional controls to prevent..."

    While the Navy may have had restrictions within the 2000 Base Instructions, the Record of Decision required the Navy to submit the IC for review and comment and finalization. This has not been done and must be acknowledged in this document. MEDEP suggests the following language: "*Prior to the Record of Decision the Navy implemented institutional controls for Site 7 in the Base Instruction (2000) to prevent the use of and contact with site groundwater and soil at Site 7; however the current Operating Instructions ...*"

15. Section 2.3.7.5, Site Inspection:

    This section must be revised per the RTC 58 in the letter dated June 2005. This referenced section should be 2.3.4.2.

16. Section 2.3.8, Question C:

    The error in assuming that all the Base was on public water and the spreading of the excavated soil on the site must also be added to this section

17. Section 2.3.8, Technical Assessment, para 1:

    a.) Change 1992 ROD to 2002 ROD.

    b.) The remedy is not functioning as intended because the Navy is in non-compliance with the ROD and this must be acknowledged.

c.) Bullet 1: There has been a physical change in the site in that the excavated soils were spread over potentially contaminated soils. Please revise.

d.) Bullet 2: The institutional controls have not been finalized per the review and comment of MEDEP and EPA. This bullet must be revised.

e.) Bullet 3: For this bullet to be factual the last sentence must be deleted. The monitoring is not sufficient to determine if there is a change in the plume concentration or extent.

18. Section 2.3.11, Protectiveness Statement:

    During this period of monitoring, exposure pathways that could result in unacceptable risks are being controlled through institutional controls, which restrict soil excavation and usage of the groundwater as a potable source and soil.

    Please delete the "as a potable source and soil". No water usage should be allowed for any reason.

19. Section 2.4.3.2, Land and Resource Use, Unnamed Streams, para 3:

    Please delete everything but the first sentence which should be moved to the Former Incinerator and Ash Landfill... portion of this section. The remainder of the paragraph has either been overtaken by events or is incorrect.

20. Section 2.4.4, Remedial Actions, Natural Attenuation:

    Please revise per RTC 72 in the June 2005 letter.

21. Section 2.4.4, Institutional Controls:

    Revise the sentence per the RTC 74 in the June 2005 letter.

22. Section 2.4.5, Progress Since ...para 1:

    Please reread and revise the verb tense from present to past in this paragraph.

23. Section 2.4.5, Progress Since ...bullet 5:

    The Base Instruction restricts both the use and contact with groundwater and soil. Please revise.

24. Section 2.4.5, Progress Since ...bullet 11:

    Since the Navy decided not to finalize the EECA this bullet must be deleted or revised to discuss the removal of the ash landfill.

25. Section 2.4.6.4, Groundwater Monitoring, para 6:

    This paragraph and its bullets must be deleted in it entirety because this information is based on a draft report and MEDEP has disagreed with some of the findings, conclusions and recommendations.

26. Section 2.4.7, Question C:

    The Navy must acknowledge that the assumption that all of the Base was attached to the public water supply was incorrect and therefore the institutional controls are not protective.

27. Section 2.4.7, Technical Assessment Summary, para 1 & 5:

    Please delete the second sentence in paragraph 1 about no physical changes and move paragraph 5 into the 1st paragraph. Also delete the sentence about the EECA.

28. Section 2.5.4.5, Basis for Taking Action, para 9:

    Please delete the 9th paragraph on eco risk. It has been replaced by the next paragraph.

29. Section 2.5.5, Remedial Action, para 1:

    a.) Move the 3rd sentence below the bullets.

    b.) Bullets: Please add a lead-in sentence. MEDEP suggests the following language: *"The remedial action of the Interim Record of Decision were designed to :"*

30. Section 2.5.5.2, System Operation..., para 7:

    Please delete this paragraph in its entirety or provide the data to support these statements.

31. Section 2.5.6, Progress Since...Bullets:

    Please combine bullet 18 and 19 since is it same investigation and bullets 17, 18, and 20 should be put in chronological order.

32. Section 2.5.8, Question A:

    "The review of documents applicable or relevant and appropriate requirement (ARRARs), risk assumptions, and the monitoring event data set indicate that the remedy is functioning as intended in the 1992 ROD and 1998 ESD."

    MEDEP suggests the following language: "The review of documents applicable or relevant and appropriate requirement (ARRARs), risk assumptions, and the monitoring event data set indicate that the remedy is functioning as intended in the 1992 *Interim* ROD, ~~and~~ *1998* ROD *and 2000* ESD."

33. *Section 2.5.8, Question C:*

    This section should be expanded to include a brief discussion of the infiltration gallery and the shift in the plume because that will need to be looked into. Also a discussion of the need to refine the IC boundary must be included in this section.

34. Section 2.5.8, Technical Assessment Summary, para 1 & para 4:

    Please add the 1992 Interim ROD and the ESD was signed 2000 not 2001.

35. Section 2.5.9, Table:

    This table could be improved by combining issues 8 & 9. MEDEP suggests the following language: *"Optimize the extraction well network for contaminate containment and removal."*

36. Section 2.5.10, Table:

    a.) To be consistent with the Issues Table there must be a follow up action for "Develop institutional control boundary for the site."

    b.) Last recommendation in the table: please revise as follows: "Collect ~~three~~ additional surface water samples~~, as recommended in Monitoring Event 23 report~~." MEDEP has already disagreed with this recommendation in the Monitoring Event report and this is not the forum to discuss the number of samples to be taken.

37. Section 2.5.11, Protectiveness Statement:

    "During this period of monitoring, exposure pathways that could result in unacceptable risks are being control through institutional controls that restrict soil excavation and the usage of the groundwater as a potable source."

    According to the Base Instruction included in this document soil excavation is not restricted within the Eastern Plume also the phase "as a potable source" should also be deleted since the groundwater should not be withdrawn for any purpose.

Appendix B:

38. Section 2.2, bullet 35:

    "The Navy, with input from the regulators, is in the process of updating the Base Operating Instruction to ensure that the regulators are notified of any potential future groundwater use prior to installation (except in matters relating to National Security)."

    Soil restrictions must also be included in the Base Instructions for Building 95 and please delete "(except in matters relating to National Security)". This is not the forum to discuss this type of detail.

39. Section 2.4, Remedial Actions, para 3"

    Please be sure to add the number of the figure (Figure 3).

40. Section 2.8, Issues, Last Item:

    Under the column Currently Affects-Protectiveness must be changed to YES. Not having adequate ICs for this site is why a dog kennel was built in an area that had surface soil contamination which was not removed because "it would destroy the trees in the area". Please revise.

41. Section 2.9, Recommendations...,Last Item:

    Change No to Yes for development of institutional controls for current protectiveness.

Thank you for the opportunity to review this report. If you have any questions or comments please call me at (207) 287-7713 or email me at claudia.b.sait@maine.gov.

Respectfully,

Claudia Sait
Project Manager-Federal Facilities
Bureau of Remediation & Waste Management

Cf: File
Chris Evans-MEDEP
Lisa Joy-BNAS
Christine Williams-EPA
Carolyn Lepage-Lepage Environmental
Al Easterday-ECC (email only)
Darren Gainer –ECC
Ed Benedikt

Appendix J.2

Comments from
Naval Air Station Brunswick
(19 September 2005)

Calderone, Gina

From: Joy, Lisa M. CIV NAS BRUNSWICK ENVIRONMENTAL [lisa.joy@navy.mil]
Sent: Monday, September 19, 2005 2:16 PM
To: Monaco, Orlando J CIV ENGFLDACT NORTHEAST
Cc: aeasterday@ecc.net; dgainer@ecc.net; Cellucci, Frank J CIV ENGFLDACT NORTHEAST
Subject: 5-yr Review - Comments

gee.txt (337 B)

Lonnie -

The following are some minor (I hope) edits that should be made to the Draft Final 5-Year Review Report:

1) Title Page: Have you had a chance to look into whether or not the CO needs to sign this document? If he does, the CO's information needs to be changed (George G. Womack, Captain).

2) General: The "hanger" spelling of aircraft hangars should be corrected.

3) Figures 1-1 through 1-3: It appears that the scales are off. For example, the runways are 8,000 ft but the scales range to 2,000+ ft.

4) Figure 1-2: It appears that the shapes for some of the sites may be inaccurate.

5) Figure 1-3: Please see comment #4. Also, the locations of the sites are not accurately shown.

6) General: As the DEP noted in the conference call, the dates for scheduled or recently completed activities need to be updated to reflect current schedules or completion dates.

7) Section 2.1.8, Page 2-18: It is indicated that the IC boundary issue currently affects protectiveness. How is this site not consistent with other sites where it does not?

8) Section 2.2.9, Page 2-33: Please see comment #7. Also, no follow-up action is listed for this issue in Section 2.2.10.

9) Section 2.3.4.2, Page 2-37: As EPA indicated, the future land use of the base should not be discussed.

10) Section 2.4: Throughout this section, the land use of the site needs to be updated to reflect the demolition of the old barracks.

11) Section 2.4.5, Page 2-62: Please see comment #6.

12) Appendix B, Section 1.2: The revised NASBINST 5090.1B signed in Dec 2000 included the EOD Pit. This needs to be at least mentioned in the site chronology and in other sections, as appropriate.

13) Appendix B, Section 2.4: "Figure X (to be determined)" needs to be revised to reference Figure 3.

R,
Lisa

Appendix J.3

Comments from U.S. Environmental Protection Agency (14 September 2005)

Calderone, Gina

From: Darren Gainer [DGainer@ecc.net]
Sent: Thursday, September 22, 2005 6:47 PM
To: Calderone, Gina
Subject: Fwd: 5-yr edits

gee.txt (330 B) gee.txt (221 B)

Darren Gainer, PG
ECC
Marlborough, MA
office: 508.229.2270
cell: 508.922.3273

>>> <williams.christine@epamail.epa.gov> 09/14/05 8:44 AM >>>
I think these will be easy enough to do on the 22nd:

remove EPA from Approval page. EPA will send a concurrence letter for the file

Add as an issue for all sites except site 2: ARAR tables are not consistent with ARAR tables across the NPL Site

Add as an issue for site 2: Monitoring Performance Standards not consistent with ARAR tables

Add as a Recommendation and Follow-up Action for all sites except site 2: ARAR tables will be made consistent across the NPL Site

Add as a Recommendation and Follow-up Action for site 2: Monitoring Performance Standards will be made consistent with ARAR tables

Recommendation and Follow-up Action for EP: change #8 to Develop institutional control boundary for site, taking into consideration groundwater withdrawal and building 584. (this is to make this section consistent with the issues noted)

Section 1.1.1 Change the summary presentation to Fall 2005 as spring has passed. guidance suggests the public be informed as soon as possible after the 5-yr is finalized. If a presentation cannot be made during the Oct meeting Navy must at least provide a press release in October and plan on a summary presentation during the Spring 2006 RAB.

Section 1.4 and other Next 5-yr Review sections: re-write to "The Third Five - Year Review for NAS Brunswick is due on December 6, 2009." I surely hope this one is signed this month.....rather than in December!

Section 2.1.7 and other Question B sections: remove the word "exposure" from the text as the guidance just asks for an evaluation of assumptions. Add a sentence to indicate that the ARAR evaluation has not indicated any changes in standards or TBCs that would call into question the protectiveness of the remedy in the short term, however, the ARAR tables will be made consistent across the site.

Section 2.3.9- & 2.3.10site 7 issues&recommendations- change the affects future protectiveness? for the QAPP finalization to Yes in both places

Section 2.4.3.2 Land and Resource Use: I believe it is best to be silent on the future of the development of the base. please remove the second to the last and the last sentence in this section.

There, now I can concentrate on the Site 9 RTCs: OK, Frank??!

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Appendix J.4

Comments from
Lepage Environmental Services
(21 September 2005)

Calderone, Gina

From: Darren Gainer [DGainer@ecc.net]
Sent: Wednesday, September 21, 2005 3:53 PM
To: Calderone, Gina
Subject: Fwd: BACSE comments for Second Five-Year Review revisions(Possible S-P-A-M 5.72/5.00)

gee.txt (438 B) gee.txt (221 B)

Darren Gainer, PG
ECC
Marlborough, MA
office: 508.229.2270
cell: 508.922.3273

>>> <CLepageGeo@aol.com> 09/21/05 11:37 AM >>>
In the interest of time, I am emailing comments on the Draft Final Second Finve-Year Review Report. I have based the following comments on the Navy's latest responses to BACSE's comments on the previous draft of the report.

1. Text revisions that were provided in a number of responses to comments did not appear in the draft final report. Please check the responses to BACSE comments 12, 14, 17, 30, 42, 44, and 57. Please also check the text referred to in comment 38 versus page 2-46 of the September 2004 draft. There appears to be a paragraph missing.

2. Re: BACSE comment 16, there should be an explanation in the report text as to why the increases in risk (which appear to be substantial) described in Attachment B do not affect the risk assessment.

3. There are several statements in the report that the Navy has no plans to cease active base status. With closure looming, the BRAC decision should be mentioned in these parts of the report. See section 2.3.4.2 on page 2-37 for Site 9, section 2.4.3.2 on page 2-53 for Site 9, and also the third bullet on page 2-56. There may be other passages that I missed.

Carolyn

Appendix J.5

Comments from U.S. Environmental Protection Agency on ARAR Tables (Currently Under Navy Review)

ARAR Tables – Sites 1 and 3

TABLE C-1 LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITES 1 AND 3

Wetland (Federal)	Wetlands Protection – Executive Order 11990	Applicable	Requires federal agencies to avoid impacts associated with the destruction or loss of wetlands and to avoid support of activities that will alter wetlands if a practicable alternative exists.	If it is determined that site topography does not preclude disturbed soil from being washed into Mere Brook and associated wetlands, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.	40 CFR Part 6, Appendix A 25 June 1985	No impact to the remedy found from compliance with these standards
Floodplain (Federal)	Floodplain Management – Executive Order 11988	Applicable	Requires federal agencies to avoid impacts associated with the modification of floodplains and to avoid support of activities that will alter floodplains if a practicable alternative exists.	If it is determined that site topography does not preclude disturbed soil from being washed into the floodplain of Mere Brook, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.	40 CFR Part 6, Appendix A 25 June 1985	No impact to the remedy found from compliance with these standards
Habitat (Federal)	Fish and Wildlife Coordination Act	Applicable	Requires federal agencies to take actions to protect fish or wildlife. Consultation required with resource agencies to develop measure to prevent and mitigate loss.	If it is determined that remedial actions will disturb fish or wildlife resources in Mere Brook or adjacent wetlands, avoidance and/or mitigation measure will be developed in consultation with the appropriate resource agencies.	16 USC 661 *et seq.*, 40 CFR 6.302 25 June 1985	No impact to the remedy found from compliance with these standards
Coastal Zone (Federal)	Coastal Zone Management Act	Applicable	This Act provides for the preservation and protection of coastal zone areas, which includes the entire area of Naval Air Station Brunswick. Federal activities that are in or directly affecting the coastal zone must be consistent to the maximum extent practicable with a federally approved state management program.	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this Act.	16 USC 1451 *et seq.*	No impact to the remedy found from compliance with these standards
Surface Water (State)	Natural Resources Protection Act ~~Permit by Rule~~ (06-096 CMR Chapter 305)	Applicable	Regulates activities in and adjacent to freshwater wetlands and streams. Soil disturbance in or adjacent to a freshwater wetland or surface waterbody requires erosion control measures to prevent erosion and sedimentation of the protected natural resources.	If it is determined that site topography does not preclude disturbed soil from being washed into Mere Brook, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.	06-096 CMR 305, Section 2 1 September 2002	No applicable changes found

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/Impact to Remedy
Wetlands (State)	Maine Wetlands Protection Rules	Applicable	Standards are provided for wetlands protection of State jurisdictional wetlands, including a 25-ft buffer from the upland edge of wetlands. Activities that have an unreasonable impact on wetlands are prohibited.	If it is determined that site topography does not preclude disturbed soil from being washed into Mere Brook and associated wetlands, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.	06-096 CMR 310	No impact to the remedy found from compliance with these standards
~~(State)~~	~~Maine Standards for Classification of Minor Drainages~~		~~All surface waters lying within the boundaries of the State that are in basins having a drainage area less than 100 mi^2 that are not classified as lakes or ponds are classified in this section.~~			
~~Groundwater (State)~~	~~Maine Standards for Classification of Groundwater (38 MRSA, Section 470)~~	~~Applicable~~	~~This law requires the classification of the state's groundwater to protect, conserve, and maintain groundwater resources in the interest of the health, safety, and general welfare of the people of the state. Under the Maine standards, groundwater is classified as GW-A.~~	~~This regulation will apply if treated groundwater is discharged back to groundwater. The Navy's current discharge option is the Brunswick Publicly-Owned Treatment Works. If discharge to groundwater is employed, the classification and uses of groundwater will be evaluated during development of discharge limits.~~	~~38 MRSA 470~~ ~~None~~	~~No applicable changes found~~
Groundwater (State)	Maine Site Location Development Law and Regulations (06-096 CMR Chapters 371-377)	Applicable	This act and associated regulations govern new developments, including those that handle hazardous waste. New developments cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality.	Those regulations concerning No Adverse Environmental Impact (i.e., Chapter 375) are applicable to implementation of the remedy. In particular, standards for protection of groundwater apply to construction and groundwater treatment activities. However, any licenses required, by reference, will not need to be obtained since permits are not required for actions conducted onsite at federal Superfund sites.	06-096 CMR371 4 May 1996 06-096 CMR372 4 May 1996 06-096 CMR373 4 May 1996 06-096 CMR374 25 July 1997 06-096 CMR375 22 September 2001 06-096 CMR376 4 May 1996 06-096 CMR377 4 May 1996	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/Impact to Remedy
Coastal Zone (State)	Coastal Zone Management Policies	Applicable	These policies provide for the regulation, conservation, beneficial use, and management of coastal resources. The entire area of Naval Air Station Brunswick is within the regulated coastal zone.	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	38 MSRA 1801 *et seq.*	No impact to the remedy found from compliance with these standards

TABLE C-2 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITES 1 AND 3

Wastes ~~Groundwater and Soil~~ (Federal)	Resource Conservation and Recovery Act, Subtitle C ~~General Facility Standards~~	~~Applicable~~ Relevant and Appropriate	~~Specifies general facility standards for operation.~~ Regulates the treatment, storage, and disposal of hazardous wastes. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations.	~~All relevant general facility standards must be met.~~ The remedy will be conducted in compliance with requirements of RCRA and the Maine Hazardous Waste Regulations.	42 USC 6921 *et seq.* ~~45 FR 33073 19 May 1980, unless otherwise noted~~	No applicable changes found
~~Soil (Federal)~~	~~RCRA – Releases from Solid Waste Management Units~~	~~Applicable~~	~~Regulates corrective action for releases of solid waste from solid waste management units at hazardous waste management facilities under RCRA.~~	~~If a release of solid waste occurs, 40 CFR Vol. 61 No. 85 will regulate the corrective action.~~	~~40 CFR Vol. 61 No. 85 1 May 1996~~	~~No applicable changes found~~
~~Soil (Federal)~~	~~RCRA – Closure and Post-Closure~~	~~Applicable~~	~~The purpose of this part is to establish minimum national standards that define the acceptable management of hazardous waste. The standards in this part apply to owners and operators of all facilities that treat, store, or dispose of hazardous waste, except as specifically provided otherwise in this part or Part 261 of this chapter.~~	~~All relevant closure and post-closure standards must be met.~~	~~40 CFR 264/265 45 FR 33221 19 May 1980, unless otherwise noted~~	~~No applicable changes found~~
~~Soil (Federal)~~	~~RCRA – Preparedness and Prevention (40 CFR 265 Subpart C)~~	~~Applicable~~	~~Facilities must be maintained and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.~~	~~All relevant preparedness and prevention standards must be met.~~	~~40 CFR 265 19 May 1980, unless otherwise noted~~	~~No applicable changes found~~
~~Soil (Federal)~~	~~RCRA – Contingency Plan and Emergency Monitoring (40 CFR 265 Subpart D)~~	~~Applicable~~	~~The owner or operator must have a contingency plan for his facility. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.~~	~~All relevant contingency plan and emergency monitoring standards must be met.~~	~~40 CFR 265 19 May 1980, unless otherwise noted~~	~~No applicable changes found~~

NOTE: RCRA = Resource Conservation and Recovery Act.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Soil (Federal)~~	~~RCRA Land Disposal Restrictions (40 CFR Part 268)~~	~~Applicable~~	~~Land disposal of RCRA hazardous waste is restricted without specified treatment. It must be determined that the waste meets the definition of one of the specified restricted wastes and the remedial action must constitute "placement" for the land disposal restrictions to be considered applicable. For each hazardous waste, the Land Disposal Restrictions specify that the waste must be treated either by a treatment technology or to a concentration level prior to disposal in a RCRA Subtitle C permitted facility.~~	~~Waste materials from Sites 1 and 3 were established as hazardous under RCRA definitions, therefore, are subject to 40 CFR 268.~~	~~40 CFR 268 64 FR 36488 6 July 1999~~	~~No applicable changes found~~
~~General (Federal)~~	~~RCRA – Miscellaneous Units~~	~~Applicable~~	~~Identify all miscellaneous units that treat, store, or dispose of hazardous waste at the facility, but do not fit the current definition of container, tank surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, underground injection well.~~	~~This regulation covers all other types of units that treat, store, or dispose of hazardous waste at the facility, but do not fit the current definition of container as defined in 40 CFR 264/265.~~	~~40 CFR 264 Subpart X 45 FR 33221 19 May 1980, unless otherwise noted~~	~~No applicable changes found~~
~~General (Federal)~~	~~OSHA – Recordkeeping, Reporting, and Related Regulations~~	~~Applicable~~	~~Specifies what recordkeeping and reporting are required by law for operation.~~	~~All relevant recordkeeping, reporting, and related regulations must be met.~~	~~29 CFR 1904 31 July 2000~~	~~No applicable changes found~~
Air (Federal)	RCRA Air Emission Standards for Process Vents	Applicable	Process vents that treat RCRA waste that have total organic concentrations of 10 ppm or greater are regulated. Maine has not yet adopted these regulations, therefore, these federal regulations are the applicable standard.	Emissions from process vents from the air stripper will meet these standards.	40 CFR Part 264, Subpart AA	No impact to the remedy found from compliance with these standards
Air (Federal)	RCRA, Air Emission Standards for Equipment Leaks	Applicable	Establishes air standards for equipment leaks at hazardous waste facilities where equipment "contains or contacts hazardous wastes with organic concentrations of at least 10 per cent by weight." Maine has not yet adopted these regulations, therefore, these federal regulations are the applicable standard.	Equipment will be monitored and maintained to prevent leaks in order to meet these standards.	40 CFR Part 264, Subpart BB	No impact to the remedy found from compliance with these standards
Air (Federal)	RCRA, Air Emission for Tanks, Surface Impoundments, and Containers	Applicable	Establishes air emission controls for tanks, surface impoundments, or containers used in the remedial actions involving hazardous waste which meet the applicability threshold. Maine has not yet adopted these regulations, therefore, these federal regulations are the applicable standard.	If the extraction and treatment system generates hazardous waste and utilizes tanks or other structures regulated under these regulations, they will be operated in compliance with these standards.	40 CFR Part 264, Subpart CC	No impact to the remedy found from compliance with these standards

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Air/Asbestos (Federal)	Clean Air Act (CAA), National Emissions Standards for Hazardous Air Pollutants	~~Relevant and Appropriate~~ Applicable	These regulations establish emissions standards for 189 hazardous air pollutants. Standards set for air emission treatment, dust control, and other release sources. Emission of asbestos fibers are regulated under Subpart M. Provides standards for packaging, transporting, and disposing of materials containing asbestos. Disposal requirements for asbestos disposal sites are established. Advance U.S. Environmental Protection Agency notification of the intended disposal site is required. ~~This regulation includes requirements for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations, for active waste disposal sites, and for waste disposal for demolition and renovation operations. It does not include requirements for inactive waste disposal sites like Sites 1 and 3. Therefore, the National Emission Standards for Hazardous Pollutants will not be applicable. However, the regulation is "relevant and appropriate" to the control of asbestos fiber emission at an inactive waste disposal site for demolition and renovation operations because the situation is sufficiently similar.~~	If the treatment system generates regulated air pollutants, or site remedial activities release dust or other contaminants, these standards will be met. ~~The National Emission Standards for Hazardous Pollutants requirements for emission limits, and personnel training for the handling and disposal of asbestos (Subpart M) are relevant and appropriated to activities regarding the placement of asbestos material beneath the landfill cap at Sites 1 and 3.~~ Remedial actions taken at Sites 1 and 3 will meet the~~se~~ National Emissions Standards for Hazardous Air Pollutants standards for asbestos.	42 USC 112(b)(1); 40 CFR Part 61 40 CFR Part 61, Subpart M 38 FR 8826 6 April 1973, unless otherwise noted	No impact to the remedy found from compliance with these standards No applicable changes found.
Asbestos (Federal)	Toxic Substances Control Act – Transport and Disposal of Asbestos Waste	Applicable	Provides standards for transport and disposal of materials that contain asbestos.	The consolidation and disposal of asbestos-contaminated material at Site 1 and 3 is in compliance with these standards.	40 CFR 763, Subpart E, Appendix D	No impact to the remedy found from compliance with these standards

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	Underground Injection Control Program (40 CFR 144, 146, 147)	Applicable	These regulations outline minimum program and performance standards for underground injection systems. Technical criteria and standards for siting, operation and maintenance, and reporting and recordkeeping ~~as required for permitting~~ are set forth in Part 146.	Discharges from the treatment system will be sent to an infiltration system which will discharge back to groundwater. Discharge of treated groundwater~~, by well injection,~~ must be in accordance with all the criteria and standards in these federal regulations, as well as meet all state Underground Injection Control Program requirements. Treated groundwater must meet all Safe Drinking Water Act standards prior to ~~well injection~~ release into the infiltration system.~~–~~	40 CFR 144 48 FR 14189 1 April 1983, unless otherwise noted 40 CFR 146 45 FR 42500 24 June 1980, unless otherwise noted 40 CFR 147 56 FR 9415 6 March 1991	No applicable changes found. No applicable changes found. No applicable changes found.
Groundwater (Federal)	Clean Water Act – Pretreatment Standards for POTW Discharge (40 CFR Part 403)	Applicable	This regulation specifies pretreatment standards for discharges to a POTW. If treated groundwater is discharged to a POTW, the POTW must have mechanisms available to meet the requirements of the National Pretreatment Program – Introduction of Pollutants which cause pass through or interference are prohibited. Discharges must also comply with any local POTW regulations. If hazardous waste is discharged to the POTW, the POTW may be subject to RCRA permit-by-rule.	~~This regulation is applicable since the Navy's current discharge option is the Brunswick POTW.~~ The remedy maintains the option to discharge treatment water to the Brunswick POTW. Because treated groundwater is discharged to a POTW, the treated water must meet all discharge limitations imposed under these standards by the POTW.	40 CFR 403 46 FR 9439 28 January 1981, unless otherwise noted	No applicable changes found.
Surface Water (Federal)	Clean Water Act – Ambient Water Quality Criteria	Relevant and Appropriate	These regulations establish water quality standards for protection of human health and the environment.	Contaminant concentrations in surface waters measured during long-term monitoring will be evaluated to assess whether the remedy remains protective.	40 CFR 122.44	No impact to the remedy found from compliance with these standards
~~Groundwater (State)~~	~~Maine Water Pollution Control Law, 38 MRSA Section 411, *et seq.*, and Regulations at Chapters 580, 584, and 581~~	~~Applicable~~	~~This law regulates the discharge of waste to surface waterbodies.~~	~~Treated groundwater must achieve Federal Ambient Water Quality Criteria or site-specific numerical criteria.~~	~~38 MRSA Chapters 580, 584, and 581 Fall 2000~~	~~No applicable changes found~~

NOTE: ~~OSHA = Occupational Safety and Health Act.~~
POTW = Publicly-Owned Treatment Works.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Groundwater and Surface Water~~ Waste (State)	Maine Hazardous Waste Management Rules – Identification and Listing (06-096 CMR, Chapters 800 ~~801, 802~~and 850-~~857~~)	~~Relevant and Appropriate~~ Applicable	~~The rules provide a comprehensive program for handling, storage, and recordkeeping at hazardous waste facilities. They supplement the RCRA regulations.~~ These regulations pertain to the identification and listing of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 261.	~~Because these requirements supplement RCRA hazardous waste regulations, they are relevant and appropriate.~~ Wastes generated through extraction, treatment, monitoring, and other remedial activities will be tested to determine whether they are hazardous wastes.	06-096 CMR800 4 May 1996 ~~06-096 CMR801~~ ~~4 May 1996~~ 06-096 CMR850 20 July 2004 ~~06-096 CMR851~~ ~~5 March 2001~~ ~~06-096 CMR852~~ ~~4 May 1996~~ ~~06-096 CMR853~~ ~~3 November 2002~~ ~~06-096 CMR854~~ ~~27 January 2003~~ ~~06-096 CMR855~~ ~~4 May 1996~~ ~~06-096 CMR856~~ ~~3 November 2002~~ ~~06-096 CMR857~~ ~~5 March 2001~~	No applicable changes found ~~No applicable changes found~~ No applicable changes found ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~
Waste (State)	Maine Hazardous Waste Management Rules – Generator Standards (06-096 CMR, Chapter 851)	Applicable	These regulations pertain to generators of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 262.	To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for generators of hazardous waste will be met.	06-096 CMR 851 5 March 2001	No applicable changes found
Waste (State)	Maine Hazardous Waste Management Rules – Standards for Hazardous Waste Facilities (06-096 CMR, Chapter 854	Applicable	These regulations pertain to facilities the treat, store, or dispose hazardous waste. Maine is a delegated state, so specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 264.	To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for the treatment, storage, and disposal of hazardous waste, including capping and monitoring of hazardous wastes left onsite, will be met.	06-096 CMR854 27 January 2003	No applicable changes found
Groundwater and Surface Water (State)	Maine Landfill Disposal Regulations	Applicable	This section regulates the disposal of solid waste into the landfill.	This regulation will be applicable and governs the disposal of solid waste into the landfill.	Title 38, Chapter 13 PL 1987, c. 517, @4 (rpr), 06-096 CMR 400 through 411	No applicable changes found

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater and Surface Water (State)	Maine Water Pollution Control Law and Regulations~~– Conditions of Licenses~~	Applicable	These regulations outline the conditions that require licensing of pollutant discharge.	This regulation will be applicable if treated groundwater is discharged back to groundwater.	38 MRSA Section 411, *et seq.*, Chapters 580, 584, and 581 Fall 2000 Title 38, Chapter 3, 414-A PL 2003, Ch. 246, §10-13 (AMD)	No applicable changes found No applicable changes found
Groundwater and Surface Water (State)	Maine Water Pollution Control Law – Certain Deposits and Discharges Prohibited	Applicable	No person, firm, corporation, or other legal entity shall place, deposit, discharge, or spill, directly or indirectly, into the groundwater, inland surface waters, or tidal waters of this State, or on the ice thereof, or on the banks thereof so that the same may flow or be washed into such waters, or in such manner that the drainage there from may flow into such waters, any of the following substances: mercury; toxic or hazardous substances; or radiological, chemical, or biological warfare agents.	This regulation will be applicable if treated groundwater is discharged back to groundwater.	Title 38, Chapter 3, 420 PL 2003, Ch. 165, § 1 (AMD)	No applicable changes found
Surface Water (State)	Surface Water Toxics Control Program (06-096 CMR Chapter 530.5)	Relevant and Appropriate	Except as naturally occurs, surface waters must be free of pollutants in concentrations which impart toxicity and cause those waters to be unsuitable for the existing and designated uses of the waterbody. This rule promulgates federal water quality criteria established by U.S. Environmental Protection Agency pursuant to Section 304(a) of the Clean Water Act.	Contaminant concentrations in surface waters measured during long-term monitoring will be evaluated to assess whether Maine's Surface Water Quality Criteria are being met.	06-096 CMR530.5 13 August 1997	No applicable changes found

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Groundwater (Federal)~~	~~Underground Injection Control Program (40 CFR 144, 146, 147)~~	~~Applicable~~	~~These regulations outline minimum program and performance standards for underground injection programs. Technical criteria and standards for siting, operation and maintenance, and reporting and recordkeeping as required for permitting are set forth in Part 146.~~	~~This regulation will be applicable if treated groundwater is discharged back to groundwater. Discharge of treated groundwater, by well injection, must be in accordance with all the criteria and standards in these federal regulations, as well as meet all state Underground Injection Control Program requirements. Treated groundwater must meet all Safe Drinking Water Act standards prior to well injection.~~	~~40 CFR 144 48 FR 14189 1 April 1983, unless otherwise noted~~ ~~40 CFR 146 45 FR 42500 24 June 1980, unless otherwise noted~~ ~~40 CFR 147 56 FR 9415, 6 March 1991~~	~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~
Groundwater (State)	Maine Rules to Control the Subsurface Discharge of Pollutants by Well Injection (06-096 CMR, Chapter 543)	Applicable	This regulation prohibits the injection of hazardous waste into or above water-bearing formations via a new Class IV well. The subsurface discharge into or through a Class IV well that would cause or allow the movement of fluid into an underground source of drinking water that may result in a violation of any Maine Primary Drinking Water Standard, or which may otherwise adversely affect public health, is prohibited.	These regulations will be applicable if treated groundwater is discharged back to groundwater. As described by the Explanation of Significant Differences, discharges from the treatment system may be sent to an infiltration system which will discharge back to groundwater. For discharge to the subsurface, groundwater must be treated to a target cleanup level less than or equal to the Maine Maximum Exposure Guidelines to be recharged to the aquifer.	06-096 CMR543 4 May 1996	No applicable changes found
~~Asbestos (Federal)~~	~~OSHA – Safety and Health Standards (29 CFR Part 1926)~~	~~Applicable~~	~~This regulation specifies the type of safety equipment and procedures for handling asbestos.~~	~~All appropriate safety equipment will be worn onsite. In addition, safety procedures will be followed during onsite activities.~~	~~29 CFR 1926 64 FR 18810 16 April 1999~~	~~No applicable changes found~~
Asbestos (State)	Maine Solid Waste Management, Testing, and Disposal of Special Wastes (Maine Department of Environmental Protection Regulations Chapter 405)	Applicable	Section 405.4 sets forth requirements that apply to the storage, transport, and disposal of asbestos wastes.	These requirements will pertain to activities involving disposal of asbestos material at Sites 1 and 3.	Title 38, Chapter 13 PL 1987, c. 517, @4 (rpr)	No applicable changes found

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Asbestos (State)	Maine Asbestos Abatement Regulations	Applicable	These regulations specify the minimum work practice requirements for asbestos abatement contractors.	These requirements will apply to remedial activities at Sites 1 and 3.	Title 38, Chapter 12A PL 1987, c. 448, @1-C (new)	No applicable changes found
Air (State)	Air Pollution Control – Classification of Air Quality Control Regions	Applicable	Establishes air quality regions, the classification of each region, and the ambient air quality and emission standards.	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met.	38 MSRA 583; 06-096 CMR 114	No impact to the remedy found from compliance with these standards
Air (State)	Ambient Air Quality Standards	Applicable	Establishes ambient air quality standards for the protection of public health and welfare for particulate matter and other listed pollutants	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met.	38 MSRA 584; 06-096 CMR 110	No impact to the remedy found from compliance with these standards
Air (State)	Air Pollution Control – Emission Requirements	Applicable	Establishes that new and modified sources of air emissions are required to demonstrate that emissions do not violate ambient air quality standards.	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met.	38 MSRA 585 and 590; 06-096 CMR 115	No impact to the remedy found from compliance with these standards
~~Air (Federal)~~	~~Clean Air Act – National Emission Standards for Hazardous Pollutants (40 CFR Part 61)~~	~~Relevant and Appropriate~~	~~Emission of asbestos fibers are regulated Subpart M of 40 CFR Part 61. This regulation includes requirements for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations, for active waste disposal sites, and for waste disposal for demolition and renovation operations. It does not include requirements for inactive waste disposal sites like Sites 1 and 3. Therefore, the National Emission Standards for Hazardous Pollutants will not be applicable. However, the regulation is "relevant and appropriate" to the control of asbestos fiber emissions at an inactive waste disposal site for demolition and renovation operations because the situation is sufficiently similar.~~	~~The National Emission Standards for Hazardous Pollutants requirements for emission limits, and personnel training for the handling and disposal of asbestos (Subpart M) are relevant and appropriate to activities regarding the placement of asbestos material beneath the landfill cap at Sites 1 and 3. Actions taken at Sites 1 and 3 will meet these requirements.~~	~~40 CFR Part 61 38 FR 8826 6 April 1973, unless otherwise noted~~	~~No applicable changes found~~

Media	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Air (Federal)~~	~~OSHA – General Industry Standards (29 CFR Part 1910)~~	~~Applicable~~	~~These regulations specify the 8-hour time-weighted average concentration for various organic compounds. Training requirements for workers at hazardous waste, including asbestos, operations are specified in 29 CFR Part 1910.120.~~	~~Proper respiratory equipment will be worn if it is impossible to maintain the work atmosphere below the concentration. Workers performing activities at Sites 1 and 3 will be required to have completed specific training requirements.~~	~~29 CFR 1910 65 FR 46818 31 July 2000~~	~~No applicable changes found~~

TABLE C-3 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITES 1 AND 3

Groundwater ~~/Surface Water~~ (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Groundwater at Naval Air Station Brunswick is not a current source of drinking water~~; therefore, MCLs are not applicable, but may be relevant and appropriate~~. To assess the potential risks to human health due to consumption of groundwater, contaminant concentrations in groundwater measured during long-term monitoring will be ~~were~~ compared to their MCLs.	40 CFR 141.11 - 66 FR 7061 22 January 2001 40 CFR 141.12 - 66 FR 3776 16 January 2001 40 CFR 141.13 – 54 FR 27527 29 June 1989	MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan) No applicable changes found No applicable changes found
Groundwater ~~/Surface Water~~ (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50-141.51)	Relevant and Appropriate	MCLGs ~~are health-based criteria. As promulgated under the Superfund Amendments and Reauthorization Act, MCLGs are to be considered for drinking water sources. MCLGs are available for several~~ have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effects on the health effects of a person would occur, allowing for an adequate margin of safety.	~~The 1990 National Contingency Plan states that non-zero MCLGs are to be used a goals. Because groundwater at NAS Brunswick is not a current source of drinking water, MCLGs are not applicable, but may be relevant and appropriate. Contaminant concentrations in groundwater were compared to their MCLGs.~~Under the selected remedy, where Federal MCLs have not been established, non-zero MCLGs will be attained through institutional controls and long-term monitoring.	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found ~~MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)~~

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Groundwater/ Surface Water (Federal)~~	~~RCRA – Subpart F Groundwater Protection Standards, Alternate Concentration Limits (40 CFR 264.94~~	~~Relevant and Appropriate~~	~~This requirement outlines standards, in addition to background concentrations and MCS, to be used in establishing cleanup levels for remediating groundwater contamination.~~	~~Most of the MCLs promulgated under RCRA are the same as SDWA MCLs. The standards set forth under RCRA do not reflect recent changes and additions to SDWA MCLs. Because groundwater is not a current source of drinking water, RCRA MCLs are not applicable, but may be relevant and appropriate.~~	~~48 FR 14294 1 April 1983~~	~~No applicable changes found~~
~~Groundwater/ Surface Water (Federal)~~	~~Clean Water Act Federal AWQC (Section 304[a][1])~~	~~Applicable~~	~~Federal AWQC include: (10 health-based criteria developed for 95 carcinogenic and non=carcinogenic compound, and (2) water quality parameters. AWQC for the protection of human health provide levels for exposure from drinking water and consuming aquatic organisms, and from consuming fish alone. Remedial actions involving contaminated surface water or groundwater must consider the uses of the water and the circumstances of the release or threatened release; this determines whether AWQC are relevant and appropriate.~~	~~AWQC will be applicable if treated groundwater is discharged to surface water. The navy's preferred discharge option is to the Brunswick POTW, although the Navy has not yet received approval from the POTW. AWQC may be considered during development of pretreatment standards because the POTW discharge its effluent to the Androscoggin River.~~	~~Section 304[a]] 31 December 2003~~	~~No applicable changes found~~
Groundwater /Surface Water (Federal)	EPA Risk Reference Doses	To Be Considered	References doses are the concentrations considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	~~Because there are only a limited number of promulgated standards for contaminants in soil and water, EPA~~ References doses ~~were used to characterize risks due to non-carcinogens in various media~~ will be used to characterize risks due to non-carcinogens in soil, groundwater and surface water, as necessary.	None	No applicable changes found

NOTE: EPA = U.S. Environmental Protection Agency.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater/ Surface Water (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects presented the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	~~Because there are only a limited number of promulgated standards for contaminant in soil and water, EPA Cancer Slop Factors were used to compute the individual incremental cancer risk resulting from exposure to certain compounds.~~ EPA Cancer Slope Factors will be used to characterize risks due to carcinogens in soil, groundwater, and surface water, as necessary.	None	No applicable changes found.
Groundwater ~~/Surface Water~~ (State)	Maine Drinking Water Rules (10-144E CMR Chapters 231-233)	Relevant and Appropriate	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at Naval Air Station Brunswick is not a current source of drinking water~~; therefore State Drinking Water Standards are relevant and appropriate~~. Contaminant concentrations in groundwater will be compared to State standards to assess the potential future risks to human health due to consumption of groundwater.	10-144 CMR231 18 August 2003 10-144 CMR232 5 May 2002 10-144 CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found
Groundwater ~~/Surface Water~~ (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144A CMR Chapter 233, Appendix C)	~~To Be Considered~~ Relevant and Appropriate	Appendix C of this regulation outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	~~MEGS have been considered for chemical compounds for which there are no promulgated standards.~~ ~~MEGS may be considered if treated groundwater is discharged back to groundwater. The Navy's preferred discharge option is to the Brunswick POTW; however, the Navy has not yet received approval from the POTW. MEGs may potentially be considered during development of discharge limits for reinjection of treated groundwater.~~ Groundwater at Naval Air Station Brunswick is not a current source of drinking water. Contaminant concentrations in groundwater will be compared to MEGs to assess the potential risks to human health due to consumption of groundwater.	10144 CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Air (Federal)~~	~~Clean Air Act – National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)~~	~~Applicable~~	~~Primary ambient air quality standards define levels of air quality to protect public health. Secondary ambient air quality standards protect public welfare from known or anticipated adverse effects from pollutants.~~	~~Particulate standard for matter less than 10 microns is 150 ug/m3, 24-hour average concentration. This requirement is applicable to excavation and construction activities.~~	~~40 CFR 50 26 FR 22384 25 November 1971, unless otherwise noted~~	~~No applicable changes found~~
~~Air (State)~~	~~Main Ambient Air Quality Standards (38 MRSA, Section 584; Maine Department of Environmental Protection Regulations, Chapter 110)~~	~~Applicable~~	~~This chapter establishes ambient air quality standards that are maximum levels of a particular pollutant permitted in the ambient air.~~	~~The standard for particulate matter is 150 ug/m3, 24-hour average concentration. This standard is applicable to excavation and construction activities.~~	~~38 MRSA, 584; Chapter 110 None~~	~~No applicable changes found~~

NOTE: MEG = Maximum Exposure Guideline.
~~SWQC = State Water Quality Criteria.~~

ARAR Tables – Site 2

TABLE D-1 MONITORING PERFORMANCE STANDARDS FOR SITE 2

Groundwater (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11-141.1~~63~~)	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water~~; therefore, MCLs are not applicable, but may be relevant and appropriate~~. To assess the potential risks to human health due to consumption of groundwater, contaminant concentrations in groundwater measured during long-term monitoring will be compared to their MCLs.	40 CFR 141.11 - 66 FR 7061 22 January 2001 40 CFR 141.12 66 FR 3776 16 January 2001 40 CFR 141.13 – 54 FR 27527 29 June 1989	No applicable changes found MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan) No applicable changes found No applicable changes found (editorial change)
Groundwater (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50-141.51)	MCLGs have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effects on the health effects of a person would occur, allowing for an adequate margin of safety. ~~MCLGs are health-based criteria. As promulgated under the Superfund Amendments and Reauthorization Act, MCLGs are to be considered for drinking water sources. MCLGs are available for several organic and inorganic contaminants.~~	Under the selected remedy, where Federal MCLs have not been established, non-zero MCLGs will be attained through institutional controls and long-term monitoring. ~~The 1990 National Contingency Plan states that non-zero MCLGs are to be used as goals. Because groundwater at NAS Brunswick is not a current source of drinking water, MCLGs are not applicable, but may be relevant and appropriate. Contaminant concentrations in groundwater measured during long-term monitoring will be compared to their MCLGs.~~	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found ~~MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)~~

Process	Requirement	Synopsis	Action to be Taken to Meet ~~Applicable or Relevant and Appropriate Requirement~~ Standard	Most Recent Effective Date	Modifications/ Impact to Remedy
Surface Water (Federal)	Clean Water Act – Ambient Water Quality Criteria	These regulations establish water quality standards for protection of human health and the environment.	Contaminant concentrations in surface waters and sediments will be compared to Ambient Water Quality Criteria as part of long-term monitoring.	40 CFR 122.44	No impact to the remedy found from compliance with these standards
Groundwater (State)	Maine Drinking Water Rules (10-144E CMR Chapters 231-233)	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at NAS Brunswick is not a current source of drinking water~~; therefore, state drinking water standards are not applicable but may be relevant and appropriate~~. Contaminant concentrations in groundwater will be compared to State standards to assess the potential future risks to human health due to consumption of groundwater.	10-144 CMR231 18 August 2003 10-144 CMR232 5 May 2002 10-144 CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found
Groundwater (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144 CMR Chapter 233, Appendix C)	Appendix C of this regulation outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water~~; therefore, MEGs are not applicable but may be relevant and appropriate.~~ Contaminant concentrations in groundwater will be compared to MEGs to assess the potential risks to human health due to consumption of groundwater.	10144 CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
~~Surface Water (State)~~	~~Natural Resources Protection Act Permit by Rule (06-096 CMR Chapter 305, Section 2)~~	~~Regulates activities in and adjacent to freshwater wetlands and streams. Soil disturbance in or adjacent to a freshwater wetland or surface water body requires erosion control measures to prevent erosion and sedimentation of the protected natural resources.~~	~~If it is determined that site topography does not preclude disturbed soil from being washed into Mere Brook, erosion control barriers will be installed prior to any soil disturbance in or adjacent to the freshwater wetland or stream. Any disturbed areas will be stabilized prior to removing the erosion control barriers.~~	~~06-096 CMR305, Section 2~~ ~~1 September 2002~~	~~No applicable changes found~~
Surface Water (State)	Surface Water Toxics Control Program (06-096 CMR Chapter 530.5)	Except as naturally occurs, surface waters must be free of pollutants in concentrations which impart toxicity and cause those waters to be unsuitable for the existing and designated uses of the waterbody. This rule promulgates federal water quality criteria established by U.S. Environmental Protection Agency pursuant to Section 304(a) of the Clean Water Act.	Contaminant concentrations measured during long-term monitoring will be evaluated to assess whether Maine's SWQC are being met.	06-096 CMR530.5 13 August 1997	No applicable changes found

ARAR Tables – Site 7

TABLE E-1 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 7

~~Soil (Federal)~~	~~RCRA Identification and Listing of Hazardous Waste Toxicity Characteristics (40 CFR 261.24~~	~~Relevant and Appropriate~~	~~This requirement identifies the maximum concentrations of contaminants for which the waste would be a RCRA characteristic waste because of its toxicity. The analytical test in Appendix II of 40 CFR Part 61 is referred to as the TCLP~~	~~In th4e event that excavations are conducted that remove soil, the soil will be analyzed by the TCLP to determine whether they are characteristic hazardous wastes under RCRA. Excavated materials that are determined to exceed TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle C treatment, storage, or disposal facility. Excavated materials that are determined to be below TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle D or other appropriate treatment, storage, or disposal facility~~	~~40 CFR 261.24 67 FR 11254 13 march 2002~~	~~No applicable changes found~~
Wastes (Federal)	Resource Conservation and Recovery Act, Subtitle C	Relevant and Appropriate	Regulates the treatment, storage, and disposal of hazardous wastes. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations.	The remedy will be conducted in compliance with requirements of the Resource Conservation and Recovery Act and the Maine Hazardous Waste Regulations.	42 USC 6921 *et seq.*	No impact to the remedy found from compliance with these standards
Air (Federal)	Clean Air Act, National Emissions Standards for Hazardous Air Pollutants	Applicable	These regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If any future excavation generates dust containing regulated air pollutants, these standards will be met.	42 USC 112(b)(1); 40 CFR Part 61	No impact to the remedy found from compliance with these standards.
~~NOTE: LDR = Land Disposal Restriction.~~ ~~TCLP = Toxicity Characteristic Leaching Procedure.~~ ~~POTW = Publicly-Owned Treatment Works.~~						

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Waste (State)	Maine Hazardous Waste Management Rules – Identification and Listing (06-096 CMR, Chapter 800)	Applicable	These regulations pertain to the identification and listing of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 261.	Wastes generated through excavation, monitoring, and other remedial activities will be tested to determine whether they are hazardous wastes.	06-096 CMR800 4 May 1996 06-096 CMR850 20 July 2004	No applicable changes found No applicable changes found
Waste (State)	Maine Hazardous Waste Management Rules – Generator Standards (06-096 CMR, Chapter 851-	Applicable	These regulations pertain to generators of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 262.	To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for generators of hazardous waste will be met.	06-096 CMR 851 5 March 2001	No applicable changes found
Waste ~~Soil~~ (State)	Maine Hazardous Waste Management Rules ~~Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units –~~ Standards for Hazardous Waste Facilities (06-096 CMR, Chapter 854)	~~Relevant and Appropriate~~ Applicable	~~This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.~~ These regulations pertain to facilities the treat, store, or dispose hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 264.	~~This applicable or relevant and appropriate requirement will be met in the event that excavation is conducted at the site.~~ To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for the treatment, storage, and disposal of hazardous waste will be met.	06-096 CMR 854 27 January 2003	No applicable changes found
Waste ~~Soil~~ (State)	Maine Solid Waste Management Rules – Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405)	Relevant and Appropriate	Water quality monitoring, leachate monitoring, and the characterization of wastes stored or disposed of are tools used for the detection and analysis of potential threats to public health and safety or the environment. The applicable tools are required to be implemented at solid waste facilities where the Department identifies potential threats to public health and safety or the environment because of the nature of the wastes stored or disposed of and/or the type, location, design, or operation of the solid waste facilities.	The substantive requirements of these rules will be used in the monitoring of groundwater at the site.	06-096 CMR 405 6 September 1999	No applicable changes found

TABLE E-2 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 7

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	Safe Drinking Water Act – MCLs (40 Code of Federal Regulations 141.11–141.16)	Relevant and Appropriate	MCLs have been promulgated for many common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Under Alternative 2, the selected remedy, the MCLs will be attained through institutional controls and long-term monitoring.	40 CFR 141.11 – 66 FR 7061 22 January 2001 40 CFR 141.12 – 66 FR 3776 16 January 2001 40 CFR 141.13 - 54 FR 27527 29 June 1989	~~No applicable changes found~~ MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan) No applicable changes found No applicable changes found (editorial change)
Groundwater (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50 – 141.51)	Relevant and Appropriate	MCLGs have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effects on the health effects of a person would occur, allowing for an adequate margin of safety. ~~MCLGs are non-enforceable public health goals.~~	Under Alternative 2, the selected remedy, where Federal MCLs have not been established, non-zero MCLGs will be attained through institutional controls and long-term monitoring.	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found ~~MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)~~
Groundwater (Federal)	EPA Risk Reference Doses	To Be Considered	Risk Reference Doses are the concentrations considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	~~Because there are only a limited number of promulgated standards for contaminants in water,~~ EPA Risk Reference Doses will be used to characterize risks due to non-carcinogens in groundwater, as necessary, during ~~the five-year reviews~~ monitoring.	None	No applicable changes found

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
EPA = U.S. Environmental Protection Agency.

SOURCE: U.S. Environmental Protection Agency (EPA). 1999. Integrated Risk Information System On-Line Database Maintained in Toxicology Data Network by the National Library of Medicine Bethesda, Maryland. EPA Environmental Criteria and Assessment Office, Cincinnati.

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects presented the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	~~Because there are only a limited number of promulgated standards for contaminants in water,~~ EPA Cancer Slope Factors will be used to characterize risks due to carcinogens in groundwater, as necessary, during ~~the five-year reviews~~ monitoring.	None	No applicable changes found
Groundwater (State)	Maine Department of Human Services (Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants [10-144A Code of Maine Regulations Chapter 233, Appendix C])	Relevant and Appropriate	MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Under Alternative 2, the selected remedy, the MEGs will be attained through institutional controls and long-term monitoring.	10144A CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
~~Groundwater (State)~~	~~Maine Hazardous Waste Rules Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)~~	~~Relevant and Appropriate~~	~~This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.~~	~~Under Alternative 2, the selected remedy, the MEGs will be attained through institutional controls and long-term monitoring.~~	~~06-096 CMR854~~ ~~27 January 2003~~	~~No applicable changes found~~
Groundwater (State)	Maine Department of Human Services Rules Relating to Drinking Water (10-144E, Chapters 231-233)	Relevant and Appropriate	Maine's primary drinking water standards are similar to Federal MCLs as drinking water standards under the Maine Safe Drinking Water Rules. When State standards are more stringent than Federal standards, and have been legally and constantly applied, the State levels will be used.	Under Alternative 2, the selected remedy, State drinking water standards that are more stringent than Federal standards will be attained through institutional controls and long-term monitoring.	10-144E CMR231 18 August 2003 10-144E CMR232 5 May 2002 10-144E CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found

TABLE E-3 LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 7

Coastal Zone (Federal)	Coastal Zone Management Act	Applicable	This act provides for the preservation and protection of coastal zone areas, which includes the entire area of Naval Air Station Brunswick. Federal activities that are in or directly affecting the coastal zone must be consistent to the maximum extent practicable with a federally approved state management program	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	16 USC 1451 *et seq.*	No impact to the remedy found from compliance with these standards
Coastal Zone (State)	Coastal Zone Management Policies	Applicable	These policies provide for the regulation, conservation, beneficial use, and management of coastal resources. The entire area of Naval Air Station Brunswick is within the regulated coastal zone.	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	38 MSRA 1801 *et seq.*	No impact to the remedy found from compliance with these standards
Groundwater (State)	Maine Site Location Development Law and Regulations (06-096 CMR Chapters 371-377)	Applicable	This Act and associated regulations govern new developments, including those that handle hazardous waste. New developments cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality.	Those regulations concerning No Adverse Environmental Impact (i.e., Chapter 375) are applicable to implementation of the remedy. In particular, standards for protection of groundwater apply to construction and groundwater treatment activities. However, any licenses required, by reference, will not need to be obtained since permits are not required for actions conducted onsite at federal Superfund sites.	06-096 CMR371 4 May 1996 06-096 CMR372 4 May 1996 06-096 CMR373 4 May 1996 06-096 CMR374 25 July 1997 06-096 CMR375 22 September 2001 06-096 CMR376 4 May 1996 06-096 CMR377 4 May 1996	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

ARAR Tables – Site 9

TABLE F-1 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 9

~~Soil (Federal)~~	~~RCRA Identification and Listing of Hazardous Waste Toxicity Characteristics (40 CFR 261.24~~	~~Relevant and Appropriate~~	~~This requirement identifies the maximum concentrations of contaminants for which the waste would be a RCRA characteristic waste because of its toxicity. The analytical test in Appendix II of 40 CFR Part 61 is referred to as the TCLP~~	~~In the event that excavations are conducted that remove soil, the soil will be analyzed by the TCLP to determine whether they are characteristic hazardous wastes under RCRA. Excavated materials that are determined to exceed TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle C treatment, storage, or disposal facility. Excavated materials that are determined to be below TCLP allowable concentrations will be disposed offsite in a RCRA Subtitle D or other appropriate treatment, storage, or disposal facility~~	~~40 CFR 261.24 67 FR 11254 13 march 2002~~	~~No applicable changes found~~
Wastes (Federal)	Resource Conservation and Recovery Act, Subtitle C	Relevant and Appropriate	Regulates the treatment, storage, and disposal of hazardous wastes. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations.	The remedy will be conducted in compliance with requirements of Resource Conservation and Recovery Act and the Maine Hazardous Waste Regulations.	42 USC 6921 *et seq.*	No impact to the remedy found from compliance with these standards
Surface Water (Federal)	Clean Water Act – Ambient Water Quality Criteria	Relevant and Appropriate	These regulations establish water quality standards for protection of human health and the environment.	Contaminant concentrations in surface waters measured during long-term monitoring will be evaluated to assess whether federal Ambient Water Quality Criteria Ambient Water Quality Criteria are being met.	40 CFR 122.44	No impact to the remedy found from compliance with these standards

NOTE: RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity Characteristic Leaching Procedure.

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Waste (State)	Maine Hazardous Waste Management Rules – Identification and Listing (06-096 CMR, Chapters 800)	Applicable	These regulations pertain to the identification and listing of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 261.	Wastes generated through monitoring and other remedial activities will be tested to determine whether they are hazardous wastes.	06-096 CMR800 4 May 1996 06-096 CMR850 20 July 2004	No applicable changes found No applicable changes found
Waste (State)	Maine Hazardous Waste Management Rules – Generator Standards (06-096 CMR, Chapter 851-	Applicable	These regulations pertain to generators of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 262.	To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for generators of hazardous waste will be met.	06-096 CMR 851 5 March 2001	No applicable changes found
Waste ~~Soil~~ (State)	Maine Hazardous Waste Management Rules ~~Relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units –~~ Standards for Hazardous Waste Facilities (06-096 CMR, Chapter 854)	~~Relevant and Appropriate~~ Applicable	~~This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.~~ These regulations pertain to facilities the treat, store, or dispose hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 264.	~~This applicable or relevant and appropriate requirement will be met in the event that excavation is conducted at the site.~~ To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for the treatment, storage, and disposal of hazardous waste will be met.	06-096 CMR 854 27 January 2003	No applicable changes found
~~Soil (State)~~	~~Maine Solid Waste Management Rules – General Provisions (06-096 CMR 400)~~	~~Relevant and Appropriate~~	~~These rules regarding administrative matters and general standards concerning solid waste facilities and solid waste handling.~~	~~The substantive requirements of these rules will be met in the event that the inactive ash landfill is disturbed or excavated, or the barracks and its foundation are removed or modified.~~	~~06-096 CMR 400, 5 March 2001~~	~~No applicable changes found.~~
~~Soil (State)~~	~~Maine Solid Waste Management Rules – Landfill Siting, Design and Operation (06-096 CMR 401)~~	~~Relevant and Appropriate~~	~~This establishes requirements for siting, design, and operation of landfills for the disposal of municipal solid waste, special wastes, construction/demolition debris, land clearing debris, and wood wastes.~~	~~The substantive requirements of the closure and post-closure provisions of these rules will be met in the event that the inactive ash landfill is disturbed or excavated, or the barracks and its foundation are removed or modified.~~	~~06-096 CMR 401 6 September 1999~~	~~No applicable changes found~~

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Soil~~ Groundwater (State)	Maine Solid Waste Management Rules – Water Quality Monitoring, Leachate Monitoring, and Waste Characterization (06-096 CMR 405)	Relevant and Appropriate	Water quality monitoring, leachate monitoring, and the characterization of wastes stored or disposed of are tools used for the detection and analysis of potential threats to public health and safety or the environment. The applicable tools are required to be implemented at solid waste facilities where the Department identifies potential threats to public health and safety or the environment because of the nature of the wastes stored or disposed of and/or the type, location, design, or operation of the solid waste facilities.	The substantive requirements of these rules will be used in the monitoring of groundwater at the site ~~the inactive landfill~~.	06-096 CMR 405 6 September 1999	No applicable changes found

TABLE F-2 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 9

Groundwater/Surface Water (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11-141.13)	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Primary MCLs have been set as the cleanup goals when the primary MCL is available and a more stringent State standard does not exist. Natural attenuation of Site 9 groundwater will restore the aquifer over time. Monitoring of the Site 9 plume will continue to determine if cleanup goals have been met. ~~Under Alternative 2, the selected remedy, the MCLs will be attained through natural attenuation.~~	40 CFR 141.11 – 66 FR 7061 22 January 2001 40 CFR 141.12 – 66 FR 3776 16 January 2001 40 CFR 141.13 – 54 FR 27527 29 June 1989	~~No applicable changes found~~ MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan) No applicable changes found No applicable changes found (editorial change)
Groundwater/Surface Water (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50-141.51)	Relevant and Appropriate	MCLGs have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effects on the health effects of a person would occur, allowing for an adequate margin of safety. ~~The MCLGs are non-enforceable public health goals.~~	Under the selected remedy ~~Alternative 2~~, where Federal MCLs have not been established, non-zero MCLGs will be attained through natural attenuation and monitoring.	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found ~~MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)~~
Groundwater (Federal)	EPA Risk Reference Doses	To Be Considered	Risk Reference Doses are the concentrations considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	~~Because there are only a limited number of promulgated standards for contaminants in water,~~ EPA Risk Reference Doses will be used to characterize risks due to non-carcinogens in groundwater, as necessary, during ~~the 5-year reviews~~ monitoring.	None	No applicable changes found.

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/Impact to Remedy
Groundwater (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects presented the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	~~Because there are only a limited number of promulgated standards for contaminants in water,~~ EPA Cancer Slope Factors will be used to characterize risks due to carcinogens in groundwater, as necessary, during ~~5-year reviews~~ monitoring	None	No applicable changes found.
Groundwater~~/Surface Water~~ (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144A CMR Chapter 233, Appendix C)	Relevant and Appropriate	Appendix C of this regulation outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Groundwater at Naval Air Station Brunswick is not a current source of drinking water. Contaminant concentrations in groundwater will be compared to MEGs to assess the potential risks to human health due to consumption of groundwater. ~~Under Alternative 2,~~ The selected remedy~~, the Maximum Exposure Guidelines~~ will attain the MEGs ~~be attained~~ through natural attenuation over time.	10144 CMR 233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)
~~Soil (State)~~	~~Maine Hazardous Waste Rules relating to Performance Standards for Establishing, Constructing, Altering, and Operating Certain Types of Hazardous Waste Units (06-096 CMR 854)~~	~~Relevant and Appropriate~~	~~This requirement outlines the State of Maine's rules relating to establishing, constructing, altering, and operating certain types of hazardous waste units.~~	~~Under Alternative 2, the selected remedy, the Maximum Exposure Guidelines will be attained through natural attenuation.~~	~~06-096 CMR 854, 27 January 2003~~	~~No applicable changes found~~
Groundwater~~/Surface~~ Water (State)	Maine Drinking Water Rules (10-144E CMR Chapters 231-233)	Relevant and Appropriate	Maine's Primary Drinking Water Standards are equivalent to federal MCLs as drinking water standards under the Maine Safe Drinking Water Rules. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at Naval Air Station Brunswick is not a current source of drinking water. Contaminant concentrations in groundwater will be compared to State standards to assess the potential future risks to human health due to consumption of groundwater. ~~Under Alternative 2,~~ The selected remedy will attain the State drinking water standards that are more stringent than Federal Standards ~~be attained~~ through natural attenuation over time.	10-144 CMR231 18 August 2003 10-144 CMR232 5 May 2002 10-144 CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found

NOTE: MEG = Maximum Exposure Guideline.

TABLE F-3 LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR SITE 9

Coastal Zone (Federal)	Coastal Zone Management Act	Applicable	This act provides for the preservation and protection of coastal zone areas, which includes the entire area of Naval Air Station Brunswick. Federal activities that are in or directly affecting the coastal zone must be consistent to the maximum extent practicable with a federally-approved state management program.	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	16 USC 1451 *et seq.*	No impact to the remedy found from compliance with these standards
Coastal Zone (State)	Coastal Zone Management Policies	Applicable	These policies provide for the regulation, conservation, beneficial use, and management of coastal resources. The entire area of Naval Air Station Brunswick is within the regulated coastal zone.	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	38 MSRA 1801 *et seq.*	No impact to the remedy found from compliance with these standards
Groundwater (State)	Maine Site Location Development Law and Regulations (06-096 CMR Chapters 371-377)	Applicable	This act and associated regulations govern new developments, including those that handle hazardous waste. New developments cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality.	Those regulations concerning No Adverse Environmental Impact (i.e., Chapter 375) are applicable to implementation of the remedy. In particular, standards for protection of groundwater apply to construction and groundwater treatment activities. However, any licenses required, by reference, will not need to be obtained since permits are not required for actions conducted onsite at federal Superfund sites.	06-096 CMR371 4 May 1996 06-096 CMR372 4 May 1996 06-096 CMR373 4 May 1996 06-096 CMR374 25 July 1997 06-096 CMR375 22 September 2001 06-096 CMR376 4 May 1996 06-096 CMR377 4 May 1996	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

ARAR Tables – Eastern Plume

TABLE G-1 LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE EASTERN PLUME

Habitat (Federal)	Fish and Wildlife Coordination Act	Applicable	Requires federal agencies to take actions to protect fish or wildlife. Consultation required with resource agencies to develop measure to prevent and mitigate loss.	If it is determined the remedial actions will disturb fish or wildlife resources in the Harpswell Cove estuary, avoidance and/or mitigation measure will be developed in consultation with the appropriate resource agencies.	16 USC 661 *et seq.*, 40 CFR 6.302 25 June 1985	No impact to the remedy found from compliance with these standards
Coastal Zone (Federal)	Coastal Zone Management Act	Applicable	This act provides for the preservation and protection of coastal zone areas, which includes the entire area of Naval Air Station Brunswick. Federal activities that are in or directly affecting the coastal zone must be consistent to the maximum extent practicable with a federally-approved state management program	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	16 USC 1451 *et seq.*	No impact to the remedy found from compliance with these standards
~~Groundwater (State)~~	~~Maine Standards for Classification of Groundwater (38 MRSA, Section 470)~~	~~Applicable~~	~~This law requires the classification of the state's groundwater to protect, conserve, and maintain groundwater resources in the interest of the health, safety, and general welfare of the people of the state. Under the Maine standards, groundwater is classified as GW-A.~~	~~This regulation will apply if treated groundwater is discharged back to groundwater. The Navy's current discharge option is the Brunswick Publicly-Owned Treatment Works. If discharge to groundwater is employed, the classification and uses of groundwater will be evaluated during development of discharge limits.~~	~~38 MRSA 470 None~~	~~No applicable changes found~~
Groundwater (State)	Maine Site Location Development Law and Regulations (06-096 CMR Chapters 371-377)	Applicable	This act and associated regulations govern new developments, including those that handle hazardous waste. New developments cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality.	Those regulations concerning No Adverse Environmental Impact (i.e., Chapter 375) are applicable to implementation of the remedy. In particular, standards for protection of groundwater apply to construction and groundwater treatment activities. However, any licenses required, by reference, will not need to be obtained since permits are not required for actions conducted onsite at federal Superfund sites.	06-096 CMR371 4 May 1996 06-096 CMR372 4 May 1996 06-096 CMR373 4 May 1996 06-096 CMR374 25 July 1997 06-096 CMR375 22 September 2001 06-096 CMR376 4 May 1996 06-096 CMR377 4 May 1996	No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found No applicable changes found

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/Impact to Remedy
~~Surface Water (State)~~	~~Surface Water Toxics Control Program (06-096 CMR Chapter 530.5)~~	~~Relevant and Appropriate~~	~~Except as naturally occurs, surface waters must be free of pollutants in concentrations which impart toxicity and cause those waters to be unsuitable for the existing and designated uses of the water body. This rule promulgates federal water quality criteria established by the U.S. Environmental Protection Agency pursuant to Section 403(1) of the Clean Water Act.~~	~~Groundwater is to be managed such that Maine's water quality standards are met.~~	~~060966CMR530.5 13 August 1997~~	~~No applicable changes found~~
Coastal Zone (State)	Coastal Zone Management Policies	Applicable	These policies provide for the regulation, conservation, beneficial use, and management of coastal resources. The entire area of NAS Brunswick is within the regulated coastal zone.	If remedial activities potentially impact coastal zone resources, activities that would reduce adverse impacts will be considered and implemented, as appropriate. Coastal resource agencies will be consulted to meet the substantive requirements under this act.	38 MSRA 1801 *et seq.*	No impact to the remedy found from compliance with these standards

TABLE G-2 ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE EASTERN PLUME

~~Groundwater/ Soil (Federal)~~	~~RCRA LDRs (40 CFR 268)~~	~~To be Determined~~	~~Land disposal of RCRA hazardous wastes is restricted without specified treatment. It must be determined that the waste, beyond a reasonable doubt, meets the definition of one of the specified restricted wastes and the remedial action must constitute "placement" for the land disposal restrictions to be considered applicable. For each hazardous waste, the LDRs specify that the waste must be treated either by a treatment technology or to a concentration level prior to disposal in a RCRA Subtitle C permitted facility.~~	~~During treatment of groundwater, sludge containing hazardous constituents will be generated. The selected remedy includes provisions for analysis of this sludge, including TCLP testing. LDRs are potentially applicable if the sludge fails TCLP. The selected remedy does address handling and disposal of the sludge as a hazardous waste, if necessary.~~	~~40 CFR 268 64 FR 36488 6 July 1999~~	~~No applicable changes found~~
Wastes (Federal)	RCRA, Subtitle C	Relevant and Appropriate	Regulates the treatment, storage, and disposal of hazardous wastes. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations.	The remedy will be conducted in compliance with requirements of RCRA and the Maine Hazardous Waste Regulations.	42 USC 6921 *et seq.*	No impact to the remedy found from compliance with these standards
Air (Federal)	RCRA Air Emission Standards for Process Vents	Applicable	Process vents that treat RCRA waste that have total organic concentrations of 10 ppm or greater are regulated. Maine has not yet adopted these regulations, therefore, these federal regulations are the applicable standard.	Emissions from process vents from the air stripper will meet these standards.	40 CFR Part 264, Subpart AA	No impact to the remedy found from compliance with these standards
Air (Federal)	RCRA, Air Emission Standards for Equipment Leaks	Applicable	Establishes air standards for equipment leaks at hazardous waste facilities where equipment "contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight." Maine has not yet adopted these regulations, therefore, these federal regulations are the applicable standard.	Equipment will be monitored and maintained to prevent leaks in order to meet these standards.	40 CFR Part 264, Subpart BB	No impact to the remedy found from compliance with these standards
Air (Federal)	RCRA, Air Emission for Tanks, Surface Impoundments, and Containers	Applicable	Establishes air emission controls for tanks, surface impoundments, or containers used in the remedial actions involving hazardous waste which meet the applicability threshold. Maine has not yet adopted these regulations, therefore, these federal regulations are the applicable standard.	If the extraction and treatment system generates hazardous waste and utilizes tanks or other structures regulated under these regulations they will be operated in compliance with these standards.	40 CFR Part 264, Subpart CC	No impact to the remedy found from compliance with these standards

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Air (Federal)	Clean Air Act, National Emissions Standards for Hazardous Air Pollutants	Applicable	These regulations establish emissions standards for 189 hazardous air pollutants. Standards set for air strippers, dust control, and other release sources.	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met.	42 USC 112(b)(1); 40 CFR Part 61	No impact to the remedy found from compliance with these standards
Groundwater (Federal)	Underground Injection Control Program (40 CFR 144, 146, 147)	Applicable	These regulations outline minimum program and performance standards for underground injection ~~programs~~ systems. Technical criteria and standards for siting, operation and maintenance, and reporting and recordkeeping~~as required for permitting~~ are set forth in Part 146.	As described by the Explanation of Significant Differences, discharges from the treatment system may be sent to an infiltration system which will discharge ~~This regulation will be applicable if treated groundwater is discharged~~ back to groundwater. ~~The Navy's current discharge option is the Brunswick POTW.~~ Discharge of treated groundwater~~, by well injection,~~ must be in accordance with all the criteria and standards in these federal regulations, as well as meet all state Underground Injection Control Program requirements. Treated groundwater must meet all Safe Drinking Water Act standards prior to well injection.~~–~~	40 CFR 144 48 FR 14189 1 April 1983, unless otherwise noted 40 CFR 146 45 FR 42500 24 June 1980, unless otherwise noted 40 CFR 147 56 FR 9415 6 March 1991	No applicable changes found No applicable changes found No applicable changes found

NOTE: RCRA = Resource Conservation and Recovery Act.
~~LDR = Land Disposal Restriction.~~
~~TCLP = Toxicity Characteristic Leaching Procedure.~~
POTW = Publicly-Owned Treatment Works.

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Groundwater (Federal)	Clean Water Act – Pretreatment Standards for POTW Discharge (40 CFR Part 403)	Applicable	This regulation specifies pretreatment standards for discharges to a POTW. If treated groundwater is discharged to a POTW, the POTW must have mechanisms available to meet the requirements of the National Pretreatment Program. Discharges must also comply with any local POTW regulations. If hazardous waste is discharged to the POTW, the POTW may be subject to RCRA permit-by-rule.	~~This regulation is applicable since the Navy's current discharge~~The Explanation of Significant Differences maintains the option ~~is~~ discharge treatment water to the Brunswick POTW. Because treated groundwater is discharged to a POTW, the treated water must meet all discharge limitations imposed under these standards by the POTW.	40 CFR 403 46 FR 9439 28 January 1981, unless otherwise noted	No applicable changes found
Surface Water (Federal)	Clean Water Act – Ambient Water Quality Criteria	Relevant and Appropriate	These regulations establish water quality standards for protection of human health and the environment.	Contaminant concentrations in surface waters measured during long-term monitoring will be evaluated to assess whether federal Ambient Water Quality Criteria are being met.	40 CFR 122.44	No impact to the remedy found from compliance with these standards
Groundwater (State)	Maine Rules to Control the Subsurface Discharge of Pollutants by Well Injection (06-096 CMR, Chapter 543)	Applicable	This regulation prohibits the injection of hazardous waste into or above water-bearing formations via a new Class IV well. The subsurface discharge into or through a Class IV well that would cause or allow the movement of fluid into an underground source of drinking water that may result in a violation of any Maine Primary Drinking Water Standard, or which may otherwise adversely affect public health, is prohibited.	These regulations will be applicable if treated groundwater is discharged back to groundwater. ~~The Navy's current discharge option is the Brunswick POTW.~~ As described by the Explanation of Significant Differences, discharges from the treatment system may be sent to an infiltration system which will discharge back to groundwater. For discharge to the subsurface, groundwater must be treated to a target clean-up level less than or equal to the Maine Maximum Exposure Guidelines to be recharged to the aquifer.	06-096 CMR543 4 May 1996	No applicable changes found

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Groundwater/ Soil (State)~~	~~Maine Underground Storage Tank Rules relating to standards for the installation, operation, and proper closure of underground storage tanks (06-096 CMR Chapter 691)~~	~~Applicable~~	~~The rules require the registration of all existing, new, and replacement underground storage facilities with the Maine Department of Environmental Protection and authorizes and provides direction for the Board of Environment Protection to develop rules for the design, installation, replacement, operation, and closure of underground oil storage tanks except for tanks used for the storage of propane. The requirements for corrective action specify that when a leak or discharge occurs, the contamination should be mitigated. These rules define contamination as applied to groundwater, soil, and surface water when one of the following is present: (1) the presence of free product or an oil sheen, (2) an exceedance of primary drinking water standards (i.e., Maine Maximum Contaminant Levels), (3) an exceedance of Maximum Exposure Guidelines (as set forth in Maine Department of Human Services memorandum dated 23 October 1992), or (4) a statistically significant increase in the concentration of measured parameters when compared to background.~~	~~Groundwater impacted by underground storage tanks will be mitigated.~~	~~06-096 CMR 691 14 March 2004~~	~~No applicable changes found~~

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
~~Groundwater and Surface Water~~ Waste (State)	Maine Hazardous Waste Management Rules – Identification and Listing (06-096 CMR, Chapters 800 ~~801, 802~~ and 850-~~857~~)	~~Relevant and Appropriate~~ Applicable	~~The rules provide a comprehensive program for handling, storage, and recordkeeping at hazardous waste facilities. They supplement the RCRA regulations.~~These regulations pertain to the identification and listing of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 261.	~~Because these requirements supplement RCRA hazardous waste regulations, they are relevant and appropriate.~~ Wastes generated through extraction, treatment, monitoring, and other remedial activities will be tested to determine whether they are hazardous wastes.	06-096 CMR800 4 May 1996 ~~06-096 CMR801~~ ~~4 May 1996~~ 06-096 CMR850 20 July 2004 ~~06-096 CMR851~~ ~~5 March 2001~~ ~~06-096 CMR852~~ ~~4 May 1996~~ ~~06-096 CMR853~~ ~~3 November 2002~~ ~~06-096 CMR854~~ ~~27 January 2003~~ ~~06-096 CMR855~~ ~~4 May 1996~~ ~~06-096 CMR856~~ ~~3 November 2002~~ ~~06-096 CMR857~~ ~~5 March 2001~~	No applicable changes found ~~No applicable changes found~~ No applicable changes found ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~ ~~No applicable changes found~~
Waste (State)	Maine Hazardous Waste Management Rules – Generator Standards (06-096 CMR, Chapter 851-	Applicable	These regulations pertain to generators of hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 262.	To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for generators of hazardous waste will be met.	06-096 CMR 851 5 March 2001	No applicable changes found

Process	Requirement	Status	Requirement Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirements	Most Recent Effective Date	Modifications/ Impact to Remedy
Waste (State)	Maine Hazardous Waste Management Rules – Standards for Hazardous Waste Facilities (06-096 CMR, Chapter 854	Applicable	These regulations pertain to facilities the treat, store, or dispose hazardous waste. Maine is a delegated state, therefore, specific requirements are established under the Maine Hazardous Waste Regulations which incorporate the standards under 40 CFR 264.	To the extent that wastes generated by remedial activities meet hazardous waste standards, requirements for the treatment, storage, and disposal of hazardous waste will be met.	06-096 CMR854 27 January 2003	No applicable changes found
Surface Water (State)	Surface Water Toxics Control Program (06-096 CMR Chapter 530.5)	Relevant and Appropriate	Except as naturally occurs, surface waters must be free of pollutants in concentrations which impart toxicity and cause those waters to be unsuitable for the existing and designated uses of the waterbody. This rule promulgates federal water quality criteria established by U.S. Environmental Protection Agency pursuant to Section 304(a) of the Clean Water Act.	Contaminant concentrations in surface waters measured during long-term monitoring will be evaluated to assess whether Maine's Surface Water Quality Criteria are being met.	06-096 CMR530.5 13 August 1997	No applicable changes found
Air (State)	Air Pollution Control – Classification of Air Quality Control Regions	Applicable	Establishes air quality regions, the classification of each region, and the ambient air quality and emission standards.	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met.	38 MSRA 583; 06-096 CMR 114	No impact to the remedy found from compliance with these standards
Air (State)	Ambient Air Quality Standards	Applicable	Establishes ambient air quality standards for the protection of public health and welfare for particulate matter and other listed pollutants.	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met	38 MSRA 584; 06-096 CMR 110	No impact to the remedy found from compliance with these standards
Air (State)	Air Pollution Control – Emission Requirements	Applicable	Establishes that new and modified sources of air emissions are required to demonstrate that emissions do not violate ambient air quality standards.	As described under the Explanation of Significant Differences, if the air stripper system generates regulated air pollutants, these standards will be met.	38 MSRA 585 and 590; 06-096 CMR 115	No impact to the remedy found from compliance with these standards

TABLE G-3 CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE EASTERN PLUME

Groundwater/Surface Water (Federal)	Safe Drinking Water Act – MCLs (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Primary MCLs have been set as the cleanup goals when the primary MCL is available and a more stringent State standard does not exist. Groundwater extraction and treatment of the Eastern Plume will continue to prevent further migration and to restore the aquifer. Monitoring of the Eastern Plume will continue to determine if cleanup goals have been met. It is estimated that cleanup goals will be attained throughout the plume over a time period between 14 and 72 years.	40 CFR 141.11 - 66 FR 7061 22 January 2001 40 CFR 141.12 66 FR 3776 16 January 2001 40 CFR 141.13 - 54 FR 27527 29 June 1989	~~No applicable changes found~~MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan) No applicable changes found No applicable changes found (editorial change)
Groundwater/Surface Water (Federal)	Safe Drinking Water Act – MCLGs (40 CFR 141.50-141.51)	Relevant and Appropriate	MCLGs have been promulgated for many common organic and inorganic contaminants. These levels indicate the level of contaminants in drinking water at which no known or anticipated adverse effects on the health effects of a person would occur, allowing for an adequate margin of safety. ~~MCLGs are health-based criteria. As promulgated under the Superfund Amendments and Reauthorization Act, MCLGs are to be considered for drinking water sources. MCLGs are available for several organic and inorganic contaminants.~~	Under the selected remedy, where Federal MCLs have not been established, non-zero MCLGs will be attained through groundwater extraction, treatment, and monitoring. ~~The 1990 National Contingency Plan states that non-zero MCLGs are to be used as goals. Because groundwater at NAS Brunswick is not a current source of drinking water, MCLGs are not applicable, but may be relevant and appropriate. Contaminant concentrations in groundwater were compared to their MCLGs.~~	40 CFR 141.50 – 57 FR 31846 17 July 1992 40 CFR 141.51 – 66 FR 7063 22 January 2001	No applicable changes found ~~MCL for arsenic revised (the revision will be incorporated into the next Long-Term Monitoring Plan)~~
Groundwater (Federal)	EPA Risk Reference Doses	To Be Considered	Risk Reference Doses are the concentrations considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	EPA Risk Reference Doses will be used to characterize risks due to non-carcinogens in groundwater, as necessary, during monitoring	None	No impact to the remedy found from compliance with these standards

NOTE: MCL = Maximum Contaminant Level.
MCLG = Maximum Contaminant Level Goal.
EPA = U.S. Environmental Protection Agency.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet Applicable or Relevant and Appropriate Requirement	Most Recent Effective Date	Modifications/Impact to Remedy
Groundwater (Federal)	EPA Human Health Assessment Group Cancer Slope Factors	To Be Considered	Carcinogenic effects presented the most up-to-date information on cancer risk potency derived from EPA's Human Health Assessment Group.	EPA Cancer Slope Factors will be used to characterize risks due to carcinogens in groundwater, as necessary, during monitoring	None	No impact to the remedy found from compliance with these standards
Groundwater/Surface Water (State)	Maine Drinking Water Rules (10-144E CMR Chapters 231-233)	Relevant and Appropriate	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. When state levels are more stringent than federal levels, the state levels may be used.	Groundwater at NAS Brunswick is not a current source of drinking water~~; therefore, State Drinking Water Standards are not applicable but may be relevant and appropriate~~. Contaminant concentrations in groundwater will be compared to State standards to assess the potential future risks to human health due to consumption of groundwater.	10-144 CMR231 18 August 2003 10-144 CMR232 5 May 2002 10-144 CMR233 18 November 1994	No applicable changes found No applicable changes found No applicable changes found
Groundwater/Surface Water (State)	Rules Relating to Testing of Private Water Systems for Potentially Hazardous Contaminants (10-144A CMR Chapter 233, Appendix C)	Relevant and Appropriate	Appendix C of this regulation outlines MEGs for organic and inorganic compounds. MEGs include health advisories, which are maximum allowable concentrations of specific contaminants in drinking water.	Groundwater at NAS Brunswick is not a current source of drinking water~~; therefore, MEGs are not applicable but may be relevant and appropriate~~. Contaminant concentrations in groundwater will be compared to MEGs to assess the potential risks to human health due to consumption of groundwater.	10144 CMR233, Appendix C 20 January 2000	MEG for selected compounds revised (the revision will be incorporated into the next Long-Term Monitoring Plan)

NOTE: MEG = Maximum Exposure Guideline.