Record of Decision
for
Operable Unit 2 – Site 6 Soil and Groundwater

Naval Submarine Base New London
Groton, Connecticut

Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62472-03-D-0057

Contract Task Order 056

December 2006

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RECORD OF DECISION
FOR
OPERABLE UNIT 2 –
SITE 6 SOIL AND GROUNDWATER

NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

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CONTRACT NUMBER N62472-03-D-0057
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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criterion
BEHP	bis(2-Ethylhexyl) phthalate
bgs	Below ground surface
BOD	Biochemical Oxygen Demand.
B&RE	Brown & Root Environmental
BTEX	Benzene, toluene, ethylbenzenes, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CGS	Connecticut General Statutes
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemicals of concern
COD	Chemical Oxygen Demand
CSF	Cancer slope factor
CTDEP	Connecticut Department of Environmental Protection
CTE	Central Tendency Exposure
CTO	Contract Task Order
DRMO	Defense Reutilization and Marketing Office
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
GCL	Geosynthetic clay layer
GMP	Groundwater Monitoring Plan
GMR	Groundwater Monitoring Report
GRA	General Response Actions
HBL	Health-Based Limit
HI	Hazard Index
HpCCD	Hepta-chlorinated dioxin
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
ICR	Incremental cancer risk
IEUBK	Integrated Exposure Uptake Biokinetic
IR	Installation Restoration

MCL	Maximum Contaminant Levels
msl	Mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic & Atmospheric Administration
NPL	National Priorities List
NPW	Net presentworth
NSB-NLON	Navy Submarine Base - New London
OCDD	Octa-chlorinated dioxin
OHM	OHM Remediation Services Corporation
O&M	Operation and maintenance
OME	Ontario Ministry of the Environment
ORNL	Oak Ridge National Laboratory
ORP	Oxidation-reduction potential
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal protective equipment
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agency
RfD	Reference dosege
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSR	Remediation Standard Regulation
SARA	Superfund Amendments and Reauthorization Act
SSL	Soil Screening Level
SVOC	Semivolatile organic compounds
SWPC	Surface Water Protection Criterion
TAG	Technical Assistance Grant
TBC	To be considered
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time-Critical Removal Action
TSDF	Treatment, Storage, and Disposal Facilities
TSS	Total Suspended Solids

TtNUS	Tetra Tech NUS, Inc.
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	Volatile organic compound
WQS	Water Quality Standard

GLOSSARY

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and State environmental rules, regulations, and criteria, such as Connecticut RSRs, which must be met by the selected remedy under the Navy's IR Program.

Connecticut Remediation Standard Regulations (RSRs): Connecticut regulations (Sections 22a-133K-1 through -3 of the Regulations of Connecticut State Agencies) concerning the remediation of polluted soil, surface water, and groundwater.

Contaminants: Any physical, biological, or radiological substance or matter that, at a certain concentration, could have an adverse effect on human health and the environment.

Ecological risk assessment: Scientific method to evaluate the effects on ecological receptors to exposure to contaminants in site-specific media.

Excavation: Earth removal with construction equipment such as backhoe, trencher, front-end loader, etc.

Feasibility Study (FS): A report that presents the development, analysis, and comparison of remedial alternatives.

GCL: Geosynthetic clay layer, a fabricated liner which consists of an impervious layer of bentonite "sandwiched" between two permeable layers of geotextile fabric.

Groundwater: Water found beneath the earth's surface. Groundwater may transport substances that have percolated downward from the ground surface as it flows towards its point of discharge.

Human health risk assessment: Scientific method to evaluate the effects on human receptors from exposure to contaminants in site-specific media.

"Hot Spots": Discrete areas of Site 6 where contaminant concentrations in soil result in unacceptable risk to receptors under current land use.

Installation Restoration (IR) Program: The purpose of the IR Program is to identify, investigate, assess, characterize, and clean up or control releases of hazardous substances and to reduce the risk to human

health and the environment from past waste disposal operations and hazardous material spills at Navy activities in a cost effective manner.

Institutional Controls: Engineered or physical controls and/or administrative or legal mechanisms designated to protect public health and the environment from residual contamination at environmental restoration sites.

Landfilling: Controlled burial of material at a site specifically designed for this purpose.

Metals: Metals are naturally occurring elements in the earth. Some metals, such as arsenic and mercury, can have toxic affects. Other metals, such as iron, are essential to the metabolism of humans and animals.

Monitoring: Collection of environmental information that helps to track changes in the magnitude and extent of contamination at a site or in the environment.

Operable Unit (OU): Contaminated media, site, or set of sites that are evaluated as a group.

PAHs: Polynuclear aromatic hydrocarbons. High molecular weight, relatively immobile, and moderately toxic solid organic chemicals with multiple benzenic (aromatic) rings in their chemical formula.

PCBs: Polychlorinated Biphenyls. High molecular weight, moderately mobile, and moderately to highly toxic liquid organics chemicals with two benzene rings and multiple chlorine atoms in the chemical formula. In the past, PCBs were commonly used as a cooling fluid in electronic transformers and, as a result, PCB contamination is relatively widespread.

Record of Decision (ROD): An official document that describes the selected remedy for a site. The ROD documents the remedy selection process and is typically issued by the lead agency following a public comment period.

Remedial Investigation (RI) - A report that describes the site, documents the type and distribution of contaminants detected at the site, and present the results of the risk assessment.

Responsiveness Summary: A summary of written and oral comments received during the public comment period, and the Navy's responses to these comments. The Responsiveness Summary is an important part of the ROD, highlighting community concerns for decision makers.

Risk Assessment - Evaluation and estimation of the current and future potential for adverse human health or environmental effects from exposure to contaminants.

Sediment: Soil, sand, and minerals typically transported by erosion from soil to the bottom of surface water bodies such as streams, rivers, ponds, and lakes.

Source: Area(s) of a site where contamination originates.

Surface Water: Water from streams, rivers, ponds, and lakes. For this Proposed Plan, surface water means water in the Thames River.

Time-Critical Removal Action (TCRA): Site cleanup action conducted on an accelerated schedule for the rapid correction of an environmental situation of particular concern.

Vadose: Soil above the typical groundwater level.

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Site 6, the Defense Reutilization and Marketing Office (DRMO), is located on the Naval Submarine Base - New London (NSB-NLON), Groton, Connecticut. This Record of Decision (ROD) addresses Operable Unit (OU) 2, which includes the contaminated soil and groundwater at Site 6. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) ID No. for the site is CTD980906575.

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the selected remedy for OU2, which includes the following components:

- Institutional Controls
- Monitoring

The selected remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (U.S.C.) §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), Public Law 99-499, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300. The decision documented in this ROD is based on the Administrative Record for the DRMO, which was developed in accordance with §113(k) of CERCLA and is available for public review. By implementing institutional controls, including maintenance of the existing asphalt and geocomposite clay layer (GCL), the Navy plans to protect potential human receptors from adverse health effects due to exposure to the underlying contaminants. By implementing monitoring, the Navy plans to verify that contaminants in soil are not migrating to the Thames River through groundwater.

The United States Department of the Navy (Navy) and the United States Environmental Protection Agency (USEPA) Region I issue this ROD jointly. The Connecticut Department of Environmental Protection (CTDEP) concurs with the selected remedy.

1.3 ASSESSMENT OF DRMO

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

The Navy has determined that remedial action is necessary for this site because the risks to potential human receptors associated with the soil at this site exceed the USEPA limit of cumulative noncarcinogenic Hazard Index (HI) of 1.0 and cumulative incremental cancer risk (ICR) of 1×10^{-6}. Also, the risks for potential receptors exceed CTDEP Remediation Standards limit of 1×10^{-6} ICR for individual contaminants with a cumulative ICR exceeding 1×10^{-5} and cumulative HI exceeding 1.0. Currently there are no receptors at the site that are facing a health risk although there is a potential for migration of contaminants through the groundwater and into the Thames River. This ROD selects the remedy to address potential future risks.

1.4 DESCRIPTION OF THE SELECTED REMEDY

This remedial action addresses OU2, the soil and groundwater at the Site 6. A Time-Critical Removal Action (TCRA) at the site was completed in January 1995. Contaminated soils were excavated to the water table and disposed off site. The excavated area was backfilled and covered with a GCL and asphalt. The remainder of the DRMO was paved with asphalt. Contaminated soil remains in place below the water table.

An Interim ROD (B&RE, 1998b) was signed for OU2 that selected institutional controls and monitoring as the interim remedy. Institutional controls, consisting of maintenance of the existing cap, limitations to site access, and restrictions on land development, were implemented as part of the Interim Remedy. In addition, groundwater monitoring was conducted at the site to confirm that no significant contaminant migration was occurring. The results of 7 years of monitoring have shown that no significant contaminant migration has occurred from Site 6 and justifies the final remedy selected for OU2 in this ROD.

The Navy has determined that institutional controls and monitoring are appropriate for the contaminated soil and groundwater at this site. Potential exposure to soil and potential migration of contaminants into the groundwater and Thames River are the principal threats posed by the site. This remedy involves monitoring and maintenance of the existing asphalt and GCL cover on the site, institutional controls [including limiting site access; adherence to Standard Operating Procedure Administrative (SOPA) Instructions regarding excavation, dewatering, and heavy equipment; at least annual monitoring of compliance with the restrictions; and, in the event of transfer from Navy control, creating a deed for the property that would include land use restrictions that would meet all applicable State property law standards for placing environmental land use restrictions on contaminated property], continuation of the existing groundwater monitoring plan, and five-year reviews.

1.5 STATUTORY DETERMINATIONS

The remedy selected by the Navy for OU2 is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to this remedial action, and is cost effective. However, because this remedy will result in hazardous substances remaining in soil at concentrations greater than health-based levels, the potential exists for contaminants to leach from the soil to the groundwater and for contaminated groundwater to migrate to the adjacent Thames River surface water. Therefore, groundwater monitoring will be implemented to assess whether the remedy is achieving long-term remedial requirements in addition to regular monitoring of the integrity of the cover and compliance with institutional controls. A review of monitoring data and site conditions will be conducted at least every 5 years to ensure that the remedy continues to provide adequate protection of human health and the environment. This remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. The selected remedy does not satisfy the statutory preference for remedies that employ treatment as a principal element to reduce toxicity, mobility, or volume of contaminants. Continued maintenance of the controls installed during the TCRA provides adequate protection of human health and the environment from exposure to contaminated soil under current land use conditions. Protection of the environment will be assessed through groundwater monitoring to evaluate contaminant migration risks.

1.6 ROD CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD:

- Chemicals of concern (COCs) and their respective concentrations.
- Baseline risk represented by the COCs.
- Cleanup levels (i.e., remedial goals) established for COCs and the basis for these levels.
- How source materials constituting principal threats are addressed.
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessments and ROD.
- Potential land and groundwater use that will be available at the sites as a result of the Selected Remedy.

- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rates, and the number of years over which the remedy cost estimates are projected.

- Key factor(s) that led to selecting the remedy (i.e., description of how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

Additional information can be found in the Administrative Record for Site 6.

1.7 AUTHORIZING SIGNATURES

The signatures provided on the following pages validate the selection of the selected remedy for OU2, the soil and groundwater at Site 6, by the Navy and USEPA, respectively. CTDEP concurs with the Selected Remedy.

Concur and recommend for immediate implementation:

Department of the Navy

By: _____ Date: 12/18/2006

Capt. Mark S. Ginda, USN
Commanding Officer
Naval Submarine Base - New London

Concur and recommend for immediate implementation:

United States Environmental Protection Agency

By: _____ Date: 12-20-06

Susan Studlien, Director
Office of Site Remediation and Restoration
USEPA Region I

2.0 DECISION SUMMARY

This ROD describes the remedy selected by the Navy and USEPA for OU2 (Site 6 Soil and Groundwater). The Navy is the lead agency for CERCLA activities at NSB-NLON and provides the funding for the cleanup activities. The USEPA provides the primary regulatory oversight and enforcement for CERCLA activities at NSB-NLON, but the CTDEP is also actively involved in supporting the activities as required under the Federal Facility Agreement (FFA)(USEPA, 1995a).

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

NSB-NLON is located in southern Connecticut in the Towns of Ledyard and Groton. NSB-NLON is situated on the eastern bank of the Thames River, approximately 6 miles north of Long Island Sound. It is bordered on the east by Connecticut Route 12, on the south by Crystal Lake Road, and on the west by the Thames River. The northern border is a low ridge that trends approximately east-southeast from the Thames River to Baldwin Hill. A general facility location map is presented as Figure 2-1. The location of each Installation Restoration (IR) Program site within NSB-NLON is shown in Figure 2-2.

The DRMO (Site 6) is located adjacent to the Thames River in the northwestern section of NSB-NLON. The site's location relative to other IR sites is shown on Figure 2-2. The site is located between a bedrock outcrop that runs roughly parallel to the Providence and Worchester Railroad to the east and the Thames River to the west. The site covers approximately 3 acres of land that gently slopes toward the Thames River. A majority of the site is paved with an asphalt layer, and the site features buildings, a weighing scale, and miscellaneous storage piles. Figure 2-3 displays the general site arrangement. Currently, the DRMO is used as a storage and collection facility for items such as computers, file cabinets, and other office equipment to be sold during auctions and sales held periodically during the year.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Site History

From 1950 to 1969, Site 6 was used as a landfill and waste-burning area. Non-salvageable waste items including construction materials and combustible scrap were burned along the Thames River shoreline, and the residue was pushed to the shoreline and partially covered.

During a review of archived aerial photographs of the DRMO area, the 1934 photographs show fill in the southern portion of the site. Fill for bulkheads and docks south of the DRMO did not exist at that time. Aerial photographs from 1951 show the land in its present configuration, except for the northwestern portion, which was not filled at that time.

During a site inspection on September 30, 1988, it was noted that metal and wood products were stored throughout most of the site. Building 355 and Building 479 are located in the southern, paved portion of the site and are primarily used for storage. A large scrap yard is located north of Building 479. Building 491, located in the northern, unpaved portion of the site was used to store miscellaneous items including batteries. Metal scrap bailing operations are performed adjacent to Building 491 on a gravel surface. Building 491 formerly housed a battery-acid-handling facility. Submarine batteries were previously stored in the southeastern portion of the site, adjacent to the railroad tracks. No evidence of leaks was observed. An in-ground rubber-lined tank and associated pumping facilities were noted on the site drawings. DRMO personnel indicated that the tank may have been installed directly adjacent to the building to the east.

2.2.2 Enforcement Activities

On August 30, 1990, NSB-NLON was placed on the National Priorities List (NPL) by the USEPA pursuant to CERCLA of 1980 and SARA of 1986. The NPL is a list of uncontrolled or abandoned hazardous waste sites identified by USEPA as requiring priority remedial actions.

The Navy, USEPA, and the State of Connecticut signed the FFA for NSB-NLON in 1995. The agreement is used to ensure that environmental impacts associated with past and present activities at NSB-NLON are thoroughly investigated and that appropriate remedial actions are pursued to protect human health and the environment. In addition, the FFA establishes a procedural framework and timetable for developing, implementing, and monitoring appropriate responses at NSB-NLON, in accordance with CERCLA (and SARA), 42 U.S.C. §9620(e)(1); the NCP, 40 CFR 300; the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 et seq., as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, Executive Order 12580; and applicable State laws. Site 6 is one of 25 CERCLA sites being addressed by the Navy's IR Program at NSB-NLON.

A Phase I Remedial Investigation (RI) (Atlantic, 1992), a Phase II RI [B&R Environmental (BR&E), 1997a], and a Focused Feasibility Study (FFS), (Atlantic, 1994) were conducted over the course of several years, ending in March 1997. A TCRA was completed in January 1995 [OHM Remediation Services Corporation (OHM), 1995] wherein approximately 4,700 tons of soil contaminated with lead, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) were excavated from the site to the water table and disposed at an offsite hazardous waste landfill. Contaminated soil below the groundwater level was left in place. The excavated area was backfilled with clean borrow material from an offsite location, and the area was capped with a GCL and overlaid by gravel/asphalt layer. At the time of completion of the removal action, the remaining area was also paved with an asphalt layer.

The Phase II RI at Site 6 concluded that the majority of contaminated soil had been removed, the groundwater was not significantly affected, and there were relatively low human health and ecological risks associated with Site 6. The Phase II RI recommended that a Feasibility Study (FS) be completed for Site 6 and that a limited action alternative including monitoring and access/use restrictions be evaluated. A draft final FS [B&RE, 1997c] and a Proposed Plan (Navy and B&RE, 1997d) based on this FS were prepared for Site 6 in September 1997. Although the scope of the FS was limited to the soil and groundwater at the site, the FS also addressed reduction of any adverse affects that the soil and groundwater may have on surface water in Thames River. The final FS was issued in November 1997 (B&RE, 1997e).

An Interim ROD (B&RE, 1998b) was signed for Site 6 soil and groundwater (OU2) in March 1998. Institutional controls, including access restrictions and cap maintenance, monitoring, and 5-year reviews, were selected as the remedial action in the Interim ROD.

The site is fenced and access is restricted. Land use controls have been in place under the Installation Restoration Site Use Restrictions Instruction at Naval Submarine Base New London since 2000 (Navy, 2000) and updated in 2003 (Navy, 2003). O&M of the cover system at Site 6 has been performed since 2003 in accordance with the O&M Manual for Installation Restoration Program Sites (O&M Manual) (TtNUS, 2002b). The landfill has been inspected annually since 2003 (ECC, 2004a; ECC, 2005b; ECC, 2005c) and 5-year reviews have been performed (TtNUS, 2001; TtNUS, 2006b).

Groundwater has been monitored at Site 6 since 1998. The results of the program are being used to verify the effectiveness of the cap in reducing infiltration and leaching of contaminants and to confirm that contamination is not migrating from soil to groundwater and eventually to the Thames River. To date, the monitoring results have not shown any significant contaminant migration issues (TtNUS, 1999; TtNUS, 2000; TtNUS, 2002a; TtNUS, 2003b; ECC, 2004b; ECC, 2005a; ECC, 2006).

Based on the Interim ROD and subsequent groundwater monitoring, a Proposed Plan recommending Institutional Controls and Monitoring as the final remedy for Site 6 was prepared in October 2006 (Navy, 2006).

2.3 COMMUNITY PARTICIPATION

The Navy has been conducting community relations activities for the IR Program since the program began. From 1988 to November 1994, Technical Review Committee meetings were held on a regular basis. In 1994, a Restoration Advisory Board (RAB) was established to increase public participation in the IR Program process.

Many community relations activities for NSB-NLON involve the RAB, which generally meets quarterly. The RAB provides a forum for discussion and exchange of information on environmental restoration activities between the Navy, regulatory agencies, and the community, and it provides an opportunity for individual community members to review the progress and participate in the decision-making process for various IR Program sites, including Site 6.

The following community relations activities are conducted as part of the Community Relations Plan for NSB-NLON (USEPA, 1992):

Information Repositories: The Public Libraries in Groton and Ledyard are the designated Information Repositories for the NSB-NLON IR Program. All pertinent reports, fact sheets, and other documents are available at these repositories.

Key Contact Persons: The Navy has designated information contacts related to the NSB-NLON. Materials distributed to the public, including any fact sheets and press releases, will indicate these contacts. The Public Affairs Officer will maintain the site mailing list to ensure that all interested individuals receive pertinent information on the cleanup.

Mailing List: To ensure that information materials reach the individuals who are interested in or affected by the cleanup activities at the NSB-NLON, the Navy maintains and regularly updates the site mailing list.

Regular Contact with Local Officials: The Navy arranges regular meetings to discuss the status of the IR Program with the RAB.

Press Releases and Public Notices: The Navy issues press releases as needed to local media sources to announce public meetings and comment periods and the availability of reports and to provide general information updates.

Public Meetings: The Navy conducts informal public meetings to keep residents and town officials informed about cleanup activities at NSB-NLON, and at significant milestones in the IR Program. Meetings are conducted to explain the findings of the RI; to explain the findings of the FS; and to present the Proposed Plan, which explains the preferred alternatives for cleaning up individual sites.

Fact Sheets and Information Updates: The Navy develops a series of fact sheets to mail to public officials and other interested individuals and/or to use as handouts at public meetings. Each fact sheet includes a schedule of upcoming meetings and other site activities. Fact sheets are used to explain

certain actions or studies, to update readers on revised or new health risks, or to provide general information on the IR Program process.

Responsiveness Summary: The responsiveness summary for the Proposed Plan summarizes public concerns and issues raised during the public comment period and documents the Navy's formal responses. The responsiveness summary may also summarize community issues raised during the course of the FS.

Announcement of the ROD: The Navy announces the signing of the ROD through a notice in actions or studies, to update readers on revised or new health risks, or to a major local newspaper of general circulation and a press release sent to everyone on the mailing list. The Navy places the signed ROD in the Information Repositories before any remedial actions begin.

Public Comment Periods: Public comment periods allow the public an opportunity to submit oral and written comments on the proposed cleanup options. Citizens have at least 30 days to comment on the Navy's preferred alternatives for cleanup actions as indicated in the Proposed Plan.

Technical Assistance Grant (TAG): A TAG from the USEPA can provide up to $50,000 to a community group to hire technical advisors to assist them in interpreting and commenting on site reports and proposed cleanup actions. Currently, no TAG funds have been awarded.

Site Tours: The Office of Public Affairs periodically conducts site tours for media representatives, local officials, and others.

A notice of availability of the Proposed Plan (Navy, 2006a) for OU2 was published on October 28, 2006 in The New London Day newspaper. The documents are available to the public in the NSB-NLON Information Repositories located at the Groton Public Library in Groton, Connecticut and the Bill Library in Ledyard, Connecticut. The notice also announced the start of the 30-day comment period, which ended on November 29, 2006. A copy of the notice and the Proposed Plan are included in Appendix A of this ROD.

The notice invited the public to attend a public meeting and hearing held at the Best Western Olympic Inn in Groton, Connecticut on November 2, 2006. The public meeting presented the proposed remedy, and oral and written comments were solicited during the public hearing. At the public meeting, personnel from the Navy, USEPA, and CTDEP answered questions from the attendees during the informal portion of the meeting. In addition, public comments on the Proposed Plan were formally received and transcribed during the public hearing. The transcript for the public meeting is provided in Appendix B. Responses to

the comments received during the public comment period are provided in the Responsiveness Summary section of this ROD.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

Site 6 is one of 25 IR Program sites currently included in the NSB-NLON IR Program. A total of 12 OUs have been defined at NSB-NLON. OU2 includes the soil and groundwater at Site 6. This ROD only applies to OU2. The Selected Remedy is the final remedy for OU2 under CERCLA.

A TCRA for the contaminated soil in OU2 was completed in January 1995. The soil was contaminated with PAHs, PCBs, and metals. A total of 4,700 tons of soil was removed and disposed off site, and a cap system was installed over the remaining contaminated soil. Assessments showed that the contaminated soil posed unacceptable risks to human and ecological receptors prior to conducting the TCRA and capping the remaining contaminated soil, but after completion of the TCRA and installation of the cap, risks to these receptors were acceptable because there was no complete exposure pathway. Similarly, human exposure to contaminants detected in groundwater at Site 6 (e.g., consumption) was considered unlikely because the groundwater is classified by the State of Connecticut as GB (i.e., groundwater in urban or industrial areas where public water supply is available, and groundwater may not be suitable for human consumption without treatment) and much of the groundwater is brackish due to the Thames River. The ecological risk evaluation of site groundwater showed that contaminants in groundwater posed potential risks to ecological receptors in the Thames River.

Subsequently, an Interim ROD (B&RE, 1998b) was signed for OU2 that selected institutional controls and monitoring as the interim remedy. Institutional controls have consisted of maintenance of the existing cap, limitations to site access, and restrictions on land development. Groundwater has been sampled at the site to confirm that no significant contaminant migration was occurring (TtNUS, 1999; TtNUS, 2000; TtNUS, 2002a; TtNUS, 2003b; ECC, 2004b; ECC, 2005a; ECC, 2006). The results of 7 years of monitoring have shown that no significant contaminant migration has occurred from Site 6 and justifies the final remedy selected for OU2 in this ROD.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

This section presents a summary of physical characteristics (topography and surface features, surface water, soil, geology, and hydrogeology) for Site 6 based on information collected during the Phase I and Phase II RIs and other site visits.

2.5.1.1 Topography and Surface Features

Topography and surface features at Site 6 are shown on Figure 2-3. The topographic contours shown are pre-TCRA contours. To the east of Site 6, an exposed bedrock high slopes steeply to the west towards the site. Across the railroad tracks, the ground surface continues to slope to the west to an elevation of approximately 10 feet above mean sea level (msl) at the western boundary of the site. The ground surface at Site 6 gently slopes to the west from an elevation of 8 feet above msl along the eastern boundary of the site to 4 feet above msl at the Thames River. The land is relatively flat, low lying, and prone to flooding by the Thames River (B&RE, 1997a).

The area where the cap was installed during the TCRA and the remaining portion of Site 6 were upgraded via placement of an asphalt layer. Buildings 479, 355, and 491 are located within the paved area.

2.5.1.2 Surface Water Features

Surface water features are also shown on Figure 2-3. All surface water drainage flows west to the Thames River, which is located along the western edge of Site 6. Two storm sewer systems exist along the southern side of the site that convey local discharge from the eastern side of the Providence and Worcester Railroad to the Thames River (B&RE, 1997a). Further north, a perimeter channel was installed during the TCRA to route westward-flowing surface water around the capped portion of the site. Surface water that enters the channel flows north along the eastern edge of the site to a drop inlet connected to a east-west culvert that conveys the surface water to the Thames River. Riprap was also placed along the western side of the capped portion of the site for protection from erosion by the Thames River.

2.5.1.3 Geology

Geologic cross section locations are shown in Figure 2-4, and Figures 2-5, 2-6, and 2-7 show geologic cross sections for this site. Geologic conditions at Site 6 consist of a westward-thickening wedge of unconsolidated materials (fill and natural deposits) overlying fractured metamorphic bedrock. Site 6 is underlain by an upper layer of fill material with a maximum thickness of approximately 20 feet. The fill consists primarily of sand and gravel but also contains metal and wood and is thickest along the Thames River.

In most cases, the fill is underlain by combinations of sand and silt that are greater than 80 feet thick along the Thames River and thin toward the east, ultimately pinching out along the bedrock outcrop to the east. An upper organic silt unit identified as river alluvium exists beneath the site and overlies a coarser-grained silty sand unit.

Bedrock underlying Site 6 has been mapped as the Mamacoke Formation [United States Geological Service (USGS), 1967]. A bedrock high exists to the east of the site and is an extension of the large bedrock high that borders the northern part of NSB-NLON. The slope of the bedrock surface at Site 6 is westward toward the Thames River at approximately 25 percent (B&RE, 1997a).

2.5.1.4 Hydrogeology and Tidal Influences

Groundwater is present within the unconsolidated material and bedrock underlying the DRMO, and the water table is generally encountered within the fill materials. The coarser fill and silty sand are expected to be significantly more permeable than the intervening organic silt unit. The organic silt unit may function as an aquitard relative to the overlying and underlying coarser-grained units, and these units are considered separate hydrostratigraphic units (B&RE, 1997a). This was generally confirmed by groundwater level measurements taken over the first few years of monitoring. Groundwater level measurements taken from monitoring well clusters 6MW2S/6MW2D, 6MW10S/6MW10D, and 6MW11S/6MW11D consistently indicated upward flow gradients between the shallow and deep wells. The deep monitoring wells were generally completed below the organic silt unit, and the shallow wells were completed above the unit.

A large portion of the site along the Thames River was originally below high-tide elevation and has since been covered with fill. The fill material was placed directly on top of river sediments in most areas (Atlantic, 1995). The land surfaces are now above the high-tide elevation, although much of the site is located within the 100-year floodplain (OHM, 1995).

Shallow groundwater elevations are approximately 3 to 6 feet below grade in the southern portion of the site and approximately 12 feet below grade in the northern portion (Atlantic, 1995).

Groundwater flow is generally from east to west, following the topographic and bedrock surface slope to the Thames River. The Thames River is tidally influenced, with a mean tidal range at the NSB-NLON of 2.3 feet, which creates localized reversals in groundwater flow directions and causes water levels to fluctuate by approximately 1.19 feet in monitoring wells.

During low tide, the hydraulic gradient of the groundwater table at NSB-NLON is towards the Thames River and results in the highest discharge rate of groundwater to the river. During high tide, the hydraulic gradient of the groundwater is reversed, and flow occurs from the river to the site, temporarily halting the discharge of groundwater from the Base to the river. The reversal of groundwater flow direction at high tide generally occurs within 300 feet of the river (B&RE, 1997a).

2.5.1.5 Ecological Habitat

Site 6 is located in the northwestern section of NSB-NLON, adjacent to the Thames River. In the past, the southern half of the DRMO was covered with asphalt, most of which was deteriorated, and the northern portion was unpaved and had a gravel surface. A TCRA was completed at the site in 1995, and a GCL cap was placed over a majority of the central and northern portions of the site (OHM, 1995). Bituminous concrete pavement was then placed over the entire area of the composite cap as well as most other open areas of the site. This section of the NSB-NLON is very well developed and is characterized by high human activity. Because of these conditions, the DRMO provides poor habitat for wildlife and does not constitute a critical habitat for any endangered species. However, the site lies within the floodplain of the Thames River, which flows past the site. Potential ecological receptors occur within the river system.

2.5.2 Summary of Nature and Extent of Contamination

2.5.2.1 DRMO Soil

The soil analytical data from the Phase I RI (Atlantic, 1992), FFS (Atlantic, 1994), Phase II RI (B&RE, 1997a), and TCRA (OHM, 1995) are summarized in Table 2-1. Because soils excavated during the TCRA are no longer present at the site, they are not included in Table 2-1 and are also excluded from the following discussion of the nature and extent of contamination at the site. The sample locations are shown on Figures 2-4 and 2-8.

Several volatile organic compounds (VOCs), including carbon disulfide, vinyl chloride, monocyclic aromatics, ketones, and several halogenated aliphatics, were detected in surface and subsurface soils at this site. Most VOCs were detected infrequently (7 of 73 total samples) and at relatively low concentrations (less than 20 µg/kg), with the exception of a few subsurface soil samples. The subsurface sample from boring 6TB4 in the central portion of the site (6 to 8 feet deep) contained the following halogenated aliphatics: 1,1,2,2-tetrachloroethane (6,400 µg/kg), 1,1,2-trichloroethane (590 µg/kg), 1,2-dichloroethane (1,900 µg/kg), 1,2-dichloroethene (16,000 µg/kg), tetrachloroethene (210 µg/kg), trichloroethene (7,100 µg/kg), and vinyl chloride (1,300 µg/kg). These compounds and their degradation products are typically used in degreasing operations. Their occurrence at such concentrations was limited to the sample collected from 6TB4. Xylenes (340 µg/kg) and acetone (350 µg/kg) were also detected in sample 6TB4. Xylenes (5,400 µg/kg) and 4-methyl-2-pentanone (5,100 µg/kg) were detected in subsurface soil sample 6TB17 (10 to 12 feet deep), located near the Thames River.

Several semivolatile organic compounds (SVOCs), including 4-methylphenol, benzoic acid, carbazole, chlorinated benzenes, phthalates, and PAHs, were detected in DRMO soils. PAHs were the most prevalent class of chemicals detected in soil at this site. Soil samples collected throughout the site

contained PAHs. PAHs detected most frequently [e.g., pyrene, fluoranthene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene] are relatively insoluble. Soluble PAHs (e.g., naphthalene, 2-methylnaphthalene, dibenzofuran, acenaphthalene) were also detected but were much less prevalent. The presence of PAHs may be attributable to the placement of contaminated material during land filling activities that occurred prior to construction of the DRMO, or it could be related to releases of oily materials. The higher concentrations generally occurred in soils surrounding the area excavated during the TCRA. Maximum concentrations of most PAHs in surface soils were found in the sample collected during the TCRA from location 45, along the excavation sidewalls, approximately 100 feet north of Building 479 in the central portion of the site. Maximum concentrations of most PAHs in subsurface soils were found in a soil sample from boring 6TB17, located approximately 60 feet further north and 50 feet east of the Thames River.

Several pesticides and PCBs (Aroclor-1254 and Aroclor-1260) were also detected in soil samples collected at the DRMO site. Pesticides and PCBs were detected more frequently and at higher concentrations in surface soils than in subsurface soils. The pesticides 4,4'-DDE, endrin, endrin aldehyde, and gamma-chlordane were detected in 1 to 3 of 17 subsurface samples at concentrations less than 6 mg/kg. A majority of the maximum concentrations of pesticides in surface soil samples were found in samples from locations 74 and 77, collected during the TCRA near the eastern border in the central portion of the site. Although several pesticides were detected in surface soils, concentrations of pesticides were low relative to PCB concentrations. With the exception of 4,4'-DDD (227 µg/kg) from location 74, all pesticide concentrations were less than 65 µg/kg. Concentrations of Aroclor-1254 and Aroclor-1260, however, ranged up to 22,400 µg/kg and 29,100 µg/kg, respectively, in surface soil samples. Concentrations of PCBs were generally highest in soils surrounding the excavation area. Aroclor-1260 was detected at maximum concentrations of 29,100 µg/kg and 12,000 in surface and subsurface soils, respectively.

The subsurface sample collected from boring 6TB20 at a depth of 4 to 6 feet was the only sample analyzed for dioxins that was not excavated during the TCRA. Octa-chlorinated dioxin (OCDD) (3.07 µg/kg) and 1,2,3,4,6,7,8-hepta-chlorinated dioxin (HpCDD) (0.67 µg/kg) were detected in this sample.

Concentrations of metals were generally higher in surface soils than in subsurface soils. Maximum concentrations of all metals detected in surface and subsurface samples exceeded NSB-NLON background with the exceptions of boron (in surface soils) and aluminum (in subsurface soils). Maximum concentrations of copper, lead, sodium, and zinc in both surface and subsurface soils, and of mercury and nickel in surface soils only, exceeded NSB-NLON background levels by more than two orders of magnitude. Maximum concentrations of metals in surface soils were found in various soil samples collected in the northern half of the DRMO site. A majority of the maximum concentrations of metals in

subsurface samples were found in the sample collected at a depth of 10 to 12 feet from boring 6TB17, located approximately 50 feet east of the Thames River shoreline and 40 feet north of the originally paved portion of the site. Cyanide was also detected at concentrations less than 8 mg/kg in 27 of 56 surface soil samples and one subsurface soil sample (6TB20).

Barium, cadmium, chromium, lead, mercury, selenium, and silver were detected in Toxicity Characteristics Leaching Procedure (TCLP) analytical results of surface soil samples. With the exception of mercury, these same metals were detected in TCLP analytical results for subsurface soil samples. The VOC 1,2-dichloroethane was also detected in the TCLP analysis for the subsurface soil sample from boring 6TB20. The maximum concentration of lead in surface soils exceeded the associated federal Toxicity Characteristic regulatory level as shown on Table 2-1. All other inorganic concentrations were less than federal Toxicity Characteristic regulatory levels.

Two pavement samples were collected in the scrap yard of the DRMO. Aroclor-1248, Aroclor-1254, and Aroclor-1260 were detected in both samples at concentrations ranging from 171 µg/kg to 388 µg/kg. Maximum concentrations of all three Aroclors were found in the pavement sample from boring 19. Lead was also detected in both samples at concentrations of 10.6 mg/kg and 25.0 mg/kg from borings 19 and 20, respectively.

2.5.2.2 DRMO Groundwater

Groundwater samples were collected during the Phase I RI, Rounds 1 and 2 of the Phase II RI, and during the past 7 years of groundwater monitoring.

Phase I and Phase II RI Groundwater Analysis

The analytical results for groundwater samples collected during the Phase I RI and Rounds 1 and 2 of the Phase II RI are summarized in Tables 2-2 through 2-4. Limited organic contamination was noted in these samples. Trichloroethene, 1,1-dichloroethane, and 1,2-dichloroethene (total) were detected in one to three shallow Phase I RI samples at concentrations of 8 µg/L or less. Maximum concentrations were all found in the sample from well 6MW4S, located in the center of the scrap yard. These same chemicals were detected, each in one shallow well sample, at concentrations of 3 µg/L or less during Round 1 of the Phase II RI. Carbon disulfide (3 µg/L) and 1,2-dichloroethene (total) (2 µg/L) were also each detected in one deep well sample during Round 1. During Round 2 of the Phase II RI, 1,2-dichloroethene (total), trichloroethene, and/or vinyl chloride were detected in samples from two shallow wells (6GW3S and 6GW8S) at concentrations of 8 µg/L or less. Trichloroethene (2 µg/L) was detected in deep well sample 6GW6D.

Benzoic acid (21 µg/L) and bis(2-ethylhexyl) phthalate (BEHP) (10 µg/L) [detected in the sample from well 6MW5D, located northeast (upgradient) of the DRMO site] were the only SVOCs detected during the Phase I RI. Several phthalate esters, benzoic acid, and 1,4-dichlorobenzene were detected in groundwater samples during Round 1 of the Phase II RI; each was detected in only one sample at a concentration of 5 µg/L or less. Two PAHs were also detected, each at 1 µg/L, in the sample from deep well 6MW2D, located near the northwestern corner of Building 355. BEHP and phenol (0.7 µg/L and 3 µg/L, respectively, in sample 6GW6D) were the only semivolatiles detected in Round 2 Phase II RI samples. No pesticides or PCBs were detected in any of the groundwater samples collected from the DRMO.

Maximum concentrations of most metals detected during the Phase I RI were found in the sample from shallow well 6MW4S, located in the center of the scrap yard. Because this well was later abandoned, no further data were available for well 6MW4S. Maximum concentrations of a majority of metals detected during the Phase II RI were found in samples from wells 6MW2S and 6MW2D, located near the northwestern corner of Building 355. Concentrations of metals were generally higher in deep wells than in shallow wells. Notable concentrations of arsenic (maximum of 21 µg/L in 6GW2D), lead (maximum of 52.7 µg/L in 6GW2S), and manganese (maximum of 1,440 µg/L in 6GW2D) were detected in groundwater samples.

Based on the levels of uncertainty reported with results (i.e., uncertainty levels are greater than results) for gross alpha in all samples for which gross alpha was analyzed, and for gross beta in samples 6MW2S and 6MW3S, gross alpha and gross beta were considered as not detected in these samples. With this in mind, gross beta was detected in shallow well samples at concentrations ranging from 6.3 pCi/L to 180 pCi/L and in the deep well sample 6MW5D at 3.1 pCi/L. Complete gamma spectrum analysis was performed only for samples from well 6MW1S collected during Rounds 1 and 2 of the Phase II RI. Only naturally occurring Potassium-40 (140 pCi/L) was detected in the Round 2 Phase II RI sample from this well.

Groundwater Monitoring

Following signing of the Interim ROD for DRMO in March 1998, the Navy implemented a groundwater monitoring program in April 1998. The purpose of the program is to verify the effectiveness of the cap installed as part of the TCRA to reduce precipitation infiltration and leaching of contaminants and to confirm that contamination is not migrating through soil into groundwater and ultimately discharging to the Thames River.

Monitoring at the DRMO was initially conducted quarterly, and then during Year 4 the monitoring frequency was reduced to semi-annually. During Year 5, the monitoring frequency was further reduced to annually.

Seven annual reports (TtNUS, 1999; TtNUS, 2000; TtNUS, 2002a; TtNUS, 2003b; ECC, 2004b; ECC, 2005a; ECC, 2006) have been issued that summarize the results of the monitoring program. The annual reports include a thorough evaluation of each year of data collected under the program. Numerous round-specific reports have also been prepared to provide a screening-level assessments of the sampling round data. All of the monitoring reports have been submitted to the USEPA and CTDEP for review and comment.

Monitoring Criteria

Sampling was initially conducted at the site in accordance with the final Groundwater Monitoring Plan (GMP) for DRMO (B&RE, 1998a). The 1998 GMP was based on the Connecticut Remediation Standard Regulations (RSRs) requirement that all groundwater plumes be remediated to attain either (a.) the Surface Water Protection Criteria (SWPCs) and the Volatilization Criteria or (b.) the background concentration for each substance in the plume (CTDEP, 1995). Accordingly, the primary monitoring criteria were the site-specific SWPCs developed for the DRMO (B&RE, 1998a) as well as the standard SWPCs and Volatilization Criteria promulgated by the CTDEP.

These monitoring criteria were defined as follows:

- SWPCs (site-specific and CTDEP) are groundwater standards based on the protection of human health and aquatic life. These standards are applicable to the remediation of groundwater that discharges to a surface water body by reduction of each substance to a concentration equal to or less than the SWPC (CTDEP, 1995).

- CTDEP Volatilization Criteria are groundwater standards applicable to all groundwater polluted with a volatile organic substance within 15 feet of the ground surface or a building. If the groundwater is below a building used solely for industrial or commercial activity, the applicable industrial/commercial Volatilization Criteria is used for evaluation of the groundwater (CTDEP, 1995).

As a result of discussions between the Navy, USEPA, and CTDEP, Connecticut's GB Pollutant Mobility Criteria were established as not applicable because the ground elevation at Site 6 is below the high seasonal water table (B&RE, 1997a). However, the groundwater analytical results obtained during monitoring were initially compared to these criteria to insure that groundwater was not adversely impacted by contaminants in the site soil.

In addition, the Connecticut Water Quality Standards (WQSs) were used as secondary monitoring criteria. Connecticut WQSs are intended to protect high quality waters from degradation due to waste discharges. WQSs for surface water are similar to the federal Ambient Water Quality Criteria (AWQCs) and were used to compare the analytical results obtained from the monitoring activities.

Federal AWQCs are non-enforceable regulatory guidelines that were considered during the selection process for secondary criteria. They are of primary utility in evaluating the potential for toxic effects in aquatic organisms. They may also be used to identify the potential for human health risks. AWQC are available for acute and chronic toxic effects in both freshwater and saltwater aquatic life, adverse human health effects from ingestion of both water (2 liters per day) and aquatic organisms (6.5 grams per day), and from ingestion of organisms alone. However, federal AWQCs were not selected as secondary criteria because it was determined that the Connecticut WQSs were applicable to Connecticut surface water and selection of the Connecticut QWSs provides consistency with the primary criteria (Alternative SWPC, SWPC, and volatilization criteria).

The groundwater analytical results obtained during the monitoring were compared to Connecticut WQSs developed for chronic (long-term) exposure of aquatic receptors in saltwater. In addition, groundwater analytical results were compared to State human health criteria for consumption of organisms because recreational fishing may occur in the Thames River. Because the Thames River is not a source of drinking water, no human health criteria for the ingestion of water were used.

Groundwater samples collected from 1998 through 2005 were analyzed for VOCs, SVOCs, PAHs, pesticides/PCBs, and metals (total and dissolved). Starting in 2006, samples will be analyzed for VOCs, SVOCs, PAHs, and metals (total). The primary and secondary monitoring criteria were developed for the 1998 GMP (B&RE, 1998a) and were used for the initial monitoring program. Primary and secondary monitoring criteria for Round 1 are presented on Tables 2-5 and 2-6 (B&RE, 1998c). Criteria were revised in later versions of the GMP (TtNUS, 2003a; TtNUS, 2006a) based on criteria updates, and data from later rounds of monitoring were compared to these updated criteria. Primary and secondary monitoring criteria for future groundwater monitoring at DRMO are presented on Tables 2-7 and 2-8 (TtNUS, 2006a).

Year 1 of the Monitoring Program

The groundwater monitoring program for Site 6 was initiated to confirm that the TCRA completed at the site (i.e., soil removal action and installation of a GCL cap with an asphalt wearing surface) was successful and that contaminants were not continuing to migrate from the site via groundwater. The Year 1 Annual Groundwater Monitoring Report (GMR) (TtNUS, 1999) summarized the groundwater analytical data collected from the monitoring well network during Rounds 1 through 4. The number of wells and

data collected from the monitoring well network during Rounds 1 through 4. The number of wells and analytes were the same as defined in the GMP with the exception of the first sampling round. Three wells, 6MW3S, 6MW3D, and 6MW9S, were found to be damaged and were not sampled during the first round. Wells 6MW11S and 6MW11D were subsequently installed to replace wells 6MW3S and 6MW3D, and 6MW9S was repaired during Round 1.

The analytical results were compared to primary criteria (i.e., the most conservative of site-specific SWPCs, CTDEP SWPCs, and Volatilization Criteria) and secondary monitoring criteria (i.e., the most conservative Connecticut WQSs). The results obtained for the initial four rounds of groundwater monitoring indicated no exceedances of the primary criteria. The following constituents exceeded secondary criteria: BEHP, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, Aroclor-1260, arsenic, copper, silver, and zinc. Figure 2-9 shows the exceedances of secondary monitoring criteria in groundwater for Rounds 1 through 4.

A statistical evaluation of the data indicated that upgradient and downgradient concentrations of both organic and inorganic COCs were found to be similar except for arsenic. The statistical evaluation established that arsenic concentrations were higher in downgradient wells than in upgradient wells. The average concentrations of arsenic in upgradient and downgradient wells showed a decreasing trend over time.

Year 2 of the Monitoring Program

Year 2 groundwater monitoring activities included four rounds of quarterly sampling from the same monitoring well network. The GMP was followed except, as agreed upon with the regulators, samples were not analyzed for dissolved metals after Round 6 because total and dissolved metal results did not show any discernible differences over the first six rounds of monitoring.

The Year 2 Annual GMR for DRMO (TtNUS, 2000) summarized the monitoring results for Rounds 5 through 8. The results obtained during the second year of monitoring indicated no exceedances of the primary criteria. The following constituents exceeded secondary criteria: BEHP, arsenic, copper, lead, and zinc. Figure 2-10 shows groundwater data that exceeded secondary monitoring criteria during Year 2 of the monitoring program.

A statistical evaluation of the data indicated that upgradient and downgradient concentrations of both organic and inorganic COCs were found to be similar except for total barium. The average barium concentrations in downgradient wells for each round were plotted as a function of the round to determine the trend of the concentrations. The regression line fit to the average barium concentrations showed a slight increasing trend, which correlated with the results of the statistical evaluation. However, "no

change" was also within the 95 percent confidence limits for the regression analysis. Therefore, the true trend of average barium concentrations in downgradient wells was uncertain. No primary or secondary screening criteria were available for comparison with the average barium concentrations to determine if the concentrations were significant.

Arsenic concentrations in downgradient wells were not statistically greater than upgradient concentrations during Year 2. A downward trend of arsenic concentration over time was noted based on an evaluation of analytical data from Rounds 1 through 8.

An assessment of redox conditions was also performed in response to USEPA comments on the Year 1 GMR. The assessment included a correlation of oxidation-reduction potential (ORP) values to metals concentrations to determine if any trends were evident. The assessment showed little correlation between ORP and metals concentrations.

Year 3 of the Monitoring Program

Year 3 groundwater monitoring activities continued with the completion of four rounds of quarterly sampling (Rounds 9 through 12) during 2000/2001 from the same monitoring well network. Figure 2-11 shows groundwater data that exceeded secondary monitoring criteria during Year 3 of the monitoring program. The analytical program was also the same as during Year 2 except samples were not analyzed for dissolved metals.

The results of the monitoring program were summarized in the Year 3 Annual GMR for DRMO (TtNUS, 2002a). The results obtained for Year 3 indicated no exceedances of primary criteria. The following constituents exceeded secondary criteria: BEHP, benzo(a)pyrene, benzo(k)fluoranthene, arsenic, copper, lead, silver, and zinc.

The statistical comparisons of COC concentrations in upgradient and downgradient monitoring wells indicated that downgradient concentrations of trans-1,2-dichloroethene, vinyl chloride, arsenic, barium, chromium, lead, and silver were statistically greater than concentrations detected in upgradient wells. However, none of the detected concentrations of COCs were in excess of primary monitoring criteria, indicating that no significant contaminant migration was occurring from the site.

The average arsenic and barium concentrations for each round were plotted as a function of time to determine trends in the data. Concentrations of these two metals during previous sampling rounds showed statistically significant differences between upgradient and downgradient wells. However, downgradient barium concentrations were not statistically greater than upgradient concentrations during Year 3, and the elevated arsenic detections were in the deep overburden wells only. The plots did not

show any significant trends in arsenic or barium detections that would indicate a contaminant migration problem from the site. The correlation between arsenic and barium detections and ORP was also evaluated. The results of the evaluation indicated that concentrations of these metals in downgradient wells were only weakly to moderately correlated with ORP values.

The results were generally similar to the results of the first 2 years of groundwater monitoring. They indicated that the TCRA completed at the site removed sufficient contaminant source material and reduced infiltration of precipitation through any remaining source material so that significant contaminant migration from the site to the Thames River was not occurring.

Year 4 of the Monitoring Program

Year 4 monitoring activities continued with two rounds of sampling during 2001/2002 (Rounds 13 and 14). Figure 2-12 shows groundwater data that exceeded criteria during Year 4 of the monitoring program. Round 13 of groundwater monitoring was already completed prior to agreement on the recommendations of the Year 3 GMR; therefore, the original sampling and analytical program was performed for Round 13. Round 14 was initiated after agreement to the recommendations, and the monitoring program reflected the approved changes. A final Year 4 GMR was prepared and submitted in August 2003 (TtNUS, 2003b).

The changes to the monitoring program implemented during Year 4 include the following:

- Monitoring wells 6MW2D, 6MW10D, and 6MW11D were eliminated from the monitoring program after Round 13.
- 2,3,3',4,5,6-Hexachlorobiphenyl was eliminated as a COC.
- A corrected SWPC for phenanthrene was used to evaluate the monitoring data.

The results obtained during Rounds 13 and 14 of groundwater monitoring for VOCs, SVOCs, pesticides/PCBs, and inorganics indicated no exceedances of primary criteria. cis-1,2-Dichloroethene and trichloroethene were each detected in 11 samples (including duplicates). Vinyl chloride was detected in two samples and trans-1,2-dichloroethene was detected in one sample. None of the VOCs exceeded primary or secondary criteria. BEHP was detected at concentrations that exceeded the secondary monitoring criterion in several samples. No pesticides or PCBs were detected in any of the groundwater samples collected during Year 4. Arsenic, barium, cadmium, chromium, copper, lead, silver, and zinc were detected in Year 4 groundwater samples. Concentrations of arsenic, copper, silver, and zinc detected in some groundwater samples were in excess of secondary screening criteria. The secondary monitoring criterion for arsenic is less than the detection limits achievable using currently available technology and equipment. Concentrations of arsenic and zinc detected in some samples also exceeded background concentrations.

COC concentrations detected in upgradient monitoring wells were statistically compared to COC concentrations detected in downgradient monitoring wells. The statistical comparisons indicated that downgradient concentrations of trans-1,2-dichloroethene, vinyl chloride, BEHP, phenanthrene, pyrene, arsenic, barium, cadmium, chromium, lead, and silver were statistically greater than concentrations detected in upgradient wells. However, none of the detected concentrations of COCs were in excess of primary monitoring criteria, indicating that no significant contaminant migration was occurring from the site.

BEHP and silver concentrations exceeded secondary monitoring criteria for both individual round averages and cumulative averages as well as the respective maximum concentrations for individual rounds and cumulative maximum concentrations. Arsenic exceeded the site-specific background level and secondary monitoring criteria in Round 14 only. Temporal plots of BEHP, arsenic, and silver showed no increasing trends in concentrations in downgradient wells.

Year 5 of the Monitoring Program

Year 5 monitoring activities continued with the collection of one round of samples during 2003 (Round 15). A final Year 5 GMR was prepared and submitted in December 2004 (ECC, 2004b).

No changes to the monitoring program were implemented during Year 5. The results obtained during Round 15 of groundwater monitoring showed that 11 of the 21 COCs were detected in groundwater. Screening of analytical data against current primary and secondary criteria showed no exceedances of primary criteria, but concentrations of BEHP, copper, and zinc exceeded secondary criteria. Figure 2-13 shows groundwater data that exceeded criteria during Year 5 of the monitoring program.

COC concentrations detected in upgradient monitoring wells were statistically compared to COC concentrations detected in downgradient monitoring wells. The statistical comparisons indicated that downgradient concentrations of BEHP, fluoranthene, pyrene, and copper were greater than concentrations detected in upgradient wells. However, concentrations of fluoranthene and pyrene were less than primary and secondary monitoring criteria and were only slightly greater than the laboratory reporting limits. BEHP was only detected once, and the concentrations of copper were less than the NSB-NLON background concentration.

The Year 5 monitoring results were generally similar to the results of the first 4 years of groundwater monitoring. The results did not indicate that significant contaminant migration was occurring from Site 6.

Year 6 of the Monitoring Program

Year 6 monitoring activities continued with the collection of one round of samples during 2004 (Round 16) (ECC, 2005a). A final Year 6 GMR was prepared and submitted in February 2005. No changes to the monitoring program were implemented during Year 6.

The results obtained during Round 16 of groundwater monitoring showed that 15 of the 21 COCs were detected in groundwater. Screening of analytical data against current primary and secondary criteria showed no exceedances of primary criteria, but concentrations of benzo(a)anthracene, BEHP, arsenic, copper, silver, and zinc exceeded secondary criteria. Figure 2-14 shows groundwater data that exceeded criteria during Year 6 of the monitoring program.

COC concentrations detected in upgradient monitoring wells were statistically compared to COC concentrations detected in downgradient monitoring wells. The statistical comparisons indicated that downgradient concentrations of vinyl chloride and copper were greater than concentrations detected in upgradient wells. However, concentrations of vinyl chloride were less than primary and secondary monitoring criteria and were only slightly greater than laboratory reporting limits. The concentrations of copper were less than the NSB-NLON background concentration.

The Year 6 monitoring results were generally similar to the results of the first 5 years of groundwater monitoring. The results did not indicate that significant contaminant migration was occurring from Site 6.

Year 7 of the Monitoring Program

One round of sampling (Round 17) was conducted during 2005 (Year 7)(ECC, 2006). No changes to the monitoring program were implemented during Year 7. The results obtained during Round 17 of groundwater monitoring showed no exceedances of primary criteria, but detected concentrations of BEHP and copper exceeded secondary criteria, and detected concentrations of zinc exceeded secondary criteria and the NSB-NLON background concentration. Figure 2-15 shows groundwater data that exceeded criteria during Year 7 of the monitoring program.

Although downgradient results for three COCs (BEHP, pyrene, and copper) were statistically greater than upgradient concentrations, these results are consistent with historical results and do not indicate that significant contaminant migration is occurring from Site 6.

2.5.2.3 DRMO Surface Water

A surface water sample was collected in the Thames River during the Phase I RI. No organic chemicals were detected in the surface water sample. Several metals were detected including aluminum, calcium, copper, iron, magnesium, manganese, potassium, selenium, sodium, and zinc. Gross alpha and gross beta were considered as not detected in this sample based on the levels of uncertainty reported with the laboratory results (i.e., uncertainty levels are greater than results).

No additional surface water samples have been collected because primary criteria have not been exceeded during the 7 years of groundwater monitoring.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Currently, Site 6 is used as a storage and collection facility for items such as computers, file cabinets, and other office equipment to be sold during auctions and sales held periodically during the year. The site is fenced and access is restricted. Groundwater at this site is classified as GB and is therefore not a drinking-water source.

SOPA (Admin) New London Instruction 5090.18B identifies site use restrictions at Site 6, including soil excavation, soil penetration, soil compaction, filling or change in topography, dewatering excavations, and operation or storage of heavy equipment. Although Instruction 5090.18B is expected to be revised in 2007, restrictions for Site 6 are not expected to be affected.

For completeness, the human health risk assessment evaluated hypothetical future residential use of Site 6. However, due to the Instruction 5090.18B restrictions, it is unlikely that this area would be developed for residential use.

A potential future use of the DRMO is as a parking area for the Navy Yacht Club. As such, this area would remain fenced with restricted access.

2.7 SUMMARY OF SITE RISKS

2.7.1 Risk Assessments

A baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as the baseline indicating what risks could exist if no action was taken at the site. This section reports the results of the baseline risk assessment conducted for the Site 6 Interim ROD.

Human health and ecological risk assessments were performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants in various media at the site. The human health risk assessment procedure followed the most recent guidance at the time of the Interim ROD (USEPA, 1989b; USEPA, 1991) and Region I guidance (USEPA, 1989a; USEPA, 1994, and USEPA; 1995b). The ecological risk assessment used numerical criteria from regulatory-based standards and guidance provided by various government agencies in the United States and Canada against which contaminant concentrations were compared to arrive at quantitative risk levels. The ecological risk assessment also used USEPA-approved methodology for estimating potential risks to terrestrial receptors via food-chain modeling.

The risk assessments followed a four step process: (1) conceptual model development and contaminant identification, which identified those chemicals that, based on the specifics of the site, were of significant concern; (2) exposure assessment, which identified actual or potential exposure pathways, characterized potentially exposed populations, and determined the extent of possible exposure; (3) toxicity assessment, which evaluated the type and magnitude of adverse health and ecological effects due to exposure to contaminants; and (4) risk characterization, which integrated the three earlier steps to summarize potential and actual noncarcinogenic (toxic) and carcinogenic (cancer-causing) risks posed by contaminants at the site, and uncertainties inherent in the risk assessment process.

2.7.1.1 Contaminant Identification

The chemicals evaluated for Site 6 are as follows:

Noncarcinogenic PAHs	Carcinogenic PAHs	PCBs (Aroclors 1260,1254 and hexachlorobiphenyl)
Other SVOCs (12 compounds: primarily phthalates and phenols	Pesticides (7 compounds and derivatives)	Inorganics (25 constituents)
BTEX Compounds (benzene, toluene, ethylbenzenes, and xylenes)	Chlorinated VOCs (13 compounds)	Other VOCs (9 compounds)

Concentrations of detected chemicals were compared to benchmark concentrations for human health concern, mainly USEPA Region III Risk-Based Concentrations (RBCs). Those analytes with concentrations exceeding the benchmarks were selected as COCs. A similar process was carried out for ecological receptors using published ecological benchmarks.

Details of the COC selection process and exposure point concentrations are presented in the Phase II RI (B&RE, 1997a).

COCs were selected by comparing maximum detected concentrations to Region III residential soil screening levels. The list of COCs for soil at Site 6 is a follows:

- VOCs: 1,1,2,2-tetrachloroethane and vinyl chloride.
- PAHs: benzo(a) anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- PCBs: Aroclors-1254 and -1260 and hexachlorobiphenyl
- Dioxins: 1,2,3,4,6,7,8-HpCDD and OCDD.
- Metals: antimony, arsenic, barium, beryllium, cadmium, chromium, lead, manganese, mercury, nickel, thallium, vanadium, and zinc.

Vinyl chloride, 1,1,2,2-tetrachloroethane, dibenz(a,h)anthracene, and dioxins were retained as COCs for the "all soil" (soil from depths of 0 to 10 feet) category only. Dioxins were not found at detectable levels in the surface soil samples.

Maximum soil detections were also compared to USEPA's Soil Screening Levels (SSLs) for migration to groundwater in the Phase II RI. Maximum site concentrations exceeded SSLs (USEPA, 1996) for antimony, arsenic, barium, cadmium, chromium, lead, mercury, nickel, silver, thallium, zinc, 1,1-dichloroethane, 1,2-dichloroethene (total), 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, tetrachloroethene, vinyl chloride, methylene chloride, trichloroethene, 1,2,4-trichlorobenzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, Aroclor-1260, hexachlorobiphenyl, and dieldrin. Based on exceedances of migration-to-groundwater SSLs, these chemicals may migrate to groundwater and potentially impact water quality.

For groundwater, all data from both shallow and deep wells were used to identify COCs. The following chemicals were retained as COCs for this medium:

- Halogenated aliphatic hydrocarbons (1,2-dichloroethene, trichloroethene, and vinyl chloride).
- 1,4-Dichlorobenzene
- BEHP
- Indeno(1,2,3-cd)pyrene

- Metals (antimony, arsenic, barium, beryllium, boron, cadmium, chromium, lead, manganese, selenium, and vanadium)

For screening purposes, concentrations of these chemicals were compared to federal Maximum Contaminant Levels (MCLs). This comparison showed that maximum detections of trichloroethene, vinyl chloride, BEHP, antimony, and lead exceeded primary MCLs. Antimony, which was not detected in unfiltered samples, was selected as a COC in the Phase II RI because the concentration of this chemical in filtered sample 6GW3S exceeded the risk-based screening level.

Although groundwater COCs were identified in the Phase II RI, the human health risk assessment did not identify any chemicals in groundwater as being of concern to potential human receptors because total risks for each exposure scenario were within acceptable USEPA limits. Critical to this conclusion is the fact that groundwater at this site is classified as GB and is therefore not a drinking-water source. Groundwater concentrations were also compared to CTDEP's SWPCs using a site-specific dilution factor that was considered appropriate for discharge of the groundwater to Thames River, and no COCs were identified based on the comparison. Also, because there is no anticipated contact between potential ecological receptors and groundwater, no COCs were identified in groundwater for ecological risks.

One site surface water sample, 6SW1, was collected from the Thames River during the Phase I RI. Aluminum, copper, iron, manganese, selenium, zinc, and several primary inorganic human nutrients were detected at varying concentrations in this sample. All detections were less than the risk-based COC screening criteria for tap water ingestion and AWQC. No COCs were identified in the Phase II RI for surface water, indicating that potential exposure to this medium would result in minimal risks.

2.7.1.2 Exposure Assessment

Based on information obtained through site visits, inspections, and discussions with personnel at the DRMO or those involved in future planning for the area, the following potential receptors were identified:

- Full-time employees exposed to surface soil up to a depth of 2.0 feet below ground surface (bgs).
- Construction workers exposed to soil to a depth of 10 feet bgs ("all soil") and groundwater
- Older child trespassers exposed to surface soil up to a depth of 2.0 feet bgs
- Future residents exposed to soil to a depth of 10 feet bgs
- Terrestrial vegetation, soil invertebrates, and terrestrial vertebrates exposed to surface soil

The only current human receptor at this site is the full-time employee. Another potential current (albeit unlikely) receptor is an older child resident of the base who might trespass on the site despite existing fencing and security. Currently, there are no significant ecological receptors at the site.

Although extremely unlikely, the possibility of Site 6 being used for residential purposes was considered for the determination of human health risks. This was done because the site constitutes riverfront real estate, and because traditionally this kind of property has been highly desirable for residential development, such a future land use scenario cannot be completely ruled out. Under such a residential scenario, removal of the asphalt layer (either by artificial forces or natural degradation) could result in significant exposure of potential ecological receptors to surface soil.

Intake of each COC by each potential receptor (human or ecological) was estimated by incorporating site-specific soil concentrations into standard equations developed by the USEPA (USEPA, 1989b; USEPA, 1991). The resulting intakes were expressed as milligrams of analyte per kilogram of body weight per day. The major assumptions about exposure frequency and duration are presented in the Phase II RI Report (B&RE, 1997a).

2.7.1.3 Toxicity Assessment

The toxicity assessment examines information concerning the potential human health effects and ecological effects from exposure to COCs. The toxicity assessment provides, for each COC, a qualitative review of potential human health and ecological effects and a quantitative estimate of the relationship between the magnitude (dose) and type of exposure and the severity and/or probability of human health effects. The toxicological evaluation involves a critical review and interpretation of toxicity data from epidemiological, clinical, animal, and in vitro studies, as well as structural-activity relationship assessments. The available toxicological data base is used by the USEPA to derive cancer slope factors (CSFs) for carcinogenic effects and Reference Doses (RfDs) for noncarcinogenic effects. CSFs and RfDs are published by the USEPA in references listed in the Phase II RI (B&RE, 1997a). These toxicity values are integrated with the exposure assessment (intake) to characterize the potential for the occurrence of adverse health effects.

The COCs for ecological receptors were selected based on the comparison between chemicals detected in site media and predicted body burdens in concentrations greater than regulation-based criteria (such as AWQCs), and ecotoxicological guidance values provided by USEPA, Ontario Ministry of the Environment (OME), Oakridge National Laboratory (ORNL), and National Oceanic and Atmospheric Administration (NOAA) [see Section 3.4 of the Phase II RI (B&RE, 1997a)].

2.7.1.4 Risk Characterization

This section on risk characterization summarizes the results of the risk assessment from the Phase II RI (B&RE, 1997a). The first part presents a summary of the human health risk characterization, and the second part presents a summary of the ecological risk characterization.

Summary of Human Health Risk Characterization

Estimated exposure (intake) values were integrated with toxicity values (CSFs and RfDs) through a series of calculations to develop HIs and ICRs for noncarcinogenic and carcinogenic risks, respectively. To determine if potentially significant risks exist for human receptors, quantitative estimates of risk were compared to "acceptable" levels of risk. Estimated HIs were compared to unity (1.0). Estimated ICRs were compared to the USEPA target risk range of 1E-4 to 1E-6. According to State of Connecticut's Soil Remediation Regulations, direct exposure criteria do not apply because the soil is beneath a cap or pavement and is considered to be inaccessible, and the pollutant mobility criteria for protection of groundwater do not apply because the soil is located below the seasonal high water table.

The following paragraphs summarize the estimated cumulative risks, and Table 2-9 presents a summary of the estimated risks. Both validated and unvalidated data were used in this risk assessment. Multiple potential receptor groups were considered for Site 6 including older child trespassers, construction workers, future residents, and full-time employees. Carcinogenic risks, as quantified by lifetime ICRs, were compared to the USEPA's target risk range of 1E-4 to 1E-6. Most cumulative ICRs were either less than 1E-6 or within the USEPA's target risk range. An exception was the cumulative ICR of 1.4E-4 for future residents under the Reasonable Maximum Exposure (RME) scenario, which assumes exposure to maximum concentrations of contaminants. In this case, potential risks are attributable to ingestion of soil containing PAHs, PCBs, dioxins, arsenic, and beryllium, as well as dermal contact with PCBs and inhalation of fugitive dust containing chromium. In general, exposure to soil contributes the most to the cumulative cancer risk for all receptors. COCs for exposure to soil include PCBs (Aroclors) and PAHs [especially benzo(a)pyrene], with somewhat less risk from certain inorganic contaminants (arsenic and beryllium).

Noncarcinogenic risks, as quantified by HIs, were compared to unity (1.0). For all receptors considered, the cumulative HIs under the RME scenario exceeded 1.0. HIs did not exceed unity for any receptor under the Central Tendency Exposure (CTE) scenario, which assumes exposure to average concentrations of contaminants. Most risks stem from ingestion of and dermal contact with soils, and the majority of the risk is attributable to PCBs. Most of the remaining risks are attributable to antimony, cadmium, and to some extent, chromium in soil. Exposure to lead in soil at Site 6 was addressed in the Phase II RI using the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) model for lead uptake from

soil. Although the conclusion in the Phase II RI was that blood levels would be less than the level of concern (10 µg/dL) for a child receptor, higher soil concentrations (by over an order of magnitude) were detected in unvalidated data from confirmation sampling associated with the January 1995 TCRA. The previously reported Phase II RI concentrations estimated blood lead levels of roughly half of the level of "concern" (10 µg/dL). However, because of the higher levels of lead reported in the confirmation sampling data for the January 1995 TCRA, it is expected that the corresponding blood lead levels could be several times higher than the level of concern (10 µg/dL), and therefore, it is now concluded that lead is a COC for soil at Site 6.

Table 2-10 identifies the complete list of human health COCs in surface and subsurface soils for the potential receptors of concern. This table presents a list of those contaminants that contributed under the RME scenario to either a cumulative HI exceeding 1.0 or a cumulative ICR exceeding 1E-4 or both. The RME scenario was chosen conservatively to be the potential exposure to receptors of concern for estimating remediation goals to be conservative.

Remediation Goals for Human Health Protection

Using risk values based on the analyte concentrations with validated and unvalidated data and for all soil data from 0 to 10 feet bgs, remediation goals were calculated for the protection of potential human receptors at NSB-NLON. The COCs that require remediation goals are those presented in Table 2-10. Initially, all exposure pathways (considering all receptors, media, and routes of exposure) with ICRs greater than 1E-06 and/or HIs greater than 1.0 were identified. If the risk or hazard value approached these levels, the relevant scenario was also included for initial consideration. For each scenario, individual chemicals which contributed at least 1E-6 to the ICR or 0.1 to the HI were selected. If the risk or hazard value approached these levels, the contributing chemicals were also included in the remediation goal calculations. Upon further consideration, the ICR level of 1E-4, established by USEPA as representing an unacceptable risk, was used instead to initially screen potential cancer risks for development of remediation goals. No groundwater COCs were identified for human health protection, as was discussed previously.

The groundwater at this site is classified as GB, which is defined as groundwater is not suitable for human consumption without treatment and where a public water supply from another source is available. Therefore, remediation goals were not developed for the protection human receptors from consumption of groundwater.

Site-specific remediation goals were calculated using the following equation:

Exposure Concentration/Calculated Risk Value = Remediation Goal/Desired Risk Level

Solving for the Remediation Goal, the equation becomes:

Remediation Goal = (Exposure Concentration x Desired Risk Level)/Calculated Risk Value

For example, assuming that the total ICR (ingestion and dermal routes) for an employee exposed to Aroclors in surface soil was 1.86E-6 (B&RE, 1997a) and that the soil concentration was 0.35 mg/kg, the remediation goal at the 1E-6 level would be calculated as follows:

Remediation Goal = [(0.35 mg/kg) (1E-6)]/1.86E-6 = 0.19 mg/kg

Remediation goal calculations are presented in Appendix A of the FS (B&RE, 1997c) under Preliminary Remediation Goal calculations.

The final remediation goals for soil COCs were selected by identifying chemicals that contributed at least a 1E-06 risk to an overall ICR greater than 1E-4 and/or a major portion of an overall HI greater than 1.0. Typically the COCs for noncarcinogenic risk contributed a hazard quotient (HQ) approaching or greater than 1.0. The following soil remediation goals were developed for the COCs identified during the human health risk assessment:

For full-time employees:

- Aroclors (1254 and 1260) 10 mg/kg

For construction workers:

- Aroclors (1254 and 1260) 6 mg/kg
- Cadmium 84 mg/kg

For older child trespassers:

- Aroclors (1254 and 1260) 10 mg/kg

For future residents:

- Benzo(a)anthracene 2 mg/kg
- Benzo(a)pyrene 0.2 mg/kg
- Benzo(b)fluoranthene 2 mg/kg
- Dibenzo (a,h)anthracene 0.2 mg/kg
- Indeno(1,2,3-cd)pyrene 2 mg/kg
- Aroclors (1254 and 1260) 0.35 mg/kg

- Hexachlorobiphenyl 0.35 mg/kg
- Dioxins (HpCDD and OCDD) 0.00059 mg/kg
- Arsenic 0.96 mg/kg
- Beryllium 0.35 mg/kg
- Cadmium 67 mg/kg
- Chromium 11 mg/kg

Summary of Ecological Risk Assessment

An ecological risk assessment was performed for Site 6 during the Phase II RI following the procedures described in Section 3.4 of the Phase II RI Report (B&RE, 1997a). The ecological risk assessment began with an evaluation of contaminants in soils. Inorganic COCs were identified as those metals with average concentrations exceeding background concentrations and published benchmark values protective of terrestrial vegetation, soil invertebrates, the short-tailed shrew, and the red-tailed hawk. Organic COCs were identified as those organics with concentrations exceeding benchmark values. Potential risks to terrestrial vegetation, soil invertebrates, and terrestrial vertebrates were then evaluated. For each COC, the potential risks were estimated by dividing the soil concentration (maximums for RME and averages for CTE) by the benchmark values to arrive at HQs. The HQs determined for this site are summarized in Tables 2-11 and 2-12. Chemicals associated with Site 6 were considered to represent a risk to receptors if the HQs exceeded 1.0. Total risks to terrestrial receptors are expressed in terms of HIs, which are sums of chemical-specific HQs for each potential pathway of exposure. These risks to potential terrestrial receptors are summarized in Tables 2-13 and 2-14. Results of these comparisons indicate that terrestrial receptors are potentially at risk under both RME and CTE conditions.

The ecological risk assessment concluded that exposure to surface soils could adversely impact terrestrial ecological receptors, using highly conservative estimates. However, Site 6 does not provide a suitable ecological habitat (due to the presence of paving, buildings, cap, etc.), and actual risks to ecological receptors are likely to be much less than those calculated for this area. It is unlikely that ecological receptors will utilize this area, essentially eliminating the possibility that these receptors will be exposed to these chemicals. Furthermore, the presence of the cap effectively eliminates direct contact with soil at the site. When the current site conditions are factored into this evaluation, it is concluded that soil at Site 6 represents little potential risk to ecological receptors. If the cap is destroyed in the future due to artificial or natural forces, then there would be a potential risk to ecological receptors.

Sediment toxicity tests conducted during the Phase II RI indicated that conditions at a sediment sampling point collected near Site 6 (EC-T3504) may adversely impact sensitive benthic macroinvertebrates. It is not known if contaminant migration from Site 6 is the cause of these conditions. The major ecological concern at Site 6 is potential future transport of contaminated soils or groundwater to the Thames River.

Remediation Goals for Protection of Ecological Receptors

Under the current land use, ecological receptor exposure risks are low. However, under a future land use scenario, removal of the asphalt cap could occur, allowing ecological receptors to be exposed to surface soil. Therefore, remediation goals for soil at Site 6 were derived from values presented in either the Area A Downstream/OBDA FS (B&RE, 1997b) or the ORNL database (ORNL, 1996) of toxicological benchmarks for ecological risk assessment. The value for DDT/DDD was derived using a risk-based approach to calculate a site-specific value that is protective of terrestrial receptors such as the short-tailed shrew (B&RE, 1997b). The remediation goal for zinc was based on a screening value determined to be protective of terrestrial plants (ORNL, 1996; Will and Suter, 1994). All other soil remediation goals presented were derived by ORNL and were chosen by comparing the ORNL benchmarks for plants, microorganisms, and earthworms in soils to calculate remediation goals for wildlife. The most conservative value resulting from these calculations was selected as the soil remediation goal (Efroymson et al., 1996). Remediation goals were only developed for COCs determined to contribute the major portion of the cumulative risk to the ecological receptors, as listed below:

- Aluminum 50 mg/kg [Efroymson, et al., 1996 (plant)]
- Antimony 5 mg/kg [Efroymson, et al., 1996 (plant)]
- Boron 0.5 mg/kg [Efroymson, et al., 1996 (plant)]
- Cadmium 3 mg/kg [Efroymson, et al., 1996 (plant)]
- Chromium 0.4 mg/kg [Efroymson, et al., 1996 (earthworm)]
- Cobalt 20 mg/kg [Efroymson, et al., 1996 (plant)]
- Copper 50 mg/kg (Efroymson, et al., 1996 (earthworm)]
- Lead 50 mg/kg [Efroymson, et al., 1996 (plant)]
- Mercury 0.128 mg/kg [Efroymson, et al., 1996 (shrew)]
- Silver 2 mg/kg [Efroymson, et al., 1996 (plant)]
- Thallium 1 mg/kg [Efroymson, et al., 1996 (plant)]
- Vanadium 2 mg/kg [Efroymson, et al., 1996 (plant)]
- Zinc 50 mg/kg [Will and Suter, 1994 (plant))
- DDTR 5 mg/kg [B&RE, 1997b (shrew)]

Remediation Goals for Protection of Surface Water

Contaminants present in groundwater could migrate to the Thames River during tidally influenced fluctuation of water table elevations. Contaminants present in vadose zone soil could migrate via infiltration into the groundwater and periodic flooding (albeit at minimal levels because of the existing asphalt cap on site), followed by migration to the Thames River. SWPCs for contaminant levels in

groundwater were developed using State of Connecticut Surface Water Criteria and a site-specific dilution factor of 100. Contaminant concentrations in groundwater did not exceed these SWPCs; therefore, remediation goals were not developed for groundwater for surface water protection.

Remediation goals were developed for contaminants present in soil that could potentially leach into groundwater and enter the Thames River. An allowable soil value was calculated to be protective of surface water by taking a ratio of the maximum SWPC divided by the Safe Drinking Water Act MCL or a Health-Based Limit (HBL) for SSL development and multiplying by the federal pollutant mobility criterion (USEPA, 1996) adjusted by a site-specific dilution factor of 10. COCs for this scenario were identified when maximum concentrations exceeded these allowable values. The following are the allowable soil values (remediation goals) developed for the COCs identified in soil to be protective of surface water from contaminants leaching from soil:

- Benzoic acid 8.4 mg/kg
- Benzo(a)anthracene 27 mg/kg
- Benzo(a)pyrene 28 mg/kg
- Benzo(b)fluoranthene 75 mg/kg
- Barium 160 mg/kg
- Cadmium 48 mg/kg
- Chromium 209 mg/kg
- Silver 6.12 mg/kg
- Zinc 13,200 mg/kg
- Aroclor-1254 and -1260 0.38 mg/kg
- Hexachlorobiphenyl 0.38 mg/kg
- 4,4'-DDD 0.08 mg/kg

Discussion of Uncertainty Factors

Uncertainties in human health risk assessment arise from the following:

- Selection of COCs
- Exposure assessment
- Toxicological evaluation
- Risk characterization

Uncertainty in the selection of COCs is associated with the quality of the predictive databases and the procedures used to include or exclude constituents as COCs.

Uncertainty associated with the exposure assessment is associated with the values used as input variables for a given intake route, the methods used and the assumptions made to determine exposure point concentrations, and the predictions regarding future land use and population characteristics.

Uncertainty in the toxicity assessment is associated with the quality of the existing data to support dose-response relationships, and the weight-of-evidence used for determining the carcinogenicity of chemicals of concern.

Uncertainty in risk characterization is associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier activities.

For the purpose of this risk assessment, the use of unvalidated data adds considerable uncertainty because these data show higher contaminant concentrations and therefore greater potential risks. However, because the data are unvalidated, it is not clear whether these greater potential risks reflect actual site conditions. Also, the exposure assessment assumes that surface soil is accessible to potential receptors, which is conservative because the entire site is paved, and it is likely to be maintained in paved condition for the foreseeable future.

Although the procedures for human health risk assessment are somewhat standardized and consequently the uncertainty factors are controlled, the procedures for ecological risk assessment are less standardized. The following discussion summarizes these uncertainty factors and states the salient assumptions for ecological risk assessment.

To understand how useful or appropriate the results of the ecological risk assessment are, the uncertainties associated with the assessment need to be considered. Uncertainties from fairly well-known sources, like errors in sampling and measurement, will affect the assessment. More serious uncertainties may stem from lesser-known sources, such as how available environmental contaminants are for uptake by exposed plants and animals, and how well toxicological studies on laboratory subjects relate to organisms in nature. The uncertainties in the ecological risk assessment are briefly summarized as follows:

- Sources of error or variability:
  - Sampling and measurement
  - Data handling and analysis
- Incomplete knowledge of the relationship between measured contaminant concentrations and actual exposure to contaminants:

- Spatial and temporal factors (e.g., lack of feeding in areas of highest or lowest contaminant concentrations)
- Availability of contaminants for uptake by organisms
- Transfer of contaminants in food chains

- Incomplete knowledge of toxicology:

  - Use of non-native organisms and unnatural situations in experiments
  - Applicability of length of the experiment and the effects measured
  - Effects of toxicant mixtures

For the most part, assumptions are made corresponding to uncertainties in the ecological risk assessment. The following list of assumptions may help clarify the nature of the uncertainties:

- Sampling and Data Handling

Errors in the design of the sampling program, performance of sampling, analytical measurement, data handling, and data analysis do not have a significant effect on the results of the ecological risk assessment. Therefore, assumptions are not relevant to this aspect of the input.

- Exposure
  - Proportion of site size to an individual's home range is an adequate exposure factor
  - Animals are exposed throughout the year
  - No degradation or loss of contaminants from the system
  - 100 percent of each contaminant is available for uptake by organisms
  - Contaminant transfer from one level of a food chain to the next is adequately described by a single factor

- Toxicology
  - Experimental conditions apply adequately to those at Site 6
  - Toxicants do not affect each others' actions via synergistic or antagonistic effects

Conclusions

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

2.7.2 ARAR and Site-Specific Action Level Changes Since the Interim ROD

The human health and ecological risks were assessed for the 1998 Interim ROD. New or changed Applicable or Relevant and Appropriate Requirement (ARARs) since the Interim ROD were reviewed to determine overall impacts to estimated human health and ecological risks. It was determined that recalculation of risk or risk assessments was not necessary to determine whether a remedy protects human health and the environment.

The interim remedy implemented for soil and groundwater at Site 6 included monitoring of groundwater and institutional controls. No new human health ARARs have been promulgated that would call into question the protectiveness of the remedy for soil. ARARs and To Be Considereds (TBCs) were reviewed to determine whether there have been changes since the Interim ROD and GMP were issued. The Interim ROD chemical-specific TBCs were changed to be consistent with standards for other remedies at the base. Listings of chemical-specific, location-specific, and action-specific ARARs, advisories, and guidance (TBCs) for this Final ROD are listed in Tables 2-15, 2-16, and 2-17, respectively.

The presence of the cap effectively eliminated direct contact with contaminated soil at the site, and the soil at Site 6 represents little potential risk to ecological receptors. Therefore, any changes in screening values since the completion of the ecological risk assessment would not impact the effectiveness of the remedial action. If the cap would be destroyed in the future due to artificial or natural forces, there could be a potential risk to ecological receptors.

The human health risk assessment for the site was conducted primarily following the USEPA Human Health Evaluation Manual and supplemental documents (USEPA, 1989b and 1991) and USEPA Region I Risk Updates (USEPA 1994 and 1995b). Since the human health risk assessments were prepared, USEPA has issued new guidance documents (USEPA, 2001; 2002a; 2002b; 2004; 2005a; and 2005b). The new guidance documents do not impact the conclusions of the original human health risk assessments.

The benchmarks used to select COCs for direct contact with soil and sediment included USEPA Region III RBCs, and Connecticut RSRs. In addition, USEPA SSLs for the protection of migration from soil to groundwater and soil to air and Connecticut RSRs for pollutant mobility were used to select COCs for soil migration pathways. The USEPA Region III RBCs are usually updated twice a year. The CTDEP RSRs were issued in 1996 (CTDEP, 1996), additional RSRs were issued in 1999 (CTDEP, 1999), and revisions to the volatilization criteria were issued in 2003 (CTDEP, 2003). The changes in criteria do not impact the conclusions of the original risk assessment.

The benchmarks used to select COCs for groundwater included USEPA Region III RBCs, USEPA MCLs, Connecticut MCLs, and CTDEP Groundwater Protection Criteria. In addition, CTDEP RSRs for surface water protection and migration from groundwater to indoor air were used to select COCs for groundwater migration pathways. The USEPA Region III RBCs are usually updated twice a year. The USEPA MCLs were last updated in 2006 (USEPA, 2006a).

The benchmarks used to select COCs for surface water included USEPA AWQCs and Connecticut Water Quality Standards WQSs. The USEPA AWQCs were last updated in 2006 (USEPA, 2006b), and the Connecticut WQS were last updated in December 2002 (CTDEP, 2002).

CTDEP WQSs published in 1992 (CTDEP, 1992) were used as ARARs in the Interim ROD for DRMO. This ARAR has been updated since the Interim ROD for Site 6 was signed. The changes in the ARARs do not impact the effectiveness of the selected remedy for Site 6.

2.8 REMEDIAL ACTION OBJECTIVES AND DEVELOPMENT OF ALTERNATIVES

This section describes the Remedial Action Objectives (RAOs) and the development of alternatives. Alternatives were developed in the FS for contaminated soil and groundwater to meet RAOs for these media.

2.8.1 Statutory Requirements/Response Objectives

Under its legal authorities, the Navy's primary responsibility at NPL sites is to undertake remedial actions that are protective of human health and the environment. In addition, §121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that the Navy's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations under an environmental or facility siting law, unless a waiver is granted; a requirement that the Navy select a remedial action that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Remedial alternatives were developed to be consistent with these Congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, RAOs were developed to aid in the development of alternatives. These RAOs were developed to mitigate existing and future potential threats to public health and the environment and are as follows:

- Prevent exposure (unacceptable risk) to receptors under either a current industrial or future, although unlikely, residential land use scenario either through institutional controls and/or removal/treatment/disposal.

- Prevent unacceptable risk to ecological receptors in the Thames River from potential migration of contaminants.

2.8.2 Estimated Volumes of Contaminated Media

For remedial action purposes, preliminary volumes of contaminated media were estimated from samples that contained contaminants at concentration levels that exceeded Remediation Goals for current industrial land use and future residential land use. Based on the known extent of contamination, the following are the estimated areas and volumes of contaminated soil:

	Estimated Area (sq ft)	Average Depth (ft)	Estimated Volume (cu yd)
Current Industrial Land Use	11,230	6 to 10	3,150
Future Residential Land Use	105,800	6 to 10[(1)]	13,570

Sq ft = square foot
Cu yd = cubic yard
1 Depths include existing clean cover of 3-foot thickness from post-removal action backfill. A 1:1 sideslope is assumed for stability during excavation.

2.8.3 Technology Screening and Alternative Development

CERCLA and the NCP have set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a list of potential technologies were screened for effectiveness, implementability, and cost in attaining the RAOs for contaminated soil and groundwater. A range of alternatives was developed from the technologies that were retained from screening.

The FS developed a range of alternatives considering the CERCLA statutory preference for a treatment that reduces the toxicity, mobility, or volume of the hazardous substances. The alternatives were as follows:

Alternative 1: No Action ($0)
Alternative 2: Institutional Controls and Monitoring ($708,000)
Alternative 3: "Hot Spots" Excavation, Offsite Disposal, Institutional Controls, and Monitoring ($4,981,000)

Alternative 4: Excavation, Onsite Treatment (thermal desorption and fixation-solidification), and Offsite Disposal ($16,129,000).

The Institutional Controls and Monitoring alternative was selected as the interim remedy for Site 6 in the Interim ROD. Because the groundwater monitoring results collected subsequent to the Interim ROD have demonstrated that no significant contaminant migration is occurring to the Thames River, the Navy is no longer considering the two alternatives that require additional excavation at the site (Alternatives 3 and 4) as final remedies.

2.9 DESCRIPTION OF ALTERNATIVES

This section provides a narrative summary of Alternatives 1 (No Action) and 2 (Institutional Controls and Monitoring). These two alternatives were determined to be viable for OU2/Site 6 based on the results of the groundwater monitoring program and they were evaluated and presented in the Proposed Plan (Navy, 2006a).

2.9.1 Alternative 1 – No Action

No action is required for this alternative. This alternative is required by the NCP and is used as a baseline comparison with other alternatives. At Site 6 this alternative would still include the existing cap but with no maintenance of that cap. This alternative is typically not selected unless the risks of doing nothing are acceptable to human health and environment. At this site, the No Action alternative would result in contamination being left in place that would be a continued threat to human health and the environment.

This alternative would not comply with chemical-specific ARARs and TBCs, specifically:

- CTDEP RSRs (Direct exposure criteria would be applicable in the future if the existing cap deteriorates and the contaminated soil is no longer considered "inaccessible").

- EPA Risk Guidance (Methodologies would be applicable for estimating risks if the existing cap deteriorates and the contaminated soil is no longer considered "inaccessible").

There are no costs associated with this alternative, except for the cost of statutorily required five-year reviews (see Appendix C).

Estimated Time for Construction:	*0 Years*
Capital Cost:	*$ 0*
O&M Cost:	*$ 0 (total for 30 years)*
Total Cost (as present worth):	*$ 32,300*

2.9.2 Alternative 2 – Institutional Controls and Monitoring

Alternative 2 would consist of two major components in addition to the existing cap: (1) institutional controls and (2) monitoring.

Institutional controls would include maintenance of the existing cap, limitations on site access, and restrictions on land use. Land use restrictions for Site 6 would limit activities such as excavation, drilling, residential use of the property, and excessive vehicular use. While the area is under jurisdiction of the Navy, there would be a Base Instruction or other Navy mechanism that documents the restrictions on land use and controls use of the site.

The Navy would, at least annually, inspect the area and document compliance with the land use restrictions. This document would be included when conducting future Five-Year Reviews of the site. If the site is ever transferred from Navy control, the Navy would create a deed for the property that would include the land use restrictions that would meet all applicable State property law standards for placing environmental land use restrictions on contaminated property.

Monitoring would be conducted to determine whether the capping remedy remains protective of human health and the environment. The integrity of the cap would be monitored to determine that contaminants cannot be released from flooding or other disturbance. Groundwater monitoring would be performed in accordance with the GMP for Site 6. Groundwater samples would be analyzed to evaluate whether contamination from Site 6 is migrating to the Thames River and causing an adverse ecological effect. The monitoring program would be optimized as appropriate based on the monitoring results.

In addition, a site review would be conducted every five years for as long as contaminants remain in place that pose a risk to human health and the environment under CERCLA. The reviews would evaluate the site status and determine whether further action is necessary.

This alternative would comply with the following chemical-specific TBCs (see Table 2-15):

- CSFs and RfDs (Remedy would prevent exposure to contaminated media and minimize risks to human receptors).

- EPA Risk Guidance (Methodologies would be applicable for estimating risks if the existing cap deteriorates and the contaminated soil is no longer considered "inaccessible").

This alternative would comply with the following location-specific ARARs (see Table 2-16):

- Executive Order 11988 regarding Floodplain Management (Considered during monitoring well installation because the site is within the 100-year floodplain of Thames River and will be considered in future during well abandonment and O&M).

- Coastal Zone Management Act (Considered during monitoring well installation because the site is within the 100-year floodplain of Thames River and will be considered in future during well abandonment and O&M).

- Fish and Wildlife Coordination Act (Considered during monitoring well installation because the site is within the Thames River's tidal zone and will be considered in future during well abandonment and O&M).

- Coastal Management Act (Considered during monitoring well installation because the site is within the 100-year floodplain of Thames River and will be considered in future during well abandonment and O&M).

- Tidal Wetlands (Considered during monitoring well installation because the site is within the Thames River's tidal zone and will be considered in future during well abandonment and O&M).

- Connecticut Endangered Species Act (Considered during monitoring well installation because the site is within the Thames River's tidal zone and the State-threatened Atlantic sturgeon inhabits the river. It will be considered in future during well abandonment and O&M).

This alternative would comply with the following action-specific ARARs and TBCs (see Table 2-17):

Guidance on Remedial Actions for Superfund Sites with PCB Contamination (Guidance will be considered during O&M and in future if site use changes).

- Hazardous Waste Management: Generator and Handler Requirements (Considered during monitoring well installation and will be considered in future during well abandonment and O&M).

- Hazardous Waste Management: TSDF Standards (Considered during monitoring well installation and will be considered in future during well abandonment and O&M).

- Control of Noise Regulations (Considered during monitoring well installation and will be considered in future during well abandonment and O&M).

- Guidelines for Soil Erosion and Sediment Control (Considered during monitoring well installation and will be considered in future during well abandonment and O&M).

- Water Quality Standards (Considered during development of Alternative SWPC and secondary criteria for the groundwater monitoring program to protect surface water resources).

- Remediation Standard Regulations (Maintenance of the cap and continued implementation of institutional controls will satisfy the regulations. Considered during development of Alternative SWPC and primary criteria for the groundwater monitoring program).

The estimated cost of Alternative 2 is as follows:

Estimated Time for Construction:	*0 Years*
Capital Cost:	*$ 15,000*
O&M Cost:	*$ 467,200 (total for 30 years)*
Total Cost (as present worth):	*$ 482,200*

The present worth cost for Alternative 2 was updated from the 1997 estimate ($708,000) to account for changes to the monitoring and O&M programs at Site 6 (see Appendix C).

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD summarizes the comparative analysis of Alternatives 1 and 2 presented in the detailed analysis section of the FS Report. The major objective is to evaluate the relative performance of the alternatives with respect to the nine evaluation criteria so that the advantages and disadvantages of each are clearly understood. The first two evaluation criteria, Overall Protection of Human Health and the Environment and Compliance with ARARs, are threshold criteria that must be satisfied by any remedial alternative chosen for the site. The primary balancing criteria are then considered to determine which alternative provides the best combination of attributes. The primary balancing criteria are as follows:

- Long-term effectiveness and permanence
- Reduction in toxicity, mobility, or volume through treatment

- Implementability
- Short-term effectiveness
- Cost

The alternatives are evaluated further against the following two modifying criteria:

- Acceptance by the State
- Acceptance by the community

2.10.1 Overall Protection of Human Health and the Environment

Alternative 1 would provide some protection of human health and the environment because of the existing cap. However, because the cap would not be maintained, this protection would be limited. Also, because no monitoring would be performed, potential contaminant migration to groundwater and to the Thames River would not be detected for appropriate action.

Alternative 2 would be protective of human health and the environment. Institutional controls would be protective because the existing cap would be maintained, site access would be restricted, land use restrictions would be enforced, and the DRMO would be kept in its current industrial function, all of which would minimize human health and ecological risks from direct exposure to contaminated soil under the current land use scenario. Maintenance of the cap would also minimize infiltration through the contaminated vadose zone, soil and thereby minimize potential contaminant migration. Monitoring would be protective because it would detect potential migration of soil contaminants to groundwater and then eventually to the Thames River where they could adversely impact ecological receptors.

2.10.2 Compliance with ARARs and TBCs

Alternative 1 would not comply with chemical-specific ARARs and TBCs. No location-specific or action-specific ARARs or TBCs apply to this alternative.

Alternatives 2 would comply with chemical-specific, location-specific, and action-specific ARARs and TBCs. This alternative would comply with the chemical-specific TBCs (risk guidance and CSFs/RfDs) by preventing exposure to contaminated media. This alternative would also comply with the location-specific ARARs by minimizing impacts to the 100-year floodplain and to endangered species in the Thames River. Alternative 2 would also comply with action-specific ARARs and TBCs corresponding to monitoring well placement and handling/storage/disposal of any hazardous waste or PCB-contaminated waste that may be generated during well placement or during any future O&M activity.

2.10.3 Long-Term Effectiveness and Permanence

Alternative 1 would have very limited long-term effectiveness and permanence because all contaminated soil would remain on site and the existing cap would not be maintained. Therefore, as the existing cap deteriorates over time, an unacceptable risk (HI greater than 1.0) could develop for site workers from direct exposure to contaminated soil. Because there would be no institutional controls to limit site access or prevent residential development, the potential would also exist for unacceptable risk to develop for trespassers (HI > 1.0) and possible future residents (HI greater than 1.0 and ICR greater than 1E-4). Residential development of Site 6 could also result in unacceptable risk to a correspondingly increased population of ecological receptors from exposure to contaminated surface soil. Because there would be no monitoring, potential impact to groundwater and the Thames River from possible migration of contaminants from soil would not be detected for appropriate remedial action.

Alternative 2 would be effective in the long-term. Institutional controls, including maintenance of the existing cap, limits to site access, and land use restrictions, would effectively minimize risks from direct exposure of human and ecological receptors to contaminated soil. Long-term monitoring would be effective for the detection of potential migration of soil contaminants to groundwater and eventually to the Thames River where they could adversely impact ecological receptors.

2.10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 1 and 2 would not achieve any reduction of toxicity, mobility, or volume of contaminants through treatment.

2.10.5 Short-Term Effectiveness

Implementation of Alternative 1 would not result in risks to site workers or adversely impact the surrounding community or environment because no remedial activities would be performed. Alternative 1 would never achieve the RAOs.

Implementation of Alternative 2 would result in a slight possibility of exposing site workers to contaminated soil during the maintenance of the existing cap and fence and to contaminated soil and groundwater during the construction of new groundwater monitoring wells and the maintenance and sampling of the new and existing wells. However, these risks of exposure would be effectively controlled by wearing of appropriate personal protective equipment (PPE) and compliance with proper site-specific health and safety procedures. Implementation of Alternative 2 would not adversely impact the surrounding community and environment. Alternative 2 would immediately achieve the RAOs; however, continued

achievement of the RAO for protection of ecological receptors in the Thames River would have to be regularly verified through monitoring.

2.10.6 Implementability

There would be no remedial action to implement under Alternative 1, other than conducting five-year reviews, which would be easily implementable.

Alternative 2 would be simple to implement. Fencing, posted notices, instituted land use restrictions, and groundwater monitoring wells are already in place. Also, preparation of the GMP, 3 years of maintenance and landfill inspection reports, two 5-year reviews, and 7 years of groundwater monitoring have already been accomplished. Continued maintenance of the existing cap, fence, posted notices, and wells can be readily accomplished. Continued monitoring and performance of 5-year reviews can also be readily accomplished. Resources, equipment, and materials are available for all of these tasks. The administrative implementability of institutional controls and monitoring would also be simple as long as the site stays under Navy control, but even in the unlikely event that this would change, adequate provisions could be relatively easily incorporated in any property transfer documents to insure continuation of these controls and monitoring under civilian ownership.

2.10.7 Cost

The capital, total O&M cost over 30 years, and 30-year net present-worth (NPW) costs of the alternatives are presented in the following table.

Alternative	Capital ($)	30-year O&M ($)	30-year NPW ($)
1	0	0	32,300
2	15,000	467,200	482,200

The estimated net present worth for Alternative 1 is $32,300 and includes only 5-year review costs of $15,000 every 5 years. The estimated net present worth of Alternative 2 is $482,200, with a capital cost of $15,000, annual maintenance cost of $10,800, monitoring cost of $40,000 every 2 years, O&M Manual update cost of $10,000 every 5 years, and 5-year review cost of $15,000 every 5 years. The details of the cost estimates for Alternatives 1 and 2 are provided in Appendix C.

2.10.8 State Acceptance

The State of Connecticut has expressed their support with the Selected Remedy (described in Section 2.12). The State's concurrence letter is provided in Appendix D.

2.10.9 Community Acceptance

The Proposed Plan presents the preferred alternative for Site 6. From October 28, 2006 through November 29, 2006, the Navy held a public comment period to accept public input. A public meeting was held in Groton, Connecticut on November 2, 2006 to discuss the Proposed Plan and to accept any oral comments.

Community acceptance of the Proposed Plan was evaluated based on comments received at the public meeting and during the public comment period. This is documented in the transcript of the Public Meeting in Appendix B, and in the Responsiveness Summary section of this ROD.

2.11 PRINICPAL THREAT WASTE

The NCP establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable [40 CFR 300.430(a)(1)(iii)(A)]. Based on the results of the investigations and studies, the contaminants in Site 6 soil and groundwater do not constitute principal threat wastes as defined by the NCP.

2.12 SELECTED REMEDY

Based on the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and comments received from the USEPA, the CTDEP, and the public, the Navy has selected Alternative 2 (Institutional Controls and Monitoring) as the most appropriate remedy for Site 6. Upon implementation of this remedy, the human health risks resulting from exposure to the soil and groundwater at the site will be minimized, and potential risks to ecological receptors in the adjacent Thames River will be monitored.

Alternative 2 consists of two components in addition to maintaining the existing asphalt and GCL cap: (1) institutional controls and (2) groundwater monitoring. This alternative will rely on maintenance of the existing cap, limitation of site access, restrictions of land use, and groundwater monitoring to evaluate whether contaminants present at the site are migrating to the Thames River and causing adverse ecological effects. Although this alternative is based on the assumption that the DRMO will continue to be owned and operated by the Navy, provisions are included in this ROD for the continuation of these institutional controls and maintenance of the other components of the remedy in the event of a change in ownership. The estimated net present worth of Alternative 2 is $482,200.

2.12.1 Component 1: Institutional Controls

Institutional controls will include limitations on site access, restrictions on land use, and monitoring and enforcement of compliance with land use restrictions. Land use restrictions for the DRMO will limit activities such as excavation, drilling, residential use of property, and excessive vehicular use. While the area is under jurisdiction of the Navy, there shall be a Base Instruction or other Navy mechanism that documents the restriction on land use and controls use of the site.

The Navy will, at least annually, inspect the area and document compliance with the land use restrictions. This document compliance shall be included when conducting future Five-Year Reviews of the site. If the site is ever transferred from Navy control, the Navy will create a deed for the property that will include the land use restrictions. The restrictions will meet all applicable State property law standards for placing environmental land use restrictions on contaminated property. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain the ultimate responsibility for remedy integrity.

2.12.1.1 Cap Maintenance

Maintenance of the existing asphalt and GCL cap will consist of regular inspections to assess the integrity of the asphalt and GCL cap. The O&M Manual (TtNUS, 2006a) details requirements for annual inspections, including a checklist for inspection items related to the fencing, asphalt cap, catch basin, culvert outlet, riprap, and monitoring wells. Record of Findings, Plan of Action, and Completion Reports will be prepared as needed based on each annual inspection. Periodic repair and replacement of the asphalt layer, monitoring wells, and any other remedy components will be performed as needed.

2.12.1.2 Limitations on Site Access

Limitations on site access will consist of maintaining the existing chain-link fence that surrounds the site and posting of signs to warn potential trespassers that a health hazard is present. Signs have been posted along the perimeter and at the front entrance to the site. In addition, during operation of the site for its current military purpose, gates will be locked, and a security desk will be maintained at the entrance to the site.

2.12.1.3 Land Use Controls

The Navy shall implement institutional controls to achieve the land use control performance objectives. The Navy prepared and submitted to USEPA and CTDEP for review and approval an update of the NSB-NLON Installation Restoration Site Use Restrictions Instruction document (5090.18C) (Navy, 2006b) (see Appendix E). The O&M Manual (TtNUS, 2006a) contains implementation and maintenance actions,

including periodic inspections. The Navy shall be responsible for implementing, inspecting, reporting, and enforcing the institutional controls described in the ROD in accordance with the approved instruction. Should any institutional control component of the selected remedy fail, the Navy would ensure that appropriate actions are taken to reestablish the selected remedy's protectiveness. The Navy may transfer various operational responsibilities for these actions to other parties through contracts, agreements and/or deed restrictions. However, the Navy acknowledges its ultimate liability under CERCLA for remedy integrity, including for the performance of any transferred operational responsibilities.

The groundwater land use controls are required because there are contaminants in the groundwater at concentrations that could result in unacceptable risks if the use of the groundwater was not controlled or restricted. The objectives of the land use controls for the Selected Remedy are as follows:

- Prevent the withdrawal and/or use of groundwater from Site 6 for potable water purposes or other purposes that may result in unacceptable risks to human health and the environment until the concentrations of contaminants in groundwater are at such levels to allow for unrestricted use and unlimited exposure. Groundwater at Site 6 is classified by the State of Connecticut as GB and much of the groundwater is brackish due to the Thames River.

- Ensure that groundwater extracted from Site 6 during groundwater monitoring or construction dewatering activities is handled, stored, and disposed in accordance with applicable State and federal regulatory requirements.

- Maintain the integrity of the proposed groundwater monitoring system for Site 6 until the goals of the monitoring plan are met.

Implementation of institutional controls on groundwater use at Site 6 has generally been completed by identifying the location, magnitude, and type of contamination and documenting it in the NSB-NLON Installation Restoration Site Use Restrictions Instruction document (5090.18C)(Navy, 2006b). The latest version of the Instruction (December 2006) also identifies the areas with soil institutional controls and provides specific instructions to Navy personnel for conducting excavation, ground disruption, and dewatering work at IR Program sites at NSB-NLON. Figure 2-16 identifies the areas at NSB-NLON that will have groundwater land use controls. The controls on groundwater use will be maintained until the results of the groundwater monitoring program show that the concentrations of hazardous substances in the groundwater allow for unrestricted use and unlimited exposure.

NSB-NLON is currently an active Navy base and should remain so into the foreseeable future. Potential future land uses for Site 6 while the Navy owns the property include the continued use of the site under its

current Naval function and possible use for Yacht Club parking. No further construction or residential development is planned for this site. In addition, the groundwater at Site 6 is classified as GB by the State of Connecticut. Based on the GB classification, the groundwater is presumed not suitable for human consumption without treatment. Much of the groundwater is brackish due to the Thames River. The groundwater at Site 6 is not currently used as a source of drinking water or for industrial water supply purposes, and there are no plans to use Site 6 groundwater in the future for either purpose. The institutional controls for groundwater that will be implemented for Site 6 will place further restrictions on the extraction and use of the groundwater at this site until the concentrations of contaminants in the groundwater are at such levels to allow for unrestricted use and unlimited exposure. In the event that the Navy would sell or transfer the property in the future, and with confirmation that contaminated groundwater remains at Site 6, a deed restriction would be needed to prohibit the use of groundwater at the site. Future commercial use would be permitted as long as controls on groundwater extraction and use were maintained. Residential use would be limited by soil contamination restrictions.

The Navy shall perform the following implementation actions to ensure that the LUC objectives are met:

- Conduct CERCLA five-year reviews and provide copies to USEPA and CTDEP for review.

- Conduct groundwater monitoring and report the results in accordance with Volume II – GMP, O&M Manual (TtNUS, 2006a). The following data will be included: (1) medium monitored; (2) analyses and analytical methods; (3) sampling locations; (4) sampling frequency; (5) field procedures; (6) data evaluation procedures; (7) reporting requirements; and (8) the decisional criteria for modifications to the monitoring plan.

- Conduct annual inspections of the major component of the LUCs and report the results in accordance with the GMP, including all of the following data: (1) inspection frequency; (2) items to be inspected; (3) corrections of irregularities and problems; (4) reporting requirements; and (5) the decisional criteria for modifications of the monitoring plan.

- Enforce groundwater LUCs per NSB-NLON Installation Restoration Site Use Restrictions Instruction Document (5090.18C) (Navy, 2006b) so that contaminated groundwater is not extracted or used in a manner that would threaten human health or the environment. Maintain the Instruction with the latest list of LUCs with associated boundaries and expected durations.

- Address any activity that may interfere with the effectiveness of the LUCs, any activity that is inconsistent with the LUC objectives, or any other action that may interfere with the effectiveness of

the LUCs, but in no case will the process be initiated later than 10 days after the Navy becomes aware of the breach.

- Notify USEPA and CTDEP as soon as practical but no longer than 10 days after discovery of any activity that is inconsistent with the LUC objective or use restrictions, or any other actions that may interfere with the effectiveness of the LUCs. The Navy will notify USEPA and CTDEP regarding how the Navy has addressed or will address the breach within 10 days of sending USEPA and CTDEP notification of the breach.

- Notify USEPA and CTDEP 45 days in advance of any proposed land use changes that are inconsistent with the LUC objectives or the Selected Remedy.

- Provide notice to USEPA and CTDEP at least 6 months prior to any transfer or sale of the property subject to the LUCs so that USEPA and CTDEP can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify USEPA and CTDEP at least 6 months prior to any transfer or sale, then the facility will notify USEPA and CTDEP as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to LUCs. In addition to the land transfer notice and discussion provisions above, the Navy further agrees to provide USEPA and CTDEP with similar notice, within the same time frames, as to federal-to-federal transfer of property. The Navy shall provide a copy of the executed deed or transfer assembly to USEPA and CTDEP.

- Not modify or terminate LUCs, implementation actions, or modify land use without approval by USEPA and CTDEP. The Navy shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.

- Monitoring of the environmental use restrictions and controls will be conducted annually by the Navy. The monitoring results will be included in a separate report or as a section of another environmental report, if appropriate, and provided to the USEPA and CTDEP. The annual monitoring reports will be used in preparation of the Five-Year Review to evaluate the effectiveness of the remedy.

- The monitoring report submitted to the regulatory agencies by the Navy will evaluate the status of the LUCs and how any LUC deficiencies or inconsistent uses have been addressed. The annual evaluation will address whether the use restrictions and controls referenced above were communicated in the deed(s), whether the owners and state and local agencies were notified of the use restrictions and controls affecting the property, and whether use of the property has conformed with such restrictions and controls.

2.12.2 Component 2: Groundwater Monitoring

Groundwater monitoring shall be performed in accordance with Volume II – GMP of the O&M Manual (TtNUS, 2006a). Samples collected under the new monitoring program will be analyzed for VOCs, SVOCs, PAHs, and metals (total) to evaluate whether contamination from the site is migrating to the Thames River and potentially causing adverse effects to ecological receptors.

As appropriate, the GMP may be revised based on the analytical data collected from the previous sampling events. Primary and secondary groundwater monitoring criteria from the 2006 GMP are presented on Tables 2-7 and 2-8. If groundwater COCs are detected at concentrations greater than SWPCs or Volatilization Criteria, additional evaluations will occur as described in the GMP, including but not limited to collection of surface water and sediment samples to determine if these COCs are migrating from Site 6 to the Thames River. After sufficient monitoring data have been collected, such data will be evaluated to determine the need for additional remedial action at the site. If data show that the site has not adversely impacted the environment, the need for additional monitoring will be evaluated and modified, as appropriate. Figure 2-17 depicts the decision-making framework for the groundwater data collection.

Every 5 years for as long as contamination onsite poses a CERCLA risk, a site review will be conducted to evaluate the site status and determine whether further action is necessary. Such site reviews are required when contaminants remain at the site [see CERCLA §121(c)].

2.13 STATUTORY DETERMINATIONS

Under CERCLA §121, the Navy must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the Selected Remedy for Site 6 meets the statutory requirements.

2.13.1 Protection of Human Health and the Environment

The Selected Remedy protects human health by minimizing direct contact with contaminants using institutional controls and maintenance of the existing asphalt and GCL cap, monitoring well network, and any other components of the remedy. The reduced exposure to potential receptors will ensure that the risks are within the acceptable limits corresponding to a maximum cumulative ICR of 1E-04 and a

maximum cumulative HI of 1.0. The Selected Remedy will be protective of the environment of concern, namely the Thames River, which runs adjacent to the site, by monitoring for contaminant migration from soil to groundwater. The monitoring will be conducted according to the GMP as summarized in Section 2.12 of this ROD. If the groundwater COCs are shown to exceed site-specific SWPCs, additional action would be taken, including expansion of the scope of monitoring to include surface water and sediment sampling. If exceedances of Volatilization Criteria are detected, additional action would be taken including determining the need for additional remedial action.

2.13.2 Compliance with ARARs

The Selected Remedy will comply with all federal and State of Connecticut ARARs and TBCs. The chemical-specific, location-specific, and action-specific ARARs and TBCs that have been analyzed for this remedial action and the methods by which compliance will be attained are summarized in Tables 2-15, 2-16, and 2-17, respectively.

2.13.3 Cost Effectiveness

In the Navy's judgment, the Selected Remedy is cost effective, (i.e., its overall protectiveness justifies the cost). In selecting this remedy, the Navy analyzed the overall effectiveness of all alternatives that were protective and complied with ARARs. The No Action alternative is the less expensive ($32,300) alternative, but it would not be protective of human health, and there would be no mechanism to monitor any impacts on the environment. Alternative 2 would address the exposure to contaminants and the potential for their migration in the environment. The current industrial land use at Site 6 is likely to continue, and residential land use is very unlikely in the foreseeable future. As long as the Base maintains and enforces the Instruction and through any other applicable means, residential land use would be prohibited and any transfer of property would be accompanied by deed restrictions. Also, signs, the Instruction, or any other applicable means would warn workers to take adequate protective measures during intrusive activities.

The estimated total cost (30-year present worth) of the Selected Remedy is $482,200.

2.13.4 Utilization of Permanent Solutions and Alternative Treatment

The Selected Remedy proposes maintenance of the existing asphalt and GCL cap to minimize exposure to potential receptors within the foreseeable future at Site 6 under the management of the Navy. The nature of the contaminants and potential risks at Site 6 do not warrant the need for an alternative treatment or resource recovery technology. Because this alternative is protective of human health and the environment and complies with ARARs, the Navy, with the USEPA and CTDEP concurrence, has

determined that this Selected Remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

2.13.5 Preference for Treatment as a Prinicipal Element

The Selected Remedy does not treat the soil for reduction of toxicity, mobility, or volume through treatment. The risks posed by the contaminants can be adequately reduced by minimizing exposure to potential receptors.

2.13.6 Five-Year Review Requirements

Because the Selected Remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted every 5 years to evaluate the site status, to determine whether further action is necessary, and to ensure that the remedy is protective of human health and the environment. The most recent Five-Year Review Report was completed in December 2006, and the next Five-Year Review Report is scheduled for completion in December 2011.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

The Navy released the Proposed Plan for public comment on October 28, 2006. The Proposed Plan identified Institutional Controls and Monitoring (Alternative 2) as the preferred alternative for soil and groundwater remediation for Site 6. Public comments have been considered by the Navy prior to the selection of the preferred alternative. Upon review of these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

TABLE 2-1

SUMMARY OF SOIL ANALTYICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT
PAGE 1 OF 5

Analyte	Surface Soils (<2 Feet) (1)			Subsurface Soils (>2 Feet) (2)		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection
VOLATILE ORGANICS (ug/kg)						
1,1,2,2-Tetrachloroethane	1/56	1.78	DRMO-35	1/17	6400	6TB4
1,1,2-Trichloroethane	0/56	-	ND	1/17	590	6TB4
1,1-Dichloroethane	3/56	1.38-6.25	DRMO-35	0/17	-	ND
1,1-Dichloroethene	0/56	-	ND	1/17	13	6TB4
1,2-Dichloroethane	2/56	1.25-6.68	DRMO-40	2/17	79-1900	6TB4
1,2-Dichloroethene (total)	0/14	-	ND	2/17	2-16000	6TB4
2-Butanone	7/56	2.35-14.4	DRMO-40	0/17	-	ND
2-Hexanone	1/56	3.03	DRMO-42	0/17	-	ND
4-Methyl-2-pentanone	1/56	1.21	DRMO-42	1/17	5100	6TB17
Acetone	30/56	1.87-1630	DRMO-72	2/17	78-350	6TB4
Benzene	2/56	1.13-6.41	DRMO-40	1/17	7	6TB4
Carbon disulfide	4/56	1-5.37	DRMO-60	3/17	2-48	6TB4
Chloroethane	1/56	1.55	DRMO-35	0/17	-	ND
Chloroform	0/56	-	ND	1/17	14	6TB4
Ethylbenzene	3/56	1.22-9.07	DRMO-45	1/17	44	6TB4
Methylene chloride	39/56	2-427	DRMO-75	2/17	17-41	6TB16
Styrene	4/56	1.28-2.59	DRMO-35	0/17	-	ND
Tetrachloroethene	12/56	1-14.7	DRMO-74	4/17	5-210	6TB4
Toluene	15/56	1-12.2	DRMO-36	3/17	1-43	6TB4
Trichloroethene	26/56	1-93.1	DRMO-44	6/17	1-7100	6TB4
Vinyl chloride	1/56	1.66	DRMO-35	1/17	1300	6TB4
Xylenes, total	10/56	0.992-29.7	DRMO-45	2/17	340-5400	6TB17
SEMIVOLATILE ORGANICS (ug/kg)						
1,2,4-Trichlorobenzene	2/56	4820-4940	DRMO-63	0/16	-	ND
1,3-Dichlorobenzene	1/56	1060	DRMO-35	0/16	-	ND
2-Methylnaphthalene	8/56	48.7-8360	DRMO-67	4/16	42-44000	6TB17
4-Methylphenol	1/56	209	DRMO-54	1/16	790	6TB4

TABLE 2-1

SUMMARY OF SOIL ANALTYICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT
PAGE 2 OF 5

Analyte	Surface Soils (<2 Feet) (1)			Subsurface Soils (>2 Feet) (2)		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection
Acenaphthene	6/56	286-13700	DRMO-45	3/16	49-52000	6TB17
Acenaphthylene	11/56	39-5600	DRMO-45	1/16	89	6MW2
Anthracene	30/56	39-29300	DRMO-45	5/16	37-41000	6TB17
Benzo(a)anthracene	36/56	100-43700	DRMO-45	9/16	72-50000	6TB17
Benzo(a)pyrene	31/56	188-40600	DRMO-45	6/16	74-31000	6TB17
Benzo(b)fluoranthene	36/56	150-78600	DRMO-45	10/16	24-39000	6TB17
Benzo(g,h,i)perylene	22/56	62.4-11000	DRMO-43	4/15	370-9400	6TB17
Benzo(k)fluoranthene	28/56	47-19400	DRMO-43	7/15	20-25000	6TB17
Benzoic acid	2/9	9300-12000	6SS3	2/10	32-220	6MW7S
Bis(2-ethylhexyl)phthalate	37/56	179-12500	DRMO-45	2/16	120-7700	6MW4
Butyl benzyl phthalate	1/56	423	DRMO-52	0/16	-	ND
Carbazole	9/47	46-14200	DRMO-45	1/8	26000	6TB17
Chrysene	37/56	93-47100	DRMO-45	11/16	100-43000	6TB17
Dibenzo(a,h)anthracene	1/56	1160	DRMO-37	1/15	130	6MW2
Dibenzofuran	6/56	82-14300	DRMO-45	1/16	46000	6TB17
Fluoranthene	42/56	66-95100	DRMO-45	11/16	36-100000	6TB17
Fluorene	9/56	214-19200	DRMO-45	3/16	66-70000	6TB17
Indeno(1,2,3-cd)pyrene	22/56	60.3-9290	DRMO-43	4/15	26-9800	6TB17
Naphthalene	6/56	228-23700	DRMO-45	2/16	6500-87000	6TB17
Phenanthrene	34/56	55-96900	DRMO-45	9/16	79-160000	6TB17
Pyrene	44/56	140-174000	DRMO-45	12/16	47-89000	6TB17
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	3/56	9.3-227	DRMO-74	0/17	-	ND
4,4'-DDE	3/56	10.5-35.9	DRMO-74	1/17	4.1	6TB9
4,4'-DDT	7/56	1.42-63.4	DRMO-74	0/17	-	ND
Aroclor-1254	36/56	75-22400	DRMO-72	3/17	72-440	6TB20
Aroclor-1260	33/56	120-29100	DRMO-35	6/17	110-12000	6TB2
Delta-BHC	1/56	5.09	DRMO-77	0/17	-	ND

TABLE 2-1

SUMMARY OF SOIL ANALTYICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT

Analyte	Surface Soils (<2 Feet) (1)			Subsurface Soils (>2 Feet) (2)		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection
Dieldrin	1/56	4.68	DRMO-77	0/17	-	ND
Endosulfan II	2/56	2.24-25.4	DRMO-74	0/17	-	ND
Endosulfan sulfate	2/56	28.9-37.9	DRMO-60	0/17	-	ND
Endrin	2/56	10.6-12.5	DRMO-77	1/17	4.4	6MW2D
Endrin aldehyde	4/47	2.56-6.86	DRMO-74	2/9	5.6-5.8	6TB9
Endrin ketone	3/56	3.21-31.9	DRMO-77	0/17	-	ND
Gamma-Chlordane	2/56	2.77-20.4	DRMO-74	1/17	2.5	6TB20
Heptachlor epoxide	5/56	0.96-20.7	DRMO-74	0/17	-	ND
DIOXINS (ug/kg)						
1,2,3,4,6,7,8-HpCDD	-	-	NA	1/1	0.67	6TB20
OCDD	-	-	NA	1/1	3.07	6TB20
INORGANICS (mg/kg)						
Aluminum	56/56	2430-18900	DRMO-46	17/17	4880-12100	6TB16
Antimony	35/45	0.0249-134	DRMO-63	3/7	4.1-7	6MW3D
Arsenic	55/56	0.31-16.4	DRMO-75	17/17	1.1-7.5	6MW1
Barium	56/56	17.9-934	DRMO-40	17/17	28-212	6TB17
Beryllium	56/56	0.119-24.9	DRMO-36	14/17	0.22-16.8	6TB17
Boron	1/5	2.9	6TB11	4/9	15.6-96.2	6TB17
Cadmium	54/56	0.175-126	DRMO-40	12/17	0.45-6.4	6MW4
Calcium	56/56	500-16300	DRMO-48	17/17	981-21400	6TB17
Chromium	56/56	4.42-1210	DRMO-63	15/17	6.2-139	6MW4
Cobalt	54/56	1.69-179	DRMO-48	16/17	3.5-130	6TB17
Copper	56/56	6.37-8730	DRMO-49	17/17	10.6-4980	6TB17
Cyanide	27/56	0.0254-7.68	DRMO-69	1/14	0.15	6TB20
Iron	56/56	3590-103000	DRMO-48	17/17	6480-65800	6TB17
Lead	56/56	2.9-5980	DRMO-77	17/17	2.3-2140	6TB17
Magnesium	56/56	1080-7190	6SS3	17/17	1820-6670	6TB16
Manganese	56/56	56.7-1260	DRMO-40	17/17	126-673	6TB17

TABLE 2-1

SUMMARY OF SOIL ANALTYICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT

Analyte	Surface Soils (<2 Feet) (1)			Subsurface Soils (>2 Feet) (2)		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection
Mercury	55/56	0.0033-20.7	DRMO-46	9/15	0.12-0.78	6TB20
Nickel	56/56	3.43-1250	DRMO-48	17/17	6.5-374	6TB17
Potassium	56/56	608-6520	6SS3	17/17	1050-6280	6MW7S
Selenium	17/56	0.112-0.773	DRMO-40	2/17	1-5.3	6TB17
Silver	33/56	0.021-24.3	DRMO-63	0/17	-	ND
Sodium	53/56	41.2-4220	DRMO-78	16/17	117-5860	6TB4
Thallium	15/56	0.0145-0.64	6TB23	0/17	-	ND
Vanadium	56/56	6.26-368	DRMO-52	17/17	9-63.8	6MW4
Zinc	56/56	12.5-28300	6TB2	17/17	25.6-14900	6TB17
TCLP (mg/L)						
Barium (100.0)	10/10	0.18-1.4	6MW4	9/9	0.073-1.3	6MW4
Cadmium (1.0)	6/10	0.011-0.25	6MW4	3/9	0.019-0.087	6MW4
Chromium (5.0)	6/10	0.008-0.11	6TB2	4/9	0.0077-0.11	6MW5S
Lead (5.0)	6/10	0.11-6.2	6SS3	3/9	0.2-0.87	6MW4
Mercury (0.2)	1/10	0.0077	6MW2	0/9	-	ND
Selenium (1.0)	1/10	0.1	6MW5S	1/9	0.1	6MW1
Silver (5.0)	5/10	0.0082-0.012	6TB1	2/9	0.01-0.029	6MW5S
1,2-Dichloroethane (0.5)	0/1	-	ND	1/1	0.028	6TB20

TABLE 2-1

SUMMARY OF SOIL ANALTYICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT

Analyte	Surface Soils (<2 Feet) (1)			Subsurface Soils (>2 Feet) (2)		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection
MISCELLANEOUS PARAMETERS						
Ash (%)	-	-	NA	2/2	81.4-85.8	6TB16
Cation ex. capacity (meq/100g)	-	-	NA	2/2	9.3-21	6TB16
pH	-	-	NA	2/2	7.69-7.76	6TB20
Specific gravity (g/cm3)	-	-	NA	2/2	2.1-2.2	6TB20
Total organic carbon (mg/kg)	-	-	NA	3/3	600-8400	6TB20

NOTES:
1 Surface soil samples from Phase I RI, FFS, and TCRA
2 Subsurface soil samples from Phase I RI, FFS, ,and Phase II RI
ND - Not Detected.
NA - Not Analyzed.
3 Values in parentheses represent Federal Toxicity Characteristic Regulatory Level (58 FR 46049)

TABLE 2-2

SUMMARY OF PHASE I GROUNDWATER ANALYTICAL RESULTS (UNFILTERED)
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT

Analyte	Shallow Wells [1]			Deep Wells [2]		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection
VOLATILE ORGANICS (ug/L)						
1,1-Dichloroethane	1/5	2	6MW4S	0/1	-	ND
1,2-Dichloroethene (total)	3/5	1-2	6MW4S	0/1	-	ND
Trichloroethene	3/5	1-8	6MW4S	0/1	-	ND
SEMIVOLATILE ORGANICS (ug/L)						
Benzoic acid	0/5	-	ND	1/1	21	6MW5D
Bis(2-ethylhexyl)phthalate	0/5	-	ND	1/1	10	6MW5D
INORGANICS (ug/L)						
Arsenic	3/5	3.35-18.6	6MW4S	0/1	-	ND
Barium	4/5	27.9-86.2	6MW4S	1/1	33.9	6MW5D
Cadmium	3/5	2.1-4	6MW4S	0/1	-	ND
Calcium	5/5	6970-170000	6MW4S	1/1	10600	6MW5D
Copper	5/5	8-355	6MW4S	1/1	9.4	6MW5D
Iron	5/5	102-4880	6MW5S	0/1	-	ND
Lead	1/5	3.4	6MW5S	0/1	-	ND
Magnesium	5/5	1270-396000	6MW4S	1/1	1000	6MW5D
Manganese	5/5	20.1-1000	6MW5S	1/1	84.5	6MW5D
Mercury	0/5	-	ND	1/1	0.3	6MW5D
Nickel	2/5	11.7-23.2	6MW4S	0/1	-	ND
Potassium	5/5	3230-123000	6MW4S	1/1	3460	6MW5D
Selenium	4/5	9.9-23.5	6MW4S	0/1	-	ND
Sodium	5/5	7470-3350000	6MW4S	1/1	14600	6MW5D
Zinc	5/5	11.25-356	6MW4S	1/1	13.8	6MW5D

NOTES:

1 Includes samples 6MW1S, 6MW2S, 6MW3S, 6MW6S (field duplicate of 6MW3S), 6MW4S, and 6MW5S. Duplicate sample results are averaged and counted as one sample.

2 Includes sample 6MW5D.

ND - Not Detected

TABLE 2-3

SUMMARY OF ROUND 1/PHASE II GROUNDWATER ANALYTICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT
PAGE 1 OF 2

Analyte	Shallow Wells [1]						Deep Wells [2]				
	Unfiltered			Filtered			Unfiltered			Filte	
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concent Ran
VOLATILE ORGANICS											
1,1-Dichloroethane	1/6	3	6MW8S	-	-	NA	0/3	-	ND	-	-
1,2-Dichloroethene (total)	1/6	1	6MW3S	-	-	NA	1/3	2	6MW3D	-	-
Carbon disulfide	0/6	-	ND	-	-	NA	1/3	3	6MW2D	-	-
Trichloroethene	1/6	2	6MW3S	-	-	NA	0/3	-	ND	-	-
SEMIVOLATILE ORGANICS											
1,4-Dichlorobenzene	1/5	0.5	6MW7S	-	-	NA	0/3	-	ND	-	-
Benzo(g,h,i)perylene	0/5	-	ND	-	-	NA	1/3	1	6MW2D	-	-
Benzoic acid	1/5	1	6MW3S	-	-	NA	0/3	-	ND	-	-
Bis(2-ethylhexyl)phthalate	1/5	4	6MW7S	-	-	NA	0/3	-	ND	-	-
Di-n-butyl phthalate	1/5	1	6MW3S	-	-	NA	0/3	-	ND	-	-
Di-n-octyl phthalate	0/5	-	ND	-	-	NA	1/3	5	6MW3D	-	-
Diethyl phthalate	1/5	2.5	6MW7S	-	-	NA	0/3	-	ND	-	-
Dimethyl phthalate	1/5	0.9	6MW7S	-	-	NA	0/3	-	ND	-	-
Indeno(1,2,3-cd)pyrene	0/5	-	ND	-	-	NA	1/3	1	6MW2D	-	-
INORGANICS											
Aluminum	3/5	27.05-2090	6MW2S	0/5	-	ND	2/3	1140-19300	6MW2D	0/3	-
Arsenic	2/5	2-4.3	6MW2S	1/5	4.2	6MW2S	1/3	15.6	6MW2D	0/3	-
Barium	5/5	10.3-75.4	6MW6S	4/5	11.5-73.3	6MW6S	3/3	29.1-288	6MW3D	2/3	156-2
Boron	4/5	474.5-1580	6MW2S	4/5	483.5-1560	6MW2S	3/3	101-2370	6MW2D	3/3	89.8-2
Cadmium	1/5	2.6	6MW6S	0/5	-	ND	0/3	-	ND	0/3	-
Calcium	5/5	24700-140000	6MW2S	5/5	23900-140000	6MW2S	3/3	23400-274000	6MW3D	3/3	22600-2
Chromium	1/5	6.3	6MW2S	0/5	-	ND	1/3	47.6	6MW2D	1/3	3.2
Cobalt	0/5	-	ND	0/5	-	ND	2/3	4.6-14.3	6MW2D	0/3	-
Copper	3/5	4.1-50.4	6MW2S	3/3	2-3.4	6MW1S	1/2	63.1	6MW2D	2/2	3.2-3
Iron	5/5	129-3170	6MW2S	2/5	144-536	6MW3S	3/3	6880-39400	6MW2D	3/3	2670-3
Lead	3/5	1.6-52.7	6MW2S	0/5	-	ND	2/3	45.6-50.9	6MW2D	1/3	2.4
Magnesium	5/5	6890-411000	6MW2S	5/5	5630-411000	6MW2S	3/3	11000-729000	6MW3D	3/3	10900-7
Manganese	4/5	14.3-602	6MW7S	4/5	5.5-606	6MW7S	3/3	852-1340	6MW2D	3/3	693-1
Mercury	1/5	0.21	6MW2S	1/5	0.2	6MW1S	0/3	-	ND	0/3	-
Nickel	0/5	-	ND	1/5	10.4	6MW3S	2/3	19.8-32.9	6MW2D	2/3	10.8-1
Potassium	5/5	4440-187000	6MW2S	5/5	4000-184000	6MW2S	3/3	7450-364000	6MW2D	3/3	6890-37
Sodium	5/5	54100-3800000	6MW2S	5/5	55700-3870000	6MW2S	3/3	87900-6490000	6MW3D	3/3	87400-75
Vanadium	2/5	28-42.4	6MW2S	2/5	12.6-19.5	6MW3S	1/2	64.2	6MW2D	0/1	-

TABLE 2-3

SUMMARY OF ROUND 1/PHASE II GROUNDWATER ANALYTICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT
PAGE 2 OF 2

Analyte	Shallow Wells [1]						Deep Wells [2]				
	Unfiltered			Filtered			Unfiltered			Filte	
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concent Ran
Zinc	2/5	4.8-81.9	6MW2S	1/5	3.7	6MW1S	1/3	113	6MW2D	1/3	22.
MISCELLANEOUS PARAMETERS											
BOD (mg/L)	1/1	46.8	6MW3S	-	-	NA	-	-	NA	-	-
COD (mg/L)	1/1	198	6MW3S	-	-	NA	-	-	NA	-	-
Hardness as $CaCO_3$ (mg/L	3/3	84-1600	6MW3S	-	-	NA	3/3	112-4800	6MW3D	-	-
Total organic carbon (mg/	1/1	3.3	6MW3S	-	-	NA	-	-	NA	-	-
Total phosphorus (mg/L)	1/1	0.73	6MW3S	-	-	NA	-	-	NA	-	-
TSS (mg/L)	1/1	8	6MW3S	-	-	NA	-	-	NA	-	-
Oil & grease (mg/L)	1/1	700	6MW3S	-	-	NA	-	-	NA	-	-

NOTES:

1 Includes samples 6GW1S, 6GW2S, 6GW3S, 6GW6S, 6GW7S, 6GW7S-D (field duplicate of 6GW7S), and 6GW8S. Duplicate sample results are averaged and counted as

2 Includes samples 6GW2D, 6GW3D, and 6GW6D.

NA - Not Analyzed.

ND - Not Detected.

BOD - Biochemical Oxygen Demand.

COD - Chemical Oxygen Demand.

TSS - Total Suspended Solids.

TABLE 2-4

SUMMARY OF ROUND 2/PHASE II GROUNDWATER ANALYTICAL RESULTS
OU2 - SITE 6 SOIL AND GROUNDWATER
NSB-NLON GROTON, CONNECTICUT

Analyte	Shallow Wells [1]						Deep Wells [2]					
	Unfiltered			Filtered			Unfiltered			Filtered		
	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Location of Maximum Detection	Frequency of Detection	Concentration Range	Loc Ma De
VOLATILE ORGANICS (ug/L)												
1,2-Dichloroethene (total)	2/6	2-8	6MW8S	-	-	NA	0/3	-	ND	-	-	
Trichloroethene	2/6	4-6	6MW3S	-	-	NA	1/3	2	6MW6D	-	-	
Vinyl chloride	1/6	5	6MW8S	-	-	NA	0/3	-	ND	-	-	
SEMIVOLATILE ORGANICS (ug/L)												
Bis(2-Ethylhexyl)phthalate	0/5	-	ND	-	-	NA	1/3	0.7	6MW6D	-	-	
Phenol	0/5	-	ND	-	-	NA	1/3	3	6MW6D	-	-	
INORGANICS (ug/L)												
Aluminum	0/5	-	ND	1/5	327	6MW2S	2/3	88.85-806	6MW2D	0/3	-	
Antimony	0/3	-	ND	1/5	5.7	6MW3S	0/2	-	ND	0/3	-	
Arsenic	3/5	10-20	6MW1S	1/5	14	6MW2S	2/3	2.65-21	6MW2D	1/3	12	6
Barium	1/5	94.4	6MW7S	3/5	25.5-116	6MW7S	3/3	28.6-242	6MW3D	3/3	13.35-297	6
Beryllium	0/5	-	ND	0/5	-	ND	1/3	1	6MW3D	0/3	-	
Boron	4/5	1280-1880	6MW2S	4/5	1360-1940	6MW2S	3/3	87.4-2340	6MW2D	3/3	85.5-2410	6
Calcium	5/5	19300-176000	6MW2S	5/5	19200-178000	6MW2S	3/3	15150-268000	6MW3D	3/3	13400-326000	6
Cobalt	0/5	-	ND	1/5	3	6MW7S	1/3	11.6	6MW6D	1/3	3.5	6
Copper	3/5	4.7-6.8	6MW2S	2/5	4.8-31.9	6MW7S	1/3	9.7	6MW2D	2/3	5.2-21.2	6
Iron	5/5	8.7-235	6MW7S	4/5	5.7-361	6MW7S	3/3	5690-44550	6MW6D	3/3	67.55-14100	6
Magnesium	5/5	4610-538000	6MW2S	5/5	4370-602000	6MW1S	3/3	8490-949000	6MW3D	3/3	8110-966000	6
Manganese	3/5	23-1010	6MW7S	4/5	1.2-1130	6MW7S	3/3	649-1440	6MW2D	3/3	18.65-1460	6
Nickel	0/5	-	ND	0/5	-	ND	1/3	24.1	6MW6D	1/3	17.5	6
Potassium	5/5	3010-210000	6MW2S	5/5	3220-224000	6MW2S	3/3	14500-313000	6MW2D	3/3	14500-317000	6
Sodium	5/5	50600-5160000	6MW2S	5/5	48200-5540000	6MW2S	3/3	109500-7560000	6MW3D	3/3	110000-7730000	6
Vanadium	1/4	7.6	6MW2S	2/4	4.9-5.1	6MW3S	1/2	5.45	6MW6D	1/2	3.1	6
Zinc	1/5	11	6MW7S	2/5	7.1-16.1	6MW1S	2/3	4.2-105	6MW6D	0/3	-	
MISCELLANEOUS PARAMETERS												
Ammonia, as nitrogen (mg/L)	1/1	3.1	6MW3S	-	-	NA	-	-	NA	-	-	
COD (mg/L)	1/1	312	6MW3S	-	-	NA	-	-	NA	-	-	
Hardness as $CaCO_3$ (mg/L)	5/5	72-3150	6MW2S	-	-	NA	3/3	70-4700	6MW3D	-	-	
Total organic carbon (mg/L)	1/1	2.5	6MW3S	-	-	NA	-	-	NA	-	-	
Total phosphorus (mg/L)	1/1	1	6MW3S	-	-	NA	-	-	NA	-	-	
TSS (mg/L)	1/1	1	6MW3S	-	-	NA	-	-	NA	-	-	
Oil & grease (ug/L)	1/1	500	6MW3S	-	-	NA	-	-	NA	-	-	

NOTES:

1 Includes samples 6GW1S-2, 6GW2S-2, 6GW3S-2, 6GW6S-2, 6GW7S-2, and 6GW8S-2.

2 Includes samples 6GW2D-2, 6GW3D-2, 6GW6D-2, and 6GW6D-D-2 (field duplicate of 6GW6D-2). Duplicate sample results are averaged and counted as one sample.

NA -Not Analyzed.

ND - Not Detected.

COD - Chemical Oxygen Demand.

TSS - Total Suspended Solids.

TABLE 2-5

PRIMARY MONITORING CRITERIA
ROUND 1 GROUNDWATER MONITORING
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Chemical	Primary Monitoring Criteria		
	Site-Specific SWPC[(1)]	CTDEP SWPC[(2)]	CTDEP Volatilization[(3)]
VOCs (µg/L)			
1,1,2,2-Tetrachloroethane	1,100	110	100
1,2-Dichloroethane	29,700	2,970	90
1,2-Dichloroethene (total)	NA	NA	NA
Trichloroethene	23,400	2,340	540
Vinyl Chloride	157,500	15,750	2
SVOCs (µg/L)			
Benzo(a)anthracene	3.0	0.3	NA
Benzo(a)pyrene	3.0	0.3	NA
Benzo(b)fluoranthene	3.0	0.3	NA
Benzo(k)fluoranthene	3.0	0.3	NA
Benzoic Acid	NA	NA	NA
Bis(2-ethylhexyl)phthalate	590	59	NA
Fluoranthene	37,000	3,700	NA
Fluorene	1,400,000	140,000	NA
Naphthalene	NA	NA	NA
Phenanthrene	0.77	0.077	NA
Pyrene	1,100,000	110,000	NA
Pesticides/PCBs (µg/L)			
Heptachlor Epoxide	0.5	0.05	NA
Aroclors 1254 & 1260	5.0	0.5	NA
Hexachlorobiphenyl	5.0	0.5	NA
4,4'-DDD	NA	NA	NA
Inorganics (µg/L)			
Arsenic	40	4	NA
Barium	NA	NA	NA
Cadmium	60	6	NA
Chromium	1,100	110	NA
Copper	480	48	NA
Lead	130	13	NA
Silver	120	12	NA
Zinc	1,230	123	NA

NOTES:
NA Not Available
(1) Surface Water Protection Criteria for substances in groundwater using a site-specific dilution factor of 100 (B&RE, 1998a).
(2) Surface Water Protection Criteria for Substances in Groundwater, using a dilution factor of 10 (CTDEP, 1995).
(3) Industrial/commercial volatilization criteria for groundwater.

TABLE 2-6

SECONDARY CRITERIA
ROUND 1 GROUNDWATER MONITORING
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Chemical	Connecticut WQSs[1]	
	Aquatic Life[3]	Human Health[2]
VOCs (µg/L):		
1,1,2,2-Tetrachloroethane	NA	11
1,2-Dichloroethane	NA	99
1,2-Dichloroethene (total)	NA	NA
Trichloroethene	NA	81
Vinyl Chloride	NA	525
SVOCs and PAHs (µg/L):		
Benzo(a)anthracene	NA	0.031
Benzo(a)pyrene	NA	0.031
Benzo(b)fluoranthene	NA	0.031
Benzo(k)fluoranthene	NA	0.031
Benzoic Acid	NA	NA
Bis(2-ethylhexyl)phthalate	NA	5.9
Fluoranthene	NA	370
Fluorene	NA	14,000
Naphthalene	NA	NA
Phenanthrene	NA	0.031
Pyrene	NA	11,000
Pesticides/PCBs (µg/L):		
Heptachlor Epoxide	0.0008	0.00011
Aroclors 1254 & 1260	0.03	0.000045
Hexachlorobiphenyl	0.03	0.000045
4,4'-DDD	NA	0.00084
Inorganics (µg/L):		
Arsenic[4]	36	0.14
Barium[4]	NA	NA
Cadmium[4]	9.3	170
Chromium[4]	50	3,400
Copper[4]	2.9	NA
Lead[4]	8.5	NA
Silver[4]	2.3[5]	65,000
Zinc[4]	86	NA

NOTES:
NA Not Available
(1) Connecticut Water Quality Standards (CTDEP, 1992).
(2) Criterion for consumption of organisms only.
(3) Criterion for saltwater at a chronic concentration.
(4) Criterion applies to the dissolved fraction.
(5) Criterion for saltwater at an acute concentration

TABLE 2-7

PRIMARY MONITORING CRITERIA AND BACKGROUND GROUNDWATER CONCENTRATIONS
2006 GROUNDWATER MONITORING PLAN
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Chemical	Background Concentration[1]	Primary Monitoring Criteria			
		Site-Specific SWPC[2]	CTDEP SWPC[3]	CTDEP Volatilization[4]	Selected Criterion[5]
VOCs (µg/L)					
1,1,2,2-Tetrachloroethane	NA	6,050	110	64	64
1,2-Dichloroethane	NA	54,500	2,970	68	68
1,2-Dichloroethene (total)	NA	NA	NA	24,000[6]	24,000[6]
Trichloroethene	NA	42,700	2,340	67	67
Vinyl chloride	NA	289,000	15,750	52	52
SVOCs and PAHs (µg/L)					
Benzo(a)anthracene	NA	270	0.3	NA	270
Benzo(a)pyrene	NA	27	0.3	NA	27
Benzo(b)fluoranthene	NA	270	0.3	NA	270
Benzo(k)fluoranthene	NA	270	0.3	NA	270
Benzoic acid	NA	NA	NA	NA	NA
BEHP	NA	3,250	59	NA	3,250
Fluoranthene	NA	704	3,700	NA	704
Fluorene	NA	27,100	140,000	NA	27,100
Naphthalene	NA	11,300,000	NA	NA	11,300,000
Phenanthrene	NA	27,000	0.3	NA	27,000
Pyrene	NA	27,000	110,000	NA	27,000
Inorganics (µg/L)					
Arsenic	1.92/2.55	11.6	4	NA	11.6[7]
Barium	227/124	NA	NA	NA	NA
Cadmium	NA	5,120	6	NA	5,120[7]
Chromium (hexavalent)	49.9/16.0	25,500	110	NA	25,500[7]
Copper	107/39.4	1,710	48	NA	1,710[7]
Lead	6.63/2.52	4,460	13	NA	4,460[7]
Silver	NA	59,200,000	12	NA	59,200,000[7]
Zinc	131/109	44,600	123	NA	44,600[7]

NOTES:
NA Not available.

1 Total/dissolved inorganic background concentrations from the Basewide Groundwater OU RI (TtNUS, 2002c).
2 SWPC for substances in groundwater, using a site-specific dilution factor (see Appendix II-G).
3 SWPC for substances in groundwater (CTDEP, 1996).
4 Industrial/commercial Volatilization Criteria for groundwater (CTDEP, 2003)
5 Criterion selected for comparison against groundwater concentration. The selected criterion for VOCs is the most conservative of the site-specific SWPC and CTDEP Volatilization Criteria. The selected criterion for SVOCs, PAHs, and Inorganics is the Site-Specific SWPC. The CTDEP SWPC were not considered because they use a default dilution factor which does not consider site-specific conditions.
6 Total of criterion for cis-1,2-dichloroethene and trans-1,2-dichloroethene.
7 Criterion should be compared to dissolved concentration.

TABLE 2-8

SECONDARY CRITERIA
2006 GROUNDWATER MONITORING PLAN
OU2 - SITE 6 SOIL AND GROUNDWTER
NSB-NLON, GROTON, CONNECTICUT

Chemical	Connecticut WQSs[1]		Selected Criterion[4]
	Aquatic Life[3]	Human Health[2]	
VOCs (µg/L):			
1,1,2,2-Tetrachloroethane	NA	11	11
1,2-Dichloroethane	NA	99	99
1,2-Dichloroethene (total)	NA	140,000[5]	140,000
Trichloroethene	NA	81	81
Vinyl chloride	NA	525	525
SVOCs and PAHs (µg/L):			
Benzo(a)anthracene	NA	0.49	0.49
Benzo(a)pyrene	NA	0.049	0.049
Benzo(b)fluoranthene	NA	0.49	0.49
Benzo(k)fluoranthene	NA	0.49	0.49
Benzoic acid	NA	NA	NA
BEHP	NA	5.9	5.9
Fluoranthene	NA	1.28	1.28
Fluorene	NA	49.2	49.2
Naphthalene	NA	20,513	20,513
Phenanthrene	NA	49.17	49.17
Pyrene	NA	49.17	49.17
Inorganics (µg/L):			
Arsenic	36	0.021	0.021[6]
Barium	NA	NA	NA
Cadmium	9.3	10,769	9.3[6]
Chromium (hexavalent)	50	2,019	50[6]
Copper	3.1	NA	3.1[6]
Lead	8.1	NA	8.1[6]
Silver	1.96[11]	107,692	107,697[6]
Zinc	81	68,740	81[6]

NOTES:
NA Not available.
1 Connecticut WQS (CTDEP, 2002).
2 Criterion for consumption of organisms only.
3 Criterion for saltwater at a chronic concentration.
4 Criterion selected for comparison against groundwater concentration. The lesser of the chronic aquatic life and human health Connecticut WQS was selected as the monitoring criteria because the Connecticut WQSs were used to calculate the alternative SWPC on Table 2-7 following CTDEP RSRs.
5 Criterion for 1,2-trans-dichloroethene.
6 Criterion should be compared to dissolved concentrations.
7 Criterion for saltwater at an acute concentration.

TABLE 2-9

ESTIMATED HUMAN HEALTH RISKS
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Exposure Route	Full-Time Employee		Construction Worker		Older Child Trespasser		Future Resident	
	RME	CTE	RME	CTE	RME	CTE	RME	CTE
HAZARD INDEX								
Incidental Ingestion of Soil	1.6E+0	5.9E-2	2.5E+0	1.9E-1	2.1E+0	3.4E-2	1.8E+0	2.1E-1
Dermal Contact with Soil[(1)]	2.9E+0	4.2E-2	9.6E-1	3.1E-2	3.1E+0	2.0E-2	1.6E+0	7.9E-2
Inhalation of Fugitive Dust and Volatile Emissions	NA[(4)]	NA	2.3E-2	1.2E-2	NA	NA	3.9E-2	2.0E-2
Dermal Contact with Groundwater	NA	NA	5.2E-1	1.3E-1	NA	NA	NA	NA
Cumulative Risk	**4.5E+0**	**1.0E-1**	**4.0E+0**	**3.6E-1**	**5.2E+0**	**5.4E-2**	**3.4E+0**	**3.1E-1**
INCREMENTAL CANCER RISK								
Incidental Ingestion of Soil	3.8E-5	7.6E-7	5.2E-6	4.1E-7	2.0E-5	2.1E-7	1.1E-4	4.2E-6
Dermal Contact with Soil[(1)]	3.9E-5	5.9E-8	5.1E-7	8.7E-9	1.7E-5	1.4E-8	2.5E-5	2.0E-7
Inhalation of Fugitive Dust and Volatile Emissions	NA	NA	5.0E-7	3.0E-7	NA	NA	5.6E-6	1.0E-6
Dermal Contact with Groundwater	NA	NA	4.3E-7	2.1E-7	NA	NA	NA	NA
Cumulative Risk:	**7.7E-5**	**8.2E-7**	**6.6E-6**	**9.3E-7**	**3.7E-5**	**2.2E-7**	**1.4E-4**	**5.4E-6**

NOTES:
1 Quantitative evaluation performed for cadmium, PCBs, and dioxins (if detected).
RME - Reasonable Maximum Exposure.
CTE - Central Tendency Exposure.
NA - Not applicable; exposure route not evaluated for this receptor.
Shading denotes exceedance of USEPA's risk criteria

TABLE 2-10

SUMMARY OF HUMAN HEALTH COCs FOR REMEDIATION GOAL DEVELOPMENT
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Potential Human Receptor	COCs	
	Noncarcinogenic Effects	**Carcinogenic Effects**
Full-Time Employee	Aroclors	None [(1)]
Construction Worker	Aroclors, Cadmium, and Hexachlorobiphenyl	None [(1)]
Older Child Trespasser	Aroclors	None [(1)]
Child/Adult Resident	Aroclors, Cadmium and Hexachlorobiphenyl	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Hexachlorobiphenyl, Arochlors, Dioxins, Arsenic, Beryllium and Chromium

1 No carcinogenic COCs were identified for these potential receptors because estimated cumulative ICRs were within USEPA's acceptable range of 1E-06 and 1E-04.

TABLE 2-11

MAJOR CONTRIBUTORS TO RISK FOR TERRESTRIAL VEGETATION
BASED ON RME AND CTE EXPOSURE
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Chemical of Concern	Hazard Quotient (RME)	Hazard Quotient (CTE)
Aluminum	2.0E+2	1.6E+2
Antimony	3.8E+0	1.5E+0
Boron	5.8E+0	3.3E+0
Cadmium	1.4E+0	1.0E+0
Chromium	2.8E+1	2.1E+1
Copper	2.9E+0	1.4E+0
Mercury	2.9E+0	1.3E+0
Silver	3.1E+0	Not Evaluated
Vanadium	1.7E+1	1.3E+1
Zinc	5.7E+2	4.5E+1

TABLE 2-12

MAJOR CONTRIBUTORS TO RISK FOR SOIL INVERTEBRATES
BASED ON RME AND CTE EXPOSURE
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Chemical of Concern	Hazard Quotient (RME)	Hazard Quotient (CTE)
Copper	9.7E+0	4.6E+0
Lead	7.7E+0	2.6E+0
Zinc	5.7E+0	Not Evaluated
Chromium	1.1E+0	Not Evaluated

TABLE 2-13

MAJOR CONTRIBUTORS TO RISK FOR TERRESTRIAL VERTEBRATES
RME SCENARIO
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Receptor	Chemicals of Concern	Total HI per COC for all Pathways	% Contribution of COC to Total Receptor HI
Short-Tailed Shrew	Antimony	3.4E+2	37.4
	Vanadium	7.2E+1	7.9
	Zinc	2.4E+2	26.4
	Lead	5.6E+1	6.1
	All others	2.0E+2	22.2
	Total Receptor HI	9.2E+2	
	Pathway	**Total HI per Pathway**	**% Contribution of Pathway to Total Receptor HI**
	Soil	4.7E+2	51.5
	Food	4.5E+2	48.5
	Water	0.0E+0	0.0
	Chemicals of Concern	**Total HI per COC for all Pathways**	**% Contribution of COC to Total Receptor HI**
Red-Tailed Hawk	Zinc	1.7E+2	88.9
	4,4'-DDT	3.3E+0	1.7
	Antimony	7.8E+0	4.2
	4,4'-DDD	2.8E+0	1.5
	All others	6.9E+1	3.7
	Total Receptor HI	1.9E+2	
	Pathway	**Total HI per Pathway**	**% Contribution of Pathway to Total Receptor HI**
	Soil	5.9E+1	31.4
	Food	1.3E+2	68.6
	Water	0.0E+0	0.0

NOTES:

HI - Hazard Index
COC - Chemical of Concern

TABLE 2-14

MAJOR CONTRIBUTORS TO RISK FOR TERRESTRIAL VERTEBRATES
CTE SCENARIO
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Receptor	Chemicals of Concern	Total HI per COC for all Pathways	% Contribution of COC to Total Receptor HI
Short-Tailed Shrew	Antimony	1.4E+2	58.8
	Zinc	1.9E+1	8.2
	Lead	1.9E+1	8.1
	Thallium	1.9E+1	8.0
	All others	4.0E+1	16.9
	Total Receptor HI	2.4E+2	
	Pathway	**Total HI per Pathway**	**% Contribution of Pathway to Total Receptor HI**
	Soil	1.3E+2	56.5
	Food	1.0E+2	43.5
	Water	0.0E+0	0.0
	Chemicals of Concern	**Total HI per COC for all Pathways**	**% Contribution of COC to Total Receptor HI**
Red-Tailed Hawk	Zinc	1.3E+1	73.7
	Antimony	3.1E+0	17.5
	Thallium	7.0E-1	3.9
	Cobalt	4.0E-1	2.2
	All others	4.8E-1	2.7
	Total Receptor HI	1.8E+1	
	Pathway	**Total HI per Pathway**	**% Contribution of Pathway to Total Receptor HI**
	Soil	8.0E+0	44.6
	Food	9.9E+0	55.4
	Water	0.0E+0	0.0

NOTES:

HI - Hazard Index
COC - Chemical of Concern

TABLE 2-15

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
FOR ALTERNATIVE 2 - INSTITUTIONAL CONTROLS AND MONITORING
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirements	Current Status / Applicability
FEDERAL				
Cancer Slope Factors (CSFs)	None	To Be Considered	CSFs are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants	The selected remedy would prevent exposure to contaminated media and thereby minimize human health concerns. This TBC would be used to recalculate risks if the site was altered in the future in a way that would change exposure scenarios.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F (March 2005)	To Be Considered	This is a general guidance document that provides a framework for assessing possible cancer risks from exposures to pollutants or other agents in the environment. The document discusses issues involving hazard identification, dose-response assessment, exposure assessment, and risk characterization with an emphasis on characterization of evidence and conclusions in each area of the assessment. As part of the characterization process, explicit evaluations are made of the hazard and risk potential for susceptible lifestages, including children.	The selected remedy would prevent exposure to contaminated media and thereby minimize human health concerns. This TBC would be used to recalculate risks if the site was altered in the future in a way that would change exposure scenarios.
Reference Doses (RfDs)	None	To Be Considered	RfDs are guidance values used to evaluate the potential noncarcinogenic hazard caused by exposure to contaminants.	The selected remedy would prevent exposure to contaminated media and thereby minimize human health concerns. This TBC would be used to recalculate risks if the site was altered in the future in a way that would change exposure scenarios.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F (March 2005)	To Be Considered	The Supplemental Guidance addresses a number of issues pertaining to cancer risks associated with early-life exposures generally, but provides specific guidance on potency adjustment for carcinogens acting through a mutagenic mode of action. This guidance recommends a default approach using estimates from chronic studies (i.e., CSFs) with appropriate modifications to address the potential for differential risk of early-lifestage exposure.	The selected remedy would prevent exposure to contaminated media and thereby minimize human health concerns. This TBC would be used to recalculate risks if the site was altered in the future in a way that would change exposure scenarios.
STATE OF CONNECTICUT				
There are no chemical-specific ARARs.				

TABLE 2-16

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs FOR ALTERNATIVE 2 - INSTITUTIONAL CONTROLS AND MONITORING OU2 – SITE 6 SOIL AND GROUNDWATER NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Current Status / Applicability
FEDERAL				
Executive Order 11988 RE: Floodplain Management	Executive Order 11988	Applicable	This order requires federal agencies, wherever possible, to avoid or minimize adverse impacts upon floodplains. Requires reduction of risk of flood loss, minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values of the floodplains.	This regulation was addressed during monitoring well installation within the 100-year floodplain. This requirement is applicable during well abandonment and O&M of the remedy.
Coastal Zone Management Act	16 USC Parts 1451 *et seq.*	Applicable	Requires that any actions must be conducted in a manner consistent with state approved management programs.	This site is located in a State coastal flood zone (within the 100-year floodplain). Therefore, applicable State coastal zone management requirements were considered during determination of the Selected Remedy. This regulation would be applicable if the site use was changed or the site was altered.
Fish and Wildlife Coordination Act	16 USC 661 *et seq.*; 40 CFR § 6.302	Applicable	Requires action to be taken to protect fish and wildlife from projects affecting streams or rivers. Consultation with U.S. Fish & Wildlife Service to develop measures to prevent and mitigate loss.	This regulation was addressed during monitoring well installation within the river's tidal zone. This requirement is applicable during well abandonment and O&M of the remedy.
STATE OF CONNECTICUT				
Coastal Management Act	CGS §§ 22a-92 and 94	Applicable	Requires projects within a State-designated coastal zone to minimize adverse impacts on natural coastal resources.	This regulation was addressed during monitoring well installation within the 100-year floodplain. This requirement is applicable during well abandonment and O&M of the remedy.
Tidal Wetlands	RCSA §§ 22a-30-1 through 17	Applicable	Activities within or affecting tidal wetlands are regulated.	This regulation was addressed during monitoring well installation within the river's tidal zone. This requirement is applicable during well abandonment and O&M of the remedy.

TABLE 2-16

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
FOR ALTERNATIVE 2 - INSTITUTIONAL CONTROLS AND MONITORING
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Current Status / Applicability
STATE OF CONNECTICUT (Continued)				
Connecticut Endangered Species Act	CGS §§ 26-303 through 314	Applicable	Regulates activities affecting State-listed endangered or threatened species or their critical habitat.	The State-threatened Atlantic sturgeon inhabits the Thames River. Because monitoring wells were installed in the river's tidal zone, protection of the Atlantic Sturgeon's habiltat was considered during installation. This requirement is applicable during well abandonment and O&M of the remedy.

TABLE 2-17

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
FOR ALTERNATIVE 2 - INSTITUTIONAL CONTROLS AND MONITORING
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

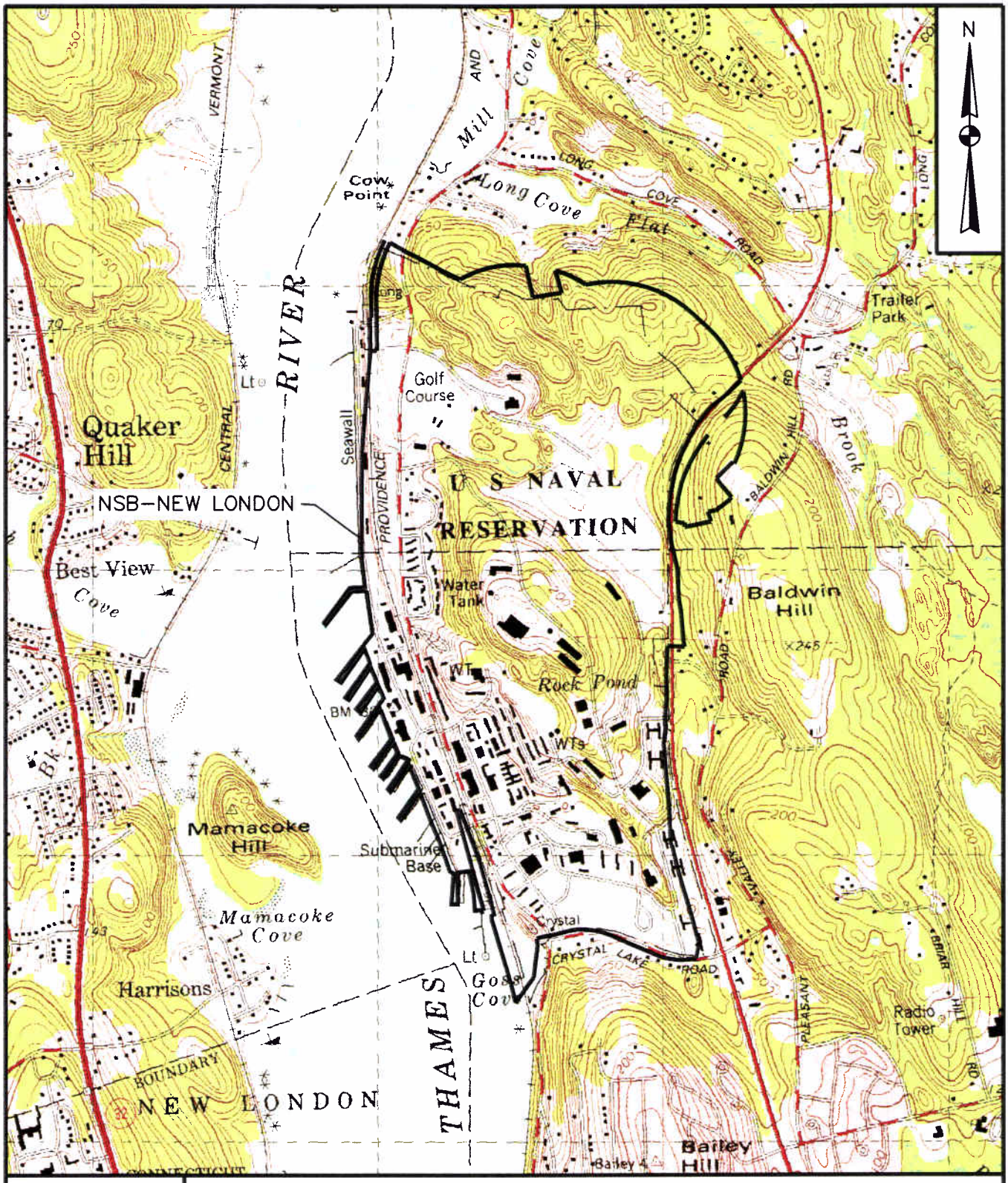
Requirement	Citation	Status	Synopsis of Requirement	Current Status / Applicability
FEDERAL				
Guidance on Remedial Actions for Superfund Sites with PCB Contamination	OSWER Directive 9355.4-01	To Be Considered	This guidance describes how to address PCB contamination issues.	Low levels of PCBs (47.2 ppm or less) remain in the soil at the site. The land use (industrial) was selected in accordance with these regulations. This guidance will be followed when conducting O&M or if the site use changes, such as if the site is used for Yacht Club parking.
STATE OF CONNECTICUT				
Hazardous Waste Management: Generator and Handler Requirements	RCSA § 22a-449 (c) 100-101	Applicable	These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-261 are incorporated by reference.	This regulation was addressed during monitoring well installation. This requirement is applicable during well abandonment and O&M of the remedy.
Hazardous Waste Management: TSDF Standards	RCSA § 22a-449 (c) 104	Applicable	This section establishes standards for groundwater monitoring and post-closure. The standards of 40 CFR 264 are incorporated by reference.	The remedy complies with the post-closure requirements of this section through groundwater monitoring and institutional controls at the Site.
Control of Noise Regulations	RCSA § 22a-69-1 through 7.4	Applicable	These regulations establish allowable noise levels. Noise levels from construction activities are exempt from these requirements.	This regulation was addressed during monitoring well installation. This requirement is applicable during well abandonment and O&M of the remedy.
Guidelines for Soil Erosion and Sediment Control	The Connecticut Council on Soil and Water Conservation	To Be Considered	The guidelines provide technical and administrative guidance for the development, adoption, and implementation of a erosion and sediment control program.	This regulation was addressed during monitoring well installation. This requirement is applicable during well abandonment and O&M of the remedy.
Water Quality Standards	CGS 22a-426	Applicable	Connecticut's WQSs establish specific numeric criteria, designated uses, and anti-degradation policies for groundwater and surface water.	The Connecticut WQSs were used to calculate the Alternative SWPC and are being used as secondary monitoring criteria to evaluate monitoring results and determine if further remedial action is required to protect resources. Updates to the Connecticut WQSs are discussed in Section 2.7.2. Changes to the WQSs in the future will need to be considered.

TABLE 2-17

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
FOR ALTERNATIVE 2 - INSTITUTIONAL CONTROLS AND MONITORING
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Current Status / Applicability
STATE OF CONNECTICUT (Continued)				
Remediation Standards Regulations	RCSA § 22a-133k-3	Applicable	These regulations provide specific numeric cleanup criteria for a wide variety of contaminants in soil, groundwater, and soil vapor. These criteria include volatilization criteria, pollutant mobility criteria, direct exposure criteria, and SWPCs.	Although no groundwater plume has been identified at this site, groundwater monitoring will continue to be conducted to confirm no COCs are migrating off site at levels above Alternative Surface Water Protection Criteria or CTDEP Volatilization Criteria. Maintenance of the cap and continued implementation of institutional controls will satisfy the CTDEP RSRs for soil. The Alternative SWPC for COCs at the DRMO were calculated following the CTDEP RSRs and are protective of receptors in the Thames River.

ACAD: 0578CM02.dwg 10/18/06 MF PIT



0 2000 4000

GRAPHIC SCALE IN FEET

SOURCE: USGS QUADRANGLE MAP UNCASVILLE, CONNECTICUT, 1984

DRAWN BY: MF	DATE: 10/18/06
CHECKED BY:	DATE:
REVISED BY:	DATE:
SCALE: AS NOTED	

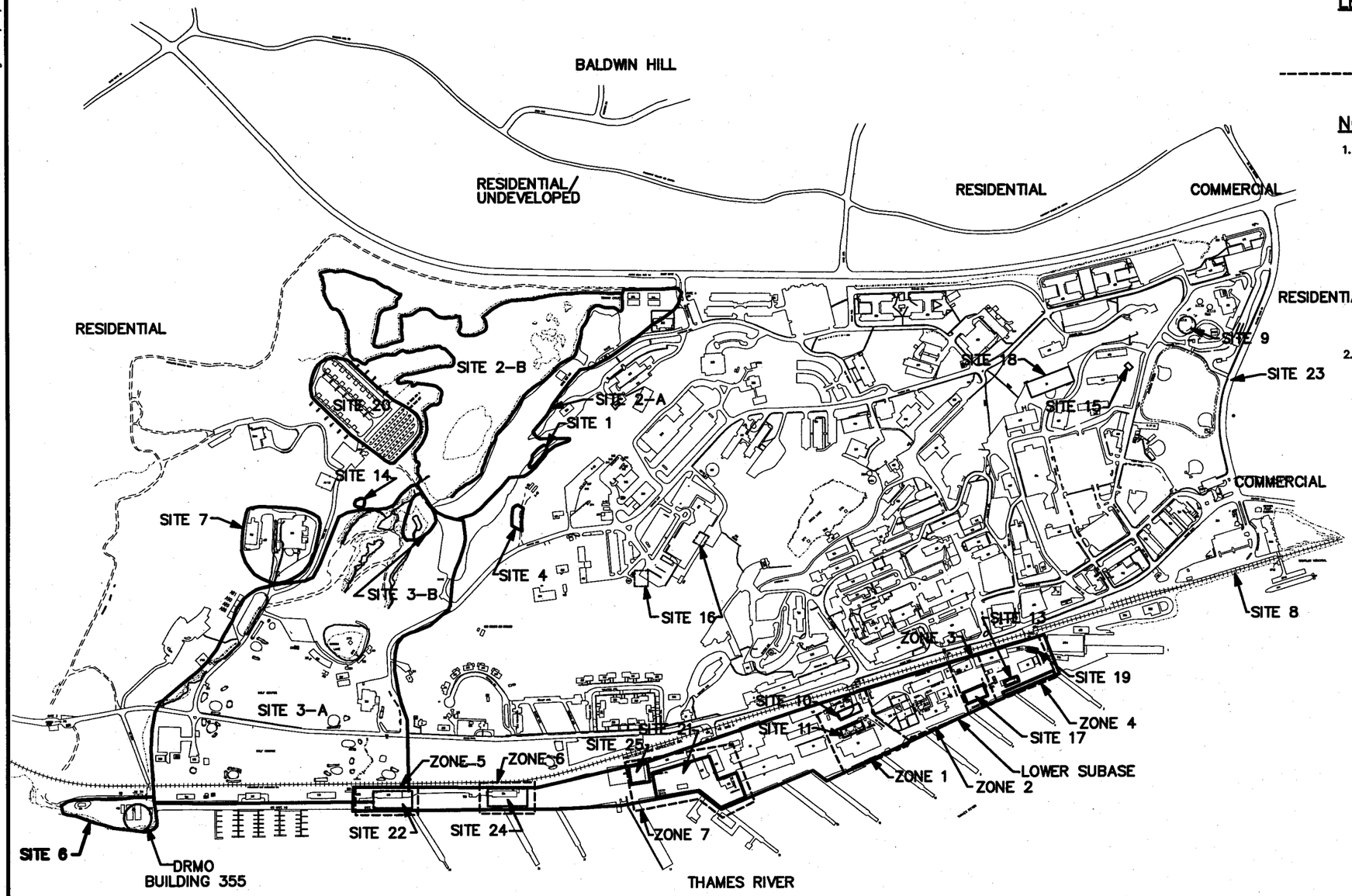
Tetra Tech NUS, Inc.

FACILITY LOCATION MAP
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO.	0578
OWNER NO.	056
APPROVED BY	CAZ
DATE	10/20/06
DRAWING NO.	FIGURE 2-1
REV.	0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98

ACAD: 0578CM03.dwg 10/18/06 MF PIT



N

LEGEND:

--------- LOWER SUBASE REMEDIAL INVESTIGATION ZONE BOUNDARY

NOTES:

1. SITE AND STUDY AREA LOCATIONS WERE TAKEN FROM THE FOLLOWING REPORTS:
   - FEDERAL FACILITY AGREEMENT UNDER CERCLA 120, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT
   - FINAL INITIAL ASSESSMENT STUDY (ENVIRODYNE, MARCH 1983)
   - HYDROGEOLOGIC INVESTIGATION UNDERGROUND STORAGE TANKS OT-4, OT-7, OT-8, OT-9, AND 54-H (FUSS & O'NEILL, SEPTEMBER 1989)
   - PHASE I REMEDIAL INVESTIGATION (ATLANTIC, AUGUST 1992)
   - SITE CHARACTERIZATION REPORT FOR OT-10, BUILDING 325, AND BUILDING 89 (HNUS, APRIL 1995)
   - DRAFT FINAL SUPPLEMENT TO INITIAL ASSESSMENT STUDY (NAVAL FACILITIES ENGINEERING SERVICE CENTER, APRIL 1995)
   - REMOVAL SITE EVALUATION FOR QUAY WALL (HNUS, MAY 1995)
2. SITE AND STUDY AREA BOUNDRIES ARE APPROXIMATE.

SITE 1 – CONSTRUCTION BATTALION UNIT (CBU) DRUM STORAGE AREA
SITE 2 – (A) AREA A LANDFILL AND (B) AREA A WETLAND
SITE 3 – (A) AREA A DOWNSTREAM WATER COURSES AND (B) OVERBANK DISPOSAL AREA (OBDA)
SITE 4 – RUBBLE FILL AREA AT BUNKER A-86
SITE 6 – DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)
SITE 7 – TORPEDO SHOPS
SITE 8 – GOSS COVE LANDFILL
SITE 9 – OILY WASTEWATER TANK (OT-5)
SITE 10 – LOWER SUBASE-FUEL STORAGE TANKS AND TANK 54-H
SITE 11 – LOWER SUBASE-POWER PLANT OIL TANKS
SITE 13 – LOWER SUBASE-BUILDING 79 WASTE OIL PIT
SITE 14 – OVERBANK DISPOSAL AREA NORTHEAST (OBDANE)
SITE 15 – SPENT ACID STORAGE AND DISPOSAL AREA (SASDA)
SITE 16 – HOSPITAL INCINERATORS
SITE 17 – HAZARDOUS MATERIALS/SOLVENT STORAGE AREA (BUILDING 31)
SITE 18 – SOLVENT STORAGE AREA (BUILDING 33)
SITE 19 – SOLVENT STORAGE AREA (BUILDING 316)
SITE 20 – AREA A WEAPONS CENTER
SITE 21 – BERTH 16
SITE 22 – PIER 33
SITE 23 – FUEL FARM
SITE 24 – CENTRAL PAINT ACCUMULATION AREA (BUILDING 174)
SITE 25 – LOWER SUBASE-CLASSIFIED MATERIALS INCINERATOR

0 800 1600
GRAPHIC SCALE IN FEET

BASE MAP SOURCE: PREPARED BY THE NAVAL SUBMARINE BASE PUBLIC WORKS DEPT., ENGINEERING DIVISION. MARCH 2006, DRAWING NO. A-667.

DRAWN BY MF	DATE 10/18/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

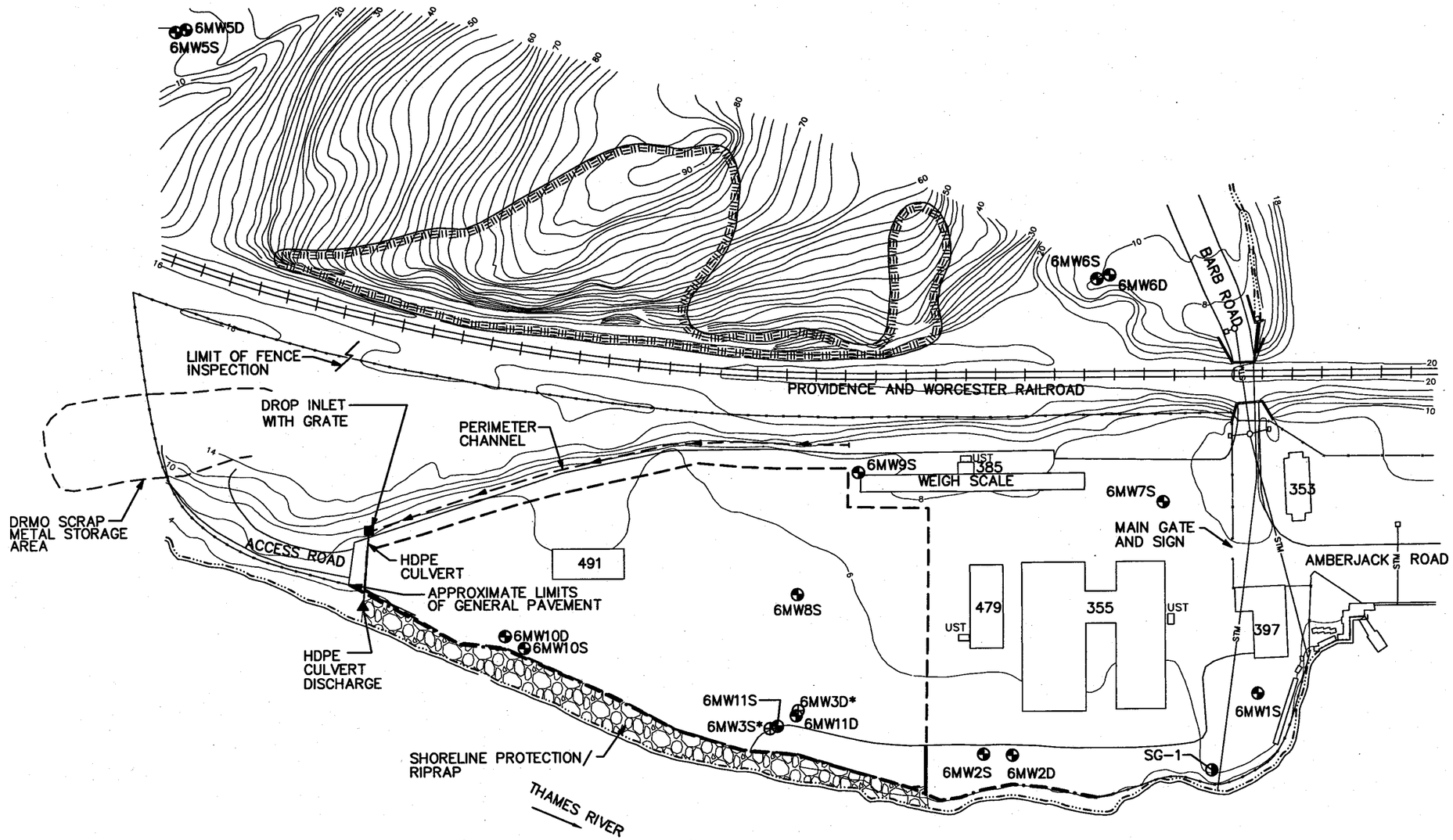
Tetra Tech NUS, Inc.

SITE LOCATION MAP
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO. 0578	
OWNER NO. 056	
APPROVED BY CAL	DATE 10/20/06
DRAWING NO. FIGURE 2-2	REV. 0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

ACAD: 0578CM04.dwg 10/18/06 MF PIT



LEGEND:

- MONITORING WELL
- ABANDONED MONITORING WELL*
- STAFF GUAGE
- APPROXIMATE LIMIT OF CAP
- APPROXIMATE LOCATION OF JERSEY BARRIER
- FENCE

NOTES:

1) UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2) BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON AND PHASE II RI WORK PLAN (ATLANTIC, 1993.)
3) APPROXIMATE CAP LIMITS AND OTHER FEATURES COMPILED FROM OHM COMPLETION REPORT AND ATLANTIC DESIGN SHEET C–2.

* LOCATION EXISTS WITH WELL GROUTED TO SURFACE

0 80 160
SCALE IN FEET

DRAWN BY: DT	DATE: 10/18/06
CHECKED BY:	DATE:
REVISED BY:	DATE:
SCALE: AS NOTED	

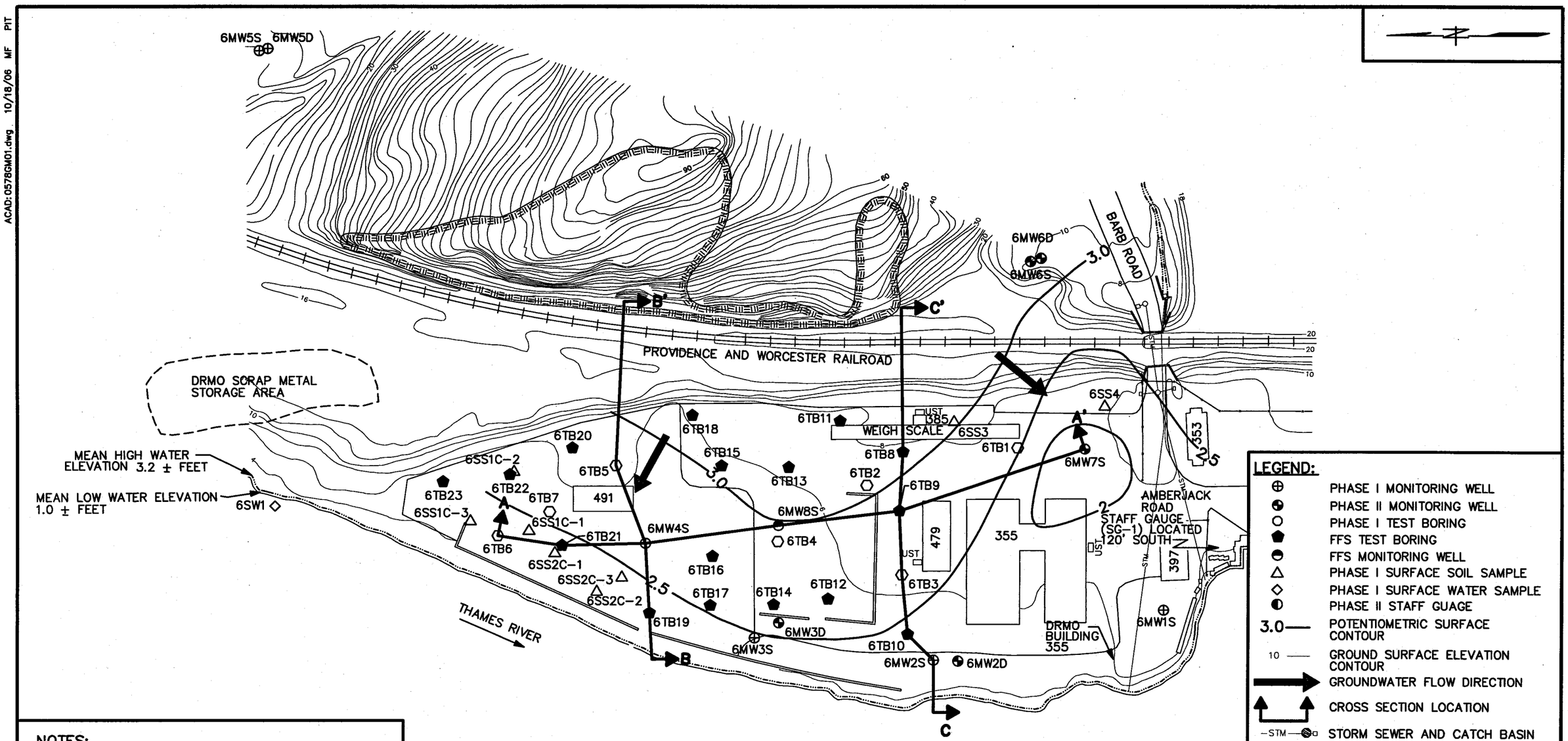
Tetra Tech NUS, Inc.

GENERAL SITE LAYOUT AND MONITORING LOCATIONS NSB-NLON GROTON, CONNECTICUT

CONTRACT NO. 0578	
OWNER NO. 058	
APPROVED BY: CAR	DATE: 10/20/06
DRAWING NO. FIGURE 2-3	REV. 0

FORM CADD NO. TTNUS–BH.DWG – REV 1 – 9/10/98

ACAD:0578GM01.dwg 10/18/06 MF PIT



LEGEND:

- PHASE I MONITORING WELL
- PHASE II MONITORING WELL
- PHASE I TEST BORING
- FFS TEST BORING
- FFS MONITORING WELL
- PHASE I SURFACE SOIL SAMPLE
- PHASE I SURFACE WATER SAMPLE
- PHASE II STAFF GUAGE
- 3.0 — POTENTIOMETRIC SURFACE CONTOUR
- 10 — GROUND SURFACE ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CROSS SECTION LOCATION
- STORM SEWER AND CATCH BASIN
- WATERCOURSE
- RAILROAD
- EXPOSED BEDROCK
- 397 BUILDING

0 80 160
SCALE IN FEET

NOTES:

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN, (ATLANTIC, 1993).
3. SURFACE SOIL SAMPLES 6SS1C-1, 6SS1C-2, AND 6SS1C-3 WERE COMPOSITED TO FORM 6SS1C.
4. SURFACE SOIL SAMPLES 6SS2C-1, 6SS2C-2, AND 6SS2C-3 WERE COMPOSITED TO FORM 6SS2C.
5. POTENTIOMETRIC SURFACE FOR WATER LEVELS MEASURED ON AUGUST 23-24, 1994.
6. MEAN HIGH WATER ELEVATION BASED ON FFS (ATLANTIC, 1994).
7. WELLS 6MW4S AND 6MW8S WERE DESTROYED DURING THE TIME CRITICAL REMOVAL.
8. DATUM FOR ELEVATIONS IS THE BASE 1982 DATUM.

DRAWN BY MF	DATE 10/18/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

SITE FEATURES AND DATA POINT LOCATIONS
DRMO
NSB-NLON, GROTON, CONNECTICUT

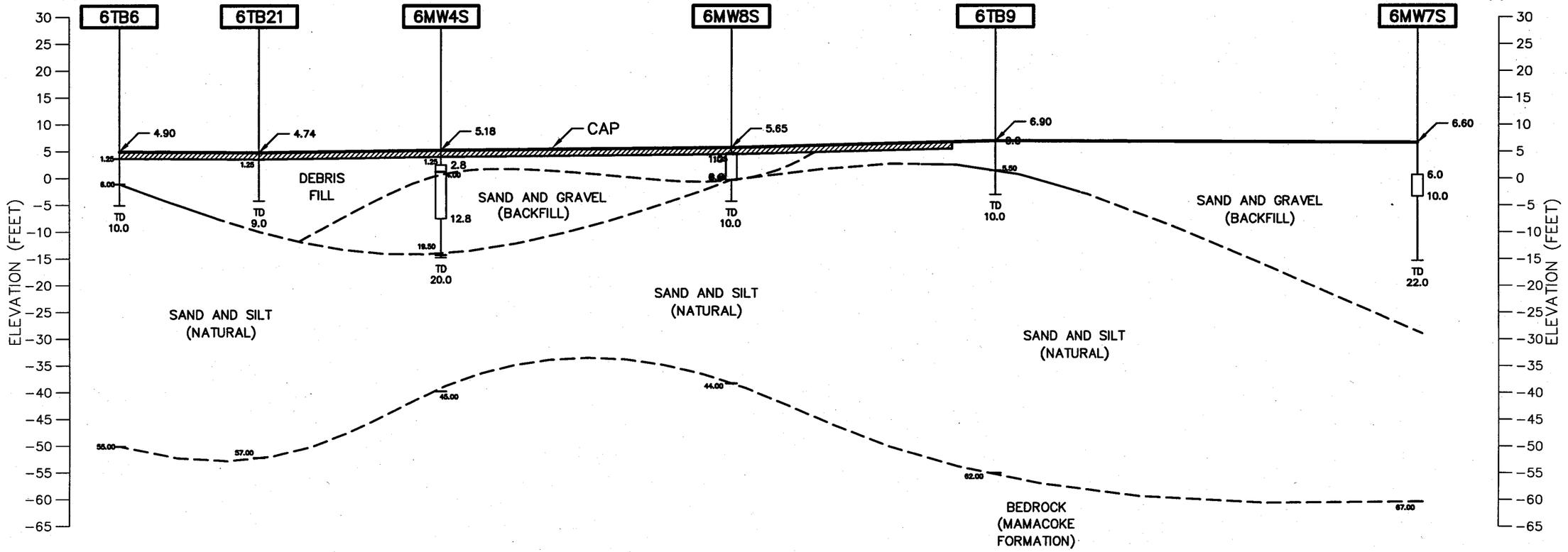
CONTRACT NO. 0578	
OWNER NO. 056	
APPROVED BY CAM	DATE 10/20/06
DRAWING NO. FIGURE 2-4	REV. 0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

ACAD: 0578GX01.dwg 10/18/06 MF PIT

A

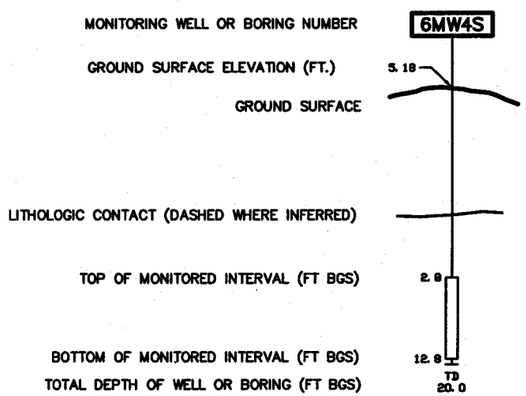
A'

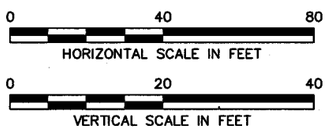


NORTH

SOUTH

LEGEND:



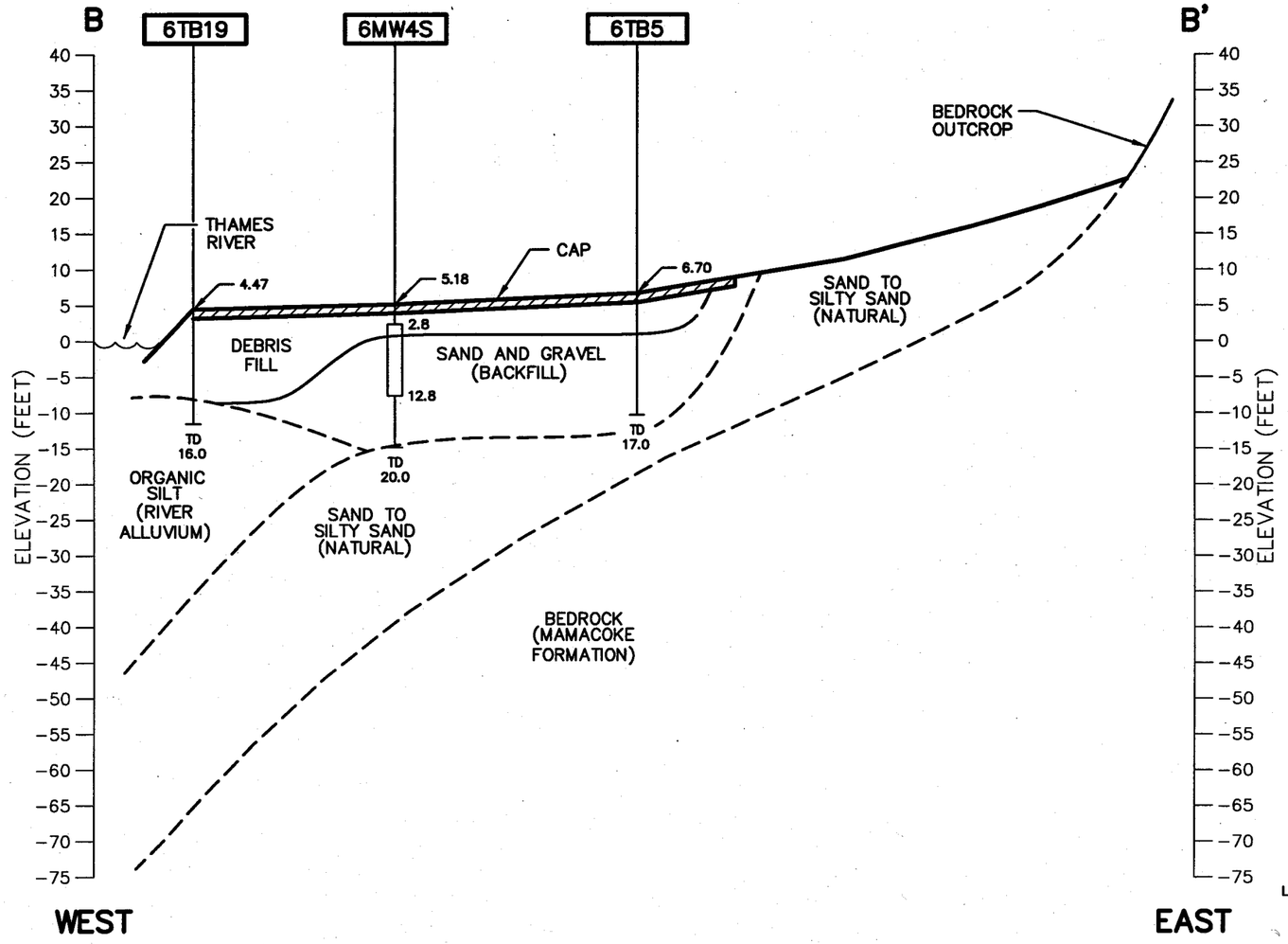


NOTE:
1. THE DATUM FOR THE ELEVATIONS IS THE BASE 1982 DATUM.

DRAWN BY MF DATE 10/18/06	Tetra Tech NUS, Inc.	GENERALIZED GEOLOGICAL CROSS SECTION A - A' DRMO NSB-NLON, GROTON, CONNECTICUT	CONTRACT NO. 0578
CHECKED BY DATE			OWNER NO. 056
REVISED BY DATE			APPROVED BY CAL DATE 10/26/06
SCALE AS NOTED			DRAWING NO. FIGURE 2-5 REV. 0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

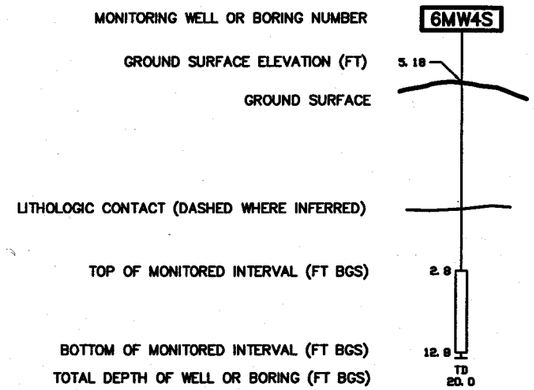
ACAD: 0578GX02.dwg 10/18/06 MF PIT



0 40 80
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

LEGEND:



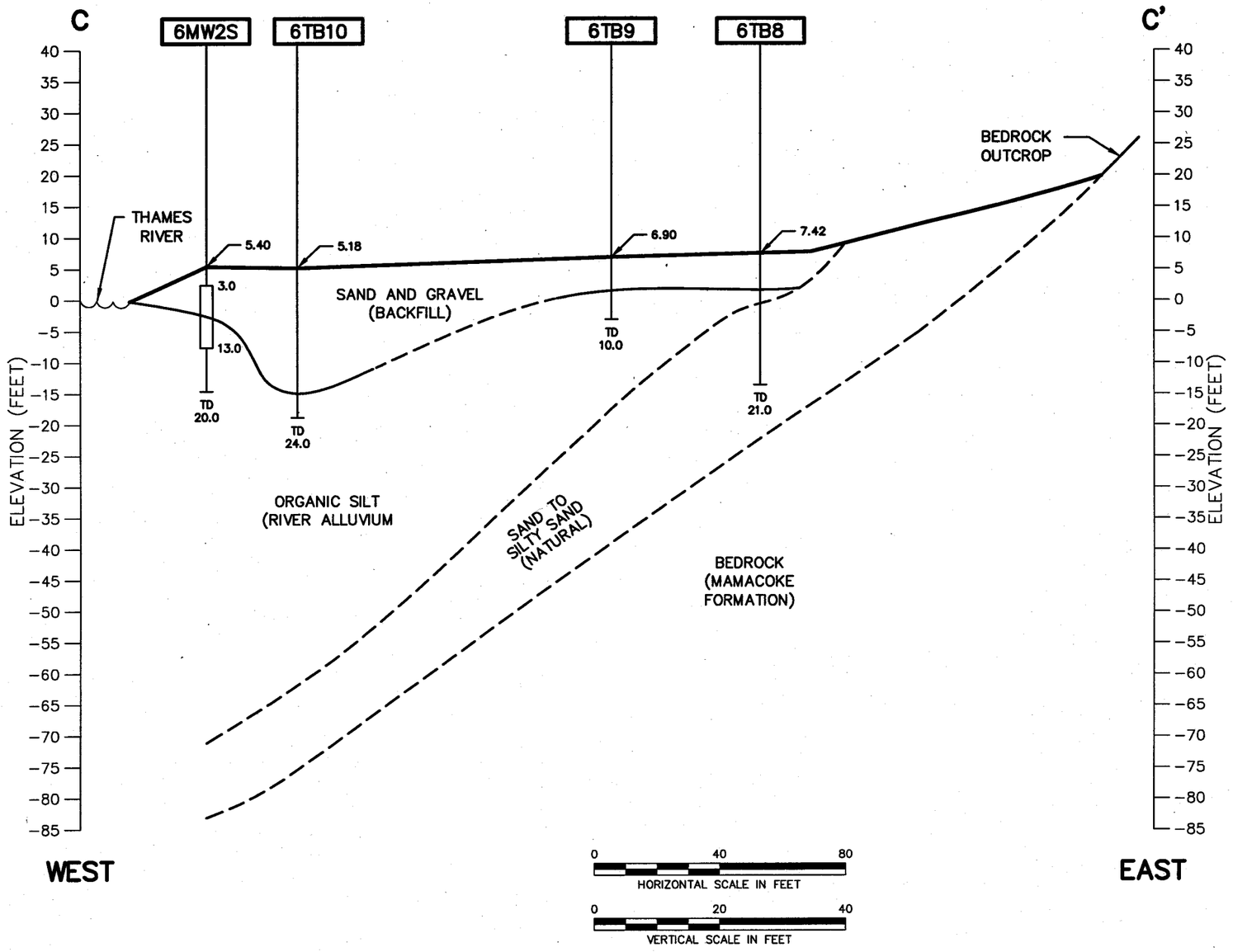
NOTE:

1. THE DATUM FOR THE ELEVATIONS IS THE BASE 1982 DATUM.

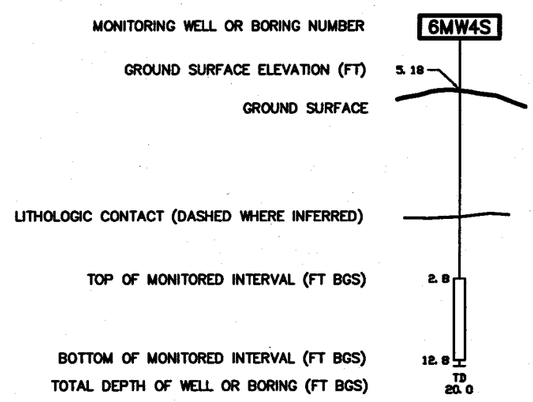
DRAWN BY MF DATE 10/18/06	Tetra Tech NUS, Inc.	GENERALIZED GEOLOGIC CROSS SECTION B - B' DRMO NSB-NLON, GROTON, CONNECTICUT	CONTRACT NO. 0578
CHECKED BY DATE			OWNER NO. 056
REVISED BY DATE			APPROVED BY CAR DATE 10/20/06
SCALE AS NOTED			DRAWING NO. FIGURE 2-6 REV. 0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

ACAD: 0578GX03.dwg 10/18/06 MF PIT



LEGEND:



NOTE:

1. THE DATUM FOR THE ELEVATIONS IS THE BASE 1982 DATUM.

DRAWN BY MF DATE 10/18/06	Tetra Tech NUS, Inc.	GENERALIZED GEOLOGICAL CROSS SECTION C - C' DRMO NSB-NLON, GROTON, CONNECTICUT	CONTRACT NO. 0578
CHECKED BY DATE			OWNER NO. 056
REVISED BY DATE			APPROVED BY CAL DATE 10/20/06
SCALE AS NOTED			DRAWING NO. FIGURE 2-7 REV. 0

ACAD: 0578CM05.dwg 10/20/06 MF PIT

N

DRMO SCRAP METAL STORAGE AREA

PROVIDENCE AND WORCESTER RAILROAD

BARB ROAD

AMBERJACK ROAD

491

UST 385

WEIGH SCALE

19(33) AND 20(34)

353

355

479

397

UST

STM

MEAN HIGH WATER ELEVATION

MEAN LOW WATER ELEVATION

THAMES RIVER

NOTES:

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB–NLON AND PHASE II RI WORK PLAN, (ATLANTIC, MAY 1993).
3. SAMPLE LOCATIONS ARE APPROXIMATE AND WERE TAKEN FROM INTERIM REMEDIAL ACTION REPORT (OHM, SEPTEMBER 1995).
4. SAMPLES 57–59 WERE SAMPLED AFTER THE PRE–EXCAVATION SAMPLES, BUT WERE SUBSEQUENTLY EXCAVATED.

LEGEND:

- POST–EXCAVATION SOIL SAMPLE
- PRE–EXCAVATION SOIL SAMPLE
- LIMIT OF EXCAVATION
- 10 — EXISTING CONTOUR
- 479 — BUILDING NUMBER
- WATERCOURSE
- STM — STORM SEWER AND CATCH BASIN
- EXPOSED BEDROCK

0 60 120
GRAPHIC SCALE IN FEET

DRAWN BY MF	DATE 10/18/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

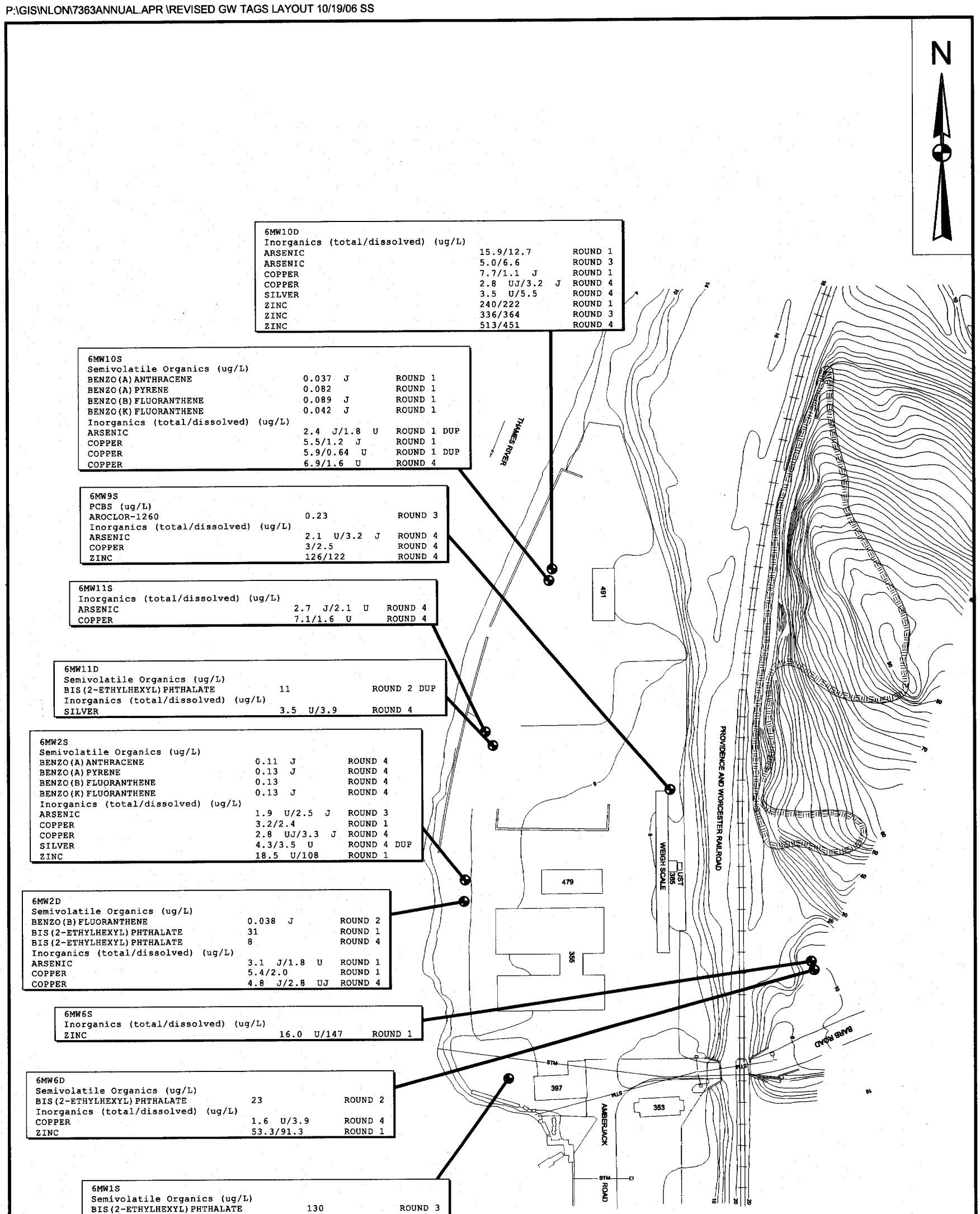
Tetra Tech NUS, Inc.

TIME-CRITICAL REMOVAL ACTION
SAMPLE LOCATIONS
DRMO, NSB- NEW LONDON
GROTON, CONNECTICUT

CONTRACT NO. 0578	
OWNER NO. 056	
APPROVED BY CAR	DATE 10/20/06
DRAWING NO. FIGURE 2-8	REV. 0

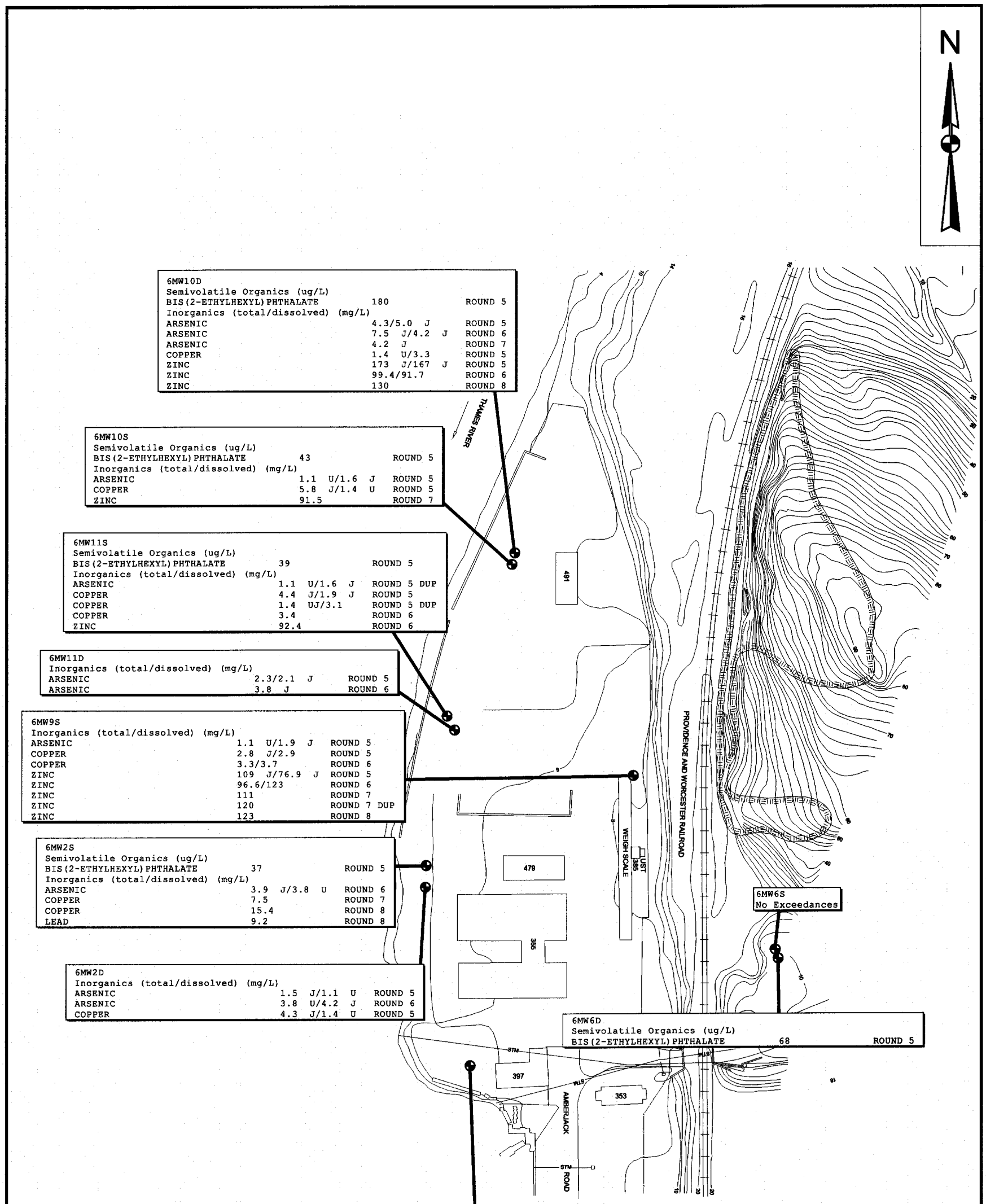
FORM CADD NO. TTNUS–BH.DWG – REV 1 – 9/10/98

P:\GIS\NLON\7363ANNUAL.APR \REVISED GW TAGS LAYOUT 10/19/06 SS



DRAWN BY J. BELLONE	DATE 10-13-99	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0578 / OWNER NUMBER 056
CHECKED BY N. BALSAMO	DATE 10-19-06	COC EXCEEDANCES OF MONITORING CRITERIA YEAR 1 GROUNDWATER SAMPLING SITE 6 - DRMO NSB-NLON, GROTON, CONNECTICUT	APPROVED BY CAL / DATE 10/20/06
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-9 / REV 0

P:\GIS\NLON\7363ANNUAL.APR REVISED GROUNDWATER TAGS-ROUNDS 5-8 LAYOUT 10/19/06 SS



DRAWN BY J. LAMEY	DATE 8-24-00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0578 / OWNER NUMBER 056
CHECKED BY N. BALSAMO	DATE 10-19-06	COC EXCEEDANCES OF MONITORING CRITERIA YEAR 2 GROUNDWATER SAMPLING SITE 6 - DRMO NSB-NLON, GROTON, CONNECTICUT	APPROVED BY CAR / DATE 10/20/06
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-10 / REV 0

P:\GIS\NLON\7363_267.APR REVISED DRMO ROUNDS 9-12 TAGS LAYOUT 10/18/06 SS

N

6MW10S
Semivolatile Organics (ug/L)

BIS(2-ETHYLHEXYL)PHTHALATE	8	J	ROUND 11

Inorganics (ug/L)

ZINC	261		ROUND 11

6MW10D
Inorganics (ug/L)

ARSENIC	6.5	J	ROUND 09
ARSENIC	7.1		ROUND 10
ARSENIC	3.2	J	ROUND 11
ZINC	99.2	J	ROUND 09
ZINC	756		ROUND 11

6MW11S
Inorganics (ug/L)

ARSENIC	12.6		ROUND 12
COPPER	12.7		ROUND 10
SILVER	17.1		ROUND 12
ZINC	299	J	ROUND 10
ZINC	150		ROUND 11
ZINC	143		ROUND 12

6MW11D
Inorganics (ug/L)

ARSENIC	26.1	J	ROUND 09
ARSENIC	8.2		ROUND 10
ARSENIC	10.9		ROUND 11
ARSENIC	12.7		ROUND 12
COPPER	32	J	ROUND 09
LEAD	10.5	J	ROUND 09
SILVER	6.9	J	ROUND 12
ZINC	108	J	ROUND 09
ZINC	86.8	J	ROUND 10
ZINC	277		ROUND 11

6MW11D (DUP)
Inorganics (ug/L)

ARSENIC	21.5	J	ROUND 09
COPPER	24.6	J	ROUND 09
LEAD	8.9	J	ROUND 09
ZINC	92.6	J	ROUND 09

6MW9S
Semivolatile Organics (ug/L)

BENZO(A)PYRENE	0.24	J	ROUND 12
BENZO(K)FLUORANTHENE	0.27	J	ROUND 12

Inorganics (ug/L)

COPPER	19		ROUND 10
ZINC	94.6	J	ROUND 09
ZINC	151	J	ROUND 10
ZINC	91.7		ROUND 11
ZINC	133		ROUND 12

6MW2D
Semivolatile Organics (ug/L)

BIS(2-ETHYLHEXYL)PHTHALATE	10.3		ROUND 09
BIS(2-ETHYLHEXYL)PHTHALATE	40		ROUND 12

Inorganics (ug/L)

ARSENIC	3.4	J	ROUND 09
ARSENIC	2.6	J	ROUND 11
COPPER	7.8	J	ROUND 09

6MW2S
Inorganics (ug/L)

ARSENIC	3.4	J	ROUND 09
COPPER	4.6		ROUND 12
SILVER	20.5		ROUND 09

6MW6S
No Exceedances

6MW6D
Semivolatile Organics (ug/L)

BIS(2-ETHYLHEXYL)PHTHALATE	18.1		ROUND 09
BIS(2-ETHYLHEXYL)PHTHALATE	6.9	J	ROUND 11

6MW1S
Semivolatile Organics (ug/L)

BIS(2-ETHYLHEXYL)PHTHALATE	17.1		ROUND 09
BIS(2-ETHYLHEXYL)PHTHALATE	25		ROUND 10
BIS(2-ETHYLHEXYL)PHTHALATE	11		ROUND 11
BIS(2-ETHYLHEXYL)PHTHALATE	19	J	ROUND 12

THAMES RIVER
APPROXIMATE LIMIT OF CAP
DRMO SCRAP METAL STORAGE AREA
PROVIDENCE AND WORCESTER RAILROAD
WEIGH SCALE
UST 385
BARS ROAD
AMBERJACK
STM ROAD
491
479
355
397
353

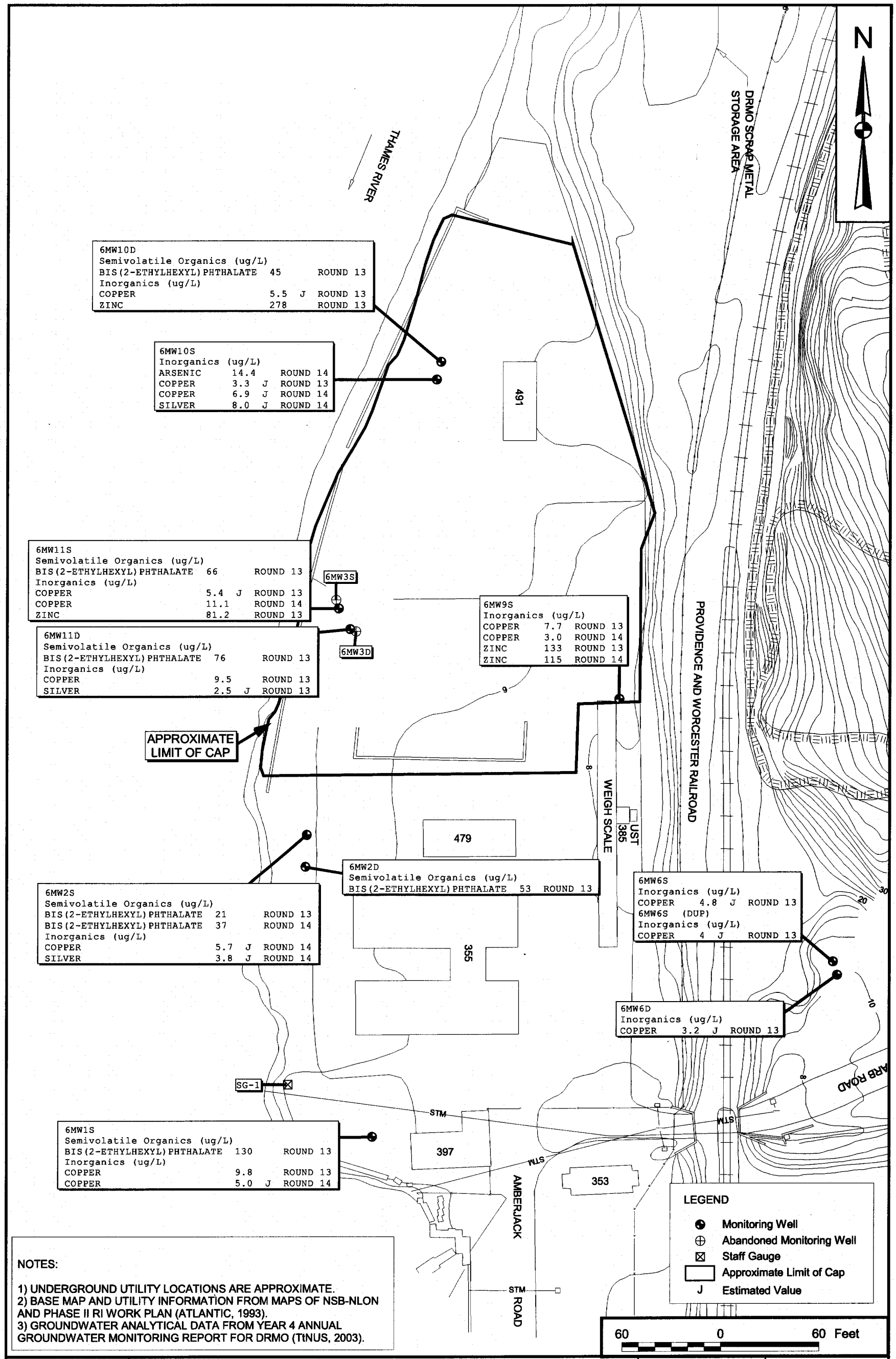
LEGEND
- Monitoring Well
- Abandoned Monitoring Well
- Staff Gauge
- Approximate Limit of Cap
- J Estimated Value

NOTE: GROUNDWATER ANALYTICAL DATA FROM YEAR 3 ANNUAL GROUNDWATER MONITORING REPORT FOR DRMO (TtNUS, 2002).

100 0 100 Feet

DRAWN BY: S. STROZ	DATE: 4/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 0578 / OWNER NUMBER: 056
CHECKED BY: N. BALSAMO	DATE: 10/18/06	COC EXCEEDANCES OF MONITORING CRITERIA YEAR 3 GROUNDWATER SAMPLING SITE 6 - DRMO NSB-NLON GROTON, CONNECTICUT	APPROVED BY: CAR / DATE: 10/20/06
COST/SCHEDULE-AREA			APPROVED BY: — / DATE: —
SCALE: AS NOTED			DRAWING NO.: FIGURE 2-11 / REV: 0

P:\GIS\NLON\7363_267.APR REVISED ROUNDS 13-14 DRMO TAGS LAYOUT 10/18/06 SS



NOTES:

1) UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2) BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN (ATLANTIC, 1993).
3) GROUNDWATER ANALYTICAL DATA FROM YEAR 4 ANNUAL GROUNDWATER MONITORING REPORT FOR DRMO (TtNUS, 2003).

DRAWN BY S. STROZ	DATE 4/27/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0578 / OWNER NUMBER 056
CHECKED BY N. BALSAMO	DATE 10/18/06	COC EXCEEDANCES OF MONITORING CRITERIA YEAR 4 GROUNDWATER SAMPLING SITE 6 -DRMO NSB-NLON GROTON, CONNECTICUT	APPROVED BY CAL / DATE 10/20/06
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-12 / REV 0

ACAD: 0578GT01.dwg 10/18/06 MF PIT

N

6MW5D
6MW5S

6MW9S	
INORGANICS (µg/L)	ROUND 15
COPPER	4.1 J
ZINC	120
6MW9S (DUP)	
INORGANICS (µg/L)	ROUND 15
COPPER	3.3 J
ZINC	110

6MW6S
6MW6D
BARB ROAD
LIMIT OF FENCE INSPECTION
DRMO SCRAP METAL STORAGE AREA
PERIMETER CHANNEL
PROVIDENCE AND WORCESTER RAILROAD
DROP INLET WITH GRATE
UST 385
WEIGH SCALE
353
6MW7S
MAIN GATE AND SIGN
AMBERJACK ROAD
ACCESS ROAD
HDPE CULVERT
491
APPROXIMATE LIMITS OF GENERAL PAVEMENT
6MW8S
6MW4S
6MW10D
UST 479
355
UST
STM
397
HDPE CULVERT DISCHARGE

6MW10S	
INORGANICS (µg/L)	ROUND 15
COPPER	30

6MW11D
SHORELINE PROTECTION/ RIPRAP
THAMES RIVER
6MW2D
SG-1

6MW11S	
INORGANICS (µg/L)	ROUND 15
COPPER	20
ZINC	180

6MW2S	
INORGANICS (µg/L)	ROUND 15
COPPER	6.9 J
SEMIVOLATILE ORGANICS (µg/L)	
BIS(2-ETHYLHEXYL)PHTHALATE	46

6MW1S	
INORGANICS (µg/L)	ROUND 15
COPPER	3.2 J

LEGEND:

- MONITORING WELL
- STAFF GUAGE
- APPROXIMATE LIMIT OF CAP

NOTE:

GROUNDWATER ANALYTICAL DATA FROM FINAL YEAR 5 ANNUAL GROUNDWATER MONITORING REPORT FOR DRMO (ECC, 2004).

0 80 160
GRAPHIC SCALE IN FEET

DRAWN BY MF	DATE 10/18/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

COC EXCEEDANCES OF MONITORING CRITERIA
YEAR 5 GROUNDWATER SAMPLING
SITE 6 - DRMO
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO.	0578
OWNER NO.	056
APPROVED BY	DATE 10/20/06
DRAWING NO.	FIGURE 2-13
REV.	0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

ACAD:0578GT02.dwg 10/18/06 MF PIT

N

6MW9S	
INORGANICS (µg/L)	ROUND 16
COPPER	4.4 J
ZINC	110
6MW9S (DUP)	
INORGANICS (µg/L)	ROUND 16
COPPER	4 J
ZINC	110

6MW6S	
SEMIVOLATILE ORGANICS (µg/L)	ROUND 16
BENZO (A) ANTHRACENE	0.14 J

6MW6D	
SEMIVOLATILE ORGANICS (µg/L)	ROUND 16
BENZO (A) ANTHRACENE	0.076 J
BIS(2-ETHYLHEXYL)PHTHALATE	10

6MW5D
6MW5S

LIMIT OF FENCE INSPECTION

DRMO SCRAP METAL STORAGE AREA

PERIMETER CHANNEL

DROP INLET WITH GRATE

ACCESS ROAD

HDPE CULVERT

APPROXIMATE LIMITS OF GENERAL PAVEMENT

HDPE CULVERT DISCHARGE

491

6MW8S

6MW4S

6MW10D

6MW11D

PROVIDENCE AND WORCESTER RAILROAD

BARB ROAD

UST 385

WEIGH SCALE

353

6MW7S
MAIN GATE AND SIGN

AMBERJACK ROAD

UST 479

355 UST

397

6MW10S	
INORGANICS (µg/L)	ROUND 16
COPPER	20

SHORELINE PROTECTION/ RIPRAP

THAMES RIVER

6MW11S	
INORGANICS (µg/L)	ROUND 16
COPPER	10
ZINC	380

6MW2D

6MW2S	
INORGANICS (µg/L)	ROUND 16
ARSENIC	3.78 J
COPPER	20
LEAD	7.92 J
SILVER	2.08 J
SEMIVOLATILE ORGANICS (µg/L)	
BIS(2-ETHYLHEXYL)PHTHALATE	22

SG-1

6MW1S	
SEMIVOLATILE ORGANICS (µg/L)	ROUND 16
BIS(2-ETHYLHEXYL)PHTHALATE	9 J

LEGEND:

- MONITORING WELL
- STAFF GUAGE
- APPROXIMATE LIMIT OF CAP

NOTE:

GROUNDWATER ANALYTICAL DATA FROM YEAR 6 ANNUAL GROUNDWATER MONITORING REPORT FOR DRMO (ECC, 2005).

0 80 160
GRAPHIC SCALE IN FEET

DRAWN BY MF	DATE 10/18/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

COC EXCEEDANCES OF MONITORING CRITERIA YEAR 6 GROUNDWATER SAMPLING SITE 6 - DRMO NSB-NLON GROTON, CONNECTICUT

CONTRACT NO. 0578	
OWNER NO. 056	
APPROVED BY CAR	DATE 10/20/06
DRAWING NO. FIGURE 2-14	REV. 0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

ACAD: 0578GT05.dwg 10/20/06 MF PIT

N

6MW9S	
INORGANICS (µg/L)	ROUND 17
COPPER	5 J
ZINC	140
6MW9S (DUP)	
INORGANICS (µg/L)	ROUND 17
COPPER	5 J
ZINC	140

6MW6D	
SEMIVOLATILE ORGANICS (µg/L)	ROUND 17
BIS(2-ETHYLHEXYL)PHTHALATE	14

6MW10S	
INORGANICS (µg/L)	ROUND 17
COPPER	10

6MW2S	
SEMIVOLATILE ORGANICS (µg/L)	ROUND 17
BIS(2-ETHYLHEXYL)PHTHALATE	22

6MW01S	
SEMIVOLATILE ORGANICS (µg/L)	ROUND 17
BIS(2-ETHYLHEXYL)PHTHALATE	62

6MW5D
6MW5S
6MW6S
6MW7S
6MW8S
6MW10D
6MW4S
6MW11S
6MW11D
6MW2D
SG-1

LIMIT OF FENCE INSPECTION
DRMO SCRAP METAL STORAGE AREA
PERIMETER CHANNEL
DROP INLET WITH GRATE
ACCESS ROAD
HDPE CULVERT
APPROXIMATE LIMITS OF GENERAL PAVEMENT
HDPE CULVERT DISCHARGE
SHORELINE PROTECTION/ RIPRAP
THAMES RIVER
PROVIDENCE AND WORCESTER RAILROAD
BARB ROAD
AMBERJACK ROAD
MAIN GATE AND SIGN
WEIGH SCALE
UST 385
353
491
479
355
UST
397
STM

LEGEND:

- MONITORING WELL
- STAFF GUAGE
- APPROXIMATE LIMIT OF CAP

NOTE:

GROUNDWATER ANALYTICAL DATA FROM YEAR 7 ANNUAL GROUNDWATER MONITORING REPORT FOR DRMO (ECC, 2006).

0 80 160
GRAPHIC SCALE IN FEET

DRAWN BY MF	DATE 10/20/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

COC EXCEEDANCES OF MONITORING CRITERIA
YEAR 7 GROUNDWATER SAMPLING
SITE 6 - DRMO
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO. 0578	
OWNER NO. 056	
APPROVED BY CAR	DATE 10/20/06
DRAWING NO. FIGURE 2-15	REV. 0

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

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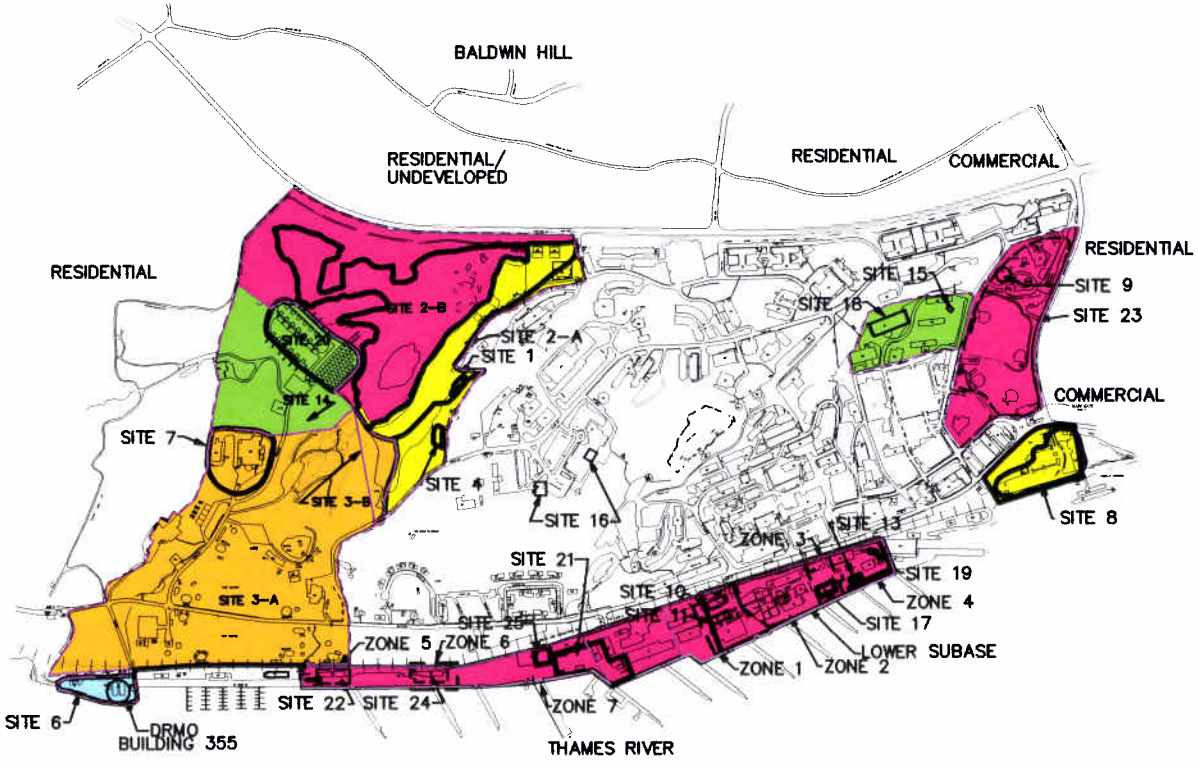

LEGEND:

- SITE BOUNDARY
- OU9 BOUNDARY
- LOWER SUBASE REMEDIAL INVESTIGATION ZONE BOUNDARY
- AREA WITH GROUNDWATER LUCs
- AREA WITH GROUNDWATER AND SOIL LUCs
- AREA WHERE LUCs ARE TBD IN A FUTURE ROD
- AREA WITH SOIL LUCs AND GROUNDWATER LUCs ARE TBD IN A FUTURE ROD
- AREA WITH NO SOIL OR GROUNDWATER LUCs

LUC LAND USE CONTROL
TBD TO BE DETERMINED
ROD RECORD OF DECISION

SITE IDENTIFICATIONS:

SITE 1 – CONSTRUCTION BATTALION UNIT (CBU) DRUM STORAGE AREA
SITE 2 – (A) AREA A LANDFILL AND (B) AREA A WETLAND
SITE 3 – (A) AREA A DOWNSTREAM WATER COURSES AND (B) OVERBANK DISPOSAL AREA (OBDA)
SITE 4 – RUBBLE FILL AREA AT BUNKER A-86
SITE 6 – DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)
SITE 7 – TORPEDO SHOPS
SITE 8 – GOSS COVE LANDFILL
SITE 9 – OILY WASTEWATER TANK (OT-5)
SITE 10 – LOWER SUBASE-FUEL STORAGE TANKS AND TANK 54-H
SITE 11 – LOWER SUBASE-POWER PLANT OIL TANKS
SITE 13 – LOWER SUBASE-BUILDING 79 WASTE OIL PIT
SITE 14 – OVERBANK DISPOSAL AREA NORTHEAST (OBDANE)
SITE 15 – SPENT ACID STORAGE AND DISPOSAL AREA (SASDA)
SITE 16 – HOSPITAL INCINERATORS
SITE 17 – HAZARDOUS MATERIALS/SOLVENT STORAGE AREA (BUILDING 31)
SITE 18 – SOLVENT STORAGE AREA (BUILDING 33)
SITE 19 – SOLVENT STORAGE AREA (BUILDING 36)
SITE 20 – AREA A WEAPONS CENTER
SITE 21 – BERTH 16
SITE 22 – PIER 33
SITE 23 – FUEL FARM
SITE 24 – CENTRAL PAINT ACCUMULATION AREA (BUILDING 174)
SITE 25 – LOWER SUBASE-CLASSIFIED MATERIALS INCINERATOR

NOTES:

1. SITE BOUNDRIES ARE APPROXIMATE
2. SOPA (ADMIN) NEW LONDON INSTRUCTION 5090.18B (2005) INCLUDES SITE USE RESTRICTIONS FOR AREAS WITH GROUNDWATER LUCs.

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SCALE AS NOTED	

Tetra Tech NUS, Inc.

AREAS WITH LAND USE CONTROLS
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT

CONTRACT NO. 0578	
OWNER NO. 056	
APPROVED BY MAR	DATE 10/20/06
DRAWING NO. FIGURE 2-16	REV. 0

FORM CADD NO. TTNUS-AH.DWG - REV 1 -9/10/98

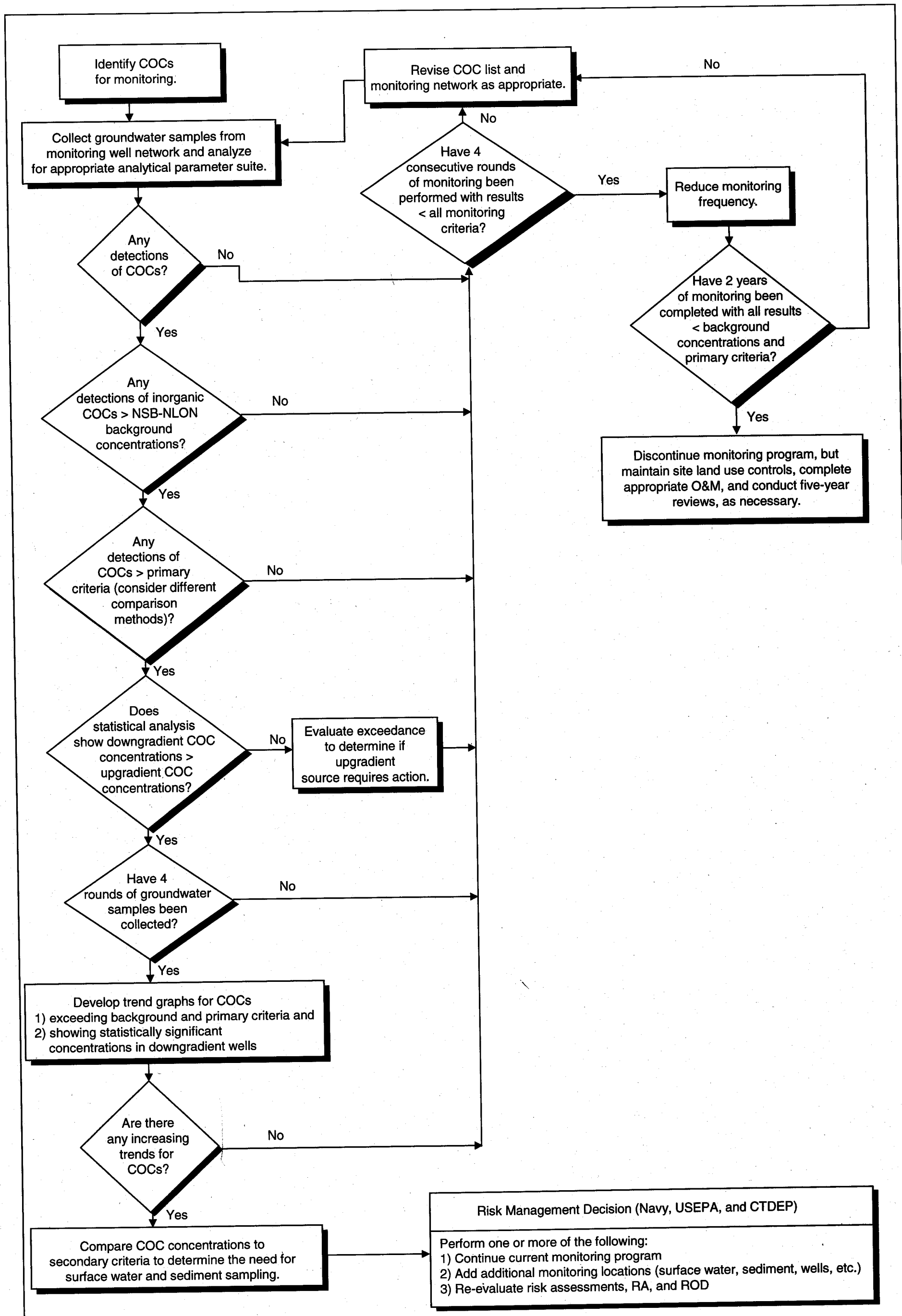

FIGURE 2-17

GROUNDWATER MONITORING PLAN DECISION DIAGRAM
OU2 – SITE 6 SOIL AND GROUNDWATER
NSB-NLON, GROTON, CONNECTICUT

TETRA TECH NUS, INC.

3.0 RESPONSIVENESS SUMMARY

The Responsiveness Summary is a concise and complete summary of significant comments received from the public and includes responses to these comments. In addition, this summary provides the decision makers with information about the views of the community. It also documents how the Navy, USEPA, and CTDEP considered public comments during the decision-making process and provides answers to significant comments. In accordance with the guidance in Community Relations in Superfund: A Handbook (USEPA, 1992), the Responsiveness Summary was prepared after the public comment period, which ended on November 29, 2006.

3.1 OVERVIEW

The Proposed Plan as presented to the public identified institutional controls and monitoring as the preferred alternative for OU2, Site 6 soil and groundwater. This alternative was selected because it is protective of human health and the environment, attained all ARARs, and was considered by the Navy, USEPA, and CTDEP as the alternative that provided the best balance of the evaluation criteria.

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT

The public comment period for the Proposed Plan for OU2 began on October 28, 2006 and ended on November 29, 2006. A public meeting and hearing were held on November 2, 2006 at the Best Western Olympic Inn on Route 12, Groton, Connecticut to accept verbal comments on the proposed action. Two comments on the proposed remedy for OU2 were received during the public hearing or public comment period; however, no revisions to the Selected Remedy, as identified in the Proposed Plan, were necessary or appropriate as a result of the comments.

3.3 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND NAVY RESPONSES

The two comments received during the public hearing and public comment period for the Site 6/OU2 Proposed Plan are summarized below. The Navy's responses to the comments are also provided below. No revisions to the Selected Remedy are required as a result of the comments.

COMMENT 1: November 2, 2006 Public Hearing, Felix Prokop, Ledgelight Health District, General Comment about Navy's Positive Efforts to Communicate Information Regarding Installation Restoration Program to Ledgelight Health District and Public (Actual Comment Documented in Meeting Transcript in Appendix B)

RESPONSE:

Comment noted. The Navy appreciates the participation of the Ledgelight Health District on the Restoration Advisory Board and will continue to provide information regarding the Installation Restoration Program to the Ledgelight Health District in the future.

COMMENT 2: November 1, 2006 Comment Letter from MR. James Citak, Supervising Environmental Analyst, State of Connecticut, Department of Agriculture, Bureau of Aquiculture and Laboratory, To Mr. Richard Conant, Installation Restoration Program Manager, Navy Submarine Base – New London, Regarding Proposed Plan for Site 6 Soil and Groundwater/OU2 at Naval Submarine Base-New London (Actual Comment Letter Provided in Appendix B)

The Department of Agriculture has no objection to the Navy's proposal to continue to provide institutional controls and monitoring groundwater at this site. The Department does have concerns with a lack of information on the current levels of PCBs, PAHs and metals in shellfish (clams, mussels, oysters) in the immediate vicinity of this site. The site is approximately 260-300 ft from the Thames River.

The Department of Agriculture realizes that there are other sources of contaminates in the Thames River that could impact shellfish at this site but a baseline level of contaminants in shellfish would be beneficial if contaminant levels increase in future groundwater and surface water samples. The Department of Agriculture will continue to prohibit the harvesting of shellfish for any purposes within 1000ft of the US Naval Sub Base shoreline.

RESPONSE:

The Navy investigated the Thames River adjacent to Site 6/OU2 during the Phase II Remedial Investigation (RI) (Brown & Root Environmental, March 1997). This report is part of the Administrative Record for Site 6/OU 2 that can be found in the Public Repositories (i.e., Public Libraries).

During the Phase II RI, surface water, sediment, and biota sampling was conducted in the Thames River. Surface water and sediment samples were collected nearshore, along the centerline of the river, and between the nearshore and centerline stations. Analyses for surface water included chemical and analyses for sediment samples included chemical, TOC, grain size, and Acid Volatile Sulfide (AVS) and Simultaneous Extractable Metals (SEM). The investigation results showed that contaminant concentrations in the surface water and sediment near Site

6/OU2 were similar to concentrations at upgradient and downgradient locations and did not indicate any significant impact from the site.

A caged mussel study was performed in which ribbed mussels were purchased and deployed in replicate (30 mussels per cage, two cages per station) adjacent to Site 6/OU2 as well as other locations in the Thames River. This study was conducted to determine which chemicals present in the Thames River were biologically available and could be concentrated in the tissues of these and other species of aquatic organisms. The results of the study showed that contaminant concentrations (VOCs, SVOCs, Pesticides, and Inorganics) detected in the caged mussels adjacent to Site 6/OU2 were similar to concentrations detected in the control samples. PCBs were not detected in either the caged or control mussels.

Oysters, blue mussels, and hardshell clams were also collected from stations in the Thames River that were upstream and downstream of Site 6/OU2. Few SVOCs and pesticides, and no PCBs were detected in the native shellfish. Of inorganics detected in Thames River native shellfish, arsenic, cadmium, chromium, and selenium were detected at low levels in most samples. Concentrations of other inorganics varied with species and location.

In addition to the Phase II RI, the Navy has been conducting groundwater monitoring at Site 6/OU2 since 1998 to verify that contaminants are not leaching from Site 6/OU2 soil and being transported via groundwater to the Thames River. To date, the monitoring results have not shown any significant contaminant migration issues. Based on these results and the decision process agreed to by the Navy and regulators (EPA and CTDEP) for the groundwater monitoring program, no additional sampling was required in the Thames River.

Therefore, considering the results of the Phase II RI and the ongoing groundwater monitoring program, the Navy believes that potential impacts to Thames River ecological receptors have been adequately addressed and no additional sampling is required near Site 6/OU2.

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APPENDIX A

PROPOSED PLAN AND PUBLIC NOTICE

PROPOSED PLAN

Naval Submarine Base - New London, Groton, Connecticut

PROPOSED PLAN FOR SITE 6 - DEFENSE REUTILIZATION AND MARKETING OFFICE/ OPERABLE UNIT 2

Introduction

In accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the law more commonly known as Superfund, this Proposed Plan summarizes the Navy's preferred option for cleanup of soil and **groundwater** at Site 6 – Defense Reutilization and Marketing Office (**DRMO**) at Naval Submarine Base - New London (**NSB-NLON**), Groton, Connecticut (Figure 1). Summaries of other alternatives considered for the site are also provided in this plan. The Navy is the lead agency for CERCLA activities at **NSB-NLON** and the Environmental Protection Agency (EPA) provides primary regulatory oversight and enforcement. The Connecticut Department of Environmental Protection is also actively involved in supporting the activities. **NSB-NLON** was placed on the National Priorities List (NPL) in 1990 and was given the CERCLIS ID No. CTD980906515.

Site 6 is one of 25 sites at **NSB-NLON** being addressed by the Navy's **Installation Restoration (IR) Program**. The **IR Program** is being conducted to identify and clean up sites created by past operations that do not meet today's environmental standards. The soil and groundwater at Site 6 were designated as **Operable Unit (OU)** 2.

The Cleanup Proposal...

After careful study of Site 6, the Navy proposes the following plan:

- Continued maintenance of the existing cap.
- Institutional controls that would limit future development at the site.
- Fencing and notices posted on the site perimeter.
- Continued long-term **monitoring** of **contaminants** in **groundwater**.
- Five-year reviews.

Learn More About the Proposed Plan

The Navy will describe this Proposed Plan and hear your questions at an informational public meeting. A formal public hearing will immediately follow this meeting.

November 2 — Public Meeting and Hearing

Meeting: 6:30 pm

Hearing: 7:00 pm

Date: November 2, 2006

Location: Best Western Olympic Inn, Route 12, Groton, Connecticut

For further information on the meeting, call Richard Conant at the NSB-NLON Environmental Department at (860) 694-5649.

What Do You Think?

The Navy is accepting public comments on this Proposed Plan from **October 30, 2006** to **November 29, 2006**. You do not have to be a technical expert to comment. If you have a comment or concern, the Navy wants to hear it before making a final decision.

There are two ways to formally register a comment:

1. Offer oral comments during the **November 2, 2006** public hearing, or
2. Send written comments postmarked no later than **November 29, 2006** via mail or e-mail following the instructions provided at the end of this Proposed Plan.

To the extent possible, the Navy will respond to your oral comments during the **November 2, 2006** public meeting section of the **November 2, 2006** meeting. During the public hearing section of the meeting, comments will be recorded, but will not be responded to that evening. Instead, federal regulations [40 Code of Federal Regulations (CFR) §300.430(f)(3)(i)(F)] require the Navy to respond to all significant comments in writing. The Navy will review the transcript of the comments received at the meeting hearing and all written comments received during the formal comment period before making a final decision and providing a written response to the comments in a document called a **Responsiveness Summary**. The **Responsiveness Summary** will be included in the **ROD**.

Technical terms shown in bold print are defined in the glossary on Pages 7 and 8.

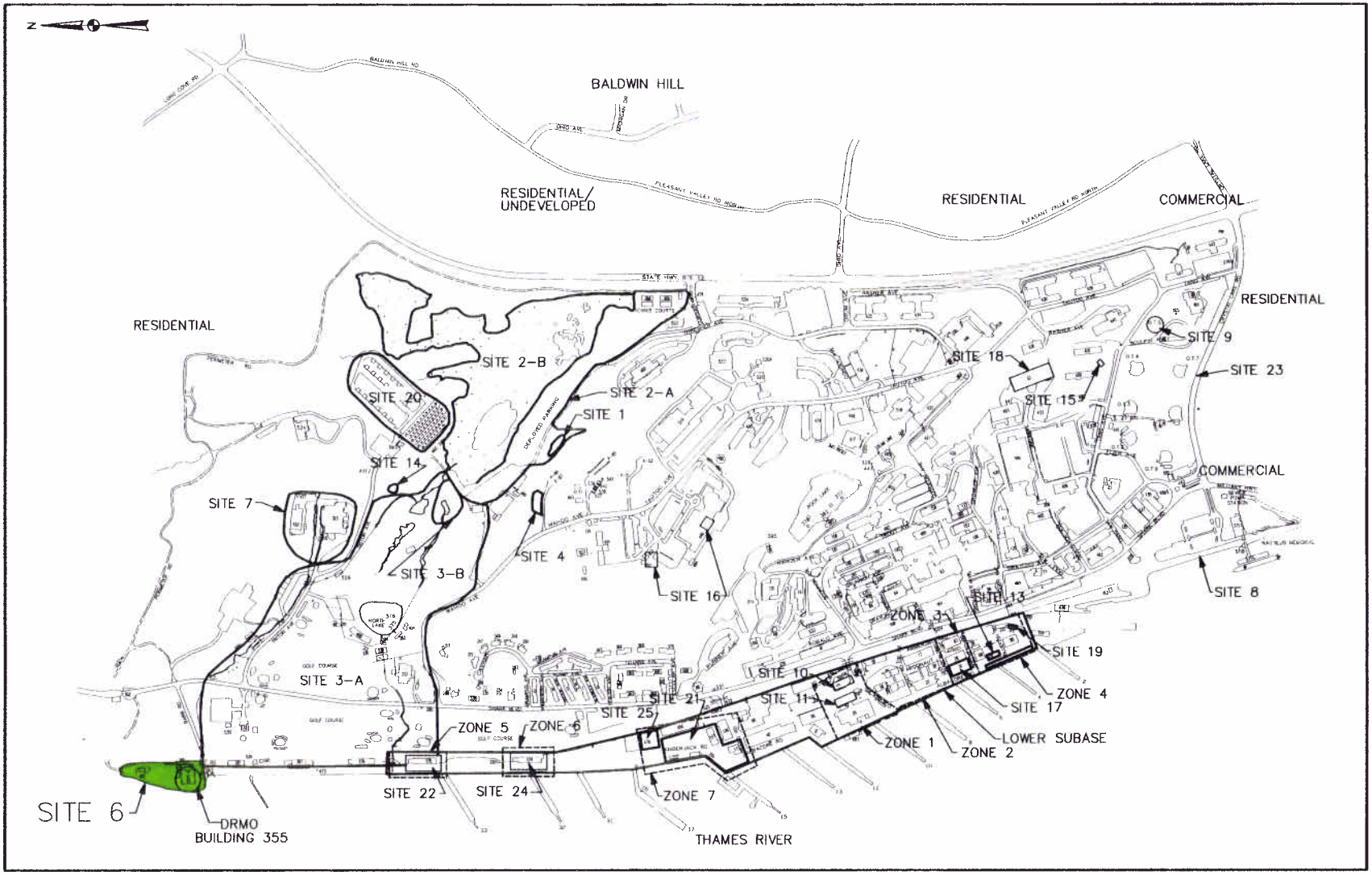

Figure 1. Site Location Map

An Interim **Record of Decision** (**ROD**) for Site 6/**OU2** was signed in 1998. Sufficient **groundwater** data have subsequently been collected since the signing of the Interim **ROD** to support selection of final remedial actions. The remedial actions proposed for **OU2** in this plan are final actions pending information received during the public comment period.

This Proposed Plan summarizes Site 6/**OU2** information contained in the Phase II Remedial Investigation (RI) (1997), **Feasibility Study** (FS) (1997), Interim **ROD** (1998), and the Final **ROD** (2006). **Groundwater monitoring** and site inspection results collected after signing the Interim **ROD** are documented in annual reports (1999-2006). Site 6/**OU2** information is also summarized in the First and Second Five-Year Review Reports for CERCLA Sites at NSB-NLON (2001 and 2006). All of these documents are available in the Information Repositories at the locations identified on page 7.

This Proposed Plan recommends continuation of **institutional controls** and long-term **monitoring** of **groundwater**. The existing cap at Site 6 protects humans and terrestrial ecological receptors from potential risk. **Groundwater monitoring** will address the ecological risk concern from the migration of site **contaminants** to the Thames River. **Groundwater** monitoring to date has shown that no significant **contaminant** migration is occurring from Site 6.

History

The DRMO (Site 6) is located adjacent to the Thames River in the northwestern section of **NSB-NLON**. The site's location relative to other **IR** sites at **NSB-NLON** is shown on Figure 1. The site covers approximately 3 acres along the Thames River. A majority of the site is paved with an asphalt layer, and the site includes buildings, a weighing scale, and miscellaneous storage piles. Figure 2 displays the general site arrangement.

From 1950 to 1969, the DRMO was used as a landfill and waste burning area. In 1995, 4,700 tons of soil contaminated with **polynuclear aromatic hydrocarbons** (**PAHs**), **polychlorinated biphenyls** (**PCBs**), and **metals** were removed and disposed off site as part of a **Time-Critical Removal Action (TCRA)**. After completion of the removal activities, the **excavated** area was backfilled with clean borrow material from an off-site location. A **geosynthetic clay liner** (**GCL**) was placed over the clean borrow material, and approximately 12 inches of crushed stone and 3 inches of asphalt were placed over the **GCL** cap.

In 1997, a Proposed Plan for an interim remedy was issued, and in 1998, an Interim **ROD** was signed that identified **institutional controls**, **groundwater monitoring**, and five-year reviews as the interim remedy for **OU2**. Institutional controls and **groundwater monitoring** were initiated at the site shortly after signing the Interim **ROD** and operation and maintenance activities began at the site in 2003 after preparation of the Operation and Maintenance Manual was completed. Five-Year reviews were conducted for the site in 2001 and 2006.

Currently, the DRMO is used as a storage and collection facility for items such as computers, file cabinets, and other office equipment to be sold during auctions and sales held periodically during the year. It is possible that land use at the site may change to a parking lot in the future, but the property will remain under Navy control.

Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the site are to:

- Prevent unacceptable risks to human receptors from exposure to contaminated soil under either a current industrial or future (although unlikely) residential land use scenario through either **institutional controls** and/or removal/treatment/disposal.
- Prevent unacceptable risk to ecological receptors in the Thames River from potential migration of DRMO contaminants.

Findings of the Field Investigations

The Navy conducted several phases of investigation from 1992 to 1995 to assess the type and distribution of **contaminants** at Site 6. The investigations at Site 6 included sampling and laboratory analysis of soil, **groundwater**, and **surface water**. These investigations showed that the soil in areas used for landfilling or waste burning contained relatively high concentrations of several organic compounds (**PAHs** and **PCBs**) and **metals** but that, in spite of this fact, no substantial impact on **groundwater** quality had occurred. Investigations also showed no significant contamination in the **surface water** in the Thames River adjacent to the DRMO.

Human health and **ecological risk assessments** were performed to evaluate the potential effects of the **contaminants** in soil and groundwater on human health and the environment. The assessments showed that the contaminated soil posed unacceptable risks to human and ecological receptors prior to conducting the **TCRA** and capping the remaining contaminated soil, but after completion of the **TCRA** and installation of the cap, risks to these receptors were acceptable because a majority of the contaminated soil was removed and there was no complete exposure pathway because of the cap. Similarly, human exposure to **contaminants** detected in the **groundwater** at Site 6 (e.g., consumption) was considered unlikely because the **groundwater** is classified by the State of Connecticut as GB (i.e. **groundwater** in urban or industrial areas where public water supply is available and **groundwater** may not be suitable for human consumption without treatment) and much of the **groundwa-**

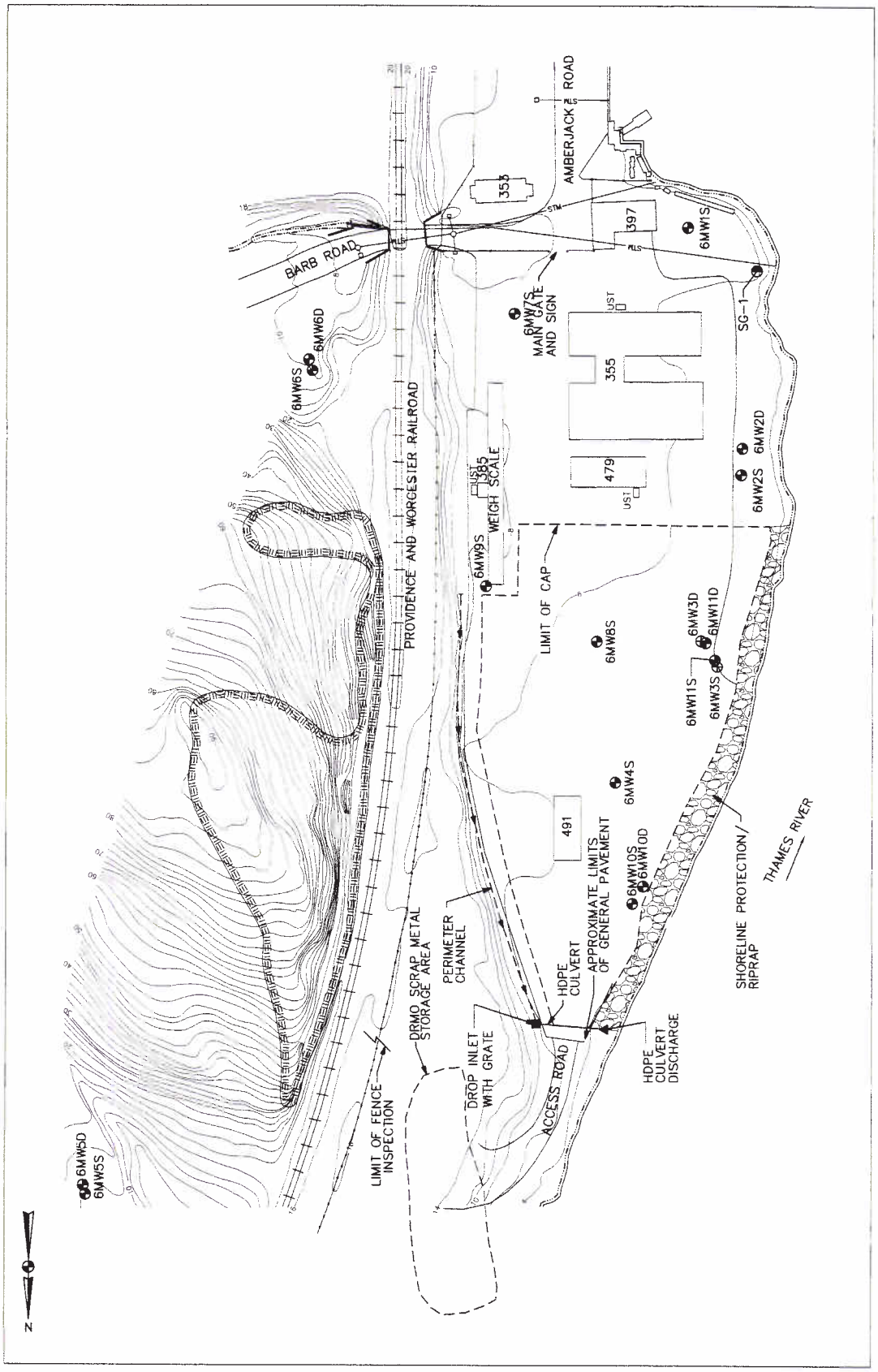

Figure 2. General Site Arrangement

ter is brackish due to the Thames River. The ecological risk evaluation of site **groundwater** showed that **contaminants** in the **groundwater** posed potential risks to ecological receptors in the Thames River.

Following the signing of the Interim **ROD** in 1998, a **groundwater monitoring** program was initiated to evaluate the effectiveness of the cap and to confirm that contamination was not migrating from the soil, into the **groundwater**, and ultimately discharging to the Thames River at concentrations that could impact ecological receptors. Primary criteria used to evaluate the **groundwater** data included site-specific and Connecticut surface water protection criteria and volatilization criteria. The **surface water** protection criteria considered the impact of dilution as the **groundwater** discharges to Thames River. Secondary criteria (i.e., the most conservative of federal Ambient Water Quality Criteria and Connecticut Water Quality Standards) were also considered for evaluation of the **groundwater** data; however, these criteria are usually only used for direct comparisons with **surface water** data. **Contaminant** concentrations in **groundwater** that exceed the secondary criteria indicate potential concerns that may warrant collection of **surface water** samples only if the primary criteria were also exceeded.

Groundwater samples were collected and analyzed quarterly during the first 3 years of the program, 2 times per year during Year 4, and once per year during Years 5, 6, and 7. The results obtained from the 7 years of **groundwater monitoring** showed that no **contaminants** were present in the **groundwater** at concentrations that exceeded the primary criteria. This indicates that employees at the DRMO are not at an increased risk because of the volatilization of organic **contaminants** in the **groundwater** and that ecological receptors in the Thames River are not at increased risk because of **contaminants** in the **groundwater** discharging to the Thames River. The following contaminants were detected in Site 6 **groundwater** at concentrations greater than secondary **monitoring** criteria: bis(2-ethylhexyl) phthalate (BEHP); benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, Aroclor-1260, and arsenic, copper, lead, silver, and zinc. Statistical comparisons of **contaminant** concentrations in upgradient and downgradient monitoring wells at the site and trend analysis of the data in each well indicated that no significant **contaminant** migration has occurred from Site 6.

It is the Navy's current judgment that the Preferred Alternative identified in the Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Alternatives Evaluation Criteria

The following is a summary of the nine criteria used in the **IR Program** to balance the pros and cons of the remedial alternatives. The **FS** alternatives were evaluated in 1997 using

What is Risk and How is it Calculated?

A **human health risk assessment** estimates "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate baseline risk at a site, the Navy undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, the Navy looks at the concentration of **contaminants** found at a site as well as past scientific studies on the effects these **contaminants** have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies helps the Navy to determine which **contaminants** are most likely to pose the greatest threat to human health.

In Step 2, the Navy considers the different ways that people might be exposed to the **contaminants** identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, the Navy calculates a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, the Navy uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. The likelihood of any kind of cancer resulting from a site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site **contaminants**. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, the Navy calculated a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, the Navy determines whether site risks are great enough to cause health problems for people at or near the site. The results of the three previous steps are combined, evaluated, and summarized. The Navy adds up the potential risks from the individual **contaminants** to determine the total risk resulting from the site.

the first seven criteria and the State of Connecticut agreed to the interim remedial action proposed in 1998. The Navy's final remedial action proposed in this plan also considered these same criteria and the State has provided their concurrence with the final action. After comments from the public are received, the alternatives will be further considered using the public's input to determine whether the preferred alternative is the most appropriate for Site 6/OU2.

1. **Overall protection of human health and the environment**: The alternative should protect human health as well as plant and animal life on and near the site.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)**: The alternative should meet applicable and relevant and appropriate federal and state environmental statutes, regulations, and requirements.

3. **Long-term effectiveness and permanence**: The alternative should maintain reliable protection of human health and the environment over time.

4. **Reduction of toxicity, mobility, or volume through treatment**: As a preference, the selected alternative should use treatment to permanently reduce the level of toxicity of **contaminants** at the site, the spread of **contaminants** away from the source of contamination, or the amount of contamination at the site.

5. **Short-term effectiveness**: The alternative should minimize short-term hazards to workers, residents, and the environment during implementation of the remedy.

6. **Implementability**: The alternative should be technically feasible, and the materials and services needed to implement the remedy should be readily available.

7. **Cost**: The alternative should provide the necessary protection for a reasonable cost.

8. **State acceptance**: The state environmental agency should agree with the proposed remedy.

9. **Community acceptance**: The community should agree with the proposed remedy. Community acceptance is based on the comments received during the public meeting and public comment period.

Summary of Alternatives Considered for Site 6/OU2

The Navy evaluated the following four remedial alternatives for Site 6/OU2 in the **FS** conducted in 1997: No Action ($0); Institutional Controls and **Monitoring** ($708,000); **"Hot Spot" Excavation**, Disposal, **Institutional Controls** and **Monitoring** ($4,981,000); and **Excavation**, Treatment, and Disposal ($16,129,000). The Institutional Controls and **Monitoring** alternative was selected as the interim remedy for Site 6 in the Interim **ROD**. Because the **groundwater monitoring** results collected subsequent to the interim **ROD** have demonstrated that no significant **contaminant** migration is occurring to the Thames River, the Navy is no longer considering the two alternatives that required additional **excavation** at the site. The following table summarizes the remedial alternatives currently being considered for Site 6/**OU2**.

Remedial Alternatives	Components	Comment
1. No Action	• None	• Provides limited protection of human health and the environment, but does not comply with all regulatory requirements • Cost: $0
2. Institutional Controls and Monitoring	• Maintenance of existing cap • Land use restrictions • Fencing and posting of notices • Groundwater sampling and analysis • Five-Year Site Reviews	• Protects human health and the environment and complies with regulatory requirements (ARARs) • Cost: $805,000

The present worth cost provided for Alternative 2 ($805,000) was updated from the 1997 estimate ($708,000) using the actual costs of **monitoring** and maintenance at Site 6/**OU2** over the past 7 years.

The Navy's Preferred Alternative

Based on the evaluation of alternatives in the **FS** and **Interim ROD** and the results of **groundwater monitoring**, the Navy's preferred alternative is Alternative 2: **Institutional Controls** and **Monitoring**. The alternative complies with State and federal ARARs. The alternative consists of the following tasks:

- **Institutional controls** that include maintenance of the existing cap, limitations on site access (fencing and posting of notices), and restrictions on land use. Land use restrictions for the DRMO limit activities such as **excavation**, drilling, residential use of property, and excessive vehicular use. While the area is under jurisdiction of the Navy, there shall be a Base Instruction or other Navy mechanism that documents the restriction on land use and controls use of the site.

  The Navy will, at least annually, inspect the area and document compliance with the land use restrictions. This document shall be included when conducting future Five-Year Reviews of the site. If the site is ever transferred from Navy control, the Navy will create a deed for the property that will include the land use restrictions that meet all applicable State property law standards for placing environmental land use restrictions on contaminated property.

- Monitoring will be conducted to determine whether the capping remedy remains protective of human health and the environment. The integrity of the cap will be moni-

tored to determine that contaminants cannot be released from flooding or other disturbance. **Groundwater and** operations and maintenance **monitoring** will be performed in accordance with the existing **groundwater monitoring** plan and operations and maintenance manual for Site 6/**OU2**. **Groundwater** samples are analyzed to evaluate whether contamination is migrating to the Thames River and causing an adverse ecological effect. The **monitoring** program will be optimized as appropriate based on the **monitoring** results.

- A site review will be conducted every 5 years for 30 years as long as contaminants remain in place that pose a risk to human health and the environment under CERCLA. The reviews will evaluate the site status and determine whether further action is necessary.

The Preferred Alternative protects human health by minimizing direct contact with the **contaminants** using institutional controls and maintenance of the existing asphalt and GCL cap. The alternative will be protective of the environment of concern, namely the Thames River, by **monitoring** for **contaminant** migration from the soil to the **groundwater**. Additional actions will be taken if the **monitoring** results indicate significant **contaminant** migration is occurring. The Preferred Alternative does not treat the soil for reduction of toxicity, mobility or volume through treatment as the principal element. The risk posed by the **contaminants** in the soil can be adequately reduced by minimizing exposure to potential receptors. The Preferred Alternative can change in response to public comment or new information.

The Public's Role in Alternative Selection

Community input is integral to the selection process. The Navy, EPA, and State of Connecticut will consider all comments in selecting the remedy prior to signing the **ROD**. The public is encouraged to participate in the decision-making process.

This Proposed Plan for Site 6/**OU2** is available for review, along with the RI/**FS** and the Administrative Record file, at the **NSB-NLON** Information Repositories located at:

Groton Public Library	Hours:
52 Newtown Road	Tues. & Thur.: 10:00am - 9:00pm
Groton, CT 06340	Wed. & Fri.: 10:00am - 5:00pm
(860) 441-6750	Sat.: 10:00am - 3:00pm
	Sun. & Mon.: Closed

Bill Library	Hours:
718 Colonel Ledyard Highway	Mon. - Thur.: 9:00am - 9:00pm
Ledyard, CT 06339	Fri. & Sat.: 9:00am - 5:00pm
(860) 464-9912	Sun.: Closed

For further information, please contact:

Steve G. Martin, P. E.
Remedial Project Manager
NAVFAC Mid-Atlantic, Code EV3
9742 Maryland Avenue
Bldg N-26, Room 3208
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Mark Lewis
Environmental Analyst 3
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Bureau of Water Protection and Land Reuse
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Hartford, CT 06106-5127
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Glossary of Technical Terms

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and State environmental rules, regulations, and criteria, such as Connecticut **RSRs**, which must be met by the selected remedy under the Navy's IR Program.

Connecticut Remediation Standard Regulations (RSRs): Connecticut regulations (Sections 22a-133K-1 through -3 of the Regulations of Connecticut State Agencies) concerning the remediation of polluted soil, surface water, and groundwater.

Contaminants: Any physical, biological, or radiological substance or matter that, at a certain concentration, could have an adverse effect on human health and the environment.

Ecological risk assessment (ERA): Scientific method to evaluate the effects on ecological receptors to exposure to **contaminants** in site-specific media.

Excavation: Earth removal with construction equipment such as backhoe, trencher, front-end loader, etc.

Feasibility Study (FS): A report that presents the development, analysis, and comparison of remedial alternatives.

GCL: Geosynthetic clay liner, a fabricated liner which consists of an impervious layer of bentonite "sandwiched" between two permeable layers of geotextile fabric.

Groundwater: Water found beneath the earth's surface. **Groundwater** may transport substances that have percolated downward from the ground surface as it flows towards its point of discharge.

Human health risk assessment (HHRA): Scientific method to evaluate the effects on human receptors from exposure to **contaminants** in site-specific media.

"Hot Spots": Discrete areas of Site 6 where contaminant concentrations in soil result in unacceptable risk to receptors under current land use.

Installation Restoration (IR) Program: The purpose of the **IR Program** is to identify, investigate, assess, characterize, and clean up or control releases of hazardous substances and to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills at Navy activities in a cost effective manner.

Institutional Controls: Engineered or physical controls and/or administrative or legal mechanisms designated to protect public health and the environment from residual contamination at environmental restoration sites.

Metals: **Metals** are naturally occurring elements in the earth. Some **metals**, such as arsenic and mercury, can have toxic effects. Other **metals**, such as iron, are essential to the metabolism of humans and animals.

Monitoring: Collection of environmental information that helps to track changes in the magnitude and extent of contamination at a site or in the environment.

Operable Unit (OU): Contaminated media, site, or set of sites that are evaluated as a group.

PAHs: Polynuclear aromatic hydrocarbons. High molecular weight, relatively immobile, and moderately toxic solid organic chemicals with multiple benzenic (aromatic) rings in their chemical formula.

PCBs: Polychlorinated Biphenyls. High molecular weight, moderately mobile, and moderately to highly toxic liquid organics chemicals with two benzene rings and multiple chlorine atoms in the chemical formula. In the past, **PCBs** were commonly used as a cooling fluid in electronic transformers and, as a result, **PCB** contamination is relatively widespread.

Record of Decision (ROD): An official document that describes the selected remedy for a site. The **ROD** documents the remedy selection process and is typically issued by the lead agency following a public comment period.

Surface Water: Water from streams, rivers, ponds, and lakes. For this Proposed Plan, **surface water** means water in the Thames River.

Time-Critical Removal Action (TCRA): Site cleanup action conducted on an accelerated schedule for the rapid correction of an environmental situation of particular concern.

Responsiveness Summary: A summary of written and oral comments received during the public comment period, and the Navy's responses to these comments. The **Responsiveness Summary** is an important part of the **ROD**, highlighting community concerns for decision makers.

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for Site 6 soil and groundwater/**OU2** at Naval Submarine Base – New London is important to the Navy. Comments provided by the public are valuable in helping the Navy select the final remedy for this site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by **November 29, 2006**. Comments can be submitted via mail or e-mail and should be sent to either of the following addresses:

Steve G. Martin, P. E.
Remedial Project Manager
NAVFAC Mid-Atlantic, Code EV3
9742 Maryland Avenue
Bldg N-26, Room 3208
Norfolk, VA 23511-3095
Tel: (757) 444-9090
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Bldg. 439, Box 101, Room 105
Route 12
Groton, CT 06349
Tel: (860) 694-5649
Email: richard.contant@navy.mil

If you have any questions about the comment period, please contact Mr. Steve G. Martin at (757) 444-9090.

Name _____

Address _____

City _____

State _____ Zip _____

Telephone _____

PUBLIC NOTICE

PUBLISHER'S CERTIFICATE

State of Connecticut)
County of New London,) ss. New London

On this 30th day of October, 2006,

Personally appeared before the undersigned, a Notary Public within and for said County and State, John Dolahan, Legal Advertising Clerk, of DAY CLASSIFIED, a daily newspaper published at New London, County of New London, State of Connecticut, who being duly sworn, states on oath, that the Order of Notice in the case of

LEGAL 927 PUBLIC NOTICE

a true copy of which is hereunto annexed, was published in said newspaper in its issue(s) of

10/28/2006

Subscribed and sworn to before me

this 30th day of October, 2006

Notary Public

My commision expires 9-30-2008

927

Public Notice

The Department of the Navy, Naval Submarine Base - New London (NSB-NLON), in conjunction with the United States Environmental Protection Agency and the Connecticut Department of Environmental Protection, will hold a public meeting and hearing to present the Proposed Plan for final cleanup of environmental issues under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) related to the soil and groundwater at Site 6 - Defense Reutilization and Marketing Office (DRMO). The soil and groundwater at Site 6 have been designated as Operable Unit (OU) 2.

A Time-Critical Removal Action was completed at this site in 1995 during which a majority of the contaminated soil was excavated and disposed off site and a geosynthetic clay liner and asphalt cap system was installed. Data collected after the removal action and evaluated during the Remedial Investigation (RI) and Feasibility Study (FS) for this site indicated that remaining contaminated soil did not pose unacceptable risks as long as the cap system was maintained and limited direct exposure to the soil, but that the contaminants in the groundwater may pose unacceptable risks to the environment if they migrate and discharge to the Thames River. As a result, an Interim Record of Decision (ROD) was signed in 1998 that required Institutional Controls and Monitoring as the interim remedy for OU2. The Navy implemented the institutional controls to maintain the cap system and monitored the groundwater for the past seven years since the Interim ROD was signed, and the groundwater results have shown no significant contaminant migration concerns. Based on this information, the Navy is proposing a final remedy for OU2 of Institutional Controls and Monitoring. This remedy will be protective of human health and the environment.

Although this is presently the preferred final remedy for OU2, the Navy welcomes the public's input. A public meeting and hearing will be held on November 2, 2006 at 6:30 p.m. at the Best Western Olympic Inn located at 360 Route 12, Groton, Connecticut. The public is encouraged to attend this meeting and hearing to ask questions and to provide verbal comments to the Navy on the remedy recommended in the Proposed Plan. Comments made at the public hearing will be transcribed, and a copy of the transcript will be added to the Administrative Record for NSB-NLON. Complete documentation for the subject site, including the RI, FS, Interim ROD, Proposed Plan, and entire Administrative Record file, is available for review at the following Information Repositories:

Groton Public Library
52 Newton Road
Groton, CT 06340
(860) 441-6750

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718 Colonel Ledyard Highway
Ledyard, CT 06339
(860) 464-9912

The public may comment in person at the public hearing and/or submit written comments via regular mail or e-mail until the end of the formal comment period on November 29, 2006 to:

Steve G. Martin, P.E.
Remedial Project Manager
NAVFAC Mid-Atlantic, Code EV3
9742 Maryland Avenue
Bldg. N-26, Room 3208
Norfolk, VA 23511-3095
Email: steven.g.martin@navy.mil

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Email: steven.g.martin@navy.mil

APPENDIX B

PUBLIC MEETING TRANSCRIPT
AND PUBLIC COMMENTS

PUBLIC MEETING TRANSCRIPT

U.S. NAVY

SUBMARINE BASE NEW LONDON

PUBLIC MEETING AND HEARING TO PRESENT

THE NAVY'S PROPOSED PLAN FOR

CLEANUP OF SOIL AND GROUNDWATER AT SITE 6

DEFENSE REUTILIZATION AND MARKETING OFFICE

(DRMO)

Public Hearing taken at the offices of Best Western Hotel, Route 12, Groton, Connecticut, before Clifford Edwards, LSR, Connecticut License No. SHR.407, a Professional Shorthand Reporter and Notary Public, in and for the State of Connecticut on November 2, 2006, at 6:26 p.m.

DEL VECCHIO REPORTING SERVICES, LLC
PROFESSIONAL SHORTHAND REPORTERS
117 RANDI DRIVE
MADISON, CT 06443

HARTFORD NEW HAVEN STAMFORD

A P P E A R A N C E S:

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PUBLIC AFFAIRS OFFICER

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REMEDIAL PROJECT MANAGER
Building N-26, Room 3208
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Norfolk, VA 23511

MEMBERS OF THE PUBLIC:

FELIX PROKOP, III
LEDGELIGHT HEALTH DISTRICT
120 Broad Street, 2nd Floor
New London, CT 06320

RICHARD CONANT: Good evening. Small crew again tonight. We do have someone from the public, and that's a good thing since -- since we're having a public meeting and hearing here for exactly what's on the screen, the proposed plan for Site 6, Defense Reutilization and Marketing Office, DRMO.

Corey from Tetra Tech -- Corey Rich from Tetra Tech will be presenting tonight, and after that, I will open this as a formal public hearing and take anyone -- any comments from the public that would like to be presented.

Corey, go ahead.

COREY RICH: Thanks, Dick.

RICHARD CONANT: Save that for after.

COREY RICH: Go to this next slide.

I guess as far as our agenda tonight, as Dick said, we're -- just our introductions, my name is Corey Rich from Tetra Tech NUS.

If everybody has gotten

handouts -- they are on the table, both presentation, the proposed plan, and the public notices that were issued through the New London Day. Please pick those up, if you haven't.

For the public meeting portion of our presentation, I'll review regulatory process, the CERCLA process, review the proposed plan that was issued. And if there's no comments that need to be addressed, we'll move on into the public hearing and hear any formal comments, any responses necessary, and then we'll close out the meeting.

As far as the CERCLA process, it's a multistep process starting with an investigation, determine what the problem is through those investigative efforts.

And then through a feasibility study, decide what we are going to do with the problem that we have identified, and then document our preferred alternative or approach for addressing that problem through a proposed plan and a ROD and then

decide how we are going to implement that remedy by going through a formal design.

And then implementing the remedy, and, if necessary, go through operations and maintenance, if -- if the remedy requires that.

The CERCLA process, where we're at today for Site 6, Operable Unit 2, is the proposed plan. With this document, we facilitate public input by putting it out to the public for review and hold these public hearings and meetings to discuss our alternatives with that. It's a requirement under CERCLA and the NCP.

It presents the alternatives that were evaluated by the responsible party, the Navy in this case, and it presents their agency -- or the Navy's preferred alternative to address the contamination that's been identified.

The next step, once we present the information to the public, we need to formalize the selection process through a record of decision.

And this document is also prepared by the Navy, and it is supported by the -- the regulators, in this case the EPA and the State of Connecticut, and it just documents the remedy that's been selected.

It's a legal document. The EPA and the Navy will both sign that document, and it summarizes the rationale and background information that supports the decision.

And it provides conceptual engineering components, outlines the remedial action objectives, and it also presents any cleanup levels that were used to select that remedy.

And it also is a tool to explain to the public the problems the remedy seeks to address and the rationale for selecting it.

As far as the site we're discussing this evening, Operable Unit 2 includes the soil and groundwater at Site 6.

The site itself is located in the northwestern corner of New London along

the Thames River. The site covers approximately three acres, and the majority of the site is paved and there are several small buildings and items that are stored there.

The site is currently used for storage and collection of miscellaneous Navy equipment that they are ready to sell at auction.

In the future, the Navy has some plans to convert this area into a parking lot, and probably be used -- it will remain under Navy control, but will be used for storage of boats at this time.

Is that right?

RICHARD CONANT: That's correct.

COREY RICH: Personal watercraft.

RICHARD CONANT: Yes.

COREY RICH: Go to the figure. As you can see, Site 6, north arrow is this way, Route 12 is out here, Site 6 is at the northern end of the sub base.

Some other issues with Site 6, the

groundwater at the site is classified by the state as GB, which indicates that it's not suitable for human consumption without treatment. And the groundwater is brackish due to the Thames River, which it's adjacent to, being a tidal estuary.

A few photos of the site. These were taken back in April 2006 during our site visit. We're looking south at the site with the Thames River over here. This is the eastern side also looking south. There's a drainage swale along that upper edge.

Some history about the site up through 1997 -- and I'll explain why that's an issue -- but early on, the site was used as a landfill and an area to burn waste material at -- from the 19- -- 1950 to 1969.

The Navy began investigations at the site back in 1992 with the Phase 1 RI. And that information collected in the Phase 1 RI led us to a focus feasibility study that was completed in '94 and that

information was used to proceed to a time critical removal action.

There was contamination identified at the site that drove us to want to address it quickly through a removal action. There were contaminants such as polynuclear aromatic hydrocarbons or PAHs, polychlorinated biphenyls or PCBs at the site, and also some metals in the soils.

During removal action, a total of 4,700 tons of contaminated soil were excavated and disposed of off site. However, through the removal action, because they got down near the water table, they left some contaminated soils in place at or below the water table.

To alleviate future concerns with direct contact and some other issues with that soil, the area was backfilled with clean borrow material, and then it was capped with a GCL or a geosynthetic clay liner -- layer.

Twelve inches of stone were put on top of that and three inches of asphalt

were placed on that for a wearing surface.

As a follow up to the removal action, Tetra Tech -- or the Navy went through and completed their investigations of the site with a Phase 2 RI and completed a Feasibility Study.

If we go to Figure 2 -- sorry, we're jumping ahead of myself -- this figure shows us the outline of the cap in the area where the removal action was done. It's cross-hatched, so this is the area that's been capped and the area that's being maintained by the Navy at this point.

The drainage swale we saw earlier is here, also some riprap was placed along the shoreline for protection.

The Phase 2 RI and those results are summarized on this slide under "Risk Assessment."

As far as the human health concerns are at the site, prior to the removal action and the capping, there were some unacceptable risks due to potential

ingestion or dermal contact with the soils. But after capping, that exposure pathway was eliminated and no significant human health risks while the cap remains in place.

An ecological risk assessment was done and the review of the site based on it being capped, and with an asphalt wearing course, the site doesn't provide a suitable ecological habitat, but if the cap would be removed, it could result in some potential risks to terrestrial recept- -- receptors.

As far as -- there are some contaminants that were detected in the groundwater. They -- they do -- they were identified as posing a potential concern to the Thames River through migration from the groundwater to the Thames River.

As far remediation goals, there were goals developed for the soils, so that the remaining contaminants would not be a concern for leaching into the groundwater and entering the Thames River.

We also -- or there were no goals

actually identified for protection of human health for consumption of groundwater in that it's currently classified as GB groundwater and it's brackish groundwater, so use of the groundwater for human consumption is unlikely.

Using the risk information, remedial objectives were identified for moving through into the FS. They are to prevent unacceptable risks to human receptors from exposure to the contaminated soil, either under an industrial or residential scenario through either institutional controls and/or removal treatment and disposal.

And for ecological receptors, the remedial action objectives are to prevent acceptable risks due to ecological receptors coming into contact with OU2 contaminants after migration to the Thames River.

Using the risk assessment results and the remedial active objectives, four alternatives were identified as viable for

the site in an interim ROD that was prepared and signed back in 1998.

So these four alternatives, a no-action alternative, a limited-action alternative, alternative two, which included institutional controls and monitoring with five-year reviews.

And then, two active remedial alternatives -- the alternative three and four, which involved -- three involves hot spot -- additional hot spot excavations, off-site disposal, and some monitoring and institutional controls.

And alternative four was developed as a clean closure, where we would excavate everything and completely close out the site under CERCLA.

But as you can see, the costs of those alternatives went up significantly from a no-action at zero dollars, obviously, to the alternative two, which included institutional controls and monitoring at about 708,000; to more active remediation, you are in the 5- to

16 million dollar range for those alternatives.

So those four alternatives were evaluated in the feasibility study and -- and Record of Decision -- in the Interim Record of Decision using the -- the nine criteria that are required under CERCLA, considering threshold criteria, which are protection of human health and the environment in compliance with the statutory and regulatory requirements.

For alternatives to be selected, you need to meet those threshold criteria. In the selection process, you also consider the balancing criteria, which are long-term effectiveness and permanence, reduction of toxicity and mobility, and volume through treatment, short-term effectiveness, implementability, and cost.

And then modifying criteria are state acceptance and public acceptance, and that's what we are here tonight to do, to see if -- well, I'm getting ahead

of myself.

Moving on. Considering all that information, the Navy, back in 1998, selected alternative two or institutional controls and monitoring with five-year reviews as their preferred alternative in the Interim ROD.

And they selected that so that they could evaluate -- they -- they selected an interim ROD so that they could evaluate the groundwater and the potential contaminant migration issues through the monitoring and if change to the remedy was required, it was still interim and they could proceed to a final ROD once they had the information that they needed.

So since that ROD -- the interim ROD was signed in 1998, what has the Navy done?

They have proceeded with implementing that remedy. They initiated institutional controls after the ROD was signed.

There is an administrative instruction that is used by the Navy that describes what -- what activities can be

conducted at the site, what activities are restricted at the site.

They also installed signs on the fence surrounding the site, so that people know not to do particular activities or who to contact if -- if they are going to do those activities.

Groundwater monitoring was initiated in 1998 and has continued through 2005. The monitoring started out as a quarterly monitoring program, and has been optimized to annual sampling.

They have also initiated operation and maintenance program at the site. That started a few years later once operations and maintenance manual was prepared.

And those include -- the activities include annual inspections to identify any problems and then routine maintenance to correct those problems as they are identified.

And the Navy has also conducted two five-year reviews at the site, the first being in 2001, the second being in 2006, which we are still in that

process, but that should be finalized here.

And the efforts under the five-year review are just to make sure there's no information that's new information, new regulations or site conditions that have come to light that may indicate that there's a problem at the site.

So the Navy has -- has sampled the groundwater out at OU2 for the past seven years. They've used two sets of criteria and really a three-step evaluation process to look at that data.

The first effort or the first criteria being considered are a combination of site-specific and Connecticut-specific surface water protection criteria, being the main goal, since the groundwater migrates towards the Thames River and we don't want to impact the Thames River.

The second criteria considered is primary is the volatilization criteria. There are several buildings on

the site and shallow groundwater, so those were all considered primary criteria, and the lowest or most conservative of those numbers was used for the screening process.

As a second -- second step, we also took a look at ambient water quality criteria and the state's water quality standards for comparison purposes.

These numbers are comparable to surface water numbers directly. We use them as kind of just a -- a gauge to look at our groundwater data to see if any potential concerns were out there or not.

But exceedence of the primary criteria was our trigger point for doing something else.

As far as our process, we looked -- we looked at the data by comparing it directly to the criteria and trying to identify any exceedences, but we also used statistics to look at -- we have a series of wells at the site.

We have some wells on the upgradient

edge, wells on the downgradient edge to see if there's any true impacts from landfill that you can see from upgradient to downgradient and those impacts from the -- from the landfill itself.

So we statistically compared those data to see if we had any -- any impacts, and we also looked at contaminant specific trend graphs to see if we had any increasing trends or anything that we could identify as a potential concern at the site.

So what have those results told us?

In the past seven years, we have seen no exceedances of primary criteria, so we don't feel that contaminant migration is a significant concern from the site.

So the -- the uncertainty that we had when we signed that interim ROD, we feel pretty certain now that we don't have that contaminant migration issue into the future.

Of the soil contaminants that we saw at the site, we had one -- one detection

of a PCB during year one, probably related to suspended sediments, but we have not seen any further detections of PCBs in the seven years that we have sampled.

We have seen some secondary exceedances of PAHs and metals, but, again, those criteria are directly comparable to surface water numbers and don't consider the dilution factor that can be applied and included for the Thames River. Our trend graphs and statistical comparisons did not show any significant concerns either.

So thinking back to what four alternatives were previously identified by the Navy back during the interim ROD process, we had four alternatives, two were active and two were passive.

With the new data in hand, the Navy believes that these two alternatives -- alternative one being no action, alternative two being institutional controls and monitoring with five-year reviews -- are the alternatives that should be considered for the site and

were evaluated for the site for a final remedy.

One point to -- to note, the costing that's provided for alternative two, for this final alternative, was updated to include the actual costs that were incurred for the first seven years of monitoring and operations and maintenance at the site.

So it -- it went up just a little bit to -- just based on actuals versus predicted.

So the Navy believes that alternative two is the best option for the site into the future. This includes -- alternative two will include institutional controls, monitoring, and five-year reviews. The EPA and the state have tentatively concurred with us on that alternative.

The first portion of the alternative includes -- or is institutional controls. The particular items included with institutional controls are future cap maintenance, limitations on site

access, signs, fencing, restrictions on land use.

We don't want to impact the cap or do any damage to the area that is capped. Activities such as excavation, drilling, residential use, etc. are restricted, and the Navy will do annual inspections to document their compliance with those controls and do regular updates to the land use control documents that are in place.

This figure is in the back of your packet, if it's hard to read up here, but this cites -- or this figure summarizes our land use controls at the facility at this point; Site 6 being up here in blue, and blue being an area that will continue to have land use controls on both soil and groundwater use.

The second part of the preferred alternative is monitoring. Groundwater will continue to be monitored in -- in accordance with the existing plan and that monitoring will help us reassure ourselves that the -- the cap will remain protective

of human health and the environment.

There's caveats in there if the contaminants would exceed any primary criteria in the future, things could -- could be reassessed and evaluated and -- to determine if there's any future remedial actions that would be required.

The monitoring program will be optimized as appropriate based on the results. I've listed the wells here that will be monitored and the -- the monitoring as it stands now will be on a biannual or every two -- two-year basis from the annual basis that we were doing it.

And O&M will be performed annually in accordance with the existing O&M manual.

We can look at the figure. This gives us a site map with north arrow being here, Thames River over here. I just presented this to show you the wells, looking at 1S, 2S, 11S, and 10S being our downgradient wells; and 9S, 6S, and 6D

being our upgradient wells that are currently included in the program.

And the final part of our alternative is five-year reviews. These are to evaluate the site status and determine whether there's any future action necessary.

These are required for sites where waste is left in place and there's a potential for unacceptable risks to human health or the environment in the future.

So our schedule, the public comment period began on October 28 and will be concluded on November 29. We are conducting our public meeting and hearing this evening.

We anticipate once we receive comments, we'll prepare a responsiveness summary to address any comments received, and anticipate a final Record of Decision in December.

This slide summarizes our -- our points of contact, both on the Navy side and the regulator side. Mr. Valdis Jurka

just became the RPM for the Navy, and he's identifying himself. I didn't have his contact information completely, but we can provide that, if necessary, since he just came on board on Monday.

And Dick Conant with Subase New London; Kimberlee Keckler with EPA; and Mark Lewis with the State of Connecticut.

At this point, I'll turn the meeting back over to Dick Conant, and we can start the public hearing portion of the presentation.

RICHARD CONANT: And, Corey, if you would entertain any questions right now in your presentation --

COREY RICH: Yes.

RICHARD CONANT: -- kind of throw it over --

COREY RICH: Before we --

RICHARD CONANT: -- to that --

COREY RICH: -- proceed?

RICHARD CONANT: -- before we start the public hearing.

COREY RICH: Any comments,

questions?

RICHARD CONANT: Very good. Thank you, Corey.

At this time, the Navy would like to officially open the public hearing here. You can please -- if you would like to make a comment, please stand, announce who you are, who you represent. I will allow any period of time for a comment within reason.

If you do not wish to make a verbal comment tonight, there are provisions to submit comments. You can -- and that is carried in the brochure that we put out, as far as ways to submit either written or e-mail comment to our attention.

I do ask that if you have a verbal comment, we will record all that and there will be a transcript prepared as Corey mentioned eventually for the public.

So right now I will entertain any comments from the public.

FELIX PROKOP: Felix Prokop, Ledgelight Health District.

How long have we been at this '93, '94?

RICHARD CONANT: The IR program?

FELIX PROKOP: Yeah.

Since we have had these meetings. I know since I've been involved --

RICHARD CONANT: Yeah.

FELIX PROKOP: -- maybe ten years?

RICHARD CONANT: Well, I can give you brief history. The Navy really got involved with first assessing contamination concerns back in the early '80s.

FELIX PROKOP: Well --

RICHARD CONANT: We were listed in --

FELIX PROKOP: I don't want to stop you --

RICHARD CONANT: Yeah.

FELIX PROKOP: -- but we have been --

RICHARD CONANT: Yeah.

FELIX PROKOP: -- doing this since

the '90s. I've been --

RICHARD CONANT: Certainly.

FELIX PROKOP: -- one of the first people to --

RICHARD CONANT: Yeah.

FELIX PROKOP: Since Ledgelight Health District has been involved, I have always been the contact person.

RICHARD CONANT: Right.

FELIX PROKOP: In all those years, I have never received a phone call or inquiry of what's going on on the base, you know, on this project, which was odd to me --

RICHARD CONANT: Uh-huh.

FELIX PROKOP: -- you know, through that era --

RICHARD CONANT: Right.

FELIX PROKOP: -- everybody would be concerned -- what's going on at --

RICHARD CONANT: And this is from the general --

FELIX PROKOP: Objection.

RICHARD CONANT: -- public to Ledgelight?

Yeah.

FELIX PROKOP: You know, going to the health department --

RICHARD CONANT: Right.

FELIX PROKOP: -- and asking questions and -- it's just something I -- I'd like to revise. I just never got that kind of interest.

RICHARD CONANT: Uh-huh.

FELIX PROKOP: I'm just surprised. You can't go by the meeting. I know that.

RICHARD CONANT: Right. Right.

FELIX PROKOP: And it's been in papers, I just --

RICHARD CONANT: Right.

FELIX PROKOP: -- haven't gotten those kind of meetings.

RICHARD CONANT: Okay.

FELIX PROKOP: Secondly, whenever I did have questions, they have always been answered from you or Andy, so I would like to put that on the record.

RICHARD CONANT: Well, thank you.

FELIX PROKOP: And, secondly, I've

gone through two or three changes of command as far as health directors. So maybe between you and somebody else can -- can -- maybe a brief chronology nothing, too --

RICHARD CONANT: Uh-huh.

FELIX PROKOP: -- complicated, because we have another director coming onboard, all new members. We have grown since -- two towns, now we have five or six towns.

RICHARD CONANT: Right. Right.

FELIX PROKOP: So maybe I can get -- I'll give you a call later.

RICHARD CONANT: Most definitely.

FELIX PROKOP: Maybe a one-page thing or --

RICHARD CONANT: Okay.

FELIX PROKOP: -- two-page thing, very --

RICHARD CONANT: Yeah.

FELIX PROKOP: Brief, not complicated.

RICHARD CONANT: Let me -- I will

make a note in my planner after this and most definitely I should be able to send you out some general briefing information that you are looking for.

FELIX PROKOP: Again, just a brief uncomplicated -- because I know this stuff can really -- you can write volumes on it. There are volumes on it, I know.

Something I can bring to my new director --

RICHARD CONANT: Okay.

FELIX PROKOP: -- and -- and the new sanitarians. We have --

RICHARD CONANT: Uh-huh.

FELIX PROKOP: -- five or six sanitarians. It used to be me and somebody else --

RICHARD CONANT: Right.

FELIX PROKOP: -- that was it.

RICHARD CONANT: I -- I think we can provide something that's a synopsis brief of the program, how it's evolved, what the sites are, and where we're going in the future.

KYMBERLEE KECKLER: We also have

EPA's facts sheet on the web --

RICHARD CONANT: Okay.

KYMBERLEE KECKLER: -- and --

RICHARD CONANT: And --

FELIX PROKOP: It's on the website too.

RICHARD CONANT: Okay.

FELIX PROKOP: Anybody can go to that. If you want to ask some really complicated questions --

RICHARD CONANT: Okay.

FELIX PROKOP: -- that's something I can do.

RICHARD CONANT: Okay. Well, I'll be glad to follow up, get some information down your way.

FELIX PROKOP: Thanks. Thank you.

RICHARD CONANT: Okay?

Thank you very much.

Any other comments, statements?

Hearing none, I officially close the public hearing here, and I thank everyone for their attendance tonight.

KYMBERLEE KECKLER: I believe we

should just take a brief recess to see if anyone shows up late.

RICHARD CONANT: We could.

KYMBERLEE KECKLER: Yes.

RICHARD CONANT: Certainly.

KYMBERLEE KECKLER: Stick around for, like, 15 minutes or so.

Yeah?

RICHARD CONANT: Yeah.

(THEREUPON, THERE WAS A RECESS TAKEN.)

COREY RICH: Meeting adjourned.

(THEREUPON, THE HEARING WAS ADJOURNED AT 7:28 P.M.)

C E R T I F I C A T E

I hereby certify that I am a Notary Public, in and for the State of Connecticut, duly commissioned and qualified to administer oaths.

I further certify that said hearing was taken by me stenographically in the presence of the panel and members of the public and reduced to typewriting under my direction, and the foregoing is a true and accurate transcript of the testimony.

I further certify that I am neither of counsel nor attorney to either of the parties to said hearing, nor am I an employee of either party to said hearing, nor of either counsel in said hearing, nor am I interested in the outcome of said cause.

Witness my hand and seal as Notary Public this 20th day of November, 2006.

Clifford Edwards

Notary Public

My commission expires: 9/30/2011

PUBLIC COMMENTS

STATE OF CONNECTICUT

DEPARTMENT OF AGRICULTURE

Bureau of Aquaculture and Laboratory

November 1, 2006

Richard Conant
Installation Restoration Program Manager
Navy Submarine Base-New London
Bldg 439 Box 101 Rm 105
Rte 15
Groton, CT 06349

RE: Groton, CT. Proposed Plan for Site 6 Soil and Groundwater/OU2 at Naval Submarine Base-New London.

Mr. Conant:

I am in receipt of the reutilization plan for site 6 at the Naval Submarine Base in Groton. The document that accompanied the public notice indicated that contaminated soils contained "relatively high levels" of PAHs, PCBs and metals (arsenic, copper, lead, silver and zinc. "No substantial contamination occurred in the groundwater and no significant contamination in the surface water of the Thames River". Remediation work was completed on the site in 1995. Contaminated soils were replaced with clean material, over a geosynthetic clay liner. The site was then capped. Groundwater and surface water continue to be monitored for contaminates as part of the remediation plan.

The Department of Agriculture has no objection to the Navy's proposal to continue to provide institutional controls and monitoring groundwater at this site. The Department does have concerns with a lack of information on the current levels of PCBs PAHs and metals in shellfish (clams, mussels, oysters) in the immediate vicinity of this site. The site is approximately 260-300 ft from the Thames River.

The Department of Agriculture realizes that there are other sources of contaminates in the Thames River that could impact shellfish at this site but a baseline level of contaminates in shellfish would be beneficial if contaminate levels increase in future groundwater and surface water samples. The Department of Agriculture will continue to prohibit the harvesting of shellfish for any purposes within 1000ft of the US Naval Sub base shoreline.

If you have any questions, contact me at 203-874-0696.

Sincerely,

James Citak, Supervising Environmental Analyst

Cc: Mark Lewis, DEP

(059site06)jsc

Phone: (203) 874-0696 / FAX: (203) 783-9976
P. O. Box 97 • MILFORD, CONNECTICUT 06460

APPENDIX C

COST ESTIMATES

- ALTERNATIVE 1 - NO ACTION
- ALTERNATIVE 2 - INSTITUTIONAL CONTROLS AND MONITORING/SELECTED REMEDY

Naval Submarine Base - New London
Site 6 DRMO
Alternative 1 - No Action
Present Worth Analysis

Year	Year	Capital Cost	Operation & Maintenance Cost	O & M Manual & Updates	5-Year Review Cost	Monitoring Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	2006	$0	$0	$0	$0	$0	$0	1.000	$0
1	2007		$0	$0	$0	$0	$0	0.935	$0
2	2008		$0	$0	$0	$0	$0	0.873	$0
3	2009		$0	$0	$0	$0	$0	0.816	$0
4	2010		$0	$0	$0	$0	$0	0.763	$0
5	2011		$0	$0	$15,000	$0	$15,000	0.713	$10,695
6	2012		$0	$0	$0	$0	$0	0.666	$0
7	2013		$0	$0	$0	$0	$0	0.623	$0
8	2014		$0	$0	$0	$0	$0	0.582	$0
9	2015		$0	$0	$0	$0	$0	0.544	$0
10	2016		$0	$0	$15,000	$0	$15,000	0.508	$7,620
11	2017		$0	$0	$0	$0	$0	0.475	$0
12	2018		$0	$0	$0	$0	$0	0.444	$0
13	2019		$0	$0	$0	$0	$0	0.415	$0
14	2020		$0	$0	$0	$0	$0	0.388	$0
15	2021		$0	$0	$15,000	$0	$15,000	0.362	$5,430
16	2022		$0	$0	$0	$0	$0	0.339	$0
17	2023		$0	$0	$0	$0	$0	0.317	$0
18	2024		$0	$0	$0	$0	$0	0.296	$0
19	2025		$0	$0	$0	$0	$0	0.277	$0
20	2026		$0	$0	$15,000	$0	$15,000	0.258	$3,870
21	2027		$0	$0	$0	$0	$0	0.242	$0
22	2028		$0	$0	$0	$0	$0	0.226	$0
23	2029		$0	$0	$0	$0	$0	0.211	$0
24	2030		$0	$0	$0	$0	$0	0.197	$0
25	2031		$0	$0	$15,000	$0	$15,000	0.184	$2,760
26	2032		$0	$0	$0	$0	$0	0.172	$0
27	2033		$0	$0	$0	$0	$0	0.161	$0
28	2034		$0	$0	$0	$0	$0	0.150	$0
29	2035		$0	$0	$0	$0	$0	0.141	$0
30	2036		$0	$0	$15,000	$0	$15,000	0.131	$1,965
								TOTAL PRESENT WORTH	$32,340

Naval Submarine Base - New London
Site 6 DRMO
Alternative 2 - Institutional Controls and Monitoring / Selected Remedy
Present Worth Analysis

Year	Year	Capital Cost (a)	Operation & Maintenance Cost	O & M Manual & Updates	5-Year Review Cost	Monitoring Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	2006	$15,000					$15,000	1.000	$15,000
1	2007		$10,800	$10,000	$0	$40,000	$60,800	0.935	$56,848
2	2008		$10,800	$0	$0	$0	$10,800	0.873	$9,428
3	2009		$10,800	$0	$0	$40,000	$50,800	0.816	$41,453
4	2010		$10,800	$10,000	$0	$0	$20,800	0.763	$15,870
5	2011		$10,800	$0	$15,000	$40,000	$65,800	0.713	$46,915
6	2012		$10,800	$0	$0	$0	$10,800	0.666	$7,193
7	2013		$10,800	$10,000	$0	$40,000	$60,800	0.623	$37,878
8	2014		$10,800	$0	$0	$0	$10,800	0.582	$6,286
9	2015		$10,800	$0	$0	$40,000	$50,800	0.544	$27,635
10	2016		$10,800	$10,000	$15,000	$0	$35,800	0.508	$18,186
11	2017		$10,800	$0	$0	$40,000	$50,800	0.475	$24,130
12	2018		$10,800	$0	$0	$0	$10,800	0.444	$4,795
13	2019		$10,800	$10,000	$0	$40,000	$60,800	0.415	$25,232
14	2020		$10,800	$0	$0	$0	$10,800	0.388	$4,190
15	2021		$10,800	$0	$15,000	$40,000	$65,800	0.362	$23,820
16	2022		$10,800	$10,000	$0	$0	$20,800	0.339	$7,051
17	2023		$10,800	$0	$0	$40,000	$50,800	0.317	$16,104
18	2024		$10,800	$0	$0	$0	$10,800	0.296	$3,197
19	2025		$10,800	$10,000	$0	$40,000	$60,800	0.277	$16,842
20	2026		$10,800	$0	$15,000	$0	$25,800	0.258	$6,656
21	2027		$10,800	$0	$0	$40,000	$50,800	0.242	$12,294
22	2028		$10,800	$10,000	$0	$0	$20,800	0.226	$4,701
23	2029		$10,800	$0	$0	$40,000	$50,800	0.211	$10,719
24	2030		$10,800	$0	$0	$0	$10,800	0.197	$2,128
25	2031		$10,800	$10,000	$15,000	$40,000	$75,800	0.184	$13,947
26	2032		$10,800	$0	$0	$0	$10,800	0.172	$1,858
27	2033		$10,800	$0	$0	$40,000	$50,800	0.161	$8,179
28	2034		$10,800	$10,000	$0	$0	$20,800	0.150	$3,120
29	2035		$10,800	$0	$0	$40,000	$50,800	0.141	$7,163
30	2036		$10,800	$0	$15,000	$0	$25,800	0.131	$3,380
							TOTAL PRESENT WORTH		$482,197

(a) Capital Cost to update the Groundwater Monitoring Plan.

APPENDIX D

STATE OF CONNECTICUT CONCURRENCE LETTER

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

79 ELM STREET HARTFORD, CT 06106-5127

PHONE: 860-424-3001

Gina McCarthy
Commissioner

December 15, 2006

Susan Studlien, Director
U.S. Environmental Protection Agency
Office of Site Remediation and Restoration
1 Congress St.
Suite 1100 (HIO)
Boston, MA 02114-2023

Mark S. Ginda
Captain, USN
Commanding Officer
Naval Submarine Base New London
Box 00, Building 86
Crystal Lake Road
Groton, CT 06349

Re: State Concurrence with Remedy for Operable Unit 2, Soil and Groundwater at Defense Reutilization & Marketing Office (Site 6) at Naval Submarine Base New London, Groton, Connecticut

Dear Ms. Studlien and Captain Ginda:

The Connecticut Department of Environmental Protection (CTDEP) concurs with the remedy selected by the EPA and the Navy for addressing soil and groundwater contamination at the Defense Reutilization and Marketing Office (DRMO, Site 6) located at the Naval Submarine Base New London, in Groton, Connecticut. The soil and groundwater at the DRMO are also known collectively as Operable Unit 2.

In January 1995, under a Time- Critical Removal Action, the Navy excavated contaminated soils from the site and installed a cap consisting of a geocomposite liner and asphalt. The Navy selected an interim remedy for soils and ground water at the DRMO in March 1998. The interim remedy included institutional controls and groundwater monitoring. Groundwater monitoring conducted since 1998 has demonstrated compliance with the surface water protection and volatilization criteria, as specified in Section 22a-133k-3 of the Regulations of Connecticut State Agencies. Since 2003 the Navy has conducted annual inspections and carried out any repairs

needed to maintain the integrity of the cap.

The Navy proposes to address soil and groundwater contaminants at the DRMO through the continued use of institutional controls and ground water monitoring. The institutional controls would include restrictions against the use of ground water and activities that could disturb the cap or ground water monitoring system, as well as restricting site access. Ground water monitoring would continue in order to ensure that the cap remains protective of human health and the environment.

The remedy is described in detail in the proposed plan, and in the Record of Decision, both dated October 2006.

The Navy proposes to document the restrictions against disturbance of the landfill cap and withdrawal of ground water at the DRMO by amending the Base "Installation Restoration Site Use Restrictions Instruction Document". This is acceptable as long as the Base remains under the control of the Navy. However, if the property is transferred to another party, CTDEP expects that the Navy would record the appropriate environmental land use restrictions in accordance with Section 22a-133q-1 of the Regulations of Connecticut State Agencies. The Record of Decision states that the Navy would provide notice to DEP and the US Environmental Protection Agency at least 6 months prior to any transfer or sale of the area subject to the restrictions.

Thank you for your cooperation on this project. We look forward to working with the Navy and the US Environmental Protection Agency toward continued remediation at the Naval Submarine Base.

Yours truly,

Gina McCarthy
Commissioner

GM:MRL

C: Mr. Valdis Jurka, P.E.
Naval Facilities Engineering Command, Mid- Atlantic
9742 Maryland Avenue
Bldg N-26, Room 3208 (Code EV3)
Norfolk, VA 23511-3095

Ms. Kymberlee Keckler, Remedial Project Manager
US Environmental Protection Agency- Region 1
1 Congress St.
Suite 1100 (HBT)
Boston, MA 02114-2023

Naval Submarine Base New London
Attn: Richard Conant
Building 439, Room 105, Box 39
Route 12
Groton, CT 06349

APPENDIX E

SOPA (ADMIN) NEW LONDON INSTRUCTION 5090.18C

DEPARTMENT OF THE NAVY
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT 06349-5000

SOPA(ADMIN)NLONINST 5090.18C
14 Dec 06

SOPA (ADMIN) NEW LONDON INSTRUCTION 5090.18C

From: Commanding Officer, Naval Submarine Base New London

Subj: INSTALLATION RESTORATION SITE USE RESTRICTIONS AT NAVAL SUBMARINE BASE NEW LONDON, GROTON, CONNECTICUT

Ref:
(a) Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)
(b) Superfund Amendments and Reauthorization Act of 1986 (SARA)
(c) OPNAVINST 5090.1B (current version)
(d) Resource Conservation and Recovery Act (RCRA)
(e) Connecticut Department of Environmental Protection Remediation Standard Regulations
(f) Federal Facility agreement under CERCLA 120, In the matter of the US Department of the Navy, SUBASENLON, Groton, Connecticut, January 1995
(g) Record of Decision, Source Control Operable Unit, Area A landfill, SUBASENLON, Groton, Connecticut, September 1995
(h) Record of Decision for Site 8 - Goss Cove Landfill, Soil and Sediment, SUBASENLON, Groton, Connecticut, February 1998
(i) Interim Record of Decision for Sites 3, 7, 14, 15, 18 and 20 Groundwater, Groton, Connecticut, December 2004
(j) Land Use Control (LUC) Remedial design for Sites 3 and 7 Groundwater, SUBASENLON, Groton, Connecticut, June 2005
(k) Public Works Department Instruction 11000.1A
(l) Record of Decision for Site 6 - Defense Reutilization and Marketing Office - Operable Unit 2, SUBASENLON, Connecticut, December 2006
(m) Operations and Maintenance Manual for Installation Restoration Program Sites at SUBASENLON, Groton, Connecticut, Volumes I, II, III, IV, and V, January 2006
(n) Final Lower SUBASE Remedial Investigation Report, SUBASENLON, Groton, Connecticut 1999
(o) Area A Landfill Allowable Loading Pressure, SUBASENLON, November 2006

Encl: (1) Defense Reutilization and Marketing Office (DRMO) Installation Restoration Site and Landfill Cap - Site 6
(2) Area A Landfill Installation Restoration Site and Landfill Cap - Site 2A
(3) Installation Restoration Site Map for SUBASENLON
(4) Excavated Soil Management for Installation Restoration Sites at SUBASENLON
(5) Management of Dewatering Wastewaters for Installation Restoration Sites at SUBASENLON
(6) Goss Cove Landfill Installation Restoration Site and Landfill Cap - Site 8

1. Purpose. This instruction defines the Naval Submarine Base New London (SUBASENLON) policy regarding ground surface disturbance of soils/sediments or any subsurface disturbance of soils/sediments and/or groundwater extraction in Installation Restoration (IR) sites and the disturbance of any remedial infrastructure, including monitoring wells and waste caps. Disturbance is defined as any form of damage to remedial infrastructure, excavation, soil penetration, soil compaction, filling, or change of topography. The definition of disturbance also includes any proposed action to dewater excavations or extract/expose groundwater for discharge, consumption, or use in any way. This instruction is intended to enact institutional controls that are specified in references (a) through (o).

2. Applicability. This instruction is applicable to all Navy departments, tenant commands, contractors, invitees, and personnel at SUBASENLON.

3. Cancellation. SOPA(ADMIN)NLONINST 5090.18B.

4. Discussion. In accordance with references (a) through (o), the SUBASENLON IR Program manages the identification, characterization and cleanup of contaminated soils, sediments and groundwater at specific SUBASENLON IR locations. The existing IR sites at SUBASENLON are in various stages of the IR investigation and cleanup process. Specialized landfill caps have been installed over the former landfill at the Defense Reutilization and Marketing Office (DRMO) site, see enclosure (1); the former landfill at the Area A site, see reference (g); the former Goss Cove landfill, see reference (h); and a small area of Area A Downstream, see enclosure (3) in order to isolate

contaminated soils and sediments from the surrounding environment. These caps can be damaged by the operation or storage of heavy equipment on the cap surface or by unauthorized excavation or penetration through the cap surface.

a. Enclosures (1), (2), (3), and (6) outline the extent of the former landfill sites, the current landfill caps, and the contamination at Area A downstream. Enclosure (3) depicts the boundaries of all other identified IR sites at SUBASENLON and areas where groundwater use controls and restrictions are in effect. Groundwater and surface water shall not be extracted and used for any purpose at SUBASENLON. All areas indicated in enclosures (1), (2), (3) and (6) may contain contaminated soil, sediment or groundwater, which can potentially threaten human health or the environment if disturbed by unauthorized excavation or dewatering. Work can be safely conducted within the boundaries of identified IR sites, but proper planning, coordination, preparation, and safety measures must be implemented in accordance with federal and state laws. IR 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, and proper management of any generated waste.

b. Enclosures (4) and (5) provide guidance for excavation and dewatering in IR sites at SUBASENLON. Reference (m) provides requirements and guidance for the protection and maintenance of all IR sites identified in enclosure (3) and their associated structures, e.g., landfill cap asphalt wearing surfaces, landfill cap toe-slope protection, diversion channels, gas management vents, stormwater conveyances, material handling and storage pads, monitoring wells, and site perimeter fencing. Note that monitoring wells are not exclusively situated within the boundaries of the IR sites depicted in enclosure (3). All such structures shall not be modified, disturbed, or in any way affected without coordination with the SUBASENLON Environmental Department. The periodic and routine maintenance of all IR sites and their associated structures, will be accomplished in strict adherence to reference (m) by authorized Navy contractors. The operation of equipment and storage of materials within any IR site identified in enclosure (3) shall also be in compliance with reference (m).

5. Action. Prior to the operation or storage of any heavy equipment at the sites depicted in enclosures (1) and (6), all

SUBASENLON departments, tenant commands, Navy contractors, and personnel shall contact SUBASENLON Public Works and Environmental Departments, which will determine general landfill cap loading restrictions for all equipment/materials to be operated or stationed on these landfill caps.

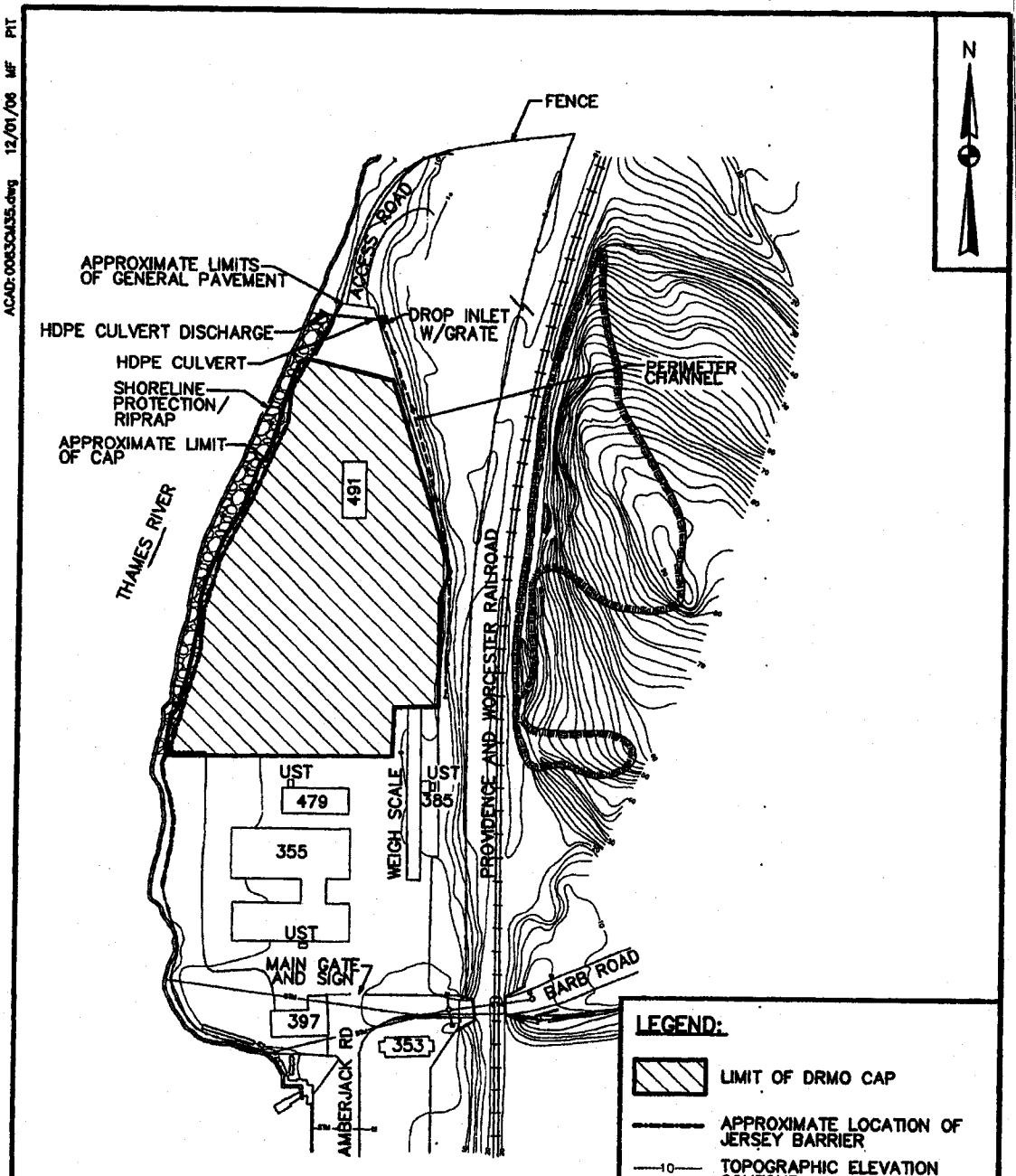
a. The Area A Landfill Installation Restoration Site and Landfill Cap - Site 2A depicted in enclosure (2) is a restricted area controlled by SUBASE Command Master-at-Arms (CMAA). All requests for access to the Area A and for the storage of any heavy equipment/ materials at Area A will be referred to the CMAA office. The CMAA office will coordinate all heavy equipment/materials storage requests with the SUBASENLON Public Works and Environmental Departments prior to authorizing any storage of heavy equipment/materials at the site. The loading guidance provided in enclosure (o) shall be utilized to assess storage of heavy equipment/material on the Area A landfill cap site. Precaution must be taken to ensure that any equipment operated and/or stationed on the three landfill caps will not damage the asphalt wearing surface to any appreciable degree. Damage to the asphalt wearing surfaces at the landfill caps must be reported immediately to the SUBASENLON Environmental Department.

b. Any SUBASENLON department, tenant command or Navy contractor planning projects involving subsurface excavation, subsurface penetration of the soil, dewatering, or ground surface disturbance at the sites depicted in enclosures (1), (2), (3) and (6) shall notify the SUBASENLON IR Program Manager at 694-5649 at the earliest project planning phase and follow the dig permit directions contained in reference (k). The IR Program Manager will coordinate project review with the Naval Facilities Remedial Project Manager, the SUBASENLON Public Works Department, the Public Safety Department, and the USEPA and the CTDEP, as applicable under references (a) through (o). Based on the outcome of this coordination, the SUBASENLON IR Program Manager will provide guidance for projects proposing ground surface disruption, subsurface excavation, penetration, or dewatering work in accordance with enclosures (4) and (5). No work shall commence in IR sites until an excavation permit, as required by reference (k), is completed and signed by the IR Program Manager and the Public Works Department. The excavation permit will specify requirements for the project, detail waste

management procedures, and establish standards for protecting remedial infrastructure and restoration of the project site.

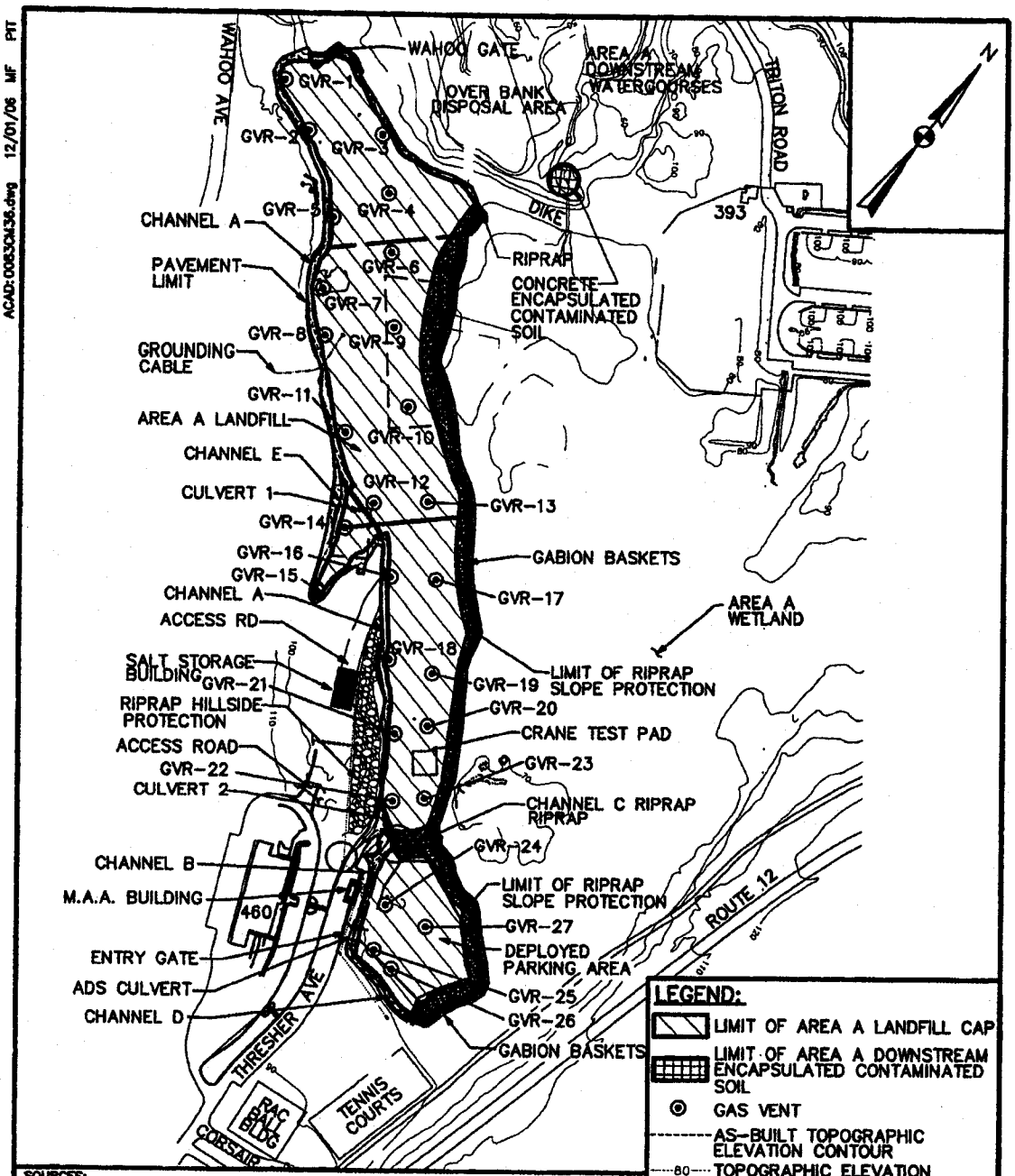
P. J. MCKENNA
By direction

Distribution: (SUBASENLONINST 5216.8N)
List D



DRAWN BY MF DATE 10/17/06	Tetra Tech NUS, Inc.	DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO) INSTALLATION RESTORATION SITE AND LANDFILL CAP NAVAL SUBMARINE BASE - NEW LONDON GROTON, CONNECTICUT	CONTRACT NO. 0083
CHECKED BY DATE			OWNER NO. 038
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. ENCLOSURE 1 REV. 0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98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WAHOO AVE
WAHOO GATE
GVR-1
GVR-2
GVR-3
GVR-4
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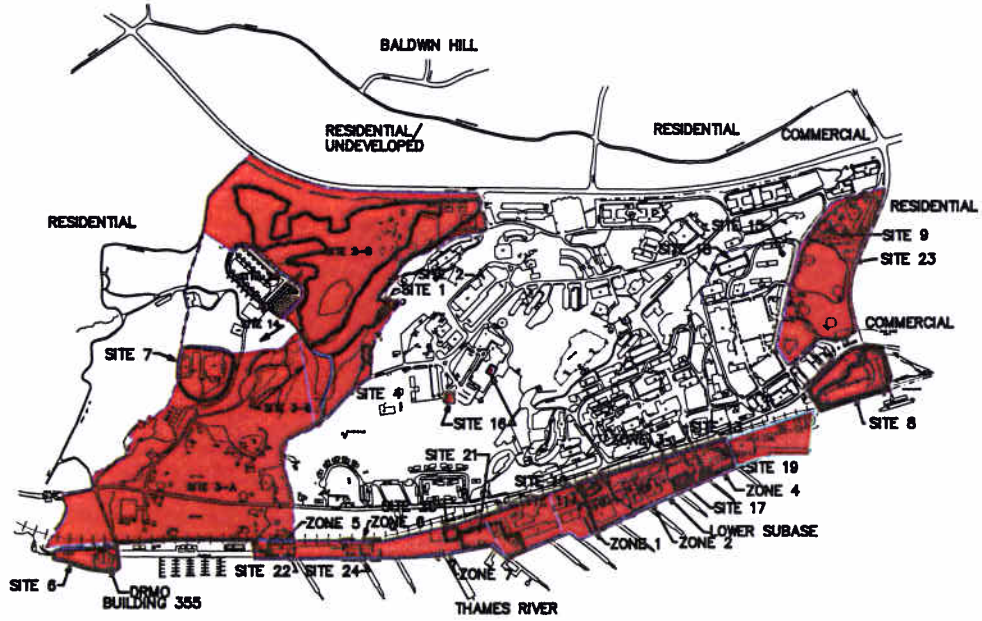
GVR-6
GVR-7
GVR-8
GVR-9
GVR-10
GVR-11
GVR-12
GVR-13
GVR-14
GVR-15
GVR-16
GVR-17
GVR-18
GVR-19
GVR-20
GVR-21
GVR-22
GVR-23
GVR-24
GVR-25
GVR-26
GVR-27
CHANNEL A
PAVEMENT LIMIT
GROUNDING CABLE
AREA A LANDFILL
CHANNEL E
CULVERT 1
CHANNEL A
ACCESS RD
SALT STORAGE BUILDING
RIPRAP HILLSIDE PROTECTION
ACCESS ROAD
CULVERT 2
CHANNEL B
M.A.A. BUILDING
460
ENTRY GATE
ADS CULVERT
CHANNEL D
THRESHER AVE
BAC BLDG
TENNIS COURTS
CORSAIR
OVER BANK DISPOSAL AREA
AREA A DOWNSTREAM WATERCOURSES
DIKE
RIPRAP
CONCRETE ENCAPSULATED CONTAMINATED SOIL
GABION BASKETS
LIMIT OF RIPRAP SLOPE PROTECTION
CRANE TEST PAD
CHANNEL C RIPRAP
RIPRAP
LIMIT OF RIPRAP SLOPE PROTECTION
DEPLOYED PARKING AREA
GABION BASKETS
TRITON ROAD
393
AREA A WETLAND
ROUTE 12
N
LEGEND:
LIMIT OF AREA A LANDFILL CAP
LIMIT OF AREA A DOWNSTREAM ENCAPSULATED CONTAMINATED SOIL
GAS VENT
AS-BUILT TOPOGRAPHIC ELEVATION CONTOUR
80 TOPOGRAPHIC ELEVATION CONTOUR OF EXISTING GROUND
0 300 600
GRAPHIC SCALE IN FEET
SOURCES:
1. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN (ATLANTIC, 1993).
2. GAS VENT COORDINATE INFORMATION FROM SAI SURVEY CO. FOSTER WHEELER AS-BUILT REPORT 11-1-97.
DRAWN BY MF DATE 10/17/06
CHECKED BY DATE
REVISED BY DATE
SCALE AS NOTED
Tetra Tech NUS, Inc.
AREA A LANDFILL
INSTALLATION RESTORATION SITE
AND LANDFILL CAP
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT
CONTRACT NO. 0063
OWNER NO. 036
APPROVED BY DATE
DRAWING NO. ENCLOSURE 2
REV. 0
FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98

ACAD: 0083CM37.dwg 12/01/06 MF PIT



LEGEND:

- SITE BOUNDARY
- OU9 BOUNDARY
- LOWER SUBASE REMEDIAL INVESTIGATION ZONE BOUNDARY
- AREA WITH LUCs ON SOIL AND/OR GROUNDWATER

LUC LAND USE CONTROL

SITE IDENTIFICATIONS:

SITE 1 – CONSTRUCTION BATTALION UNIT (CBU) DRUM STORAGE AREA
SITE 2 – (A) AREA A LANDFILL AND (B) AREA A WETLAND
SITE 3 – (A) AREA A DOWNSTREAM WATER COURSES AND (B) OVERBANK DISPOSAL AREA (OBDA)
SITE 4 – RUBBLE FILL AREA AT BUNKER A–86
SITE 6 – DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)
SITE 7 – TORPEDO SHOPS
SITE 8 – GOSS COVE LANDFILL
SITE 9 – OILY WASTEWATER TANK (OT–5)
SITE 10 – LOWER SUBASE–FUEL STORAGE TANKS AND TANK 54–H
SITE 11 – LOWER SUBASE–POWER PLANT OIL TANKS
SITE 13 – LOWER SUBASE–BUILDING 79 WASTE OIL PIT
SITE 14 – OVERBANK DISPOSAL AREA NORTHEAST (OBDANE)
SITE 15 – SPENT ACID STORAGE AND DISPOSAL AREA (SASDA)
SITE 16 – HOSPITAL INCINERATORS
SITE 17 – HAZARDOUS MATERIALS/SOLVENT STORAGE AREA (BUILDING 31)
SITE 18 – SOLVENT STORAGE AREA (BUILDING 33)
SITE 19 – SOLVENT STORAGE AREA (BUILDING 36)
SITE 20 – AREA A WEAPONS CENTER
SITE 21 – BERTH 16
SITE 22 – PIER 33
SITE 23 – FUEL FARM
SITE 24 – CENTRAL PAINT ACCUMULATION AREA (BUILDING 174)
SITE 25 – LOWER SUBASE–CLASSIFIED MATERIALS INCINERATOR

NOTES:

1. THIS FIGURE SHOULD BE IN COLOR. IF IT IS NOT, PLEASE CONTACT THE ENVIRONMENTAL DEPARTMENT.
2. SITE BOUNDRIES ARE APPROXIMATE
3. SOPA (ADMIN) NEW LONDON INSTRUCTION 5090.18C (2006) INCLUDES SITE USE RESTRICTIONS FOR AREAS WITH GROUNDWATER LUCs.

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SCALE IN FEET

DRAWN BY MF	DATE 10/17/06
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

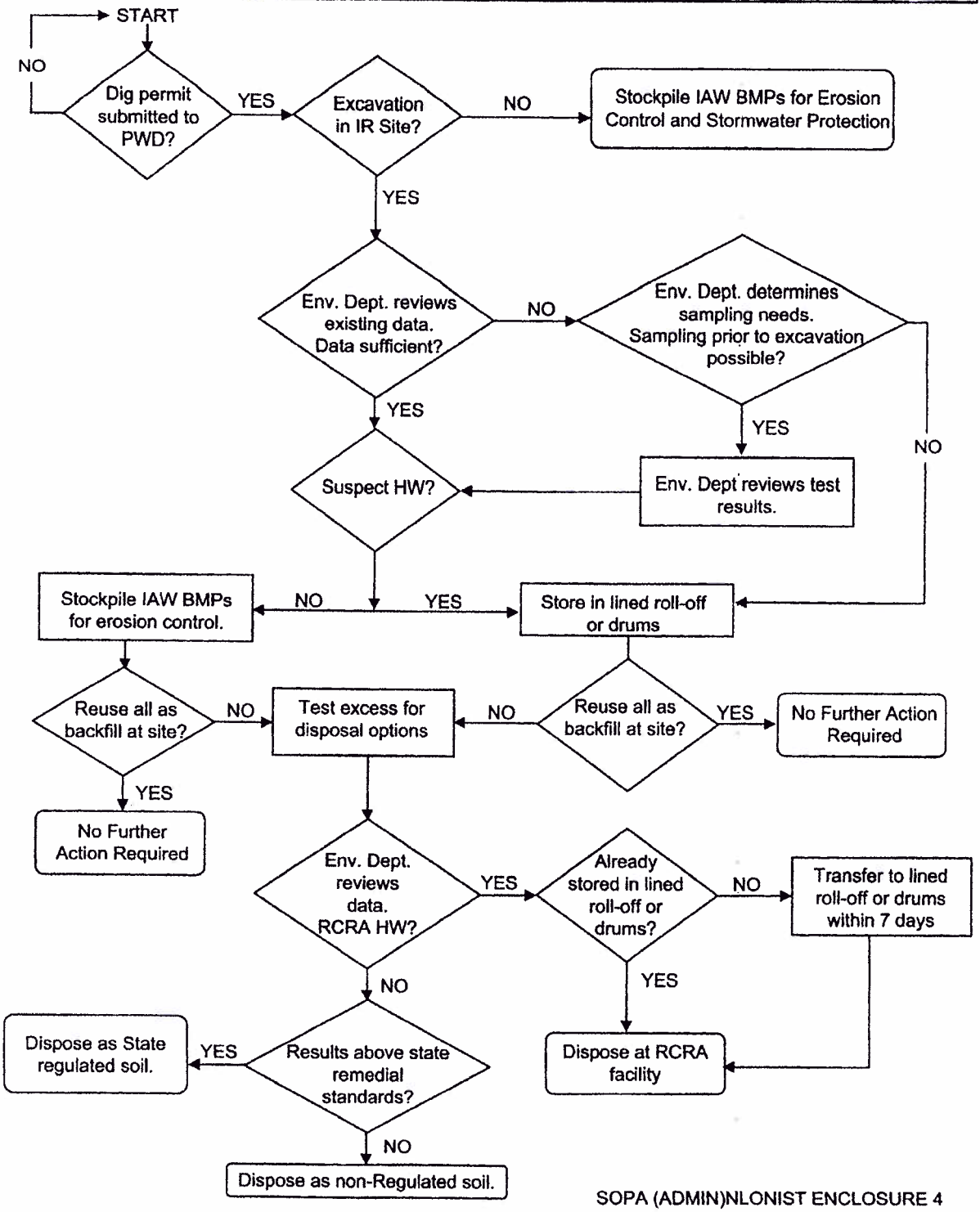
ACTIVE INSTALLATION RESTORATION SITES AND AREAS WITH LAND USE CONTROLS
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT

CONTRACT NO. 0083	
OWNER NO. 038	
APPROVED BY	DATE
DRAWING NO. ENCLOSURE 3	REV. 0

FORM CADD NO. TTNUS-AH.DWG - REV 1 -9/10/98

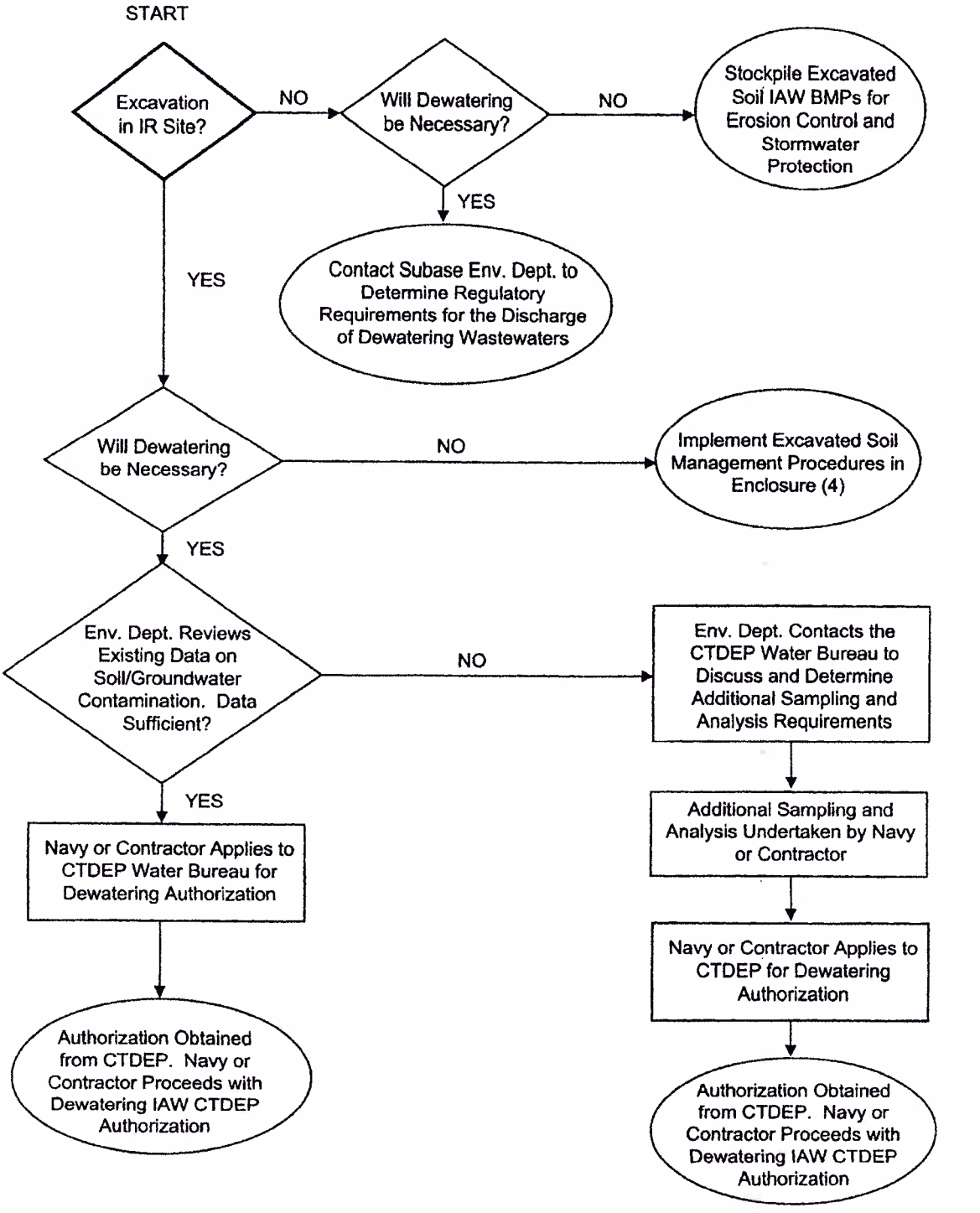
SOPA(ADMIN)NLONINST 5090.18C
14 Dec 06

EXCAVATED SOIL MANAGEMENT FOR INSTALLATION RESTORATION SITES
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT

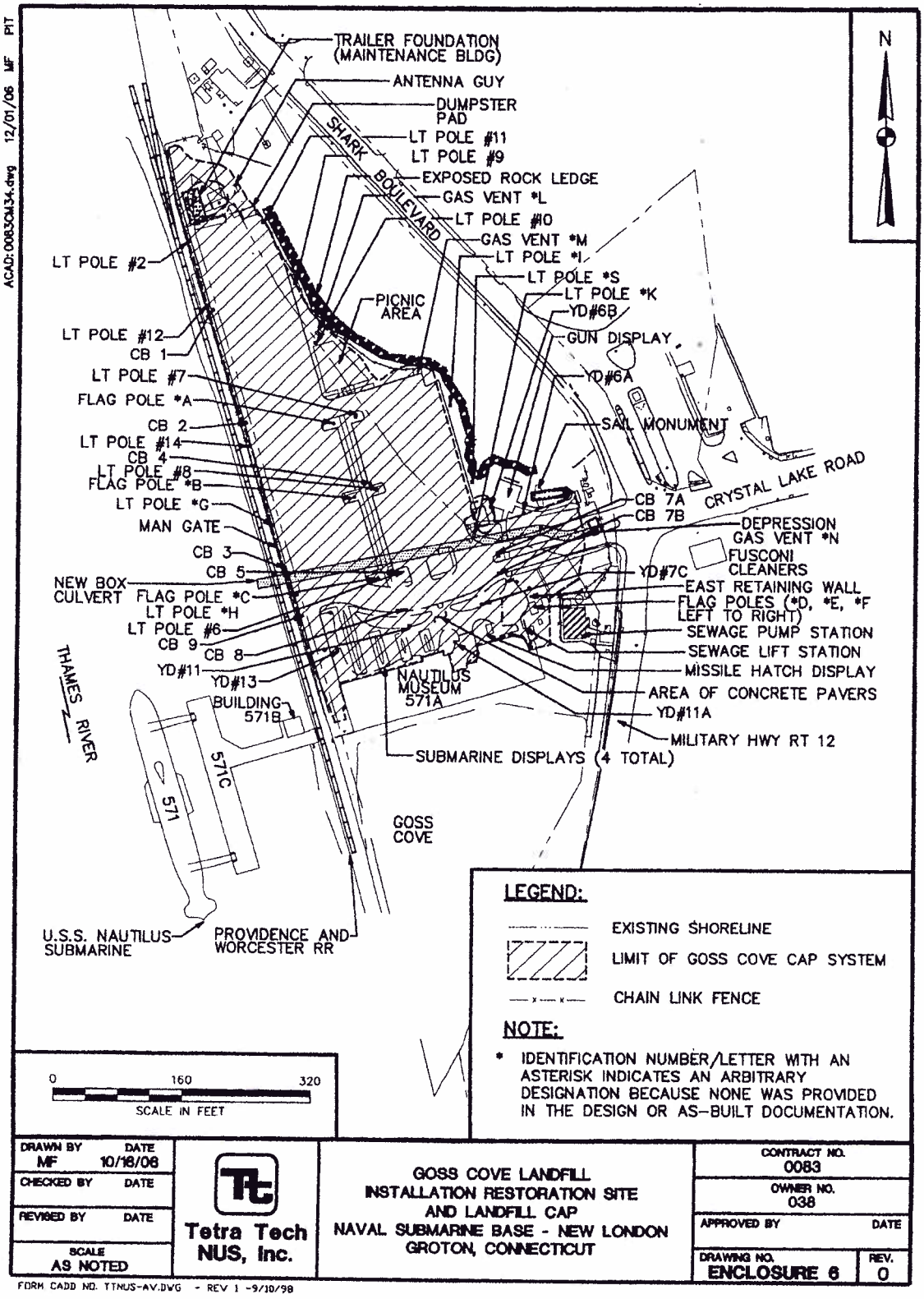


SOPA (ADMIN)NLONIST ENCLOSURE 4

**MANAGEMENT OF DEWATERING WASTEWATERS FOR INSTALLATION RESTORATION SITES
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT**



SOPA (ADMIN)NLONIST ENCLOSURE 5



DRAWN BY MF DATE 10/18/06	Tetra Tech NUS, Inc.	GOSS COVE LANDFILL INSTALLATION RESTORATION SITE AND LANDFILL CAP NAVAL SUBMARINE BASE - NEW LONDON GROTON, CONNECTICUT	CONTRACT NO. 0083
CHECKED BY DATE			OWNER NO. 038
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. ENCLOSURE 6 REV. 0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98