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Record of Decision
for
Site 7 - Torpedo Shops and Site 14 - Overbank Disposal Area Northeast Soil (OU8)

Naval Submarine Base New London
Groton, Connecticut

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
Lester, Pennsylvania

Contract Number N62467-94-D-0888

Contract Task Order 0841

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LIST OF ACRONYMS

bgs	below ground surface
cy	cubic yards
mg/kg	milligram/kilogram
µg/kg	microgram per kilogram
ARARs	Applicable or Relevant and Appropriate Requirements
Atlantic	Atlantic Environmental Services, Inc.
B&RE	Brown & Root Environmental
BGOURI	Basewide Groundwater Operable Unit Remedial Investigation
CB	chlorobenzene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGS	Connecticut General Statutes
COC	chemical of concern
COPC	chemical of potential concern
CSF	Cancer Slope Factor
CTDEP	Connecticut Department of Environmental Protection
CTE	Central Tendency Exposure
DCB	Dichlorobenzene
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
ESQD	Explosive Safety Quantity Distance
FFA	Federal Facility Agreement
FS	Feasibility Study
FWEC	Foster Wheeler Environmental Corporation
HI	Hazard Index
HQ	Hazard Quotient
HHRA	human health risk assessment
HSWA	Hazardous and Solid Waste Amendment
IAS	Initial Assessment Study
ICR	Incremental Cancer Risk
IR	Installation Restoration
NAVD	North American Vertical Datum
Navy	United States Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity

NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NSB-NLON	Naval Submarine Base – New London
NTCRA	Non-Time-Critical Removal Action
OBDANE	Overbank Disposal Area Northeast
O&M	operations and maintenance
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
POTW	Publicly-owned treatment works
PRG	Preliminary Remediation Goal
RAB	Restoration Advisory Board
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agencies
RD	Remedial Design
RfD	Reference Dose
RG	Remedial Goal
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSRs	Remediation Standard Regulations
SARA	Superfund Amendments and Reauthorization Act
Site 7	Torpedo Shops
Site 14	OBDANE
SVOC	semi-volatile organic compound
TAG	Technical Assistance Grant
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbon
TSD	treatment, storage, or disposal
TtNUS	Tetra Tech NUS, Inc.
U.S.C.	United States Code
UST	Underground Storage Tank
VOC	volatile organic compound

GLOSSARY OF TECHNICAL TERMS

This glossary defines terms used in this Record of Decision (ROD). The definitions apply specifically to this ROD and may have other meanings when used in different circumstances.

Administrative Record File: A file that contains all information used by the lead agency to make its decision in selecting a response under CERCLA. This file is to be available for public review, and a copy is to be established at or near the site, usually at one of the information repositories. Also, a duplicate is filed in a central location such as regional or state office.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental rules, regulations, and criteria that must be met by the selected remedy under Superfund.

Carcinogen: A substance that may cause cancer.

Comment Period: A time during which the public can review and comment on various documents and actions taken either by the Navy, EPA, or CTDEP. For example, a comment period is provided when EPA proposes to add sites to the National Priorities List. A minimum 30-day comment period is held to allow community members to review the Administrative Record file and review and comment on the Proposed Plan.

Community Relations: The Navy and NSB-NLON program to inform and involve the public in the Superfund process and respond to community concerns.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a trust fund to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, EPA can do either of the following:

- Pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling to perform the work.

- Take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

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

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

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

Five-Year Review: Review of any remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site. The review is conducted no less often than each five years after the initiation of the remedial action.

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.

Hazard Index (HI): Sum of the HQs for all chemicals and all routes of exposure.

Hazard Quotient (HQ): The ratio of the daily intake of a chemical from on-site exposure divided by the reference dose for that chemical. The reference dose represents the daily intake of a chemical that is not expected to cause adverse health effects.

Incremental Cancer Risk: The incremental increase in the probability of developing cancer during one's lifetime from exposure to carcinogenic chemicals in addition to the background probability of developing cancer. The EPA Incremental Cancer Risk goal is between $1x10^{-6}$ (1 in a million) and $1x10^{-4}$ (1 in ten thousand) chance of cancer risk. Cancer risk less than or within the risk goal is considered an acceptable risk level by the EPA. The CTDEP Incremental Cancer Risk Guideline is $1x10^{-5}$ (1 in a hundred thousand) and applies to cumulative risk posed by multiple contaminants. The State's acceptable carcinogenic risk for individual pollutants is $1x10^{-6}$ (1 in a million).

Information Repository: A file containing information, technical reports, and reference documents regarding a Superfund site that is made available to the public.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): Federal regulations that provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants.

National Priorities List (NPL): The EPA list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response. The list is based on the score a site receives in the Hazard Ranking System. EPA is required to update the NPL at least once a year.

Operable Unit (OU): Operable units are site management tools that define discrete steps towards comprehensive actions as part of a Superfund site cleanup. They can be based on geological portions of a site, specific site problems, initial phases of action, or any set of actions performed over time or concurrently at different parts of the site.

Organic Compounds: Naturally occurring or man-made chemicals containing carbon. Volatile organics can evaporate more quickly than semivolatile organics. Other organics associated with RI/FS activities include pesticides and polychlorinated biphenyls (PCBs). Some organic compounds may cause cancer; however, their strength as a cancer-causing agent can vary widely. Other organics may not cause cancer but may be toxic. The concentrations that can cause harmful effects can also vary widely.

Otto Fuel II: Otto Fuel II is a distinct-smelling, reddish-orange, oily liquid that the Navy uses as a fuel for torpedoes and other weapon systems. It is a mixture of three synthetic substances: propylene glycol dinitrate (the major component), 2-nitrodiphenylamine, and cibutyl sebacate and produces hydrogen cyanide when burned. Propylene glycol dinitrate, a colorless liquid with an unpleasant odor, is explosive. 2-Nitrodiphenylamine is an orange solid used to control the explosion of propylene glycol dinitrate. Dibutyl sebacate is a clear liquid used for making plastics, many of which are used for food packaging. It is also used to enhance flavor in some foods such as ice cream, candy, baked goods, and nonalcoholic drinks, and is found in some shaving creams.

Polynuclear Aromatic Hydrocarbons (PAHs): High molecular weight, relatively immobile, and moderately toxic solid organic chemicals featuring multiple benzenic (aromatic) rings in their chemical formula. Typical examples of PAHs are naphthalene and phenanthrene.

Proposed Plan: A public participation requirement of SARA in which the lead agency summarizes for the public the preferred clean-up strategy and rationale for preference and reviews the alternatives presented in the detailed analysis of the FS. The Proposed Plan may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under consideration.

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

Remedial Investigation (RI): A report that describes the site, documents the nature and extent of contaminants detected at the site, and presents the results of the risk assessment.

Remedial Action: The actual construction or implementation phase that follows the remedial design for the selected clean-up alternative at a site on the NPL.

Response Action: As defined by CERCLA Section 101(25), means remove, removal, remedy, or remedial action, including enforcement activities.

Responsiveness Summary: A summary of written and oral comments received during the public comment period, together with the Navy's and EPA's responses to these comments.

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.

Superfund: The trust fund established by CERCLA that can be drawn upon to plan and conduct cleanups of past hazardous waste disposal sites and current releases or threats of releases of non-petroleum products. Superfund is often divided into removal, remedial, and enforcement components.

Superfund Amendments and Reauthorization Act (SARA): The public law enacted on October 17, 1986 to reauthorize the funding provisions and amend the authorities and requirements of CERCLA and associated laws. Section 120 of SARA requires that all federal facilities be subject to and comply with this act in the same manner and to the same extent as any non-government entity.

Subsurface Soil: Soil, sand, and minerals typically found deeper than the top 12 inches of the earth's surface.

Surface Soil: Soil, sand, and minerals typically found within the top 12 inches of the earth's surface.

TH Dimer: Tetrahydromethylcyclopentadiene, also called RJ-4, is a fuel developed for ram-jet missiles. It has been used for the Navy Sea Launched Cruise Missile. It can be used alone or blended with other fuels (e.g., a component of JP-9 jet fuel).

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Operable Unit 8 [Site 7 - Torpedo Shops and Site 14 Overbank Disposal Area Northeast (OBDANE) soil]
Naval Submarine Base – New London
Groton, Connecticut
CERCLIS ID No. CTD980906515

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedies for Operable Unit (OU) 8 at Naval Submarine Base – New London (NSB-NLON), Groton, Connecticut. The Selected Remedies were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record for this site.

The United States Department of the Navy (Navy) and the United States Environmental Protection Agency (EPA) Region I issue this ROD (jointly). The State of Connecticut Department of Environmental Protection (CTDEP) concurs with the Selected Remedy.

1.3 ASSESSMENT OF SITE

The response actions selected in this ROD are necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site.

1.4 DESCRIPTION OF SELECTED REMEDIES

A total of 12 OUs have been defined at NSB-NLON. This ROD only applies to OU8, the soil at Sites 7 and 14. The Selected Remedy for Site 7 soil requires the design and implementation of response measures that will protect human health and the environment from contaminated soil. No Further Action (NFA) is required for Site 14 soil.

The groundwater at Sites 7 and 14 will be collectively addressed with the groundwater at Site 3 (Area A Downstream Watercourses), Site 15 (Spent Acid Storage and Disposal Area), Site 18 (Solvent Storage Area, Building 33), and Site 20 (Area A Weapons Center) in a future interim ROD. The groundwater at these sites makeup a portion of the Basewide Groundwater OU9. Additional portions of OU9, including

the groundwater at Site 2 (Area A Landfill and Wetlands), Site 9 (Oily Waste Water Tank OT-5), and Site 23 (Fuel Farm), will be addressed in separate interim RODs. A final ROD for OU9 will be prepared after interim RODs have been signed for all portions of OU9. No decision document is required for the surface water or sediment at Site 7.

1.4.1 Site 7

The investigation of Site 7 media (soil, groundwater, sediment, and surface water) was completed over multiple phases. Based on the evaluation of site conditions, site-related risks, applicable or relevant and appropriate requirements (ARARs), and Remedial Action Objectives, the following issues were identified for Site 7 soil:

- Polynuclear aromatic hydrocarbons [(PAHs); benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and ideno(1,2,3-cd)pyrene] were identified in a small area near the southeastern corner of Building 325 in surface and subsurface soil. The human health risk assessment (HHRA) showed that there are no unacceptable risks to potential receptors from direct exposure to the contaminants in Site 7 soil considering EPA's target risk range [$1x10^{-4}$ >Incremental Cancer Risk (ICR)> 10^{-6}; Hazard Index (HI)<1] and CTDEP's acceptable levels for cumulative risk (ICR<$1x10^{-5}$; HI<1). However, the ICR for full-time workers and child resident from exposure to benzo(a)pyrene in surface soil and surface/subsurface soil, respectively, exceeded CTDEP's target level for individual chemicals (ICR<$1x10^{-6}$). In addition, the maximum concentration of benzo(a)pyrene in soil exceeds Connecticut's Remediation Standard Regulations (RSRs) Industrial/Commercial Direct Exposure soil criterion and the maximum concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and ideno(1,2,3-cd)pyrene in soil exceed Connecticut's RSRs Residential Direct Exposure soil criteria. The maximum concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and ideno(1,2,3-cd)pyrene also exceed Connecticut's RSRs Pollutant Mobility Criteria, indicating a potential soil to groundwater contaminant migration concern; however, the available site data indicates that the potential for soil to groundwater migration of PAHs is not significant.

- An additional area of soil contamination is suspected along the western side of Building 325 near the location of a septic tank formerly used for Site 7. Benzene, chlorobenzene (CB), and dichlorobenzene (DCB) were detected in the groundwater originating from the septic tank location. The HHRA showed that there are potential unacceptable risks to future adult residents from exposure to maximum concentrations of these contaminants in Site 7 groundwater. Even though these contaminants were not detected in soil samples collected at nearby locations, it is believed that they are present in the septic tank or surrounding soil and the tank or contaminated soil are acting as the source of these contaminants to groundwater.

- An assessment of the risks to ecological receptors from Site 7 soil was completed and showed that the contaminants in the soil represent little potential risk to ecological receptors. It was also noted that Site 7 generally does not provide desirable habitat for ecological receptors.

The Selected Remedy for Site 7 soil is Excavation and Offsite Disposal. The remedy includes the excavation of contaminated soil and the septic tank (if necessary) and transportation of them to an approved off-site facility for disposal or recycling. The purpose for excavating the PAH-contaminated soil is to eliminate the potential for direct contact with the soil by current (construction worker) and future (adult and child residents) potential receptors. The purpose for excavating the source (soil and/or septic tank) of the benzene, CB, and DCB contamination is to eliminate future contaminant migration from the source to groundwater and to eliminate any potential concerns with direct contact with the contaminated soil. Completion of the Selected Remedy will allow for clean closure to residential reuse standards of Site 7 soil to residential reuse standards (i.e., no land use restrictions or additional actions required).

The Selected Remedy complies with regulatory requirements and includes the following major components:

- Advance additional soil borings (approximately 15) and collect additional soil samples (approximately 30 samples) to finalize the delineation of the horizontal and vertical extent of contaminated soil at both locations identified near Building 325. Collect samples to determine the nature of the contents of the septic tank. A brief sampling plan will be developed that provides the details of the pre-design investigation sampling program.

- Excavate approximately 1,900 cubic yards (cy) of surface and subsurface soil from OU8. The excavated soil includes approximately 1,700 cy of contaminated soil and 200 cy of uncontaminated soil that will be excavated to stabilize the excavation areas. The septic tank and its contents will also be removed during excavation activities if the pre-design investigation identifies it as the source of groundwater contamination.

- Transport and dispose/recycle approximately 1,900 cy of excavated surface and subsurface soil and the septic tank and its contents (if necessary). Disposal and/or recycling will occur at an approved off-site treatment, storage, or disposal (TSD) facility.

- Collect verification samples from the bottom and along the sidewalls of the excavation areas to verify that all chemicals of concern (COCs) have been either removed or are at concentrations less than the remedial goals (RGs). The verification samples will be sent to a laboratory and analyzed for COCs.

The final details of the verification sapling program will be provided as part of the remedial design documentation.

- Site restoration will be performed after verification samples indicate that all COCs have been removed or reduced to concentrations less than the RGs. Restoration will include backfilling the excavations and restoring the surface to pre-remedial action conditions (e.g. grass, asphalt, or gravel surfaces).

1.4.2 Site 14

The investigation of Site 14 soil identified minimal organic contamination, including low concentrations of volatile organic compounds, PAHs, and pesticides, and slightly more significant inorganic contamination (e.g., arsenic and lead). The HHRA showed that the risks to potential receptors associated with Site 14 soil were minimal; however, the results of the ecological risk assessment indicated that the chemicals detected in Site 14 soil could adversely impact ecological receptors. A Non-Time-Critical Removal Action (NTCRA) was conducted at Site 14 in 2001 and approximately 270 tons of debris and contaminated soil were removed and disposed off site. The RGs selected for the NTCRA were a combination of the goals selected for the Site 3 (OU3) remedial action and the Connecticut GB Pollutant Mobility Criteria. By removing all debris and contaminated soil with concentrations above the RGs, the Navy addressed all site-related risks. It is the Navy's current judgment that NFA under CERCLA is necessary for Site 14 soil.

1.5 STATUTORY DETERMINATIONS

1.5.1 Site 7

The Selected Remedy for Site 7 soil is protective of human health and the environment, complies with federal and State requirements that are applicable or relevant and appropriate, and provides a permanent solution for the contaminated soil at the site.

The Selected Remedy for Site 7 soil does not satisfy the statutory preference for treatment as a principal element of the remedy. Due to the limited amount of contaminated soil, the Navy has determined that incorporating technologies to reduce the toxicity of the contaminants on site would not be cost effective. However, the remedy does allow for the treatment or recycling of the contaminated soil by an approved TSD facility.

Because the remedy for Site 7 soil will result in the removal of contaminants from the site, either completely or to levels less than the RGs, the Selected Remedy will allow for the clean closure of OU8. Therefore, five-year reviews or other such periodic inspections and operations and maintenance (O&M)

procedures will not be required. This allows the alternative to be cost effective when compared to the other evaluated alternatives.

1.5.2 Site 14

NFA was selected for Site 14 soil because a NTCRA was conducted at the site which removed all debris and contaminated soil with concentrations above RGs and addressed all site-related risks. Because the remedy will not result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required.

1.6 ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for OU8.

- COCs and their respective concentrations.
- Baseline risk represented by the COCs.
- Cleanup levels (i.e., RGs) 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 assessment and ROD.
- Potential land and groundwater use that will be available at the site as a result of implementation of the Selected Remedy.
- Estimated capital, annual 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).

1.7 AUTHORIZING SIGNATURES

Capt. Sean P. Sullivan, USN
Commanding Officer
Naval Submarine Base - New London

9/27/04
Date

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

9-30-04
Date

2.0 DECISION SUMMARY

This ROD describes the remedies selected by the Navy and EPA for OU8 (Sites 7 and 14 soil). The Navy is the lead agency for CERCLA activities at NSB-NLON and provides the funding for the cleanup activities. The EPA provides the primary regulatory oversight and enforcement for the CERCLA activities at NSB-NLON, but the CTDEP is also actively involved in supporting the activities as required under the Federal Facility Agreement (FFA).

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 east 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.

2.1.1 Site 7

Site 7 includes the Torpedo Shops (Buildings 325, 450, 477, and 528) and is located in the northern portion of NSB-NLON on the northern side of Triton Road. Figure 2-2 shows the location of Site 7 at NSB-NLON, and Figure 2-3 shows general site features and historical sampling locations. The site is bordered on the east and north by 60-foot-high bedrock cliffs. The remainder of the site slopes to the southwest towards the Site 3 Area A Downstream Watercourses. An earthen berm extends along the base of the eastern portion of the exposed rock face.

The Navy conducts maintenance activities on torpedoes at the site. The major historical sources of contamination at Site 7 included potential disposal of solvents/chemicals into two on-site septic systems and leaks or spills associated with underground storage tanks (USTs) previously located at the site. The Navy currently manages the use, storage, and disposal of hazardous material and waste at Site 7 in accordance with Resource Conservation and Recovery Act (RCRA) regulations.

2.1.2 Site 14

Miscellaneous wastes were dumped at Site 14 in the past. The site is located adjacent to Sites 3 and 7 in a wooded area on the edge of a ravine just north of Stream 3 (Figure 2-2). A dirt road provides limited access to the site. A nearly vertical 20-foot high bedrock face is located at the eastern edge of the site. Figure 2-4 shows general site features and historical sampling locations.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Site History

2.2.1.1 Site 7

Building 325 is a torpedo overhaul facility. It was built in 1955 and had an on-site septic system until 1983, when the plumbing for the building was connected to sanitary sewers. The original septic leach field for Building 325 was located southwest of the building, adjacent to Triton Road. This leach field became clogged in 1975 and was abandoned. A new leach field (south leach field) was constructed next to the original leach field and was used until sanitary sewers were installed in 1983.

A variety of fuels, solvents, and petroleum products have been used in Building 325. Otto Fuel II [which is comprised of propylene glycol dinitrate (76 percent), 2-nitrodiphenylamine (1.5 percent), and di-n-butyl sebacate (22.5 percent) and produces hydrogen cyanide when burned], high-octane alcohol (190 proof grain alcohol), and TH-Dimer (jet rocket fuel) have been observed in maintenance areas. Solvents including mineral spirits, alcohol, and 1,1,1-trichloroethane, as well as petroleum products such as motor oil and grease, were also used in this building. A sink in one area was previously used for film development, and another sink was used for the overhaul of alkaline batteries. These sinks drained into the on-site septic system until 1983. A maintenance area has a shallow sump covered with flush-mounted steel grating. The area surrounding this sump was previously a washdown/blowdown area for weapons. It is suspected that the sump drains into the south leach field. Two No. 2 fuel oil USTs were located on the southern side of Building 325. One of the tanks was closed in 1995. A third tank, which was located above ground adjacent to the building, was used for temporary storage of No. 2 fuel oil but, based on field reconnaissance, had been removed as of March 15, 1995.

A smaller building attached to the eastern side of Building 325 was previously used as an assembly shop for torpedoes and as a paint shop. During a previous inspection at the building, a storage closet in this building was found to include containers of 1,1,1-trichloroethane and methyl ethyl ketone (2-butanone). Drums and cylinders were stored outside on the eastern side of this building. The vessels were labeled as containing propane, isobutane, 2-butanone, xylot, methylene chloride, propellant, and zinc chromate. An addition to the northern side of Building 325 was under construction at the time of the 1989 inspection and has since been completed. This addition is also used as a torpedo shop.

Building 450 is the primary MK-48 torpedo overhaul/assembly facility. Petroleum products including TL-250 motor oil and hydraulic fluid have been used in this building for torpedo maintenance. It was built in 1974 and was served by its own septic system until 1983, when it was connected to sanitary sewers. Only domestic wastewater from toilets, lavatories, and showers in Building 450 had been directed to the

septic field (north leach field). Torpedo overhaul/assembly operations at Building 450 generate fuels, solvents, and petroleum products as wastes. An Otto fuel and seawater mixture is drained from the torpedoes and replenished with fresh fuel. The Initial Assessment Study (IAS) Report (Envirodyne, 1983) indicated that Building 450 generates approximately 3,000 gallons of Otto fuel wastewater per month. This building was constructed with a waste collection system that collected waste products from floor drains and discharged them to an underground waste tank/sump with a capacity of approximately 1,500 gallons. The waste tank was pumped periodically, and the contents were disposed off site. Otto fuel product was previously stored in a 4,000-gallon UST south of Building 450.

An inspection of Building 450 was conducted in March 1989. The former septic leach field is located southwest of this building in a flat, elevated area. The hazardous waste sump was no longer in use and was reportedly decommissioned in 1987. It was replaced with three 1,000-gallon above-ground tanks located south of the building. The floor drains were sealed and replaced with a new system for pumping waste products to the new tanks. A 4,000-gallon above-ground Otto fuel storage tank replaced the previous underground tank and is located south of the building.

Building 477, approximately 65 feet east of Building 450, was formerly used to store drums of Otto fuel. Solvents including 1,1,1-trichloroethane, trichloroethene (TCE), toluene, mineral spirits, alcohol, and bulk freon have been used at this facility.

2.2.1.2 Site 14

Miscellaneous wastes were dumped at Site 14 in the past. Historical reports state that the vegetation at the site indicated that no dumping had occurred within 10 years prior to 1982. Inspection of the site verified the presence of several empty fiber drums.

2.2.2 Enforcement Activities

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

The Navy, EPA, and the State of Connecticut signed the FFA (EPA, 1995) for NSB-NLON. 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 amendment of 1986), the NCP, RCRA and Hazardous and Solid

Waste Amendment (HSWA) of 1984, Executive Order 12580, and applicable State laws. Sites 7 and 14 are two of 25 CERCLA sites being addressed by the Navy's Installation Restoration (IR) Program at NSB-NLON.

2.2.2.1 Site 7

Site 7 was investigated under CERCLA during the Phase I Remedial Investigation (RI) [Atlantic Environmental Services, Inc. (Atlantic), 1992], Phase II RI [Brown & Root Environmental (B&RE), 1997], and the Basewide Groundwater Operable Unit Remedial Investigation (BGOURI) [Tetra Tech NUS, Inc. (TtNUS), 2002]. The combined soil data set from these three investigations was provided and evaluated in the BGOURI. Additionally, the soil data were summarized and further evaluated in the BGOURI Update/Feasibility Study (FS) (TtNUS, 2004) to develop appropriate remedial alternatives.

Two USTs at Site 7 were also investigated under the State of Connecticut UST regulations to support closure of one tank and to establish that the other tank was operating properly and could remain in service. Total petroleum hydrocarbon (TPH)-contaminated soil was detected at one of the USTs. The contaminated soil was subsequently excavated and disposed at an off-site facility. The soil cleanup goal for the removal action was 500 milligrams per kilogram (mg/kg).

2.2.2.2 Site 14

Site 14 soil was investigated during the Phase I RI (Atlantic, 1992) and Phase II RI (B&RE, 1997). Based on the results of the Phase I and II RIs, an Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum (Navy, 1999) were subsequently prepared for the soil at Site 14. A NTCRA was conducted at Site 14 in 2001 and approximately 270 tons of debris and contaminated soil were removed and disposed off site. The results of the NTCRA were documented in the Final Removal Action Report [Foster Wheeler Environmental Corporation (FWEC), 2002]. The RGs selected for the NTCRA were a combination of the ecological-based goals selected for the Site 3 (OU3) remedial action and the Connecticut GB Pollutant Mobility Criteria. The limit of excavation for the NTCRA and the locations of the confirmation samples are shown on Figure 2-5. By removing all debris and contaminated soil with concentrations above the RGs, all site-related risks were addressed.

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. The RAB 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 OU8.

The following community relations activities are conducted as part of the Community Relations Plan (EPA, 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 the 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 EPA 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, 2004) for OU8 was published on July 16, 2004 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 August 17, 2004. 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 held at the Best Western Olympic Inn in Groton, Connecticut on July 28, 2004. The public meeting presented the proposed remedy and solicited oral and written comments. At the public meeting, personnel from the Navy, EPA, and the 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. 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 in Section 3.0.

2.4 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

Sites 7 and 14 are two of 25 IR Program sites currently included in the NSB-NLON IR Program. As with many Superfund sites, the problems at Sites 7 and 14 are complex. As a result, the soil and groundwater at the sites have been separated into different OUs.

OU8: Includes the contaminated soil at Sites 7 and 14.
OU9: Includes the Basewide Groundwater associated with the upper-base portion of NSB-NLON, including the groundwater at Sites 2, 3, 7, 9, 14, 15, 18, 20, and 23.

A total of 12 OUs have been defined at NSB-NLON. This ROD only applies to OU8. OU9 will be addressed in separate RODs. The Selected Remedies are the first and final remedies for OU8 under CERCLA.

2.4.1 Site 7

PAHs were identified in a small area near the southeastern corner of Building 325 in surface and subsurface soil and an additional area of soil contamination (benzene, CB, and DCB) is suspected near the location of a septic tank formerly used for Site 7 along the western side of Building 325. The HHRA showed that there are potential risks for full-time workers and child resident from exposure to benzo(a)pyrene in surface soil and surface/subsurface soil, respectively, considering CTDEP's target level for individual chemicals (ICR<$1x10^{-6}$). In addition, there were contaminants detected at concentrations that exceeded Connecticut's RSRs. The maximum concentration of benzo(a)pyrene in soil exceeds Connecticut's RSRs Industrial/Commercial Direct Exposure soil criterion and the maximum concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and ideno(1,2,3-cd)pyrene in soil exceed Connecticut's RSRs Residential Direct Exposure soil criteria. In addition, the HHRA showed that there are potential unacceptable risks to future adult residents from exposure to maximum concentrations of benzene, CB, and DCB in Site 7 groundwater along the western side of Building 325. It is suspected that the source of these groundwater contaminants is the septic tank or surrounding soil.

The Selected Remedy, Excavation and Off-site Disposal, provides the best alternative for eliminating current and future exposure to the contaminated soil at Site 7 by potential receptors and further cross-media contaminant migration from soil to groundwater. After execution of this ROD, the Navy will prepare a Remedial Design (RD) that will document the approach to be used to excavate and dispose the contaminated soil and septic tank (if necessary) at Site 7.

2.4.2 Site 14

The investigation of Site 14 soil identified minimal organic contamination, including low concentrations of volatile organic compounds, PAHs, and pesticides, and slightly more significant inorganic contamination (e.g., arsenic and lead). The HHRA showed that the risks to potential receptors associated with Site 14 soil were minimal; however, the results of the ecological risk assessment indicated that the chemicals detected in Site 14 soil could adversely impact ecological receptors. A NTCRA was conducted at Site 14 in 2001 and approximately 270 tons of debris and contaminated soil were removed and disposed off site. The RGs selected for the NTCRA were a combination of the ecological-based goals selected for the Site 3 (OU3) remedial action and the Connecticut GB Pollutant Mobility Criteria. By removing all debris and contaminated soil with concentrations above the RGs, all site-related risks were addressed and no future adverse health affects are anticipated from exposure to Site 14 soil. The Selected Remedy for Site 14 soil is NFA under CERCLA.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Setting

2.5.1.1 Site 7

Figure 2-3 shows the topography and surface features of Site 7. Site 7 is surrounded on the north and east by an exposed bedrock cliff. The cliff is the result of quarry activity along the northern bedrock high. The ground surface slopes gently to the southwest. There is an earthen berm along the eastern boundary of the site. Surface water runoff from Site 7 flows southwestward to drainage swales and storm sewers located on the southern side of Buildings 325 and 450. Runoff contained by the berm and by the storm sewer system drains through culverts under Triton Road into the Area A Downstream Watercourses (Stream 5) and eventually into the Thames River.

The geology of Site 7 consists of a southwestward-thickening wedge of overburden materials overlying metamorphic bedrock. The surficial deposits underlying Site 7 consist of fill material that varies in thickness from 2 to 10 feet and consists primarily of sand and gravel. The fill either lies directly on bedrock (in the northeastern portion of the site) or is underlain by up to 30 feet of silty sand (along the southwestern edge of the site). This area has a history of quarrying and filling; therefore, the silty sand is natural alluvium. The bedrock in this area has been identified as the Mamcoke Formation. In the northeastern portion of the site, the bedrock surface is relatively flat and has a mild slope toward the southwest. The bedrock surface between groundwater monitoring wells 7MW1D and 7MW7S slopes at a grade of approximately 2 percent. The bedrock surface in this area has been altered by quarry activity. Overburden thickness is typically less than 6 feet in this area. Southwest of groundwater monitoring wells 7MW7S and 7MW2D and southeast of test boring 7TB10, the bedrock slopes to the west and southwest

more steeply. The bedrock surface between groundwater monitoring wells 7MW7S and 7MW3D slopes at a steeper grade of approximately 14 percent. The overburden thickness increases to 30 to 40 feet in this area.

Groundwater was encountered in both the overburden and bedrock underlying Site 7. Depths to groundwater average less than 10 feet across the site. Within the overburden, the water table was generally encountered near the fill/alluvium interface at locations where both units were present. Figure 2-6 shows the overburden groundwater flow pattern across the Site 7 area based on August 2000 water-level data. The figure shows that the general direction of shallow groundwater flow is to the west-southwest toward Site 3 - Area A Downstream Watercourses. Groundwater flow directions in the shallow bedrock, as determined during the BGOURI, are to the west and southwest (Figure 2-7). In the overburden, the hydraulic gradient across the site is approximately 0.02. Within the bedrock, the flow gradient appears to be slightly lower at 0.015.

Downward vertical gradients were consistently observed at Site 7. Groundwater monitoring well clusters 7MW2S/2D (alluvium/bedrock), 7MW3S/3D (combined fill and alluvium/deep alluvium), and 7MW5S/5D (combined overburden and bedrock/deeper bedrock) all had downward vertical gradients, indicating that the Site 7 area is a local recharge area for groundwater.

Slug tests have been performed in three alluvium and two bedrock wells at Site 7 over the course of the various RI field efforts. The estimated site-specific average hydraulic conductivity for the alluvium, based on the slug test results, is 11.4 feet per day. Using a hydraulic gradient of 0.02 and a measured porosity of 0.37, the estimated groundwater seepage velocity in the alluvium at the site is 0.62 foot per day.

Site 7 is a relatively well developed area and a significant portion is paved with asphalt. Buildings and maintained lawns cover the unpaved areas. Consequently, Site 7 provides poor habitat for wildlife.

2.5.1.2 Site 14

Prior to the removal of the debris and contaminated soil during the NTCRA, the disposal area at Site 14 was circular and approximately 80 feet in diameter. A dirt road provided limited access to the site. A nearly vertical 20-foot high bedrock face is located at the eastern edge of the site. The rest of the site sloped to the southwest.

Site 14 is located within the lower portion of a northwest-trending valley (northern valley) situated between the topographic/bedrock high that occupies the central area of the NSB-NLON and the topographic/bedrock high that forms the northern border of the NSB-NLON. Surface water runoff from

Site 14 flows into Stream 3 of Site 3 (see Figure 2-4). The streams within Site 3 convey the surface water to the Thames River.

The geology of Site 14 consists of overburden deposits overlying metamorphic bedrock. The overburden consists of silty sand and gravel. The bedrock at Site 14 has been identified as the Mamacoke Formation. The bedrock surface slopes from the northern and central bedrock highs that surround the area toward the northwest-trending valley. There are bedrock exposures upslope of Site 14 and bedrock was encountered at the site at a depth of 12 feet below ground surface.

A single overburden monitoring well (14MW1S) was installed at Site 14. Based on information collected from the Site 14 monitoring well and test borings and monitoring wells installed within Site 3, a site adjacent to Site 14, groundwater is present in both the overburden and bedrock underlying Site 14. The depth to groundwater was less than 5 feet below ground surface. The saturated thickness of the overburden materials was approximately 6 to 10 feet along Stream 3. Figure 2-8 presents the shallow overburden potentiometric surface map and groundwater flow directions for Site 14 and adjacent sites. It is based on water levels measured in October 2002. The bedrock potentiometric surface map and groundwater flow directions in the vicinity of Site 14 are shown on Figure 2-7. This figure is based on water levels measured in August 2000.

Site 14 is located in a heavily wooded area on the edge of a ravine. The area is classified as upland deciduous forest. This portion of NSB-NLON provides good habitat for terrestrial receptors.

2.5.2 Nature and Extent of Contamination

2.5.2.1 Site 7

This section summarizes the nature and extent of soil contamination at Site 7. The summary includes historical soil data collected during the Phase I and Phase II RIs and soil data collected during the BGOURI. The relevant and most recent soil data are summarized in Tables 2-1 through 2-4. The locations of COCs detected in the soil are presented in Figure 2-9. A complete version of the analytical database for Site 7 soils is presented in the BGOURI (TtNUS, 2002).

Historic Investigations (Phase I and II RIs)

Nine volatile organic compounds (VOCs), including three chlorinated aliphatics, three monocyclic aromatics, two ketones, and carbon disulfide, were detected in Site 7 soil samples. Most were detected infrequently and at low concentrations. Methylene chloride, a common laboratory contaminant, was detected most frequently (14 of 27 samples). Benzene, toluene, and total xylenes were each detected in

from 1 to 6 of 37 samples. 1,1-Dichloroethene, 2-butanone, acetone, carbon disulfide, and tetrachloroethene were each detected in from 1 to 5 of 27 samples. With the exception of acetone, which was detected at a maximum concentration of 0.17 mg/kg, these remaining VOCs were detected at trace concentrations ranging from 0.003 mg/kg to 0.032 mg/kg.

Twenty-five semi-volatile organic compounds (SVOCs), including 17 PAHs, four phthalate esters, 4-methylphenol, benzoic acid, carbazole, and dibenzofuran, were detected in soil samples collected from the Torpedo Shops site. PAHs were detected most frequently and, with one exception, at the greatest concentrations. Reported concentrations of PAHs ranged from 0.018 mg/kg (fluoranthene) to 4.3 mg/kg (phenanthrene). Diethyl phthalate was detected at a concentration of 14 mg/kg in the soil sample collected at a depth interval of 1 to 3 feet below ground surface (bgs) from boring 7MW7S, located along the drainage swale south of Building 450. Maximum concentrations of nine SVOCs (all PAHs) were associated with the soil sample collected from a depth interval of 1 to 3 feet bgs from test boring 7TB10, located south of Building 325. Maximum concentrations of an additional nine SVOCs were associated with the soil sample collected from a depth interval of 1 to 3 feet bgs from well boring 7MW4S, located near the southeastern corner of Building 325.

Eight pesticides and one polychlorinated biphenyl (PCB) were detected in the Torpedo Shops soil samples. DDT and its metabolites DDD and DDE were detected most frequently, each detected in 4 or 5 of 23 samples. Concentrations of these three pesticides ranged from 0.0044 mg/kg to 0.21 mg/kg. Aroclor-1254 was detected in a single soil sample collected at a depth interval of 2 to 4 feet bgs from well boring 7MW2S at a concentration of 0.66 mg/kg. Endrin ketone (0.0068 mg/kg), heptachlor (0.0047 mg/kg), and methoxychlor (0.032 mg/kg) were detected in the soil sample collected from a depth interval of 1 to 3 feet bgs from well boring 7MW4S, located near the southeastern end of Building 325. The remaining two pesticides (endosulfan sulfate and endrin aldehyde) were each detected in two samples at concentrations ranging from 0.0055 mg/kg to 0.035 mg/kg.

Twenty-three metals were detected in the Torpedo Shops soil samples, although mercury, selenium, and thallium were each detected in from only 1 to 5 of 27 samples. Maximum concentrations of 11 metals were detected in the soil sample collected from a depth interval of 5 to 7 feet bgs from well boring 7MW6S, located along the western side of Building 325.

Toxicity Characteristic Leaching Procedure (TCLP) extraction followed by analysis for metals was performed for 10 soil samples collected from the Torpedo Shops site. In addition, the TCLP leachate of one of these samples was also analyzed for TCLP organics (VOCs, SVOCs, pesticides, and herbicides). No organic compounds were detected in this leachate. Arsenic, barium, cadmium, and selenium were detected in the TCLP leachate samples.

TPH was detected in 12 of 20 soil samples at concentrations ranging from 28 mg/kg to 898 mg/kg. The maximum TPH concentration was detected in the soil sample collected from a depth interval of 4 to 8 feet bgs from well boring 7MW8S, located along Triton Road in the western portion of the site.

BGOURI

2-Butanone, acetone, carbon disulfide, CB, and toluene were detected in the four subsurface soil samples collected during the BGOURI. These compounds were detected in from two to three of four samples. Pyrene was the only detected SVOC, and it was detected only in sample S7SB100607 at a concentration of 25 micrograms per kilogram (µg/kg). Twenty metals were detected in four soil samples. Eighteen of these 20 metals were detected in all four samples. Antimony was detected in only two of four samples, and thallium was detected only in sample S7SB100607. Most of the maximum detected concentrations of these 20 metals were in samples S7SB090809 and S7SB100607. Of the detected metals, the maximum detected concentrations of antimony, arsenic, copper, iron, lead, and potassium were less than background concentrations.

Although no soil samples were collected in the immediate area of the septic tank during the BGOURI, groundwater detections of CBs (1,4-DCB, CB, and hexachlorobenzene) and benzene in this area suggest the possibility that the septic tank or soil surrounding the septic tank is the source of the constituents found in the groundwater at this location (see Figure 2-10).

Summary

PAHs and inorganics were generally the chemicals detected most frequently and at significant concentrations in Site 7 soil. PAHs were identified in an area along the southeastern corner of Building 325. Inorganics were detected across the site and appear to be related to background conditions.

The CBs and benzene detected in groundwater (Figure 2-10) appear to be related to the septic tank or contaminated soil along the western side of Building 325. It is possible that the septic tank or the surrounding soil is the source of the contamination. No data were available to confirm this hypothesis. Additional soil sampling activities will be conducted as part of a pre-design investigation to confirm the source of the contamination.

2.5.2.2 Site 14

This section summarizes the nature and extent of soil contamination at Site 14. The summary includes historic soil data collected during the Phase I and Phase II RIs and the confirmation sample results from

the NTCRA. The historic Site 14 soil data was used as the basis for conducting the NTCRA at the site. Tabular summaries of the historic data can be found in the Phase II RI (B&RE, 1997).

Historic Investigations (Phase I and II RIs)

Only a few volatile organics were present at very low concentrations. Tetrachloroethene was detected in two surface soil samples at concentrations of 2 µg/kg and 3 µg/kg. Several additional volatile organic compounds were also detected in single surface or subsurface soil samples. Surface soil sample 14SS3 contained the majority of these compounds. Toluene (18 µg/kg) and chloromethane (8 µg/kg) were detected in surface soil samples from borings 14MW1S and 14SS3, respectively, while methylene chloride was detected at a concentration of 7 µg/kg in the subsurface soil sample from boring 14TB2A. The concentrations of other volatile organic compounds, which were detected in surface soil samples only and included several halogenated aliphatics and two monocytic aromatics, were 2 or 3 µg/kg.

Several PAHs were detected in the surface and subsurface soil samples. The shallow samples (0 to 2 feet deep) from the onsite boring (14TB1) and the well boring (14MW1) as well as surface soil sample 14SS3 contained several PAHs (at concentrations below 100 µg/kg) and benzoic acid (Cmax = 64 µg/kg). Fluoranthene and pyrene were the only semivolatile organics detected in the 0 to 2 foot sample from boring 14TB2. Maximum concentrations of all semivolatiles except benzoic acid in surface soil samples were found in the 0 to 2 foot sample from boring 14TB1, located in the northwest portion of the site.

The subsurface soil samples collected from outside the actual disposal area contained notably fewer chemicals at lower concentrations. For example, the sample collected at a depth of 2 to 4 feet from the well boring (14MW1) contained only benzoic acid (29 µg/kg). The subsurface sample from boring 14TB2 contained no detectable semivolatile organics. The deepest sample collected (8 to 10 feet) from the on-site boring (14TB1) contained a wide variety of PAHs. All concentrations were at or below 110 µg/kg.

Surface soil samples 14SS3 and 14SS3C were also analyzed for pesticides. 4,4' DDT (400 µg/kg) and related compounds, 4,4' DDE (74 µg/kg) and 4,4' DDD (11 µg/kg), were detected in sample 14SS3. The results do not appear to indicate that pesticide contaminated material was disposed at this site, but rather that this site may have been affected by past base wide applications of 4,4'-DDT.

Metals concentrations were generally higher in surface soils than in subsurface soils. A majority of maximum concentrations were found in samples collected from well 14MW1S and boring 14TB1. Only concentrations of beryllium and cobalt were less than the NSB-NLON background concentrations. Three metals (arsenic, boron, and lead) were detected in surface sample 14SS3 at concentrations (16.3 mg/kg, 27.6 mg/kg, and 403 mg/kg, respectively) notably greater than in the other soil samples. All other metals in surface soil sample 14SS3 were reported at concentrations below the maximum detected result for the

other samples. Since the disposal area does not appear to contain these metals at elevated concentrations, no source can be identified.

Barium, cadmium, chromium, and lead were detected in the TCLP extracts of one or two surface soil samples. All results were below Federal toxicity characteristic regulatory levels and Connecticut remediation standards for pollutant mobility for GB waters. Overall, the analytical results do not indicate the presence of a significant source area at the site.

Overall, the historic investigations of Site 14 soil identified minimal organic contamination, including low concentrations of volatile organic compounds, PAHs, and pesticides, and slightly more significant inorganic contamination (e.g., arsenic and lead).

NTCRA

Confirmation sample results from the NTCRA, as presented in the Final Removal Action Report [Foster Wheeler Environmental Corporation (FWEC), 2002], are provided in Appendix B. These results indicate the contaminant concentrations that remained after the NTCRA was completed at Site 14. The RGs for the NTCRA are also provided in the Appendix B tables.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

NSB-NLON is currently an active Navy base and should remain so into the foreseeable future. Site 7 is the Torpedo Shops at NSB-NLON, and reasonable potential future land use of the area includes the continued use as a torpedo maintenance facility or other industrial activities associated with submarine operations and maintenance. Site 14 is an undeveloped area and it is expected to remain undeveloped in the future.

Sites 7 and 14 are located within designated Explosive Safety Quantity Distance (ESQD) arcs of the Area A Weapons Center; therefore, further development is not planned for this area. Navy regulations prohibit construction of inhabited buildings or structures within these arcs and, although existing buildings operate under a waiver of these regulations, no further construction is planned. Therefore, there are no plans for residential development of the sites.

The groundwater aquifers found within the overburden and bedrock at the sites are not used for drinking water or industrial water supply purposes. The groundwater is classified as GB by the State of Connecticut. The groundwater in the overburden aquifer discharges locally to streams that eventually discharge to the Thames River, or directly to the Thames River. The overburden aquifer is hydraulically

connected to the bedrock aquifer. There are no current plans to use either the overburden or bedrock aquifer in this area for drinking water or industrial water supply purposes.

If the Navy sells this property in the future, it is possible that the sites could be developed for residential use. Therefore, hypothetical future residential use of the site was evaluated in the risk assessment for the purposes of completeness and to determine whether land use controls are needed.

2.7 SUMMARY OF SITE RISKS

The purpose of a risk assessment is to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminated media at a site. The results of the risk assessment provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action.

The human health risks associated with exposure to contaminated media (i.e., soil and groundwater) at Site 7 were originally evaluated in the Phase II RI (B&RE, 1997), then updated in the BGOURI (TtNUS, 2002) after additional data was collected, and further refined in the BGOURI Update/FS (TtNUS, 2004). The ecological risks associated with exposure to contaminated media (i.e., surface soil) were evaluated in the Phase II RI (B&RE, 1997). The results of these Site 7 risk assessments are provided below.

The human health and ecological risks associated with exposure to contaminated media at Site 14 were originally evaluated in the Phase II RI (B&RE, 1997). A NTCRA was conducted at Site 14 in 2001 and debris and contaminated soil were removed and disposed off site. The RGs selected for the NTCRA were a combination of the ecological-based goals selected for the Site 3 (OU3) remedial action and the Connecticut GB Pollutant Mobility Criteria (see Appendix B). By removing all debris and contaminated soil with concentrations above the RGs, all unacceptable site-related risks were addressed and no future adverse human health or ecological health affects are anticipated from exposure to Site 14 soil. No additional human health or ecological risk assessment information for Site 14 soil is provided in this ROD.

2.7.1 Human Health Risk Assessment

The major components of a HHRA include data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Data evaluation is a task that uses a variety of information to determine which of the chemicals detected in site media are most likely to present a risk to potential receptors. The end result of the evaluation is a list of contaminants of potential concern (COPCs) and representative exposure point concentrations for each medium. During the exposure assessment, potential human exposure pathways are identified at the source areas under consideration. Chemical-specific toxicity criteria for the identified COPCs are identified during the toxicity assessment and are used

in the quantification of potential human health risks. Risk characterization involves quantifying the risks associated with exposure to the COPCs using algorithms established by the EPA and CTDEP. Risks from chemicals are calculated for either carcinogenic or noncarcinogenic effects. The uncertainty analysis identifies limitations in the risk assessment that might affect the final risk results. The final result of the risk assessment is the identification of media-specific COCs and exposure pathways that need to be addressed by a remedial action.

COPCs were identified by comparing maximum concentrations of contaminants to risk-based and health-based criteria. If the maximum concentration exceeded any criteria, the chemical was retained for all exposure routes involving that medium. The Site 7 surface soil COPCs and the screening criteria used to identify them are summarized in Tables 2-1 and 2-2. Similar information for Site 7 subsurface soil is summarized in Tables 2-3 and 2-4. The tables differentiate COPCs based on direct contact and migration exposure scenarios.

Potential receptors for exposures to soil at Site 7 included construction workers, full-time employees, and future residents. Potential exposure pathways are summarized in Table 2-5. These pathways consider the potential for exposure based on present use, potential future use, and location of the site. Exposure assumptions for the receptors and toxicity information for the COPCs were presented in the BGOURI (TtNUS, 2002) and are not reiterated in this ROD.

Exposure point concentrations for each of the COPCs were developed for reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. Based on the limited data set, the maximum and average concentrations were used for surface soil exposure concentrations under the RME and CTE scenarios, respectively. The 95 percent upper confidence limit was used as the exposure concentration for exposures to subsurface soil under the RME and CTE scenarios.

Potential human health risks resulting from exposure to Site 7 COPCs were estimated using algorithms established by the EPA and CTDEP that calculate risk as a function of chemical concentration, human exposure parameters, and toxicity. Risks attributable to exposure to chemical carcinogens were estimated as the probability of an individual developing cancer over a lifetime (ICR). According to EPA, risks less than 1×10^{-6} (or a risk less than one in one million) are generally considered to be “acceptable," and risks greater than 1×10^{-4} (1 in 10,000) are generally considered to be “unacceptable." According to CTDEP, risks less than 1×10^{-5} (1 in 100,000) for cumulate risk or 1×10^{-6} (1 in 1,000,000) for individual chemicals are generally considered to be “acceptable," while risks greater than 1×10^{-5} for cumulative risk or 1×10^{-6} for individual chemicals, are generally considered to be “unacceptable." The hazards associated with the effects of noncarcinogenic chemicals were evaluated by comparing an exposure level or intake to a reference dose (RfD). If the ratio of the intake of a chemical to the RfD [hazard quotient

(HQ)] exceeds unity, noncarcinogenic (toxic) effects may occur. A HI was generated by summing the individual HQs for all the COPCs associated with a specific pathway. If the value of the HI exceeds unity, noncarcinogenic health effects associated with that particular chemical mixture may occur, and therefore it is necessary to segregate the HQs by target organ effects or mechanism of action. The HQ should not be construed as a probability in the manner of the ICR, but rather as a numerical indicator of the extent to which a predicted intake exceeds or is less than an RfD.

Tables 2-6 and 2-7 present the cancer risks and HIs for Site 7 under the RME and CTE scenarios, respectively. Risk Assessment Guidance for Superfund (RAGS) Part D, Summary of Receptor Risks and Hazards for COPCs, tables for Site 7 are included in Appendix D. Cumulative ICRs and HIs resulting from exposure to soil at Site 7 were within the EPA and CTDEP acceptable ranges for the receptors and scenarios considered. However, chemical-specific ICRs for arsenic (child residents) and benzo(a)pyrene (full-time workers and child residents) exceeded CTDEP's target level of 1×10^{-6} for individual chemicals. It should be noted that the maximum detected concentration of arsenic was less than its respective CTDEP RSR for residential exposure. The evaluation also showed that there are contaminants in soil, primarily PAHs and inorganics that pose a potential contaminant migration to groundwater issue.

The chemicals identified as a concern in Site 7 soil during the HHRA were further evaluated during the uncertainty analysis using additional information such as background levels, nature and extent information (e.g., frequency of detection), and ARARs. The following table summarizes the COCs for Site 7 soil that were identified through the HHRA and uncertainty analysis.

Medium	Method	Scenario	COCs Based on Federal Requirements	COCs Based on CTDEP Requirements
Soil	HHRA	Carcinogenic	None	Benzo(a)pyrene
		Non-Carcinogenic	None	None
	Direct Comparison Criteria	Direct Contact-Industrial/ Commercial	None	Benzo(a)pyrene
		Direct Contact - Residential	None	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Indeno(1,2,3-cd)pyrene
		Migration from Soil to Groundwater	None	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Chrysene Indeno(1,2,3-cd)pyrene

Although not detected in site soil samples, relatively significant concentrations of CB, 1,4-DCB, and benzene were detected in the groundwater west of Building 325 at Site 7. These detections suggest that residual contaminated soil/waste may remain in this area. The suspected contaminated soil/waste is probably acting as an ongoing source of groundwater contamination. The septic tank and associated piping or surrounding contaminated soil are likely sources. As a result, CB, 1,4-DCB, and benzene were also retained as Site 7 soil COCs.

Due to the potential for risks from direct contact exposure to Site 7 soil contaminants and the potential for Site 7 soil contaminants to impact the underlying groundwater, the response action selected in this ROD is necessary to protect the public health and welfare of the environment from actual and potential exposure to and releases of contaminants from the site.

2.7.2 Ecological Risk Assessment

An assessment of the risks to ecological receptors from exposure to surface soil at Site 7 was conducted during the Phase II RI. An exposure assessment was conducted and showed that the Torpedo Shops represent a well-developed area that does not provide either cover or forage for wildlife receptors. Areas near the Torpedo Shops (e.g., the wooded area to the south) do represent desirable habitat for wildlife. Organisms inhabiting this area may come in contact with on-site soil while moving through the area to forage in the nearby Area A Wetland.

In order to evaluate potential impacts to ecological receptors, it was assumed that the Torpedo Shops supported diverse vegetation and a population of soil invertebrates. Short-tailed shrews were assumed to inhabit and forage in the area, preying on soil invertebrates. These same small mammals in turn were assumed to serve as prey for red-tailed hawks.

The maximum and average concentrations of chemicals detected in surface soil samples collected from the site were compared to benchmark values that are protective of various terrestrial ecological receptors. The calculated HQs exceeded 1.0 for terrestrial vegetation and soil invertebrates. The calculated HIs also exceeded 1.0 for terrestrial vertebrates. Inorganics contributed most significantly to the potential risks.

After the risks were calculated, the uncertainty in the results was considered. While the potential for exposure to soil does exist, actual exposure would be much more limited than that considered in the evaluation, thereby resulting in actual ecological risks associated with this site which are significantly lower than those estimated in the assessment. When the current site conditions are factored into this evaluation, it is concluded that the Torpedo Shops site presents little potential risk to ecological receptors.

No ecological COCs were retained for the site, and subsequently, no response actions are required for ecological receptors.

2.8 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) provide a general description of what the response action will accomplish. These goals typically serve as the design basis for many of the remedial alternatives discussed in the next section. The RAOs provide the basis for evaluating clean-up options for the site and an understanding of how the risks identified in the previous section will be addressed by the response action. No RAOs were required for Site 14 soil because there were no unacceptable risks and no COCs for the site.

Based on the results of the HHRA completed for the BGOURI, the evaluation of the HHRA results in the BGOURI Update, and the ecological risk assessment completed during the Phase II RI, the following RAOs were developed for Site 7 soil:

RAO1 - Protect current receptors (construction worker and full-time employee) from incidental exposure to soil contaminated with PAHs and potentially contaminated with benzene, CB, and DCB at concentrations greater than the preliminary remediation goals (PRGs) (see Table 2-8). The HHRA identified potential risks to full-time employees from exposure to benzo(a)pyrene in surface soil. In addition, benzo(a)pyrene was detected in subsurface soil at a concentration that exceeds the Connecticut Industrial/Commercial RSR for direct exposure. The concentrations of benzene, CB, and DCB in the soil will not be known until additional sampling is conducted near the septic tank.

RAO2 - Protect existing groundwater quality by preventing the leaching of PAHs and benzene, CB, and DCB in soil at concentrations greater than the PRGs (see Table 2-8). Since the Connecticut soil to groundwater pollutant mobility criteria are based on theoretical concepts and cross-media impacts, compliance with this RAO can also be demonstrated conclusively with site-specific groundwater data. Available site data indicates that soil to groundwater migration of PAHs is not significant, but soil to groundwater migration of benzene, CB, and DCB may be significant.

RAO3 - Protect aquatic ecological receptors by preventing the erosion of soil containing COCs at concentrations greater than the PRGs. Potential risks to aquatic ecological receptors were not identified, and therefore, PRGs were not selected (see Table 2-8).

RAO4 - Protect potential future receptors (residential use) from incidental exposure to soil contaminated with PAHs and potentially with benzene, CB, and DCB at concentrations greater than the PRGs

(see Table 2-8). The HHRA identified potential risks to a hypothetical future child resident from exposure to benzo(a)pyrene in soil. In addition, the maximum concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in soil exceed the Connecticut Residential RSRs for direct exposure. The concentrations of benzene, CB, and DCB in soil will not be known until additional sampling is conducted near the septic tank.

The PRGs identified to address the RAOs associated with Site 7 soil contaminants are based on risk assessment results and the CTDEP RSRs including direct contact and groundwater protection considerations. The PRG selection process for Site 7 soil was presented in Appendix C, Table C-3 of the BGOURI Update/FS (TtNUS, 2004).

2.9 DESCRIPTION OF ALTERNATIVES

A detailed analysis of three potential remedial alternatives for Site 7 soil was completed in the BGOURI Update/FS (TtNUS, 2004). The alternatives were developed to provide a range of remedial actions for Site 7 soil. With the exception of Alternative 1 (No Action), the remedial alternatives were developed to achieve the RAOs. The following sections of the ROD summarize the alternatives that were evaluated for Site 7 soil in the FS. An FS was not conducted for Site 14 soil because there were no unacceptable risks and no COCs for the site.

2.9.1 Description of Remedial Alternatives

Alternatives were formulated from the technologies and process options that passed the screening process. The three remedial alternatives and their major components are discussed below.

Alternative S1 - No Action: Other than five-year reviews, no activities would be conducted for this alternative. There would be no restrictions placed on excavations, handling, or disposal of contaminated soil from the site. Existing environmental records would not be consulted for any activities that may be conducted at the site. This alternative is required under CERCLA to establish a basis for comparison with other alternatives. The durations and costs associated with this alternative are as follows:

- Estimated Time for Design and Construction: NA
- Estimated Time for Operation: 30 years
- Estimated Capital Cost: $0
- Estimated O&M Costs (Present Worth): $89,600
- Estimated Total Present Worth: $89,600

Alternative S2 - Institutional Controls with Permeable Cover: This alternative consists of institutional controls that would identify the location, magnitude, and type of soil contamination present and place restrictions on excavation and handling of contaminated soil at the site. The primary document for implementing this control would be the NSB-NLON Site Use Restrictions document. The aerial extent of the restrictions is estimated to be 10,500 square feet (0.24 acre) for the PAH-contaminated soil and 300 square feet (0.007 acre) for the suspected CB-, DCB-, and benzene-contaminated soil.

Under this alternative, existing permeable covers (soil/gravel/asphalt) would be maintained at the site as long as waste remains, but no additional cover would be placed to increase the thickness of the permeable covers. If disturbance of the subsurface is necessary (e.g. underground utility or building foundation work) and contaminated soil is contacted or excavated, construction workers must wear appropriate PPE. If contaminated soil is excavated, this soil must be properly handled and disposed, (e.g. in a landfill and not used as clean fill). When the excavation is complete, a permeable cover consistent with site operations must be re-applied to the site.

This alterative allows for natural degradation of site contaminants. Monitoring of mobile contaminants would be addressed as part of the Site 3 and 7 groundwater remedy. Periodic testing of the PAH-contaminated soil would be conducted on an as-needed basis (e.g., during underground utility work).

Lastly, this alternative provides for periodic reviews of site conditions and analytical data (i.e., five-year reviews). The land use controls, testing, and periodic reviews would continue until the selected RGs are met. The goals would be the most conservative of the goals provided in Table 2-8, and attainment of the goals would allow the site to be used without any restrictions in the future. In the event of a property transfer and with confirmation that contaminated soil remains at the site, a deed notification would be used to prohibit exposure to contaminated soil. The assumed durations and estimated costs associated with this alternative are as follows:

- Estimated Time for Design and Construction: 6 months
- Estimated Time for Operation: 30 years
- Estimated Capital Cost: $6,250
- Estimated O&M Costs (Present Worth): $91,750
- Estimated Total Present Worth: $98,000

Alternative S3 - Excavation and Off-Site Disposal: This alternative would consist of the delineation of contaminated soils and the excavation of approximately 1,900 cy of soil (1,600 cy of PAH-contaminated soil, 90 cy of suspected CB-, DCB-, and benzene-contaminated soil and/or waste/septic tank, and 200 cy of non-contaminated soil to establish a safe excavation). The excavated soil would be characterized and

then disposed or recycled at an off-site facility. After excavation, soil samples would be collected from the bottom and sidewalls of each excavation area to verify the removal of all COCs or to verify that COCs that remain are at concentrations less than the RGs. The RGs selected for Site 7 soil would be the most conservative PRGs of those provided in Table 2-8. Attainment of the goals would allow the site to be used without any restrictions in the future. Following the verification process, clean soil would be used to fill the excavations and restore the site to pre-remediation conditions. The assumed durations and estimated costs associated with this alternative are as follows:

- Estimated Time for Design and Construction: 1.5 years
- Estimated Time for Construction: 3.5 months
- Estimated Capital Cost: $440,200
- Estimated O&M Costs (Present Worth): $0
- Estimated Total Present Worth: $440,200

2.9.2 Common Elements and Distinguishing Features of Each Alternative

Alternatives S1, S2, and S3 are similar in that none of the alternatives actively treat the contaminated soil. Ultimately, site contaminants would be expected to degrade through natural biological, chemical, and physical processes. For Alternatives S1 and S2, the contaminated soil will remain on site. Under Alternative S3, the contaminated soil would be transported off site to be handled at another facility.

Alternatives S1 and S2 allow the contaminated soil to remain in place and include periodic site reviews that would be conducted every 5 years. However, Alternative S2 provides for institutional controls that would restrict construction and development activities at the site, thus removing the potential for contacting the contaminated soil that will remain in place; Alternative S1 does not provide for any type of activity restrictions.

Alternatives S2 and S3 are similar in that they both address the exposure pathways associated with Site 7 soil. However, Alternative S2 addresses the exposure pathways by limiting construction and development activities, and Alternative S3 addresses the exposure pathways by removing the contaminated soil from Site 7. Both alternatives address the risk issues with Site 7 soil, but Alternative S3 opens the site for unrestricted future use.

Alternative S3 is the only alternative that provides active remediation of Site 7 soil. Alternatives S1 and S2 are passive alternatives that allow for natural degradation of site contaminants. They include only periodic inspection (Alternative S1 and S2) and periodic testing (Alternative S2).

2.9.3 Expected Outcomes of Each Alternative

Under Alternative S1 (No Action), the site could not be released for unrestricted use. In the event that the site was released for unrestricted use, Alternative S1 would not be protective of human health. Additionally, Alternative S1 does not address the potential hazards that may result from migration of soil contaminants to groundwater.

Under Alternative S2 (Institutional Controls with Permeable Cover), the site could not be released for unrestricted use. Institutional controls would dictate protective site restrictions and procedures for construction activities performed at Site 7. As with Alternative S1, Alternative S2 does not fully address the potential hazards that may result from migration of soil contaminants to groundwater.

After implementation of Alternative S3 (Excavation and Off-Site Disposal), Site 7 soil would be released for unrestricted use. Unacceptable human health risks and the potential for contaminant migration from soil to groundwater would be eliminated through excavation and off-site disposal of the contaminated soil.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD summarizes the comparative analysis of the Site 7 soil alternatives 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

Alternatives S2 and S3 are expected to be moderately to very protective of human health and the environment. Currently, contaminants in site soil are relatively isolated from human contact and therefore do not present significant risks. Contaminated soil also does not represent a significant ecological threat. However, Alternative S1 may not be completely protective in the future because construction workers or potential future residents could come in contact with PAH-contaminated soil. This contact would result in unacceptable risks. Also, contaminated soil could be excavated and used elsewhere without restriction. If the contaminated soil/waste was used elsewhere without adequate cover, unacceptable risks to human health could result. In addition, under Alternative S1, the suspected presence of CB-, DCB-, and benzene-contaminated soil or wastes near the septic tank may continue to impact groundwater. This soil may represent a significant direct contact risk (additional sampling results are necessary to confirm) and it may act as an ongoing source that would prevent groundwater contamination from naturally degrading in a timely manner.

Alternative S2 would achieve most of the RAOs and would be less protective of human health and the environment than Alternative S3 because contaminants would remain on site and would require long-term enforcement of site use restrictions. Alternative S2 also includes periodic soil testing that would be conducted during construction projects or during a property transfer to re-evaluate site risks and potential future restrictions at that time. Because the COCs in Site 7 soil are organic, they are subject to slow natural biological and chemical degradation. The PAH-contaminated soil is likely present in a high organic-content matrix (asphalt) that would slow natural degradation processes. Under Alternative S2, soil concentrations should decrease to less than PRGs but several years to several decades may be required. At that time, site use restrictions could be eliminated.

Alternative S3 would achieve all the RAOs and be the most protective alternative by removing all contaminated soil from the site. After remedial actions are complete, additional actions or restrictions would not be required.

2.10.2 Compliance with ARARs

Section 121(d) of CERCLA and the NCP, 40 Code of Federal Regulations (CFR) 300.430(f)(1)(ii)(B), require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and State requirements, standards, criteria, and limitation, unless such ARARs are waived under CERCLA Section 121(d)(4). The primary chemical-specific ARAR is the Connecticut RSRs [Connecticut General Statutes (CGS) 22a-133k; Regulations of Connecticut State Agencies (RCSA) 22a-133k – 1 thru 3]. The potentially applicable action-specific ARARs are the Connecticut Hazardous

and Solid Waste Management Regulations and the federal and Connecticut Clean Water Act (see Tables 2-10 and 2-13).

Alternative S3 would comply with all chemical-specific ARARs. Alternative S2 would not comply with all chemical-specific ARARs because there may be inadequate soil cover to meet the Connecticut Direct Exposure Criteria and soil with contaminant concentrations in excess of the Connecticut Pollutant Mobility Criteria would remain in place. Because unmanaged PAH-contaminated soil and potentially contaminated soil/waste near the septic tank would remain at the site, Alternative S1 would not comply with the Connecticut RSRs for contaminated soil. In addition, this alternative may not comply with TBCs because site contaminants are present at concentrations that could result in unacceptable risks to current and potential future receptors. Location-specific ARARs are not applicable to these alternatives. Action-specific ARARs are not applicable to Alternative S1 or S2. Alternative 3 would comply with action-specific ARARs. Alternative S3 involves the off-site disposal or reuse of contaminated soil and potentially of treatment residues. This action would trigger federal and State hazardous and/or solid waste requirements.

2.10.3 Long-Term Effectiveness and Permanence

Currently, an estimated 1,600 cy of contaminated soil containing approximately 8,500 µg/kg of total PAHs are present at the site. The maximum individual PAH concentration is 3,200 µg/kg, and the corresponding PRG for this PAH is 1,000 µg/kg. There may also be approximately 90 cy of contaminated soil or waste near the septic tank that may continue to impact groundwater.

Alternative S3 would provide the most protection over the long term with respect to soil contamination at Site 7 because the contaminated soil would be excavated and transported off site for disposal. Under Alternatives S2 and S1, the soil contamination would be expected to degrade through natural biological, chemical, and physical processes, although the duration for natural degradation is expected to be several years to decades. Alternative S2 includes testing to determine the magnitude of residual contamination over time and institutional controls to maintain the effectiveness of this alternative until the RGs are reached. Alternative S1 does not include monitoring or institutional controls and would be the least effective alternative over the long term.

2.10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the remedial alternatives includes a treatment component that would reduce the toxicity, mobility, or volume of the contamination in Site 7 soil. However, under Alternative S3, approximately 1,600 cy of contaminated soil containing approximately 41 pounds of PAHs would be removed from the site and either beneficially reused or recycled as part of the disposal process or placed in a landfill.

2.10.5 Short-Term Effectiveness

The three alternatives are expected to be effective in the short term. No action is associated with Alternative S1; therefore, there is no time required to implement the alternative, and there are no risks to community, environment, or workers during its implementation. Alternative S2 would also not result in any short-term risks to the community, environment, and workers during implementation because the contaminated soil would remain in place, and no exposure to the soil would occur. Under Alternative S3, potential risks to the community and construction workers could result from excavation and off-site disposal of contaminated soil. However, these risks would be managed through existing federal and State requirements for construction works and transportation.

Alternative S1 would not achieve the RAOs. Alternative 2 would achieve most of the RAOs within approximately 6 months. This time would be required to implement institutional controls. Final site attenuation is expected to require years to decades to complete. Alternative S3 would achieve the RAOs in approximately 1.5 years.

2.10.6 Implementability

All of the alternatives considered are easily implementable. All of the services, materials, and administrative supports needed for each of the alternatives are readily available. Alternative S1 (No Action) would be the easiest to implement followed by Alternatives S2 and S3. Alternative S3 has several implementation issues that would have to be resolved including:

- Potential interferences with site operations during construction.
- Definition of the extent of soil contamination, and in particular, concerns with the ability to excavate the contaminated soil if it extends underneath Building 325.

2.10.7 Cost

The estimated costs for the three alternatives are presented below:

Alternative	Capital Cost	O&M Cost (Present Worth)	Total Cost (Present Worth)
Alternative S1	$0	$89,600	$89,600
Alternative S2	$6,250	$91,750	$98,000
Alternative S3	$440,200	$0	$440,200

2.10.8 State Acceptance

The State of Connecticut has expressed their support of the Selected Remedy. The State's concurrence letter is provided in Appendix B.

2.10.9 Community Acceptance

Based on the fact that no comments were expressed at the Public Meeting on July 28, 2004 and no written comments were received during the public comment period, it appears that the community generally agrees with the Selected Remedies presented in the Proposed Plan. Specific issues raised by the community can be found in the Responsiveness Summary in Section 3.0 of this ROD.

2.11 PRINCIPAL 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 7 soil do not constitute principal threat wastes as defined by the NCP. All contaminated soil and debris were removed from Site 14 during the NTCRA; therefore, no principal threat wastes remain at the site.

2.12 SELECTED REMEDY

This section identifies the Selected Remedies and expands on the details provided in Section 2.9 (Description of Alternatives) of the ROD. The Selected Remedy for Site 7 soil is Alternative S3 (Excavation and Off-Site Disposal). This alternative meets RAOs, provides adequate protection of human health and the environment, and attains ARARs in a cost-effective manner.

Excavation is required in two areas adjacent to Building 325. The PAH excavation area is located near the southeastern corner of Building 325, and the benzene, CB and DCB excavation area is located at the septic tank along the western side of Building 325 (see Figure 2-6). A detailed description of the major remedy components are provided below:

Finalize Delineation: To determine the final horizontal and vertical extent of soil contamination at Site 7, approximately 10 soil borings will be advanced in the area of PAH-contaminated soils and approximately 5 soil borings will be advanced in the area of suspected benzene-, CB-, and DCB-contaminated soil. It is expected that two soil samples will be collected from each boring for a total of approximately 30 soil samples. These soil samples will be sent to a laboratory for analysis. The samples collected from the PAH area will be analyzed for PAHs; the remaining samples will be analyzed for VOCs. It is also

expected that a sample of the contents of the septic tank will be collected and analyzed. A sampling plan will be developed to provide the details of the predesign investigation sampling program.

Excavation: Following final delineation, excavation equipment will be used to excavate the contaminated soil from Site 7 (approximately 1600 cy of PAH-contaminated soil and 90 cy of benzene-, CB-, and DCB-contaminated soil and the septic tank). The excavated soil will be characterized to determine the appropriate disposal facility. Due to the depth of excavation (5 to 8 feet), it is anticipated that the excavation side walls will have to be laid back to provide for safe working conditions. Therefore, it is anticipated that approximately 200 cy of additional soil outside the extent of contamination will need to be excavated to provide a safe operation. The additional soil will be disposed off site along with the contaminated soil. The total volume of soil to be excavated and disposed off site is approximately 1,900 cy. Groundwater may also be encountered during excavation of contaminated soil. If encountered, the water may need to be removed from the excavation, pre-treated, and discharged to the publicly-owned treatment works (POTW).

Transportation: Upon determination of the appropriate disposal facility, the contaminated soil will be loaded into trucks for transportation to the off site disposal or recycling center.

Verification Sampling: After the excavation of contaminated soil, soil samples will be collected from the bottom and sidewalls of each excavation area. The soil samples will be analyzed for their respective sets of COCs to verify the removal of the COCs or to verify that the remaining COC concentrations are less than the RGs. Table 2-9 provides the COCs for each excavation area and the RGs for each COC. Due to the size of each excavation, it is anticipated that 10 verification samples will be collected from each excavation area. In the event that COCs remain at concentrations greater than the remediation goals, additional soil will be excavated where appropriate, and additional verification samples will be collected. The final details of the verification sampling program will be provided as part of the remedial design documentation.

Restoration: Lastly, after it is verified that the COCs have been removed from Site 7 or that COC concentrations remaining in Site 7 soil are less than RGs, clean soil will be brought to the site to backfill the excavations. Following the backfilling of the excavations, the surface will be returned to pre-excavation conditions (e.g., grassed, paved, or gravel).

2.13 STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the lead agency (i.e., Navy) must select remedies that are protective of human health and the environment, comply with ARARs (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 practical. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of contamination as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy for Site 7 soil meets these statutory requirements.

2.13.1 Protection of Human Health and the Environment

The Selected Remedy for Site 7 soil (Alternative S3) will protect human health and the environment by removing the contaminated soil from the site and transporting the soil to an off-site disposal facility. The PAH-contaminated soil may also be considered for beneficial reuse in an asphalting plant. After the soil is removed from the site, remaining risks associated with contaminated soil and potential concerns with soil contaminants impacting groundwater would be eliminated, and Site 7 soil would be available for unrestricted use.

2.13.2 Compliance with ARARs

The Selected Remedy for Site 7 soil of excavation and off-site disposal complies with all ARARs. This alternative would comply with Connecticut RSRs under a current industrial/commercial scenario and a potential future residential scenario by removing all contaminated soil from this site and properly managing it off site. This alternative would comply with all action-specific ARARs. Excavation and off-site disposal of contaminated soil would trigger federal and State solid waste regulations and, based on characterization, could trigger hazardous waste regulations. During excavation, the soil would be characterized for hazardous waste properties and recycling value and would be managed accordingly. Groundwater may also be encountered during excavation of the suspected CB-, DCB-, and benzene-contaminated soil. If encountered, the water may need to be removed from the excavation and discharged to the POTW. Pre-treatment of this water prior to discharge may be required. Alternatively, if smaller volumes of groundwater are encountered, they may be disposed off site at a wastewater treatment system. Both of these types of facilities are regulated through National Pollution Discharge Elimination System (NPDES) permits that identify the types of wastes that can be accepted and treatment requirements.

The ARARs that are considered applicable or potentially applicable to the Selected Remedy are presented below, and all of the ARARs are presented in Tables 2-12 (chemical-specific) and 2-13 (action-specific). There are no location-specific ARARs associated with the Selected Remedy.

Chemical-specific ARARs and TBCs include:

- Cancer Slope Factors – These are guidance values (TBCs) that are used in risk assessments to evaluate the potential carcinogenic hazards caused by exposure to contaminated soil.

- RSRs - These State regulations (ARARs) provide specific numerical cleanup criteria for contaminants in soil. Requirements are based on groundwater in the area being classified by the State as GB.

Action-specific ARARs include:

- Clean Water Act, Section 402, NPDES - NPDES permits are federal permits required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be ARARs.

- Clean Water Act, Section 403, Pretreatment Regulations - These federal regulations set general pretreatment requirements for discharging to a POTW. If remedial activities include such a discharge, pretreatment standards would be ARARs.

- Hazardous Waste Management - These State specifications establish standards for the listing, identification, and management of hazardous waste.

- Solid Waste Management Regulations - These State specifications establish standards for management of non-hazardous waste.

- Connecticut Water Pollution Control Act - This State regulation governs the treatment and discharge of water into surface water bodies in the State.

2.13.3 Cost Effectiveness

Although the present worth cost of the Selected Remedy is the highest of the three alternatives evaluated, the Selected Remedy is the only remedy that is protective of human health and the environment and will allow for unrestricted use of Site 7 soil in the future with no annual testing or reporting costs.

2.13.4 Utilization of Permanent Solutions and Alternative Treatment

The Navy, with EPA and State concurrence, has determined that the Selected Remedy for Site 7 soil represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practical manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the Navy has determined that the Selected Remedy provides the

best balance of trade-offs in terms of the five balancing criteria. The Navy also considered the statutory preference for treatment as a principal element, the bias against off-site treatment and disposal, and EPA, State, and community acceptance.

On-site treatment of contaminated Site 7 soil was not considered because of the small volume of material identified as being contaminated. In addition, because of the physical features of the site (surface and subsurface) and the need to maintain access to the Torpedo Shops, long-term operations with support facilities are not practical or cost efficient.

2.13.5 Preference for Treatment as a Principal Element

The Selected Remedy for Site 7 soil does not satisfy the statutory preference for treatment as a principal element. The reasons why treatment of Site 7 contaminated soils is not practical were discussed above in Section 2.13.4.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for OU8 at NSB-NLON, Groton, Connecticut was released for public comment on July 16, 2004. The Proposed Plan identified Alternative S3, Excavation and Off-Site Disposal, as the Selected Remedy for Site 7 soil and NFA as the Selected Remedy for Site 14 soil. The Navy reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to this decision, as originally identified in the Proposed Plan, were necessary or appropriate.

TABLE 2-1

SUMMARY OF DETECTED COMPOUNDS IN SURFACE SOIL AT SITE 7
AND COPC SELECTION FOR DIRECT CONTACT EXPOSURE SCENARIOS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	Risk-Based COPC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Volatile Organics																	
75-09-2	METHYLENE CHLORIDE	0.005	J	0.005	J	mg/kg	7TB9-0002	1/2	0.007	0.005	NA	8.9	C	13 82	SSL-INH CTRESSOIL	NO	BSL
1330-20-7	XYLENES, TOTAL	0.00053	J	0.00134		mg/kg	B325-SO05-0002	3/6	0.00109 - 0.011	0.00134	NA	210	sat	410 500	SSL-INH CTRESSOIL	NO	BSL
Semivolatile Organics																	
56-55-3	BENZO(A)ANTHRACENE	0.27	J	0.27	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.27	NA	0.62	C	N/A 1	SSL-INH CTRESSOIL	NO	BSL
50-32-8	**BENZO(A)PYRENE**	0.57		0.57		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.57	NA	**0.062**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
205-99-2	BENZO(B)FLUORANTHENE	0.61		0.61		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.61	NA	0.62	C	N/A 1	SSL-INH CTRESSOIL	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.54		0.54		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.54	NA	230(7)	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.51		0.51		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.51	NA	6.2	C	N/A 8.4	SSL-INH CTRESSOIL	NO	BSL
218-01-9	CHRYSENE	0.38	J	0.38	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.38	NA	62	C	N/A 84	SSL-INH CTRESSOIL	NO	BSL
53-70-3	**DIBENZO(A,H)ANTHRACENE**	0.063	J	0.063	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.063	NA	**0.062**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
206-44-0	FLUORANTHENE	0.39	J	0.39	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.39	NA	230	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.54		0.54		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.54	NA	0.62	C	N/A 1	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PHENANTHRENE	0.17	J	0.17	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.17	NA	230(7)	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PYRENE	0.33	J	0.33	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.33	NA	230	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
Inorganics																	
7429-90-5	ALUMINUM	3730		13,700		mg/kg	081390-7MW1(0-2)	2/2	NA	13700	17600	**7600**	N	N/A N/A	SSL-INH CTRESSOIL	NO	BKG, EPAI
7440-36-0	**ANTIMONY**	19.4	J	19.4	J	mg/kg	081390-7MW1(0-2)	1/2	3.3	19.4	**2.05**	**3.1**	N	N/A 27	SSL-INH CTRESSOIL	**YES**	ASL
7440-38-2	ARSENIC	1.4		3.5	J	mg/kg	7TB9-0002	2/2	NA	3.5	3.6	**0.39**	C	750 10	SSL-INH CTRESSOIL	NO	BKG
7440-39-3	BARIUM	23.2		159		mg/kg	081390-7MW1(0-2)	2/2	NA	159	**39**	540	N	690000 4700	SSL-INH CTRESSOIL	NO	BSL
7440-41-7	BERYLLIUM	0.58		0.58		mg/kg	081390-7MW1(0-2)	1/2	0.22	0.58	0.72	15	N	1300 2	SSL-INH CTRESSOIL	NO	BSL, BKG
7440-43-9	**CADMIUM**	4.6		4.6		mg/kg	081390-7MW1(0-2)	1/2	0.44	4.6	**0.24**	**3.7**	N	1800 34	SSL-INH CTRESSOIL	**YES**	ASL
7440-70-2	CALCIUM	1230		5830		mg/kg	081390-7MW1(0-2)	2/2	NA	5830	**314**	N/A		N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7440-47-3	CHROMIUM	6.8		18.4	J	mg/kg	081390-7MW1(0-2)	2/2	NA	18.4	19.3	30(8)	C	270 100	SSL-INH CTRESSOIL	NO	BSL, BKG
7440-48-4	COBALT	14.8		14.8		mg/kg	081390-7MW1(0-2)	1/2	3.5	14.8	**7**	470	N	N/A N/A	SSL-INH CTRESSOIL	NO	BSL
7440-50-8	COPPER	9.2		39.8	J	mg/kg	081390-7MW1(0-2)	2/2	NA	39.8	**17.9**	290	N	N/A 2500	SSL-INH CTRESSOIL	NO	BSL
7439-89-6	IRON	4580		21600		mg/kg	081390-7MW1(0-2)	2/2	NA	21600	**16800**	**2300**	N	N/A N/A	SSL-INH CTRESSOIL	NO	EPAI

TABLE 2-1

SUMMARY OF DETECTED COMPOUNDS IN SURFACE SOIL AT SITE 7
AND COPC SELECTION FOR DIRECT CONTACT EXPOSURE SCENARIOS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	Risk-Based COPC Screening Level(5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Inorganics (Continued)																
7439-92-1	LEAD	4.5	J	7.1	J	mg/kg	081390-7MW1(0-2)	2/2	NA	7.1	17.5	400(9)	N/A 500	SSL-INH CTRESSOIL	NO	BSL, BKG
7439-95-4	MAGNESIUM	1510		6440		mg/kg	081390-7MW1(0-2)	2/2	NA	6440	**2460**	N/A	N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7439-96-5	**MANGANESE**	87.7		300	J	mg/kg	081390-7MW1(0-2)	2/2	NA	300	**172**	**180** N	N/A N/A	SSL-INH CTRESSOIL	**YES**	ASL
7440-02-0	NICKEL	7.5		14.4	J	mg/kg	081390-7MW1(0-2)	2/2	NA	14.4	**5**	160 N	13000 1400	SSL-INH CTRESSOIL	NO	BSL
7440-09-7	POTASSIUM	1020		5360	J	mg/kg	081390-7MW1(0-2)	2/2	NA	5360	**669**	N/A	N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7440-22-4	SILVER	0.5		5.5	J	mg/kg	081390-7MW1(0-2)	2/2	NA	5.5	**0.385**	39 N	N/A 340	SSL-INH CTRESSOIL	NO	BSL
7440-23-5	SODIUM	60.9		366	J	mg/kg	081390-7MW1(0-2)	2/2	NA	366	**16.56**	N/A	N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7440-62-2	VANADIUM	7.7		45.8		mg/kg	081390-7MW1(0-2)	2/2	NA	45.8	**33.3**	55 N	N/A 470	SSL-INH CTRESSOIL	NO	BSL
7440-66-6	ZINC	13.8		62.9	J	mg/kg	081390-7MW1(0-2)	2/2	NA	62.9	**25.6**	2300 N	N/A 20000	SSL-INH CTRESSOIL	NO	BSL

A shaded value indicates that the concentration used for screening exceeds the criterion or background value.
A shaded chemical name indicates that the chemical has been selected as a COPC .

Footnotes:

1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 Atlantic, 1995. Background concentrations of Inorganics in Soil - Naval Submarine Base - New London. If the maximum detected concentration of an inorganic is less than the background concentration, then that metal is not selected as a COPC.
5 The risk-based COPC screening level for residential land use is presented. The value is based on a target Hazard Quotient of 0.1 for noncarcinogens (denoted with a "N" flag) or an incremental cancer risk of 1E-6 for carcinogens (denoted with a "C" flag) (EPA, 2000).
6 The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and/or an ARAR/TBC(s).
7 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
8 Hexavalent Chromium.
9 OSWER soil screening level for residential land use (EPA, 1994).

Associated Samples:

081390-7MW1(0-2)	B325-SO05-0002
7TB13-0001	B325-SO06-0002
7TB9-0002	B325-SO06-0002-AVG
B325-SO03-0002	B325-SO06-0002-D
	B325-SO07-0003

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COPC = Chemical of Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.
SSL-INH = Soil Screening Level for transfers from soil to air (Inhalation) (EPA, 1996).
CTRESSOIL - CTDEP direct contact criteria for residential exposures to soil.

Rationale Codes:

For Selection as a COPC:
ASL = Above COPC Screening Level/ARAR/TBC.

For Elimination as a COPC:
BKG = Within Background Levels.
BSL = Below COPC Screening Level/ARAR/TBC.
NUT = Essential Nutrient.
NTX = No criteria available.
EPAI = USEPA Region 1 does not advocate evaluation of this chemical.

TABLE 2-2

SUMMARY OF DETECTED COMPOUNDS IN SURFACE SOIL AT SITE 7
AND COPC SELECTION FOR MIGRATION PATHWAYS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	EPA SSL-Soil to GW(5)	CTDEP Mobility Criteria(6)	CTDEP Soil Vapor Volatilization(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Volatile Organics (mg/kg)																
75-09-2	METHYLENE CHLORIDE	0.005	J	0.005	J	mg/kg	7TB9-0002	1/2	0.007	0.005	NA	0.02	1	1200	NO	BSL
1330-20-7	XYLENES, TOTAL	0.00053	J	0.00134		mg/kg	B325-SO05-0002	3/6	0.00109 - 0.011	0.00134	NA	190	19.5	500	NO	BSL
Semivolatile Organics (mg/kg)																
56-55-3	BENZO(A)ANTHRACENE	0.27	J	0.27	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.27	NA	2	1	N/A	NO	BSL
50-32-8	BENZO(A)PYRENE	0.57		0.57		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.57	NA	8	1	N/A	NO	BSL
205-99-2	BENZO(B)FLUORANTHENE	0.61		0.61		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.61	NA	NA	1	N/A	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.54		0.54		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.54	NA	4200(8)	42	N/A	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.51		0.51		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.51	NA	49	1	N/A	NO	BSL
218-01-9	CHRYSENE	0.38	J	0.38	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.38	NA	160	1	N/A	NO	BSL
53-70-3	DIBENZO(A,H)ANTHRACENE	0.063	J	0.063	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.063	NA	2	1	N/A	NO	BSL
206-44-0	FLUORANTHENE	0.39	J	0.39	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.39	NA	4300	56	N/A	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.54		0.54		mg/kg	081390-7MW1(0-2)	1/2	0.36	0.54	NA	14	1	N/A	NO	BSL
85-01-8	PHENANTHRENE	0.17	J	0.17	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.17	NA	4200(8)	40	N/A	NO	BSL
85-01-8	PYRENE	0.33	J	0.33	J	mg/kg	081390-7MW1(0-2)	1/2	0.36	0.33	NA	4200	40	N/A	NO	BSL
Inorganics (mg/kg)																
7429-90-5	ALUMINUM	3730		13,700		mg/kg	081390-7MW1(0-2)	2/2	NA	13700	17600	N/A	N/A	N/A	NO	BKG
7440-36-0	**ANTIMONY**	19.4	J	19.4	J	mg/kg	081390-7MW1(0-2)	1/2	3.3	19.4	**2.05**	**5**	N/A	N/A	**YES**	ASL
7440-38-2	ARSENIC	1.4		3.5	J	mg/kg	7TB9-0002	2/2	NA	3.5	3.6	29	N/A	N/A	NO	BSL, BKG
7440-39-3	BARIUM	23.2		159		mg/kg	081390-7MW1(0-2)	2/2	NA	159	**39**	1600	N/A	N/A	NO	BSL
7440-41-7	BERYLLIUM	0.58		0.58		mg/kg	081390-7MW1(0-2)	1/2	0.22	0.58	0.72	63	N/A	N/A	NO	BSL, BKG
7440-43-9	CADMIUM	4.6		4.6		mg/kg	081390-7MW1(0-2)	1/2	0.44	4.6	**0.24**	8	N/A	N/A	NO	BSL
7440-70-2	CALCIUM	1230		5830		mg/kg	081390-7MW1(0-2)	2/2	NA	5830	**314**	N/A	N/A	N/A	NO	NTX
7440-47-3	CHROMIUM	6.8		18.4	J	mg/kg	081390-7MW1(0-2)	2/2	NA	18.4	19.3	38	N/A	N/A	NO	BSL, BKG
7440-48-4	COBALT	14.8		14.8		mg/kg	081390-7MW1(0-2)	1/2	3.5	14.8	**7**	N/A	N/A	N/A	NO	NTX
7440-50-8	COPPER	9.2		39.8	J	mg/kg	081390-7MW1(0-2)	2/2	NA	39.8	**17.9**	N/A	N/A	N/A	NO	NTX
7439-89-6	IRON	4580		21600		mg/kg	081390-7MW1(0-2)	2/2	NA	21600	**16800**	N/A	N/A	N/A	NO	NTX
7439-92-1	LEAD	4.5	J	7.1	J	mg/kg	081390-7MW1(0-2)	2/2	NA	7.1	17.5	N/A	N/A	N/A	NO	BKG
7439-95-4	MAGNESIUM	1510		6440		mg/kg	081390-7MW1(0-2)	2/2	NA	6440	**2460**	N/A	N/A	N/A	NO	NTX
7439-96-5	MANGANESE	87.7		300	J	mg/kg	081390-7MW1(0-2)	2/2	NA	300	**172**	N/A	N/A	N/A	NO	NTX
7440-02-0	NICKEL	7.5		14.4	J	mg/kg	081390-7MW1(0-2)	2/2	NA	14.4	**5**	130	N/A	N/A	NO	BSL
7440-09-7	POTASSIUM	1020		5360	J	mg/kg	081390-7MW1(0-2)	2/2	NA	5360	**669**	N/A	N/A	N/A	NO	NTX
7440-22-4	SILVER	0.5		5.5	J	mg/kg	081390-7MW1(0-2)	2/2	NA	5.5	**0.385**	34	N/A	N/A	NO	BSL
7440-23-5	SODIUM	60.9		366	J	mg/kg	081390-7MW1(0-2)	2/2	NA	366	**16.56**	N/A	N/A	N/A	NO	NTX
7440-62-2	VANADIUM	7.7		45.8		mg/kg	081390-7MW1(0-2)	2/2	NA	45.8	**33.3**	6000	N/A	N/A	NO	BSL
7440-66-6	ZINC	13.8		62.9	J	mg/kg	081390-7MW1(0-2)	2/2	NA	62.9	**25.6**	12000	N/A	N/A	NO	BSL

A shaded value indicates that the concentration used for screening exceeds the criterion or background value.
A shaded chemical name indicates that the chemical has been selected as a COPC .

Footnotes:

1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 Atlantic, 1995. Background concentrations of Inorganics in Soil - Naval Submarine Base - New London. If the maximum detected concentration of an inorganic is less than the background concentration, then that metal is not selected as a COPC.

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COPC = Chemical of Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.

TABLE 2-2

SUMMARY OF DETECTED COMPOUNDS IN SURFACE SOIL AT SITE 7
AND COPC SELECTION FOR MIGRATION PATHWAYS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

5 EPA Soil Screening Level Guidance, 1996.
6 CTDEP RSRs, 1996.
7 The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and/or an ARAR/TBC(s).
8 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.

Associated Samples:

081390-7MW1(0-2)	B325-SO05-0002
7TB13-0001	B325-SO06-0002
7TB9-0002	B325-SO06-0002-AVG
B325-SO03-0002	B325-SO06-0002-D
	B325-SO07-0003

Rationale Codes:

For Selection as a COPC:
ASL = Above COPC Screening Level/ARAR/TBC.

For Elimination as a COPC:
BKG = Within Background Levels.
NTX = No criteria available.

TABLE 2-3

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR DIRECT CONTACT EXPOSURE SCENARIOS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	Risk-Based COPC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Volatile Organics																	
75-35-4	1,1-DICHLOROETHENE	0.003	J	0.003	J	mg/kg	7 SO 4S 0103	1/29	0.006 - 0.061	0.003	NA	0.054	C	0.07 1	SSL-INH CTRESSOIL	NO	BSL
78-93-3	2-BUTANONE	0.003		0.032		mg/kg	081090-7TB5(6-8)	4/29	0.011 - 0.061	0.032	NA	730	N	N/A 500	SSL-INH CTRESSOIL	NO	BSL
67-64-1	ACETONE	0.011	J	0.17		mg/kg	081090-7TB5(6-8)	7/29	0.011 - 0.27	0.17	NA	160	N	100000 500	SSL-INH CTRESSOIL	NO	BSL
71-43-2	BENZENE	0.004	J	0.004	J	mg/kg	081090-7TB5(6-8)	1/35	0.00107 - 0.07	0.004	NA	0.65	C	0.8 21	SSL-INH CTRESSOIL	NO	BSL
75-15-0	CARBON DISULFIDE	0.003	J	0.025	J	mg/kg	081090-7TB5(6-8)	4/29	0.006 - 0.061	0.005	NA	36	N	720 500	SSL-INH CTRESSOIL	NO	BSL
108-90-7	CHLOROBENZENE	0.001	J	0.006	J	mg/kg	S7SB180506	2/29	0.006 - 0.061	0.006	NA	15	N	130 500	SSL-INH CTRESSOIL	NO	BSL
75-09-2	METHYLENE CHLORIDE	0.003	J	0.42	J	mg/kg	7MW8S-0408	13/29	0.006 - 0.023	0.42	NA	8.9	C	13 82	SSL-INH CTRESSOIL	NO	BSL
127-18-4	TETRACHLOROETHENE	0.003	J	0.018	J	mg/kg	7MW8S-0408	5/29	0.006 - 0.024	0.018	NA	5.7	C	11 12	SSL-INH CTRESSOIL	NO	BSL
108-88-3	TOLUENE	0.002	J	0.008	J	mg/kg	7TB160305	9/35	0.00107 - 0.061	0.008	NA	520	sat	650 500	SSL-INH CTRESSOIL	NO	BSL
1330-20-7	XYLENES, TOTAL	0.00096	J	0.011	J	mg/kg	7 SO 4S 0103	3/35	0.00107 - 0.061	0.011	NA	210	sat	410 500	SSL-INH CTRESSOIL	NO	BSL
Semivolatile Organics																	
91-57-6	2-METHYLNAPHTHALENE	0.023	J	0.17	J	mg/kg	7 SO 4S 0103	3/29	0.2 - 0.5	0.17	NA	5.6(7)	N	N/A 474	SSL-INH CTRESSOIL	NO	BSL
106-44-5	4-METHYLPHENOL	0.56		0.56		mg/kg	080990-7MW2(2-4)	1/29	0.2 - 0.5	0.56	NA	31	N	N/A 340	SSL-INH CTRESSOIL	NO	BSL
83-32-9	ACENAPHTHENE	0.043	J	0.79		mg/kg	7 SO 4S 0103	5/29	0.2 - 0.5	0.79	NA	370	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
208-96-8	ACENAPHTHYLENE	0.02	J	0.055	J	mg/kg	7 SO 10 0103	3/29	0.2 - 0.5	0.055	NA	230(8)	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
120-12-7	ANTHRACENE	0.021	J	1.3		mg/kg	7 SO 10 0103	6/29	0.2 - 0.5	1.3	NA	2200	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
56-55-3	**BENZO(A)ANTHRACENE**	0.036	J	2.7		mg/kg	7 SO 10 0103	8/29	0.2 - 0.5	2.7	NA	**0.62**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
50-32-8	**BENZO(A)PYRENE**	0.033	J	1.9		mg/kg	7 SO 10 0103	11/29	0.2 - 0.5	1.9	NA	**0.062**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
205-99-2	**BENZO(B)FLUORANTHENE**	0.021	J	3.2	J	mg/kg	7 SO 10 0103	10/29	0.2 - 0.5	3.2	NA	**0.62**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
191-24-2	BENZO(G,H,I)PERYLENE	0.02	J	1.3	J	mg/kg	7 SO 4S 0103	9/29	0.2 - 0.5	1.3	NA	230(8)	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.024	J	0.52		mg/kg	7TB12-0204	8/29	0.2 - 0.5	0.52	NA	6.2	C	N/A 8.4	SSL-INH CTRESSOIL	NO	BSL
65-85-0	BENZOIC ACID	0.023	J	0.13	J	mg/kg	7 SO 4S 0103	10/25	1.7 - 2.4	0.13	NA	100000	max	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	0.13	J	0.74	J	mg/kg	081390-7TB3(4-6)	4/29	0.35 - 0.5	0.74	NA	35	C	31000 44	SSL-INH CTRESSOIL	NO	BSL
85-68-7	BUTYLBENZYL PHTHALATE	0.026	J	0.026	J	mg/kg	7TB7-0406	1/29	0.2 - 0.5	0.026	NA	1200	N	930 1000	SSL-INH CTRESSOIL	NO	BSL
86-74-8	CARBAZOLE	0.027	J	0.66		mg/kg	7 SO 4S 0103	4/21	0.2 - 0.47	0.66	NA	24	C	N/A 31	SSL-INH CTRESSOIL	NO	BSL
218-01-9	CHRYSENE	0.025	J	2.4		mg/kg	7 SO 10 0103	10/29	0.2 - 0.5	2.4	NA	62	C	N/A 84	SSL-INH CTRESSOIL	NO	BSL
84-74-2	DI-N-BUTYL PHTHALATE	0.02	J	0.17	J	mg/kg	081490-7TB4(4-6)	10/29	0.35 - 0.47	0.17	NA	610	N	2300 1000	SSL-INH CTRESSOIL	NO	BSL

TABLE 2-3

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR DIRECT CONTACT EXPOSURE SCENARIOS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	Risk-Based COPC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Semivolatile Organics (Continued)																	
132-64-9	DIBENZOFURAN	0.027	J	0.35	J	mg/kg	7 SO 4S 0103	3/29	0.2 - 0.5	0.35	NA	29	N	N/A 270	SSL-INH CTRESSOIL	NO	BSL
84-66-2	DIETHYL PHTHALATE	0.094	J	14		mg/kg	7MW7S-0103	2/29	0.2 - 0.48	14	NA	4900	N	2000 1000	SSL-INH CTRESSOIL	NO	BSL
206-44-0	FLUORANTHENE	0.018	J	3.8	J	mg/kg	7 SO 10 0103	13/29	0.2 - 0.5	3.8	NA	230	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
86-73-7	FLUORENE	0.043	J	0.71		mg/kg	7 SO 4S 0103	5/29	0.2 - 0.5	0.71	NA	260	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
193-39-5	**INDENO(1,2,3-CD)PYRENE**	0.024	J	1.2		mg/kg	7 SO 10 0103	9/29	0.2 - 0.5	1.2	NA	**0.62**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
91-20-3	NAPHTHALENE	0.26	J	0.31	J	mg/kg	7 SO 4S 0103	2/29	0.2 - 0.5	0.31	NA	5.6	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PHENANTHRENE	0.025	J	4.3	J	mg/kg	7 SO 4S 0103	9/29	0.2 - 0.5	4.3	NA	230(8)	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PYRENE	0.021	J	4.2	J	mg/kg	7 SO 10 0103	14/29	0.2 - 0.5	4.2	NA	230	N	N/A 1000	SSL-INH CTRESSOIL	NO	BSL
Pesticides/PCBs																	
72-54-8	4,4'-DDD	0.0044	J	0.025	J	mg/kg	7MW7S-0103	4/21	0.02 - 0.047	0.025	NA	2.4	C	N/A 2.6	SSL-INH CTRESSOIL	NO	BSL
72-55-9	4,4'-DDE	0.0054	J	0.21		mg/kg	081390-7TB3(4-6)	4/21	0.02 - 0.047	0.21	NA	1.7	C	N/A 1.8	SSL-INH CTRESSOIL	NO	BSL
50-29-3	4,4'-DDT	0.0049	J	0.026	J	mg/kg	7TB160305	5/21	0.02 - 0.047	0.026	NA	1.7	C	N/A 1.8	SSL-INH CTRESSOIL	NO	BSL
11097-69-1	**AROCLOR-1254**	0.66		0.66		mg/kg	080990-7MW2(2-4)	1/21	0.2 - 0.47	0.66	NA	**0.22**	C	N/A 1	SSL-INH CTRESSOIL	**YES**	ASL
1031-07-8	ENDOSULFAN SULFATE	0.013	J	0.035	J	mg/kg	7MW7S-0103	2/21	0.02 - 0.047	0.035	NA	37(9)	N	N/A 410	SSL-INH CTRESSOIL	NO	BSL
7421-93-4	ENDRIN ALDEHYDE	0.0055	J	0.0055	J	mg/kg	TB7-0406, 7TB8-0202	2/13	0.035 - 0.047	0.0055	NA	1.8(10)	N	N/A 20	SSL-INH CTRESSOIL	NO	BSL
53494-70-5	ENDRIN KETONE	0.0068	J	0.0068	J	mg/kg	7 SO 4S 0103	1/21	0.02 - 0.047	0.0068	NA	1.8(10)	N	N/A 20	SSL-INH CTRESSOIL	NO	BSL
76-44-8	HEPTACHLOR	0.0047	J	0.0047	J	mg/kg	7 SO 4S 0103	1/21	0.0098 - 0.024	0.0047	NA	0.11	C	4 0.1	SSL-INH CTRESSOIL	NO	BSL
72-43-5	METHOXYCHLOR	0.032	J	0.032	J	mg/kg	7 SO 4S 0103	1/21	0.098 - 0.24	0.032	NA	31	N	N/A 340	SSL-INH CTRESSOIL	NO	BSL
Inorganics																	
7429-90-5	ALUMINUM	4450		20,000		mg/kg	7 SO 6S 0507	29/29	NA	20000	**17600**	**7,600**	N	N/A N/A	SSL-INH CTRESSOIL	NO	EPAI
7440-36-0	**ANTIMONY**	3.4		19.4	J	mg/kg	080990-7TB2(2-4)	13/28	0.62 - 18.2	19.4	**2.05**	**3.1**	N	N/A 27	SSL-INH CTRESSOIL	**YES**	ASL
7440-38-2	**ARSENIC**	0.82	J	8.1		mg/kg	7MW9S-0608	27/29	1.6 - 4.6	8.1	**3.6**	**0.39**	C	750 10	SSL-INH CTRESSOIL	**YES**	ASL
7440-39-3	BARIUM	17.4	J	506		mg/kg	7 SO 6S 0507	29/29	NA	506	**57.2**	540	N	690000 4700	SSL-INH CTRESSOIL	NO	BSL
7440-41-7	BERYLLIUM	0.21	J	1		mg/kg	080990-7TB1(2-4)-D	27/29	0.2 - 0.23	1	**0.72**	15	N	1300 2	SSL-INH CTRESSOIL	NO	BSL
7440-43-9	**CADMIUM**	0.47	J	5.1		mg/kg	080990-7TB1(2-4)-D	12/29	0.11 - 1	5.1	**0.24**	**3.7**	N	1800 34	SSL-INH CTRESSOIL	**YES**	ASL
7440-70-2	CALCIUM	600	J	2810		mg/kg	7TB8-0202.9, 7 SO 6S 0507	29/29	NA	2810	**499**	N/A		N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7440-47-3	**CHROMIUM**	7		61.1		mg/kg	7 SO 6S 0507	29/29	NA	61.1	**21.5**	**30(11)**	C	270 100	SSL-INH CTRESSOIL	**YES**	ASL

TABLE 2-3

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR DIRECT CONTACT EXPOSURE SCENARIOS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	Risk-Based COPC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Inorganics (Continued)																	
7440-48-4	COBALT	4.7	J	19.2	J	mg/kg	7 SO 6S 0507	25/29	1.8 - 3.9	19.2	8	470	N	N/A N/A	SSL-INH CTRESSOIL	NO	BSL
7440-50-8	COPPER	7.6		45		mg/kg	7TB7-0406	29/29	NA	45	25.6	290	N	N/A 2500	SSL-INH CTRESSOIL	NO	EPAI
7439-89-6	IRON	6750		32900		mg/kg	7 SO 6S 0507	29/29	NA	32900	17200	2300	N	N/A N/A	SSL-INH CTRESSOIL	NO	EPAI
7439-92-1	LEAD	3.3	J	27.5	J	mg/kg	7TB12-0204	24/29	2.5 - 9.1	27.5	17.5	400(12)		N/A 500	SSL-INH CTRESSOIL	NO	BSL
7439-95-4	MAGNESIUM	1660		19500		mg/kg	7 SO 6S 0507	29/29	NA	19500	3650	N/A		N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7439-96-5	MANGANESE	60.7		725		mg/kg	7 SO 6S 0507	29/29	NA	725	188	180	N	N/A N/A	SSL-INH CTRESSOIL	YES	ASL
7439-97-6	MERCURY	0.11	J	1.2	J	mg/kg	7MW10S-0608	5/29	0.06 - 0.14	1.2	0.05	2.3	N	10 20	SSL-INH CTRESSOIL	NO	BSL
7440-02-0	NICKEL	5.1		42.1	J	mg/kg	7 SO 6S 0507	29/29	NA	42.1	5.95	160	N	13000 1400	SSL-INH CTRESSOIL	NO	BSL
7440-09-7	POTASSIUM	575	J	18400	J	mg/kg	7 SO 6S 0507	29/29	NA	18400	2580	N/A		N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7782-49-2	SELENIUM	0.77		0.77		mg/kg	081090-7TB5(6-8)	1/29	0.44 - 0.85	0.77	0.445	39	N	N/A 340	SSL-INH CTRESSOIL	NO	BSL
7440-22-4	SILVER	0.86	J	5.4	J	mg/kg	081490-7TB6(6-8)	13/29	0.4 - 2.4	5.4	0.385	39	N	N/A 340	SSL-INH CTRESSOIL	NO	BSL
7440-23-5	SODIUM	54.8	J	708		mg/kg	7 SO 4S 0103	28/29	103	708	20.56	N/A		N/A N/A	SSL-INH CTRESSOIL	NO	NUT
7440-28-0	THALLIUM	0.26		1	J	mg/kg	7 SO 6S 0507	5/29	0.2 - 1.2	1	0.29	0.52	N	N/A 5.4	SSL-INH CTRESSOIL	YES	ASL
7440-62-2	VANADIUM	12.3		86.7		mg/kg	7 SO 6S 0507	24/29	14.3 - 38.4	86.7	35.1	55	N	N/A 470	SSL-INH CTRESSOIL	YES	ASL
7440-66-6	ZINC	18.7		133	J	mg/kg	7 SO 4S 0103	29/29	NA	133	31.3	2300	N	N/A 20000	SSL-INH CTRESSOIL	NO	BSL

A shaded value indicates that the concentration used for screening exceeds the criterion or background value.
A shaded chemical name indicates that the chemical has been selected as a COPC.

Footnotes:

1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 Atlantic, 1995. Background concentrations of Inorganics in Soil - Naval Submarine Base - New London. If the maximum detected concentration of an inorganic is less than the background concentration, then that metal is not selected as a COPC.
5 The risk-based COPC screening level for residential land use is presented. The value is based on a target Hazard Quotient of 0.1 for noncarcinogens (denoted with a "N" flag) or an incremental cancer risk of 1E-6 for carcinogens (denoted with a "C" flag) (EPA, 2000).
6 The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and/or an ARAR/TBC(s).
7 Value is for naphthalene.

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COPC = Chemical of Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.
SSL-INH = Soil Screening Level for transfers from soil to air (Inhalation) (EPA, 1996).
CTRESSOIL - CTDEP direct contact criteria for residential exposures to soil.

Rationale Codes:

For Selection as a COPC:
ASL = Above COPC Screening Level/ARAR/TBC.

TABLE 2-3

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR DIRECT CONTACT EXPOSURE SCENARIOS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	Risk-Based COPC Screening Level(5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)

8 Pyrene is used as a surrogate for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene.
9 Value is for endosulfan.
10 Value is for endrin.
11 Hexavalent Chromium.
12 OSWER soil screening level for residential land use (EPA, 1994).

For Elimination as a COPC:
BKG = Within Background Levels.
BSL = Below COPC Screening Level/ARAR/TBC.
NUT = Essential Nutrient.
NTX = No criteria available.
EPAI = USEPA Region I does not advocate evaluation of this chemical.

Associated Samples:

080990-7MW2(2-4)	7 SO 4S 0103	7TB12-0204	B325-SO03-0408
080990-TTB1(2-4)	7 SO 6S 0305	7TB1301.5 03.5	B325-SO04-0406
080990-7TB1(2-4)-AVG	7 SO 6S 0507	7TB14-0507	B325-SO04-0608
080990-TTB1(2-4)-D	7MW10S-0608	7TB15-0608	B325-SO05-0406
080990-7TB2(2-4)	7MW11S-0507	7TB160305	B325SS-0203
081090-7TB5(6-8)	7MW5S-1011	7TB7-0406	B325SW-0203
081390-7TB3(4-6)	7MW7S-0103	7TB8-0202.9	S7SB080607
081490-7MW3(6-8)	7MW8S-0408	7TB8-0202.9-AVG	S7SB090809
081490-7TB4(4-6)	7MW9S-0608	7TB8-0202.9-D	S7SB100607
081490-7TB6(6-8)	7MW9S-0608-AVG	B325-SO01-0204	S7SB180506
7 SO 10 0103	7MW9S-0608-D	B325-SO01-0406	

TABLE 2-4

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR MIGRATION PATHWAYS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	EPA SSL-Soil to GW(5)	CTDEP Mobility Criteria(6)	CTDEP Soil Vapor Volatilization(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Volatile Organics																
75-35-4	1,1-DICHLOROETHENE	0.003	J	0.003	J	mg/kg	7 SO 4S 0103	1/29	0.006 - 0.061	0.003	N/A	0.06	1.4	1	NO	BSL
78-93-3	2-BUTANONE	0.003		0.032		mg/kg	081090-7TB5(6-8)	4/29	0.011 - 0.061	0.032	N/A	N/A	80	2400	NO	BSL
67-64-1	ACETONE	0.011	J	0.17		mg/kg	081090-7TB5(6-8)	7/29	0.011 - 0.27	0.17	N/A	16	140	2400	NO	BSL
71-43-2	BENZENE	0.004	J	0.004	J	mg/kg	081090-7TB5(6-8)	1/35	0.00107 - 0.07	0.004	N/A	0.03	0.2	1	NO	BSL
75-15-0	CARBON DISULFIDE	0.003	J	0.025	J	mg/kg	081090-7TB5(6-8)	4/29	0.006 - 0.061	0.005	N/A	32	140	N/A	NO	BSL
108-90-7	CHLOROBENZENE	0.001	J	0.006	J	mg/kg	S7SB180506	2/29	0.006 - 0.061	0.006	N/A	1	20	31	NO	BSL
75-09-2	**METHYLENE CHLORIDE**	0.003	J	0.42	J	mg/kg	7MW8S-0408	13/29	0.006 - 0.023	0.42	N/A	**0.02**	1	1200	**YES**	ASL
127-18-4	TETRACHLOROETHENE	0.003	J	0.018	J	mg/kg	7MW8S-0408	5/29	0.006 - 0.024	0.018	N/A	0.06	1	11	NO	BSL
108-88-3	TOLUENE	0.002	J	0.008	J	mg/kg	7TB160305	9/35	0.00107 - 0.061	0.008	N/A	12	67	780	NO	BSL
1330-20-7	XYLENES, TOTAL	0.00096	J	0.011	J	mg/kg	7 SO 4S 0103	3/35	0.00107 - 0.061	0.011	N/A	190	19.5	500	NO	BSL
Semivolatile Organics																
91-57-6	2-METHYLNAPHTHALENE	0.023	J	0.17	J	mg/kg	7 SO 4S 0103	3/29	0.2 - 0.5	0.17	N/A	N/A	9.8	N/A	NO	BSL
106-44-5	4-METHYLPHENOL	0.56		0.56		mg/kg	080990-7MW2(2-4)	1/29	0.2 - 0.5	0.56	N/A	N/A	7	N/A	NO	BSL
83-32-9	ACENAPHTHENE	0.043	J	0.79		mg/kg	7 SO 4S 0103	5/29	0.2 - 0.5	0.79	N/A	570	84	N/A	NO	BSL
208-96-8	ACENAPHTHYLENE	0.02	J	0.055	J	mg/kg	7 SO 10 0103	3/29	0.2 - 0.5	0.055	N/A	N/A	84	N/A	NO	BSL
120-12-7	ANTHRACENE	0.021	J	1.3		mg/kg	7 SO 10 0103	6/29	0.2 - 0.5	1.3	N/A	12000	400	N/A	NO	BSL
56-55-3	**BENZO(A)ANTHRACENE**	0.036	J	2.7		mg/kg	7 SO 10 0103	8/29	0.2 - 0.5	2.7	N/A	**2**	**1**	N/A	**YES**	ASL
50-32-8	**BENZO(A)PYRENE**	0.033	J	1.9		mg/kg	7 SO 10 0103	11/29	0.2 - 0.5	1.9	N/A	8	**1**	N/A	**YES**	ASL
205-99-2	**BENZO(B)FLUORANTHENE**	0.021	J	3.2	J	mg/kg	7 SO 10 0103	10/29	0.2 - 0.5	3.2	N/A	N/A	**1**	N/A	**YES**	ASL
191-24-2	BENZO(G,H,I)PERYLENE	0.02	J	1.3	J	mg/kg	7 SO 4S 0103	9/29	0.2 - 0.5	1.3	N/A	4200(8)	42	N/A	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.024	J	0.52		mg/kg	7TB12-0204	8/29	0.2 - 0.5	0.52	N/A	49	1	N/A	NO	BSL
65-85-0	BENZOIC ACID	0.023	J	0.13	J	mg/kg	7 SO 4S 0103	10/25	1.7 - 2.4	0.13	N/A	400	10000	N/A	NO	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	0.13	J	0.74	J	mg/kg	081390-7TB3(4-6)	4/29	0.35 - 0.5	0.74	N/A	3600	11	N/A	NO	BSL
85-68-7	BUTYLBENZYL PHTHALATE	0.026	J	0.026	J	mg/kg	7TB7-0406	1/29	0.2 - 0.5	0.026	N/A	930	200	N/A	NO	BSL
86-74-8	**CARBAZOLE**	0.027	J	0.66		mg/kg	7 SO 4S 0103	4/21	0.2 - 0.47	0.66	N/A	**0.6**	1	N/A	**YES**	ASL
218-01-9	**CHRYSENE**	0.025	J	2.4		mg/kg	7 SO 10 0103	10/29	0.2 - 0.5	2.4	N/A	160	**1**	N/A	**YES**	ASL
84-74-2	DI-N-BUTYL PHTHALATE	0.02	J	0.17	J	mg/kg	081490-7TB4(4-6)	10/29	0.35 - 0.47	0.17	N/A	2300	140	N/A	NO	BSL
132-64-9	DIBENZOFURAN	0.027	J	0.35	J	mg/kg	7 SO 4S 0103	3/29	0.2 - 0.5	0.35	N/A	N/A	5.6	N/A	NO	BSL
84-66-2	DIETHYL PHTHALATE	0.094	J	14		mg/kg	7MW7S-0103	2/29	0.2 - 0.48	14	N/A	470	1100	N/A	NO	BSL
206-44-0	FLUORANTHENE	0.018	J	3.8	J	mg/kg	7 SO 10 0103	13/29	0.2 - 0.5	3.8	N/A	4300	56	N/A	NO	BSL
86-73-7	FLUORENE	0.043	J	0.71		mg/kg	7 SO 4S 0103	5/29	0.2 - 0.5	0.71	N/A	560	56	N/A	NO	BSL
193-39-5	**INDENO(1,2,3-CD)PYRENE**	0.024	J	1.2		mg/kg	7 SO 10 0103	9/29	0.2 - 0.5	1.2	N/A	14	**1**	N/A	**YES**	ASL
91-20-3	NAPHTHALENE	0.26	J	0.31	J	mg/kg	7 SO 4S 0103	2/29	0.2 - 0.5	0.31	N/A	84	56	N/A	NO	BSL
85-01-8	PHENANTHRENE	0.025	J	4.3	J	mg/kg	7 SO 4S 0103	9/29	0.2 - 0.5	4.3	N/A	4200(8)	40	N/A	NO	BSL
85-01-8	PYRENE	0.021	J	4.2	J	mg/kg	7 SO 10 0103	14/29	0.2 - 0.5	4.2	N/A	4200	40	N/A	NO	BSL
Pesticides/PCBs																
72-54-8	4,4'-DDD	0.0044	J	0.025	J	mg/kg	7MW7S-0103	4/21	0.02 - 0.047	0.025	N/A	16	N/A	N/A	NO	BSL
72-55-9	4,4'-DDE	0.0054	J	0.21		mg/kg	081390-7TB3(4-6)	4/21	0.02 - 0.047	0.21	N/A	54	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	0.0049	J	0.026	J	mg/kg	7TB160305	5/21	0.02 - 0.047	0.026	N/A	32	N/A	N/A	NO	BSL
11097-69-1	AROCLOR-1254	0.66	J	0.66	J	mg/kg	080990-7MW2(2-4)	1/21	0.2 - 0.47	0.66	N/A	N/A	NA	N/A	NO	ASL
1031-07-8	ENDOSULFAN SULFATE	0.013	J	0.035	J	mg/kg	7MW7S-0103	2/21	0.02 - 0.047	0.035	N/A	18(9)	8.4	N/A	NO	BSL
7421-93-4	ENDRIN ALDEHYDE	0.0055	J	0.0055	J	mg/kg	7TB7-0406, 7TB8-0202.9	2/13	0.035 - 0.047	0.0055	N/A	1(10)	N/A	N/A	NO	BSL
53494-70-5	ENDRIN KETONE	0.0068	J	0.0068	J	mg/kg	7 SO 4S 0103	1/21	0.02 - 0.047	0.0068	N/A	1(10)	N/A	N/A	NO	BSL
76-44-8	HEPTACHLOR	0.0047	J	0.0047	J	mg/kg	7 SO 4S 0103	1/21	0.0098 - 0.024	0.0047	N/A	23	0.013	N/A	NO	BSL
72-43-5	METHOXYCHLOR	0.032	J	0.032	J	mg/kg	7 SO 4S 0103	1/21	0.098 - 0.24	0.032	N/A	160	8	N/A	NO	BSL
Inorganics																
7429-90-5	ALUMINUM	4450		20,000		mg/kg	7 SO 6S 0507	29/29	N/A	20000	**17600**	N/A	N/A	N/A	NO	NTX
7440-36-0	**ANTIMONY**	3.4		19.4	J	mg/kg	080990-7TB2(2-4)	13/28	0.62 - 18.2	19.4	**2.05**	**5**	N/A	N/A	**YES**	ASL
7440-38-2	ARSENIC	0.82	J	8.1		mg/kg	7MW9S-0608	27/29	1.6 - 4.6	8.1	**3.6**	29	N/A	N/A	NO	BSL
7440-39-3	BARIUM	17.4	J	506		mg/kg	7 SO 6S 0507	29/29	N/A	506	**57.2**	1600	N/A	N/A	NO	BSL
7440-41-7	BERYLLIUM	0.21	J	1		mg/kg	080990-7TB1(2-4)-D	27/29	0.2 - 0.23	1	**0.72**	63	N/A	N/A	NO	BSL
7440-43-9	CADMIUM	0.47	J	5.1		mg/kg	080990-7TB1(2-4)-D	12/29	0.11 - 1	5.1	**0.24**	8	N/A	N/A	NO	BSL
7440-70-2	CALCIUM	600	J	2810		mg/kg	7TB8-0202.9, 7 SO	29/29	N/A	2810	**499**	N/A	N/A	N/A	NO	NTX
7440-47-3	**CHROMIUM**	7		61.1		mg/kg	7 SO 6S 0507	29/29	N/A	61.1	**21.5**	**38**	N/A	N/A	**YES**	ASL

TABLE 2-4

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR MIGRATION PATHWAYS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	EPA SSL-Soil to GW(5)	CTDEP Mobility Criteria(6)	CTDEP Soil Vapor Volatilization(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Inorganics (Continued)																
7440-48-4	COBALT	4.7	J	19.2	J	mg/kg	7 SO 6S 0507	25/29	1.8 - 3.9	19.2	**8**	N/A	N/A	N/A	NO	NTX
7440-50-8	COPPER	7.6		45		mg/kg	7TB7-0406	29/29	N/A	45	**25.6**	N/A	N/A	N/A	NO	NTX
7439-89-6	IRON	6750		32900		mg/kg	7 SO 6S 0507	29/29	N/A	32900	**17200**	N/A	N/A	N/A	NO	NTX
7439-92-1	LEAD	3.3	J	27.5	J	mg/kg	7TB12-0204	24/29	2.5 - 9.1	27.5	**17.5**	N/A	N/A	N/A	NO	NTX
7439-95-4	MAGNESIUM	1660		19500		mg/kg	7 SO 6S 0507	29/29	N/A	19500	**3650**	N/A	N/A	N/A	NO	NTX
7439-96-5	MANGANESE	60.7		725		mg/kg	7 SO 6S 0507	29/29	N/A	725	**188**	N/A	N/A	N/A	NO	NTX
7439-97-6	MERCURY	0.11	J	1.2	J	mg/kg	7MW10S-0608	5/29	0.06 - 0.14	1.2	**0.05**	2	N/A	N/A	NO	BSL
7440-02-0	NICKEL	5.1		42.1	J	mg/kg	7 SO 6S 0507	29/29	N/A	42.1	**5.95**	130	N/A	N/A	NO	BSL
7440-09-7	POTASSIUM	575	J	18400	J	mg/kg	7 SO 6S 0507	29/29	N/A	18400	**2580**	N/A	N/A	N/A	NO	NTX
7782-49-2	SELENIUM	0.77		0.77		mg/kg	081090-7TB5(6-8)	1/29	0.44 - 0.85	0.77	**0.445**	5	N/A	N/A	NO	BSL
7440-22-4	SILVER	0.86	J	5.4	J	mg/kg	081490-7TB6(6-8)	13/29	0.4 - 2.4	5.4	**0.385**	34	N/A	N/A	NO	BSL
7440-23-5	SODIUM	54.8	J	708		mg/kg	7 SO 4S 0103	28/29	103	708	**20.56**	N/A	N/A	N/A	NO	NTX
7440-28-0	**THALLIUM**	0.26		1	J	mg/kg	7 SO 6S 0507	5/29	0.2 - 1.2	1	**0.29**	**0.7**	N/A	N/A	**YES**	ASL
7440-62-2	VANADIUM	12.3		86.7		mg/kg	7 SO 6S 0507	24/29	14.3 - 38.4	86.7	**35.1**	6000	N/A	N/A	NO	BSL
7440-66-6	ZINC	18.7		133	J	mg/kg	7 SO 4S 0103	29/29	N/A	133	**31.3**	12000	N/A	N/A	NO	BSL

A shaded value indicates that the concentration used for screening exceeds the criterion or background value.
A shaded chemical name indicates that the chemical has been selected as a COPC .

Footnotes:

1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 Atlantic, 1995. Background concentrations of Inorganics in Soil - Naval Submarine Base - New London. If the maximum detected concentration of an inorganic is less than the background concentration, then that metal is not selected as a COPC.
5 EPA Soil Screening Level Guidance, 1996.
6 CTDEP RSRs, 1996.
7 The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and/or an ARAR/TBC(s).
8 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene
9 Value is for endosulfan.
10 Value is for endrin.

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COPC = Chemical of Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.

Rationale Codes:

For Selection as a COPC:
ASL = Above COPC Screening Level/ARAR/TBC.
BSL = Below Screening Level.

For Elimination as a COPC:
BKG = Within Background Levels.
NTX = No criteria available.

TABLE 2-4

SUMMARY OF DETECTED COMPOUNDS IN SUBSURFACE SOIL AT SITE 7
AND COPC SELECTION FOR MIGRATION PATHWAYS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	EPA SSL-Soil to GW(5)	CTDEP Mobility Criteria(6)	CTDEP Soil Vapor Volatilization(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
	Associated Samples:															
	080990-7MW2(2-4)	7 SO 4S 0103		7TB12-0204		B325-SO03-0408										
	080990-TTB1(2-4)	7 SO 6S 0305		7TB1301.5 03.5		B325-SO04-0406										
	080990-7TB1(2-4)-AVG	7 SO 6S 0507		7TB14-0507		B325-SO04-0608										
	080990-TTB1(2-4)-D	7MW10S-0608		7TB15-0608		B325-SO05-0406										
	080990-7TB2(2-4)	7MW11S-0507		7TB160305		B325SS-0203										
	081090-7TB5(6-8)	7MW5S-1011		7TB7-0406		B325SW-0203										
	081390-7TB3(4-6)	7MW7S-0103		7TB8-0202.9		S7SB080607										
	081490-7MW3(6-8)	7MW8S-0408		7TB8-0202.9-AVG		S7SB090809										
	081490-7TB4(4-6)	7MW9S-0608		7TB8-0202.9-D		S7SB100607										
	081490-7TB6(6-8)	7MW9S-0608-AVG		B325-SO01-0204		S7SB180506										
	7 SO 10 0103	7MW9S-0608-D		B325-SO01-0406												

TABLE 2-5

SELECTION OF EXPOSURE PATHWAYS FOR SITE 7
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Surface Soil	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
				Full-Time Employees	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Full-time employees may contact surface soil during normal work activities.
		Air	Surface Soil	Construction Workers	Adult	Inhalation	On-site	None	No COPCs were identified in surface soil for the inhalation pathway.
				Full-Time Employees	Adult	Inhalation	On-site	None	No COPCs were identified in surface soil for the inhalation pathway.
	Subsurface Soil	Subsurface Soil	Subsurface Soil	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Full-Time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	Full-time employees are not exposed to subsurface soil.
		Air	Subsurface Soil	Construction Workers	Adult	Inhalation	On-site	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Full-Time Employees	Adult	Inhalation	On-site	None	Full-time employees are not exposed to subsurface soil.
Future	Surface Soil	Surface Soil	Surface Soil	Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Child residents may contact surface soil.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Adult residents may contact surface soil.
		Air	Surface Soil	Residents	Child	Inhalation	On-site	Quant	Child residents may be exposed to fugitive dust and volatile emissions from surface soil.
					Adult	Inhalation	On-site	Quant	Adult residents may be exposed to fugitive dust and volatile emissions from surface soil.
	Subsurface Soil	Subsurface Soil	Subsurface Soil	Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Child residents may contact subsurface soil that has been brought to the surface.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Adult residents may contact subsurface soil that has been brought to the surface.
		Air	Subsurface Soil	Residents	Child	Inhalation	On-site	Quant	Child residents may be exposed to fugitive dust and volatile emissions from subsurface soil that has been brought to the surface.
					Adult	Inhalation	On-site	Quant	Adult residents may be exposed to fugitive dust and volatile emissions from subsurface soil that has been brought to the surface.

TABLE 2-5

SELECTION OF EXPOSURE PATHWAYS FOR SITE 7
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Groundwater	Groundwater	Overburden/Bedrock Aquifer	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	None Quant	Construction workers may have dermal contact with groundwater during excavation activities.
				Full-Time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	Full-time employees are not exposed to groundwater.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Trespassers do not have contact with groundwater.
				Residents	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Groundwater may be used as a potable water source in the future.
					Child	Ingestion Dermal	On-Site On-Site	None	Exposures to a child resident are less than those for an adult resident.
		Air	Overburden/Bedrock Aquifer	Construction Workers	Adult	Inhalation	On-site	None	Construction workers exposure via volatilization is expected to be insignificant due to dilution with outdoor air.
				Full-Time Employees	Adult	Inhalation	On-site	None	Full-time employees are not exposed to chemicals volatilizing from groundwater.
				Trespassers	Adolescents	Inhalation	On-Site	None	Trespassers do not have contact with site groundwater.
				Residents	Adult	Inhalation	On-site	Quant	On-site residents may be exposed to volatile emissions from groundwater while showering.
					Child	Inhalation	On-site	None	Exposures to a child resident are less than those for an adult resident.

COPC - Chemical of Potential Concern
Quant - Quantitative

TABLE 2-6

SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR SITE 7
REASONABLE MAXIMUM EXPOSURE SCENARIO
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals with HI > 1
Construction Worker	Surface/Subsurface Soil	Ingestion	2.8E-07	- -	- -	- -	0.2	- -
		Dermal Contact	3.5E-08	- -	- -	- -	0.005	- -
		Total	3.2E-07	- -	- -	- -	0.2	- -
	Groundwater	Dermal Contact	4.2E-07	- -	- -	- -	0.09	- -
Full-Time Employees	Surface Soil	Ingestion	9.7E-07	- -	- -	- -	0.04	- -
		Dermal Contact	9.6E-07	- -	- -	- -	0.0008	- -
		Total	1.9E-06	- -	- -	Benzo(a)pyrene	0.04	- -
Child Resident	Surface/Subsurface Soil	Ingestion	4.2E-06	- -	- -	Arsenic, Benzo(a)pyrene	0.4	- -
		Dermal Contact	6.7E-07	- -	- -	- -	0.02	- -
		Total	4.8E-06	- -	- -	Arsenic, Benzo(a)pyrene	0.5	- -
Adult Resident	Surface/Subsurface Soil	Ingestion	1.8E-06	- -	- -	- -	0.05	- -
		Dermal Contact	3.7E-07	- -	- -	- -	0.002	- -
		Total	2.1E-06	- -	- -	- -	0.05	- -
	Groundwater	Ingestion	3.2E-04	Arsenic	Bis(2-ethylhexyl)phthalate, 1,4-Dichlorobenzene, Hexachlorobenzene	Benzene, Trichloroethene	3.8	Arsenic, Chromium
		Dermal Contact	2.9E-04	Hexachlorobenzene	Bis(2-ethylhexyl)phthalate, 1,4-Dichlorobenzene	- -	1.3	- -
		Inhalation[1]	3E-05	- -	1,4-Dichlorobenzene	Benzene, Trichloroethene	0.5	- -
		Total	6.4E-04	Arsenic, Hexachlorobenzene	Bis(2-ethylhexyl)phthalate, 1,4-Dichlorobenzene	Benzene, Trichloroethene	5.6	Arsenic, Chromium

Notes:
1 - Inhalation risk is assumed to be equal to risk from ingestion for volatiles.

TABLE 2-7

SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR SITE 7
CENTRAL TENDENCY EXPOSURE SCENARIO
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals with HI > 1
Construction Worker	Surface/Subsurface Soil	Ingestion	9.5E-08	- -	- -	- -	0.06	- -
		Dermal Contact	2.3E-09	- -	- -	- -	0.0004	- -
		Total	9.7E-08	- -	- -	- -	0.06	- -
	Groundwater	Dermal Contact	1.0E-07	- -	- -	- -	0.05	- -
Full-Time Employees	Surface Soil	Ingestion	9.1E-08	- -	- -	- -	0.002	- -
		Dermal Contact	1.8E-08	- -	- -	- -	0.00004	- -
		Total	1.1E-07	- -	- -	- -	0.002	- -
Child Resident	Surface/Subsurface Soil	Ingestion	6.9E-07	- -	- -	- -	0.2	- -
		Dermal Contact	6.7E-08	- -	- -	- -	0.005	- -
		Total	7.6E-07	- -	- -	- -	0.2	- -
Adult Resident	Surface/Subsurface Soil	Ingestion	2.6E-07	- -	- -	- -	0.02	- -
		Dermal Contact	1.5E-08	- -	- -	- -	0.0003	- -
		Total	2.7E-07	- -	- -	- -	0.02	- -
	Groundwater	Ingestion	1.2E-05	- -	- -	Arsenic, Hexachlorobenzene	0.2	- -
		Dermal Contact	3.2E-05	- -	Hexachlorobenzene	- -	0.8	- -
		Inhalation (1)	8.5E-08	- -	- -	- -	0.02	- -
		Total	4.4E-05	- -	Hexachlorobenzene	Arsenic, Bis(2-ethylhexyl)phthalate	1.1	- -

Notes:
1 - Inhalation risk is assumed to be equal to risk from ingestion for volatiles.

TABLE 2-8

SITE 7 SOIL PRELIMINARY REMEDIATION GOALS[1] (mg/kg)
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Area of Concern	Chemical of Concern	Maximum Detected Concentration - Surface/Subsurface	PRG for Protection of Current Receptors[2]	PRG for Protection of Groundwater (GA/GB)	PRG for Protection of Aquatic Ecological Receptors	PRG for Protection of Future Potential Receptors [3]
West of Building 325	Benzene	ND/0.004	No PRG, BSC	0.02/0.2	No PRG, BSC	4.5
	Chlorobenzene	ND/0.006	No PRG, BSC	2/20	No PRG, BSC	37
	1,4-Dichlorobenzene	ND/ND	No PRG, BSC	1.5/15	No PRG, BSC	26
South of Building 325	Benzo(a)anthracene	0.27/2.7	No PRG, BSC	NA	No PRG, BSC	1.0
	Benzo(a)pyrene	0.57/1.9	1.0	NA	No PRG, BSC	1.0
	Benzo(b)fluoranthene	0.61/3.2	No PRG, BSC	NA	No PRG, BSC	1.0
	Indeno(1,2,3-cd)pyrene	0.54/1.2	No PRG, BSC	NA	No PRG, BSC	1.0

1 PRGs are based on RCSA 22a-133k including direct contact and groundwater protection considerations and risk-based PRGs.
2 Current receptors consist of employees and construction workers. Employees would be exposed to surface soil only. Construction workers may be exposed to both surface and subsurface soil.
3 Future receptors consist of residents living at the site that may be exposed to both surface and subsurface soil.

BSC Below screening criteria. Maximum detected concentration at the site is less than a potential PRG that assumes that surface soil erodes into the adjacent stream and becomes sediment (ecological) or the maximum detected concentration at the site is less than a potential PRG based on an industrial scenario (human health).

ND - Not detected.
NA - Not applicable.

TABLE 2-9

SITE 7 SOIL REMEDIATION GOALS
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Area of Concern	Chemical of Concern	Remediation Goal (mg/kg)
West of Building 325	Benzene	0.02
	Chlorobenzene	2.0
	1,4-Dichlorobenzene	1.5
South of Building 325	Benzo(a)anthracene	1.0
	Benzo(a)pyrene	1.0
	Benzo(b)fluoranthene	1.0
	Indeno(1,2,3-cd)pyrene	1.0

TABLE 2-10

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs FOR SITE 7 SOIL
ALTERNATIVE S1 - NO ACTION
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

FEDERAL

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
CSF	Not applicable	To be considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Alternative may not comply with TBC. Site contaminants (PAHs) are present at concentrations that could result in unacceptable risks to current and potential future receptors. No actions would be taken to address these potential risks.

STATE OF CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k - 1 thru 3	Applicable	These regulations provide specific numerical cleanup criteria for contaminants in soil. Requirements are based on groundwater in the area being classified by the State as GB.	Alternative would not comply with ARAR. PAHs are present in soils at concentrations greater than applicable criteria. PAHs represent a potential threat to current and potential future receptors and could impact groundwater at concentrations greater than applicable criteria. No action would be taken to address these risks.

TABLE 2-11

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs FOR SITE 7 SOIL ALTERNATIVE S2 - INSTITUTIONAL CONTROLS WITH PERMEABLE COVER SITES 7 AND 14 SOIL ROD NSB-NLON, GROTON, CONNECTICUT

FEDERAL

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
CSF	Not applicable	To be considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Alternative should comply with TBC, PAHs are present in soils at concentrations greater than applicable criteria; however, Restrictions would be used to limit worker contact with contaminated soils during normal construction/maintenance activities. Institutional controls would be used to prohibit future residential development in contaminated areas. Monitoring would be conducted to confirm that PAHs in soil are not adversely impacting groundwater.

TABLE 2-11

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs FOR SITE 7 SOIL
ALTERNATIVE S2 - INSTITUTIONAL CONTROLS WITH PERMEABLE COVER
SITES 7 AND 14 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

STATE OF CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k - 1 thru 3	Applicable	These regulations provide specific numerical cleanup criteria for contaminants in soil. Requirements are based on groundwater in the area being classified by the State as GB.	Alternative would partially comply with ARAR. PAHs are present in soils at concentrations greater than applicable criteria; however, The depth of soil cover and asphalt paving would allow some of the contaminated soil to be designated as inaccessible soil. Soil in other areas would not be able to be designated as inaccessible and would not comply with the requirements. Restrictions would be used to limit worker contact with contaminated soils during normal construction/maintenance activities. Institutional controls would be used to prohibit future residential development in contaminated areas. Groundwater monitoring would be conducted under the Site 7 groundwater alternative to confirm that PAHs do not adversely impact groundwater.

TABLE 2-12

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs FOR SITE 7 SOIL ALTERNATIVE S3 AND SELECTED REMEDY - EXCAVATION AND OFF-SITE DISPOSAL SITES 7 AND 14 SOIL ROD NSB-NLON, GROTON, CONNECTICUT

FEDERAL

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Cancer Slope Factors (CSF)	Not applicable	To be considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	Alternative would comply with TBC. Contaminated soils would be excavated and properly managed off site. This action would eliminate site contamination that could adversely impact human health.

STATE OF CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k - 1 thru 3	Applicable	These regulations provide specific numerical cleanup criteria for contaminants in soil. Requirements are based on groundwater in the area being classified by the State as GB.	Alternative would comply with ARAR. Contaminated soil would be excavated and properly managed off site. This action would eliminate site contamination that could adversely impact human health.

TABLE 2-13

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs FOR SITE 7 SOIL ALTERNATIVE S3 AND SELECTED REMEDY - EXCAVATION AND OFF-SITE DISPOSAL SITES 7 AND 14 SOIL ROD NSB-NLON, GROTON, CONNECTICUT

FEDERAL

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to be Taken
Clean Water Act, Section 402, National Pollution Discharge Elimination System (NPDES)	40 CFR 122 through 125, 131	Potentially applicable	NPDES permits are required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be ARARs. Standards would be enforced through the State program.	If water management is required during soil excavation and the water is to be discharged directly to a surface water body, then treatment in accordance with these regulations will likely be required.
Clean Water Act, Section 403, Pretreatment Regulations	Section 403	Potentially applicable	General pretreatment requirements for discharge to a POTW. If remedial activities include such a discharge to the local sanitary sewer, pre-treatment standards would be ARARs. Standards would be enforced through the State program.	If water management is required during soil excavation and the water is to be discharged to a sanitary sewer system, then treatment in accordance with these regulations may be required.

TABLE 2-13

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs FOR SITE 7 SOIL ALTERNATIVE S3 AND SELECTED REMEDY - EXCAVATION AND OFF-SITE DISPOSAL SITES 7 AND 14 SOIL ROD NSB-NLON, GROTON, CONNECTICUT

STATE OF CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to be Taken
Hazardous Waste Management: Generator and Handler Requirements	RCSA § 22a-449(c) 100-102	Potentially applicable	These sections establish standards for listing, identification, and management of hazardous waste. The standards of 40 CFR 260 to 262 are incorporated by reference.	Excavated soils would be tested for hazardous waste characteristics (i.e., TCLP criteria). If soils were determined to be a hazardous waste, then they would be excavated, stored, transported, and disposed off site in accordance with hazardous waste regulations.
Solid Waste Management Regulations	RCSA §22a-209-1 to 15	Potentially applicable	These sections establish standards for management of non-hazardous waste.	If the soils are determined to be a non-hazardous waste, then they would be managed and disposed off site in accordance with the non-hazardous regulations.
Connecticut Water Pollution Control Act	RCSA §22a - 416 to 599	Potentially applicable	These regulations govern the treatment and discharge of water into surface water bodies in the State.	If water management is required during soil excavation and the water is to be discharged directly to a surface water body, then treatment in accordance with these regulations will likely be required. If water is to be discharged to a POTW, then the applicable pre-treatment sections of the POTW permit would apply.

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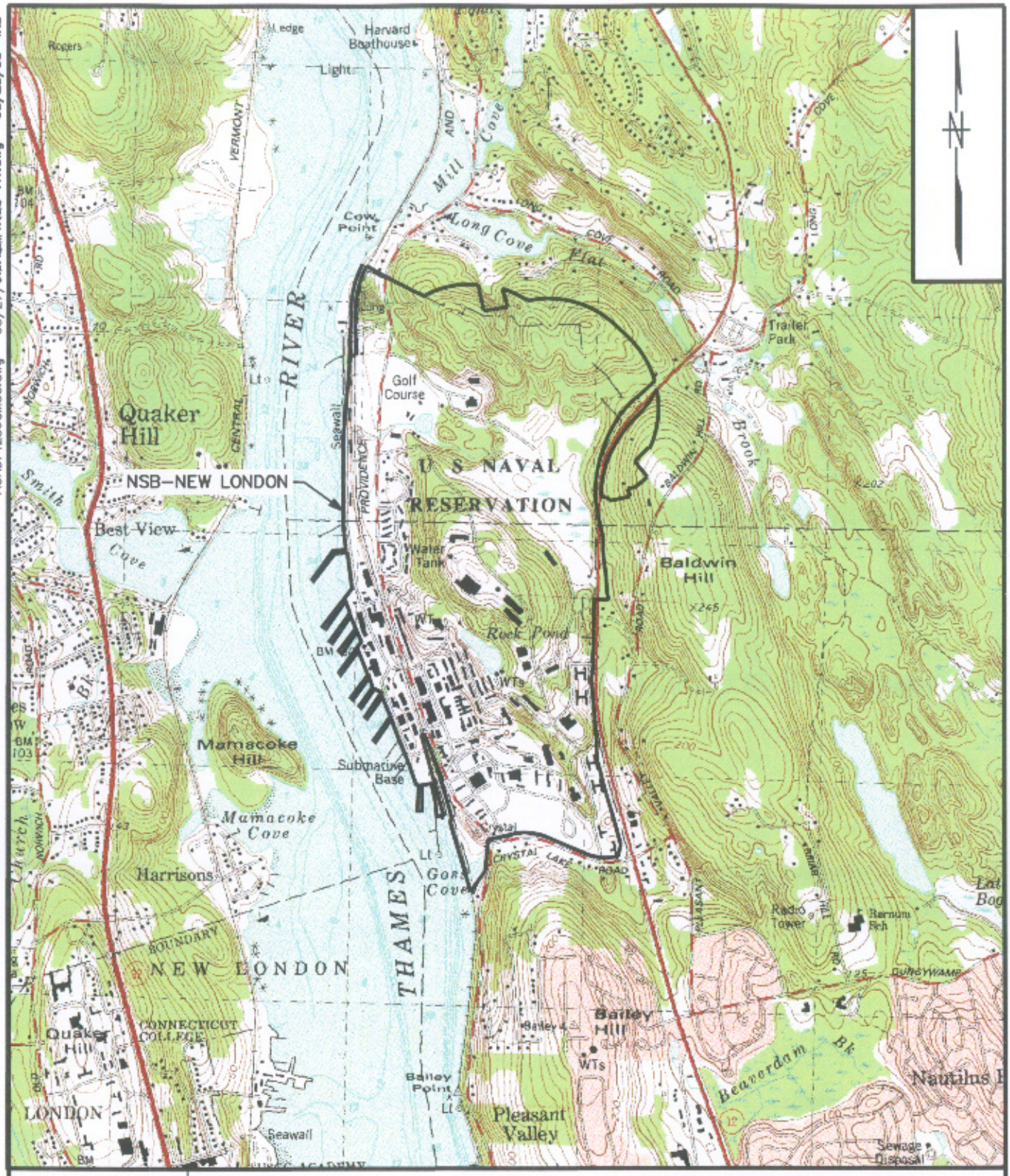

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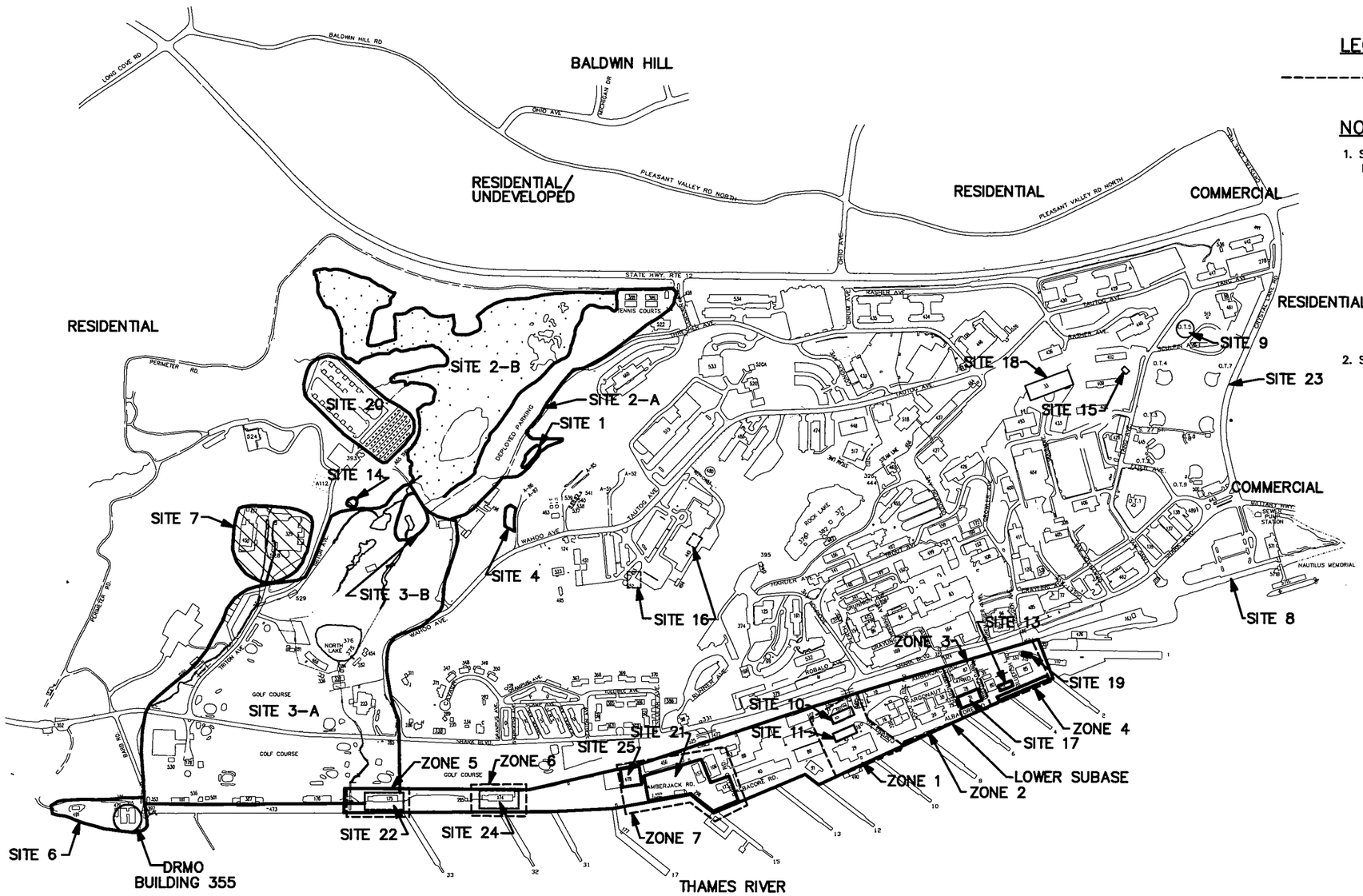
SCALE IN FEET

DRAWN BY DM DATE 8/30/04	Tetra Tech NUS, Inc.	LOCATION MAP SITES 7 AND 14 SOIL RECORD OF DECISION NSB-NLON, GROTON, CONNECTICUT	CONTRACT NO. 4286
CHECKED BY CAR DATE 8/31/04			OWNER NO. 0841
REVISED BY DATE			APPROVED BY CAR DATE 8/31/04
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 REV. 0

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

ACAD: 4286CM51.dwg 08/30/04 DM PIT



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 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

0 800 1600
SCALE IN FEET

DRAWN BY DM DATE 8/30/04	Tetra Tech NUS, Inc.	SITE LOCATION MAP SITES 7 AND 14 SOIL RECORD OF DECISION NSB-NLON, GROTON, CONNECTICUT	CONTRACT NO. 4286
CHECKED BY CAR DATE 8/31/04			OWNER NO. 0841
REVISED BY DATE			APPROVED BY CAR DATE 8/31/04
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 REV. 0

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

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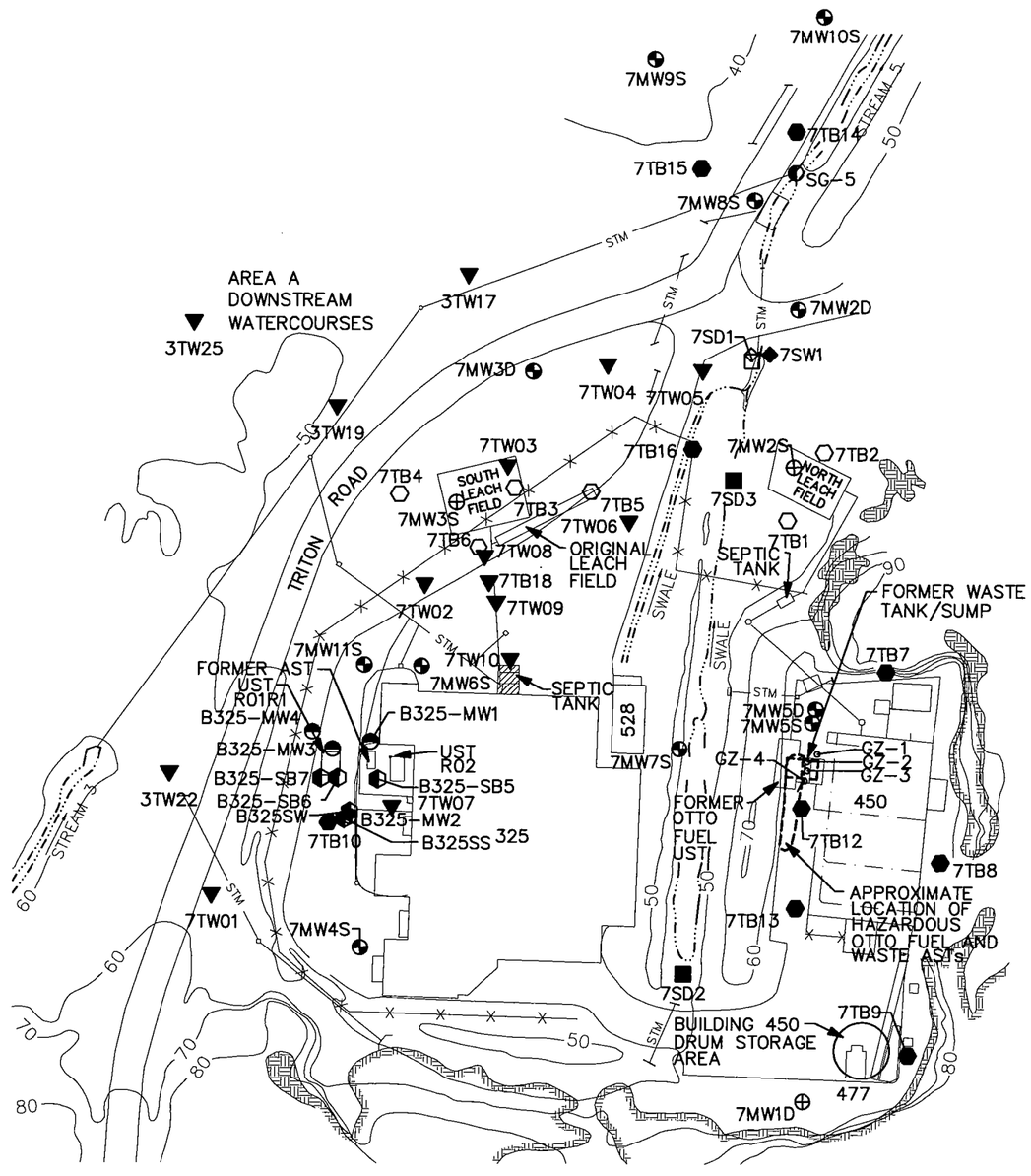


NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN.

LEGEND

⊕7MW2S	PHASE I MONITORING WELL
⊕7MW7S	PHASE II MONITORING WELL
⊕B325-MW1	SITE CHARACTERIZATION MONITORING WELL
⬡7TB1	PHASE I TEST BORING
⬢7TB12	PHASE II TEST BORING
⬢B325-SB6	SITE CHARACTERIZATION SOIL BORING
◇7SW1	PHASE I EXISTING SURFACE WATER SAMPLE
◆7SW1	PHASE II SURFACE WATER SAMPLE
□7SD1	PHASE I SEDIMENT SAMPLE
■7SD3	PHASE II SEDIMENT SAMPLE
◐SG-5	PHASE II STAFF GAUGE
▼7TB17	BGOURI TEST BORING LOCATION
▼7TW17	BGOURI TEMPORARY WELL
—10—	TOPOGRAPHIC CONTOUR
123	BUILDING No.
-···-	WATERCOURSE
—STM—□—	STORM SEWER AND CATCH BASIN
	EXPOSED BEDROCK
—X—X—	FENCE

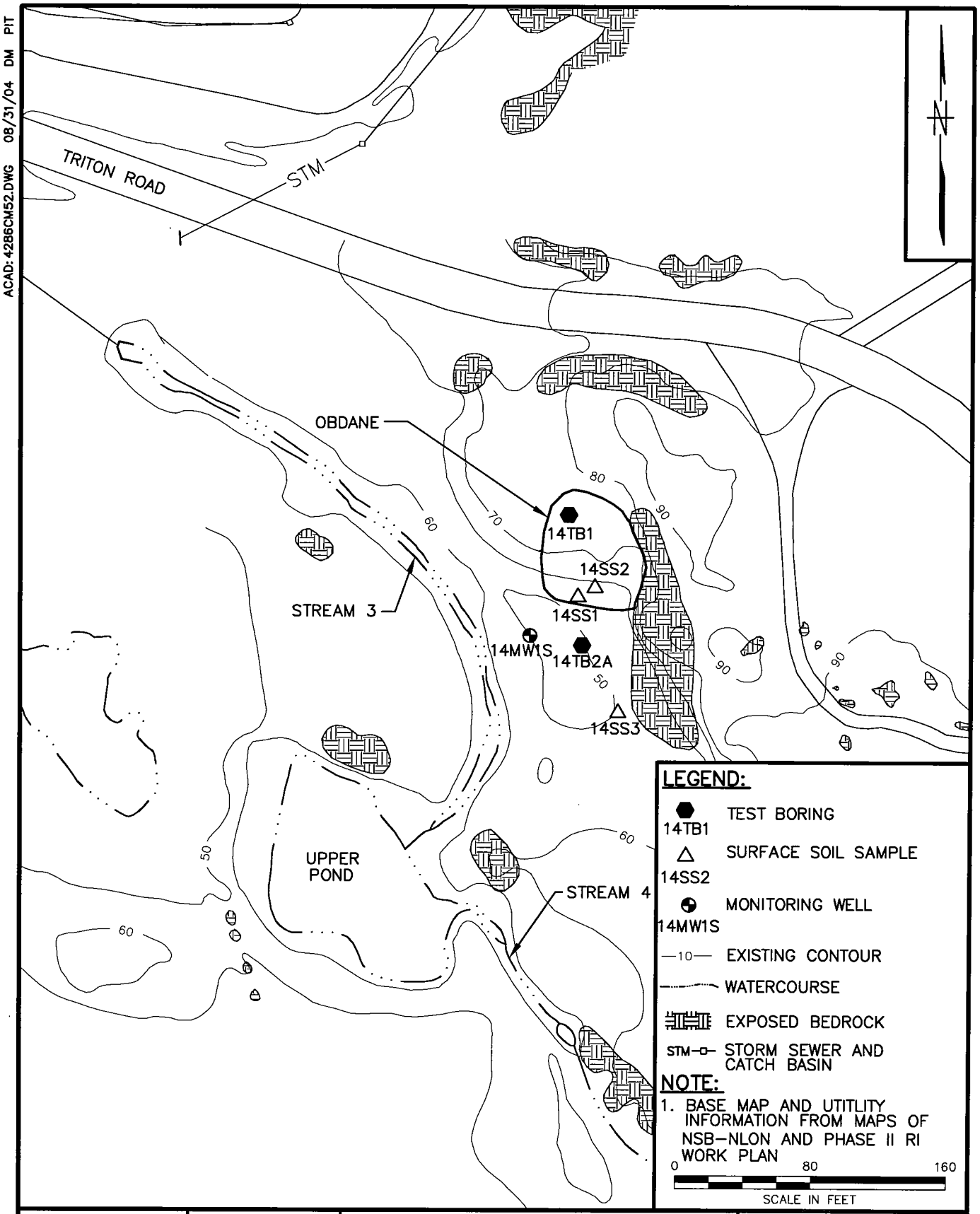
0 110 220
SCALE IN FEET

DRAWN BY DM	DATE 8/30/04	Tetra Tech NUS, Inc.	GENERAL SITE LAYOUT AND HISTORIC SAMPLING LOCATIONS SITE 7 - TORPEDO SHOPS SITES 7 AND 14 SOIL RECORD OF DECISION NSB-NLON, GROTON, CONNECTICUT
CHECKED BY CAR	DATE 8/31/04		
REVISED BY	DATE		
SCALE AS NOTED			

CONTRACT NO. 4286	
OWNER NO. 0841	
APPROVED BY CAR	DATE 8/31/04
DRAWING NO. FIGURE 2-3	REV. 0

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

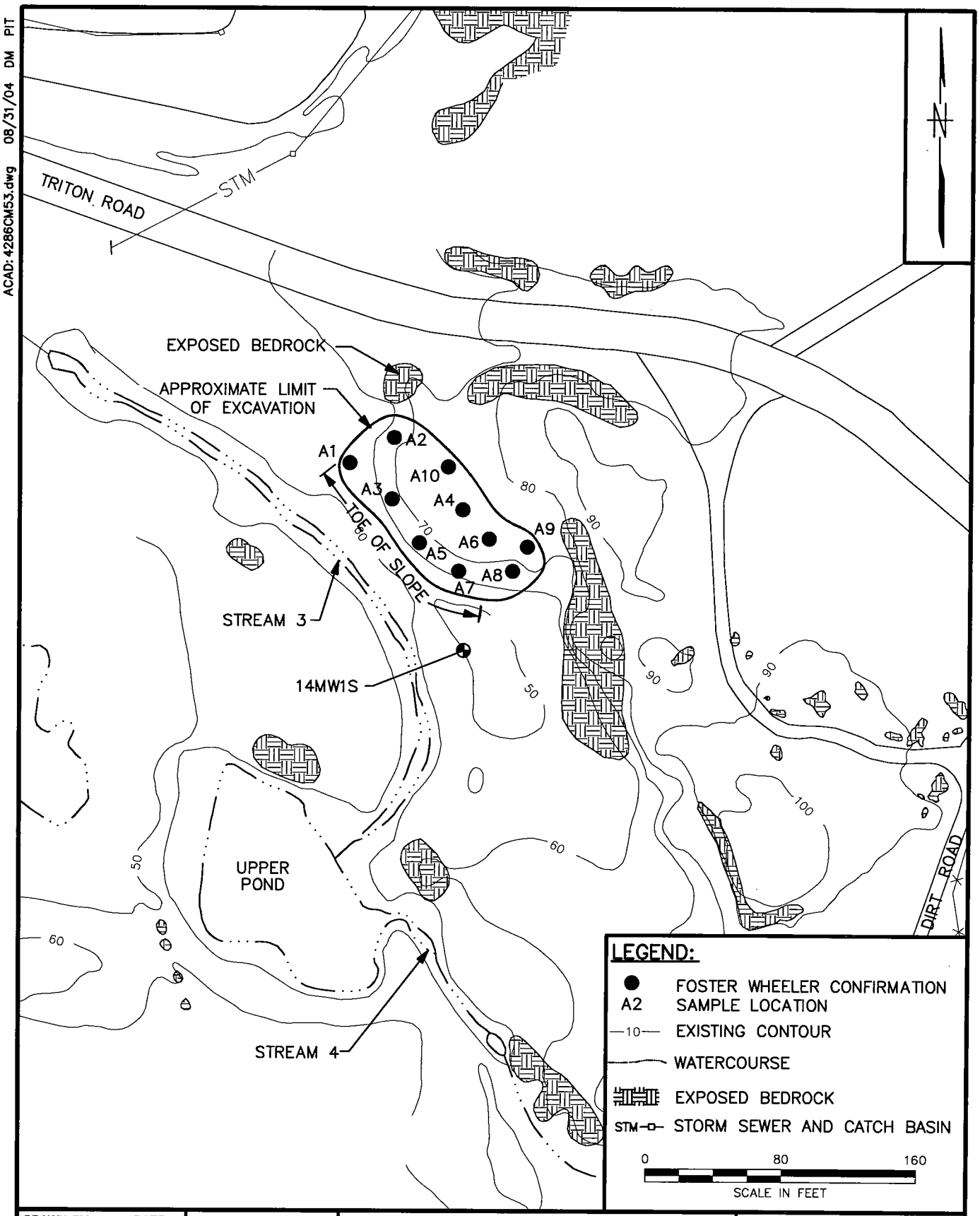
ACAD: 4286CM52.DWG 08/31/04 DM PIT



DRAWN BY DM	DATE 8/30/04	Tetra Tech NUS, Inc.	CONTRACT NO. 4286
CHECKED BY CAR	DATE 8/31/04	GENERAL SITE LAYOUT AND HISTORIC SAMPLING LOCATIONS SITE 14 - OBDANE SITES 7 AND 14 SOIL RECORD OF DECISION NSB-NLON, GROTON, CONNECTICUT	OWNER NO. 0841
REVISED BY	DATE		APPROVED BY CAR DATE 8/31/04
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 REV. 0

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

ACAD: 4286CM53.dwg 08/31/04 DM PIT



DRAWN BY DM	DATE 8/30/04	Tetra Tech NUS, Inc.	LIMIT OF EXCAVATION OF SITE 14 NTCRA SITES 7 AND 14 SOIL RECORD OF DECISION NSB-NLON, GROTON, CONNECTICUT
CHECKED BY CAR	DATE 8/31/04		CONTRACT NO. 4286
REVISED BY	DATE		OWNER NO. 0841
SCALE AS NOTED			APPROVED BY CAR DATE 8/31/04
			DRAWING NO. FIGURE 2-5 REV. 0

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

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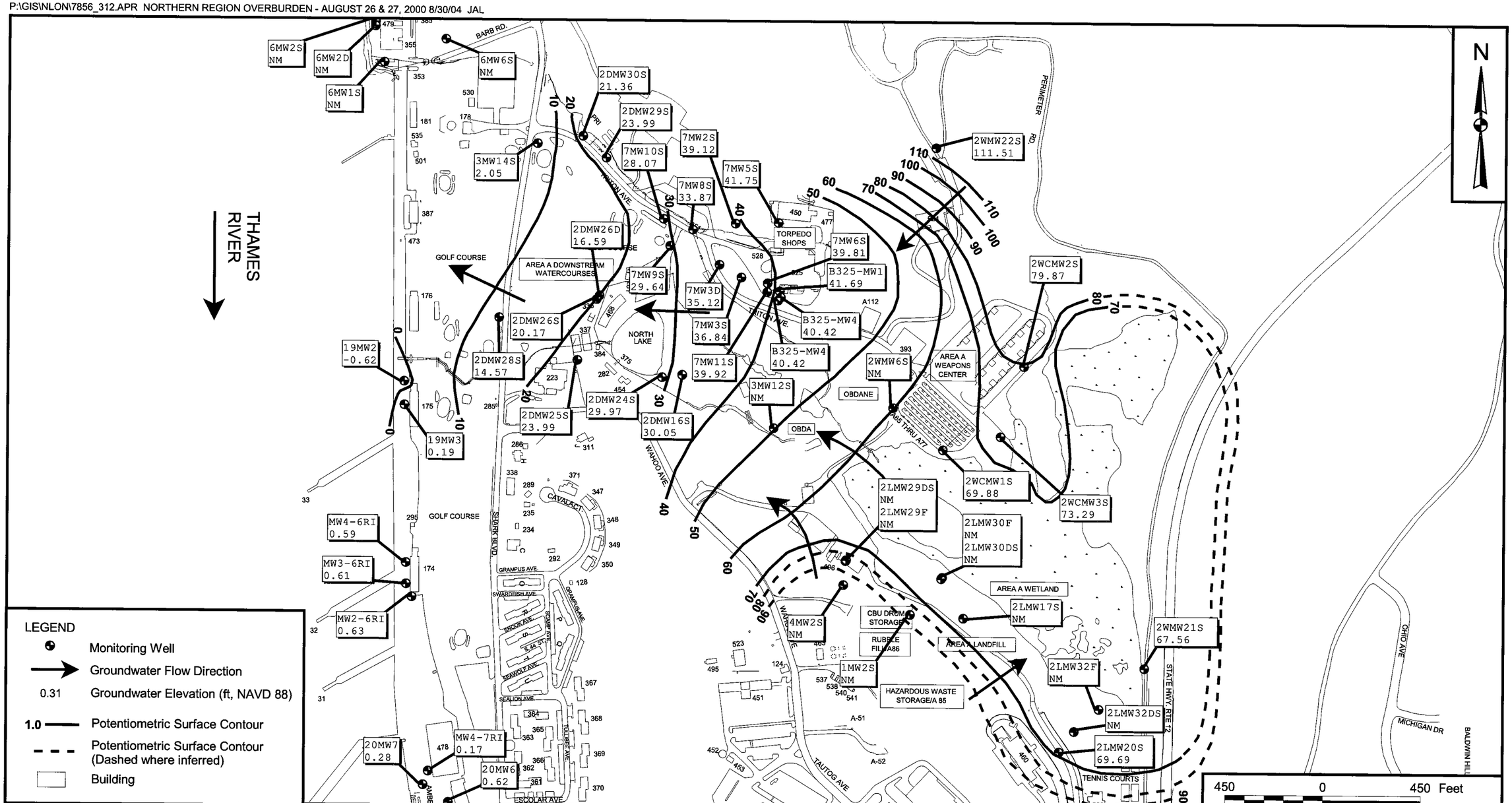

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY K. PEILA DATE 12/9/03
CHECKED BY C. RICH DATE 8/31/04
COST/SCHEDULE-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SHALLOW OVERBURDEN POTENTIOMETRIC SURFACE MAP
AUGUST 2000
NORTHERN REGION
SITES 7 AND 14 SOIL RECORD OF DECISION
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER 4286
OWNER NUMBER 841
APPROVED BY CAR DATE 8/31/04
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REV 0

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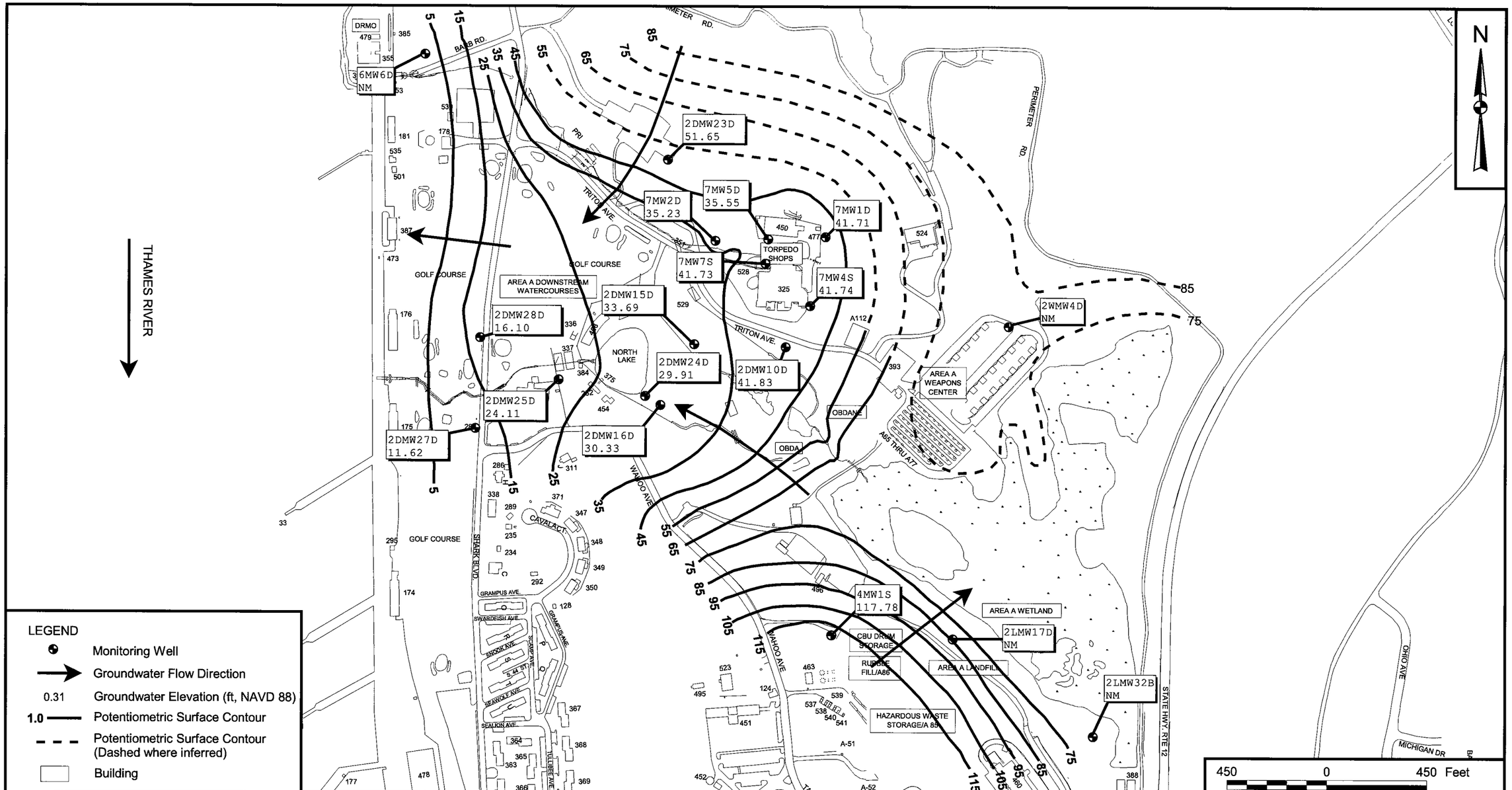

LEGEND

- Monitoring Well
- Groundwater Flow Direction
- 0.31 Groundwater Elevation (ft, NAVD 88)
- 1.0 Potentiometric Surface Contour
- Potentiometric Surface Contour (Dashed where inferred)
- Building

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY K. PEILA DATE 12/9/03
CHECKED BY C. RICH DATE 8/31/04
COST/SCHEDULE-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

BEDROCK POTENTIOMETRIC SURFACE MAP
AUGUST 2000
NORTHERN REGION
SITES 7 AND 14 SOIL RECORD OF DECISION
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER 4286
OWNER NUMBER 841
APPROVED BY CAR DATE 8/31/04
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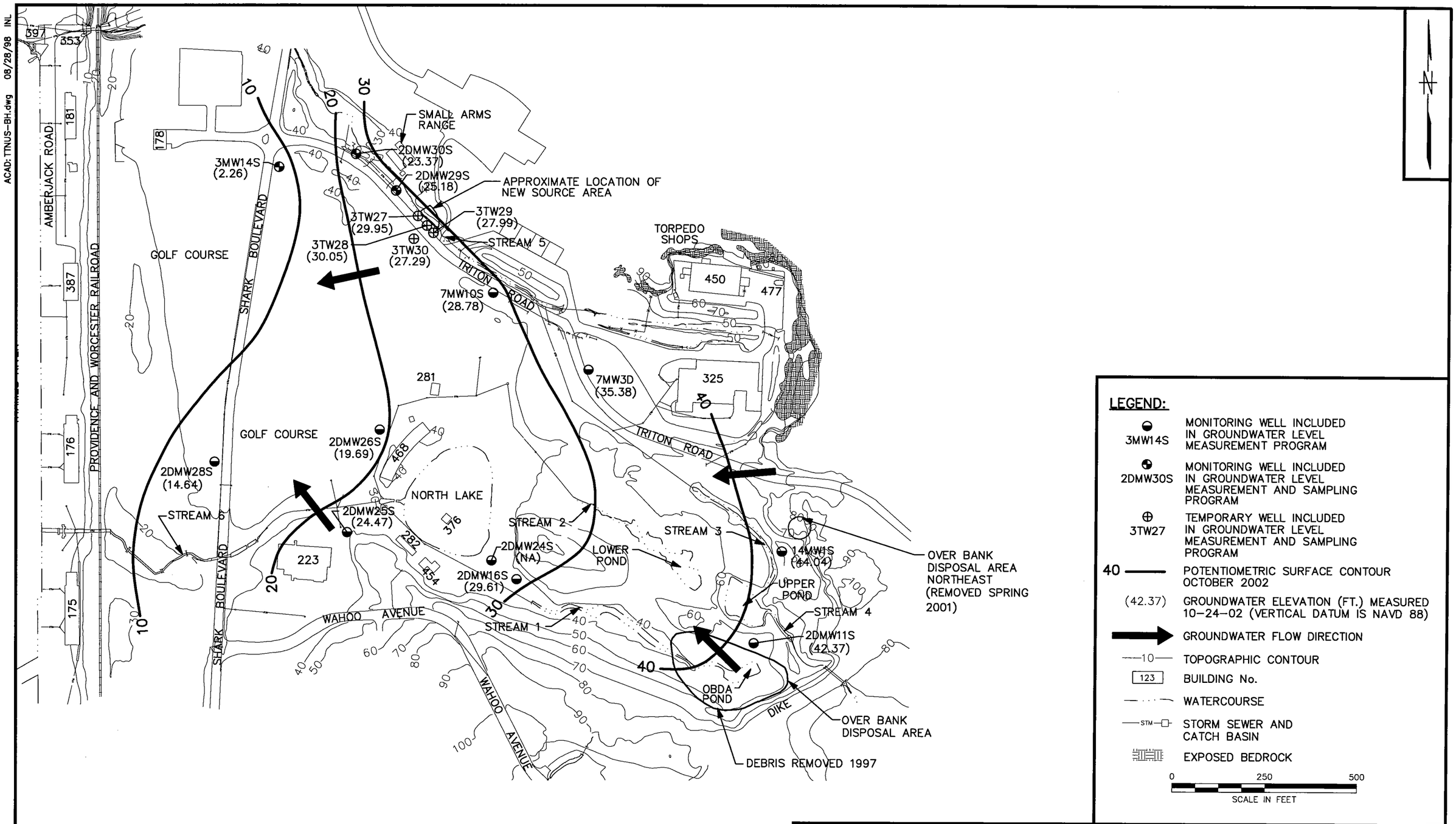
REV 0

ACAD: TTNUS-BH.dwg 08/28/98 INL



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SCALE	
AS NOTED	

Tetra Tech NUS, Inc.

SHALLOW OVERBURDEN POTENTIOMETRIC SURFACE MAP OCTOBER 2002
SITES 7 AND 14 SOIL RECORD OF DECISION
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NO.	
4286	
OWNER NO.	
0841	
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FIGURE 2-8	0

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

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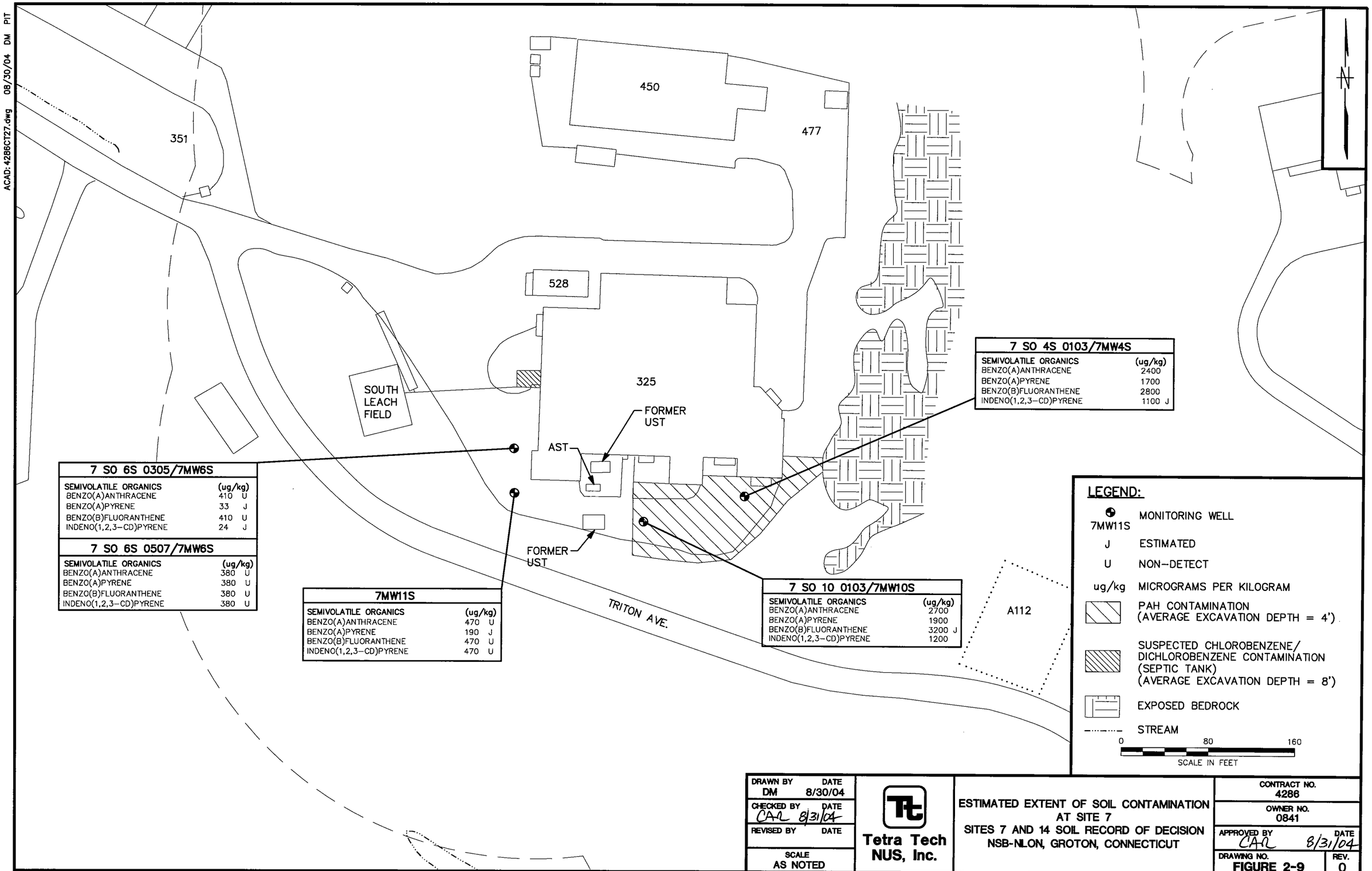

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CHECKED BY	DATE
CAR	8/31/04
REVISED BY	DATE
SCALE	
AS NOTED	

Tetra Tech NUS, Inc.

ESTIMATED EXTENT OF SOIL CONTAMINATION AT SITE 7
SITES 7 AND 14 SOIL RECORD OF DECISION
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NO.	
4286	
OWNER NO.	
0841	
APPROVED BY	DATE
CAR	8/31/04
DRAWING NO.	REV.
FIGURE 2-9	0

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

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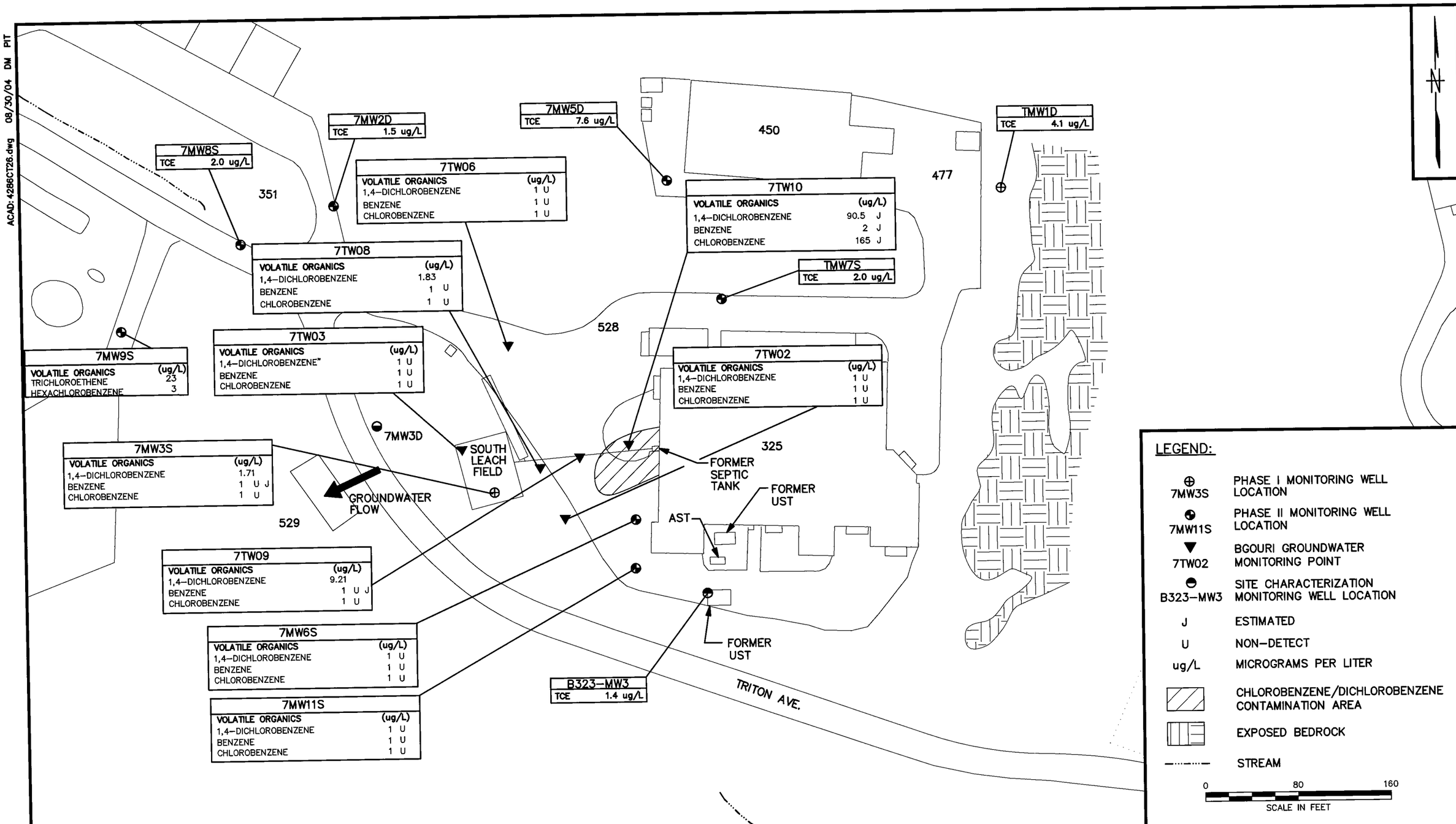

DRAWN BY DM	DATE 8/30/04	Tetra Tech NUS, Inc.	ESTIMATED EXTENT OF GROUNDWATER CONTAMINATION AT SITE 7 SITES 7 AND 14 SOIL RECORD OF DECISION NSB-NLON, GROTON, CONNECTICUT
CHECKED BY CAR	DATE 8/31/04		
REVISED BY	DATE		
SCALE AS NOTED			

CONTRACT NO. 4286	
OWNER NO. 0841	
APPROVED BY CAR	DATE 8/31/04
DRAWING NO. FIGURE 2-10	REV. 0

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

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, EPA, 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 (EPA, 1992), the Responsiveness Summary was prepared after the public comment period, which ended on August 17, 2004.

3.1 OVERVIEW

The Proposed Plan as presented to the public identified excavation and off-site disposal as the preferred alternative for Site 7 soil and NFA as the preferred alternative for Site 14 soil. The Site 7 alternative was selected because it is protective of human health and the environment, attained all ARARs, and was considered by the Navy, EPA, and CTDEP as the alternative that provided the best balance of the evaluation criteria. The NFA alternative for Site 14 was recommended because the soil remaining at the site after the NTCRA does not pose any unacceptable risks to human health or the environment.

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT

The public comment period for the Proposed Plan for OU8 began on July 16, 2004 and ended on August 17, 2004. A public meeting was held on July 28, 2004 at the Best Western Olympic Inn on Route 12, Groton, Connecticut to accept verbal comments on the proposed action. No comments on the proposed remedies for OU8 were received during the public meeting or public comment period; therefore, no revisions to the Selected Remedies, as identified in the Proposed Plan, were necessary or appropriate.

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

No comments on the proposed remedies for OU8 were received during the public meeting or public comment period.

REFERENCES

Atlantic (Atlantic Environmental Services, Inc.), 1992. Phase I Remedial Investigation Naval Submarine Base - New London, Groton, Connecticut. Colchester, Connecticut, August.

Atlantic, 1995. Background Concentrations of Inorganics in Soil. Naval Submarine Base-New London, Groton, Connecticut. Colchester, Connecticut, April.

B&RE (Brown & Root Environmental), 1997. Phase II Remedial Investigation Report for Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. March.

CTDEP (Connecticut Department of Environmental Protection), 1996. Remediation Standard Regulations. Bureau of Water Management, Permitting, Enforcement and Remediation Division, Hartford, Connecticut, January.

Envirodyne (Envirodyne Engineers, Inc.), 1983. Final Initial Assessment Study of Naval Submarine Base, New London, Connecticut. Prepared for Navy Assessment and Control of Installation Pollutants (NACIP) Department, Naval Energy and Environmental Support Activity (NEESA) 13-025. Port Hueneme, California. St. Louis, Missouri, March.

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EPA, 1994. Revised Interim Guidance on Establishing Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Office of Solid Waste and Emergency Response, Washington, D.C., Directive 9355.4-12, July 14.

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APPENDIX A

PROPOSED PLAN
PUBLIC NOTICE

PROPOSED PLAN

Naval Submarine Base - New London

SITE 7 - TORPEDO SHOPS and SITE 14 - OVERBANK DISPOSAL AREA NORTHEAST SOIL - OPERABLE UNIT 8
PROPOSED PLAN

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 the soil found at the Torpedo Shops (Site 7) and Overbank Disposal Area Northeast (OBDANE) (Site 14), **Operable Unit (OU)** 8, at Naval Submarine Base - New London (NSB-NLON) (Figure 1). The sites are two of 25 sites being addressed by the Navy's **Installation Restoration (IR)** Program at NSB-NLON. The **IR** Program is being conducted to identify and clean up sites created by past operations that do not meet today's environmental standards.

This Proposed Plan recommends removal of the Site 7 contaminated soil in **OU**8. This proposed action will address both CERCLA risks and State chemical-specific requirements. Detailed descriptions of Site 7 are provided in the **Basewide Groundwater Operable Unit Remedial Investigation (BGOURI) Update/Feasibility Study (FS)** Report, **BGOURI** Report, and Phase II RI Report, which are avaiable in the Information Repositories at the locations identified on Page 10. The **BGOURI Update/FS** Report concluded that there are potential unacceptable risks to human health or the environment from exposure to Site 7 soil and there are potential risks for certain receptors from

The Cleanup Proposal...

After careful study of **OU**8, the Navy proposes the following plan:

Site 7 Soil:

- Complete delineation of contaminated soil and characterization of septic tank contents.
- Excavate, characterize, transport, and dispose contaminated soil and septic tank (if necessary) at an off-site location.
- Collect verification samples to ensure removal of all contaminated soil above remedial goals.
- Restore site to pre-**excavation** conditions.

Site 14 Soil:

- No Further Action.

Technical terms shown in bold print are defined in the glossary on Page 9.

What Do You Think?

The Navy is accepting public comments on this Proposed Plan from July 16, 2004 to August 17, 2004. 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 July 28, 2004 public meeting and hearing, or
2. Send written comments postmarked no later than August 17, 2004 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 July 28, 2004 public meeting and hearing. In addition, regulations require the Navy to respond to all formal comments in writing. The Navy will review the transcript of the comments received at the meeting, 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**.

Learn More About the Proposed Plan

The Navy will describe the Proposed Plan and hear your questions at an informational public meeting.

A formal public hearing will immediately follow this meeting.

July 28

PUBLIC MEETING

Meeting: 6:30 pm
Hearing: 7:00 pm
Date: Wednesday July 28, 2004
Location: Best Western Olympic Inn, Route 12, Groton, Connecticut

For further information regarding the public meeting and hearing, call Ms. Melissa Griffin with the NSB-NLON Environmental Department at (860) 694-5191.

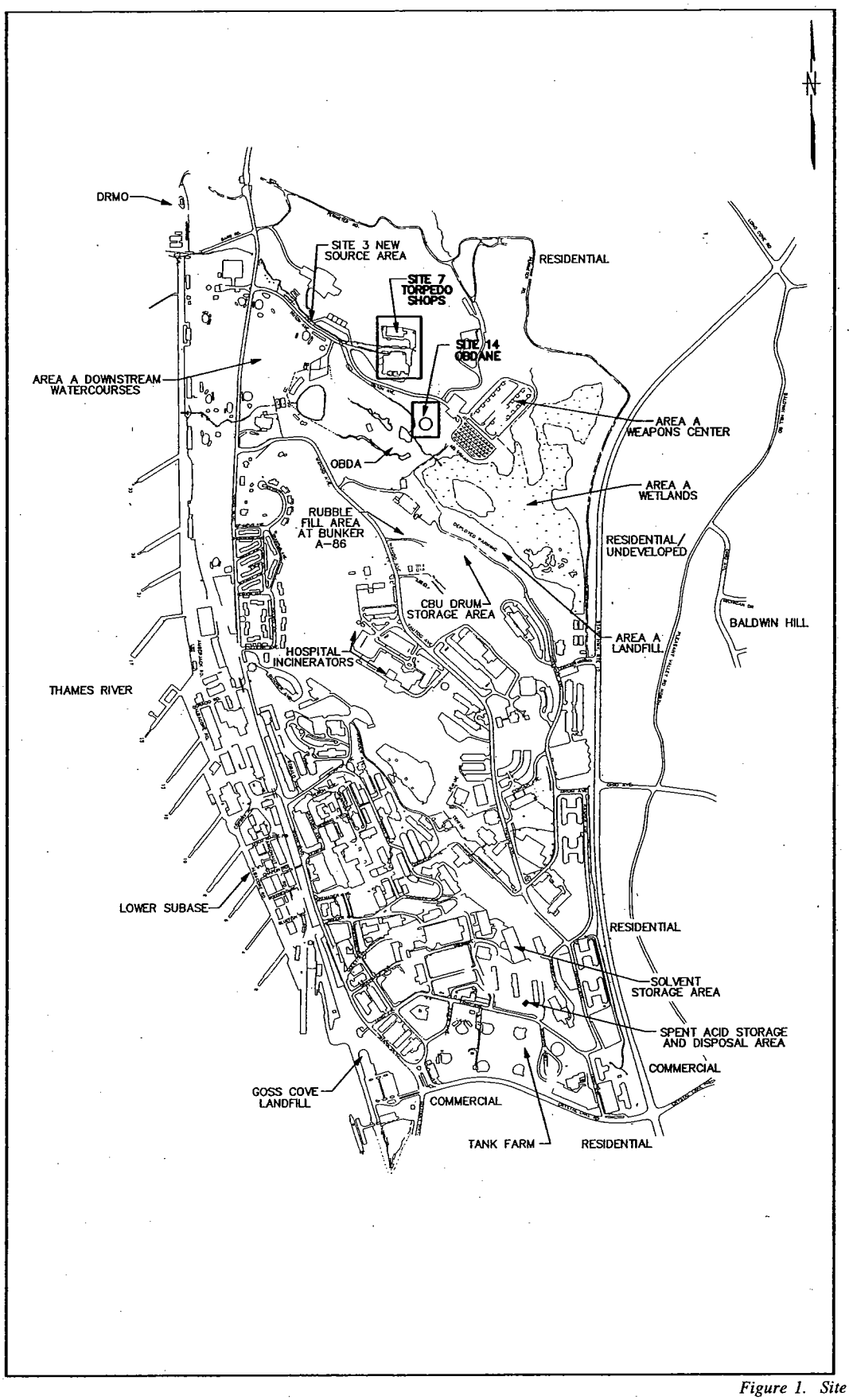

Figure 1. Site Location Map

Introduction (Continued)

direct contact with contaminated soil based on State chemical-specific requirements and potential contaminant migration issues from soil to **groundwater**. The Phase II RI Report concluded that there are no significant risks to ecological receptors from exposure to Site 7 soil. Site 7 **groundwater** contamination is being addressed as part of the Basewide **Groundwater** OU9 under a separate action and in a separate decision document.

This Proposed Plan recommends No Further Action for Site 14 soil in **OU8**. A detailed description of Site 14 is provided in the Phase II RI Report, which is available in the Information Repositories. A Non-Time-Critical Removal Action (NTCRA) was conducted at Site 14 in 2001 to remove debris and contaminated soil identified at the site during the Phase II RI. The NTCRA addressed all site-related risks and further action under CERCLA is not necessary. Site 14 **groundwater** is being addressed as part of the Basewide Groundwater **OU9** in a separate decision document.

History

Site 7 is the Torpedo Shops (Buildings 325, 450, 477, and 528) and is located in the northern portion of NSB-NLON on the northern side of Triton Road (Figure 1). The Navy conducts maintenance activities on torpedoes at the site. Contaminated soil at Site 7, **OU**8 was found or is suspected on the southern and western sides of Building 325 (Figure 2). The contaminated soil located on the southern side of the building appears to be related to former underground storage tanks used to store fuel oil, and the suspected soil **contamination** on the western side of the building appears to be related to the septic tank for a former septic system. The underground storage tanks were closed in the 1990s, and the septic system was abandoned when sanitary sewers were installed in 1983.

Miscellaneous wastes were dumped at Site 14 in the past. The site is located adjacent to Sites 3 and 7 in a wooded area on the edge of a ravine just north of Stream 3 (Figure 1). An NTCRA was completed at the site in 2001 to address the soil and miscellaneous wastes dumped at the site. Approximately 270 tons of material were removed and disposed off site (see Figure 3), and the site was subsequently restored.

Findings of the Field Investigations

The Navy conducted several field investigations from 1990 through 2000 to assess the nature and extent of **contamination** at Sites 7 and 14. Investigations were performed at **OU**8 in 1990, 1994, and 2000. Human health and ecological **risk assessments** were performed to evaluate the potential effects of the **contamination** found in the soil of Sites 7 and 14 on human health and the environment.

The investigation of Site 7 soil identified **polynuclear aromatic hydrocarbons [(PAHs)**; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene] and inorganics (metals) as the primary chemicals in the soil at Site 7. The **PAHs** were identified in a small area near the southeastern corner of Building 325 in surface and subsurface soil. The inorganics were detected in soil across Site 7. An additional area of soil **contamination** is suspected near the location of a septic tank formerly used for Site 7 along the western side of Building 325. Benzene, chlorobenzene, and dichlorobenzene were detected in the groundwater originating from the septic tank location. Even though these contaminants were not detected in soil samples collected at nearby locations, it is believed that they are present in the septic tank or surrounding soil and the tank or contaminated soil are acting as the source of these contaminants to groundwater.

The human health **risk assessment** (HHRA) showed that there are no unacceptable risks to potential receptors from direct exposure to the contaminants in Site 7 soil considering EPA's target risk range [$1x10^{-4}$ <incremental cancer risk (ICR)< 10^{-6}; hazard index (HI)<1] and CTDEP's acceptable levels for cumulative risk (ICR<$1x10^{-5}$; HI<1). However, the ICR for full-time workers and child resident from exposure to benzo(a)pyrene in **surface soil** and **surface/subsurface soil**, respectively, exceeded CTDEP's target level for individual chemicals ($1x10^{-6}$). In addition, there were contaminants detected at concentrations that exceeded Connecticut's Remediation Standard Regulations (RSRs), which are **applicable or relevant and appropriate requirements (ARARs)** for **OU**8. The maximum concentration of benzo(a)pyrene in soil exceeds Connecticut's RSRs Industrial/Commercial Direct Exposure soil criterion and the maximum concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in soil exceed Connecticut's RSRs Residential Direct Exposure soil criteria. The maximum concentrations of

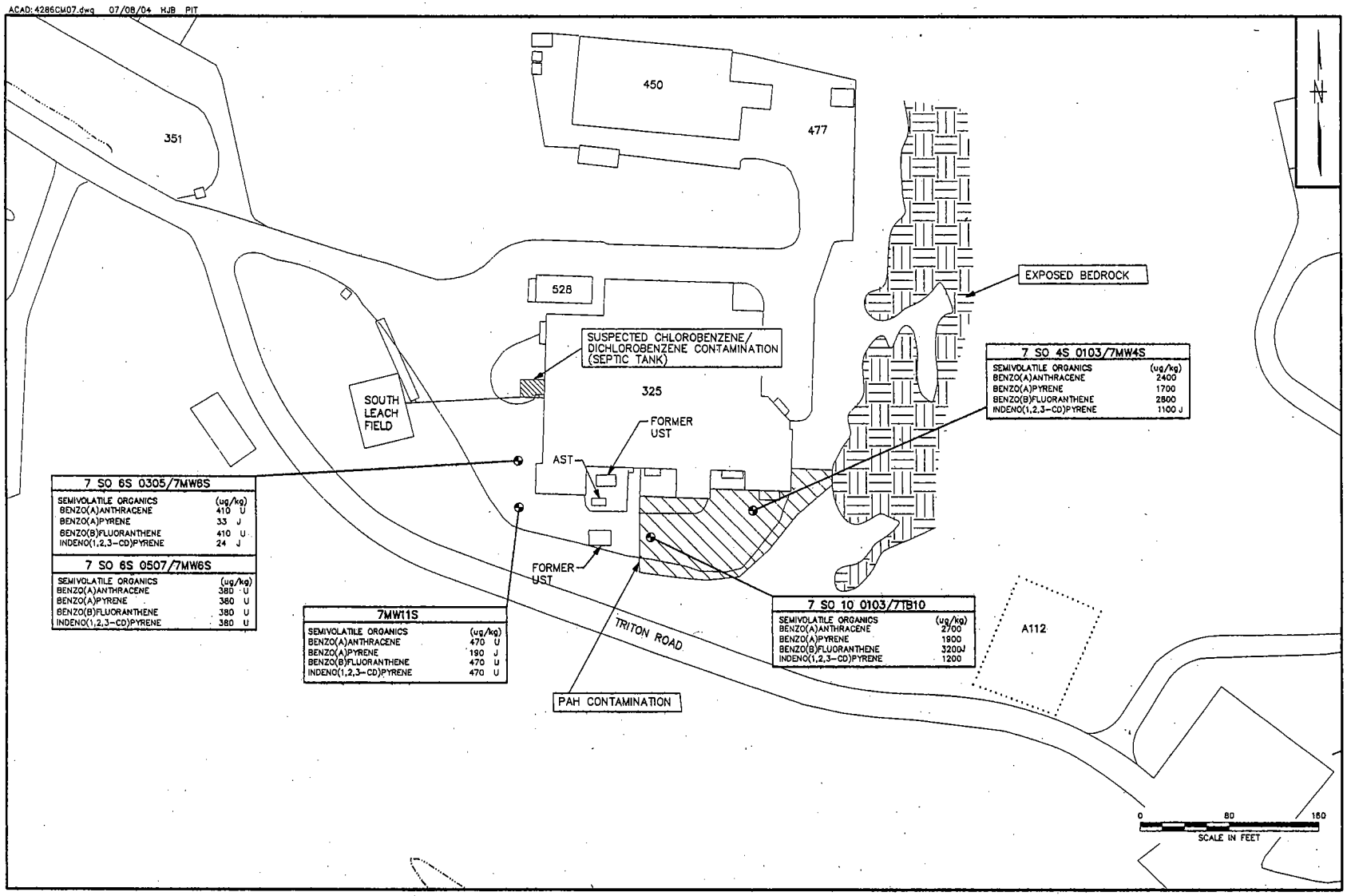

Figure 2. Site 7 Layout and Contaminant Distribution Map

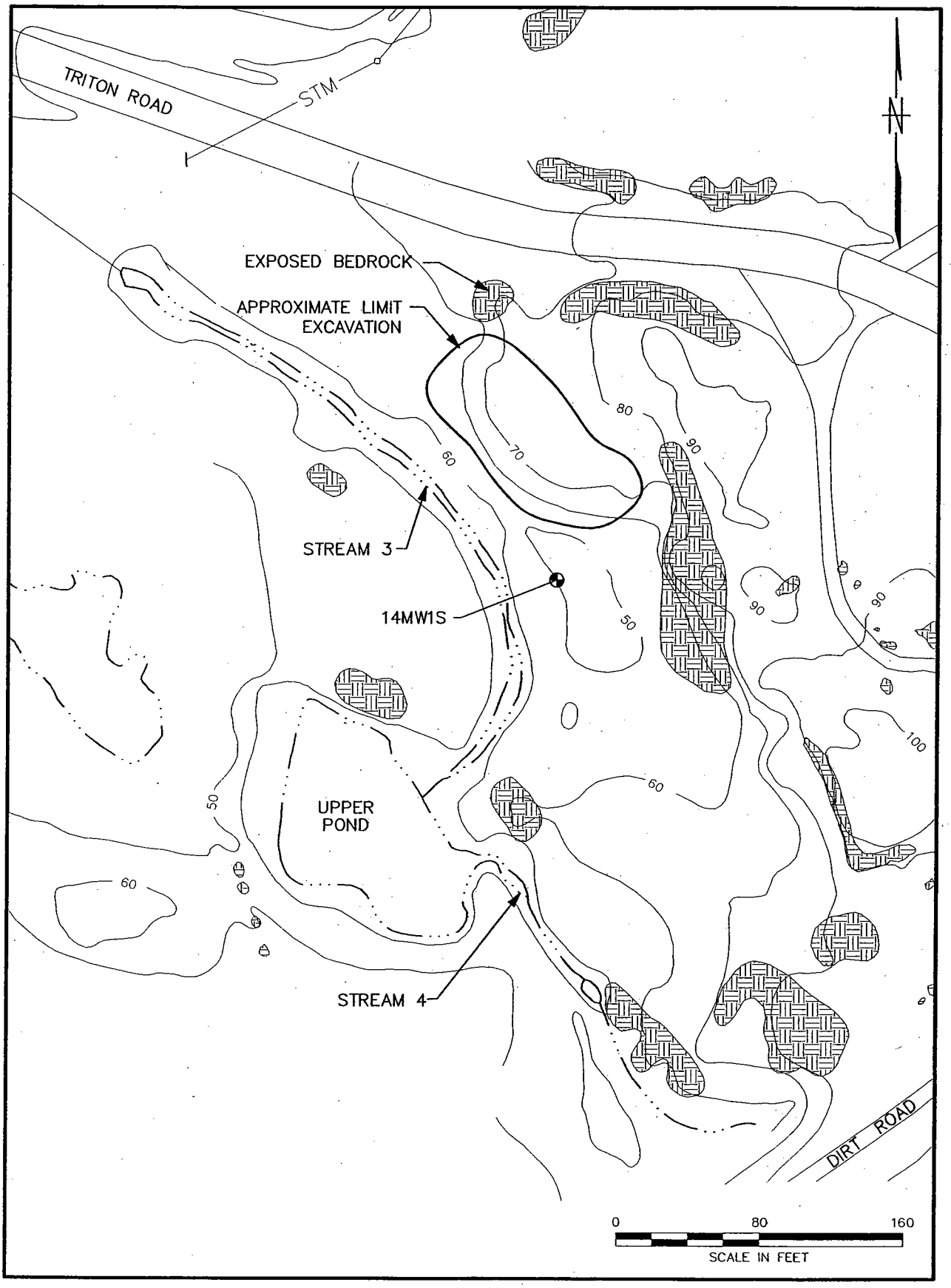

Figure 3. Site 14 NTCRA Limit of Excavation

benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene also exceed Connecticut's RSRs Pollutant Mobility Criteria, indicating a potential soil to **groundwater** contaminant migration concern; however, the available site data indicates that the potential for soil to **groundwater** migration of PAHs is not significant.

In addition, the HHRA showed that there are potential unacceptable risks to future adult residents from exposure to maximum concentrations of benzene, chlorobenzene, and dichlorobenzene in Site 7 **groundwater** along the western side along Building 325 [Site 7 **groundwater** is addressed in the **Record of Decision (ROD)** for Sites 3, 7, 14, 15, 18, and 20 **Groundwater** (a portion of the Basewide **Groundwater OU**9)]. Because it is suspected that the source of these **groundwater** contaminants is the septic tank or surrounding soil, these three **groundwater** contaminants were retained as suspected soil contaminants of concern (COCs) without performing additional sampling activities. The Navy took this approach to expedite resolution of Site 7 soil, and additional sampling activities will be performed as part of a pre-design investigation to confirm the extent of soil contamination at Site 7 and the contents of the septic tank.

An assessment of the risks to ecological receptors from exposure to surface soil at Site 7 was conducted during the Phase II RI. It was concluded that the Torpedo Shops soil represents little potential risk to ecological receptors. No ecological COCs were retained for the site and subsequently no response action is required for ecological receptors.

The Site 7 COCs and the remedial goals selected for each of them are as follows:

COCs	Remedial Goals that are Protective of Future Receptors
Benzene	0.02 **milligrams/kilograms (mg/kg)**
Chlorobenzene	2.0 **mg/kg**
1,4-Dichlorobenzene	1.5 **mg/kg**
Benzo(a)anthracene	1.0 **mg/kg**
Benzo(a)pyrene	1.0 **mg/kg**
Benzo(b)fluoranthene	1.0 **mg/kg**
Indeno(1,2,3-cd)pyrene	1.0 **mg/kg**

It is the Navy's current judgement that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or

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.

contaminants from Site 7 soil which may present an imminent and substantial endangerment to public health or welfare.

The investigation of Site 14 soil identified minimal organic contamination, including low concentrations of volatile organic compounds, **PAHs**, and pesticides, and slightly more significant inorganic contamination (e.g., arsenic and lead). The HHRA showed that the risks to potential receptors associated with Site 14 soil were minimal; however, the results of the ecological risk assessment indicated that the chemicals detected in Site 14 soil could adversely impact ecological receptors. A NTCRA was conducted at Site 14 in 2001 and approximately 270 tons of debris and contaminated soil were removed and disposed off site. The remedial goals selected for the NTCRA were a combination of the goals selected for the Area A Downstream Watercourses/OBDA (Site 3/**OU3**) remedial action and the Connecticut GB Pollutant Mobility Criteria. By removing all debris and contaminated soil with concentrations above the remedial goals, the Navy addressed all site-related risks. It is the Navy's current judgment that No Further Action under CERCLA is necessary for Site 14 soil.

Summary of Alternatives Considered for OU8

The Navy prepared the **BGOURI Update/FS** to evaluate alternatives for Site 7, **OU**8. The three alternatives evaluated included Alternative S1 (No Action), Alternative S2 (Institutional Controls with Permeable Cover), and Alternative S3 (**Excavation** and Off-Site Disposal). Alternative S1 was evaluated for comparison purposes, and the other two alternatives were selected based upon their abilities to meet the Remedial Action Objectives (RAOs). The RAOs as defined in the **FS** are (1) to protect current receptors (construction workers and employees) from incidental exposure to contaminated soil, (2) to protect existing **groundwater** quality, (3) to protect aquatic ecological receptors, and (4) to protect potential future receptors (residential use) from incidental exposure to contaminated soil. The following table summarizes the remedial alternatives considered in the **FS**. Estimated costs are presented, including capital, operation and maintenance (O&M), and total present worth costs.

Alternatives Evaluation Criteria

The following is a summary of the nine Superfund-mandated criteria used to balance the pros and cons of the remedial alternatives. The **FS** alternatives were evaluated using the first seven criteria. After comments from the

Remedial Alternatives	Components	Comments
Alternative S1: **No Action**	None, except mandatory five-year site reviews.	This alternative is not expected to be fully protective of human health and the environment. Capital Cost = $0 O&M Cost (Present Worth) = $89,600 Total Present Worth Cost = $89,600
Alternative S2: **Institutional Controls With Permeable Cover**	Place restrictions on **excavation** and handling of impacted soils as well as future development of the site. Testing would be required for disposal of impacted soil. Maintain existing permeable cover (soil/gravel/asphalt) over contaminated soil. The permeable cover would be maintained as required by Connecticut regulations. Groundwater monitoring for potentially mobile contaminants present in Site 7 soil would be conducted as part of the Basewide groundwater remedy. Conduct five-year site reviews.	Under this alternative human health and the environment would be protected through institutional controls and a permeable cover that restrict **excavation** and exposure to Site 7 impacted soil. However, this alternative does not address the possibility of soil contamination migrating to the groundwater where it could cause potential human health or ecological impacts. Capital Cost = $6,250 O&M Cost (Present Worth) = $91,750 Total Present Worth Cost = $98,000
Alternative S3: **Excavation and Off-Site Disposal**	Delineation of contaminated soil and characterize the septic tank contents. Excavate, characterize, transport, and dispose/recycle all contaminated soil to residential reuse standards and septic tank (if necessary) offsite. Conduct verification sampling. Perform site restoration.	Under this alternative human health and the environment would be protected since the contaminated soil and septic tank would be removed from the site and disposed properly. Capital Cost = $440,200 O&M Cost = $0 Total Present Worth Cost = $440,200

State of Connecticut and public are received, the alternatives will be compared using the last two criteria to select the final remedy for Site 7, **OU**8.

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:** CERCLA contains the statutory preference that 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, or 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:** Capital costs, annual operation and maintenance costs, and their associated net present values of all alternatives retained for detailed analysis shall be compared.

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

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

The Navy's Proposed Remedy

The Navy's proposed remedy for Site 7 soil is Remedial Alternative S3. Alternative S3 meets all of the RAOs by removing the contaminated soil from the site to meet residential reuse standards. This remedial alternative consists of four major components; (1) Finalize delineation of soil **contamination** and characterize the contents of the septic tank, (2) Excavate, characterize, transport, and dispose contaminated soil and septic tank (if necessary), (3) Collect verification samples to ensure removal of all contaminated soil, and (4) Restore site. This alternative can be completed within 1.5 years after the start of design activities.

To finalize delineation of soil **contamination** and verify the contents of the septic tank, additional soil borings (approximately 15) will be advanced and soil/waste samples (approximately 30) will be collected to determine the horizontal and vertical extent of contaminated soil and the nature of the contents of the septic tank. A sampling plan will be developed to provide the details of the pre-design sampling program.

Following delineation, **excavation** equipment will be used to excavate the contaminated soil from **OU**8 (approximately 1,600 cubic yards of **PAH**-contaminated soil and 90 cubic yards of benzene-, chlorobenzene-, and dichlorobenzene-contaminated soil) and the septic tank , if necessary. Approximately 200 cubic yards of clean soil will also need to be excavated to ensure stable sidewalls of the **excavation**. The excavated soil will be temporarily stockpiled and characterized to determine the appropriate disposal facility. Upon determination of the appropriate disposal facility, the contaminated soil and the septic tank, if necessary, will be loaded into trucks and transported to the off-site disposal facility.

After the **excavation** of contaminated soil and the septic tank, if necessary, soil samples will be collected from the bottom and sidewalls of each **excavation** area and analyzed to verify the removal of the COCs or to verify that COCs remaining at the site are at concentrations less than the remedial goals.

Lastly, after the contaminated soil and the septic tank, if necessary, have been excavated and removed from **OU8**, clean soil will be brought to the site to backfill the **excavation**s. Following the backfilling of the **excavation**s, the surface will be returned to pre-**excavation** conditions (grassed, paved, or gravel).

The U.S. Environmental Protection Agency (EPA) and Connecticut Department of Environmental Protection (CTDEP) concur with the Navy's Proposed Remedy. Based on information currently available, the Navy believes the Preferred Alternative meets the threshold criteria and pro-

vides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. The Navy expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): a. be protective of human health and the environment; b. comply with **ARARs**; c. be cost-effective; d. utilize permanent solutions and alternative treatment techologies or resource recovery technologies to the maximum extent practicable; and e. satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

The Navy also recommends No Further Action for the Site 14 soil in **OU8**. By removing all debris and contaminated soil with concentrations above the remedial goals during the NTCRA, the Navy addressed all site-related risks.

Glossary of Technical Terms

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental rules, regulations, and criteria that must be met by the selected remedy under Superfund.

Basewide Groundwater Operable Unit Remedial Investigation (BGOURI) Update/Feasibility Study (FS): A Remedial Investigation report describes the site, documents the nature and extent of **contaminants** detected at the site, and presents the results of the risk assessment. An **FS** report presents the development, analysis, and comparison of remedial alternatives.

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

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

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

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.

Installation Restoration (IR) Program: The purpose of the 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 enviornment from past waste disposal operations and hazardous material spills at Navy activities in a cost-effective manner.

milligrams per kilogram (mg/kg): One part of contaminant in a million parts of a solid material.

Operable Unit (OU): Operable units are site management tools that define discrete steps towards comprehensive actions as part of a Superfund site cleanup. They can be based on geologic portions of a site, specific site problems, initial phases of action, or any set of actions performed over time or concurrently at different parts of the site.

Polynuclear Aromatic Hydrocarbons (PAHs): High molecular weight, relatively immobile, and moderately toxic solid organic chemicals featuring multiple benzenic (aromatic) rings in their chemical formula. Typical examples of **PAHs** are benzo(a)anthracene and benzo(a)pyrene.

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

Remedial Investigation (RI): A report which describes the site, documents the nature and extent of contaminants detected at the site, and presents the results of the **risk assessment**.

Responsiveness Summary: A summary of written and oral comments received during the public comment period, together with the Navy's and EPA's responses to these comments.

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 soil: Soil, sand, and minerals typically found within the top 12-inches of the earth's surface.

Subsurface soil: Soil, sand, and minerals typically found deeper than the top 12-inches of the earth's surface.

The Public's Role in Alternative Selection

Community input is integral to the selection process. The Navy and regulatory agencies will consider all comments in selecting the remedial action prior to signing the **ROD**. The public is encouraged to participate in the decision-making process.

This Proposed Plan for **OU**8 is available for review, along with supplemental documentation, at the following Information Repositories:

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

Hours:
Mon. - Thru.: 9:00am - 9:00pm
Fri.: 9:00am - 5:30pm
Sat.: 9:00am - 5:00pm
Sun.: noon - 6:00pm

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

Hours:
Mon. - Thru.: 9:00am - 9:00pm
Fri. & Sat.: 9:00am - 5:00pm
Sun.: 1:00pm - 5:00pm

For further information, please contact:

Mr. Mark Evans, Remedial Project Manager
Naval Facilities Engineering Command
Engineering Field Activity Northeast
10 Industrial Highway
Mail Stop 82, Code 1823/ME
Lester, Pennsylvania 19113-2090
Tel: (610) 595-0567 ext. 162
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Hartford, CT 06106-5127
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e-mail: mark.lewis@po.state.ct.us

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for **OU**8 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 clean-up remedy for this site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by August 17, 2004. Comments can be submitted via mail or e-mail and should be sent to either of the following addresses:

Mr. Mark Evans, Remedial Project Manager
Naval Facilities Engineering Command
Engineering Field Activity Northeast
10 Industrial Highway
Mail Stop 82, Code 1823/ME
Lester, Pennsylvania 19113-2090
Tel: (610) 595-0567 ext. 162
e-mail: mark.evans1@navy.mil

Ms. Melissa Griffin
Installation Restoration Manager
Naval Submarine Base - New London
Building 439
Groton, CT 06349-5039
Tel: (860) 694-5191
e-mail: griffinm@cnrne.navy.mil

If you have any questions about the comment period, please contact Mr. Mark Evans at (610) 595-0567 ext. 162.

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Name _____

Address _____

City _____

State _____ Zip _____

Telephone _____

PUBLIC NOTICE

PUBLISHER'S CERTIFICATE

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

On this 16th day of July, 2004,

Personally appeared before the undersigned, a

Notary Public within and for said County and

State, Kimberlee R. Butler, Legal Advertising Clerk,

of THE DAY, 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 383 PUBLIC NOTICE

a true copy of which is hereunto annexed, was

published in said newspaper in its issue(s) of

07/16/2004

Kimberlee R. Butler

Subscribed and sworn to before me

this 16th day of July, 2004

Lorraine Martens

Notary Public

My commision expires 9-30-2008

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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 to discuss the results of the Remedial Investigations (RIs)/Feasibility Studies (FSs) and to present the Proposed Plans for cleanup of environmental issues under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) related to the soil at the following sites:

- Site 3 - New Source Area (NSA)
- Site 7 - Torpedo Shops
- Site 14 - Overbank Disposal Area Northeast (OBDANE)
- Site 16 - Hospital Incinerators
- Site 18 - Solvent Storage Area

The preferred remedy for Site 3 - NSA soil is No Further Action under CERCLA because the petroleum contamination found at the site is not covered under CERCLA and there were no unacceptable risks under CERCLA. However, the Navy intends to address the petroleum contaminated soil under State regulations by excavation and offsite disposal.

The preferred remedy for Site 7 soil is also excavation and offsite disposal. Data collected during the RI indicated that contaminants in the soil posed unacceptable risks to human health and the environment.

The preferred remedies for the soil at sites 14, 16, and 18 are "No Further Action". Available information indicates that the soil at these sites do not pose unacceptable risks to human health or the environment.

Although these are presently the preferred remedies, the Navy welcomes the public's input. The Public Meeting will be held on July 28, 2004 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 to ask questions and to provide verbal comments to the Navy on the remedies recommended in the Proposed Plans. Comments made at the Public Meeting will be transcribed and a copy of the transcript will be added to the Administrative Record for NSB-NLON. Complete documentation for the subject sites, including the RIs/FSs, Proposed Plans, and entire Administrative Record file, is available for review at the following Information Repositories:

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

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

The public may comment in person at the Public Meeting and/or submit written comments until the end of the formal comment period on August 17, 2004 to:

Mr. Mark Evans, Remedial Project Manager
Naval Facilities Engineering Command
Engineering Field Activity Northeast
10 Industrial Highway
Mail Stop 82, Code 1823/ME
Lester, Pennsylvania 19113-2090
e-mail: Mark.Evans1@navy.mil

APPENDIX B

STATE OF CONNECTICUT
CONCURRENCE LETTER

NTCRA CONFIRMATION
SAMPLE RESULTS

STATE OF CONNECTICUT
CONCURRENCE LETTER

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

79 ELM STREET HARTFORD, CONNECTICUT 06106

PHONE: (860) 424-3001

Arthur J. Rocque, Jr.
Commissioner

September 30, 2004

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

Sean P. Sullivan, Jr.
Captain, USN
Commanding Officer
Naval Submarine Base New London
Box 00
Groton, CT 06349

Re: State Concurrence with Remedy for Soil - Site 3 New Source Area- Naval Submarine Base New London, Groton, Connecticut

Dear Captain Sullivan and Ms. Studlien:

The Connecticut Department of Environmental Protection (CTDEP) concurs with the remedy selected by the EPA and the Navy for soil at the Site 3 New Source Area at the Naval Submarine Base New London, Groton, Connecticut.

Approximately 385 cubic yards of petroleum- contaminated soil are present at the site. The Navy and EPA determined that this soil does not present an actionable risk under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). However, the petroleum concentrations exceed the direct exposure and pollutant mobility criteria specified in the State's Remediation Standard Regulations (Regulations of Connecticut State Agencies, Sections 22a-133k-1 to k-3). Therefore, the Navy will excavate the contaminated soil and dispose of it off site or recycle it at a licensed facility.

The remedy is described in detail in the proposed plan dated July 2004, and in the draft Record of Decision dated September 2004.

The Navy will address ground water at these sites under a separate remedy. CTDEP expects that the groundwater remedy will comply with all state regulatory requirements.

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.

Sincerely,

Arthur J. Rocque, Jr.
Commissioner

AJR:MRL

C: Mr. Mark Evans, Remedial Project Manager
Naval Facilities Engineering Command
Engineering Field Activity Northeast
10 Industrial Highway
Mail Stop 82, Code 1823/ME
Lester, PA 19113-2090

Ms. Kymberlee Keckler, Remedial Project Manager
US Environmental Protection Agency- Region 1
1 Congress St.
Suite 1100 (HBT)
Boston, MA 02114-2023

NTCRA CONFIRMATION
SAMPLE RESULTS

U.S. NAVY ENGINEERING FIELD ACTIVITY NORTHEAST
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-99-D-0032
CONTRACT TASK ORDER NO. 0063

FINAL REMOVAL ACTION REPORT FOR OVER BANK DISPOSAL AREA NORTHEAST REMEDIATION NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNECTICUT

February 2002

Prepared by

Foster Wheeler Environmental Corporation
133 Federal Street
Boston, Massachusetts 02110

Revision	Date	Prepared by	Approved by	Pages Affected
3	2/4/02	T. Fowler	L. Kahrs, P.E.	All

ND02-006
2/4/02

APPENDIX A

Laboratory Analytical Data

OBDA NE Laboratory Results

	Connecticut DEP Criteria		Area A Downstream/ OBDA RGs									
	Pollutant Mobility GB		SED/SOIL	OBDANE-BA-SS-A1	OBDANE-BA-SS-A1 (SPLP)	OBDANE-BA SS-A2	OBDANE-BA SS-A3	OBDANE-BA SS-A4	OBDANE-BA SS-A5	OBDANE-BA SS-A6	OBDANE-BA SS-A7	OBDANE-BA SS-A8
Pesticides	(mg/Kg)	(mg/Kg)	(mg/Kg)									
Dieldrin	0.007	0.007	0.045 / 0.57	U	-	U	U	U	U	U	U	U
4,4'-DDE	NE	NE	NE	0.0053	-	0.0028	U	U	U	U	U	U
4,4'-DDD	NE	NE	NE	0.0026	-	0.0018	U	U	U	U	U	U
4,4'-DDT	NE	NE	NE	0.0099	-	0.0098	U	U	U	U	U	U
DDTr	NE	NE	2.0 / 5.0	0.0178	-	0.0144	U	U	U	U	U	U
Endrin	NE	NE	NE	U	-	U	U	0.0026	U	U	U	U
Priority Pollutant Metals	(mg/L)	(mg/Kg as 20 x mg/L)	(mg/Kg)									
Antimony	0.06	1.2	NE	U	-	U	0.6	U	0.54	U	U	U
Arsenic	0.5	10	6.1	3.7	-	1.8	2.3	2.7	2.2	2	1.8	1.4
Beryllium	0.04	0.8	2.1	0.25	-	0.12	0.12	0.26	0.18	0.12	0.13	0.13
Cadmium	0.05	1	9.6	U	-	U	U	U	U	U	U	U
Chromium (total)	0.5	10	NE	10.7	0.0169	6	4.8	9.1	4.7	5.4	6.4	6.2
Copper	13	260	NE	40.6	-	8	7.9	12.8	7	7	8.9	8.2
Lead	0.15	3	218	24.1	0.0551	5.9	2.8	7.6	3.7	4	4.9	3.2
Mercury	0.02	0.4	NE	0.29	-	0.1	0.05	0.09	0.05	0.05	0.04	0.04
Nickel	1	20	NE	6.5	-	3.6	3.2	5.5	3.1	3.6	3.4	3.4
Selenium	0.5	10	NE	U	-	U	U	U	U	U	U	U
Silver	0.36	7.2	NE	U	-	U	U	U	U	U	U	U
Thallium	0.05	1	NE	U	-	0.54	0.68	U	0.69	U	0.69	U
Zinc	50	1000	410	56	-	18.8	16.6	46.8	16.3	18.9	34.7	16.8

Note: Results in mg/Kg except for SPLP samples which are mg/L.
Bold and gray numbers for results exceeding 20 X SPLP criteria.
U: Undetected below the Method Detection Limit
NE: Not Established
- Not analyzed

OBDA NE Laboratory Results

	Connecticut DEP Criteria		Area A Downstream/ OBDA RGs							
	Pollutant Mobility GB		SED/SOIL	OBDANE-BA SS-A9	OBDANE-BA SS-A9 (SPLP)	OBDANE-BA SS-A10	OBDANE-BA SS-A10 (SPLP)	OBDANE-BA SS-TS	OBDANE-BA SS-TS (SPLP)	OBDANE-BA SS-FD
Pesticides	(mg/Kg)	(mg/Kg)	(mg/Kg)							
Dieldrin	0.007	0.007	0.045 / 0.57	U	-	U	-	U	-	U
4,4'-DDE	NE	NE	NE	0.004	-	0.004	-	0.009	-	0.01
4,4'-DDD	NE	NE	NE	U	-	U	-	U	-	U
4,4'-DDT	NE	NE	NE	0.011	-	0.012	-	0.011	-	0.01
DDTr	NE	NE	2.0 / 5.0	0.015	-	0.016	-	0.02	-	0.02
Endrin	NE	NE	NE	U	-	U	-	U	-	U
Priority Pollutant Metals	(mg/L)	(mg/Kg as 20 x mg/L)	(mg/Kg)							
Antimony	0.06	1.2	NE	0.79	-	1.1	-	0.72	-	0.83
Arsenic	0.5	10	6.1	3.8	-	5.1	-	2.5	-	2.8
Beryllium	0.04	0.8	2.1	0.28	-	0.3	-	0.2	-	0.26
Cadmium	0.05	1	9.6	U	-	0.34	-	U	-	U
Chromium (total)	0.5	10	NE	**16.2**	0.0242	**14.5**	0.0324	8.6	-	**10.5**
Copper	13	260	NE	26.9	-	39.7	-	14.5	-	18.5
Lead	0.15	3	218	**61.1**	0.0868	**57.7**	0.097	**13.6**	0.0443	**18.9**
Mercury	0.02	0.4	NE	**0.49**	0.0167	**0.53**	0.009	0.18	-	0.18
Nickel	1	20	NE	8.4	-	7.6	-	5.2	-	6.3
Selenium	0.5	10	NE	U	-	0.25	-	U	-	U
Silver	0.36	7.2	NE	U	-	U	-	U	-	U
Thallium	0.05	1	NE	0.49	-	U	-	U	-	U
Zinc	50	1000	410	70.6	-	102	-	38.3	-	47.1

Note: Results in mg/Kg except for SPLP samples which are mg/L.
Bold and gray numbers for results exceeding 20 X SPLP criteria.
U: Undetected below the Method Detection Limit
NE: Not Established
- Not analyzed

APPENDIX C

PUBLIC MEETING TRANSCRIPT

1 PROPOSED PLANS FOR
2 SITE 3 - NEW SOURCE AREA SOIL;
3 SITES 7 AND 14 SOIL (OU8); AND
4 SITES 16 AND 18 SOIL (OU11)
5 ----------
6 Public hearing taken at the
7 Best Western Olympic Inn, 360 Route
8 12, Groton, Connecticut, before
9 Clifford Edwards, LSR, Connecticut
10 License No. SHR.407, a Professional
11 Shorthand Reporter and Notary
12 Public, in and for the State of
13 Connecticut on July 28, 2004, at
14 6:41 p.m.
15
16
17
18
19
20
21
22
23
24

1 APPEARANCES:

2

3 COREY A. RICH, PE

4 TETRA TECH NUS, INC.

5 611 Andersen Drive

6 Pittsburgh, PA 15220

7

8

9 MARK D. EVANS

10 NAVFAC

11 10 Industrial Highway

12 Mail Stop #82

13 Lester, PA 19113

14

15

16 ALSO PRESENT:

17 KYMBERLEE KECKLER

18 MELISSA COKAS

19 FELIX PROKOP

20 LARRY GIBSON

21 MARK LEWIS

22

23

24

1 PROCEEDINGS

2

3 MR. EVANS: Corey was going

4 to give some technical presentations

5 on each individual site real quick --

6 well, a little quicker now.

7 At the end of that

8 presentation, we were going to give

9 anybody that wanted to actually make a

10 formal comment that would actually be

11 part of the public record a chance to

12 do that.

13 At that point, you can

14 stand, state your name so that the

15 stenographer can get that and it will

16 actually be part of the public record.

17 Okay?

18 MR. RICH: Thank you, Mark.

19 As you're all aware, my

20 name is Corey Rich. I work with Tetra

21 Tech NUS. We're a consultant for the

22 Navy. We're here tonight to talk

23 about three proposed plans that were

24 issued back on July 16.

The three proposed plans cover the soil operable units at Site 3, SiteS 7 and 14, which are listed as OU8 -- which is designated as OU8, Sites 16 and 18 soil, which are designated as OU11.

As Mark said, we're going to go through some technical presentations on the three proposed plans and I'm going to start off with a quick review of the regulatory process.

The Comprehensive Environmental Response Compensation Liability Act, or CERCLA, has a set process we need to go through. These sites we've investigated and are here to discuss -- are covered under CERCLA.

The first step is to go through a preliminary assessment or site inspection, let's us know if there's a potential problem at that site.

1 If that shows that there's
2 an issue, we go into a remedial
3 investigation which is a more in-depth
4 look at that site, and what you try
5 and do is find out what's there, what
6 type of contamination and who will it
7 impact or what.
8 With a feasibility study,
9 we try to determine what we do with
10 what's there, determine the approach
11 for cleaning it up.
12 Once we go through and
13 determine that approach, we need to
14 present that information in a proposed
15 plan, which we're here to do tonight,
16 and we take the multiple alternatives
17 that were looked at in the FS and
18 select one of those and present it to
19 the public.
20 We need to then formally
21 document that in a record of decision
22 and incorporate any public input we
23 got during our public meeting with a
24 Responsiveness Summary.

1 After we come up with our
2 alternative and document it in the
3 ROD, we have to come up with a
4 remedial design and how we are going
5 to implement that remedy and actually
6 go out and do the remedy itself during
7 remedial action, and then we have to
8 monitor things through operations and
9 maintenance.
10 Just quickly give you some
11 more in-depth information on the
12 proposed plan and record of decision.
13 The proposed plan is a document used
14 to facilitate public involvement in
15 the CERCLA process.
16 It presents the lead
17 agencies preferred alternatives,
18 presents the alternatives evaluated
19 and the reasons for recommending that
20 preferred alternative, and it's a
21 public participation requirement under
22 CERCLA and the NCP.
23 The record of decision is
24 a legal document that's prepared by

1 the lead agency and with the support
2 of the -- support agencies, in this
3 case, the EPA and the State of
4 Connecticut, and it certifies that the
5 remedy was selected following the
6 CERCLA and NCP process.
7 It provides the technical
8 rationale and background information
9 that's provided in the admin record
10 and identifies the engineering
11 components and outlines remedial
12 actions and objectives and cleanup
13 goals for the remedy. And it's a
14 tool to explain to the public the
15 problems the remedy seeks to address
16 and the rationale for its selection.
17 I'll go through the first
18 site, Site 3, new source area. Just
19 some brief details about the site.
20 It's located in the northern part of
21 the sub base. Hopefully you can see
22 this map of the sub base over here.
23 This is the northern end
24 of the sub base. Site 3 itself is

1 this area. And Site 3 new source area
2 is just a small area right about
3 there.
4 It's about six-hundredths
5 of an acre.
6 It was an abandoned
7 disposal area. Some rusted drums and
8 wire cable are visible at the site.
9 It was detected or found during the
10 OU3 Site 3 remedial action.
11 It's petroleum
12 contamination was found at that time
13 and the site was not cleaned up at
14 that time because we needed to
15 determine what the nature and extent
16 of that contamination was.
17 But there were some
18 temporary measures put into place to
19 minimize further contaminant migration
20 until we could study the site and
21 implement the remedy.
22 Mark, can you show us --
23 This is just a blowup
24 really of our larger scale figure over

1 there. Mark's pointing to the new
2 source area there just to give you an
3 idea. There's the torpedo shops.
4 This is the Area A Downstream, Site 3.
5 Stream 5 of the Area A Downstream runs
6 adjacent to Site 3 new source area.
7 Just minimize that.
8 Okay. This is a picture
9 of the site.
10 You can see the rusted
11 drum here and here, and some wire
12 cable there. Just another view of the
13 site looking in the southerly
14 direction. Stream 5 is right here.
15 This is Triton Road, and the golf
16 course is over there.
17 Just a quick summary of
18 the nature and extent of
19 contamination. The site was
20 investigated during a data gap
21 investigation. The data and results
22 were presented in the basewide ground
23 water operable unit remedial
24 investigation update and feasibility

1 study that was finalized in July of
2 2004.
3 In general, the main
4 contamination found was TPH, or
5 petroleum contamination, and we did
6 see some stained soil and some free
7 petroleum oil on the water surface out
8 there. We've estimated about 385
9 cubic yards is contaminated and will
10 need to be addressed.
11 We also found some
12 polynuclear aromatic hydrocarbons, or
13 PAHs, in a small area just adjacent to
14 Triton Road, which was a surface soil
15 sample that we had.
16 And in evaluation of that
17 some more, we determined it was
18 related to the actual asphalt
19 pavement. We may have picked up a
20 little asphalt in our sample or
21 something like that that skewed our
22 results.
23 We also saw some low level
24 concentrations of some other

1 compounds, volatile organics, some
2 pesticides, one PCB, and some
3 inorganics.
4 Show the slide. Just
5 maximize that.
6 This is a cross-section
7 through the site itself. That
8 disposal area is up here.
9 This is Stream 5, Triton
10 Road.
11 What we have found is
12 there's kind of a smear zone of
13 contamination right along the bedrock
14 interface and water table.
15 Looks like some oil was
16 released from those rusted drums and
17 has migrated into the subsurface and
18 down along that bedrock interface.
19 We went through a risk
20 assessment for this site, both
21 human health and ecological risk
22 assessments. Generally the only thing
23 we found there was TPH or petroleum.
24 And there were generally

1 no risks for the contaminants other
2 than TPH, but the TPH did exceed
3 Connecticut standards which shows a
4 potential issue there. It poses both
5 a direct exposure concern and a
6 contaminant migration concern.
7 We also looked at eco
8 risks and we didn't really see any
9 significant risks from the non-TPH
10 contaminants out there, but with there
11 being some mobile free product there,
12 that would pose a potential issue to
13 the ecological receptors.
14 So the overall results of
15 the risk assessment showed that TPH
16 was our main contaminant of concern.
17 So we went into a
18 feasibility study to determine the
19 appropriate approach for addressing
20 the issues, the TPH contamination, and
21 basically we want to protect current
22 receptors.
23 That would be construction
24 workers, somebody out their digging,

1 putting in sewer lines, something like
2 that, current employees or a
3 trespasser from any exposure to the
4 contaminated soil.
5 We also want to protect
6 any groundwater that's at the site.
7 We also want to protect any aquatic
8 ecological receptors in Stream 5
9 adjacent to the site, and also protect
10 any potential future residents that
11 may live in that area if the base
12 would subsequently be closed or
13 something like that.
14 When we went into the
15 feasibility study, we looked at
16 general response actions or main
17 approaches for addressing this
18 contamination and then looked at
19 process options and technologies and
20 went through a screening process and
21 honed it down to three different
22 alternatives that would be appropriate
23 for the TPH contamination out there.
24 We have to include a no

1 action alternative under CERCLA for
2 comparison purposes. We looked at a,
3 basically a passive alternative of
4 institutional controls, just limiting
5 access to the site.
6 Because it is petroleum,
7 it naturally degrades, we have some
8 natural degradation that would occur
9 on the site which hopefully would
10 eventually clean up on its own. Just
11 by restricting access, we would
12 eliminate any risks to the public or
13 environment and do some limited
14 monitoring just to confirm that.
15 Or our third alternative
16 Is a more aggressive approach: We
17 actually go out and excavate and
18 remove the contaminated soil and
19 dispose of that off site, get rid of
20 the problem.
21 Go back one second.
22 Each of these
23 alternatives, I have a present worth
24 cost at the end of them.

1 Obviously no action would
2 be zero dollars.
3 Institutional controls
4 would run about $124,000 over a
5 30-year life cycle, and excavation and
6 off-site disposal would be about
7 $286,000.
8 Each of those alternatives
9 go through an evaluation or evaluation
10 process against seven main criteria
11 and then two modifying criteria.
12 Within the FS itself, these seven
13 criteria are evaluated -- or each
14 alternative is evaluated with these
15 criteria.
16 These threshold criteria
17 are mandatory; the alternatives need
18 to meet these. The balancing criteria
19 are more subjective or qualitative
20 evaluation criteria.
21 And then the modifying
22 criteria of state acceptance and
23 community acceptance provides the Navy
24 with input from both the state and the

1 public on their alternatives and helps
2 keep all parties informed and involved
3 in the decision-making process.
4 For Site 3, based on that
5 evaluation and regulatory input -- I
6 guess let me take one step back.
7 The petroleum
8 contamination that was found at this
9 site isn't directly covered under
10 CERCLA, and there were no risks from
11 the CERCLA-related contaminants at the
12 site.
13 So what the Navy is
14 proposing under CERCLA is no further
15 action for this site because there
16 were no risks from the non-TPH
17 contaminants at the site.
18 But they understand
19 there's a concern from the petroleum
20 and they have selected alternative S3,
21 which is excavation and off-site
22 disposal for the contaminated soil,
23 and that cleanup would be done under
24 the Connecticut regulations and

1 meeting a TPH of 500 milligrams per
2 kilogram and eliminating the mobile
3 free product out there.
4 The 500 milligrams per
5 kilogram level would meet residential
6 reuse requirements.
7 And as part of that
8 alternative, they would go in and do
9 some minor additional characterization
10 just to clarify the size of the area,
11 the volume. They would go through
12 that predesign investigation and then
13 do an actual design, remedial design
14 for the site.
15 It's anticipated they will
16 need to construct a temporary road
17 to maintain access to the torpedo
18 shops and the weapons center which are
19 located east on Triton Road.
20 They would go in and
21 excavate the contaminated soil,
22 characterize it with some
23 verification -- with testing and then
24 they would take it off site and

1 dispose of it. There's a possibility,
2 if they can, they would recycle it
3 through asphalt paving plants or
4 something like that.
5 They might be able to
6 recycle that material.
7 In the bottom of the
8 excavation itself, they will collect
9 verification samples to make sure they
10 meet the 500 milligram per kilogram
11 cleanup goal, and they'll restore the
12 site to its preexcavation conditions.
13 The whole process of
14 design and remediation is anticipated
15 to take a year and a half. The actual
16 in-field excavation work would take
17 about two to three months.
18 So moving on to the next
19 site, Site 7, which is part of
20 Operable Unit 8, there are several
21 buildings that are designated as the
22 torpedo shops in the northern portion
23 of New London. The Navy conducts
24 maintenance activities at these

1 buildings for torpedos. They use
2 solvents and petroleum products.
3 Through that process, they store them
4 there and also use them.
5 Next slide. This is just
6 a picture of Building 325, one of the
7 larger buildings of the four and one
8 of the main areas where maintenance
9 activities are completed.
10 This is also a picture of
11 Building 450. Again, one of the
12 larger buildings where maintenance
13 activities are completed.
14 The site was investigated
15 During three different phases: The
16 Phase 1 RI back in the early '90s, the
17 Phase 2 RI in the mid '90s, and
18 basewide groundwater OU RI in early
19 2000.
20 Soil data was reevaluated
21 in our RI update and feasibility study
22 this year and, in general, we found
23 during our investigations two areas
24 of contamination, one being an area

1 contaminated with polynuclear aromatic
2 hydrocarbons, that being south of
3 Building 325.
4 And it looks like this is
5 related to some former leakage or
6 spillage of some fuel oil tanks in
7 that area, and it looks like there's
8 possibly 1,700 cubic yards of
9 contaminated soil in that area.
10 We also have on the
11 western side of Building 325 an area
12 of contamination or suspected
13 contamination. We found some
14 groundwater contamination in that area
15 just adjacent to a former septic tank
16 that was used until the early 1980s,
17 and it looks like there may be
18 residual contamination in that area
19 leaching into the groundwater and
20 causing a problem.
21 Excuse me. Yeah, we can
22 take a look at the figure.
23 This figure is from the
24 feasibility study and just shows those

1 two areas in a little more detail.
2 This is the PAH contamination area
3 with cross-hatching on it. We had two
4 hits generally in the subsurface.
5 This sample was from 1 to
6 3 feet, and this one is from 6 to 8
7 feet below -- no, that's 1 to 3 as
8 well.
9 Contaminant levels are
10 around 1,700 to 2,000 micrograms per
11 kilogram range, which exceed
12 Connecticut's cleanup goals.
13 And then the septic tank
14 area is over here. There was a septic
15 tank and that drained off into this
16 leach field, and we believe that that
17 historic septic tank is still in place
18 and maybe has some sludge or something
19 in there that's acting as a source.
20 We went through the risk
21 assessment process and the PAH soil
22 poses a potential contaminant
23 migration issue as well as potential
24 risks to human receptors, and the

1 solvent area causes a definite --
2 causes risks to human receptors
3 through groundwater at this point in
4 time. The soil data didn't confirm a
5 risk from the soil, but we're going to
6 confirm that information.
7 No significant ecological
8 risks based on the site. As you saw
9 on those pictures, most of the site is
10 paved. The ecological receptors
11 really don't have access to the site.
12 So our contaminants of
13 concern for the soil are the PAHs, the
14 benzo(a)anthracene, benzo(a)pyrene,
15 benzo(b)fluoranthene, and
16 indeno(1,2,3-cd)pyrene, and then the
17 solvents, the benzene, chlorobenzene,
18 and 1,4-dichlorobenzene.
19 The remedial action
20 objectives that we came up with, very
21 similar to the other ones that we had
22 for Site 3. We want to protect
23 current receptors from the
24 contaminated soil, protect the

1 groundwater from contaminants in the
2 soil leeching to it, protect any
3 aquatic receptors.
4 We generally didn't have
5 any of these main issues, but we still
6 wanted to state that we're protecting
7 them and we also want to protect any
8 future receptors if this facility
9 would be shut down and this would be
10 reused for residential purposes.
11 We have came up with three
12 very similar alternatives as we had
13 for Site 3 new source area, a
14 no-action, which is mandatory under
15 five-year reviews.
16 Because we had some additional
17 contaminants, CERCLA contaminants of
18 concern, we would have to do five-year
19 reviews under a no-action scenario and
20 that would give us a cost compared to
21 the Site 3 new source area which had
22 none.
23 Alterative 2 is a passive
24 institutional controls alternative

1 prohibiting access to the site,
2 allowing natural degradation to occur,
3 conducting our reviews and doing
4 periodic testing.
5 And then Alternative 3
6 would be excavation and off-site
7 disposal.
8 The cost for Alternative 2
9 is $98,000.
10 Alternative 3,
11 approximately $440,000.
12 We screened all the
13 alternatives with a similar set of
14 criteria, and the Navy's preferred
15 remedy for the soil at Site 7 is
16 Alternative S3, which is excavation
17 and off-site disposal.
18 They will do some
19 additional characterization to
20 finalize the delineation of the
21 contaminated soil, and they want to
22 locate and sample any contents in the
23 septic tank. That will be done as
24 part of a predesign investigation.

1 They'll conduct a remedial
2 design and then the actual remedial
3 action will include excavation,
4 characterization, transportation, and
5 disposal of the contaminated soil and
6 tank off site and verification
7 sampling to confirm that we've gotten
8 all the contaminated soil out of the
9 ground. Then restore the site and
10 similar time frames for the total
11 project duration and remedial action.
12 These are the remedial
13 goals for the soil at Site 7. These
14 goals are based on Connecticut
15 remediation standards. They meet both
16 direct exposure and contaminant
17 migration concerns.
18 Site 7 is one part of OU8.
19 The other part of Operable Unit 8 is
20 overbank disposal area northeast,
21 which is OBDANE for abbreviation.
22 Site 14 is located
23 adjacent to Sites 3 and 7. It was a
24 small disposal area where

1 miscellaneous waste was dumped over
2 the edge of a ravine in the past.
3 This is a picture of the site, I
4 believe in early or maybe late 2000
5 early 2001. This was after Stream 3
6 was remediated as part of the OU3
7 remedial effort.
8 The site was originally
9 investigated during two phases in the
10 early and mid 1990s. We found some
11 low level VOCs, volatile organic
12 compounds, PAHs and pesticides, and
13 some slightly higher levels of
14 inorganics, in particular, arsenic and
15 lead.
16 Taking that information
17 into the risk assessment, we didn't
18 see any significant risks to human
19 health related to those contaminants,
20 but we did see some risk to ecological
21 receptors because of those
22 contaminants of concern. So our
23 contaminants of concern for this site
24 were pesticides and inorganics, and

1 originally the Phase 2 RI recommended
2 that we do some further
3 characterization, but -- next slide.
4 The Navy opted to go in
5 and do a removal action at the site
6 and they performed an engineering
7 evaluation and cost analysis which is
8 a streamlined feasibility study and
9 then signed an action memorandum for
10 that site which is a kind of a
11 streamlined record of decision for a
12 removal action.
13 They went in and completed
14 that removal action in 2001. They
15 took out about 270 tons of debris and
16 contaminated soil and disposed of that
17 off site.
18 They selected remedial
19 goals for pesticides and inorganics
20 from both the State of Connecticut
21 criteria and previously selected
22 remedial goals that were used during
23 the Site 3 removal -- remedial action
24 that was conducted, and those Site 3

1 goals were based on ecological
2 receptors which was the concern that
3 was identified for Site 14.
4 You want to look at the
5 figure quick, Mark. If you go down
6 and fit the -- This figure just gives
7 you a plan view, and this line
8 outlines the limit of excavation for
9 the removal action. And this is
10 Stream 3, the stream that was visible
11 on that earlier figure. This is
12 upper pond. This is Triton Road.
13 And this picture shows us
14 postremoval action. That area has
15 been cleaned up, reseeded, and you can
16 still see some of the silt fence down
17 along the lower edge of the site.
18 So since the removal
19 action was done and all the debris and
20 contaminated soil has been removed,
21 the Navy proposes no further action
22 for this site under CERCLA and this
23 site will be written off then.
24 So that was OU8.

1 Now we are going to move
2 on to Operable Unit 11. This was
3 another proposed plan. The two sites
4 included are Sites 16, the hospital
5 incinerators, and site 18, the solvent
6 storage area of Building 33. I'll
7 talk about Site 16 first.
8 Site 16 consisted of two
9 locations where a mobile incinerator
10 was used next to the hospital.
11 Want to look at the figure
12 there, Mark?
13 The main hospital area is
14 Building 449. Based on best
15 information available, the incinerator
16 was used in this area and also over on
17 the edge of the parking lot in this
18 area back in the '80s, I guess, late
19 '70s time frame.
20 And it was -- the
21 incinerator was used to destroy
22 medical records and medical waste.
23 And from what everybody -- from all
24 records and information that we

1 have received, the ash was disposed of
2 off site at a municipal landfill. So
3 we weren't really expecting
4 significant issues at this site, but
5 we wanted to go through the process
6 and evaluate it.
7 These are just two
8 pictures of those areas that we
9 outlined on the plan view drawing.
10 This is Location A and this is
11 Location B.
12 This site was actually
13 looked at back in the early '80s under
14 the initial assessment study.
15 It was recommended at the
16 time to delay any further
17 investigation because it was still
18 operational and they were still using
19 it. They ceased operation in the
20 late '80s, early '90s, and we
21 investigated this site in early 2000.
22 Some soil samples were
23 collected at the site and analyzed for
24 organic compounds, pesticides, PCBs,

1 dioxins/furans, inorganics, and we
2 also did some leachability testing on
3 the soil samples.
4 We also went through risk
5 assessment, mainly a human health risk
6 assessment, and the data did not show
7 a significant risk to human receptors.
8 The site itself doesn't provide any
9 significant suitable ecological
10 habitat so we didn't conduct an
11 ecological risk assessment.
12 We did, through our data
13 screening, identify some potential
14 contaminant migration concerns with
15 contaminated soil possibly impacting
16 groundwater.
17 We took a look at some
18 background concentrations and the
19 leachability test results and used
20 that information to show there really
21 weren't any significant concerns
22 related to those potential
23 contaminants.
24 The Navy recommends no

1 further action for Site 16 soil based
2 on the information that's available.
3 And they will pursue that, no further
4 action.
5 Site 18, the other part or
6 other site included in Operable Unit
7 11, is located in the southern part of
8 New London just north of Sites 15
9 and 23. Just give you a quick look at
10 Site 18 is down here, Site 16 is up
11 here.
12 This figure shows you some
13 of the sample locations that were used
14 to evaluate the site, and then Site 15
15 is spent acid storage and disposal
16 area and the tank farm, Site 23, were
17 located south of the site.
18 The building was used for
19 storage of gas cylinders and 55-gallon
20 drums of solvents such as TCE or
21 trichloroethylene or dichloroethylene.
22 This gives you a picture, just an old
23 warehouse.
24 We investigated the site

1 in early 2000, collected soil samples,
2 analyzed them for broad range of
3 compounds and also did some
4 leachability tests and, in general, we
5 didn't find much contamination at all
6 in the soil out at the site. Some low
7 concentrations of volatile organic
8 compounds and polynuclear aromatic
9 hydrocarbon and some inorganics, but
10 this is one of the cleanest area on
11 the facility.
12 We didn't see any
13 significant risks to human health from
14 the building in general, and this
15 surrounding parking lot didn't provide
16 an ecological habitat so no ecological
17 risk assessments were completed. And
18 we didn't see any potential migration
19 issues from the contaminants found in
20 the site.
21 So the Navy's preferred
22 alternative for this site is no action
23 because no significant risk or
24 environmental concerns.

1 So those are the Navy's
2 preferred remedies. We are in the
3 middle of the public comment period
4 right now. The comment period started
5 on July 16 with the issuance of a
6 public notice in The Day newspaper and
7 we'll wind up on August 17.
8 We are currently
9 conducting the public meeting.
10 Once the public comment
11 period is over, if there are any
12 comments received, the Navy will put
13 together a responsiveness summary
14 which is formal responses to any of
15 the comments received and that
16 information will get incorporated into
17 the records of decision.
18 And we hope to have our
19 records of decision -- there will be
20 three separate ones associated with
21 these three proposed plans -- out in
22 the September to October 2004 time
23 frame.
24 Points of contact, these

1 Folks are all in attendance tonight:
2 Mr. Mark Evans provided our
3 introduction; Ms. Melissa Cokas is at
4 the subase in charge of the
5 environmental program there; Ms.
6 Kymberlee Keckler from the EPA; and
7 Mr.
8 Mark Lewis from the State of
9 Connecticut.
10 That's the end of the
11 technical presentation. With no
12 comments during the presentation, do
13 we want to open the floor for any
14 formal comments from the public?
15 MR. GIBSON: Larry Gibson.
16 It was a very good and comprehensive
17 presentation, and I agree with all the
18 decisions that have been recommended
19 so far.
20 MR. EVANS: Thank you.
21 MR. PROKOP: For the record,
22 my name is Felix Prokop. I'm with the
23 Ledyard Health District. And we cover
24 the Town of Groton and, in the last

1 year or two, we cover Ledyard. In
2 early February, we have been taken
3 over as far as the environmental
4 health, the wells, the septic system,
5 and things like that, and I've been to
6 these meetings for years as you guys
7 know.
8 Was there any problems on
9 the Groton site or Ledyard site, you
10 know, Route 12, Military Highway, Long
11 Cove, any problem with well
12 contamination?
13 I remember some years ago,
14 some wells claimed they had a boron
15 problem. I remember -- I forgot, this
16 happened so many years ago, I did take
17 samples for boron for somebody in the
18 public and there didn't tend to be
19 much.
20 Was there any problem in
21 those wells that you know of?
22 MR. EVANS: No. There was,
23 I think it was way back in the Phase 1
24 RI that Atlantic completed, boron was

1 showing up at high levels in every
2 sample they took or a lot of samples
3 they took.
4 MR. PROKOP: Where were
5 they -- in what? On the base?
6 MR. EVANS: Mainly the
7 monitoring wells. I don't think they
8 ever saw any residential wells. Most
9 of the residential wells were gone by
10 then or starting to be decommissioned.
11 MR. PROKOP: Shortly after
12 that, the water line --
13 MR. EVANS: Then the water
14 line came up to Route 12, yeah. The
15 boron only showed up on that one round
16 and all indications were it was some
17 sort of lab contaminant screwup at
18 that time.
19 MR. PROKOP: But the best
20 you know, there was no contaminated
21 wells?
22 MR. EVANS: No. Remember up
23 on Route 12, there were some
24 residences up there on the northern

1 end that the Navy bought all that
2 property because it was in the
3 explosive arc?
4 Other than that, I don't
5 think we know of any residential wells
6 still.
7 MR. PROKOP: I mean, nobody
8 had to tie into public water
9 because -- because I went through
10 those records pretty thorough and I
11 didn't see anything.
12 MR. EVANS: I don't think so
13 either.
14 MR. PROKOP: Okay.
15 MR. EVANS: The other thing
16 is most of the groundwater flows from
17 the sub base towards the Thames River,
18 away from --
19 MR. RICH: There's very
20 little, if any, flow off property in
21 that direction.
22 MR. PROKOP: Was there any
23 surveys done in that area? Did
24 anybody do any spot wells in that

area?

MR. RICH: The Navy did.

MR. EVANS: Seems we did during Phase 2. I think during Phase 2 RI, we did some of that work.

MR. PROKOP: Do you remember where?

MR. EVANS: No.

MR. RICH: There's a report.

MR. EVANS: A separate report?

MR. RICH: Yeah, that Atlantic prepared. There's probably a dozen or more public wells that were sampled.

MR. PROKOP: Public or private?

MR. RICH: Private, I'm sorry.

MR. EVANS: Yeah, it's coming back to me now that we did do a report like that.

MR. PROKOP: That's all I have.

1 MR. EVANS: Those reports
2 are probably in the admin record now.
3 We have updated that.
4 Did you put a copy of that
5 in the library yet?
6 MS. COKAS: No.
7 MR. EVANS: We've updated
8 those CDS.
9 I think we're up to 13 CDs
10 that have every document that we've
11 ever prepared. As soon as that's
12 finalized, those will be in the two
13 libraries.
14 You can go in there and
15 take a look at any of those documents.
16 It's pretty easy to search the stuff
17 on them.
18 MR. PROKOP: I'm the only
19 guy in the office without a computer.
20 Leave it that way. But I'm sure if
21 there was a problem, it would have
22 been --
23 MR. EVANS: We can use the
24 library's computers for those, right?

1 MS. COKAS: I believe so. I
2 wasn't there when they brought the
3 first set, so I didn't really talk to
4 the library about it.
5 MR. RICH: If that's all the
6 questions, then --
7 MR. EVANS: We'll stick
8 around a little bit if you guys want
9 to take a look at the posters and
10 stuff.
11 MR. RICH: The meeting is
12 adjourned.
13 (THEREUPON, THE HEARING WAS
14 CONCLUDED AT 7:24 P.M.)
15
16
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24

1 CERTIFICATE

2

3 I hereby certify that said hearing
4 was taken by me stenographically in the
5 presence of counsel and reduced to
6 typewriting under my direction, and the
7 foregoing is a true and accurate
8 transcript of hearing.

9

10 I further certify that I am neither of
11 counsel nor attorney to any of the parties
12 of said cause, nor am I an employee of
13 either party to said cause, nor of either
14 counsel in said cause, nor am I interested
15 in the outcome of said cause.

16

17 Witness my hand and seal as Notary
18 Public this 30th day of
19 August, 2004.

20

21 Clifford Edwards

22 Clifford Edwards
23 Notary Public
24 My commission expires: 9/30/2006

APPENDIX D

HUMAN HEALTH RISK ASSESSMENT
RAGS PART D TABLES

LIST OF TABLES

RAGS PART D TABLE 9

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR SITE 7 COPCS

Table No.	
	REASONABLE MAXIMUM EXPOSURES
9.1.RME	Construction Worker
9.2.RME	Full-Time Employee
9.3.RMC	Child Resident
9.4.RME	Adult Resident
	CENTRAL TENDENCY EXPOSURES
9.1.CTE	Construction Worker
9.2.CTE	Full-Time Employee
9.3.CTE	Child Resident
9.4.CTE	Adult Resident

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NSB-NLON, GROTON, CONNECTICUT

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	Torpedo Shops (Site 7)	Benzo(a)anthracene	9.7E-09	- -	2.0E-09	--	1.2E-08	NA	- -	- -	- -	- -
			Benzo(a)pyrene	9.5E-08	- -	2.0E-08	--	1.2E-07	NA	- -	- -	- -	- -
			Benzo(b)fluoranthene	1.2E-08	- -	2.5E-09	--	1.4E-08	NA	- -	- -	- -	- -
			Indeno(1,2,3-cd)pyrene	8.8E-09	- -	1.8E-09	--	1.1E-08	NA	- -	- -	- -	- -
			Aroclor-1254	1.4E-08	- -	2.2E-09	--	1.6E-08	Immune	0.02	- -	0.004	0.03
			Antimony	- -	- -	- -	--	- -	Blood	0.08	- -	- -	0.08
			Arsenic	1.4E-07	- -	6.9E-09	--	1.5E-07	Skin	0.02	- -	0.001	0.02
			Cadmium	- -	- -	- -	--	- -	Kidney	0.01	- -	0.0004	0.01
			Chromium	- -	- -	- -	--	- -	None Specified	0.02	- -	- -	0.02
			Manganese (soil)	- -	- -	- -	--	- -	CNS	0.005	- -	- -	0.005
			Thallium	- -	- -	- -	--	- -	None Specified	0.01	- -	- -	0.01
			Vanadium	- -	- -	- -	--	- -	None Specified	0.01	- -	- -	0.01
			Chemical Total	2.8E-07	--	3.5E-08	--	3.2E-07		0.2	- -	0.005	0.2
		Exposure Point Total						3.2E-07					0.2
	Exposure Medium Total							3.2E-07					0.2
Medium Total								3.2E-07					0.2
Receptor Total							Receptor Risk Total	3.2E-07				Receptor HI Total	0.2

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Full-Time Employee
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Torpedo Shops (Site 7)	Benzo(a)pyrene	8.7E-07	- -	8.6E-07	--	1.7E-06	NA	- -	- -	- -	- -
			Dibenzo(a,h)anthracene	9.6E-08	- -	9.5E-08	--	1.9E-07	NA	- -	- -	- -	- -
			Antimony	- -	- -	- -	--	- -	Blood	0.03	- -	- -	0.03
			Cadmium	- -	- -	- -	--	- -	Kidney	0.005	- -	0.0008	0.006
			Manganese (Soil)	- -	- -	- -	--	- -	CNS	0.001	- -	- -	0.001
			Chemical Total	9.7E-07	--	9.6E-07	--	1.9E-06		0.04	- -	0.0008	0.04
		Exposure Point Total						1.9E-06					0.04
	Exposure Medium Total							1.9E-06					0.04
Medium Total								1.9E-06					0.04
Receptor Total							Receptor Risk Total	1.9E-06				Receptor HI Total	0.04

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	Torpedo Shops (Site 7)	Benzo(a)anthracene	1.4E-07	- -	3.8E-08	--	1.8E-07	NA	- -	- -	- -	- -
			Benzo(a)pyrene	1.4E-06	- -	3.8E-07	--	1.8E-06	NA	- -	- -	- -	- -
			Benzo(b)fluoranthene	1.8E-07	- -	4.8E-08	--	2.2E-07	NA	- -	- -	- -	- -
			Indeno(1,2,3-cd)pyrene	1.3E-07	- -	3.5E-08	--	1.6E-07	NA	- -	- -	- -	- -
			Aroclor-1254	2.0E-07	- -	4.2E-08	--	2.4E-07	Immune	0.06	- -	0.01	0.07
			Antimony	- -	- -	- -	--	- -	Blood	0.2	- -	--	0.2
			Arsenic	2.1E-06	- -	1.3E-07	--	2.2E-06	Skin	0.05	- -	0.003	0.06
			Cadmium	- -	- -	- -	--	- -	Kidney	0.03	- -	0.001	0.03
			Chromium	- -	- -	- -	--	- -	None Specified	0.04	- -	--	0.04
			Manganese (soil)	- -	- -	- -	--	- -	CNS	0.01	- -	--	0.01
			Thallium	- -	- -	- -	--	- -	None Specified	0.03	- -	--	0.03
			Vanadium	- -	- -	- -	--	- -	None Specified	0.03	- -	--	0.03
			Chemical Total	4.2E-06	--	6.7E-07	--	4.8E-06		0.4	- -	0.02	0.5
		Exposure Point Total						4.8E-06					0.5
	Exposure Medium Total							4.8E-06					0.5
Medium Total								4.8E-06					0.5
Receptor Total							Receptor Risk Total	4.8E-06				Receptor HI Total	0.5

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	Torpedo Shops (Site 7)	Benzo(a)anthracene	6.1E-08	- -	2.1E-08	--	8.1E-08	NA	- -	- -	- -	- -
			Benzo(a)pyrene	6.0E-07	- -	2.1E-07	--	8.0E-07	NA	- -	- -	- -	- -
			Benzo(b)fluoranthene	7.5E-08	- -	2.6E-08	--	1.0E-07	NA	- -	- -	- -	- -
			Indeno(1,2,3-cd)pyrene	5.5E-08	- -	1.9E-08	--	7.4E-08	NA	- -	- -	- -	- -
			Aroclor-1254	8.6E-08	- -	2.3E-08	--	1.1E-07	Immune	0.006	- -	0.002	0.008
			Antimony	- -	- -	- -	--	- -	Blood	0.02	- -	--	0.02
			Arsenic	9.1E-07	- -	7.2E-08	--	9.8E-07	Skin	0.006	- -	0.0005	0.006
			Cadmium	- -	- -	- -	--	- -	Kidney	0.003	- -	0.0002	0.003
			Chromium	- -	- -	- -	--	- -	None Specified	0.004	- -	--	0.004
			Manganese (soil)	- -	- -	- -	--	- -	CNS	0.001	- -	--	0.001
			Thallium	- -	- -	- -	--	- -	None Specified	0.003	- -	--	0.003
			Vanadium	- -	- -	- -	--	- -	None Specified	0.003	- -	--	0.003
			Chemical Total	1.8E-06	--	3.7E-07	--	2.1E-06		0.05	- -	0.002	0.05
		Exposure Point Total						2.1E-06					0.05
	Exposure Medium Total							2.1E-06					0.05
Medium Total								2.1E-06					0.05
Receptor Total							Receptor Risk Total	2.1E-06				Receptor HI Total	0.05

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	Torpedo Shops (Site 7)	Benzo(a)anthracene	3.2E-09	- -	1.3E-10	--	3.4E-09	NA	- -	- -	- -	- -
			Benzo(a)pyrene	3.2E-08	- -	1.3E-09	--	3.3E-08	NA	- -	- -	- -	- -
			Benzo(b)fluoranthene	4.0E-09	- -	1.6E-10	--	4.2E-09	NA	- -	- -	- -	- -
			Indeno(1,2,3-cd)pyrene	2.9E-09	- -	1.2E-10	--	3.0E-09	NA	- -	- -	- -	- -
			Aroclor-1254	4.6E-09	- -	1.5E-10		4.8E-09	Immune	0.008	- -	0.0003	0.008
			Antimony	- -	- -	- -		- -	Blood	0.03	- -	- -	0.03
			Arsenic	4.8E-08	- -	4.6E-10	--	4.9E-08	Skin	0.008	- -	0.00007	0.008
			Cadmium	- -	- -	- -	--	- -	Kidney	0.004	- -	0.00003	0.004
			Chromium	- -	- -	- -	--	- -	None Specified	0.005	- -	- -	0.005
			Manganese (soil)	- -	- -	- -	--	- -	CNS	0.002	- -	- -	0.002
			Thallium	- -	- -	- -	--	- -	None Specified	0.004	- -	- -	0.004
			Vanadium	- -	- -	- -	--	- -	None Specified	0.004	- -	- -	0.004
			Chemical Total	9.5E-08	--	2.3E-09	--	9.7E-08		0.06	- -	0.0004	0.06
		Exposure Point Total						9.7E-08					0.06
	Exposure Medium Total							9.7E-08					0.06
Medium Total								9.7E-08					0.06
Receptor Total							Receptor Risk Total	9.7E-08				Receptor HI Total	0.06

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Full-Time Employee
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Torpedo Shops (Site 7)	Benzo(a)pyrene	6.9E-08	- -	1.4E-08	--	8.2E-08	NA	- -	- -	- -	- -
			Dibenzo(a,h)anthracene	2.2E-08	- -	4.4E-09	--	2.7E-08	NA	- -	- -	- -	- -
			Antimony	- -	- -	- -	--	- -	Blood	0.008	- -	- -	0.008
			Cadmium	- -	- -	- -	--	- -	Kidney	0.001	- -	0.00004	0.001
			Manganese (Soil)	- -	- -	- -	--	- -	CNS	0.0004	- -	- -	0.0004
			Chemical Total	9.1E-08	--	1.8E-08	--	1.1E-07		0.01	- -	0.00004	0.01
		Exposure Point Total						1.1E-07					0.01
	Exposure Medium Total							1.1E-07					0.01
Medium Total								1.1E-07					0.01
Receptor Total							Receptor Risk Total	1.1E-07				Receptor HI Total	0.01

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	Torpedo Shops (Site 7)	Benzo(a)anthracene	2.4E-08	- -	3.8E-09	--	2.7E-08	NA	- -	- -	- -	- -
			Benzo(a)pyrene	2.3E-07	- -	3.8E-08	--	2.7E-07	NA	- -	- -	- -	- -
			Benzo(b)fluoranthene	2.9E-08	- -	4.8E-09	--	3.4E-08	NA	- -	- -	- -	- -
			Indeno(1,2,3-cd)pyrene	2.1E-08	- -	3.5E-09	--	2.5E-08	NA	- -	- -	- -	- -
			Aroclor-1254	3.4E-08	- -	4.2E-09	--	3.8E-08	Immune	0.03	- -	0.004	0.03
			Antimony	- -	- -	- -	--	- -	Blood	0.09	- -	--	0.09
			Arsenic	3.5E-07	- -	1.3E-08	--	3.7E-07	Skin	0.03	- -	0.001	0.03
			Cadmium	- -	- -	- -	--	- -	Kidney	0.01	- -	0.0004	0.02
			Chromium	- -	- -	- -	--	- -	None Specified	0.02	- -	--	0.02
			Manganese (soil)	- -	- -	- -	--	- -	CNS	0.006	- -	--	0.006
			Thallium	- -	- -	- -	--	- -	None Specified	0.02	- -	--	0.02
			Vanadium	- -	- -	- -	--	- -	None Specified	0.01	- -	--	0.01
			Chemical Total	6.9E-07	--	6.7E-08	--	7.6E-07		0.2	- -	0.005	0.2
		Exposure Point Total						7.6E-07					0.2
	Exposure Medium Total							7.6E-07					0.2
Medium Total								7.6E-07					0.2
Receptor Total							Receptor Risk Total	7.6E-07				Receptor HI Total	0.2

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil/Subsurface Soil	Surface/Subsurface Soil	Torpedo Shops (Site 7)	Benzo(a)anthracene	8.8E-09	- -	8.7E-10	--	9.7E-09	NA	- -	- -	- -	- -
			Benzo(a)pyrene	8.7E-08	- -	8.6E-09	--	9.6E-08	NA	- -	- -	- -	- -
			Benzo(b)fluoranthene	1.1E-08	- -	1.1E-09	--	1.2E-08	NA	- -	- -	- -	- -
			Indeno(1,2,3-cd)pyrene	8.0E-09	- -	7.9E-10	--	8.8E-09	NA	- -	- -	- -	- -
			Aroclor-1254	1.3E-08	- -	9.6E-10	--	1.4E-08	Immune	0.003	- -	0.0002	0.003
			Antimony	- -	- -	- -	--	- -	Blood	0.010	- -	--	0.01
			Arsenic	1.3E-07	- -	3.0E-09	--	1.4E-07	Skin	0.003	- -	0.00007	0.003
			Cadmium	- -	- -	- -	--	- -	Kidney	0.002	- -	0.00002	0.002
			Chromium	- -	- -	- -	--	- -	None Specified	0.002	- -	--	0.002
			Manganese (soil)	- -	- -	- -	--	- -	CNS	0.0006	- -	--	0.0006
			Thallium	- -	- -	- -	--	- -	None Specified	0.002	- -	--	0.002
			Vanadium	- -	- -	- -	--	- -	None Specified	0.001	- -	--	0.001
			Chemical Total	2.6E-07	--	1.5E-08	--	2.7E-07		0.02	- -	0.0003	0.02
		Exposure Point Total						2.7E-07					0.02
	Exposure Medium Total							2.7E-07					0.02
Medium Total								2.7E-07					0.02
Receptor Total							Receptor Risk Total	2.7E-07				Receptor HI Total	0.02