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Record of Decision
for
Sites 16 and 18 Soil (Operable Unit 11)

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

September 2004

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LIST OF ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
Atlantic	Atlantic Environmental Services, Inc.
B&RE	Brown & Root Environmental
BGOURI	Basewide Groundwater Operable Unit Remedial Investigation
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CTDEP	Connecticut Department of Environmental Protection
CTE	Central tendency exposure
DDD	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
DDE	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene
DDT	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
DGI	Data Gap Investigation
DPT	Direct-push technology
EPA	United States Environmental Protection Agency
EPCs	Exposure point concentrations
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
GA/GAA	CTDEP Groundwater Quality Classification
GB	CTDEP Groundwater Quality Classification
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendment of 1984
IAS	Initial Assessment Study
ICR	Incremental cancer risk
IEUBK	Integrated Exposure Uptake Biokinetic
IR	Installation Restoration
J	A laboratory data qualifier; an estimated positive result with validation noncompliances
MCLs	Maximum Contaminant Levels
mg/kg	milligrams per kilogram (parts per million)
mg/L	milligrams per liter (parts per million)
ng/kg	nanograms per kilogram (parts per trillion)

Navy	United States Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NFA	No further action
NPL	National Priorities List
NSB-NLON	Naval Submarine Base - New London
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PRGs	Preliminary Remediation Goals
RAB	Restoration Advisory Board
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RfD	Reference dose
RI	Remedial Investigation
RME	Reasonable maximum exposure
ROD	Record of Decision
RSRs	Remediation Standard Regulations (Connecticut)
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Service
SSL	Soil Screening Level
SPLP	Synthetic Precipitation Leaching Procedure
SVOCs	Semivolatile organic compounds
TAG	Technical Assistance Grant
TBC	To Be Considered
TCE	Trichloroethene
TCLP	Toxicity Characteristics Leaching Procedure
TSCA	Toxic Substances Control Act
TDS	Total dissolved solids
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper confidence limit
UST	Underground storage tank
UTL	Upper Tolerance Limit
VOCs	Volatile organic compounds
µg/kg	Micrograms per kilogram (parts per billion)
µg/L	Micrograms per liter (parts per billion)

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 which must be met by the selected remedy under Superfund.

Carcinogen: A substance that may cause cancer.

Chemical of Concern (COC): A regulated chemical that is present at a concentration deemed to pose an unacceptable risk to human health or the environment, taking into account the acceptable level of risk, land-use definitions (i.e., current and reasonable potential future), and exposure scenario (i.e., completed pathways).

Chemical of Potential Concern (COPC): A chemical identified as a potential concern to human health or the environment through a screening-level assessment because its concentration exceeds regulatory criteria.

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.

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

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

Dioxins: A family of 75 organic compounds known chemically as polychlorinated dibenzo-p-dioxins. The individual compounds are technically referred to as congeners. Concern about them arises from their potential toxicity as contaminants and their hydrophobic nature and resistance towards metabolism. Dioxins are typically created and released into the air during combustion processes such as commercial or municipal waste incineration and from burning fuels (e.g., wood, coal, or oil). They can also be created in small quantities during certain types of chemical manufacturing and processing.

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.

Furans: A family of 135 organic compounds known chemically as polychlorinated dibenzofurans. The individual compounds are technically referred to as congeners. Typically found with dioxins and having similar properties, concern about furans arises from their potential toxicity as contaminants and their hydrophobic nature and resistance towards metabolism.

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. Provides an indication of the noncarcinogenic risks associated with the chemicals, media, and 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.

Human Health Risk Assessment (HHRA): Scientific method to evaluate the effects on human receptors from exposure to contaminants in site-specific media.

Incremental Cancer Risk (ICR): 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 below 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.

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

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 release 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.

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

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.

Polychlorinated Biphenyls (PCBs): A family of 204 organic compounds, formerly used in the manufacture of plastics and in electrical transformers. They were used because they conducted heat well while being fire resistant and good electrical insulators. PCBs tend to bioaccumulate in fish and other animals. PCBs are probable human carcinogens. Studies also suggest non-cancer effects on humans and animals.

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.

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.

Remedial Action: Activities to control exposure to, treat, or remove contaminated media, waste, or material.

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

Remedial Goal (RG): Allowable concentration of contaminant that can be left in medium and not adversely impact human health or the environment. It may also be the end result of a long-term action that stops or substantially reduces a release or threatened release of hazardous substances.

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

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.

Volatile Organic Compounds (VOCs): Carbon-based chemical compounds that have high vapor pressures and evaporate readily at normal temperatures. Examples of VOCs are the components of gasoline (i.e., benzene, toluene, ethylbenzene, and xylenes) and solvents (e.g., trichloroethene).

1.0 DECLARATION

1.1 SITE NAMES AND LOCATIONS

Naval Submarine Base – New London (NSB-NLON)
Groton, Connecticut
CERCLIS ID No. CTD980906515

This Record of Decision (ROD) covers the soil at Site 16 – Hospital Incinerators and Site 18 – Solvent Storage Area, Operable Unit (OU) 11.

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the Selected Remedy for Sites 16 and 18 soil at NSB-NLON, Groton, Connecticut. The Selected Remedy was 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 DESCRIPTIONS OF SELECTED REMEDIES

Samples of Site 16 and Site 18 surface soil and subsurface soil were collected and analyzed. The analytical data were evaluated and human health risk assessments (HHRAs) were conducted. The risk assessments concluded that there were no unacceptable risks to human health from exposure to media at these sites. Ecological risk assessments were not performed for these sites because neither of them provide suitable ecological habitat, i.e., Site 16 consists of two small areas adjacent to a hospital and Site 18 is a building. Based on this information, No Further Action (NFA) was selected for Sites 16 and 18 soil (OU 11). The soil at these sites pose no current or future potential threat to human health or the environment; therefore, the Navy will not implement any treatment, engineering controls, or institutional controls.

A total of 12 OUs have been defined at NSB-NLON to address some of the 25 Installation Restoration (IR) Program sites included in the NSB-NLON IR Program. Sites 16 and 18 are two of the 25 IR Program sites. The OUs associated with these sites are discussed below.

- The soil at Sites 16 and 18 is defined as OU 11. The selected NFA remedy for the soil at these two sites is the first and final remedy.

- There was no groundwater encountered at Site 16. The groundwater at Site 18 is included in the Basewide Groundwater OU 9. Site 18 groundwater and the remainder of OU 9 will be addressed at a later date in another decision document.

1.4 STATUTORY DETERMINATIONS

The selection of the NFA remedy for Sites 16 and 18 soil (OU 11) is based on the results of an investigation which indicated that no remedial actions are necessary to ensure protection of human health and the environment. Risk assessments conducted on data collected during the investigation concluded that there were no unacceptable risks to human health or the environment. 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 5-year review will not be required for these remedial actions.

1.5 AUTHORIZING SIGNATURES

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

9/24/04
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 remedy selected by the Navy and EPA for Sites 16 and 18 soil (OU 11). 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) (EPA, 1995).

2.1 SITE NAMES, LOCATIONS AND BRIEF DESCRIPTIONS

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-southward from the Thames River to Baldwin Hill. A general facility location map is shown on Figure 2-1. The location of each site within NSB-NLON is shown on Figure 2-2.

2.1.1 Site 16

Site 16 consists of the two locations where a skid-mounted incinerator was used near the Naval Hospital Groton. The two sites (i.e., 16A and 16B) are located west of Tautog Road, adjacent to Building 449 and Building 452. The sites are shown on Figure 2-3. The location of the site, relevant to other IR sites, is shown on Figure 2-2.

2.1.2 Site 18

Site 18 consists of Building 33, the Solvent Storage Area. The building was used for the storage of gas cylinders and 55-gallon drums of solvents. The location of Building 33 is shown on Figure 2-2 and Figure 2-4.

2.2 SITE HISTORIES AND ENFORCEMENT ACTIVITIES

2.2.1 Site Histories

Site 16 was identified as the two locations (16A and 16B) that the Naval Hospital Groton operated a skid-mounted waste incinerator adjacent to the hospital in the 1980s. According to the FFA (EPA, 1995), the incinerator was used to destroy medical records and medical waste contaminated with pathological agents.

Ash generated by the waste incinerator was transferred to dumpsters for disposal at the municipal landfill. The Navy subsequently ceased operation of the incinerator at the hospital.

According to the FFA (EPA, 1995), Site 18 was used for the storage of gas cylinders and 55-gallon drums of solvents such as trichloroethene (TCE) and dichloroethene.

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 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 the appropriate remedial action is 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, Resource Conservation and Recovery Act (RCRA) and Hazardous and Solid Waste Amendment (HSWA) of 1984, Executive Order 12580, and applicable State laws.

Sites 16 and 18 are two of 25 sites being addressed by the Navy's IR Program at NSB-NLON. Site 16 and 18 data were provided and evaluated in the Basewide Groundwater Operable Unit Remedial Investigation (BGOURI) Report [Tetra Tech NUS, Inc. (TtNUS), 2002a].

2.2.2.1 Site 16

Site 16 was evaluated during the Initial Assessment Study (IAS) that was conducted for NSB-NLON [Envirodyne Engineers, Inc. (Envirodyne), 1983]. No sampling activities were conducted as part of the study. The study's recommendation for this site was to not pursue further investigation of the site because, at the time of the IAS study, the site was still operational. As a result, no investigation of Site 16 was conducted during the early phases of investigation at NSB-NLON (e.g., Phase I Remedial Investigation (RI) [Atlantic Environmental Services, Inc. (Atlantic), 1992] or Phase II RI [Brown & Root Environmental (B&RE), 1997]. The Navy subsequently ceased operation of the incinerator at the hospital and the site was investigated during the BGOURI in 2000 to determine the impact of the operation of the incinerator. The results of the investigation were documented in the BGOURI Report (TtNUS, 2002a).

2.2.2.2 Site 18

The solvent storage area at Building 33 was identified during the IAS (Envirodyne, 1983) for NSB-NLON. The site was identified as Study Area F in the FFA and is now identified as Site 18 for the IR Program. The site was not identified as a high priority site and as a result, no investigation of Site 18 was conducted during the early phases of investigation at NSB-NLON (e.g., Phase I or Phase II RIs). The Navy investigated the site during the BGOURI in 2000 to determine the impact of the operation of the storage facility. Both soil and groundwater samples were collected to characterize the site. The results of the investigation were documented in the BGOURI Report (TtNUS, 2002a).

2.3 COMMUNITY PARTICIPATION

The Navy has been conducting community relations activities for the IR Program since 1994. Prior 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 Sites 16 and 18.

The following community relations activities are conducted as part of the Community Relations Plan:

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; 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) was published on July 16, 2004 in The New London Day newspaper. The documents are available to the public in the NSB-NLON Information Repository 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 public 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 concurrence letter from the State of Connecticut is provided in Appendix B. The transcript for the public meeting is provided in Appendix C. 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

A total of 12 OUs have been defined at NSB-NLON to address the 25 IR Program sites currently included in the NSB-NLON IR Program. Sites 16 and 18 are two of the 25 IR Program sites. The OUs associated with these sites are discussed below.

- OU 9 – Basewide Groundwater including Site 18 groundwater
- OU 11 – Sites 16 and 18 soil

No groundwater was encountered at Site 16. The groundwater at Site 18 is included in the Basewide Groundwater OU 9. Site 18 groundwater and the remainder of OU 9 will be addressed at a later date in another decision document.

This NFA ROD addresses the soil at Sites 16 and 18 (OU 11). The NFA remedy selected for the soil at Sites 16 and 18 is the first and final remedy under CERCLA. Evaluation of the available analytical data indicated that there are no adverse health effects anticipated from exposure to the soil at Sites 16 and 18.

2.5 SITES CHARACTERISTICS

2.5.1 Physical Settings

2.5.1.1 Site 16

Figure 2-3 shows the surface features of Site 16. The skid-mounted incinerator was operated in two areas, one adjacent to Building 452 (16A) and the other adjacent to Building 452 (16B). Based on mapping provided in the FFA, it appears that these two areas are within or directly adjacent to parking lots.

The hospital complex is located on the top of the bedrock hill located in the central portion of NSB-NLON. The topography in this area indicates that surface water would flow toward the west and ultimately discharge into the Thames River. Surface water runoff from the hospital parking lot is collected by a storm sewer system. The surface water is discharged to drainage swales outside the parking lot.

The Soil Conservation Service (SCS) Soils Map (SCS, 1983) classifies the soil around the hospital complex as Urban land. Bedrock exposures (Hollis-Charlton-Rock outcrop complex) are prevalent because the central bedrock high extends toward the south and west. The soils overlying the bedrock range from very stony fine sandy loam to gravelly loam.

The geology of the Hospital site is characterized by a very shallow (less than 10 feet thick), unsaturated weathered bedrock surface overlying a less weathered bedrock surface. The investigations conducted at the site during the BGOURI were conducted with direct-push technology (DPT) methods that were incapable of penetrating the more resistant bedrock. The unconsolidated material consisted of silty sand with some rock fragments. At most drilling locations, the DPT rig was unable to penetrate more than 3 feet due to bedrock refusal. This is consistent with information received from the NSB-NLON Public Works Department that indicated bedrock was excavated in order to build the hospital. The Precambrian Mamacoke Formation is the bedrock that underlies Site 16.

No hydrogeologic investigations of Site 16 were conducted during the BGOURI because of the shallow depth of bedrock. Additional efforts were not made to investigate the groundwater in the bedrock because of the following factors:

- The source of contamination at Site 16 was a skid-mounted incinerator and the contaminants at the site (i.e., dioxins/furans, PCBs, and metals) are not typically mobile in the dissolved phase.

- The bedrock (granite) at NSB-NLON is relatively competent and would likely impede vertical contaminant migration. In addition, regional hydrogeologic information suggests that the depth to groundwater in the bedrock is more than 70 feet below the ground surface.

Inferred hydrogeologic information from the Phase II RI (B&RE, 1997) indicates that groundwater flows from Site 16 toward the Lower Subase and the Thames River.

2.5.1.2 Site 18

Figure 2-4 shows the surface features of Site 18. The site is located north of Site 15 and the Tank Farm (Site 23). A steep embankment exists on the northern and eastern sides of Building 33. The embankment slopes at an approximate gradient of 50 percent toward the south and west. The gradient flattens to approximately 5 percent on the southern and eastern sides of Building 33.

Surface water runoff from this site is collected by a storm sewer system. The storm sewer system passes through the Tank Farm (Site 23) and Goss Cove Landfill (Site 8) and eventually discharges to the Thames River.

The SCS Soils Map (SCS, 1983) classifies the soil on the southern and western sides of Building 33 as Urban land. Upgradient of the site (north and east), bedrock exposures (Hollis-Charlton-Rock outcrop complex) are prevalent as the central bedrock high extends toward the south. The soils overlying the bedrock range from very stony fine sandy loam to gravelly loam.

Minimal subsurface investigation work has been performed at Site 18. The site has a veneer of silty sand overlying shallow metamorphic bedrock. The sand is fine to medium grained and contains trace to some gravel and rock fragments.

Groundwater levels were measured in temporary wells 18TW2 and 18TW4 on June 14, 2000. The elevations associated with these measurements are presented on Figure 2-4. The general direction of groundwater flow in the shallow overburden at Site 18 is to the south. Groundwater from this site will eventually discharge to the Thames River. The saturated thickness of the overburden at the site varies from approximately 1 foot to greater than 5 feet.

2.5.2 <u>Nature and Extent of Contamination</u>

An investigation was conducted at Sites 16 and 18 to assess the nature and extent of contamination. The investigation at Site 16 focused on surface and subsurface soil; while the investigation at Site 18 focused

on groundwater, surface soil, and subsurface soil. The results of the investigations are summarized below.

2.5.2.1 Site 16

An evaluation of the nature and extent of soil contamination at Site 16 is provided below. The discussion is based on the soil data collected during the BGOURI in 2000. Since the exposure scenarios for surface soil and subsurface soil are different, the discussion addresses each soil type separately. Surface soils are considered to be soil samples collected from 0 to 2 feet bgs. Subsurface soils are considered to be soil samples collected from 2 to 10 feet bgs. Soil sample locations are shown on Figure 2-3.

Table 2-1 presents a summary of positive soil analytical results for Site 16. Table 2-2 presents a summary of Synthetic Precipitation Leaching Procedure (SPLP) results. Descriptive statistics (i.e., frequency of detections, minimum and maximum concentrations, range of detection limits, and the associated sample numbers) for surface soil samples and relevant information for the COPC screening for the HHRA are tabulated in Tables 2-3 through 2-5. Different exposure scenarios (i.e., direct exposure and migration) are considered in each table. Analytical results for subsurface soil samples are summarized in Tables 2-6 through 2-8.

<u>Surface Soil</u>

Seven dioxin/furan congeners were detected in surface soil samples; five of which were at concentrations exceeding the CTDEP pollutant mobility criterion. None of the dioxin/furan congeners were detected at concentrations exceeding any direct exposure criteria. At least one dioxin/furan congener was detected in every Site 16 soil sample.

1,2,3,4,6,7,8-HPCDD was detected in five of seven samples at concentrations ranging from 7 nanograms per kilogram (ng/kg) to 120 ng/kg. The maximum concentration was detected in sample S16SB070001, which was taken from Site 16B. Surface soil sample S16SS01, taken at Site 16A near the outlet of the storm sewer outfall, had a concentration of 1,2,3,4,6,7,8-HPCDD of 31 ng/kg.

1,2,3,4,6,7,8-HPCDF was detected in five of seven surface soil samples at concentrations ranging from 0.41 to 5.4 ng/kg. The maximum concentration was detected in surface soil sample S16SS01 and it was the only concentration that exceeded the alternative CTDEP pollutant mobility criterion developed by the Navy of 4.7 ng/kg. In general, 1,2,3,4,6,7,8-HPCDF was detected more frequently and at higher concentrations at Site 16A than at Site 16B.

1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, and 2,3,7,8-TCDF were detected only once in sample S16SB050001. The concentrations of 2,3,4,7,8-PECDF (0.36 ng/kg) and 2,3,7,8-TCDF (1.8 ng/kg) exceeded their respective alternative CTDEP pollutant mobility criterion (0.093 ng/kg and 0.47 ng/kg, respectively).

OCDD was detected in all surface soil samples at concentrations ranging from 110 to 29,000 ng/kg. The maximum concentration of this congener was detected in sample S16SB070001. Concentrations of OCDD in four of the seven soil samples were greater than the alternative CTDEP pollutant mobility criterion for this compound (467 ng/kg).

OCDF was detected in three of seven soil samples at concentrations ranging from 2.9 to 12 J ng/kg. The maximum concentration of this congener was detected in surface soil sample S16SS01. None of the detected concentrations exceeded the alternative CTDEP pollutant mobility criterion.

Three volatile organic compounds (VOCs) (2-butanone, acetone, and toluene) were detected at relatively low concentrations (i.e., below CTDEP pollutant mobility criterion) in Site 16 surface soil samples. 2-Butanone was detected in five of seven samples at concentrations ranging from 3 J micrograms per kilogram (µg/kg) to 5 J µg/kg. Acetone was detected in two of seven soil samples at a maximum concentration of 180 J µg/kg, and toluene was detected in four of seven soil samples at a maximum concentration of 4 J µg/kg.

A total of 15 semivolatile organic compounds (SVOCs) were detected in Site 16 surface soil samples. A majority of the maximum concentrations of polynuclear aromatic hydrocarbons (PAHs) were detected in soil sample S16SB05001. The only SVOC that was detected at a concentration that exceeded a direct contact exposure criteria was benzo(a)pyrene. None of the detected concentrations exceeded the CTDEP pollutant mobility criterion. Benzo(a)pyrene was detected in five of seven samples at concentrations ranging from 0.02 to 0.330 milligrams per kilogram (mg/kg). The highest concentrations of benzo(a)pyrene were detected in soil samples from Site 16A. None of the samples collected from Site 16B had concentrations in excess of the direct contact screening criteria. However, it should be noted that the two samples collected at Site 16B with nondetect concentrations had detection levels that were in excess of the screening criteria.

Five pesticides [i.e., 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane (4,4'-DDD), 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene (4,4'-DDE), 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane (4,4'-DDT), alpha chlordane, and gamma chlordane] and one polychlorinated biphenyl (PCB) (i.e., Aroclor-1248) were detected infrequently in Site 16 surface soil samples. The maximum concentrations of all the pesticides and the PCB were detected in sample S16SB07001. None of the pesticides were detected at

concentrations in excess of any screening criteria. Aroclor 1248 was found at a concentration of 0.006 mg/kg in sample S16SB070001, which exceeds the CTDEP pollutant mobility criterion. This concentration is well below the Toxic Substances Control Act (TSCA) residential cleanup criterion of 1 mg/kg; therefore, this detection does not suggest a problem.

Twenty inorganics were detected in the soil samples collected from Site 16. Arsenic, manganese, and thallium were detected at concentrations that exceeded direct contact screening criteria and background concentrations. Arsenic was detected in all seven samples at levels were above the risk-based screening level of 0.39 mg/kg. The concentrations of arsenic ranged from 1.7 to 8.5 mg/kg. Manganese was also detected in all seven surface soil samples at concentrations ranging from 100 to 400 mg/kg. Only sample S16SS01 (400 mg/kg) had a detection above the direct contact exposure criteria and site background. Thallium was detected in six of seven samples at concentrations ranging from 0.49 J (S16SB060001) to 1.2 J (S16SS01) mg/kg.

The maximum detected concentration of thallium (S16SS01) exceeded the EPA Soil Screening Level (SSL). The SPLP results for the Site 16 surface soil samples, presented in Table 2-5, indicate that chromium, copper, lead, and vanadium are of potential concern due to contaminant migration.

Subsurface Soil

Only one subsurface soil sample (S16SB080405) was collected at Site 16. 1,2,3,4,6,7,8-HPCDD was detected at a concentration of 24 ng/kg in sample S16SB080405. This concentration was similar to concentrations of this congener found in surface soil samples and it exceeded the alternative CTDEP pollutant mobility criterion of 4.7 ng/kg.

OCDD was detected at a concentration of 6,400 ng/kg in the subsurface soil sample. This concentration was the second highest concentration detected in any soil sample from this site. The OCDD concentration exceeded the alternative CTDEP mobility criterion of 47 ng/kg.

Three VOCs (bromomethane, chloromethane, and toluene) were detected at relatively low concentrations (i.e., below direct exposure and CTDEP pollutant mobility criterion) in the single Site 16 subsurface soil samples. Toluene was also detected at low concentrations in four surface soil samples.

No SVOCs were detected in sample S16SB080405; however, this is probably because the detection limits for SVOCs were elevated for this sample. Several of the detection limits exceeded the screening criteria.

No pesticides or PCBs were detected in sample S16SB080405.

Fourteen inorganics were detected in the single subsurface soil sample. Antimony, beryllium, cobalt, nickel, sodium, and zinc were positively detected in surface soil samples but were not detected in the subsurface soil sample S16SB080405. Of the 14 inorganics detected, arsenic was the only compound that was detected at a concentration that exceeded any screening criteria. Arsenic was detected at a concentration of 4.4 mg/kg, which slightly exceeds background (3.6 mg/kg) and exceeds the direct contact screening criterion (0.39 mg/kg) by approximately one order of magnitude.

No detected concentrations of inorganics in subsurface soil sample S16SB080405 exceeded any EPA SSLs. In addition, the SPLP results for the Site 16 subsurface soil sample, presented in Table 2-16, do not indicate that the inorganics pose a potential concern due to contaminant migration.

2.5.2.2 Site 18

An evaluation of the nature and extent of soil contamination at Site 18 is provided below. The discussion includes soil data collected during the BGOURI in 2000. Since the exposure scenarios for surface soil and subsurface soil are different, the discussion addresses each soil type separately. Surface soils are considered to be soil samples collected from 0 to 2 feet bgs. Subsurface soils are considered to be soil samples collected from 2 to 10 feet bgs. Soil sample locations are shown on Figure 2-4.

Table 2-9 presents a summary of positive soil analytical results for Site 18. Table 2-10 presents a summary of SPLP results. Descriptive statistics (i.e., frequency of detections, minimum and maximum concentrations, range of detection limits, and the associated sample numbers) for surface soil and the COPC screening information for the HHRA are tabulated in Tables 2-11 through 2-13. Different exposure scenarios (i.e., direct exposure and migration) are considered in each table. Analytical results for subsurface soil samples are summarized in Tables 2-14 through 2-16.

<u>Surface Soil</u>

Two VOCs (2-butanone and toluene) were detected at relatively low concentrations (i.e., below CTDEP pollutant mobility criteria) in Site 18 surface soil samples. 2-Butanone was detected in three of three samples at concentrations ranging from 2 J µg/kg to 4 J µg/kg. Toluene was detected in all five soil samples at concentrations ranging from 1 J µg/kg to 6 J µg/kg.

A total of 15 SVOCs were detected in Site 18 surface soil samples. All 15 were PAHs that were detected only in soil sample S18SB010001-SO. None of the detected concentrations exceeded direct contact exposure criteria or the CTDEP pollutant mobility criteria.

No pesticides or PCBs were detected in these samples.

Sixteen inorganics were detected in the soil samples collected from Site 18. Twelve of the 16 detected metals were present in all five samples. The maximum concentrations of metals were detected most frequently in sample S18SB030001-SO. Although no concentrations of metals in surface soil samples exceeded the migration pathway screening criteria, arsenic, lead, and thallium were detected at concentrations that exceeded direct contact screening criteria and background concentrations. Arsenic and lead were detected in all five samples. The horizontal limits of arsenic above surface soil screening criteria were not established. Concentrations of arsenic in all five samples were above the risk-based screening level of 0.39 mg/kg. The concentrations of arsenic ranged from 1.9 to 4 mg/kg. Lead was detected in all five surface soil samples at concentrations below 10 mg/kg, except in sample S18SB050001 where was detected at a concentration of 430 mg/kg, which is above the risk-based screening level of 400 mg/kg. Thallium was detected in three of five samples. Thallium was detected at concentrations ranging from 0.43 J (S18SB050001-SO) to 0.64 J (S18SB030001-SO) mg/kg. The concentrations of thallium in samples S18SB030001-SO and S18SB040001-SO exceeded the risk-based screening level. Therefore, the northwestern limit of thallium at concentrations in excess of the screening criterion is not established.

The SPLP results for the Site 18 surface soil samples, presented in Table 2-13, indicate that antimony is of potential concern due to contaminant migration. The concentration of antimony [86 micrograms per liter (µg/L)] detected in the leachate exceeded the CTDEP pollutant mobility criteria.

Subsurface Soil

Two VOCs (methylene chloride and toluene) were detected at relatively low concentrations (i.e., below direct contact and CTDEP pollutant mobility criteria) in Site 18 subsurface soil samples. Methylene chloride was detected in only sample S18SB020405-SO-D at a concentration of 67 J µg/kg, which is in excess only of the EPA SSL for migration from soil to groundwater. Toluene was detected in three of five soil samples at concentrations ranging from 1 J µg/kg to 2 J µg/kg. None of the detected concentrations of toluene were in excess of either the direct contact exposure criteria or the CTDEP pollutant mobility criterion.

A total of 10 SVOCs were detected in Site 18 subsurface soil samples. All 10 were PAHs that were detected only in soil sample S18SB010506-SO. None of the detected concentrations exceeded direct contact exposure criteria or the CTDEP pollutant mobility criteria.

No pesticides or PCBs were detected in these samples.

Fifteen inorganics were detected in the five subsurface soil samples. All the same metals positively detected in surface soil samples were detected in the subsurface soil samples, except antimony. Of the 15 inorganics detected, manganese and thallium were the only compounds that were detected at concentrations in excess of any screening criteria. Manganese was detected in all five subsurface soil samples at concentrations ranging from 33 mg/kg to 220 mg/kg. However, only the concentration of manganese in sample S18SB040708-SO (220 mg/kg) exceeds background (188 mg/kg) and the direct contact screening criterion (180 mg/kg). Thallium was detected only once in sample S18SB040708-SO at a concentration of 0.75 mg/kg, which is in excess of background (0.29 mg/kg) and exceeds the direct contact screening criteria (0.52 mg/kg).

The concentration of thallium in subsurface soil sample S18SB040708 exceeded the EPA SSL for migration from soil to groundwater. However, the SPLP results for the Site 18 subsurface soil samples, presented in Table 2-16, do not indicate that the inorganic poses a potential concern due to contaminant migration.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

NSB-NLON is currently an active Navy base and should remain so into the foreseeable future. Reasonable potential future land uses of Sites 16 and 18 include the continued use under their current Naval functions.

If the Navy would sell this property in the future, it is possible that the sites could be developed for residential use. Therefore, hypothetical future residential use of the sites 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

2.7.1 Human Health Risk Assessments

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 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 chemicals of potential concern (COPCs) and

representative exposure point concentrations (EPCs) for each media. 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 Chemicals of Concern (COCs) and exposure pathways that need to be addressed by a remedial action.

For Sites 16 and 18, COPCs for soil were identified by comparing maximum detected concentrations of contaminants to EPA Region 9 Preliminary Remedial Goals (PRGs) for residential exposures to soil, CTDEP Remediation Standard Regulations (RSRs) for residential exposure to soil, EPA SSLs for soil to air, EPA SSLs for migration from soil to groundwater, and CTDEP pollutant mobility criteria for migration from soil to groundwater.

Potential receptors for exposure to surface soil and subsurface soil included construction workers and hypothetical future child and adult residents. Potential receptors for exposure to surface soil only included full-time employees and adolescent trespassers. Potential receptors for exposures to groundwater included construction workers and future adult residents. Potential exposure pathways are summarized in Tables 2-17 and 2-18 for Sites 16 and 18, respectively. These pathways consider the potential for exposure based on present use, potential future use, and location of the sites. Exposure assumptions for the receptors and toxicity information for the COPCs were presented in the BGOURI Report (TtNUS, 2002a) and are not reiterated in this ROD.

EPCs for each of the COPCs were developed for reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. For exposures to soil, if there were more than 10 samples, then the upper confidence limit (UCL) was used as the EPC under both the RME and CTE scenarios. If there were less than 10 samples then the maximum and average concentration was used as the EPC under the RME and CTE scenarios, respectively.

Potential human health risks resulting from exposure to COPCs were estimated using algorithms established by the EPA and CTDEP. The algorithms are used to 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 [incremental cancer risk (ICR)]. According to EPA, risks below 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 x 10^{-5} (1 in 100,000) for cumulative risk or 1 x 10^{-6} (1 in 1,000,000) for individual chemicals are generally considered to be “acceptable," while risks greater than 1 x 10^{-5} for cumulative risk or 1 x 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 hazard index (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. The results of the HHRAs for Sites 16 and 18 are discussed below.

2.7.1.1 Site 16

Results

The Site 16 COPCs and the screening criteria used to identify them are summarized in Tables 2-3, 2-4, and 2-5 for surface soil and Tables 2-6, 2-7, and 2-8 for subsurface soil. Tables 2-19 and 2-20 present the risk estimates from the BGOURI HHRA for Site 16 under the RME and CTE scenarios, respectively. RAGS Part D Summary of Receptor Risks and Hazards for COPCs tables for Site 16 are included in Appendix D.

ICRs for Site 16 ranged from 5.7 x 10^{-8} for older child trespassers (CTE) to 7.8 x 10^{-6} for child residents (RME). All ICRs for exposures to soil at Site 16 were less than or within EPA's target risk range of 10^{-4} to 10^{-6} and less than CTDEP's acceptable level of 1 x 10^{-5} for cumulative exposures. Although all ICRs were less than CDTEP's target level for cumulative exposures, chemical-specific ICRs for arsenic (full-time workers, older child trespassers, child residents, and adult residents) and benzo(a)pyrene (child residents) exceeded CTDEP's target level of 1 x 10^{-6} for individual chemicals. It should be noted that the maximum detected concentrations of benzo(a)pyrene and arsenic were less than their respective CTDEP RSRs for residential exposures.

All HIs for exposure to soil at Site 16 were less than EPA's and CTDEPs acceptable level of 1.0. HIs for Site 16 ranged from 0.007 for full-time employees (CTE) and adult residents (CTE) to 0.3 for child residents (RME).

Uncertainty Analysis

The following sources of uncertainty in the HHRA were identified and discussed. Maximum detected concentrations of several dioxin congeners exceeded the alternative CTDEP pollutant mobility criterion calculated by the Navy but were less than EPA SSLs for migration from soil to groundwater. The CTDEP pollutant mobility criterion was derived by multiplying the groundwater protection criterion by 20, which is based on the fact that the toxicity characteristics leaching procedure (TCLP) test requires a soil-to-extract ratio of 20. EPA SSLs are derived using a simple conservative groundwater model and the chemicals' physical constants. Although both sets of criteria are conservative, the EPA SSLs give a more realistic indication of a chemical's potential to migrate from soil to groundwater since the EPA SSLs are based on chemical-specific parameters. In addition, dioxins are considered to be very persistent and relatively immobile in soil and are essentially insoluble in water. Based on a request from the CTDEP, the dioxin mobility issue in Site 16 soil was further evaluated and the results of the evaluation were documented in a memorandum (see Appendix B). The conclusion of the evaluation was that the dioxin concentrations in Site 16 soil are background concentrations and should not be a concern to the CTDEP. Consequently, the migration of dioxins from soil to groundwater at Site 16 is not expected to be a significant migration pathway.

Temporary groundwater monitoring wells were to be installed and sampled at the site; however, they were not installed or sampled because shallow bedrock was encountered. The contaminants detected in soil samples collected from the site are typically not mobile and are not expected to migrate vertically to groundwater beneath the site. The potential source of contamination is a former skid mounted incinerator which would not introduce contamination in the subsurface such as an underground storage tank (UST) might. Based on the Navy's experience with drilling a bedrock well (i.e., 2LMW35B) at a location upgradient of the site, the depth of drilling may exceed 100 feet until a substantial fracture is encountered that would yield sufficient groundwater. Consequently, it is unlikely that contamination in surface soil at the site has impacted groundwater beneath the site. Also, there are no current potential exposure pathways from groundwater. The only potential future exposure pathway would be if groundwater at the site was developed as a potable well supply which is not likely based on its current State classification (GB) and the expected future site use. Therefore, the absence of groundwater data for Site 16 does not introduce any major uncertainty in the HHRA for the site.

The maximum detected concentration was used as the exposure point concentration for the RME scenario since fewer than 10 soil samples were collected at Site 16. As a result of using the maximum detected concentration, the estimates of risk are most likely to be overstated since it is unlikely that potential receptors would be exposed to the maximum concentration over the entire exposure period.

No dermal absorption value was available for thallium; consequently, dermal exposures to thallium in soil could not be evaluated. The lack of a dermal absorption value for thallium does not significantly impact

the estimated risks. The highest HI for exposures to thallium in soil occurred for a child resident (HI = 0.1) under the RME scenario. The HI would still be less than the acceptable level of 1.0, even with 100 percent dermal absorption of thallium (HI = 0.3). Therefore, there is no significant uncertainty due to the lack of a dermal absorption for thallium.

Conclusions

The HHRA, data screening results, and uncertainty analysis showed that there are no soil COCs for Site 16.

2.7.1.2 Site 18

Results

The Site 18 COPCs and the screening criteria used to identify them are summarized in Tables 2-11, 2-12, and 2-13 for surface soil and Tables 2-14, 2-15, and 2-16 for subsurface soil. Tables 2-21 and 2-22 present the risk estimates from the BGOURI HHRA for Site 18 under the RME and CTE scenarios, respectively. RAGS Part D Summary of Receptor Risks and Hazards for COPCs tables for Site 18 are included in Appendix D. No COPCs were identified for groundwater; therefore, no ICRs and HIs were calculated for exposures to groundwater.

ICRs for Site 18 ranged from 3.3×10^{-8} for older child residents (CTE) to 3.0×10^{-6} for future child residents (RME). All ICRs for exposures to soil at Site 18 were less than or within EPA's target risk range of 10^{-4} to 10^{-6} and less than CTDEP's acceptable level of 1×10^{-5} for cumulative exposures. Although all ICRs were less than CDTEP's target level for cumulative exposures, chemical-specific ICRs for arsenic (full-time workers, future child residents, and future adult 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 CTDEP RSRs for residential exposures.

All HIs for exposure to soil at Site 18 were less than EPA's and CTDEP's acceptable level of 1.0. HIs for Site 18 ranged from 0.003 for older child residents (CTE) to 0.1 for child residents (RME).

Lead was identified as a COPC in surface soil at Site 18. Lead was detected at a maximum concentration of 430 mg/kg, which exceeds the OSWER soil screening level of 400 mg/kg for residential land use.

EPA’s IEUBK model was used to evaluate exposures to lead in soil by future child residents. As recommended by the model, the average concentration of lead in surface/subsurface soil of 47.6 mg/kg

was used as the exposure point concentration for soil. Default parameters were used for the rest of the model input parameters. The estimated geometric mean blood-lead level for children exposed to lead in surface/subsurface soil was 2.0 µg/dL, which is less than the level of concern of 10 µg/dL. The IEUBK Model estimates that 0.03 percent of children are expected to have blood-lead levels greater than 10 µg/dL. These results indicate that no adverse effects are anticipated for hypothetical future child residents exposed to lead in surface/subsurface soil Site 18.

EPA recommends that exposures to lead by nonresidential adults can be evaluated by use of a slope-factor approach developed by the EPA Technical Review Workgroup for Lead (EPA, 1996b). As recommended by the model, the average concentration of lead in surface soil of 93.7 mg/kg was used for the exposure point concentration. The incidental ingestion rate was assumed to be 100 mg/day, which is the recommended value for contact intensive scenarios. The exposure frequency was assumed to be 150 days/year (full-time workers). Default parameters were used for the rest of the model input parameters. The model estimated that the 95th percentile blood-lead concentration among fetuses born to women having site exposures ranged from 4.5 µg/dl to 7.3 µg/dL, which is less than the acceptable level of 10 µg/dL. The model estimates that the probability that the fetal blood level exceeds 10 µg/dL ranged from 0.1 to 2, percent which is less than the acceptable level of 5 percent, indicating that adverse effects are not anticipated for nonresidential adults exposed to lead in surface soil at the Site 18.

Uncertainty Analysis

The maximum detected concentration was used as the exposure point concentration for exposures to surface soil under the RME scenario since fewer than 10 samples were collected at Site 18. As a result of using the maximum detected concentration, the estimates of risk for exposure to surface soil are most likely to be overstated since it is unlikely that potential receptors would be exposed to the maximum concentration over the entire exposure period.

No dermal absorption value was available for thallium. Consequently, dermal exposures to thallium in soil could not be evaluated. The lack of a dermal absorption value for thallium does not significantly impact the estimated risks. The highest HI for exposures to thallium in soil occurred for a child resident (HI = 0.03) under the RME scenario. The HI would still be less than the acceptable level of 1.0, even with 100 percent dermal absorption of thallium (HI = 0.09). Therefore, there is no significant uncertainty due to the lack of a dermal absorption for thallium.

Conclusions

The maximum detected concentration for antimony in surface soil exceeded its CTDEP mobility criterion. Antimony was not detected in groundwater at Site 18 indicating that antimony is not migrating from soil to

groundwater. Therefore, antimony was not retained as a COC for the soil to groundwater migration pathway for surface soil.

The maximum detected concentration of methylene chloride exceeded its EPA SSL for migration from soil to groundwater but was less than its CTDEP pollutant mobility criteria. The maximum detected concentration of thallium also exceeded its EPA SSL for migration from soil to groundwater. Methylene chloride and thallium were not detected in groundwater at Site 18 indicating that these chemicals are not migrating from soil to groundwater. Therefore, methylene chloride and thallium were not retained as a COCs for the soil to groundwater migration pathway for subsurface soil.

The HHRA, data screening results, and uncertainty analysis showed that there are no soil COCs for Site 18.

2.7.2 Ecological Risk Assessments

Site 16 is adjacent to a hospital and Site 18 is a building. Both sites are in well developed portions of the NSB-NLON. Neither sites nor the areas near the sites represent habitats suitable for supporting a wildlife population. Given the site conditions, it is unlikely that ecological receptors are at risk as a result of any contaminants associated with Sites 16 or 18. No ecological risk assessments were performed at Sites 16 or 18 because there were no ecological issues identified at these sites.

2.8 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for Sites 16 and 18 soil (OU 11) at NSB-NLON, Groton, Connecticut was released for public comment on July 16, 2004. The Proposed Plan identified NFA as the Selected Remedy for the sites. Available information indicates that the media at these sites do not pose any unacceptable risks to human health or the environment.

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 POSITIVE SOIL ANALYTICAL RESULTS FOR SITE 16
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

location	**S16SB01**	**S16SB03**	**S16SB05**	**S16SB06**	**S16SB07**	**S16SB08**	**S16SB08**	**S16SS01**
matrix	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**	**SB**	**SS**
nsample	**S16SB010001-SO**	**S16SB030001-SO**	**S16SB050001-SO**	**S16SB060001-SO**	**S16SB070001-SO**	**S16SB080001-SO**	**S16SB080405-SO**	**S16SS01-SO**
sample	**S16SB010001**	**S16SB030001**	**S16SB050001**	**S16SB060001**	**S16SB070001**	**S16SB080001**	**S16SB080405**	**S16SS01**
top_depth	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**
bottom_dep	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**0**
sample_dat	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/25/2000**
Dioxins/Furans (ng/kg)								
1,2,3,4,6,7,8-HPCDD	21	1.9 U	7	3.1 U	120	20	24	31
1,2,3,4,6,7,8-HPCDF	3	0.41	3.4	0.44	0.21 U	0.33 U	0.5 U	5.4
1,2,3,7,8-PECDF	0.13 U	0.2 U	0.21	0.11 U	0.19 U	0.12 U	0.14 U	0.37 U
2,3,4,7,8-PECDF	0.13 U	0.2 U	0.36	0.11 U	0.19 U	0.12 U	0.14 U	0.38 U
2,3,7,8-TCDF	0.18 U	0.19 U	1.8	0.13 U	0.16 U	0.15 U	0.16 U	0.58 U
OCDD	740	110	240	450	29000	4300	6400	1200 J
OCDF	7.9	0.3 U	2.9	0.24 U	0.25 U	0.13 U	0.18 U	12 J
TOTAL HPCDD	120	1.9 U	20	3.1 U	220	38	43	69
TOTAL HPCDF	3	0.41	3.4	0.69	0.21 U	0.33 U	0.22 U	5.4
TOTAL HXCDF	3.1	0.1 U	2.1	0.2 U	0.14 U	0.16 U	0.14 U	1.1 UJ
TOTAL PECDF	0.13 U	0.2 U	4	0.11 U	0.19 U	0.12 U	0.14 U	2.3
TOTAL TCDD	0.22 U	0.54 J	0.17 U	0.16 U	0.17 U	0.22 U	0.2 U	0.65 UJ
TOTAL TCDF	0.9	0.19 U	2.2	0.13 U	0.16 U	0.15 U	0.16 U	0.58 U
Volatile Organics (ug/kg)								
2-BUTANONE	4 J	5 J	3 J	10 UJ	3 J	4 J	10 UR	12 U
ACETONE	37	51 U	29 U	10 U	67 U	56 U	10 UR	180 J
BROMOMETHANE	5 U	5 UJ	5 U	5 UJ	7 U	5 U	32 J	6 UJ
CHLOROMETHANE	5 U	5 UJ	5 U	5 UJ	7 U	5 U	91 J	6 UJ
TOLUENE	5 U	3 J	1 J	5 UJ	2 J	1 J	4 J	6 UJ
Semivolatile Organics (ug/kg)								
ACENAPHTHYLENE	180 U	170 U	99 J	170 U	190 U	200 U	170 U	44 J
ANTHRACENE	180 U	170 U	850 U	170 U	190 U	200 U	170 U	25 J
BENZO(A)ANTHRACENE	50 J	41 J	410 J	22 J	190 U	200 U	170 U	200
BENZO(A)PYRENE	48 J	41 J	330 J	20 J	190 U	200 U	170 U	200
BENZO(B)FLUORANTHENE	50 J	54 J	260 J	170 U	190 U	200 U	170 U	200
BENZO(G,H,I)PERYLENE	67 J	60 J	360 J	24 J	190 U	200 U	170 U	150 J
BENZO(K)FLUORANTHENE	39 J	48 J	280 J	170 U	190 U	200 U	170 U	200
BENZOIC ACID								180 J
BUTYL BENZYL PHTHALATE	180 U	170 U	850 U	20 J	200 U	200 U	180 U	190 U
CHRYSENE	67 J	63 J	520 J	26 J	190 U	200 U	170 U	260
DIBENZO(A,H)ANTHRACENE	180 UJ	170 U	850 UJ	170 U	190 U	200 U	170 U	49 J
FLUORANTHENE	99 J	100 J	630 J	41 J	190 U	200 U	170 U	360
INDENO(1,2,3-CD)PYRENE	52 J	51 J	280 J	20 J	190 U	200 U	170 U	130 J
PHENANTHRENE	44 J	46 J	230 J	35 J	190 U	200 U	170 U	120 J
PYRENE	91 J	98 J	720 J	47 J	190 U	200 U	170 U	370

TABLE 2-1

SUMMARY OF POSITIVE SOIL ANALYTICAL RESULTS FOR SITE 16
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

location	**S16SB01**	**S16SB03**	**S16SB05**	**S16SB06**	**S16SB07**	**S16SB08**	**S16SB08**	**S16SS01**
matrix	**SS**	**SS**	**SS**	**SS**	**SS**	**SS**	**SB**	**SS**
nsample	**S16SB010001-SO**	**S16SB030001-SO**	**S16SB050001-SO**	**S16SB060001-SO**	**S16SB070001-SO**	**S16SB080001-SO**	**S16SB080405-SO**	**S16SS01-SO**
sample	**S16SB010001**	**S16SB030001**	**S16SB050001**	**S16SB060001**	**S16SB070001**	**S16SB080001**	**S16SB080405**	**S16SS01**
top_depth	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**
bottom_dep	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**0**
sample_dat	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/25/2000**
Pesticides/PCBs (ug/kg)								
4,4'-DDD	1.4 U	1.4 U	1.4 U	1.4 UJ	2.4	1.6 U	1.4 U	0.76 U
4,4'-DDE	1.4 U	1.4 U	1.4 U	1.4 UJ	4.7 J	1.6 U	1.4 U	2.2 J
4,4'-DDT	2.7 J	1.4 U	1.5 J	1.4 UJ	4.1	1.6 U	1.4 U	10 R
ALPHA-CHLORDANE	0.74 U	0.74 U	0.72 U	0.73 UJ	0.51 J	0.85 U	0.74 U	0.39 U
AROCLOR-1248	7.3 U	7.3 U	7 U	7.2 UJ	6 J	8.3 U	7.3 U	7.7 U
GAMMA-CHLORDANE	0.74 U	0.74 U	0.72 U	0.73 UJ	4.2	0.85 U	0.74 U	0.39 U
Inorganics (mg/kg)								
ALUMINUM	5600	4400	4600	8900	21000	17000	8100	8900
ANTIMONY	0.48 UJ	0.57 UJ	0.56 UJ	0.54 UJ	0.71 J	0.6 UJ	0.54 UJ	1 U
ARSENIC	3.6	1.7	2.5	2.5	5.2	4.2	4.4	8.5
BARIUM	41	27	34	41	37	29	34	47
BERYLLIUM	0.23 J	0.35 U	0.27	0.59 U	0.7 U	0.74 U	0.38 U	0.36 U
CALCIUM	1300	660 J	1000	47000 J	1000 J	560 J	1500 J	2100
CHROMIUM	9.7 U	4.9	8.9 U	14	22	23	15	14
COBALT	6	4.6 U	4.9	4.8 U	8 U	9.1 U	6.2 U	7.8
COPPER	13 J	7.3	11 J	12	12	14	14	200
IRON	8400	5600 J	6700	9500 J	18000 J	16000 J	10000 J	16000
LEAD	3.9	3.5	35	5.1	12	4	3.8	16
MAGNESIUM	2200	1500	1900	3200	2800	3900	2500	2500
MANGANESE	130	120 J	200	140 J	100 J	120 J	180 J	400
NICKEL	7.1	5.1 U	6.2	8.7 U	11 U	13 U	10 U	38
POTASSIUM	1600	1100	1400	1600	670	900	1200	1700
SILVER	2 J	1.3 J	2.2	2.2 J	4.9	4.2	2.6	4.9
SODIUM	76 U	41 U	62 U	210	180 U	160 U	130 U	60 U
THALLIUM	0.65 J	0.53 J	0.44 U	0.49 J	0.54 J	0.63 J	0.44 J	1.2 J
VANADIUM	16	11	13	21	40	34	20	24 U
ZINC	24	61	26	48	43	25	18 U	1300

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-2

SUMMARY OF SPLP SAMPLING AND ANALYTICAL PROGRAM FOR SITE 16
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

location	**S16SB01**	**S16SB03**	**S16SB05**	**S16SB06**	**S16SB07**	**S16SB08**	**S16SB08**	**S16SS01**
matrix	**SPLP**	**SPLP**	**SPLP**	**SPLP**	**SPLP**	**SPLP**	**SPLP**	**SPLP**
nsample	**S16SB010001-SO-P**	**S16SB030001-SO-P**	**S16SB050001-SO-P**	**S16SB060001-SO-P**	**S16SB070001-SO-P**	**S16SB080001-SO-P**	**S16SB080405-SO-P**	**S16SS01-SO-P**
sample	**S16SB010001**	**S16SB030001**	**S16SB050001**	**S16SB060001**	**S16SB070001**	**S16SB080001**	**S16SB080405**	**S16SS01**
top_depth	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**
bottom_dep	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**0**
sample_dat	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/13/2000**	**6/25/2000**
PCBs (ug/L)								
AROCLOR-1016	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U
AROCLOR-1221	4 U	4 U	4 U	4 U	4 U	4 U	4 U	1.6 U
AROCLOR-1232	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U
AROCLOR-1242	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U
AROCLOR-1248	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U
AROCLOR-1254	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U
AROCLOR-1260	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.8 U
Total Metals (ug/L)								
ALUMINUM	760	760	640	500	1200	66 U	66 U	370 U
ANTIMONY	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.6 U
ARSENIC	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	2.3 U
BARIUM	210 U	170 U	180 U	79 U	210 U	210 U	190 U	200 U
BERYLLIUM	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.72 U
CADMIUM	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.64 U
CALCIUM	1300 J	870 U	840 J	26000 J	1500 U	1200 U	2700 U	2500 U
CHROMIUM	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	7.1 J
COBALT	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	4.2 U
COPPER	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	34
IRON	540	510	490	84 U	800	22 U	22 U	650
LEAD	2.1 U	2.1 U	2.5 J	2.1 U	2.1 U	2.1 U	2.1 U	3.1 J
MAGNESIUM	280	210	240	270	200	210	150	530
MANGANESE	8.7	16 U	16	3.5 U	3.9 U	19	24	24 U
MERCURY	0.14 U	0.16 U	0.15 U	0.17 U	0.19 U	0.17 U	0.16 U	0.12 U
NICKEL	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	9.2 U
POTASSIUM	780 U	1100 U	610 U	2100 U	540 U	620 U	360 U	1700
SELENIUM	2.7 U	2.7 U	2.7 U	4 U	2.8 U	2.7 U	2.7 U	2.8 U
SILVER	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	5.2 U
SODIUM	3900 U	3700 U	3700 U	5700 U	6800 U	6200 U	5200 U	1500 U
THALLIUM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	3 U
VANADIUM	4.8 J	4.4 U	4.4 U	21	4.4 U	4.4 U	4.4 U	6.3 U
ZINC	24 U	45 U	32 U	23 U	42 U	46 U	25 U	360 U

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-3

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT SITE 16
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Hospital Incinerator (Site 16)

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 COC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COC Flag	Rationale for Contaminant Deletion or Selection(6)
Dioxins/Furans																	
35822-46-9	1,2,3,4,6,7,8-HPCDD	0.000007		0.00012		mg/kg	S16SB070001	5/7	0.0000019 - 0.0000031	1.2E-04	NA	3.9E-04	C	NA	SSL-INH CTRESSOIL	NO	BSL
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.00000041		0.0000054		mg/kg	S16SS01	5/7	0.00000021 - 0.00000033	5.4E-06	NA	3.9E-04	C	NA	SSL-INH CTRESSOIL	NO	BSL
57117-41-6	1,2,3,7,8-PECDF	0.00000021		0.00000021		mg/kg	S16SB050001	1/7	0.00000011 - 0.00000037	2.1E-07	NA	7.8E-05	C	NA	SSL-INH CTRESSOIL	NO	BSL
57117-31-4	2,3,4,7,8-PECDF	0.00000036		0.00000036		mg/kg	S16SB050001	1/7	0.00000011 - 0.00000038	3.6E-07	NA	7.8E-06	C	NA	SSL-INH CTRESSOIL	NO	BSL
51207-31-9	2,3,7,8-TCDF	0.0000018		0.0000018		mg/kg	S16SB050001	1/7	0.00000013 - 0.00000058	1.8E-06	NA	3.9E-05	C	NA	SSL-INH CTRESSOIL	NO	BSL
3268-87-9	OCDD	0.00011		0.029		mg/kg	S16SB070001	7/7	---	2.9E-02	NA	3.9E-02	C	NA	SSL-INH CTRESSOIL	NO	BSL
39001-02-0	OCDF	0.0000029		0.000012	J	mg/kg	S16SS01	3/7	0.00000013 - 0.0000003	1.2E-05	NA	3.9E-02	C	NA	SSL-INH CTRESSOIL	NO	BSL
37871-00-4	TOTAL HPCDD	0.00002		0.00022		mg/kg	S16SB070001	5/7	0.0000019 - 0.0000031	2.2E-04	NA	NA		NA	SSL-INH CTRESSOIL	NO	NTX
38998-75-3	TOTAL HPCDF	0.00000041		0.0000054		mg/kg	S16SS01	5/7	0.00000021 - 0.00000033	5.4E-06	NA	NA		NA	SSL-INH CTRESSOIL	NO	NTX
55684-94-1	TOTAL HXCDF	0.0000021		0.0000031		mg/kg	S16SB010001	2/7	0.0000001 - 0.0000011	3.1E-06	NA	NA		NA	SSL-INH CTRESSOIL	NO	NTX
30402-15-4	TOTAL PECDF	0.0000023		0.000004		mg/kg	S16SB050001	2/7	0.00000011 - 0.0000002	4.0E-06	NA	NA		NA	SSL-INH CTRESSOIL	NO	NTX
41903-57-5	TOTAL TCDD	0.00000054	J	0.00000054	J	mg/kg	S16SB030001	1/7	0.00000016 - 0.00000065	5.4E-07	NA	NA		NA	SSL-INH CTRESSOIL	NO	NTX
55722-27-5	TOTAL TCDF	0.0000009		0.0000022		mg/kg	S16SB050001	2/7	0.00000013 - 0.00000058	2.2E-06	NA	NA		NA	SSL-INH CTRESSOIL	NO	NTX
Volatile Organics																	
78-93-3	2-BUTANONE	0.003	J	0.005	J	mg/kg	S16SB030001	5/7	0.01 - 0.012	0.005	NA	730	N	NA 500	SSL-INH CTRESSOIL	NO	BSL
67-64-1	ACETONE	0.037		0.18	J	mg/kg	S16SS01	2/7	0.01 - 0.067	0.18	NA	160	N	100000 500	SSL-INH CTRESSOIL	NO	BSL
108-88-3	TOLUENE	0.001	J	0.003	J	mg/kg	S16SB030001	4/7	0.005 - 0.006	0.003	NA	52	N	650 500	SSL-INH CTRESSOIL	NO	BSL
Semivolatile Organics																	
208-96-8	ACENAPHTHYLENE	0.044	J	0.099	J	mg/kg	S16SB050001	2/7	0.17 - 0.2	0.099	NA	370 (7)	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
120-12-7	ANTHRACENE	0.025	J	0.025	J	mg/kg	S16SS01	1/7	0.17 - 0.85	0.025	NA	2200	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
56-55-3	BENZO(A)ANTHRACENE	0.022	J	0.41	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.41	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
50-32-8	**BENZO(A)PYRENE**	0.02	J	0.33	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.33	NA	**0.062**	C	NA 1	SSL-INH CTRESSOIL	**YES**	ASL
205-99-2	BENZO(B)FLUORANTHENE	0.05	J	0.26	J	mg/kg	S16SB050001	4/7	0.17 - 0.2	0.26	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.024	J	0.36	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.36	NA	230 (8)	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.039	J	0.28	J	mg/kg	S16SB050001	4/7	0.17 - 0.2	0.28	NA	6.2	C	NA 8.4	SSL-INH CTRESSOIL	NO	BSL

TABLE 2-3

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT SITE 16
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Hospital Incinerator (Site 16)

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 COC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COC Flag	Rationale for Contaminant Deletion or Selection(6)
65-85-0	BENZOIC ACID	0.18	J	0.18	J	mg/kg	S16SS01	1/1	---	0.18	NA	10000	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
85-68-7	BUTYL BENZYL PHTHALATE	0.02	J	0.02	J	mg/kg	S16SB060001	1/7	0.17 - 0.85	0.02	NA	1200	N	930 1000	SSL-INH CTRESSOIL	NO	BSL
218-01-9	CHRYSENE	0.026	J	0.52	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.52	NA	62	C	NA 84	SSL-INH CTRESSOIL	NO	BSL
53-70-3	DIBENZO(A,H)ANTHRACENE	0.049	J	0.049	J	mg/kg	S16SS01	1/7	0.17 - 0.85	0.049	NA	0.062	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
206-44-0	FLUORANTHENE	0.041	J	0.63	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.63	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.02	J	0.28	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.28	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PHENANTHRENE	0.035	J	0.23	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.23	NA	230 (8)	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
129-00-0	PYRENE	0.047	J	0.72	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.72	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
Pesticides/PCBs																	
72-54-8	4,4'-DDD	0.0024		0.0024		mg/kg	S16SB070001	1/7	0.00076 - 0.0016	0.0024	NA	2.4	C	NA 2.6	SSL-INH CTRESSOIL	NO	BSL
72-55-9	4,4'-DDE	0.0022	J	0.0047	J	mg/kg	S16SB070001	2/7	0.0014 - 0.0016	0.0047	NA	1.7	C	NA 1.8	SSL-INH CTRESSOIL	NO	BSL
50-29-3	4,4'-DDT	0.0015	J	0.0041		mg/kg	S16SB070001	3/6	0.0014 - 0.0016	0.0041	NA	1.7	C	NA 1.8	SSL-INH CTRESSOIL	NO	BSL
5103-71-9	ALPHA-CHLORDANE	0.00051	J	0.00051	J	mg/kg	S16SB070001	1/7	0.00039 - 0.00085	0.00051	NA	1.6	C	20 0.49	SSL-INH CTRESSOIL	NO	BSL
12672-29-6	AROCLOR-1248	0.006	J	0.006	J	mg/kg	S16SB070001	1/7	0.007 - 0.0083	0.006	NA	0.22	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
12789-03-6	GAMMA-CHLORDANE	0.0042		0.0042		mg/kg	S16SB070001	1/7	0.00039 - 0.00085	0.0042	NA	1.6	C	20 0.49	SSL-INH CTRESSOIL	NO	BSL
Inorganics																	
7429-90-5	ALUMINUM	4400		21000		mg/kg	S16SB070001	7/7	---	21000	**17600**	**7600**	N	NA NA	SSL-INH CTRESSOIL	NO	EPAI
7440-36-0	ANTIMONY	0.71	J	0.71	J	mg/kg	S16SB070001	1/7	0.48 - 1	0.71	2.05	3.1	N	NA 27	SSL-INH CTRESSOIL	NO	BSL, BKG
7440-38-2	**ARSENIC**	1.7		8.5		mg/kg	S16SS01	7/7	---	8.5	**3.6**	**0.39**	C	750 10	SSL-INH CTRESSOIL	**YES**	ASL
7440-39-3	BARIUM	27		47		mg/kg	S16SS01	7/7	---	47	**39**	540	N	690000 4700	SSL-INH CTRESSOIL	NO	BSL
7440-41-7	BERYLLIUM	0.23	J	0.27		mg/kg	S16SB050001	2/7	0.35 - 0.74	0.27	0.72	15	N	1300 2	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-70-2	CALCIUM	560	J	47000	J	mg/kg	S16SB060001	7/7	---	47000	**314**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-47-3	CHROMIUM	4.9		23		mg/kg	S16SB080001	5/7	8.9 - 9.7	23	**19.3**	30 (9)	C	270 100	SSL-INH CTRESSOIL	NO	BSL
7440-48-4	COBALT	4.9		7.8		mg/kg	S16SS01	3/7	4.6 - 9.1	7.8	**7**	470	N	NA NA	SSL-INH CTRESSOIL	NO	BSL
7440-50-8	COPPER	7.3		200		mg/kg	S16SS01	7/7	---	200	**17.9**	290	N	NA 2500	SSL-INH CTRESSOIL	NO	BSL
7439-89-6	IRON	5600	J	18000	J	mg/kg	S16SB070001	7/7	---	18000	**16800**	**2300**	N	NA NA	SSL-INH CTRESSOIL	NO	EPAI
7439-92-1	LEAD	3.5		35		mg/kg	S16SB050001	7/7	---	35	**17.5**	400 (10)	N	NA 500	SSL-INH CTRESSOIL	NO	BSL
7439-95-4	MAGNESIUM	1500		3900		mg/kg	S16SB080001	7/7	---	3900	**2460**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT

TABLE 2-3

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT SITE 16
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Hospital Incinerator (Site 16)

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 COC Screening Level(5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COC Flag	Rationale for Contaminant Deletion or Selection(6)
7439-96-5	**MANGANESE**	100	J	400		mg/kg	S16SS01	7/7	---	400	**172**	**180** N	NA NA	SSL-INH CTRESSOIL	**YES**	ASL
7440-02-0	NICKEL	6.2		38		mg/kg	S16SS01	3/7	5.1 - 13	38	**5**	160 N	13000 1400	SSL-INH CTRESSOIL	NO	BSL
7440-09-7	POTASSIUM	670		1700		mg/kg	S16SS01	7/7	---	1700	**669**	NA	NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-22-4	SILVER	1.3	J	4.9		mg/kg	S16SB070001, S16SS01	7/7	---	4.9	**0.385**	39 N	NA 340	SSL-INH CTRESSOIL	NO	BSL
7440-23-5	SODIUM	210		210		mg/kg	S16SB060001	1/7	41 - 180	210	**16.56**	NA	NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-28-0	**THALLIUM**	0.49	J	1.2	J	mg/kg	S16SS01	6/7	0.44	1.2	**0.105**	**0.52** N	NA 5.4	SSL-INH CTRESSOIL	**YES**	ASL
7440-62-2	VANADIUM	11		40		mg/kg	S16SB070001	6/7	24	40	**33.3**	55 N	NA 470	SSL-INH CTRESSOIL	NO	BSL
7440-66-6	ZINC	24		1300		mg/kg	S16SS01	7/7	---	1300	**25.6**	2300 N	NA 20000	SSL-INH CTRESSOIL	NO	BSL

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC .

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 COC.
5 The risk-based COC 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 COC if the maximum detected concentration exceeds the risk-based COC screening level and/or an ARAR/TBC(s).
7 Acenaphthene is used as a surrogate for acenaphthylene.
8 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
9 Hexavalent Chromium.
10 OSWER soil screening level for residential land use (EPA, 1994).

Associated Samples:

S16SB010001	S16SB070001
S16SB030001	S16SB080001
S16SB050001	S16SS01
S16SB060001	

Definitions:

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

Rationale Codes:

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

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

TABLE 2-4

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT SITE 16
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Hospital Incinerator (Site 16)

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)
Dioxins/Furans																
35822-46-9	**1,2,3,4,6,7,8-HPCDD**	0.000007		0.00012		mg/kg	S16SB070001	5/7	0.0000019 - 0.0000031	1.2E-04	NA	5.60E-04	**4.67E-06** (8)	NA	**YES**	ASL
67562-39-4	**1,2,3,4,6,7,8-HPCDF**	0.00000041		0.0000054		mg/kg	S16SS01	5/7	0.00000021 - 0.00000033	5.4E-06	NA	5.60E-04	**4.67E-06** (8)	NA	**YES**	ASL
57117-41-6	1,2,3,7,8-PECDF	0.00000021		0.00000021		mg/kg	S16SB050001	1/7	0.00000011 - 0.00000037	2.1E-07	NA	1.12E-04	9.34E-07 (8)	NA	NO	BSL
57117-31-4	**2,3,4,7,8-PECDF**	0.00000036		0.00000036		mg/kg	S16SB050001	1/7	0.00000011 - 0.00000038	3.6E-07	NA	1.12E-05	**9.34E-08** (8)	NA	**YES**	ASL
51207-31-9	**2,3,7,8-TCDF**	0.0000018		0.0000018		mg/kg	S16SB050001	1/7	0.00000013 - 0.00000058	1.8E-06	NA	5.60E-05	**4.67E-07** (8)	NA	**YES**	ASL
3268-87-9	**OCDD**	0.00011		0.029		mg/kg	S16SB070001	7/7	---	2.9E-02	NA	5.60E-02	**4.67E-04** (8)	NA	**YES**	ASL
39001-02-0	OCDF	0.0000029		0.000012	J	mg/kg	S16SS01	3/7	0.00000013 - 0.0000003	1.2E-05	NA	5.60E-02	4.67E-04 (8)	NA	NO	BSL
37871-00-4	TOTAL HPCDD	0.00002		0.00022		mg/kg	S16SB070001	5/7	0.0000019 - 0.0000031	2.2E-04	NA	NA	NA	NA	NO	NTX
38998-75-3	TOTAL HPCDF	0.00000041		0.0000054		mg/kg	S16SS01	5/7	0.00000021 - 0.00000033	5.4E-06	NA	NA	NA	NA	NO	NTX
55684-94-1	TOTAL HXCDF	0.0000021		0.0000031		mg/kg	S16SB010001	2/7	0.0000001 - 0.0000011	3.1E-06	NA	NA	NA	NA	NO	NTX
30402-15-4	TOTAL PECDF	0.0000023		0.000004		mg/kg	S16SB050001	2/7	0.00000011 - 0.0000002	4.0E-06	NA	NA	NA	NA	NO	NTX
41903-57-5	TOTAL TCDD	0.00000054	J	0.00000054	J	mg/kg	S16SB030001	1/7	0.00000016 - 0.00000065	5.4E-07	NA	NA	NA	NA	NO	NTX
55722-27-5	TOTAL TCDF	0.0000009		0.0000022		mg/kg	S16SB050001	2/7	0.00000013 - 0.00000058	2.2E-06	NA	NA	NA	NA	NO	NTX
Volatile Organics																
78-93-3	2-BUTANONE	0.003	J	0.005	J	mg/kg	S16SB030001	5/7	0.01 - 0.012	0.005	NA	NA	80	2400	NO	BSL
67-64-1	ACETONE	0.037		0.18	J	mg/kg	S16SS01	2/7	0.01 - 0.067	0.18	NA	16	140	2400	NO	BSL
108-88-3	TOLUENE	0.001	J	0.003	J	mg/kg	S16SB030001	4/7	0.005 - 0.006	0.003	NA	12	67	760	NO	BSL
Semivolatile Organics																
208-96-8	ACENAPHTHYLENE	0.044	J	0.099	J	mg/kg	S16SB050001	2/7	0.17 - 0.2	0.099	NA	NA	84	NA	NO	BSL
120-12-7	ANTHRACENE	0.025	J	0.025	J	mg/kg	S16SS01	1/7	0.17 - 0.85	0.025	NA	12000	400	NA	NO	BSL
56-55-3	BENZO(A)ANTHRACENE	0.022	J	0.41	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.41	NA	2	1	NA	NO	BSL
50-32-8	BENZO(A)PYRENE	0.02	J	0.33	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.33	NA	8	1	NA	NO	BSL
205-99-2	BENZO(B)FLUORANTHENE	0.05	J	0.26	J	mg/kg	S16SB050001	4/7	0.17 - 0.2	0.26	NA	NA	1	NA	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.024	J	0.36	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.36	NA	4200(9)	42	NA	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.039	J	0.28	J	mg/kg	S16SB050001	4/7	0.17 - 0.2	0.28	NA	49	1	NA	NO	BSL
65-85-0	BENZOIC ACID	0.18	J	0.18	J	mg/kg	S16SS01	1/1	---	0.18	NA	400	10000	NA	NO	BSL
85-68-7	BUTYL BENZYL PHTHALATE	0.02	J	0.02	J	mg/kg	S16SB060001	1/7	0.17 - 0.85	0.02	NA	930	NA	NA	NO	BSL
218-01-9	CHRYSENE	0.026	J	0.52	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.52	NA	160	1	NA	NO	BSL
53-70-3	DIBENZO(A,H)ANTHRACENE	0.049	J	0.049	J	mg/kg	S16SS01	1/7	0.17 - 0.85	0.049	NA	2	1	NA	NO	BSL
206-44-0	FLUORANTHENE	0.041	J	0.63	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.63	NA	4300	56	NA	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.02	J	0.28	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.28	NA	14	1	NA	NO	BSL
85-01-8	PHENANTHRENE	0.035	J	0.23	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.23	NA	4200(9)	40	NA	NO	BSL
129-00-0	PYRENE	0.047	J	0.72	J	mg/kg	S16SB050001	5/7	0.19 - 0.2	0.72	NA	4200	40	NA	NO	BSL
Pesticides/PCBs																
72-54-8	4,4'-DDD	0.0024		0.0024		mg/kg	S16SB070001	1/7	0.00076 - 0.0016	0.0024	NA	16	NA	NA	NO	BSL
72-55-9	4,4'-DDE	0.0022	J	0.0047	J	mg/kg	S16SB070001	2/7	0.0014 - 0.0016	0.0047	NA	54	NA	NA	NO	BSL
50-29-3	4,4'-DDT	0.0015	J	0.0041		mg/kg	S16SB070001	3/6	0.0014 - 0.0016	0.0041	NA	32	NA	NA	NO	BSL
5103-71-9	ALPHA-CHLORDANE	0.00051	J	0.00051	J	mg/kg	S16SB070001	1/7	0.00039 - 0.00085	0.00051	NA	10	0.066	NA	NO	BSL
12672-29-6	**AROCLOR-1248**	0.006	J	0.006	J	mg/kg	S16SB070001	1/7	0.007 - 0.0083	0.006	NA	NA	**0.005**	NA	**YES**	ASL
12789-03-6	GAMMA-CHLORDANE	0.0042		0.0042		mg/kg	S16SB070001	1/7	0.00039 - 0.00085	0.0042	NA	10	0.066	NA	NO	BSL
Inorganics																
7429-90-5	ALUMINUM	4400		21000		mg/kg	S16SB070001	7/7	---	21000	**17600**	NA	NA(10)	NA	NO	NTX
7440-36-0	ANTIMONY	0.71	J	0.71	J	mg/kg	S16SB070001	1/7	0.48 - 1	0.71	2.05	5	NA(10)	NA	NO	BSL
7440-38-2	ARSENIC	1.7		8.5		mg/kg	S16SS01	7/7	---	8.5	**3.6**	29	NA(10)	NA	NO	BSL
7440-39-3	BARIUM	27		47		mg/kg	S16SS01	7/7	---	47	**39**	1600	NA(10)	NA	NO	BSL
7440-41-7	BERYLLIUM	0.23	J	0.27		mg/kg	S16SB050001	2/7	0.35 - 0.74	0.27	0.72	63	NA(10)	NA	NO	BSL,BKG
7440-70-2	CALCIUM	560	J	47000	J	mg/kg	S16SB060001	7/7	---	47000	**314**	NA	NA(10)	NA	NO	NUT
7440-47-3	CHROMIUM	4.9		23		mg/kg	S16SB080001	5/7	8.9 - 9.7	23	**19.3**	38	NA(10)	NA	NO	BSL
7440-48-4	COBALT	4.9		7.8		mg/kg	S16SS01	3/7	4.6 - 9.1	7.8	**7**	NA	NA(10)	NA	NO	NTX
7440-50-8	COPPER	7.3		200		mg/kg	S16SS01	7/7	---	200	**17.9**	NA	NA(10)	NA	NO	NTX
7439-89-6	IRON	5600	J	18000	J	mg/kg	S16SB070001	7/7	---	18000	**16800**	NA	NA(10)	NA	NO	BKG
7439-92-1	LEAD	3.5		35		mg/kg	S16SB050001	7/7	---	35	**17.5**	NA	NA(10)	NA	NO	NTX
7439-95-4	MAGNESIUM	1500		3900		mg/kg	S16SB080001	7/7	---	3900	**2460**	NA	NA(10)	NA	NO	NUT
7439-96-5	MANGANESE	100	J	400		mg/kg	S16SS01	7/7	---	400	**172**	NA	NA(10)	NA	NO	NTX

TABLE 2-4

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT SITE 16
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Hospital Incinerator (Site 16)

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)
7440-02-0	NICKEL	6.2		38		mg/kg	S16SS01	3/7	5.1 - 13	38	**5**	130	NA(10)	NA	NO	BSL
7440-09-7	POTASSIUM	670		1700		mg/kg	S16SS01	7/7	---	1700	**669**	NA	NA(10)	NA	NO	NUT
7440-22-4	SILVER	1.3	J	4.9		mg/kg	S16SB070001, S16SS01	7/7	---	4.9	**0.385**	34	NA(10)	NA	NO	BSL
7440-23-5	SODIUM	210		210		mg/kg	S16SB060001	1/7	41 - 180	210	**16.56**	NA	NA(10)	NA	NO	NUT
7440-28-0	**THALLIUM**	0.49	J	1.2	J	mg/kg	S16SS01	6/7	0.44	1.2	**0.105**	**0.7**	NA(10)	NA	**YES**	ASL
7440-62-2	VANADIUM	11		40		mg/kg	S16SB070001	6/7	24	40	**33.3**	6000	NA(10)	NA	NO	BSL
7440-66-6	ZINC	24		1300		mg/kg	S16SS01	7/7	---	1300	**25.6**	12000	NA(10)	NA	NO	BSL

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC .

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 COC.
5 EPA Soil Screening Level Guidance, 1996a.
6 CTDEP Remediation Standard Regulations, 1996.
7 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level and/or an ARAR/TBC(s).
8 TtNUS, 1999. Toxicity criteria not available. Toxicity criteria for 2,3,7,8-TCDD used in conjunction with toxicity equivalent factor (TEF) (EPA, 1989) to calculate a value.
9 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene
10 See Table 2-13.

Associated Samples:

S16SB010001	S16SB070001
S16SB030001	S16SB080001
S16SB050001	S16SS01
S16SB060001	

Definitions:

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

Rationale Codes:

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

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

TABLE 2-5

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT SITE 16
MIGRATION PATHWAYS - SPLP RESULTS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Hospital Incinerator (Site 16)

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)	CTDEP Mobility Criteria	COPC Flag	Rationale for Contaminant Deletion or Selection(5)
Inorganics														
7429-90-5	ALUMINUM	500		1200		ug/L	S16SB070001-SO-P	5/7	66 - 370	1200	NA	NA	NO	BSL
7440-70-2	CALCIUM	840	J	26000	J	ug/L	S16SB060001-SO-P	3/7	870 - 2500	26000	NA	NA	NO	NTX
7440-47-3	**CHROMIUM**	7.1	J	7.1	J	ug/L	S16SS01-SO-P	1/7	8.4	7.1	NA	**0.5**	**YES**	ASL
7440-50-8	**COPPER**	34		34		ug/L	S16SS01-SO-P	1/7	5.4	34	NA	**13**	**YES**	ASL
7439-89-6	IRON	490		800		ug/L	S16SB070001-SO-P	5/7	22 - 84	800	NA	NA	NO	NTX
7439-92-1	**LEAD**	2.5	J	3.1	J	ug/L	S16SS01-SO-P	2/7	2.1	3.1	NA	**0.15**	**YES**	ASL
7439-95-4	MAGNESIUM	200		530		ug/L	S16SS01-SO-P	7/7	---	530	NA	NA	NO	NTX
7439-96-5	MANGANESE	8.7		19		ug/L	S16SB080001-SO-P	3/7	3.5 - 24	19	NA	NA	NO	NTX
7440-09-7	POTASSIUM	1700		1700		ug/L	S16SS01-SO-P	1/7	540 - 2100	1700	NA	NA	NO	NTX
7440-62-2	**VANADIUM**	4.8	J	21		ug/L	S16SB060001-SO-P	2/7	4.4 - 6.3	21	NA	**0.5**	**YES**	ASL

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC .

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 SPLP analysis was not performed on background samples.
5 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level.

Associated Samples:

S16SB010001-SO-P
S16SB030001-SO-P
S16SB050001-SO-P
S16SB060001-SO-P
S16SB070001-SO-P
S16SB080001-SO-P
S16SS01-SO-P

Definitions:

C = Carcinogen
COC = Chemical of Concern
J = Estimated Value
N = Noncarcinogen
NA = Not Applicable

Rationale Codes:

For Selection as a COC:
ASL = Above COC Screening Level

For Elimination as a COC:
NTX = No criteria available

TABLE 2-6

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOIL AT SITE 16
DIRECT CONTACT EXPOSURE PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Hospital Incinerator (Site 16)

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)
Dioxins/Furans																	
35822-46-9	1,2,3,4,6,7,8-HPCDD	0.000024		0.000024		mg/kg	S16SB080405-SO	1/1	---	0.000024	NA	0.00039	C	NA NA	SSL-INH CTRESSOIL	NO	BSL
3268-87-9	OCDD	0.0064		0.0064		mg/kg	S16SB080405-SO	1/1	---	0.0064	NA	0.039	C	NA NA	SSL-INH CTRESSOIL	NO	BSL
37871-00-4	TOTAL HPCDD	0.000043		0.000043		mg/kg	S16SB080405-SO	1/1	---	0.000043	NA	NA		NA NA	SSL-INH CTRESSOIL	NO	NTX
Volatile Organics																	
74-83-9	BROMOMETHANE	0.032	J	0.032	J	mg/kg	S16SB080405-SO	1/1	---	0.032	NA	3.9		10 95	SSL-INH CTRESSOIL	NO	BSL
74-87-3	CHLOROMETHANE	0.091	J	0.091	J	mg/kg	S16SB080405-SO	1/1	---	0.091	NA	1.2		NA 47	SSL-INH CTRESSOIL	NO	BSL
108-88-3	TOLUENE	0.004	J	0.004	J	mg/kg	S16SB080405-SO	1/1	---	0.004	NA	52	N	650 500	SSL-INH CTRESSOIL	NO	BSL
Inorganics																	
7429-90-5	ALUMINUM	8100		8100		mg/kg	S16SB080405-SO	1/1	---	8100	17600	**7600**	N	NA NA	SSL-INH CTRESSOIL	NO	BKG, EPAI
7440-38-2	**ARSENIC**	4.4		4.4		mg/kg	S16SB080405-SO	1/1	---	4.4	**3.6**	**0.39**	C	750 10	SSL-INH CTRESSOIL	**YES**	ASL
7440-39-3	BARIUM	34		34		mg/kg	S16SB080405-SO	1/1	---	34	57.2	540	N	690000 4700	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-70-2	CALCIUM	1500	J	1500	J	mg/kg	S16SB080405-SO	1/1	---	1500	**499**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-47-3	CHROMIUM	15		15		mg/kg	S16SB080405-SO	1/1	---	15	21.5	30(7)	C	270 100	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-50-8	COPPER	14		14		mg/kg	S16SB080405-SO	1/1	---	14	25.6	290	N	NA 2500	SSL-INH CTRESSOIL	NO	BSL,BKG
7439-89-6	IRON	10000	J	10000	J	mg/kg	S16SB080405-SO	1/1	---	10000	17200	**2300**	N	NA NA	SSL-INH CTRESSOIL	NO	BKG, EPAI
7439-92-1	LEAD	3.8		3.8		mg/kg	S16SB080405-SO	1/1	---	3.8	17.5	400(8)	N	NA 500	SSL-INH CTRESSOIL	NO	BSL,BKG
7439-95-4	MAGNESIUM	2500		2500		mg/kg	S16SB080405-SO	1/1	---	2500	3650	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7439-96-5	MANGANESE	180	J	180	J	mg/kg	S16SB080405-SO	1/1	---	180	188	180	N	NA NA	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-09-7	POTASSIUM	1200		1200		mg/kg	S16SB080405-SO	1/1	---	1200	2580	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-22-4	SILVER	2.6		2.6		mg/kg	S16SB080405-SO	1/1	---	2.6	**0.385**	39	N	NA 340	SSL-INH CTRESSOIL	NO	BSL
7440-28-0	THALLIUM	0.44	J	0.44	J	mg/kg	S16SB080405-SO	1/1	---	0.44	**0.29**	0.52	N	NA 5.4	SSL-INH CTRESSOIL	NO	BSL
7440-62-2	VANADIUM	20		20		mg/kg	S16SB080405-SO	1/1	---	20	35.1	55	N	NA 470	SSL-INH CTRESSOIL	NO	BSL,BKG

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 .

TABLE 2-6

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOIL AT SITE 16
DIRECT CONTACT EXPOSURE PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

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 COC.
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 COC if the maximum detected concentration exceeds the risk-based COC screening level and/or an ARAR/TBC(s).
7 Hexavalent Chromium.
8 OSWER soil screening level for residential land use (EPA, 1994).

Associated Samples:
S16SB080405-SO

Definitions:

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

Rationale Codes:

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

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

TABLE 2-7

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOIL AT SITE 16
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Hospital Incinerator (Site 16)

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)
Dioxins/Furans																
35822-46-9	**1,2,3,4,6,7,8-HPCDD**	0.000024		0.000024		mg/kg	S16SB080405-SO	1/1	---	2.4E-05	NA	5.60E-04	**4.67E-06** (8)	NA	**YES**	ASL
3268-87-9	**OCDD**	0.0064		0.0064		mg/kg	S16SB080405-SO	1/1	---	6.4E-03	NA	5.60E-02	**4.67E-05** (8)	NA	**YES**	ASL
37871-00-4	TOTAL HPCDD	0.000043		0.000043		mg/kg	S16SB080405-SO	1/1	---	4.3E-05	NA	NA	NA	NA	NO	NTX
Volatile Organics																
74-83-9	BROMOMETHANE	0.032	J	0.032	J	mg/kg	S16SB080405-SO	1/1	---	0.032	NA	0.2	2	NA	NO	BSL
74-87-3	CHLOROMETHANE	0.091	J	0.091	J	mg/kg	S16SB080405-SO	1/1	---	0.091	NA	NA	NA	NA	NO	NTX
108-88-3	TOLUENE	0.004	J	0.004	J	mg/kg	S16SB080405-SO	1/1	---	0.004	NA	12	67	760	NO	BSL
Inorganics																
7429-90-5	ALUMINUM	8100		8100		mg/kg	S16SB080405-SO	1/1	---	8100	17600	NA	NA(9)	NA	NO	BKG
7440-38-2	ARSENIC	4.4		4.4		mg/kg	S16SB080405-SO	1/1	---	4.4	**3.6**	29	NA(9)	NA	NO	BSL
7440-39-3	BARIUM	34		34		mg/kg	S16SB080405-SO	1/1	---	34	57.2	1600	NA(9)	NA	NO	BSL,BKG
7440-70-2	CALCIUM	1500	J	1500	J	mg/kg	S16SB080405-SO	1/1	---	1500	**499**	NA	NA(9)	NA	NO	NUT
7440-47-3	CHROMIUM	15		15		mg/kg	S16SB080405-SO	1/1	---	15	21.5	38	NA(9)	NA	NO	BSL,BKG
7440-50-8	COPPER	14		14		mg/kg	S16SB080405-SO	1/1	---	14	25.6	NA	NA(9)	NA	NO	BKG
7439-89-6	IRON	10000	J	10000	J	mg/kg	S16SB080405-SO	1/1	---	10000	17200	NA	NA(9)	NA	NO	BKG
7439-92-1	LEAD	3.8		3.8		mg/kg	S16SB080405-SO	1/1	---	3.8	17.5	NA	NA(9)	NA	NO	BKG
7439-95-4	MAGNESIUM	2500		2500		mg/kg	S16SB080405-SO	1/1	---	2500	3650	NA	NA(9)	NA	NO	NUT, BKG
7439-96-5	MANGANESE	180	J	180	J	mg/kg	S16SB080405-SO	1/1	---	180	188	NA	NA(9)	NA	NO	BKG
7440-09-7	POTASSIUM	1200		1200		mg/kg	S16SB080405-SO	1/1	---	1200	3580	NA	NA(9)	NA	NO	NUT, BKG
7440-22-4	SILVER	2.6		2.6		mg/kg	S16SB080405-SO	1/1	---	2.6	**0.385**	34	NA(9)	NA	NO	BSL
7440-28-0	THALLIUM	0.44	J	0.44	J	mg/kg	S16SB080405-SO	1/1	---	0.44	**0.29**	0.7	NA(9)	NA	NO	BSL
7440-62-2	VANADIUM	20		20		mg/kg	S16SB080405-SO	1/1	---	20	35.1	6000	NA(9)	NA	NO	BSL,BKG

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC.

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 Environmental Services, April 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 COC.
5 USEPA Soil Screening Level Guidance, 1996a.
6 CTDEP Remediation Standard Regulations, 1996.
7 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level and/or an ARAR/TBC(s).
8 TtNUS, 1999. Toxicity criteria not available. Toxicity criteria for 2,3,7,8-TCDD used in conjunction with toxicity equivalent factor (TEF) (EPA, 1989) to calculate a value.
9 See Table 2-16.

Associated Samples:
S16SB080405-SO

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COC = Chemical of Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.
SSL-MIGR = Soil Screening Level for transfers from soil to groundwater for Dilution and Attenuation Factor of 1 (EPA, 1996a).

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

For Elimination as a COC:
BKG = Within Background Levels.
BSL = Below COC Screening Level/ARAR/TBC.
NUT = Essential Nutrient.
NTX = No criteria available.

TABLE 2-8

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOIL AT SITE 16
MIGRATION PATHWAYS - SPLP RESULTS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Hospital Incinerator (Site 16)

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)	CTDEP Mobility Criteria	COPC Flag	Rationale for Contaminant Deletion or Selection(5)
Inorganics														
7439-95-4	MAGNESIUM	150		150		ug/L	S16SB080405-SO-P	1/1	---	150	NA	NA	NO	NTX
7439-96-5	MANGANESE	24		24		ug/L	S16SB080405-SO-P	1/1	---	24	NA	NA	NO	NTX

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC .

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 SPLP analysis was not performed on background samples.
5 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level.

Associated Samples:
S16SB080405-SO-P

Definitions:
C = Carcinogen.
COC = Chemical of Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.

Rationale Codes:
For Selection as a COC:
ASL = Above COC Screening Level.

For Elimination as a COC:
NTX = No criteria available.

TABLE 2-9

SUMMARY OF POSITIVE SOIL ANALYTICAL RESULTS FOR SITE 18
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

location	**S18SB01**	**S18SB01**	**S18SB02**	**S18SB02**	**S18SB02**	**S18SB02**
matrix	**SS**	**SB**	**SS**	**SB**	**SB**	**SB**
nsample	**S18SB010001-SO**	**S18SB010506-SO**	**S18SB020001-SO**	**S18SB020405-SO**	**S18SB020405-SO-AVG**	**S18SB020405-SO-D**
sample	**S18SB010001**	**S18SB010506**	**S18SB020001**	**S18SB020405**	**S18SB020405**	**FD0612001**
top_depth	**0**	**5**	**0**	**4**	**4**	**4**
bottom_dep	**1**	**6**	**1**	**5**	**5**	**5**
sample_dat	**6/12/2000**	**6/12/2000**	**6/12/2000**	**6/12/2000**	**6/12/2000**	**6/12/2000**
Volatile Organics (ug/kg)						
2-BUTANONE	10 UR	10 UR	4 J	11 UJ	11 UJ	12 UR
METHYLENE CHLORIDE	9 U	8 U	5 U	5 U	34.75 J	67 J
TOLUENE	2 J	5 U	1 J	2 J	2 J	6 U
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	26 J	170 U	180 U	190 U	190 U	190 U
ANTHRACENE	33 J	170 U	180 U	190 U	190 U	190 U
BENZO(A)ANTHRACENE	71 J	26 J	180 U	190 U	190 U	190 U
BENZO(A)PYRENE	54 J	22 J	180 U	190 U	190 U	190 U
BENZO(B)FLUORANTHENE	51 J	22 J	180 U	190 U	190 U	190 U
BENZO(G,H,I)PERYLENE	68 J	29 J	180 U	190 U	190 U	190 U
BENZO(K)FLUORANTHENE	51 J	21 J	180 U	190 U	190 U	190 U
CARBAZOLE	27 J	170 U	180 U	190 U	190 U	190 U
CHRYSENE	74 J	30 J	180 U	190 U	190 U	190 U
FLUORANTHENE	170 J	66 J	180 U	190 U	190 U	190 U
FLUORENE	24 J	170 U	180 U	190 U	190 U	190 U
INDENO(1,2,3-CD)PYRENE	61 J	25 J	180 U	190 U	190 U	190 U
NAPHTHALENE	19 J	170 U	180 U	190 U	190 U	190 U
PHENANTHRENE	150 J	51 J	180 U	190 U	190 U	190 U
PYRENE	130 J	49 J	180 U	190 U	190 U	190 U
Inorganics (mg/kg)						
ALUMINUM	6500	5300	8800	6200	4750	3300
ANTIMONY	0.62 UJ	0.55 UJ	0.64 UJ	0.55 UJ	0.545 UJ	0.54 UJ
ARSENIC	1.9	0.77 J	3.1	1.2 J	0.755 J	0.62 U
BARIUM	24	39	35	30	24	18
CALCIUM	1000 J	1100 J	1400 J	1100 J	770 J	440 J
CHROMIUM	9.5	8.9	13	10	6.75	3.5 J
COPPER	7.1	11	12	10	7.05	4.1
IRON	7500 J	7800 J	8700 J	6100 J	4650 J	3200 J
LEAD	2.5	2.4	25	1.9	1.425	0.95 J
MAGNESIUM	1900	2400	2500	2000	1550	1100
MANGANESE	110 J	170 J	130 J	110 J	105 J	100 J
POTASSIUM	870	1800	1300	1400	1145	890
SILVER	1.6	2.1 J	1.5 J	1.2 U	1.15 U	1.1 U
THALLIUM	0.48 U	0.42 U	0.49 U	0.43 U	0.425 U	0.42 U
VANADIUM	16	17	18	14	8.575	6.3 U
ZINC	19 U	30	21 U	17 U	14 U	11 U

TABLE 2-9

SUMMARY OF POSITIVE SOIL ANALYTICAL RESULTS FOR SITE 18
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

location	**S18SB03**	**S18SB03**	**S18SB04**	**S18SB04**	**S18SB05**	**S18SB05**
matrix	**SS**	**SB**	**SS**	**SB**	**SS**	**SB**
nsample	**S18SB030001-SO**	**S18SB030708-SO**	**S18SB040001-SO**	**S18SB040708-SO**	**S18SB050001-SO**	**S18SB050405-SO**
sample	**S18SB030001**	**S18SB030708**	**S18SB040001**	**S18SB040708**	**S18SB050001**	**S18SB050405**
top_depth	**0**	**7**	**0**	**7**	**0**	**4**
bottom_dep	**1**	**8**	**1**	**8**	**1**	**5**
sample_dat	**6/12/2000**	**6/12/2000**	**6/12/2000**	**6/12/2000**	**6/12/2000**	**6/12/2000**
Volatile Organics (ug/kg)						
2-BUTANONE	4 J	10 UR	2 J	10 UR	13 UR	11 UJ
METHYLENE CHLORIDE	5 U	14 U	5 U	27 U	14 U	24 U
TOLUENE	2 J	1 J	3 J	1 J	6 J	6 UJ
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	200 U	180 U	190 U	180 U	180 U	200 U
ANTHRACENE	200 U	180 U	190 U	180 U	180 U	200 U
BENZO(A)ANTHRACENE	200 U	180 U	190 U	180 U	180 U	200 U
BENZO(A)PYRENE	200 U	180 U	190 U	180 U	180 U	200 U
BENZO(B)FLUORANTHENE	200 U	180 U	190 U	180 U	180 U	200 U
BENZO(G,H,I)PERYLENE	200 U	180 U	190 U	180 U	180 U	200 U
BENZO(K)FLUORANTHENE	200 U	180 U	190 U	180 U	180 U	200 U
CARBAZOLE	200 U	180 U	190 U	180 U	180 U	200 U
CHRYSENE	200 U	180 U	190 U	180 U	180 U	200 U
FLUORANTHENE	200 U	180 U	190 U	180 U	180 U	200 U
FLUORENE	200 U	180 U	190 U	180 U	180 U	200 U
INDENO(1,2,3-CD)PYRENE	200 U	180 U	190 U	180 U	180 U	200 U
NAPHTHALENE	200 U	180 U	190 U	180 U	180 U	200 U
PHENANTHRENE	200 U	180 U	190 U	180 U	180 U	200 U
PYRENE	200 U	180 U	190 U	180 U	180 U	200 U
Inorganics (mg/kg)						
ALUMINUM	15000	1400	15000	8100	8700	6500
ANTIMONY	0.6 UJ	0.5 UJ	0.67 UJ	0.57 UJ	0.73 J	0.54 UJ
ARSENIC	4	0.58 U	2.5	0.65 U	2.3	0.75 J
BARIUM	33	7.7 U	38	43	36	42
CALCIUM	480 J	880 J	180 U	700 J	750 J	990 J
CHROMIUM	19	1.6 U	14	9.4	13	9.8
COPPER	8.4	4	4.2	7	11	6.7
IRON	13000 J	1700 J	13000 J	8500 J	9500 J	7000 J
LEAD	5.5	0.39 U	5.3	2.2	430	1.6
MAGNESIUM	2800	360	1400	2100	2600	2300
MANGANESE	110 J	33 J	82 J	220 J	110 J	170 J
POTASSIUM	420	300	330	1700	1200	1900
SILVER	3.4	1.1 U	3.2	2.2 J	2 J	1.3 J
THALLIUM	0.64 J	0.39 U	0.54 J	0.75 J	0.43 J	0.42 U
VANADIUM	33	4.1 U	25	17	21	15
ZINC	23	7.2 U	38	22	22	19 U

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-10

SUMMARY OF SPLP SAMPLING AND ANALYTICAL PROGRAM FOR SITE 18
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

location	S18SB01	S18SB01	S18SB02	S18SB02	S18SB02	S18SB02	S18SB03	S18SB03	S18SB04	S18SB04	S18SB05	S18SB05
matrix	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP	SPLP
nsample	S18SB010001-SO-P	S18SB010506-SO-P	S18SB020001-SO-P	S18SB020405-SO-P	S18SB020405-SO-P-AVG	S18SB020405-SO-P-D	S18SB030001-SO-P	S18SB030708-SO-P	S18SB040001-SO-P	S18SB040708-SO-P	S18SB050001-SO-P	S18SB050405-SO-P
sample	S18SB010001	S18SB010506	S18SB020001	S18SB020405	S18SB020405	FD0612001	S18SB030001	S18SB030708	S18SB040001	S18SB040708	S18SB050001	S18SB050405
top_depth	0	5	0	4	4	4	0	7	0	7	0	4
bottom_dep	1	6	1	5	5	5	1	8	1	8	1	5
sample_dat	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000	6/12/2000
PCBs (ug/L)												
AROCLOR-1016	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1221	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
AROCLOR-1232	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1242	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1248	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1254	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1260	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Total Metals (ug/L)												
ALUMINUM	66 U	66 U	66 U	66 U	66 U	66 U	66 U	66 U	150 U	67 U	66 U	66 U
ANTIMONY	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	86	2.7 U
ARSENIC	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
BARIUM	140 U	140 U	130 U	130 U	130 U	130 U	130 U	130 U	160 U	130 U	190 U	120 U
BERYLLIUM	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CADMIUM	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U
CALCIUM	520 U	3000 U	2400 U	1600 U	1650 U	1700 U	850 U	2300 U	180 U	820 U	1700 U	310 U
CHROMIUM	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ	8.4 UJ
COBALT	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
COPPER	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
IRON	22 U	22 U	22 U	22 U	22 U	22 U	37 U	22 U	57 U	34 U	32 U	28 U
LEAD	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
MAGNESIUM	120	950	120	110 U	110 U	110 U	110 U	110 U	110 U	120	250 U	110 U
MANGANESE	19 U	46	3.5 U	3.5 U	10.375	19	3.5 U	7.5 U	5.9 U	3.5 U	10 U	3.5 U
MERCURY	0.12 U	0.13 U	0.13 U	0.28 U	0.23 U	0.18 U	0.14 U	0.12 U	0.1 U	0.13 U	0.19 U	0.14 U
NICKEL	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U	7.7 U
POTASSIUM	480 U	360 U	360 U	360 U	1330 U	2300 U	6600	360 U	390 U	370 U	510 U	540 U
SELENIUM	2.7 U	2.7 U	2.7 U	2.7 U	2.8 U	2.9 U	2.9 U	3.4 U	2.7 U	3.9 U	2.7 U	2.7 U
SILVER	5.7 U	5.7 U	5.7 U	5.7 U	5.575	8.3	18	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U
SODIUM	3700 U	3900 U	3900 U	3400 U	3350 U	3300 U	4500 U	3400 U	680 U	1600 U	5900 U	5200 U
THALLIUM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
VANADIUM	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
ZINC	30 U	32 U	15 U	15 U	18 U	21 U	17 U	17 U	260 U	85 U	20 U	19 U

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-11

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SURFACE SOIL AT SITE 18
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Solvent Storage Area (Site 18)

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																	
78-93-3	2-BUTANONE	0.002	J	0.004	J	mg/kg	S18SB020001-SO, S18SB030001-SO	3/3	---	0.002	NA	730	N	NA 500	SSL-INH CTRESSOIL	NO	BSL
108-88-3	TOLUENE	0.001	J	0.006	J	mg/kg	S18SB050001-SO	5/5	---	0.001	NA	52	N	650 500	SSL-INH CTRESSOIL	NO	BSL
Semivolatile Organics																	
83-32-9	ACENAPHTHENE	0.026	J	0.026	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.026	NA	370	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
120-12-7	ANTHRACENE	0.033	J	0.033	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.033	NA	2200	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
56-55-3	BENZO(A)ANTHRACENE	0.071	J	0.071	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.071	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
50-32-8	BENZO(A)PYRENE	0.054	J	0.054	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.054	NA	0.062	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
205-99-2	BENZO(B)FLUORANTHENE	0.051	J	0.051	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.051	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.068	J	0.068	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.068	NA	230(7)	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.051	J	0.051	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.051	NA	6.2	C	NA 8.4	SSL-INH CTRESSOIL	NO	BSL
86-74-8	CARBAZOLE	0.027	J	0.027	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.027	NA	2.4	N	NA 31	SSL-INH CTRESSOIL	NO	BSL
218-01-9	CHRYSENE	0.074	J	0.074	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.074	NA	62	C	NA 84	SSL-INH CTRESSOIL	NO	BSL
206-44-0	FLUORANTHENE	0.17	J	0.17	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.17	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
86-73-7	FLUORENE	0.024	J	0.024	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.024	NA	260	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.061	J	0.061	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.061	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
91-20-3	NAPHTHALENE	0.019	J	0.019	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.019	NA	5.6	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PHENANTHRENE	0.15	J	0.15	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.15	NA	230(7)	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
129-00-0	PYRENE	0.13	J	0.13	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.13	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
Inorganics																	
7429-90-5	ALUMINUM	6500		15000		mg/kg	S18SB030001-SO, S18SB040001-SO	5/5	---	15000	17600	**7600**	N	NA NA	SSL-INH CTRESSOIL	NO	EPAI, BKG
7440-36-0	ANTIMONY	0.73	J	0.73	J	mg/kg	S18SB050001-SO	1/5	0.6 - 0.67	0.73	**2.05**	3.1	N	NA 27	SSL-INH CTRESSOIL	NO	BSL
7440-38-2	**ARSENIC**	1.9		4		mg/kg	S18SB030001-SO	5/5	---	4	**3.6**	**0.39**	C	750 10	SSL-INH CTRESSOIL	**YES**	ASL
7440-39-3	BARIUM	24		38		mg/kg	S18SB040001-SO	5/5	---	38	39	540	N	690000 4700	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-70-2	CALCIUM	480	J	1400	J	mg/kg	S18SB020001-SO	4/5	180	1400	**314**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT

TABLE 2-11

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SURFACE SOIL AT SITE 18
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Solvent Storage Area (Site 18)

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)
7440-47-3	CHROMIUM	9.5		19		mg/kg	S18SB030001-SO	5/5	---	19	19.3	30(8)	C	270 100	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-50-8	COPPER	4.2		12		mg/kg	S18SB020001-SO	5/5	---	12	17.9	290	N	NA 2500	SSL-INH CTRESSOIL	NO	BSL,BKG
7439-89-6	IRON	7500	J	13000	J	mg/kg	S18SB030001-SO, S18SB040001-SO	5/5	---	13000	16800	**2300**	N	NA NA	SSL-INH CTRESSOIL	NO	EPAI, BKG
7439-92-1	**LEAD**	2.5		430		mg/kg	S18SB050001-SO	5/5	---	430	**17.5**	**400**		NA 500	SSL-INH CTRESSOIL	**YES**	ASL
7439-95-4	MAGNESIUM	1400		2800		mg/kg	S18SB030001-SO	5/5	---	2800	**2460**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7439-96-5	MANGANESE	82	J	130	J	mg/kg	S18SB020001-SO	5/5	---	130	172	180	N	NA NA	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-09-7	POTASSIUM	330		1300		mg/kg	S18SB020001-SO	5/5	---	1300	**669**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-22-4	SILVER	1.5	J	3.4		mg/kg	S18SB030001-SO	5/5	---	3.4	**0.385**	39	N	NA 340	SSL-INH CTRESSOIL	NO	BSL
7440-28-0	**THALLIUM**	0.43	J	0.64	J	mg/kg	S18SB030001-SO	3/5	0.48 - 0.49	0.64	**0.105**	**0.52**	N	NA 5.4	SSL-INH CTRESSOIL	**YES**	ASL
7440-62-2	VANADIUM	16		33		mg/kg	S18SB030001-SO	5/5	---	33	33.3	55	N	NA 470	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-66-6	ZINC	22		38		mg/kg	S18SB040001-SO	3/5	19 - 21	38	**25.6**	2300	N	NA 20000	SSL-INH CTRESSOIL	NO	BSL

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC.

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 COC.
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 2-methylnaphthalene, benzo(g,h,i)perylene, and phenanthrene.
8 Hexavalent Chromium.
9 OSWER soil screening level for residential land use (EPA, 1994).

Associated Samples:

S18SB010001-SO
S18SB020001-SO
S18SB030001-SO
S18SB040001-SO
S18SB050001-SO

Definitions:

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

Rationale Codes:

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

For Elimination as a COPC:
BKG = Within Background Levels.
BSL = Below COC Screening Level/ARAR/TBC.
NUT = Essential Nutrient.
EPAI = USEPA Region one does not advocate evaluation of this chemical.

TABLE 2-12

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SURFACE SOIL AT SITE 18
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Solvent Storage Area (Site 18)

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																
78-93-3	2-BUTANONE	0.002	J	0.004	J	mg/kg	S18SB020001-SO, S18SB030001-SO	3/3	---	0.004	NA	NA	80	2400	NO	BSL
108-88-3	TOLUENE	0.001	J	0.006	J	mg/kg	S18SB050001-SO	5/5	---	0.006	NA	12	67	760	NO	BSL
Semivolatile Organics																
83-32-9	ACENAPHTHENE	0.026	J	0.026	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.026	NA	570	84	NA	NO	BSL
120-12-7	ANTHRACENE	0.033	J	0.033	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.033	NA	12000	400	NA	NO	BSL
56-55-3	BENZO(A)ANTHRACENE	0.071	J	0.071	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.071	NA	2	1	NA	NO	BSL
50-32-8	BENZO(A)PYRENE	0.054	J	0.054	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.054	NA	8	1	NA	NO	BSL
205-99-2	BENZO(B)FLUORANTHENE	0.051	J	0.051	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.051	NA	NA	1	NA	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.068	J	0.068	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.068	NA	4200(8)	42	NA	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.051	J	0.051	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.051	NA	49	1	NA	NO	BSL
86-74-8	CARBAZOLE	0.027	J	0.027	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.027	NA	0.6	1	NA	NO	BSL
218-01-9	CHRYSENE	0.074	J	0.074	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.074	NA	160	1	NA	NO	BSL
206-44-0	FLUORANTHENE	0.17	J	0.17	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.17	NA	4300	56	NA	NO	BSL
86-73-7	FLUORENE	0.024	J	0.024	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.024	NA	560	56	NA	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.061	J	0.061	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.061	NA	14	1	NA	NO	BSL
91-20-3	NAPHTHALENE	0.019	J	0.019	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.019	NA	84	56	NA	NO	BSL
85-01-8	PHENANTHRENE	0.15	J	0.15	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.15	NA	4200(8)	40	NA	NO	BSL
129-00-0	PYRENE	0.13	J	0.13	J	mg/kg	S18SB010001-SO	1/5	0.18 - 0.2	0.13	NA	4200	40	NA	NO	BSL
Inorganics																
7429-90-5	ALUMINUM	6500		15000		mg/kg	S18SB030001-SO, S18SB040001-SO	5/5	---	15000	17600	NA	NA(9)	NA	NO	BKG
7440-36-0	ANTIMONY	0.73	J	0.73	J	mg/kg	S18SB050001-SO	1/5	0.6 - 0.67	0.73	2.05	5	NA(9)	NA	NO	BSL
7440-38-2	ARSENIC	1.9		4		mg/kg	S18SB030001-SO	5/5	---	4	**3.6**	29	NA(9)	NA	NO	BSL
7440-39-3	BARIUM	24		38		mg/kg	S18SB040001-SO	5/5	---	38	39	1600	NA(9)	NA	NO	BSL,BKG
7440-70-2	CALCIUM	480	J	1400	J	mg/kg	S18SB020001-SO	4/5	180	1400	**314**	NA	NA(9)	NA	NO	NUT
7440-47-3	CHROMIUM	9.5		19		mg/kg	S18SB030001-SO	5/5	---	19	19.3	38	NA(9)	NA	NO	BSL,BKG
7440-50-8	COPPER	4.2		12		mg/kg	S18SB020001-SO	5/5	---	12	17.9	NA	NA(9)	NA	NO	BKG
7439-89-6	IRON	7500	J	13000	J	mg/kg	S18SB030001-SO, S18SB040001-SO	5/5	---	13000	16800	NA	NA(9)	NA	NO	BKG
7439-92-1	LEAD	2.5		430		mg/kg	S18SB050001-SO	5/5	---	430	**17.5**	NA	NA(9)	NA	NO	NTX
7439-95-4	MAGNESIUM	1400		2800		mg/kg	S18SB030001-SO	5/5	---	2800	**2460**	NA	NA(9)	NA	NO	NTX
7439-96-5	MANGANESE	82	J	130	J	mg/kg	S18SB020001-SO	5/5	---	130	172	NA	NA(9)	NA	NO	BKG
7440-09-7	POTASSIUM	330		1300		mg/kg	S18SB020001-SO	5/5	---	1300	**669**	NA	NA(9)	NA	NO	BSL
7440-22-4	SILVER	1.5	J	3.4		mg/kg	S18SB030001-SO	5/5	---	3.4	**0.385**	34	NA(9)	NA	NO	NTX
7440-28-0	THALLIUM	0.43	J	0.64	J	mg/kg	S18SB030001-SO	3/5	0.48 - 0.49	0.64	**0.105**	0.7	NA(9)	NA	NO	BSL
7440-62-2	VANADIUM	16		33		mg/kg	S18SB030001-SO	5/5	---	33	33.3	6000	NA(9)	NA	NO	BSL,BKG
7440-66-6	ZINC	22		38		mg/kg	S18SB040001-SO	3/5	19 - 21	38	**25.6**	12000	NA(9)	NA	NO	BSL

TABLE 2-12

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SURFACE SOIL AT SITE 18
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC.
5 EPA Soil Screening Guidance, 1996a.
6 CTDEP Remediation Standard Regulations, 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 Mobilization criteria for inorganics developed to be compared to TCLP or SPLP.

Associated Samples:

S18SB010001-SO	S18SB040001-SO
S18SB020001-SO	S18SB050001-SO
S18SB030001-SO	

Definitions:

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

Rationale Codes:

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

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

TABLE 2-13

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SURFACE SOIL AT SITE 18
MIGRATION PATHWAYS - SPLP RESULTS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Solvent Storage Area (Site 18)

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)	CTDEP Mobility Criteria(5)	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Inorganics														
7440-36-0	**ANTIMONY**	86		86		ug/L	S18SB050001-SO-P	1/5	2.7	86	NA	**60**	**YES**	ASL
7439-95-4	MAGNESIUM	120		120		ug/L	S18SB010001-SO-P, S18SB020001-SO-P	2/5	110 - 250	120	NA	NA	NO	NTX
7440-09-7	POTASSIUM	6600		6600		ug/L	S18SB030001-SO-P	1/5	360 - 510	6600	NA	NA	NO	NTX
7440-22-4	SILVER	18		18		ug/L	S18SB030001-SO-P	1/5	5.7	18	NA	360	NO	BSL

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
A shaded value indicates that the concentration used for screening exceeds the criterion.
A shaded chemical name indicates that the chemical has been selected as a COC.

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 SPLP analysis was not performed on background samples.
5 CTDEP Remediation Standard Regulations, 1996.
6 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level.

Associated Samples:

S18SB010001-SO-P
S18SB020001-SO-P
S18SB030001-SO-P
S18SB040001-SO-P
S18SB050001-SO-P

Definitions:

C = Carcinogen.
COC = Chemical of Potential Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not available.

Rationale Codes:

For Selection as a COC:
ASL = Above COC Screening Level.

For Elimination as a COC:
BSL = Below COC Screening Level.
NTX = No criteria available.

TABLE 2-14

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SUBSURFACE SOIL AT SITE 18
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Solvent Storage Area (Site 18)

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 COC Screening Level(5)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COC Flag	Rationale for Contaminant Deletion or Selection(6)
Volatile Organics																	
75-09-2	METHYLENE CHLORIDE	0.067	J	0.067	J	mg/kg	S18SB020405-SO-D	1/5	0.005 - 0.027	0.067	NA	8.9	C	13 82	SSL-INH CTRESSOIL	NO	BSL
108-88-3	TOLUENE	0.001	J	0.002	J	mg/kg	S18SB020405-SO	3/5	0.005 - 0.006	0.002	NA	52	N	650 500	SSL-INH CTRESSOIL	NO	BSL
Semivolatile Organics																	
56-55-3	BENZO(A)ANTHRACENE	0.026	J	0.026	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.026	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
50-32-8	BENZO(A)PYRENE	0.022	J	0.022	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.022	NA	0.062	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
205-99-2	BENZO(B)FLUORANTHENE	0.022	J	0.022	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.022	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.029	J	0.029	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.029	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.021	J	0.021	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.021	NA	6.2	C	NA 8.4	SSL-INH CTRESSOIL	NO	BSL
218-01-9	CHRYSENE	0.03	J	0.03	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.03	NA	62	C	NA 84	SSL-INH CTRESSOIL	NO	BSL
206-44-0	FLUORANTHENE	0.066	J	0.066	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.066	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.025	J	0.025	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.025	NA	0.62	C	NA 1	SSL-INH CTRESSOIL	NO	BSL
85-01-8	PHENANTHRENE	0.051	J	0.051	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.051	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
129-00-0	PYRENE	0.049	J	0.049	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.049	NA	230	N	NA 1000	SSL-INH CTRESSOIL	NO	BSL
Inorganics																	
7429-90-5	ALUMINUM	1400		8100		mg/kg	S18SB040708-SO	5/5	---	8100	17600	**7600**	N	NA NA	SSL-INH CTRESSOIL	NO	BKG, EPAI
7440-38-2	ARSENIC	0.75	J	1.2	J	mg/kg	S18SB020405-SO	3/5	0.58 - 0.65	1.2	3.6	**0.39**	C	750 10	SSL-INH CTRESSOIL	NO	BKG
7440-39-3	BARIUM	18		43		mg/kg	S18SB040708-SO	4/5	7.7	43	57.2	540	N	690000 4700	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-70-2	CALCIUM	440	J	1100	J	mg/kg	S18SB020405-SO, S18SB010506-SO	5/5	---	1100	**499**	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-47-3	CHROMIUM	3.5	J	10		mg/kg	S18SB020405-SO	4/5	1.6	10	21.5	30(8)	C	270 100	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-50-8	COPPER	4		11		mg/kg	S18SB010506-SO	5/5	---	11	25.6	290	N	NA 2500	SSL-INH CTRESSOIL	NO	BSL,BKG
7439-89-6	IRON	1700	J	8500	J	mg/kg	S18SB040708-SO	5/5	---	8500	17200	**2300**	N	NA NA	SSL-INH CTRESSOIL	NO	BKG, EPAI
7439-92-1	LEAD	0.95	J	2.4		mg/kg	S18SB010506-SO	4/5	0.39	2.4	17.5	400(9)		NA 500	SSL-INH CTRESSOIL	NO	BSL,BKG
7439-95-4	MAGNESIUM	360		2400		mg/kg	S18SB010506-SO	5/5	---	2400	3650	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT,BKG

TABLE 2-14

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SUBSURFACE SOIL AT SITE 18
DIRECT CONTACT EXPOSURE SCENARIOS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Solvent Storage Area (Site 18)

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 COC Screening Level(5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COC Flag	Rationale for Contaminant Deletion or Selection(6)
7439-96-5	**MANGANESE**	33	J	220	J	mg/kg	S18SB040708-SO	5/5	---	220	**188**	**180** N	NA NA	SSL-INH CTRESSOIL	**YES**	ASL
7440-09-7	POTASSIUM	300		1900		mg/kg	S18SB050405-SO	5/5	---	1900	2580	NA	NA NA	SSL-INH CTRESSOIL	NO	NUT,BKG
7440-22-4	SILVER	1.3	J	2.2	J	mg/kg	S18SB040708-SO	3/5	1.1 - 1.2	2.2	**0.385**	39 N	NA 340	SSL-INH CTRESSOIL	NO	BSL
7440-28-0	**THALLIUM**	0.75	J	0.75	J	mg/kg	S18SB040708-SO	1/5	0.39 - 0.43	0.75	**0.29**	**0.52** N	NA 5.4	SSL-INH CTRESSOIL	**YES**	ASL
7440-62-2	VANADIUM	14		17		mg/kg	S18SB010506-SO, S18SB040708-SO	4/5	4.1 - 6.3	17	35.1	55 N	NA 470	SSL-INH CTRESSOIL	NO	BSL,BKG
7440-66-6	ZINC	22		30		mg/kg	S18SB010506-SO	2/5	7.2 - 19	30	31.3	2300 N	NA 20000	SSL-INH CTRESSOIL	NO	BSL,BKG

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
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 COC.

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 COC.
5 The risk-based COC 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 COC if the maximum detected concentration exceeds the risk-based COC 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:

S18SB010506-SO	S18SB030708-SO
S18SB020405-SO	S18SB040708-SO
S18SB020405-SO-D	S18SB050405-SO

Definitions:

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

Rationale Codes:

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

For Elimination as a COC:
BKG = Within Background Levels.
BSL = Below COC Screening Level/ARAR/TBC.
NUT = Essential Nutrient.
EPAI = USEPA Region one does not advocate evaluation of this chemical.

TABLE 2-15

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SUBSURFACE SOIL AT SITE 18
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Solvent Storage Area (Site 18)

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)	COC Flag	Rationale for Contaminant Deletion or Selection(7)
Volatile Organics																
75-09-2	**METHYLENE CHLORIDE**	0.067	J	0.067	J	mg/kg	S18SB020405-SO-D	1/5	0.005 - 0.027	0.067	NA	**0.02**	1	1200	**YES**	ASL
108-88-3	TOLUENE	0.001	J	0.002	J	mg/kg	S18SB020405-SO	3/5	0.005 - 0.006	0.002	NA	12	67	760	NO	BSL
Semivolatile Organics																
56-55-3	BENZO(A)ANTHRACENE	0.026	J	0.026	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.026	NA	2	1	NA	NO	BSL
50-32-8	BENZO(A)PYRENE	0.022	J	0.022	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.022	NA	8	1	NA	NO	BSL
205-99-2	BENZO(B)FLUORANTHENE	0.022	J	0.022	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.022	NA	5	1	NA	NO	BSL
191-24-2	BENZO(G,H,I)PERYLENE	0.029	J	0.029	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.029	NA	4200(8)	42	NA	NO	BSL
207-08-9	BENZO(K)FLUORANTHENE	0.021	J	0.021	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.021	NA	49	1	NA	NO	BSL
218-01-9	CHRYSENE	0.03	J	0.03	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.03	NA	160	1	NA	NO	BSL
206-44-0	FLUORANTHENE	0.066	J	0.066	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.066	NA	4300	56	NA	NO	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	0.025	J	0.025	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.025	NA	14	1	NA	NO	BSL
85-01-8	PHENANTHRENE	0.051	J	0.051	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.051	NA	4200(8)	40	NA	NO	BSL
129-00-0	PYRENE	0.049	J	0.049	J	mg/kg	S18SB010506-SO	1/5	0.18 - 0.2	0.049	NA	4200	40	NA	NO	BSL
Inorganics																
7429-90-5	ALUMINUM	1400		8,100		mg/kg	S18SB040708-SO	5/5	---	8,100	17,600	NA	NA(9)	NA	NO	BKG
7440-38-2	ARSENIC	0.75	J	1.2	J	mg/kg	S18SB020405-SO	3/5	0.58 - 0.65	1.2	3.60	29	NA(9)	NA	NO	BSL,BKG
7440-39-3	BARIUM	18		43		mg/kg	S18SB040708-SO	4/5	7.7	43	57.2	1600	NA(9)	NA	NO	BSL,BKG
7440-70-2	CALCIUM	440	J	1,100	J	mg/kg	S18SB020405-SO, S18SB010506-SO	5/5	---	1100	**499**	NA	NA(9)	NA	NO	NUT
7440-47-3	CHROMIUM	3.5	J	10		mg/kg	S18SB020405-SO	4/5	1.6	10	21.5	38	NA(9)	NA	NO	BSL,BKG
7440-50-8	COPPER	4		11		mg/kg	S18SB010506-SO	5/5	---	11	25.6	NA	NA(9)	NA	NO	BKG
7439-89-6	IRON	1700	J	8,500	J	mg/kg	S18SB040708-SO	5/5	---	8,500	17,200	NA	NA(9)	NA	NO	BKG
7439-92-1	LEAD	0.95	J	2.4		mg/kg	S18SB010506-SO	4/5	0.39	2.4	17.5	NA	NA(9)	NA	NO	BKG
7439-95-4	MAGNESIUM	360		2400		mg/kg	S18SB010506-SO	5/5	---	2400	3,650	NA	NA(9)	NA	NO	NUT,BKG
7439-96-5	MANGANESE	33	J	220	J	mg/kg	S18SB040708-SO	5/5	---	220	**188**	NA	NA(9)	NA	NO	BSL
7440-09-7	POTASSIUM	300		1900		mg/kg	S18SB050405-SO	5/5	---	1900	2,580	NA	NA(9)	NA	NO	NUT,BKG
7440-22-4	SILVER	1.3	J	2.2	J	mg/kg	S18SB040708-SO	3/5	1.1 - 1.2	2.2	**0.385**	34	NA(9)	NA	NO	BSL
7440-28-0	**THALLIUM**	0.75	J	0.75	J	mg/kg	S18SB040708-SO	1/5	0.39 - 0.43	0.75	**0.29**	**0.7**	NA(9)	NA	**YES**	ASL
7440-62-2	VANADIUM	14		17		mg/kg	S18SB010506-SO, S18SB040708-SO	4/5	4.1 - 6.3	17	35.1	6000	NA(9)	NA	NO	BSL,BKG
7440-66-6	ZINC	22		30		mg/kg	S18SB010506-SO	2/5	7.2 - 19	30	31.3	12000	NA(9)	NA	NO	BSL,BKG

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-15

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SUBSURFACE SOIL AT SITE 18
MIGRATION PATHWAYS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

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 COC.

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 COC.
5 EPA Soil Screening Level Guidance, 1996a, DAF = 20.
6 CTDEP Remediation Standard Regulations, 1996.
7 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level and/or an ARAR/TBC(s).
8 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene
9 Mobilization criteria for inorganics developed to be compared to TCLP or SPLP

Associated Samples:

S18SB010506-SO	S18SB030708-SO
S18SB020405-SO	S18SB040708-SO
S18SB020405-SO-D	S18SB050405-SO

Definitions:

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

Rationale Codes:

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

For Elimination as a COC:
BKG = Within Background Levels.

TABLE 2-16

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR SUBSURFACE SOIL AT SITE 18
MIGRATION PATHWAYS - SPLP RESULTS
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Solvent Storage Area (Site 18)

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)	CTDEP Mobility Criteria(5)	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Inorganics														
7439-95-4	MAGNESIUM	120		950		ug/L	S18SB010506-SO-P	2/5	110	950	NA	NA	NO	NTX
7439-96-5	MANGANESE	19		46		ug/L	S18SB010506-SO-P	2/5	3.5 - 7.5	46	NA	NA	NO	NTX
7440-22-4	SILVER	8.3		8.3		ug/L	S18SB020405-SO-P-D	1/5	5.7	8.3	NA	360	NO	BSL

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).
A shaded value indicates that the concentration used for screening exceeds the criterion.
A shaded chemical name indicates that the chemical has been selected as a COC.

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 SPLP analysis was not performed on background samples.
5 CTDEP Remediation Standard Regulations, 1996.
6 The chemical is selected as a COC if the maximum detected concentration exceeds the risk-based COC screening level.

Associated Samples:

S18SB010506-SO-P	S18SB030708-SO-P
S18SB020405-SO-P	S18SB040708-SO-P
S18SB020405-SO-P-D	S18SB050405-SO-P

Definitions:
C = Carcinogen.
COC = Chemical of Potential Concern.
J = Estimated Value
N = Noncarcinogen.
NA = Not Applicable.

Rationale Codes:
For Selection as a COC:
ASL = Above COC Screening Level.

For Elimination as a COC:
BSL = Below COC Screening Level.
NTX = No criteria available.

TABLE 2-17

SELECTION OF EXPOSURE PATHWAYS FOR SITE 16
SITES 16 AND 18 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.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Trespassers may be exposed to surface soil while at the site.
		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.
				Trespassers	Adolescents	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.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Trespassers 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.
				Trespassers	Adolescents	Inhalation	On-Site	None	Trespassers 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.

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-18

SELECTION OF EXPOSURE PATHWAYS FOR SITE 18
SITES 16 AND 18 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.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Trespassers may be exposed to surface soil while at the site.
		Air	Surface 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	Quant	Full-time employees may be exposed to fugitive dust and volatile emissions during work activities.
				Trespassers	Adolescents	Inhalation	On-Site	Quant	Trespassers may be exposed to fugitive dust and volatile emissions from soil.
	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.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Trespassers are not exposed to subsurface soil.
		Air	Subsurface Soil	Construction Workers	Adult	Inhalation	On-site	None	Construction workers are not likely to 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.
				Trespassers	Adolescents	Inhalation	On-Site	None	Trespassers 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

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR SITE 16
REASONABLE MAXIMUM EXPOSURES
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Media	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	4.9E-07	- -	- -	- -	0.1	- -
		Dermal Contact	3.5E-08	- -	- -	- -	0.003	- -
		Total	5.2E-07	- -	- -	- -	0.1	- -
Full-Time Workers	Surface Soil	Ingestion	3.2E-06	- -	- -	Arsenic	0.03	- -
		Dermal Contact	1.1E-06	- -	- -	- -	0.004	- -
		Total	4.3E-06	- -	- -	Arsenic	0.03	- -
Older Child Trespasser	Surface Soil	Ingestion	1.7E-06	- -	- -	Arsenic	0.04	- -
		Dermal Contact	4.8E-07	- -	- -	- -	0.004	- -
		Total	2.1E-06	- -	- -	Arsenic	0.04	- -
Child Resident	Surface/Subsurface Soil	Ingestion	7.1E-06	- -	- -	Arsenic, Benzo(a)pyrene	0.3	- -
		Dermal Contact	6.8E-07	- -	- -	- -	0.01	- -
		Total	7.8E-06	- -	- -	Arsenic, Benzo(a)pyrene	0.3	- -
Adult Resident	Surface/Subsurface Soil	Ingestion	3.1E-06	- -	- -	Arsenic	0.03	- -
		Dermal Contact	3.7E-07	- -	- -	- -	0.001	- -
		Total	3.4E-06	- -	- -	Arsenic	0.03	- -

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-20

SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR SITE 16
CENTRAL TENDENCY EXPOSURES
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Media	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	7.5E-08	- -	- -	- -	0.02	- -
		Dermal Contact	9.9E-10	- -	- -	- -	0.0001	- -
		Total	7.6E-08	- -	- -	- -	0.02	- -
Full-Time Employees	Surface Soil	Ingestion	1.7E-07	- -	- -	- -	0.007	- -
		Dermal Contact	1.1E-08	- -	- -	- -	0.0002	- -
		Total	1.9E-07	- -	- -	- -	0.007	- -
Older Child Trespassers	Surface Soil	Ingestion	4.9E-08	- -	- -	- -	0.004	- -
		Dermal Contact	7.9E-09	- -	- -	- -	0.0003	- -
		Total	5.7E-08	- -	- -	- -	0.004	- -
Child Resident	Surface/Subsurface Soil	Ingestion	5.4E-07	- -	- -	- -	0.06	- -
		Dermal Contact	2.9E-08	- -	- -	- -	0.001	- -
		Total	5.7E-07	- -	- -	- -	0.07	- -
Adult Resident	Surface/Subsurface Soil	Ingestion	2.0E-07	- -	- -	- -	0.007	- -
		Dermal Contact	6.5E-09	- -	- -	- -	0.00009	- -
		Total	2.1E-07	- -	- -	- -	0.007	- -

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-21

SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR SITE 18
REASONABLE MAXIMUM EXPOSURES
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Media	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	1.9E-07	- -	- -	- -	0.05	- -
		Dermal Contact	9.2E-09	- -	- -	- -	0.001	- -
		Total	2.0E-07	- -	- -	- -	0.05	- -
Full-Time Workers	Surface Soil	Ingestion	1.3E-06	- -	- -	Arsenic	0.01	- -
		Dermal Contact	2.9E-07	- -	- -	- -	0.002	- -
		Total	1.5E-06	- -	- -	Arsenic	0.01	- -
Older Child Trespassers	Surface Soil	Ingestion	6.6E-07	- -	- -	- -	0.02	- -
		Dermal Contact	1.2E-07	- -	- -	- -	0.002	- -
		Total	7.8E-07	- -	- -	- -	0.02	- -
Child Resident	Surface/Subsurface Soil	Ingestion	2.8E-06	- -	- -	Arsenic	0.1	- -
		Dermal Contact	1.8E-07	- -	- -	- -	0.005	- -
		Total	3.0E-06	- -	- -	Arsenic	0.1	- -
Adult Resident	Surface/Subsurface Soil	Ingestion	1.2E-06	- -	- -	Arsenic	0.01	- -
		Dermal Contact	9.6E-08	- -	- -	- -	0.0006	- -
		Total	1.3E-06	- -	- -	Arsenic	0.01	- -

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 2-22

SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR SITE 18
CENTRAL TENDENCY EXPOSURES
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Media	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	6.4E-08	- -	- -	- -	0.02	- -
		Dermal Contact	6.1E-10	- -	- -	- -	0.0001	- -
		Total	6.5E-08	- -	- -	- -	0.02	- -
Full-Time Employees	Surface Soil	Ingestion	1.0E-07	- -	- -	- -	0.004	- -
		Dermal Contact	4.7E-09	- -	- -	- -	0.0001	- -
		Total	1.1E-07	- -	- -	- -	0.005	- -
Older Child Trespassers	Surface Soil	Ingestion	2.9E-08	- -	- -	- -	0.003	- -
		Dermal Contact	3.3E-09	- -	- -	- -	0.0002	- -
		Total	3.3E-08	- -	- -	- -	0.003	- -
Child Resident	Surface/Subsurface Soil	Ingestion	4.7E-07	- -	- -	- -	0.06	- -
		Dermal Contact	1.8E-08	- -	- -	- -	0.001	- -
		Total	4.9E-07	- -	- -	- -	0.06	- -
Adult Resident	Surface/Subsurface Soil	Ingestion	1.8E-07	- -	- -	- -	0.007	- -
		Dermal Contact	4.0E-09	- -	- -	- -	0.00009	- -
		Total	1.8E-07	- -	- -	- -	0.007	- -

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

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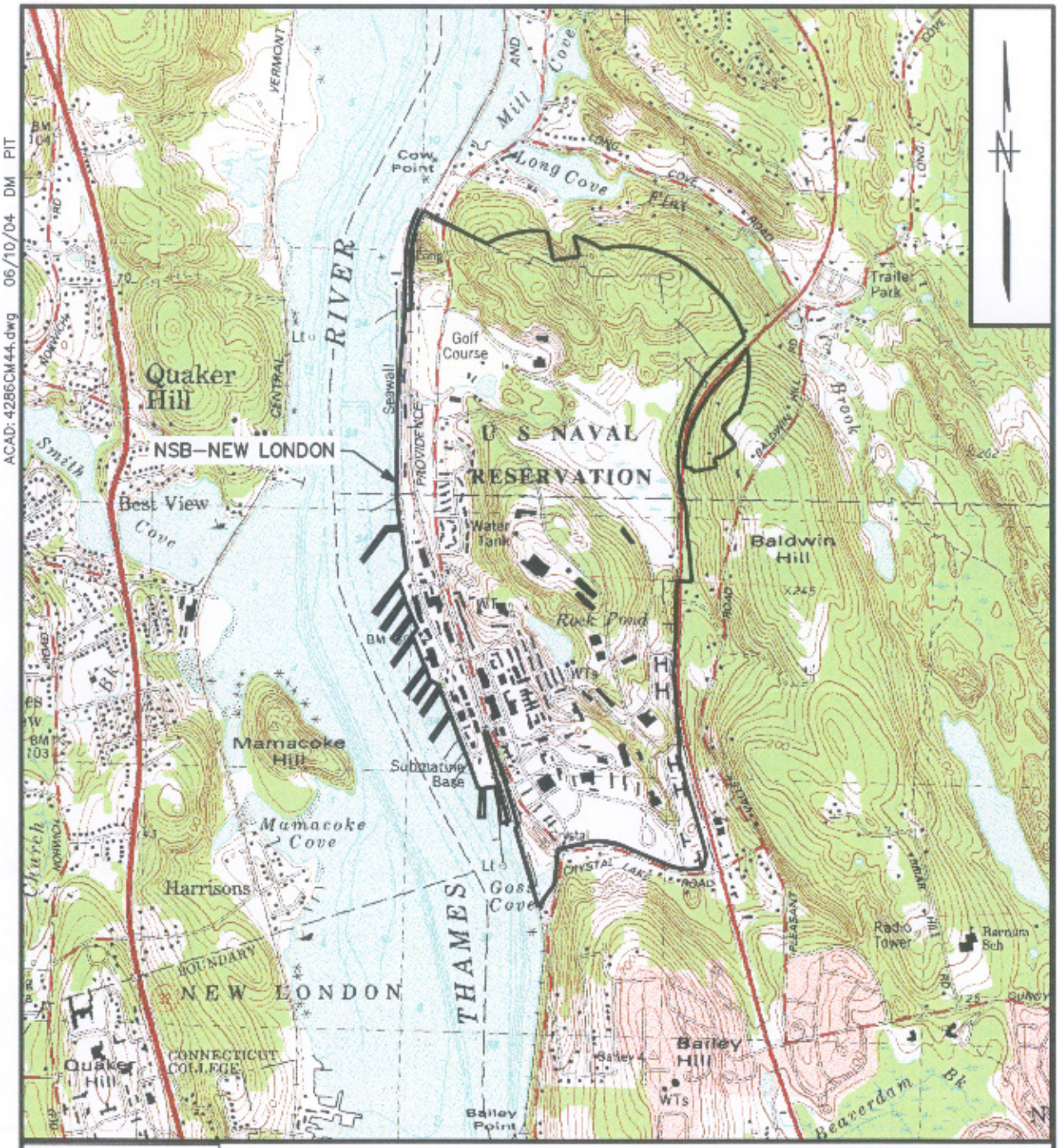

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SCALE IN FEET

SOURCE: QUADRANGLE MAP UNCASTVILLE, CONNECTICUT 1984.

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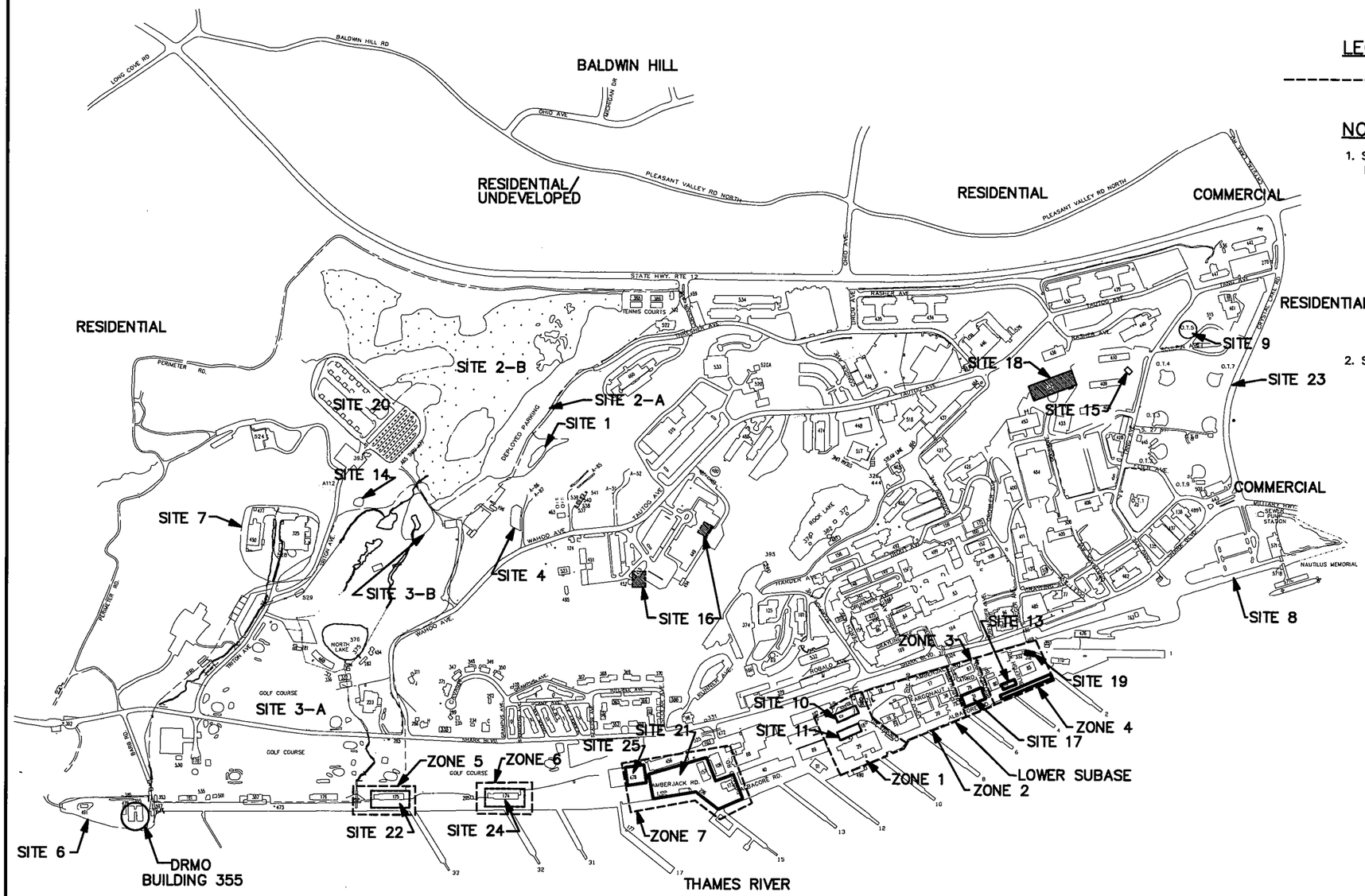
CHECKED BY RJB DATE 6/14/04	LOCATION MAP SITES 16 AND 18 SOIL ROD NSB-NLON, GROTON, CONNECTICUT	APPROVED BY CAR	DATE 6/14/04
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2-1	REV. 0

FORM CADD NO. TNNUS_AV.DWG – REV 0 – 1/22/98

ACAD: 4286CM45.dwg 06/10/04 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

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DM DATE 6/10/04
CHECKED BY TJOS DATE 6/14/04
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITES 16 AND 18 SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NO. 4286
OWNER NO. 0841
APPROVED BY CAR DATE 6/14/04
APPROVED BY DATE
DRAWING NO. FIGURE 2-2 REV. 0

FORM CADD NO. TtNUS_BH.DGN – REV 0 – 1/20/98

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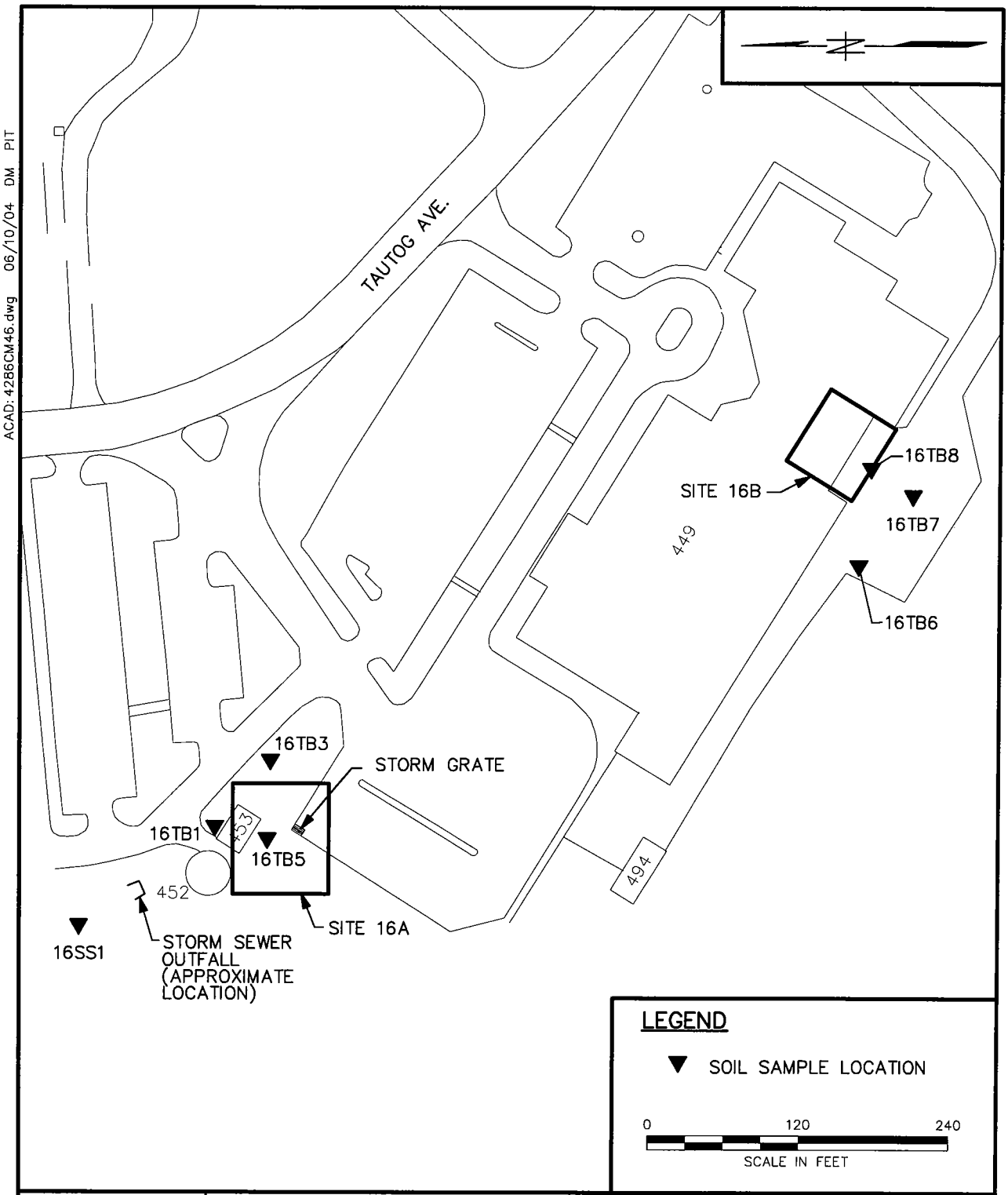

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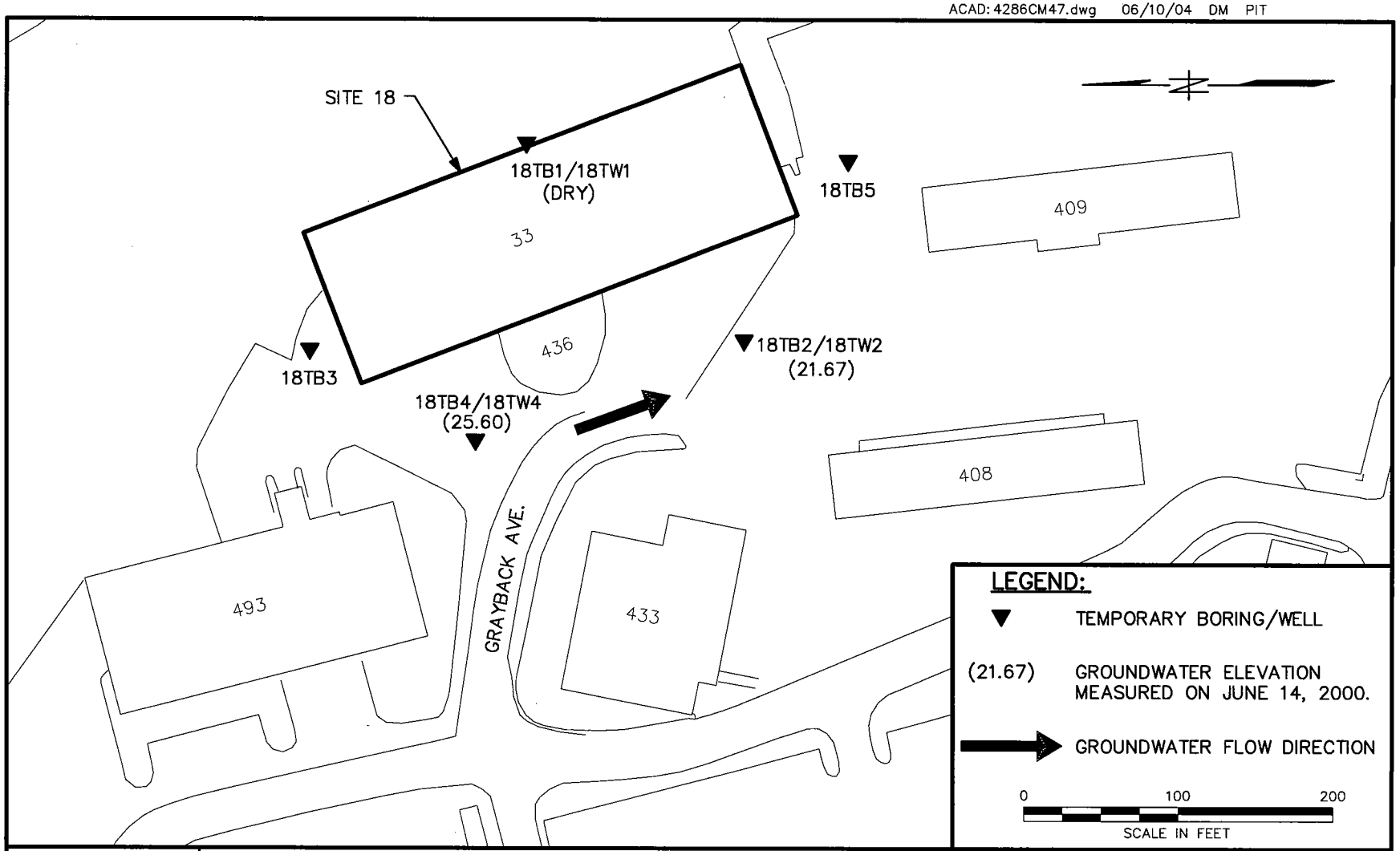
CHECKED BY DATE 6/14/04	GENERAL SITE 16 LAYOUT AND SAMPLE LOCATIONS SITES 16 AND 18 SOIL ROD NSB-NLON, GROTON, CONNECTICUT	APPROVED BY CAR DATE 6/14/04	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 2-3	REV. 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

ACAD: 4286CM47.dwg 06/10/04 DM PIT



DRAWN BY DM DATE 6/10/04	Tetra Tech NUS, Inc.	CONTRACT NO. 4286	OWNER NO. 0841
CHECKED BY MJS DATE 6/14/04	GENERAL SITE 18 LAYOUT AND SAMPLE LOCATIONS SITES 16 AND 18 SOIL ROD NSB-NLON, GROTON, CONNECTICUT	APPROVED BY CAR	DATE 6/14/04
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2-4	REV. 0

FORM CADD NO. TtNUS_AH.DWG – REV 0 – 1/22/98

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, was NFA for Sites 16 and 18 soil (OU 11). This remedy was recommended because the media at these sites do 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 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 remedy. No comments on the proposed remedy for OU 11 were received during the public meeting or public comment period; therefore, no revisions to the Selected Remedy, 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 remedy for OU 11 were received during the public meeting or public comment period.

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TtNUS, 2002a. Basewide Groundwater Operable Unit Remedial Investigation Report for Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

TtNUS, 2002b. Work Plan for Basewide Groundwater Operable Unit Data Gap Investigation, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. October.

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APPENDIX A

- PROPOSED PLAN
- PUBLIC NOTICE

PROPOSED PLAN

Naval Submarine Base - New London

SITE 16 - HOSPITAL INCINERATORS AND
SITE 18 - SOLVENT STORAGE AREA SOIL - OPERABLE UNIT 11
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 remedy for the soil at Site 16 – Hospital Incinerators and Site 18 - Solvent Storage Area (Building 33). Sites 16 and 18 are two of 25 sites at Naval Submarine Base - New London (NSB-NLON), Groton, Connecticut (Figure 1) being addressed by the Navy's **Installation Restoration (IR) Program.** The **IR Program** is being conducted to identify and clean up sites created by past operations that do not meet today's environmental standards. A total of 12 **Operable Units (OUs)** have been defined to date at NSB-NLON to address portions of the 25 IR Program sites.

The groundwater at Site 18 is a portion of the Basewide Groundwater **OU** 9. Site 18 groundwater and the remaining portions of **OU** 9 will be addressed in future decision documents. The soil at Sites 16 and 18 has been designated **OU** 11. The proposed remedy for **OU 11** is the first and final action.

Detailed descriptions of Sites 16 and 18 are provided in the **Basewide Groundwater Operable Unit Remedial Investigation (BGOURI)** Report. The document is available in the Information Repositories at the locations identified on Page 5.

This Proposed Plan recommends No Further Action (NFA) under **CERCLA** for Sites 16 and 18 soil. The **BGOURI** Report did not identify excessive risks to human health or the environment from contact with the soil at these sites.

The Cleanup Proposal...

After careful study, the Navy proposes NFA under **CERCLA** for:

- Sites 16 and 18 soil (OU 11)

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.

Technical terms shown in bold print are defined in the glossary on Page 6.

There are two ways to formally register a comment:

1. Offer oral comments during the July 28, 2004 public meeting, or
2. Send written comments postmarked no later than August 17, 2004 following the instructions provided at the end of the **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, federal regulations [40 Code of Federal Regulations (CFR) §300.430(f)(3)(i)(F)] require the Navy to respond to all significant comments in writing. The Navy will review the transcript of the comments received at the meeting and all written comments received during the formal comment period before making a final decision and providing a written response to the comments in a document called a **Responsiveness Summary.** The **Responsiveness Summary** will be included in the **Record of Decision (ROD).**

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 on the meeting, call Ms. Melissa Griffin at the NSB-NLON Environmental Department, (860) 694-5191

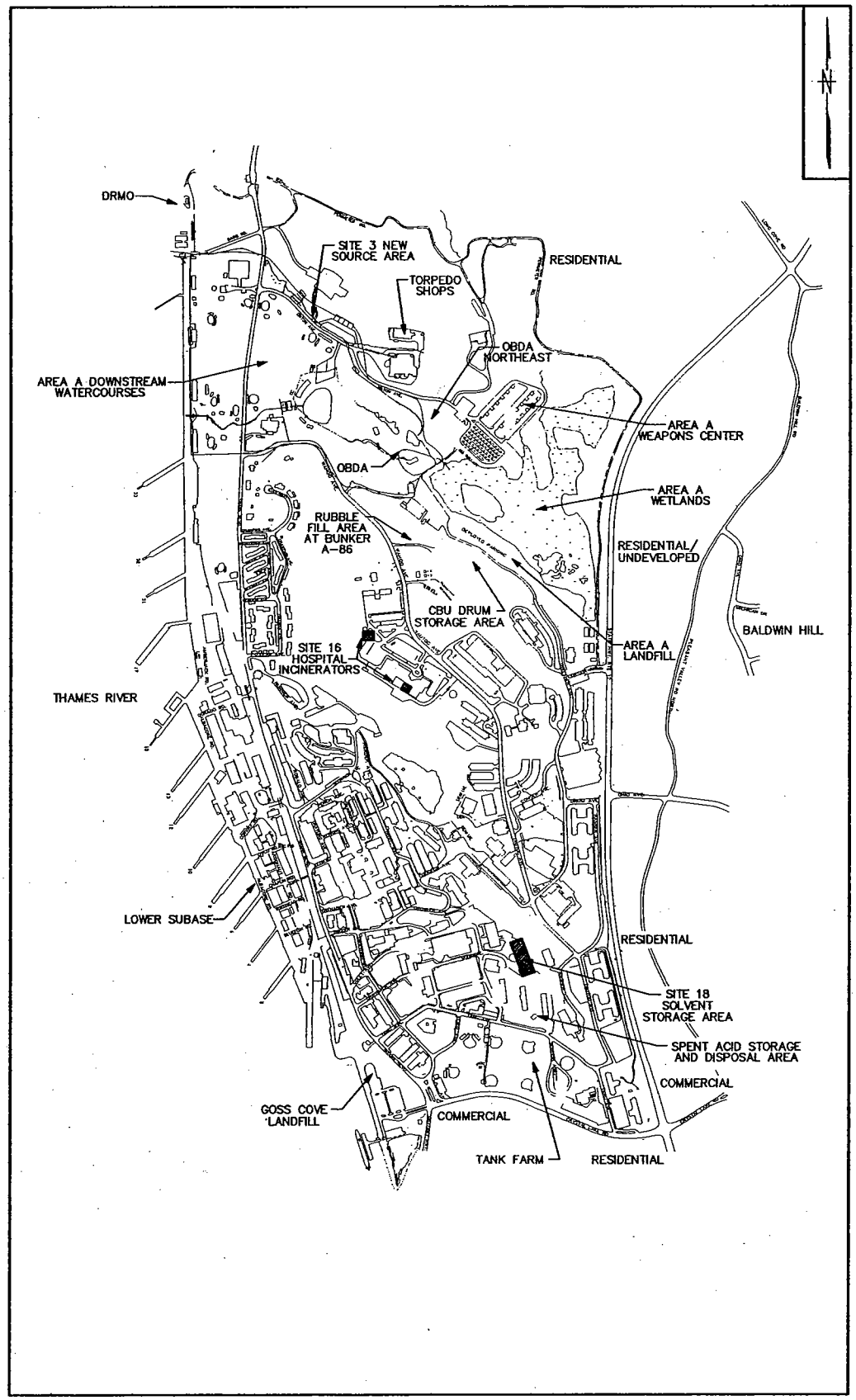

Figure 1. Site Location Map

History

Site 16 (see Figure 1) consists of the two locations where a mobile incinerator was used at Naval Hospital Groton. In the 1980s, the Naval Hospital Groton operated a skid-mounted waste incinerator at two sites adjacent to the hospital. The two sites (16A and 16B) are located west of Tautog Road, adjacent to Building 452 and Building 449, respectively (Figure 2). According to the Federal Facility Agreement (FFA) (1995), the incinerator was used to destroy medical records and medical waste contaminated with pathological agents. Ash generated by the waste incinerator was transferred to dumpsters for disposal at the municipal landfill.

Site 16 was evaluated during the Initial Assessment Study (IAS) conducted for NSB-NLON. No sampling activities were conducted as part of the study. The study's recommendation for this site was to not pursue further investigation of the site because, at the time of the IAS study, the site was still operational. As a result, no investigation of Site 16 was conducted during either of the early remedial investigations **(RIs)** conducted at NSB-NLON, i.e., the Phase I **RI** (1992) or Phase II **RI** (1997). The Navy subsequently ceased operation of the incinerator at the hospital and investigated the site during the **BGOURI** (2001) to determine the impact of the operation of the incinerator. Only soil samples were collected at the site during the **BGOURI** because of the shallow depth of competent bedrock, the lack of an overburden aquifer, the type contaminants, and the source of contaminants.

Site 18 consists of Building 33, the Solvent Storage Area. The location of Building 33 is shown on Figure 1 and Figure 3. This building has been used for the storage of gas cylinders and 55-gallon drums of solvents such as trichloroethene (TCE) and dichloroethene.

The Solvent Storage Area at Building 33 was identified during the IAS. The site was identified as Study Area F in the FFA and is now identified as Site 18 for the **IR Program.** Soil samples were collected from the site during the **BGOURI** (2002).

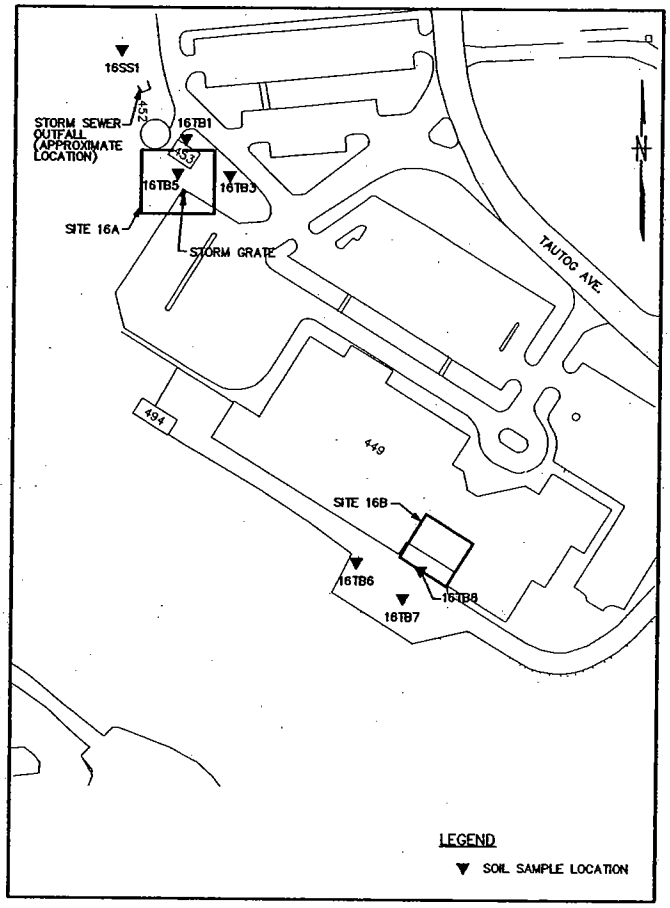

Figure 2. Site 16 Layout Map

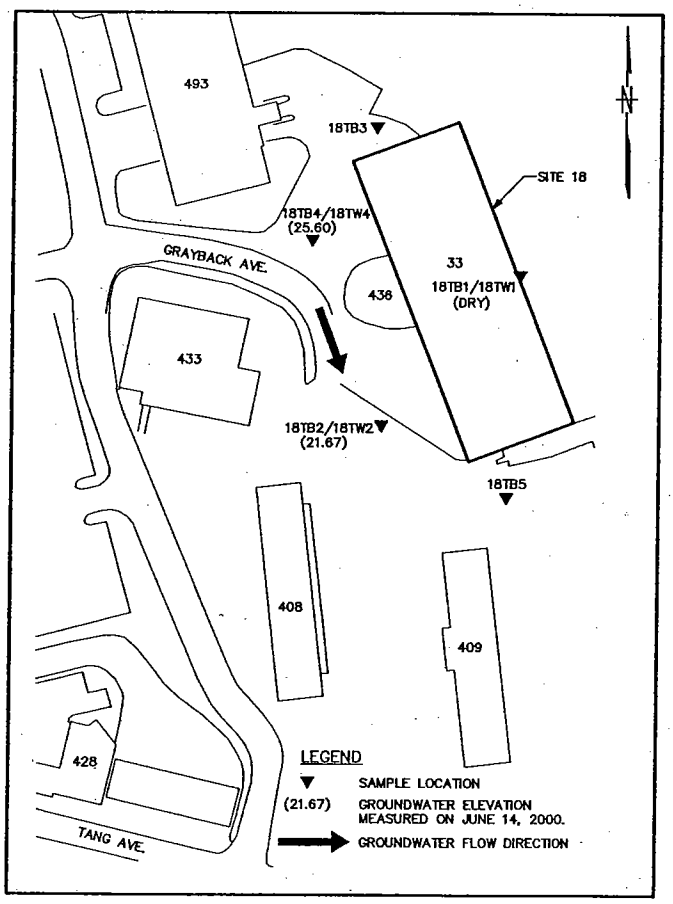

Figure 3. Site 18 Layout Map

Findings of the Field Investigations

At Site 16, the nature and extent of contamination and human health risk assessment (**HHRA**) results from the **BGOURI** indicated that the past operation of the skid-mounted incinerator did not significantly impact the surrounding soil and that site soils do not pose significant risks to any potential human receptors. The **HHRA** considered construction workers, full-time employees, older child trespassers, and future child and adult residents. All incremental cancer risks (ICRs) from exposure to soil at Site 16 (i.e., 5.2×10^{-7} for a construction worker to 7.8×10^{-6} for a future child resident) were less than or within United States Environmental Protection Agency's (EPA's) target risk range of 10^{-4} to 10^{-6} and less than Connecticut Department of Environmental Protection's (CTDEP's) acceptable level of 1×10^{-5} for cumulative exposures. Although all ICRs were less than CTDEP's target level for cumulative exposures, chemical-specific ICRs for arsenic (full-time workers, older child trespassers, child residents, and adult residents) and benzo(a)pyrene (child residents) exceeded CTDEP's target level of 1×10^{-6} for individual chemicals. However, the maximum detected concentrations of arsenic and benzo(a)pyrene were less than their respective CTDEP **Remediation Standard Regulations (RSRs)** for residential exposures which indicates that these risks are not significant. All Hazard Indices (HIs) for exposure to soil at Site 16 were less than EPA's and CTDEP's acceptable level of 1.0.

Several chemicals in Site 16 soil samples were identified as posing a potential contaminant migration concern because their concentrations exceeded screening criteria for contaminant migration from soil to groundwater. Additional information was available to show that these chemicals were not true contaminant migration concerns. For example, the concentrations of **dioxins/furans** that exceeded the pollutant mobility criteria were found to be consistent with background concentrations of dioxins/furans in soil in the State of Connecticut and across the United States. A **polychlorinated biphenyl (PCB)** and a **metal** were detected in Site 16 soil at concentrations that exceeded their respective mobility criterion; however, additional testing using the Synthetic Precipitation Leaching Procedure showed that these contaminants do not pose a significant migration issue. Site conditions would also reduce the potential for contaminant migration from the site. Asphalt pavement covers a majority of the site and limits infiltration through the soil and erosion of surface soil. In addition, relatively competent bedrock is very shallow at this site and it is likely that it would impede vertical contaminant migration.

At Site 18, the nature and extent of contamination and **HHRA** results from the **BGOURI** indicated that past storage of solvents at Building 33 (Site 18) did not significantly impact the surrounding soil and groundwater and that the site does not pose significant risks to any potential human receptors. The **HHRA** determined that health risks from exposure to soil at

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 concentrations 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 help 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 exposure to 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.

Site 18 were within target risk ranges. Potential receptors for exposures to soil at Site 18 included construction workers, full-time employees, older child trespassers, and future residents. All ICRs for exposures to soil at Site 18 were less than or within EPA's target risk range of 10^{-4} to 10^{-6} and less than CTDEP's acceptable level of $1x10^{-5}$ for cumulative exposures. Although all ICRs were less than CTDEP's target level for cumulative exposures, chemical-specific ICRs for arsenic (full-time workers, future child residents, and future adult residents) exceeded CTDEP's target level of 1×10^{-6} for individual chemicals. However, the maximum detected concentration of arsenic was less than its CTDEP **RSR** for residential exposures which indicates that this risk is not significant. All HIs for exposure to soil at Site 18 were less than EPA's and CTDEP's acceptable level of 1.0.

Site 16 is adjacent to a hospital and Site 18 is a storage building surrounded by a parking lot. Both sites are in well-developed portions of NSB-NLON. Neither of these sites or the areas near these sites represent habitats suitable for supporting a wildlife population. Based on the site conditions, it is unlikely that ecological receptors are at risk as a result of contaminants associated with Sites 16 and 18.

The Navy's Proposed Remedy

Based on the results of the **BGOURI**, it is the Navy's current judgment that NFA is required under **CERCLA** for the soil at Sites 16 and 18, which is designated as **OU** 11. These sites pose no current or future potential threats to human health or the environment; therefore, the Navy proposes that no treatment, engineering controls, or institutional controls be implemented at these sites. The EPA and CTDEP concur with the Navy's Proposed Remedy.

The Public's Role in Alternative Selection

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

This **Proposed Plan** for Sites 16 and 18 soil is available for review, along with supplemental documentation, at the:

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

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

For further information, please contact:

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
Email: Mark.Evans1@navy.mil

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

Kymberlee Keckler, Remedial Project Manager
United States Environmental Protection Agency
1 Congress Street
Suite 1100 (HBT)
Boston, MA 02114-2023
Tel: (617) 918-1385
Email: keckler.kymberlee@epa.gov

Mark Lewis
Environmental Analyst 3
Connecticut Department of Environmental Protection
Eastern District Remediation Program
Planning & Standards Division
Bureau of Waste Management
79 Elm Street
Hartford, CT 06106-5127
Tel. (860) 424-3768
Email: mark.lewis@po.state.ct.us

Glossary of Technical Terms

Chemicals of Potential Concern (COPCs): Chemicals identified as potential concerns to human health or the environment through a screening-level assessment because their concentrations exceed regulatory criteria.

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 and uncontrolled hazardous waste sites.

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

Dioxins: A family of 75 organic compounds known chemically as polychlorinated dibenzo-p-dioxins. The individual compounds are technically referred to as congeners. Concern about them arises from their potential toxicity as **contaminants** and their hydrophobic nature and resistance towards metabolism. Dioxins are typically created and released into the air during combustion processes such as commercial or municipal waste incineration and from burning fuels (e.g., wood, coal, or oil). They can also be created in small quantities during certain types of chemical manufacturing and processing.

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

Furans: A family of 135 organic compounds known chemically as polychlorinated dibenzofurans. The individual compounds are technically referred to as congeners. Typically found with dioxins and having similar properties, concern about furans arises from their potential toxicity as **contaminants** and their hydrophobic nature and resistance towards metabolism.

Human Health Risk Assessment (HHRA): Scientific method to evaluate the effects on human receptors from exposure to contaminants in site-specific media.

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

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

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.

Polychlorinated Biphenyls (PCBs): A family of 204 organic compounds, formerly used in the manufacture of plastics and in electrical transformers. They were used because they conducted heat well while being fire resistant and good electrical insulators. PCBs tend to bioaccumulate in fish and other animals and are probable human carcinogens. Studies also suggest non-cancer effects on humans and animals from these compounds.

Proposed Plan: A public participation requirement in which the lead agency summarizes for the public the preferred cleanup strategy and rationale for preference and reviews the alternatives presented in the detailed analysis of the Feasibility Study. The document is used to solicit public review and comment on all alternatives under consideration.

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

Remedial Investigation (RI): A Remedial Investigation report [e.g., Basewide Groundwater Operable Unit RI (BGOURI)] describes the site, documents the nature and extent of contaminants detected at the site, and presents the results of the risk assessment.

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

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

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the **Proposed Plan** for Sites 16 and 18 soil (OU 11) at Naval Submarine Base – New London is important to the Navy. Comments provided by the public are valuable in helping the Navy select the final remedy for these sites.

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 PM 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
278 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
- SITE 16 SOIL DIOXIN MEMORANDUM

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 16 Hospital Incinerator and Site 18 (Solvent Storage 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 Site 16 (Hospital Incinerator) and Site 18 (Solvent Storage Area), Naval Submarine Base New London, Groton, Connecticut. The Navy plans to take no further action at these two sites. The Navy has demonstrated compliance with 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).

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.

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

SITE 16 SOIL DIOXIN MEMORANDUM

MEMORANDUM
Revision 1

TO: **Mr. Mark Lewis, CTDEP**
Ms. Kymberlee Keckler, USEPA
Mr. Mark Evans, EFANE
Ms. Melissa Griffin, NSB-NLON

DATE: **August 4, 2004**

FROM: **Corey Rich, CTO 841 Project Manager**

SUBJECT: **Resolution of Site 16 Soil Dioxin Issue**
Exceedances of Connecticut Pollutant Mobility Criteria
NSB-NLON, Groton, Connecticut

Mr. Mark Lewis of the Connecticut Department of Environmental Protection (CTDEP) contacted Mr. Corey Rich of Tetra Tech NUS, Inc., a contractor for the Navy, by phone on July 1, 2004 regarding the draft Proposed Plan and Record of Decision for Sites 16 and 18 soil (Operable Unit 11) at Naval Submarine Base – New London (NSB-NLON), Groton, Connecticut. He said that the Proposed Plan and Record of Decision included discussions that indicated dioxins were detected in Site 16 soil at concentrations that exceeded Connecticut Pollutant Mobility Criteria (PMC). Mr. Lewis said his main concern was that the State would not be able to concur with the proposed No Further Action remedy for Site 16 soil if there was contaminated soil that would be left in place with contaminant concentrations in excess of the Connecticut PMC. Mr. Lewis said he did not think that the dioxin concentrations were a true concern, but additional evaluation was necessary to write off the potential issue. In addition, he said that the State does not have any promulgated PMC for dioxins and he did not recall the State providing acceptance of any additional PMC for dioxins calculated by the Navy. He said that he would review his records regarding the issue. In a July 8, 2004 e-mail, Mr. Lewis said that the State had approved the Navy's additional PMC for dioxins in a letter dated August 18, 1999. Mr. Lewis also requested in a July 12, 2004 e-mail that the Navy provide available site-specific dioxin concentrations for Installation Restoration Program sites at NSB-NLON, Groton, Connecticut.

To address the CTDEP's concerns, TtNUS completed additional evaluation of the Site 16 soil dioxin issue for the Navy and the results of the evaluation are summarized below.

- The CTDEP has not promulgated PMC for dioxin/furans, consequently, TtNUS calculated values following the methodology presented in the CTDEP Remediation Standard Regulations (1996) and using professional judgment. Values for dioxin/furans were derived by first calculating a groundwater protection standard for 2,3,7,8-TCDD (2.33×10^{-7} ug/L). This value was multiplied

by 20 to produce a GA pollutant mobility standard for 2,3,7,8-TCDD (4.67 x 10^{-9} mg/kg). The GA pollutant mobility standard then was multiplied by 10 to produce a GB pollutant mobility standard value for 2,3,7,8-TCDD (4.67 x 10^{-8} mg/kg). Standards were then calculated for each of the positively detected dioxin/furans congeners by dividing the GB pollutant mobility standard for 2,3,7,8-TCDD with the associated toxicity equivalency factor (TEF) for the individual dioxin/furans congeners. These values were presented in a letter dated April 14, 1999 from TtNUS to the CTDEP. The dioxin PMC were subsequently used in the Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002) to screen analytical data for soil samples collected at the Site 16 – Hospital Incinerators site.

- An EPA Soil Screening Level for migration from soil to groundwater for 2,3,7,8-TCDD (5.6 x 10^{-6} mg/kg) was also obtained from EPA's Soil Screening Calculations Internet site located at http://www.epa.gov/superfund/programs/risk/calctool.htm. The dioxin Soil Screening Level was used in the Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002) to screen the analytical data from the soil samples collected at the Site 16 – Hospital Incinerators site.

- A comparison of detected concentrations of dioxin/furans in soil to the CTDEP- and EPA-based PMC was presented in the Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002). Detected concentrations of individual dioxin/furan congeners in soil exceeded the calculated CTDEP PMC, but were less than the EPA Soil Screening Levels.

- A discussion of the uncertainty associated with the migration of dioxins/furans from soil to groundwater was presented in Section 9.6.4, Uncertainty Analysis, of the Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002). The discussion concluded that although both the CTDEP PMC and EPA Soil Screening Levels are conservative, the EPA Soil Screening Levels give a more realistic indication of a chemical's potential to migrate from soil to groundwater since the EPA Soil Screening Levels are based on chemical-specific parameters. In addition, dioxin/furans are considered to be very persistent and immobile in soil and are essentially insoluble in water. Consequently, the report concluded that migration of dioxins/furans from soil to groundwater at Site 16 was not expected to be a significant migration pathway.

- To further evaluate the dioxin issue, Toxicity Equivalency (TEQs) concentrations were calculated for each of the Site 16 soil samples and the results are presented in Table 1 which is attached to this memorandum. Dioxin concentrations detected in soil and sediment samples collected during Installation Restoration Program investigations at Naval Submarine Base – New London, Groton, Connecticut are summarized in Table 2. The data provided in the table shows that the dioxin

concentrations detected in Site 16 soil samples are generally within the range of dioxin concentrations detected at the other sites and the maximum dioxin concentration detected in Site 16 soil samples (4.16 ng/kg) was significantly less than the maximum dioxin concentrations detected in Site 2 and Site 6 soil samples (61.0 and 110 ng/kg, respectively). The EPA and other sources have estimated that background concentrations of dioxins in urban areas of the United States range from 2.21 to 21 ng/kg TEQ (ENVIRON, 2002). The EPA also estimated that the background concentration of dioxins in rural areas of Connecticut is 5.74 ng/kg TEQ (ENVIRON, 2002). The maximum dioxin concentration detected in Site 16 soil samples was 4.16 ng/kg TEQ (see Table 1), which is within the background dioxin concentration range for urban areas and below the background dioxin concentration for rural areas in Connecticut.

- Conclusion: These results indicate that the dioxin concentrations in the soil at Site 16 are background concentrations and should not be a pollutant mobility concern to the CTDEP. This information will be incorporated into the Proposed Plan and Record of Decision for Sites 16 and 18 soil as necessary to resolve the potential dioxin issue.

References

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

CTDEP, 1999. Letter from Ms. Elsie Patton, CTDEP to Mr. Corey Rich, TtNUS regarding Additional Remediation Criteria, Basewide Groundwater Operable Unit Remedial Investigation, Naval Submarine Base - New London, Groton, Connecticut. Hartford, Connecticut. August 18.

ENVIRON International Corporation, 2002. Sources and Background Exposure to Dioxins in the Environment, Emeryville, California. June 7.

TtNUS (Tetra Tech NUS, Inc.), 1999. Letter from Mr. Corey Rich to Connecticut Department of Environmental Protection regarding Responses to CTDEP's Comments on Calculated Remediation Standards, Existing Data Summary Report for the Basewide Groundwater Operable Unit Remedial Investigation, Naval Submarine Base - New London, Groton, Connecticut. Pittsburgh, Pennsylvania. April.

TtNUS, 2002. Basewide Groundwater Operable Unit Remedial Investigation Report for Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

TABLE 1

TOXICITY EQUIVALENCY (TEQ) CONCENTRATIONS FOR SITE 16 SOIL SAMPLES
BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION
NSB-NLON, GROTON, CONNECTICUT

location	TOXICITY EQUIVALENT FACTOR (TEF)	S16SB01	S16SB03	S16SB05	S16SB06	S16SB07	S16SB08	S16SB08	S16SS01
matrix		SS	SS	SS	SS	SS	SS	SB	SS
nsample		S16SB010001-SO	S16SB030001-SO	S16SB050001-SO	S16SB060001-SO	S16SB070001-SO	S16SB080001-SO	S16SB080405-SO	S16SS01-SO
sample		S16SB010001	S16SB030001	S16SB050001	S16SB060001	S16SB070001	S16SB080001	S16SB080405	S16SS01
top_depth		0	0	0	0	0	0	4	0
bottom_dep		1	1	1	1	1	1	5	0
sample_dat		6/13/2000	6/13/2000	6/13/2000	6/13/2000	6/13/2000	6/13/2000	6/13/2000	6/25/2000
Dioxins/Furans (ng/kg)									
1,2,3,4,6,7,8-HPCDD	0.01	21	1.9 U	7	3.1 U	120	20	24	31
1,2,3,4,6,7,8-HPCDF	0.01	3	0.41	3.4	0.44	0.21 U	0.33 U	0.5 U	5.4
1,2,3,7,8-PECDF	0.05	0.13 U	0.2 U	0.21	0.11 U	0.19 U	0.12 U	0.14 U	0.37 U
2,3,4,7,8-PECDF	0.5	0.13 U	0.2 U	0.36	0.11 U	0.19 U	0.12 U	0.14 U	0.38 U
2,3,7,8-TCDF	0.1	0.18 U	0.19 U	1.8	0.13 U	0.16 U	0.15 U	0.16 U	0.58 U
OCDD	0.0001	740	110	240	450	29000	4300	6400	1200 J
OCDF	0.0001	7.9	0.3 U	2.9	0.24 U	0.25 U	0.13 U	0.18 U	12 J
2,3,7,8-TCDD TEQ		0.360	0.089	0.499	0.102	4.16	0.672	0.929	0.618

Notes:
For non-detects, one-half the detection limit was used in the calculation of the TEQs.

TABLE 2

SUMMARY OF DIOXIN TEQ CONCENTRATIONS IN SOIL AND SEDIMENT SAMPLES COLLECTED DURING INSTALLATION RESTORATION PROGRAM INVESTIGATIONS NSB-NLON, GROTON CONNECTICUT

SITE	MEDIUM	NUMBER OF SAMPLES	MINIMUM DIOXIN TEQ CONCENTRATION (ng/kg)	MAXIMUM DIOXIN TEQ CONCENTRATION (ng/kg)
Site 2 - Area A Landfill	Soil	4	ND	61.0
Site 3 - Area A Downstream	Sediment	2	ND	5.53
Site 6 - DRMO	Soil	2	25.0	110
Site 8 - Goss Cove	Soil	2	ND	0.284
Site 16 - Hospital Incinerators	Soil	8	0.089	4.16
Site 20 - Area A Weapons Center	Sediment	1	ND	ND

ND – Nondetect

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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23
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

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RAGS PART D TABLE 9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.

REASONABLE MAXIMUM EXPOSURES

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9.2.RME Full-Time Employees - Site 16
9.3.RME Older Child Trespasser - Site 16
9.4.RME Child Residents - Site 16
9.5.RME Adult Residents - Site 16
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CENTRAL TENDENCY EXPOSURES

9.1.CTE Construction Workers - Site 16
9.2.CTE Full-Time Employees - Site 16
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9.6.CTE Construction Workers - Site 18
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9.8.CTE Older Child Trespasser - Site 18
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9.10.CTE Adult Residents - Site 18

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Construction Workers
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/Subsurface Soil	Surface/Subsurface Soil	Hospital Incinerators (Site 16)	Benzo(a)pyrene	7.8E-08	--	1.6E-08	--	9.4E-08	NA	- -	- -	- -	- -
			Arsenic	4.1E-07	--	2.0E-08	--	4.3E-07	Skin	0.06	- -	0.003	0.07
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.006	- -	- -	0.006
			Thallium	- -	--	- -	--	- -	None Specified	0.04	- -	- -	0.04
			Chemical Total	4.9E-07	--	3.5E-08	--	5.2E-07		0.1	- -	0.003	0.1
		Exposure Point Total						5.2E-07					0.1
	Exposure Medium Total							5.2E-07					0.1
Medium Total								5.2E-07					0.1
Receptor Total							Receptor Risk Total	5.2E-07				Receptor HI Total	0.1

From Basewide Groundwater Operable Unit Remedial Investigation (TtNUS, 2002a).

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Full-Time Employees
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	Hospital Incinerators (Site 16)	Benzo(a)pyrene	5.1E-07	--	5.0E-07	--	1.0E-06	NA	- -	- -	- -	- -
			Arsenic	2.7E-06	--	6.1E-07	--	3.3E-06	Skin	0.02	- -	0.004	0.02
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.002	- -	- -	0.002
			Thallium	- -	--	- -	--	- -	None Specified	0.01	- -	- -	0.01
			Chemical Total	3.2E-06	--	1.1E-06	--	4.3E-06		0.03	- -	0.004	0.03
		Exposure Point Total						4.3E-06					0.03
	Exposure Medium Total							4.3E-06					0.03
Medium Total								4.3E-06					0.03
Receptor Total							Receptor Risk Total	4.3E-06				Receptor HI Total	0.03

From Basewide Groundwater Operable Unit Remedial Investigation (TtNUS, 2002a).

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Older Child Trespasser
Receptor Age: Adolescent

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	Hospital Incinerators (Site 16)	Benzo(a)pyrene	2.6E-07	--	2.2E-07	--	4.8E-07	NA	- -	- -	- -	- -
			Arsenic	1.4E-06	--	2.6E-07	--	1.7E-06	Skin	0.02	- -	0.004	0.03
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.002	- -	- -	0.002
			Thallium	- -	--	- -	--	- -	None Specified	0.01	- -	- -	0.01
			Chemical Total	1.7E-06	--	4.8E-07	--	2.1E-06		0.04	- -	0.004	0.04
		Exposure Point Total						2.1E-06					0.04
	Exposure Medium Total							2.1E-06					0.04
Medium Total								2.1E-06					0.04
Receptor Total							Receptor Risk Total	2.1E-06				Receptor HI Total	0.04

From Basewide Groundwater Operable Unit Remedial Investigation (TtNUS, 2002a).

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Child Residents
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/Subsurface Soil	Surface/Subsurface Soil	Hospital Incinerators (Site 16)	Benzo(a)pyrene	1.1E-06	--	3.1E-07	--	1.4E-06	NA	- -	- -	- -	- -
			Arsenic	6.0E-06	--	3.8E-07	--	6.4E-06	Skin	0.2	- -	0.01	0.2
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.02	- -	- -	0.02
			Thallium	- -	--	- -	--	- -	None Specified	0.09	- -	- -	0.09
			Chemical Total	7.1E-06	--	6.8E-07	--	7.8E-06		0.3	- -	0.01	0.3
		Exposure Point Total						7.8E-06					0.3
	Exposure Medium Total							7.8E-06					0.3
Medium Total								7.8E-06					0.3
Receptor Total							Receptor Risk Total	7.8E-06				Receptor HI Total	0.3

From Basewide Groundwater Operable Unit Remedial Investigation (TtNUS, 2002a).

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Adult Residents
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/Subsurface Soil	Surface/Subsurface Soil	Hospital Incinerators (Site 16)	Benzo(a)pyrene	4.8E-07	--	1.7E-07	--	6.5E-07	NA	- -	- -	- -	- -
			Arsenic	2.6E-06	--	2.0E-07	--	2.8E-06	Skin	0.02	- -	0.001	0.02
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.002	- -	- -	0.002
			Thallium	- -	--	- -	--	- -	None Specified	0.01	- -	- -	0.01
			Chemical Total	3.1E-06	--	3.7E-07	--	3.4E-06		0.03	- -	0.001	0.03
		Exposure Point Total						3.4E-06					0.03
	Exposure Medium Total							3.4E-06					0.03
Medium Total								3.4E-06					0.03
Receptor Total							Receptor Risk Total	3.4E-06				Receptor HI Total	0.03

From Basewide Groundwater Operable Unit Remedial Investigation (TtNUS, 2002a).

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Construction Workers
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/Subsurface Soil	Surface/Subsurface Soil	Solvent Storage Area (Site 18)	Arsenic	1.9E-07	--	9.2E-09	--	2.0E-07	Skin	0.03	--	0.001	0.03
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (soil)	--	--	--	--	--	CNS	0.002	--	--	0.002
			Thallium	--	--	--	--	--	None Specified	0.02	--	--	0.02
			Chemical Total	1.9E-07	--	9.2E-09	--	2.0E-07		0.05	--	0.001	0.05
		Exposure Point Total						2.0E-07					0.05
	Exposure Medium Total							2.0E-07					0.05
Medium Total								2.0E-07					0.05
Receptor Total							Receptor Risk Total	2.0E-07				Receptor HI Total	0.05

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Full-Time Employees
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	Solvent Storage Area (Site 18)	Arsenic	1.3E-06	--	2.9E-07	--	1.5E-06	Skin	0.008	- -	0.002	0.010
			Lead	- -	--	- -	--	- -	NA	- -	- -	- -	- -
			Thallium	- -	--	- -	--	- -	None Specified	0.005	- -	- -	0.005
			Chemical Total	1.3E-06	--	2.9E-07	--	1.5E-06		0.01	- -	0.002	0.01
		Exposure Point Total						1.5E-06					0.01
	Exposure Medium Total							1.5E-06					0.01
Medium Total								1.5E-06					0.01
Receptor Total							Receptor Risk Total	1.5E-06				Receptor HI Total	0.01

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Older Child Trespasser
Receptor Age: Adolescent

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	Solvent Storage Area (Site 18)	Arsenic	6.6E-07	--	1.2E-07	--	7.8E-07	Skin	0.01	--	0.002	0.01
			Lead	--	--	--	--	--	NA	--	--	--	--
			Thallium	--	--	--	--	--	None Specified	0.007	--	--	0.007
			Chemical Total	6.6E-07	--	1.2E-07	--	7.8E-07		0.02	--	0.002	0.02
		Exposure Point Total						7.8E-07					0.02
	Exposure Medium Total							7.8E-07					0.02
Medium Total								7.8E-07					0.02
Receptor Total							Receptor Risk Total	7.8E-07				Receptor HI Total	0.02

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Child Residents
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/Subsurface Soil	Surface/Subsurface Soil	Solvent Storage Area (Site 18)	Arsenic	2.8E-06	--	1.8E-07	--	3.0E-06	Skin	0.07	--	0.005	0.08
			Lead	--	--	--	--	--	NA	--	--	--	--
			Manganese (soil)	--	--	--	--	--	CNS	0.006		--	0.006
			Thallium	--	--	--	--	--	None Specified	0.04	--	--	0.04
			Chemical Total	2.8E-06	--	1.8E-07	--	3.0E-06		0.1	--	0.005	0.1
		Exposure Point Total						3.0E-06					0.1
	Exposure Medium Total							3.0E-06					0.1
Medium Total								3.0E-06					0.1
Receptor Total							Receptor Risk Total	3.0E-06				Receptor HI Total	0.1

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Adult Residents
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/Subsurface Soil	Surface/Subsurface Soil	Solvent Storage Area (Site 18)	Arsenic	1.2E-06	--	9.6E-08	--	1.3E-06	Skin	0.008	- -	0.0006	0.008
			Lead	- -	--	- -	--	- -	NA	- -	- -	- -	- -
			Manganese (soil)	- -	--	- -	--	- -	CNS	0.0006		- -	0.0006
			Thallium	- -	--	- -	--	- -	None Specified	0.005	- -	- -	0.005
			Chemical Total	1.2E-06	--	9.6E-08	--	1.3E-06		0.01	- -	0.0006	0.01
		Exposure Point Total						1.3E-06					0.01
	Exposure Medium Total							1.3E-06					0.01
Medium Total								1.3E-06					0.01
Receptor Total							Receptor Risk Total	1.3E-06				Receptor HI Total	0.01

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Construction Workers
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/Subsurface Soil	Surface/Subsurface Soil	Hospital Incinerators (Site 16)	Benzo(a)pyrene	9.0E-09	--	3.7E-10	--	9.4E-09	NA	- -	- -	- -	- -
			Arsenic	6.6E-08	--	6.2E-10	--	6.6E-08	Skin	0.01	- -	0.0001	0.01
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.0009	- -	- -	0.001
			Thallium	- -	--	- -	--	- -	None Specified	0.006	- -	- -	0.01
			Chemical Total	7.5E-08	--	9.9E-10	--	7.6E-08		0.02	- -	0.0001	0.02
		Exposure Point Total						7.6E-08					0.02
	Exposure Medium Total							7.6E-08					0.02
Medium Total								7.6E-08					0.02
Receptor Total							Receptor Risk Total	7.6E-08				Receptor HI Total	0.02

From Basewide Groundwater Operable Unit Remedial Investigation (TtNUS, 2002a).

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Full-Time Employees
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	Hospital Incinerators (Site 16)	Benzo(a)pyrene	2.2E-08	--	4.3E-09	--	2.6E-08	NA	- -	- -	- -	- -
			Arsenic	1.5E-07	--	6.9E-09	--	1.6E-07	Skin	0.004	- -	0.0002	0.004
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.0004	- -	- -	0.0004
			Thallium	- -	--	- -	--	- -	None Specified	0.003	- -	- -	0.003
			Chemical Total	1.7E-07	--	1.1E-08	--	1.9E-07		0.007	- -	0.0002	0.007
		Exposure Point Total						1.9E-07					0.007
	Exposure Medium Total							1.9E-07					0.007
Medium Total								1.9E-07					0.007
Receptor Total							Receptor Risk Total	1.9E-07				Receptor HI Total	0.007

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Older Child Trespasser
Receptor Age: Adolescent

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	Hospital Incinerators (Site 16)	Benzo(a)pyrene	6.2E-09	--	3.0E-09	--	9.2E-09	NA	- -	- -	- -	- -
			Arsenic	4.3E-08	--	4.9E-09	--	4.8E-08	Skin	0.002	- -	0.0003	0.002
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.0002	- -	- -	0.0002
			Thallium	- -	--	- -	--	- -	None Specified	0.001	- -	- -	0.001
			Chemical Total	4.9E-08	--	7.9E-09	--	5.7E-08		0.004	- -	0.0003	0.004
		Exposure Point Total						5.7E-08					0.004
	Exposure Medium Total							5.7E-08					0.004
Medium Total								5.7E-08					0.004
Receptor Total							Receptor Risk Total	5.7E-08				Receptor HI Total	0.004

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Child Residents
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/Subsurface Soil	Surface/Subsurface Soil	Hospital Incinerators (Site 16)	Benzo(a)pyrene	6.6E-08	--	1.1E-08	--	7.6E-08	NA	- -	- -	- -	- -
			Arsenic	4.8E-07	--	1.8E-08	--	5.0E-07	Skin	0.04	- -	0.001	0.04
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.003	- -	- -	0.003
			Thallium	- -	--	- -	--	- -	None Specified	0.02	- -	- -	0.02
			Chemical Total	5.4E-07	--	2.9E-08	--	5.7E-07		0.06	- -	0.001	0.07
		Exposure Point Total						5.7E-07					0.07
	Exposure Medium Total							5.7E-07					0.07
Medium Total								5.7E-07					0.07
Receptor Total							Receptor Risk Total	5.7E-07				Receptor HI Total	0.07

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Adult Residents
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/Subsurface Soil	Surface/Subsurface Soil	Hospital Incinerators (Site 16)	Benzo(a)pyrene	2.5E-08	--	2.4E-09	--	2.7E-08	NA	- -	- -	- -	- -
			Arsenic	1.8E-07	--	4.1E-09	--	1.8E-07	Skin	0.004	- -	0.00009	0.004
			Manganese (Soil)	- -	--	- -	--	- -	CNS	0.0004	- -	- -	0.0004
			Thallium	- -	--	- -	--	- -	None Specified	0.002	- -	- -	0.002
			Chemical Total	2.0E-07	--	6.5E-09	--	2.1E-07		0.007	- -	0.00009	0.007
		Exposure Point Total						2.1E-07					0.007
	Exposure Medium Total							2.1E-07					0.007
Medium Total								2.1E-07					0.007
Receptor Total							Receptor Risk Total	2.1E-07				Receptor HI Total	0.007

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Construction Workers
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/Subsurface Soil	Surface/Subsurface Soil	Solvent Storage Area (Site 18)	Arsenic	6.4E-08	--	6.1E-10	--	6.5E-08	NA	0.01	- -	0.0001	0.01
			Lead	- -	--	- -	--	- -	Skin	- -	- -	- -	- -
			Manganese (soil)	- -	--	- -	--	- -	CNS	0.0008	- -	- -	0.0008
			Thallium	- -	--	- -	--	- -	None Specified	0.006	- -	- -	0.006
			Chemical Total	6.4E-08	--	6.1E-10	--	6.5E-08		0.02	- -	0.0001	0.02
		Exposure Point Total						6.5E-08					0.02
	Exposure Medium Total							6.5E-08					0.02
Medium Total								6.5E-08					0.02
Receptor Total							Receptor Risk Total	6.5E-08				Receptor HI Total	0.02

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Full-Time Employees
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	Solvent Storage Area (Site 18)	Arsenic	1.0E-07	--	4.7E-09	--	1.1E-07	NA	0.003	- -	0.0001	0.003
			Lead	- -	--	- -	--	- -	Skin	- -	- -	- -	- -
			Thallium	- -	--	- -	--	- -	None Specified	0.002	- -	- -	0.002
			Chemical Total	1.0E-07	--	4.7E-09	--	1.1E-07		0.004	- -	0.0001	0.005
		Exposure Point Total						1.1E-07					0.005
	Exposure Medium Total							1.1E-07					0.005
Medium Total								1.1E-07					0.005
Receptor Total							Receptor Risk Total	1.1E-07				Receptor HI Total	0.005

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Older Child Trespasser
Receptor Age: Adolescent

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	Solvent Storage Area (Site 18)	Arsenic	2.9E-08	--	3.3E-09	--	3.3E-08	NA	0.002	- -	0.0002	0.002
			Lead	- -	--	- -	--	- -	Skin	- -	- -	- -	- -
			Thallium	- -	--	- -	--	- -	None Specified	0.001	- -	- -	0.001
			Chemical Total	2.9E-08	--	3.3E-09	--	3.3E-08		0.003	- -	0.0002	0.003
		Exposure Point Total						3.3E-08					0.003
	Exposure Medium Total							3.3E-08					0.003
Medium Total								3.3E-08					0.003
Receptor Total							Receptor Risk Total	3.3E-08				Receptor HI Total	0.003

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Child Residents
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/Subsurface Soil	Surface/Subsurface Soil	Solvent Storage Area (Site 18)	Arsenic	4.7E-07	--	1.8E-08	--	4.9E-07	Skin	0.04	- -	0.001	0.04
			Lead	- -	--	- -	--	- -	NA	- -	- -	- -	- -
			Manganese (soil)	- -	--	- -	--	- -	CNS	0.003	- -	- -	0.003
			Thallium	- -	--	- -	--	- -	None Specified	0.02	- -	- -	0.02
			Chemical Total	4.7E-07	--	1.8E-08	--	4.9E-07		0.06	- -	0.001	0.06
		Exposure Point Total						4.9E-07					0.06
	Exposure Medium Total							4.9E-07					0.06
Medium Total								4.9E-07					0.06
Receptor Total							Receptor Risk Total	4.9E-07				Receptor HI Total	0.06

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).

TABLE 9.10.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION

NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Receptor Population: Adult Residents
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/Subsurface Soil	Surface/Subsurface Soil	Solvent Storage Area (Site 18)	Arsenic	1.8E-07	--	4.0E-09	--	1.8E-07	Skin	0.004	- -	0.00009	0.004
			Lead	- -	--	- -	--	- -	NA	- -	- -	- -	- -
			Manganese (soil)	- -	--	- -	--	- -	CNS	0.0003	- -	- -	0.0003
			Thallium	- -	--	- -	--	- -	None Specified	0.002	- -	- -	0.002
			Chemical Total	1.8E-07	--	4.0E-09	--	1.8E-07		0.007	- -	0.00009	0.007
		Exposure Point Total						1.8E-07					0.007
	Exposure Medium Total							1.8E-07					0.007
Medium Total								1.8E-07					0.007
Receptor Total							Receptor Risk Total	1.8E-07				Receptor HI Total	0.007

From Basewide Groundwater Operable Unit Remedial Investigation Report (TtNUS, 2002a).