UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

June 29, 2000

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Record of Decision for the Area A Weapons Center

Dear Mr. Evans:

I am enclosing the fully executed original of the Record of Decision for the Area A Weapons Center. As you know, a copy should be placed in the Administrative Record and in the information repositories.

I appreciate your efforts in meeting this commitment and look forward to working with you on the remedial design of the Area A Weapons Center. Please do not hesitate to contact me at (617) 918-1385 should you wish to discuss this matter further.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Enclosure

cc: Mark Lewis, CTDEP, Hartford, CT
Darlene Ward, NSBNL, Groton, CT
David Peterson, USEPA, Boston, MA
Mary Sanderson, USEPA, Boston, MA

Record of Decision
for
Operable Unit 7 - Area A Weapons Center (Site 20)
Soil and Sediment Operable Unit

Naval Submarine Base - New London
Groton, Connecticut

June 2000
FINAL

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LIST OF ACRONYMS

ARAR	Applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986
COC	Constituents of concern
COPC	Chemicals of potential concern
CTDEP	Connecticut Department of Environmental Protection
ELUR	Environmental Land Use Restriction
EPA	U.S. Environmental Protection Agency
HHRA	Human health risk assessment
HI	Hazard index
ICDEC	Industrial/Commercial Direct Exposure Criteria
NSB NLON	Naval Submarine Base New London
PAH	Polycyclic aromatic hydrocarbon
PMC	Pollutant Mobility Criteria
PRG	Preliminary Remediation Goals
RDEC	Residential Direct Exposure Criteria
ROD	Record of Decision
RSR	Remediation Standard Regulations

PART 1—DECLARATION

I. SITE NAME AND LOCATION

Operable Unit 7 - Area A Weapons Center (Site 20)
Soil and Sediment Operable Unit
Naval Submarine Base New London
CERCLIS ID NUMBER: CTD980906515
Groton, Connecticut

II. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit 7, the Area A Weapons Center (Site 20), at Naval Submarine Base New London (NSB NLON). This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986; and the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on information documented in the Administrative Record which can be reviewed by the public at the public libraries in Groton and Ledyard, Connecticut.

The State of Connecticut Department of Environmental Protection concurs with the selected remedy.

III. ASSESSMENT OF THE SITE

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

IV. DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for Site 20 is Selected Excavation with Asphalt Batching or offsite disposal, Residential Scenario (Alternative 3b). The following major components of the selected remedy are needed to address soil contamination at Site 20:

- Excavation of all soil and sediment containing constituents of concern (COCs) in excess of media-specific residential cleanup goals.

- Offsite asphalt batching of excavated media, or disposal in offsite landfill if asphalt batching is not available in the State of Connecticut at the time of excavation.

- Collection of confirmatory samples.

The selected remedy addresses principal and low level wastes in soil and sediments, including polycyclic aromatic hydrocarbons and inorganic constituents, by Selective Excavation, and Offsite Asphalt Batching or Landfill Disposal. Ground water at Site 20 will be addressed as part of the base-wide Operable Unit and will be addressed under a separate ROD.

V. STATUTORY DETERMINATIONS

The remedy selected for Site 20 satisfies the statutory requirements of Section 121(b)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act in that it is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. The remedy at this site will only satisfy the statutory preference for treatment as a principal element of the remedy if off-site asphalt batching is used to treat the excavated contaminated soil and sediment.

Because this remedy will not result in hazardous substances remaining onsite, 5-year reviews will not be required.

VI. RECORD OF DECISION DATA CERTIFICATION CHECKLIST

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

- COCs and their respective concentrations
- Baseline risks represented by the COCs
- Cleanup levels established for COCs and the basis for the levels
- Current and future land use assumptions used in the baseline risk assessment and ROD
- Land use that will be allowed at the site as a result of the selected remedy
- Estimated capital, operations and maintenance, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected
- Decisive factor(s) that led to selecting the remedy including cost, practicability, and implementability.

VII. AUTHORIZING SIGNATURES AND SUPPORT AGENCY ACCEPTANCE OF REMEDY

This ROD represents the selected remedial action for Operable Unit 7 – Area A Weapons Center (Site 20) at NSB NLON, Groton, Connecticut.

Concur and recommend for immediate implementation.

Department of the Navy

By: _____ Date: 22 JUNE 2000

Captain H. A. Lincoln
Commanding Officer
Naval Submarine Base New London, Groton, Connecticut
U.S. Department of the Navy

This ROD represents the selected remedial action for Operable Unit 7 - Area A Weapons Center (Site 20) at NSB NLON, Groton, Connecticut.

Concur and recommend for immediate implementation.

U.S. Environmental Protection Agency

By: Linda Murphy FOR Date: 6/29/2000

Patricia L. Meaney
Director, Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, New England

PART 2—DECISION SUMMARY

I. SITE NAME, LOCATION, AND BRIEF DESCRIPTION

A. Name and Location

NSB NLON is located in southeastern Connecticut in the Towns of Ledyard and Groton (Figure 2-1). Operable Unit 7, the Area A Weapons Center (Site 20) is located in the northeastern portion of the base, contiguous to the northwestern edge of Area A Wetland and the southeastern end of Triton Avenue. The Area A Weapons Center consists of Building 524 and the southern bunker area (Figure 2-2) and is approximately 23 acres in size.

B. Comprehensive Environmental Response, Compensation, and Liability Act Information Systems Identification Number

The CERCLA Information System identification number for NSB NLON is CTD980906515.

C. Lead Agency

The Navy is the lead agency with regulatory oversight from the U.S. Environmental Protection Agency (EPA) and State of Connecticut Department of Environmental Protection (CTDEP).

D. Site Description

- NSB NLON is an active base owned and operated by the Federal Government through the Department of the Navy. The primary mission of NSB NLON is to provide base command for Naval submarine activities in the Atlantic Ocean.

- NSB NLON is located on approximately 576 acres on the eastern bank of the Thames River, approximately 6 mi north of Long Island Sound. The base provides housing for Navy personnel and their families; submarine training facilities; military offices; medical facilities; and facilities for submarine maintenance, repair, and overhaul.

- Topography of NSB NLON is characterized by four bedrock highs, which form the topographic upland areas on the northern, eastern, and southern portions of the base. One bedrock high, in the center of the base, divides drainage into northern and southern valleys, which drain into the Thames River at the western property boundary.

- Ground surface elevations of the bedrock high reach in excess of 200 ft above mean sea level. Elevations in the northern and southern valley are approximately 80 ft. A sharp 30- to 40-ft elevation drop exists in the eastern portion of the northern valley along the earthen dike where the Area A Wetlands drain to the Area A Downstream

Watercourses. The steep elevation change is due to the construction of a dike and subsequent filling of the current wetland areas with dredge spoils from the Thames River in the late 1950s.

- Current property use surrounding NSB NLON consists of several residential communities, including the towns of Ledyard, Pleasant Valley, and Groton/NSB NLON, within a 1-mi radius of the base.

- Site 20 is located in the northeast portion of the base. The site includes Building 524, located near the top of a bedrock high, and the southern bunker area, located southeast and downhill of Building 524 adjacent to the Area A Wetland. Site 20 consists of three drainage areas (Drainage Areas 1, 2, and 3).

- Building 524 was historically used for administration, minor torpedo assembly, and storage of simulator torpedoes. Chemicals, including cleaning and lubricating compounds, paints, adhesives, and liquid fuels, were used and stored in relatively small amounts at the site. Currently, the bunkers are used for storage of live and simulator torpedoes and missiles.

- Site 20 is located within a high security, restricted area.

- Soils at Site 20 consist primarily of coarse sand, gravel, and rock fill underlain by up to 17 ft of fine-grained dredge spoils.

- Ground water at Site 20 is located in both the overburden soil and the underlying bedrock and flows to the southwest. Ground water is classified as GB, indicating the area has been used for long-term, intense industrial or commercial development. Ground water is not used as a source of drinking water.

A more complete description of Site 20 can be found in the Phase II Remedial Investigation Report (Brown & Root 1997).

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Site Activity History

In 1867, the State of Connecticut donated a 112-acre parcel of land on the eastern bank of the Thames River to the Navy. In 1868, the Navy officially designated the property as a Navy Yard to moor small craft and obsolete war ships and a coal fueling station for the Atlantic Fleet. In 1916, the Navy designated the facility as a submarine base. During World War I, the facility was expanded to 6 piers and 81 buildings. In 1917, a submarine school was established, and the following year the Submarine Medical Center was founded.

Between 1935 and 1945, the Navy constructed more than 180 buildings at the base and acquired additional adjacent land. Following World War II, NSB NLON expanded to include a Medical Research Laboratory. In subsequent years, the Naval Submarine Support Facility and the Naval Undersea Medical Institute were established. Currently, NSB NLON consists of more than 300 buildings and 576 acres of land.

The area of concern described in this ROD is Site 20. Pertinent areas within Site 20 include Building 524 and the Bunker Area.

1. Building 524

- Building 524 was constructed in 1990/1991. Prior to construction, the area was primarily woodlands. Portions of the site were blasted to remove bedrock during construction.

- The building was historically used for administration, minor torpedo assembly, and storage of simulator torpedoes. Chemicals, including cleaning and lubricating compounds, paints, adhesives, and liquid fuels, were used and stored in relatively small amounts at the site.

- Although Building 524 is part of Operable Unit 7, remedial action in this area is not expected because no impacted soil or sediment has been identified.

2. Bunker Area

- The southern bunkers are first evident in aerial photographs from 1969, and the northern area bunker is evident in photographs from 1974 (Brown & Root 1997). The southern bunkers were reconstructed in the mid-1980s, including removal of structurally unsuitable soils (most likely dredge spoils associated with the Area A Wetlands) and subsequent analytical testing of soils, excavations, and ground water was performed.

- Drainage Areas 1, 2, and 3 are located in the southern bunker area.

- Currently, the bunkers are used for the storage of live and simulator torpedoes and missiles.

Future Land Use

Future land use at Site 20 is likely to remain the same. NSB NLON has no plans to cease active base status. However, should the base close or transfer, it is possible that Site 20 may become part of a residential area.

B. History of Federal and State Investigations and Removals and Remedial Actions

- In 1982, an Initial Assessment Study was completed (Envirodyne 1983) as part of the Navy Assessments and Control of Installation Pollutants, to assess the potential for environmental contamination. At that time, Site 20 was not identified as a potential contaminated site and was not investigated.

- In 1992, the Navy completed a Phase I Remedial Investigation (Atlantic 1992). Site 20 was not included in this investigation, although samples were collected in the Area A Wetlands, which is adjacent to Site 20.

- The Phase II Remedial Investigation was completed in 1997 (Brown & Root 1997) and recommended that this site proceed to a Feasibility Study to evaluate a "limited action" effort consisting of a ground-water monitoring program and possibly access/use restrictions.

- In June 2000, a Final Feasibility Study (EA, 2000) for Site 20 was completed identifying potential remedial alternatives.

- On May 17, 2000, the Navy published a Proposed Remedial Action Plan and a public hearing was held on the Proposed Remedial Action Plan on May 23, 2000 presenting the selected remedial alternatives for Site 20.

This ROD presents the selected remedial action discussed in the May 17, 2000 Proposed Remedial Action Plan and addresses the public comments regarding the preferred alternative. Responses to written and oral comments are included in Appendix A of this ROD, the Responsiveness Summary.

C. History of Comprehensive Environmental Response, Compensation, and Liability Act Enforcement

- On August 30, 1990, NSB NLON was placed on the National Priorities List.

- In October and November 1994, the Navy, EPA, and State of Connecticut signed the Federal Facilities Agreement for NSB NLON to ensure that environmental impacts associated with past and present activities at NSB NLON are thoroughly investigated and that appropriate remedial actions are pursued to protect human health and the environment.

III. COMMUNITY PARTICIPATION

A. Public Outreach Effort

Community concern and involvement have been high at NSB NLON. The Navy has kept the community and other interested parties apprized of site activities.

- Prior to 1994, a Technical Review Committee was established and met on a regular basis.
- In 1994, the Navy began the following community relations activities under the Installation Restoration Program:
  - In August 1995 an Administrative Record was established that includes all documents relevant to NSB NLON investigations. The Administrative Record is available at the Public Libraries in Groton and Ledyard.
  - As part of the Installation Restoration Program, a Restoration Advisory Board was established to create forum for Navy, EPA, CTDEP and community representatives to discuss site issues. The Restoration Advisory Board meets quarterly to review the program and receive community input.
  - Key Contact Persons have been designated by the Navy. Mr. Chris Zendin is the designated public affairs officer.
  - A mailing list has been created to distribute information to individuals affected by or interested in remedial activities at NSB NLON. Press releases, public notices, fact sheets, and information updates are issued as needed to the mailing list and the media.
- The Office of Public Affairs periodically conducts site tours for media representatives, local officials, and others.
- A notice of the Proposed Remedial Action Plan was published on May 19, 2000, in the *The New London Day*.
- On May 23, 2000, a public meeting was held to present the Proposed Remedial Action Plan for Site 20.
- From May 17, 2000 to June 15, 2000, a public comment period on the Proposed Remedial Action Plan was held.

- EPA and the Navy's response to public comments and notes from the May 23, 2000 meeting are included in the Responsiveness Summary (Appendix A).

B. Public Outreach Results

The public outreach efforts at NSB NLON have been effective in informing the residents who live near the site. The results of the public outreach effort have been:

- 1 public meeting, with approximately 2 people from the local community in attendance.
- 1 fact sheets and information update newsletters, reaching up to 200 people.
- 1 local newspaper article.
- No written comment letters on the Proposed Remedial Action Plan (Appendix A).

C. Technical Assistance Grants

Technical Assistance Grants from the EPA 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 Technical Assistance Grants have been awarded to any community groups involved with the NSB-NLON.

IV. SCOPE AND ROLE OF RESPONSE ACTION

A. Problems Addressed

Based on the investigations performed by the Navy to date, this ROD addresses soil and sediment contamination at Site 20. Surface water at Site 20 does not present a significant impact to human health or the environment. Ground-water contamination that may exist at the site will be addressed under a separate base-wide ROD for the Ground Water Operable Unit.

Cleanup levels for soil were determined by comparison to the more stringent of Connecticut's Remediation Standard Regulations (RSRs) or Preliminary Remediation Goals (PRGs) based on an excess lifetime cancer risk of 10^{-5}. Cleanup levels in sediment were determined from risk-based 10^{-5} PRGs.

Risk-based PRGs were developed based upon the results of the human health risk assessments (HHRAs). The HHRAs determined the COCs at the site based on carcinogenic risk exceeding 10^{-6} or non-carcinogenic risk exceeding 1.0. Section VII contains a detailed discussion about the HHRAs and COCs. Human health risks were calculated for both industrial and residential scenarios. The industrial scenario addressed potential future construction workers and full-

time employees. The residential scenario took into account potential future resident adults and resident children.

The results of the risk assessment conducted to evaluate potential human health risks resulting from potential exposure to soil at Site 20 indicated the following results:

- COCs in soil were arsenic and benzo(a)pyrene for the industrial scenario and for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene for the residential scenario. Scenario-specific PRGs were developed for these chemicals in soil.

The results of the risk assessment conducted to evaluated potential human health risks resulting from potential exposures to sediments at Site 20 indicated the following results:

- COCs in sediment were arsenic and benzo(a)pyrene for the industrial scenario and for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene for the residential scenario. Scenario-specific PRGs were developed for these chemicals in sediment.

In addition to the calculation of PRGs, cleanup levels for soil also took into account Connecticut RSRs. The RSRs consist of the Residential Direct Exposure Criteria (RDEC), Industrial/Commercial Direct Exposure Criteria (ICDEC), and the Pollutant Mobility Criteria (PMC). Once PRGs were calculated, these values were compared to the RDEC, ICDEC, and PMC, depending upon the scenario. The more stringent of these values was chosen as the cleanup level.

Additional COCs were determined based on comparison to the Connecticut PMC. Three chemicals exceeded the PMC but not the PRGs, RDEC, or ICDEC. Therefore, these chemicals were considered COCs. These additional COCs were benz(a)anthracene and benzo(b) fluoranthene for both residential and industrial scenarios. Chrysene also was determined to be a COC based on comparison to the PMC for the residential scenario. The PMC was determined to be the cleanup level for these additional chemicals.

The following were determined to be COCs:

- COCs in soil for the residential exposure scenario are arsenic, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and dibenz(a,h,)anthracene.

- COCs for the residential exposure scenario in Drainage Area 1 sediment are arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene. No COCs were detected above cleanup levels in Drainage Areas 2 and 3.

In summary, the principal and low level threats addressed in this ROD are:

Source Media	Affected Media	Contaminant(s)	Reason	Maximum Concentration	Receptors
Principal Threats					
None at Site 20	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Low Level Threats					
Stormwater runoff & soil contaminated by Weapons Center operations	Soil, sediment	Polycyclic aromatic hydrocarbons (PAHs)	Limited mobility	6,900 µg/kg	Full-time workers, construction workers, future residents
Stormwater runoff & soil contaminated by Weapons Center operations	Soil, sediment, groundwater	Arsenic	Limited mobility	13.15 mg/kg	Full-time workers, construction workers, future residents

B. Planned Sequence of Action

The following remedial actions are planned for Site 20.

1. Soil and Sediment Contamination

The planned sequence of action with regard to soil and sediment contamination for Site 20 is as follows:

- The Navy will excavate soil and sediment that contain COCs in concentrations exceeding the cleanup levels.

- Soil and sediment will be removed from Drainage Area 1 (Figure 2-3). Soil and sediments in Drainage Areas 2 and 3 are expected to be below cleanup levels and do not require remediation. These areas will be sampled to ensure that all soil and sediment at the Area A Weapons Center are below remediation goals.

- The affected soil and sediment will be temporarily stockpiled onsite.

- Confirmatory soil and sediment samples will be collected from the bottom and sidewalls of the excavation and sent to a laboratory for PAHs and inorganic analyses to confirm that material exceeding the media-specific cleanup levels has been removed. At least 5 samples will be taken at each excavation location (one from the bottom and each sidewall of the excavation) and one sample per 10 ft along the drainage swale. In

addition, one sample per 100 yd^3 of excavated material will be collected for waste characterization.

- The excavated area will be backfilled with clean soil, the drainage swales will be regraded, and disturbed asphalt will be repaired.

- The excavated soil will be treated using thermoplastic stabilization/solidification (*e.g.*, asphalt batching). In the event that asphalt batching is not available, the soil will be disposed at an offsite, licensed disposal facility. The final disposal location will depend on the actual volume excavated (*i.e.*, cost effectiveness) and the results of the waste characterization samples (*i.e.*, determination that the material can be accepted by an asphalt batching facility). Asphalt batching is the preferred disposal option. However, if the necessary offsite Connecticut permits cannot be secured, then transport to an out-of-state disposal facility will be pursued.

- Safety precautions will be taken during excavation, loading, and transporting activities to minimize fugitive dust emissions.

V. SUMMARY OF SITE CHARACTERISTICS

A. Site Overview

- Site 20 is located in the northeast portion of the NSB NLON. It consists of Building 524 and storage bunkers which are adjacent to the Area A Wetland. Site 20 includes three drainage areas (Drainage Areas 1, 2, and 3).

- Site 20 is principally urbanized and runoff is managed via a stormwater system. Runoff is conveyed through a series of grass-lined swales. Drainage swales collect surface runoff from Site 20 and the surrounding hillsides and discharge water into the Area A Wetland, at three locations identified as Drainage Areas 1, 2, and 3 (Figure 2-3).

- Drainage swales run along the northwest side of Drainage Area 1 to a storm sewer that passes along the southern side of the site and discharges into the Area A Wetland.

- The drainage swale along the southeast side of Drainage Area 2 collects runoff from the hillside north of the site and continues in a southeasterly direction, eventually discharging to the Area A Wetland.

- There are no drainage swales in Drainage Area 3. However, there is a storm sewer under the southern bunkers in Drainage Area 3 along the southeast fence that discharges into the Area A Wetland.

- The Area A Wetland serves as a detention basin for Site 20 drainage. Drainage from Area A Wetland is controlled by the dike and culvert elevations that detain water. The culvert has a water control gate that can control water elevation in the wetlands. The Area A Wetland discharges to the Area A Downstream Watercourses and subsequently into the Thames River.

- Building 524 is located near the top of the northern topographic and bedrock high. Ground surface slopes from the northern bedrock high to the south toward the Area A Wetland. To the west and southwest, the ground slopes to a ravine (Area A Downstream Watercourses) and toward the Overbank Disposal Area Northeast.

- Building 524 was historically used for administration, minor torpedo assembly, and storage of simulator torpedoes. Chemicals, including cleaning and lubricating compounds, paints, adhesives, and liquid fuels, were used and stored in relatively small amounts at the site. Currently, the bunkers are used for storage of live and simulator torpedoes and missiles.

- Soils at Site 20 consist primarily of coarse sand, gravel, and rock fill underlain by up to 17 ft of fine-grained dredge spoils.

- Bedrock at Site 20 consists of the granitic gneiss. Bedrock generally slopes to the southwest, toward the valley occupied by the Area A Wetland. Localized bedrock depression(s) are present at Site 20, most likely caused by blasting associated with construction of Building 524.

- Ground water is present in both the overburden soil and in the bedrock underlying Site 20. Overburden ground water is primarily found within the dredge material, with only the lowermost few feet of the coarser-grained fill deposits saturated. Ground water in the overburden and bedrock flows across Site 20 to the southwest. Figure 2-4 shows the inferred ground-water flow patterns at Site 20. The depth to the ground-water table varies from 0 to 15 ft across Site 20. Based on ground-water data collected during the Phase II Remedial Investigation, a downward gradient exists from the overburden to the bedrock aquifer.

- Ground water is characterized as GB indicating that the area has been used for long-term, intense industrial or commercial development. Ground water is not used as a source of drinking water at Site 20.

- Site 20 is located within a high security, restricted area.

- Full time employees and construction workers are the populations most likely to be exposed to Site 20 contamination. Potential future residents are also considered as a conservative measure.

- Site 20 does not have high ecological habitat value, consisting primarily of impervious surfaces with some maintained grass. Primary ecological populations at Site 20 include soil invertebrates, birds, and small mammals.

B. Contamination Sources and Sampling Strategies

Media sampled during the Remedial Investigation include surface soils, subsurface soils, sediments, ground water, and surface water. The Remedial Investigation identified the following potential sources of contamination:

Contaminant Type	Media Affected	Suspected Source
PAHs	Soil and sediment	Runoff/discharge from the northern portions of Site 20; Area A Weapons Center activities and spills
Arsenic	Soil and sediment	Runoff from northern portions of Site 20.

Sampling strategies from the Remedial Investigation are presented in Table 2-1. This table presents a summary of sampling and analytical program.

C. Type of Contamination and Affected Media

Chapter 1 of the Feasibility Study contains an overview of the Remedial Investigation. The following text details significant findings of the Remedial Investigation.

Soil and Sediment

Soil and sediment at Site 20 have been impacted by PAHs and arsenic. Contamination is most likely due to urbanized runoff from the northern portion of the base. Migration of these contaminants has the potential to impact other media including surface water and ground water.

Surface Water

To date, no significant impacts to surface water at Site 20 have been identified.

Ground Water

Ground water at Site 20 will be addressed under the base-wide groundwater operable unit (OU9).

D. Known or Potential Routes of Migration

The fate of chemical contaminants at Site 20 is as follows:

Soil

- PAHs in soil are relatively immobile and have low solubility in water
- PAHs are likely to adsorb to soils and migrate via soil erosion
- Surface and ground-water analytical data have indicated that Site 20 is not currently a source of contamination at downstream or downgradient locations.

Sediment

- PAHs in sediment are relatively immobile and have low solubility in water
- There is a potential for sediments to be transported downstream into the Area A Wetland via the drainage swale.

E. Conceptual Site Model

Sources of contamination, release mechanisms, exposure pathways to receptors, and site-specific factors have been diagramed and displayed on Figure 2-5 with a conceptual site model for soil and sediment. The conceptual site model presents all current and future site conditions identified in the Phase II Remedial Investigation (Brown & Root 1997). Based on the human health and ecological risk assessments presented in the Remedial Investigation, not all migration routes and receptors shown on the conceptual site model were determined to have unacceptable risk levels. As a result, the PRGs, presented in the ROD, only take into account those migration routes and receptors that had unacceptable risk levels. A complete discussion of the conceptual site model can be found in the Phase II Remedial Investigation (Brown & Root 1997).

F. Principal and Low Level Threat Wastes

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Low level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Principal and low level threat wastes at Site 20 are summarized in the following table:

Source Media	Affected Media	Contaminant(s)	Reason	Maximum Concentration	Receptors
Principal Threats					
None at Site 20	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Low Level Threats					
Stormwater runoff	Soil, sediment	PAHs	Limited mobility	6,900 µg/kg	Full-time workers, construction workers, future residents
Stormwater runoff	Soil, sediment	Arsenic	Limited mobility	13.15 mg/kg	Full-time workers, construction workers, future residents

1. Soil Contamination

Soils at Site 20 are considered to represent a low level threat based on the following:

- The primary COCs in soil are PAHs and arsenic, which are commonly associated with urban runoff from paved areas.
- Contamination is limited to localized areas. Based on the extent of COCs, the estimated amount of contaminated soil is 110 yd^3 (Figure 2-6).
- Calculated cancer risks for soils are within EPA's acceptable risk range for the future resident. However, calculated cancer risks exceed the State's acceptable level of 10^{-6} for individual contaminants and 10^{-5} for the collective risk posed by multiple contaminants. Non-carcinogenic risks for soils do not exceed a hazard index (HI) of 1.0 for the construction worker and the future resident.
- Site 20 is currently a high security, restricted access area.
- Soil contamination has not been shown to impact groundwater, but will be further evaluated as part of a separate Basewide Groundwater study.

2. Sediment Contamination

Contamination associated with sediments is considered to represent a low-level threat based on the following:

- The primary COCs in sediments are PAHs.
- Contamination is limited to localized areas. Based on the extent of COCs, the estimated amount of contaminated sediment is 89 yd^3 (Figure 2-6).

- Calculated cancer risks are within EPA's acceptable risk range from 10^{-6} to 10^{-4}. However, calculated cancer risks exceed the State's acceptable level of 10^{-6} for individual contaminants and 10^{-5} for the collective risk posed by multiple contaminants. Non-carcinogenic risks do not exceed a HI of 1.0. However, the sediments could pose an ecological threat to downstream waterbodies.

- Site 20 is currently a high security, restricted access area.

3. Surface Water Contamination

Surface water at Site 20 has not been adversely impacted and does not require remediation. Therefore, surface water is not included in the remedial component of this ROD.

4. Ground-Water Contamination

Ground water at Site 20 will be addressed under the base-wide groundwater operable unit (OU9). Therefore, ground water is not included in the remedial component of this ROD.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Current and potential future site and resource uses are summarized in the following table:

Resource	Current Onsite Use	Current Adjacent Use	Potential Use	Potential Use Basis	Potential Use Time Frame
Soil Sediment	Weapon storage	Wildlife (Area A Wetland; Area A Downstream; woodlands) & recreational activities	Industrial or Residential	NSB NLON plans to remain active. If it should close, Site 20 could become a residential area	Unknown
Overburden Ground Water	None	None	Minimal potable use potential	GB designation	Unknown
Bedrock Ground Water	None	None	Minimal potable use potential	GB designation	Unknown
Surface Water	None	Thames River, transportation, recreation	None	None	Not applicable

Currently, NSB NLON is operated by the Department of the Navy. There are no plans to cease active base operations at NSB NLON. Should the base close, the re-use of Site 20 will be assessed through the base closure process.

VII. SUMMARY OF SITE RISKS

A baseline risk assessment was completed as part of the Phase II Remedial Investigation at Site 20. The purpose of this risk assessment was to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants in soils and sediment at Site 20, assuming no remedial action was taken. The Phase II Remedial Investigation risk assessment did not address sediment. Therefore, an additional risk assessment was conducted as part of the Feasibility Study (EA 2000). The risks identified during the risk assessments provide the basis for taking the remedial action described in this ROD. The risk assessments identify the contaminants and exposure pathways that must be addressed by the remedial action.

The Phase II Remedial Investigation evaluated risk to ecological receptors at Site 20. The onsite risk to ecological receptors was determined to be negligible. The ecological risk assessment is discussed further in Part B below.

The HHRAs follow a 4-step process: (1) contaminant identification that identified those hazardous substances which, given the specifics of the site, were of potential concern; (2) exposure assessment that identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; (3) toxicity assessment that considered the types and magnitude of adverse health effects associated with exposure to hazardous substances; and (4) risk characterization that integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks. A summary of those aspects of the HHRAs that support the need for remedial action is discussed in Part A below.

A. Human Health Risk Assessment

The HHRAs were conducted in accordance with regional and EPA guidance and were approved by EPA Region I (Brown & Root 1997; EA 2000). The results of the HHRAs were used to determine risk-based PRGs for Site 20. Figure 2-7 depicts the PRG development process flow diagram, including the role of the HHRA. The details of the HHRAs are discussed below.

Chemicals of potential concern (COPCs) were determined in the screening assessment portion of the HHRAs based on frequency of detection, toxicity, concentration, and mobility and persistence in the environment. As a conservative measure, EPA Region III risk-based concentrations for industrial soil and residential soil were employed for the screening analysis for both soil and sediment.

Human health risks were calculated for exposures to COPCs identified in soil and sediment for the following scenarios: industrial (construction worker, full-time employee) and residential (adult, child). Exposure pathways were incidental ingestion of soil, dermal contact with soil,

inhalation of soil particles, incidental ingestion of sediment, and dermal contact with sediments. Risks were calculated using reasonable maximum exposure assumptions. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present use, potential future uses, and location of the site. Appendix F.7 of the Phase II Remedial Investigation Report (Brown & Root 1997) and Appendix B of the Feasibility Study (EA 2000) shows a summary of all COPCs, exposure point concentrations used to evaluate the reasonable maximum exposure scenario, and estimates of average or central tendency exposure concentrations.

Potential human health effects associated with exposure to these COPCs were estimated quantitatively or qualitatively through the development of several exposure pathways. Risks for full-time employees were based on exposure to surface soil (0-4 ft bgs), and construction worker and residential risks were based on exposure to total soil. Total soil encompassed both surface and subsurface soil (to 10 ft) data. Risks for construction workers, full-time employees, and residents were based on exposure point concentrations that were based on all sediment samples. A more thorough description of all exposure pathways evaluated in the risk assessment can be found in Appendix Q of the Remedial Investigation (Brown & Root 1997) and in Appendix B of the Feasibility Study (EA 2000).

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

EPA's generally acceptable risk range for site-related exposure is from 10^{-4} to 10^{-6}. CTDEP's incremental carcinogenic guideline is 1×10^{-6} for individual contaminants, and 1×10^{-5} for the cumulative risk posed by multiple contaminants. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. All COPCs that represented a risk greater than 10^{-6} were considered further in the Feasibility Study as COCs at Site 20.

In assessing the potential for adverse effects other than cancer, a hazard quotient is calculated by dividing the daily intake level by the reference dose or other suitable benchmark. Reference doses have been developed by EPA, and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. Reference doses are derived from epidemiological or animal studies and incorporate uncertainty factors to

ensure that adverse health effects will not occur. A hazard quotient less than one indicates that a receptor's dose of a single contaminant is less than the reference dose, and that toxic non-carcinogenic effects from that chemical are unlikely. The HI is generated by adding the hazard quotients for all COPCs that affect the same target organ (e.g., liver) within or across all media to which a given individual may reasonably be exposed. A HI less than one indicates that toxic non-carcinogenic effects are not likely. All COPCs with a hazard quotient greater than one were considered further in the Feasibility Study as COCs.

Table 2-2 presents each COC and its exposure point concentration for soil and sediment. This table includes the maximum concentrations detected for each COC, the frequency of detection, the exposure point concentration, and how the exposure point concentration was derived. The maximum concentration for each COC was used to determine the reasonable maximum risk estimate at Site 20.

Human Health Risk Assessment Results

1. Baseline Risk Assessment

The baseline risk assessment conducted during the Phase II Remedial Investigation to evaluate potential human health risks resulting from potential exposures at Site 20 indicated the following results:

- Cumulative non-cancer HIs were above EPA's risk target of HI = 1.0 for the construction worker and future resident. Therefore, there are concerns for potential risks from exposure to non-carcinogens.

- Cumulative cancer risks estimated for full-time employees were 6.1×10^{-6}, and cumulative cancer risks estimated for future residents were 6.7×10^{-4}.

2. Soil

The risk assessment conducted during the Feasibility Study to evaluate potential human health risks in soil resulting from potential exposures at Site 20 indicated the following results:

- Cumulative non-cancer HIs were below EPA's risk target of HI = 1.0 for the construction worker and the future resident. Therefore, there are no concerns for potential risks from exposure to non-carcinogens in soil.

- Cumulative cancer risks estimated for full-time employees were 5.6×10^{-6}, and individual cancer risks exceeded 10^{-6} for arsenic and benzo(a)pyrene. Cumulative cancer risk estimated for future residents were 1.4×10^{-5}. Individual cancer risks exceeded 10^{-6} for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene. Therefore, these three analytes were considered COCs.

3. Sediment

The risk assessment conducted during the Feasibility Study to evaluate potential human health risks in sediment resulting from potential exposures to sediments at Site 20 indicated the following results:

- Cumulative non-cancer HIs for all receptors were below EPA's risk target of HI = 1.0. Therefore, there are no concerns for potential risks from exposures to non-carcinogens in sediment.

- Cumulative cancer risk for full-time employees was 4.9×10^{-6}. Arsenic and benzo(a)pyrene have individual cancer risks exceeding 10^{-6}. Cumulative cancer risk estimates for potential future residents were 1.8×10^{-5}. Individual cancer risk estimates exceeded 10^{-6} for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene. Therefore, these three analytes were considered COCs.

Table 2-3 provides a cancer toxicity data summary for the COCs in soil and sediment. Table 2-4 provides carcinogenic risk estimates for the significant routes of exposure at Site 20. Tables presenting non-carcinogenic toxicity parameters and results were not applicable owing to the lack of non-carcinogenic COCs. These risk estimates are based on reasonable maximum exposure assumptions and were developed by taking into account various conservative assumptions about the frequency and duration of an exposure to soil and sediment, as well as the toxicity of carcinogenic PAHs and inorganic compounds. Exposure point concentrations were derived as the 95 percent upper confidence limit of the mean concentration of a contaminant in all samples.

Human Health Risk-Based Preliminary Remediation Goals

Figure 2-7 depicts the PRG process flow diagram. Risk-based PRGs were developed for each COC which had human health risk estimates in excess of 10^{-6} or an HI exceeding 1.0 for soil and sediment at Site 20. The PRGs were developed in the Feasibility Study (EA 2000). PRGs are risk-based concentrations in media of concern which correspond to a given human health risk level. At Site 20, soil and sediment are the media of concern for which risk-based PRGs were derived using the following equation:

$$\text{PRG} = \text{Exposure Point Concentrations} \cdot \text{Target Risk Level/Calculated Risk Value}$$

There were no individual COCs in soil or sediment with HIs exceeding 1.0, therefore, PRGs were not necessary for non-carcinogens. For carcinogenic COCs, PRGs were derived to correspond to risk levels of 10^{-6}, 10^{-5}, and 10^{-4}.

Risk Assessment Uncertainties

Risk assessment uncertainties identified in the HHRAs may include the following factors:

- Extrapolation from animal studies to quantify chemical-specific toxicological parameters
- Variability within the human population of sensitivity to toxic effects
- Conservative assumptions for exposure parameters.

To minimize the impact of these uncertainties on the outcome of the risk assessment, realistic lower and upper bounds of the risk are provided for each exposure scenario. These numbers are not indices of absolute risk, but rather a range that should include the actual risk. Thus, PRGs were derived to correspond to risk levels of 10^{-6}, 10^{-5}, and 10^{-4}.

B. Ecological Risks

The Phase II Remedial Investigation ecological risk assessment evaluated risk to ecological receptors at Site 20. Because the onsite risk to ecological receptors was determined to be negligible, quantitative PRGs for ecological risk were not necessary. However, recognizing that the drainage flows into the Area A Wetland, a remedial goal to minimize potential transport of COCs for the three drainage areas in the Area A Wetland and the Area A Downstream Watercourses is recommended.

C. Basis for Response Action

The Response Action for Site 20 is based on the following:

- The baseline HHRA revealed that full-time workers, construction workers, and future residents may potentially be at risk if exposed to COCs in soils or sediments via dermal contact or incidental ingestion.
- If not addressed by implementing the selected remedy in this ROD, these factors may present an imminent and substantial danger to human health or the environment.

VIII. REMEDIAL ACTION OBJECTIVES

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA established several other statutory requirements and preferences, including: a requirement that the Navy's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria, or limitations, unless a waiver is invoked; a requirement that the Navy select a remedial action that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for

remedies in which treatment which permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substance as a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the development and screening of alternatives. These remedial action objectives were developed to mitigate existing and potential future threats to public health and the environment. The remedial action objectives for Site 20 are to:

- Minimize potential human exposure to COCs above cleanup levels presented in Table 2-5. The cleanup levels will ensure that carcinogenic risk levels do not exceed 1×10^{-5}, and non-carcinogenic risks do not exceed a HI of 1.0.

- Minimize the potential migration of COCs from soil into ground water. This is accomplished through consideration of Connecticut's PMC.

- Minimize potential transport of COCs from the Area A Weapons Center into the Area A Wetlands or the Area A Downstream Watercourses.

The remedial action objectives are the most practical for Site 20 based on current and reasonably anticipated exposure routes and future land use considerations.

IX. DEVELOPMENT AND SCREENING OF ALTERNATIVES

CERCLA and the National Contingency Plan set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives was developed for Site 20. With respect to a soil and sediment response action, the Remedial Investigation/Feasibility Study developed a limited number of remedial alternatives that attain site-specific remediation levels within different time frames using different technologies; and a No Action alternative.

As discussed in Chapter 3 of the Feasibility Study (EA 2000), soil and sediment treatment technology options were identified, assessed, and screened based on implementability, effectiveness, and cost. These technologies were combined into source control and management of migration alternatives. Chapter 4 of the Feasibility Study presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the National Contingency Plan. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in the Feasibility Study.

Of the remedial alternatives screened in Chapter 4 of the Feasibility Study, four alternatives were retained as possible options for cleanup at the site. This section presents a description of the four remedial alternatives considered for Site 20:

- Alternative 1—No Action
- Alternative 2—Institutional Controls and Monitoring
- Alternative 3a—Selective Excavation, Asphalt Batching or Offsite Disposal, and Institutional Controls and Monitoring (Industrial Scenario).
- Alternative 3b—Selective Excavation, and Asphalt Batching or Offsite Disposal (Residential Scenario).

A. Alternative 1—No Action

Under the No Action alternative, no remedial action would be implemented. This alternative would not require any remedial activity, long-term monitoring, or institutional controls. The No Action alternative is required by CERCLA to serve as a baseline for comparison. The No Action alternative does not meet the remedial action objectives for Site 20 because it would not prevent exposure to affected soil and sediments nor prevent migration of COCs. Hence, the No Action alternative is not protective of human health and the environment.

In accordance with CERCLA Section 121(c), the Navy would conduct 5-year reviews as long as COCs remain onsite above concentrations that allow for unrestricted use and unlimited exposure. Under Alternative 1, 5-year reviews would be required. Costs associated with 5-year reviews are reflected in the present worth cost analysis below.

-Estimated Time for Design and Construction:	N/A
-Estimated Time for Operation:	N/A
-Estimated Capital Cost:	$0
-Estimated Annual Operations and Maintenance (Present Worth):	$0
-Estimated Total Cost (30-Year Present Worth):	$142,500

Applicable or Relevant and Appropriate Requirements for the No Action alternative are presented in Appendix B.

B. Alternative 2—Institutional Controls and Monitoring

To address soil and sediment contamination at Site 20, this alternative would include the following:

- The Navy will establish an Environmental Land Use Restriction (ELUR) which will consist of institutional controls to control contact with COCs in soil and sediment. The metes and bounds of the areas subject to the ELUR will be surveyed and delineated on the Base Master Plan and any subsequent deed, lease or other property transfer document.

- Under the State Remediation Standards, ELURs cannot be established until a deed is created for the parcel. Because there are no deeds currently for NSB NLON, the ELUR would instead be recorded on the Base Master Plan. Furthermore, there will be a requirement written into the ELUR and the ROD that if the site were ever sold or leased, upon creation of the deed or lease, the ELUR would be recorded in accordance with applicable federal, state, and local standards.

- The ELUR would: (1) prevent future human contact with COCs in soil and sediment, (2) prevent removal of asphalt over areas where COCs in soil exceed PMC, and (3) specify the use of personal protective equipment for maintenance work within the areas delineated under the ELUR as containing contaminated media above regulatory standards.

- ELURs would cover the extent of Site 20 and be maintained for as long as COCs are present above Connecticut RSRs and/or risk-based PRGs. Unless additional remediation is undertaken, Site 20 could not be redeveloped for residential land use.
- The Navy would implement a tiered monitoring program to demonstrate that COC concentrations are stable or decreasing and not adversely impacting the environment (particularly downgradient areas via transport of impacted sediment in drainage ditches).

- The tiered monitoring program would include sediment and surface water sampling on an annual basis for 5 years. It is anticipated that soil sampling will be required on a biannual basis because the site is largely paved and the primary migration route for COCs at Site 20 is via the drainage channels. A 5-year review will be conducted to assess the site and analyze sample results. It is anticipated that the frequency of monitoring may be reduced after the initial 5-year review. The reduction in sample frequency will be evaluated by EPA and CTDEP, with EPA approval required to change the monitoring requirement. Samples will be analyzed for PAHs and inorganics.

- Ground-water sampling will be considered as part of the separate Feasibility Study for the ground-water operable unit at NSB NLON.

- Five-year reviews

Applicable or Relevant and Appropriate Requirements for Alternative 2 are presented in Appendix B.

Five-Year Review

In accordance with CERCLA Section 121(c), the Navy would conduct 5-year reviews as long as COCs remain onsite above concentrations that allow for unrestricted use and unlimited exposure. Under Alternative 2, 5-year reviews would be required because COC concentrations above the Connecticut RSRs and/or the risk-based PRGs would remain in soil and sediment. The 5-year reviews would focus on compliance with the ELUR, the future site use (anticipated to remain an active Naval base), and would evaluate the site status through site visits and data from the monitoring program to determine whether further action is warranted.

Alternative Characteristics

Estimated Time for Design and Construction:	Up to 1 year
Estimated Time for Operation:	Up to 30 years
Estimated Capital Cost:	$12,000
Estimated Annual Operations and Maintenance (30-Year Present Worth):	$246,100
Estimated Total Cost (30-Year Present Worth):	$258,100

C. Alternative 3a—Selective Excavation, Asphalt Batching or Offsite Disposal, and Institutional Controls and Monitoring for Industrial Land Use Scenario (Industrial Scenario)

This alternative addresses soil and sediment contamination at Site 20 to meet the current industrial land use scenario. For Alternative 3a, the following generalized remedial activities will be conducted:

- Excavation of soil and sediment found to contain COCs in concentrations exceeding the media-specific cleanup levels generated assuming a future industrial scenario.

- Collection of confirmatory soil and sediment samples from the bottom and sidewalls of the excavations. Samples will be analyzed for PAHs and inorganics to confirm that material exceeding the media-specific cleanup levels has been removed. The excavated area will then be backfilled with clean fill, the drainage swales will be regraded, and any disturbed asphalt will be repaired.

- Excavated soil and sediment would either be disposed at an offsite, licensed disposal facility or treated using thermoplastic stabilization/solidification (*i.e.*, asphalt batching). The final disposal facility will depend on the actual total volume that is excavated (*i.e.*, cost effectiveness) and the results of the waste characterization samples (*i.e.*,

determination that the material can be accepted by an asphalt batching facility). Asphalt batching is the preferred disposal option.

- Soil located at 2WCTB2 from 0 to 2 ft bgs (under pavement) would be included in the selective excavation to achieve the cleanup levels.

- Soil and sediment from Drainage Areas 2 and 3 do not exceed cleanup levels. Therefore, no excavation is required in these areas.

- It is anticipated that an approximate total of 2 yd^3 of soil and sediment will be removed to achieve compliance with this alternative's cleanup levels.

- Because COCs are left in-place above residential cleanup levels, an ELUR, a monitoring program, and 5-year reviews will be implemented similar to those described in Alternative 2.

Applicable or Relevant and Appropriate Requirements for Alternative 3a are presented in Appendix B.

Five-Year Review

In accordance with CERCLA Section 121(c), the Navy would conduct 5-year reviews as long as COCs remain onsite above concentrations that allow for unrestricted use and unlimited exposure. Under Alternative 3a, 5-year reviews would be required. The 5-year reviews would focus on compliance with ELURs, the future site use (anticipated to remain an active Naval base), and would evaluate the site status through site visits and data from the monitoring program to determine whether further action is warranted.

Alternative Characteristics

The costs outlined below assume the excavated materials are taken offsite for asphalt batching:

Estimated Time for Design and Construction:	1 year
Estimated Time for Operation:	Up to 30 years
Estimated Annual Operations and Maintenance (30-Year Present Worth):	$185,400
Estimated Total Cost (30-Year Present Worth):	$217,800

The costs outlined below assume the excavated materials are sent offsite for disposal (landfill):

Estimated Time for Design and Construction:	1 year
Estimated Time for Operation:	Up to 30 years
Estimated Capital Cost:	$32,400

- 30-Year Present Worth of Operations and Maintenance: $185,400
- 30-Year Net Present Worth Costs: $217,700

D. Alternative 3b—Selective Excavation, and Asphalt Batching or Offsite Disposal for Residential Land Use Scenario (Residential Scenario)

This alternative addresses soil and sediment contamination at Site 20 to meet the future residential land use scenario. For Alternative 3b, the following generalized remedial activities will be conducted:

- Excavation of soil and sediment found to contain COCs in concentrations exceeding the residential media-specific cleanup levels, and removal of the affected soil and sediment from Site 20. Sediment located at 2WCSD3 from 0 to 1 ft bgs, soil located at 2WCTB2 from 0 to 2 ft bgs (under pavement), soil located at 2WCTB3 from 4 to 6 ft bgs (under pavement), and soil at 2WCTB5 from 6 to 8 ft would be included in the selective excavation to achieve residential cleanup levels.

- Sediments from Drainage Areas 2 and 3 are not expected to exceed the cleanup levels; therefore, no further excavation is anticipated.

- Collection of confirmatory soil and sediment samples from the bottom and sidewalls of the excavation. Samples will be analyzed for PAHs and inorganics to confirm that material exceeding the media-specific cleanup levels has been removed. The excavated area will be backfilled with clean fill, the drainage swales will be regraded, and disturbed asphalt will be repaired.

- Excavated soil will either be disposed at an offsite, licensed disposal facility or treated using thermoplastic stabilization/solidification (*i.e.*, asphalt batching), depending on the actual total volume that is excavated (*i.e.*, cost effectiveness) and the results of the waste characterization samples (*i.e.*, determination that the material can be accepted by an asphalt batching facility). Asphalt batching is the preferred disposal option.

- It is anticipated that an approximate total of 199 yd^3 of soil and sediment will be removed to achieve compliance with this alternative's cleanup levels under the future residential land use scenario.

- This alternative would eliminate potential future overland transport of COCs.

Applicable or Relevant and Appropriate Requirements for the Alternative 3b are presented in Appendix B.

Five-Year Review

No 5-year review is required for Alternative 3b as all COCs above residential cleanup levels will be removed and no hazardous substances will be left in place.

Capital costs for Alternative 3b primarily consist of excavation, asphalt batching/offsite disposal, and site restoration. No operations and maintenance costs are anticipated to be associated with Alternative 3b.

Alternative Characteristics

The costs outlined below assume the excavated materials are sent offsite for asphalt batching:

Estimated Time for Design and Construction:	1 year
Estimated Time for Operation:	1 year
Estimated Capital Costs:	$63,300
30-Year Present Worth of Operations and Maintenance:	$0
30-Year Net Present Worth Costs:	$63,300

The costs outlined below assume the excavated materials are sent offsite for disposal (landfill):

Estimated Time for Design and Construction:	1 year
Estimated Time for Operation:	1 year
Estimated Capital Costs:	$81,200
30-Year Present Worth of Operations and Maintenance:	$0
30-Year Net Present Worth Costs:	$81,200

X. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, are required in considering assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan articulated nine evaluation criteria to be used in assessing the individual remedial alternatives.

A. Evaluation Criteria Used for Comparative Analysis

A detailed analysis was performed on the alternative using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows.

1. **Threshold Criteria**

The two threshold criteria described below must be met in order for the alternative to be eligible for selection in accordance with the National Contingency Plan:

a. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

b. **Compliance with ARARs** addresses whether or not a remedy will meet all of the ARARs of other federal and state environmental and facility siting laws and/or provides grounds for invoking a waiver.

2. **Primary Balancing Criteria**

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

a. **Long-term effectiveness and permanence** assesses alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

b. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

c. **Short-term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup levels are achieved.

d. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

e. **Cost** includes estimated capital and operations and maintenance costs, as well as present worth costs.

3. Modifying Criteria

a. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

b. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Remedial Action Plan and Remedial Investigation/Feasibility Study report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted as shown below:

Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls and Monitoring	Alternative 3a Selective Excavation, Asphalt Batching or Offsite Disposal, and Institutional Controls and Monitoring (Industrial Scenario)	Alternative 3b Selective Excavation, Asphalt Batching or Offsite Disposal, and Institutional Controls and Monitoring (Residential Scenario)
Overall protection of human health and the environment	No	No	Yes	Yes
Compliance with ARARs	No	No	Yes	Yes
Long-term effectiveness and permanence	No	No	Yes	Yes
Reduction of toxicity, mobility, or volume through treatment	No	No	Yes, if asphalt batching is used	Yes, if asphalt batching is used
Short-term effectiveness	No	No	Yes	Yes
Implementability	Yes	Yes	Yes	Yes
Cost	$142544	$258,100	$217,800 (asphalt batching) $217,700 (landfill)	$63,312 (asphalt batching) $81,200(landfill)
State acceptance	No	No	Yes	Yes
Community acceptance	No	No	No	Yes

NOTE: Yes indicates the alternative meets the intent of the criteria.
No indicates the alternative partially meets the intent of the criteria or indicates the alternative does not meet the intent of the criteria.

B. Summary of the Comparative Analysis

The section below presents the nine criteria and a brief narrative of the alternative, strengths, and weaknesses according to the detailed and comparative analysis. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

1. Overall Protection to Human Health and the Environment

This criterion addresses each alternative's ability to provide protection to human health and the environment and describes how risks are reduced, controlled, or eliminated through engineering or institutional controls.

- Alternative 1 provides no protection to human health and the environment as it does nothing to prevent possible contact with contaminants.

- Alternative 2 provides limited protection to human health and the environment through the use of institutional controls and monitoring.

- Alternatives 3a and 3b provide the best protection of human health and the environment by excavation and offsite disposal of contaminated soils and sediments at Site 20. However, Alternative 3b provides the overall best protection of human health and the environment due to excavation of COCs to residential levels. Confirmatory samples will be collected to verify that cleanup levels were met.

2. Compliance with Applicable or Relevant and Appropriate Requirements

- Alternative 1 does not comply with ARARs as COCs above ARARs will remain onsite.

- Alternative 2 does not comply with ARARs as COCs above ARARs will remain onsite.

- Alternatives 3a and 3b comply with ARARs identified for Site 20 by removing impacted media from the site. Alternative 3a may result in some COCs above residential cleanup levels. However, an ELUR would prohibit residential redevelopment of the property.

3. Long-Term Effectiveness and Permanence

This criterion refers to the ability of a remedial action to protect human health and the environment over time.

- Alternative 1 would provide no long-term effectiveness.

- Alternative 2 would provide limited long-term effectiveness though institutional controls.

- Alternatives 3a and 3b provide both long-term effectiveness and permanence by removing impacted media from the site. An ELUR would be established under Alternative 3a which would prohibit residential redevelopment of the site.

4. Reduction in Toxicity, Mobility, or Volume Through Treatment

This criterion addresses the performance of treatment technologies implemented by the remedial action.

- Alternatives 1 and 2 do not use engineered treatment methods.

- Alternatives 3a and 3b reduce toxicity, mobility, or volume by excavation and removal of impacted media only if asphalt batching is used. If asphalt batching is approved for excavated material, these alternatives would result in the reduction of toxicity, mobility, and volume through the use of treatment. However, if asphalt batching is not implementable, Alternatives 3a and 3b would not be effective in reducing the toxicity, mobility, or volume of COCs through the use of treatment.

5. Short-Term Effectiveness

Short-term effectiveness deals with the period of time needed to achieve remediation goals, including any deleterious impacts that may be caused by the construction and implementation period.

- Alternative 1 does not provide short-term effectiveness because no action will be taken to address existing risks. Remediation goals will not be met.

- Alternative 2 would have moderate short-term effectiveness. This alternative would pose no new threats to the environment since the only disturbances to the site would involve monitoring activities, but existing risks would remain and remediation goals would not be met.

- Alternatives 3a and 3b would also have moderate short-term effectiveness. Both alternatives would require excavation that could introduce contamination to the environment or site workers. With the use of proper engineering practices during excavation (e.g., dust control, safety controls, and personal protective equipment), no adverse impacts to site worker, the community, or the environment are anticipated.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedial action:

- Alternative 1 provides the best implementability because no action will be instituted.

- Alternative 2 is readily implementable because the required monitoring can easily be established.

- Alternatives 3a and 3b would be reasonably implementable but with some difficulties because of ongoing base operations and existing surface cover. In addition, the availability and implementability of asphalt batching is questionable. If asphalt batching is not available during the remedial action, excavated material will be disposed in a landfill. Landfill disposal is readily implementable and sufficient landfill capacity exists to handle waste from Site 20.

7. Cost

This criterion estimates the monetary cost of the proposed alternatives, over a 30-year period:

- Alternative 3b is the most cost effective ($63,300 asphalt batching, $81,200 landfill)
- Alternative 1 would cost $142,544
- Alternative 2 has the highest cost ($258,100)
- Alternative 3a would cost between $217,800 (asphalt batching) and $217,700 (landfill).

8. State Acceptance

This criterion includes the state/support agency preference, comments, and/or support of the selected remedial alternative:

- Alternative 1 - Not acceptable because CTDEP regulations would not be met and because it is not protective of human health and the environment.
- Alternative 2 - Not acceptable because CTDEP regulations would not be met and because it is not protective of human health and the environment.
- Alternative 3a - Acceptable because CTDEP regulations would be met.
- Alternative 3b - Acceptable because CTDEP regulations would be met. Preferred because of its long-term effectiveness and permanence.

9. Community Acceptance

This criterion includes the community preference, comments, and/or support of the selected remedial alternative:

- Alternative 1 - The community does not accept this alternative because it is not protective of human health and the environment.
- Alternative 2 - The community does not support this remedy because it is not cost-effective.
- Alternative 3a - The community does not support this remedy because it is not cost-effective.
- Alternative 3b - The community supports this remedy because it is effective over the long-term and is cost-effective.

XI. THE SELECTED REMEDY

Alternative 3b, Selective Excavation and Asphalt Batching or Offsite Disposal (Residential Scenario), is the selected remedy for Site 20. An expected outcome of the selected remedy is that Site 20 will no longer present an unacceptable risk to humans or the environment. The selected remedy will treat the low level threats associated with site contaminants. The amount of time necessary to achieve the goals consistent with potential future residential use is within 1 year.

A. Soil and Sediment Cleanup Levels

Soil and sediment cleanup levels have been established to be the more stringent of either the RSR (PMC, RDEC, or ICDEC), or the 10^{-5} risk-based PRGs as calculated in the Feasibility Study (EA 2000). Cleanup levels are presented in Table 2-5.

B. Description of Remedial Components

Selective excavation will be conducted to remove contaminated soil and sediment. The following soils and sediments will be excavated in order to achieve the residential scenario cleanup levels:

- **Drainage Area 1**—Sediment with PAH (benzo[a]pyrene) concentrations in excess of cleanup levels is located at 2WCSD3 from 0 to 1 ft bgs. Soil with PAH concentrations (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and chrysene) in excess of cleanup levels is located at 2WCTB2 from 0 to 2 ft bgs (under pavement). Soil with arsenic concentrations in excess of cleanup levels is located at 2WCTB3 from 4 to 6 ft bgs (under pavement), and at 2WCTB5 from 6 to 8 ft.

- **Drainage Area 2**— Soil concentrations are not expected to exceed cleanup levels but will be sampled to ensure that the remediation goals are met.

- **Drainage Area 3**—Soil concentrations are not expected to exceed cleanup levels but will be sampled to ensure that the remediation goals are met.

Based on the locations and depths of COCs, it is anticipated that a total of approximately 199 yd^3 of soil and sediment will be removed under Alternative 3b to achieve compliance with the cleanup levels under the future residential land use scenario.

1. Five-Year Review

Under Alternative 3b, contamination above media specific cleanup levels will be removed from the site. Therefore, 5-year reviews will not be required.

2. Applicable or Relevant and Appropriate Requirements

Applicable or Relevant and Appropriate Requirements for the Alternative 3b are presented in Appendix B.

3. Outcomes

After completion of the remedial action, soil and sediments will no longer present a hazard to human health or the environment. In addition, Site 20 will be suitable for residential redevelopment and re-use should NSB NLON close.

XII. STATUTORY DETERMINATIONS

The remedial action selected for implementation at Site 20 is consistent with CERCLA and the National Contingency Plan. The selected remedy is protective of human health and the environment, will comply with ARARs, and is cost effective. In addition, the selected remedy will use permanent solutions and alternate treatment technologies or resource recovery technologies if off-site asphalt batching is used as a component of the remedy.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this site will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through the removal of contaminated soil and sediments.

The selected remedy will eliminate human health risks by meeting the remediation goals. It will reduce potential human health risk levels to protective levels. Implementation of the selected remedy will not pose any unacceptable short-term risk or cause any cross-media impacts.

B. The Selected Remedy Complies with Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with federal and applicable, more stringent state ARARs that pertain to the site. ARARs for Site 20 include both federal and state guidelines. Applicable or Relevant and Appropriate Requirements for the Alternative 3b are presented in Appendix B.

C. The Selected Remedial Action is Cost Effective

The selected remedy is cost effective because the remedy costs are proportional to its overall effectiveness (40 C.F.R. §300.430[f][1][ii][D]). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (*i.e.*, that are

protective of human health and the environment and comply with federal and applicable, more stringent state ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria; long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative was compared to the alternative's cost to determine cost effectiveness. The relationship of the overall effectiveness of the selected remedy was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

The Navy first identified those alternatives that are protective of human health and the environment by meeting or waiving ARARs, as appropriate, then identified which alternatives used permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs in terms of: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; (5) permanent solutions and alternative treatment or resource recovery technologies to the extent practicable; and (6) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility, and volume through treatment. There is a preference to use treatment to address the principal threats posed by a site, wherever practicable. The selected remedy provides the best balance of trade-offs among the alternatives evaluated, particularly if off-site asphalt batching is used to permanently treat the contaminated soil and sediment.

E. The Selected Remedy Satisfies the Preference for Treatment which Permanently and Significantly Reduces the Toxicity, Mobility, or Volume or the Hazardous Substances as a Principal Element

The selected remedy satisfies the preference for treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances as a principal element by selectively removing soils and sediments containing COC concentrations above risk-based levels. Excavated material will be treated through the use of asphalt batching, which is the thermoplastic stabilization/solidification treatment method. If asphalt batching is not used then this criteria will not be satisfied.

F. Five-Year Review Requirements

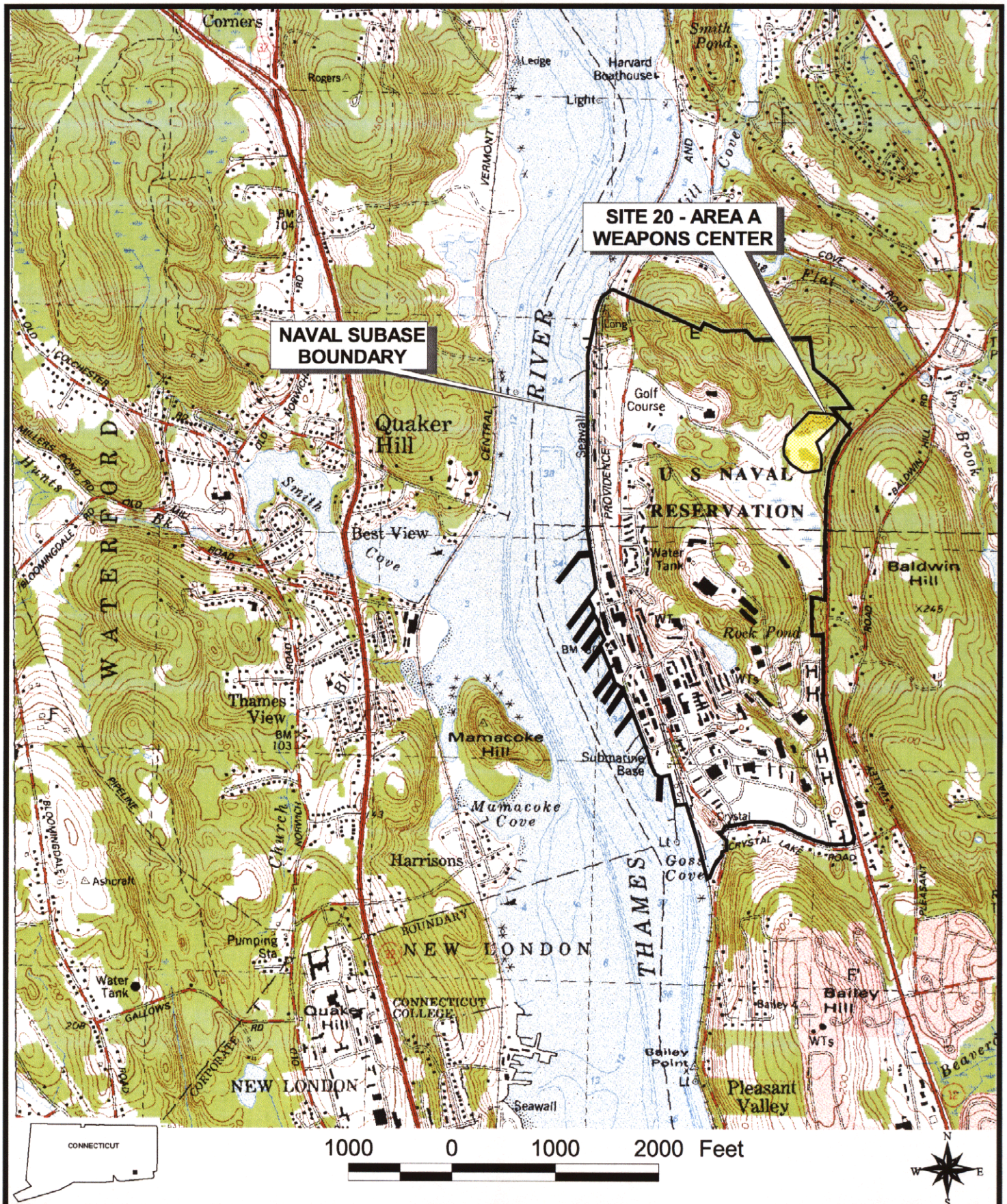
Because this remedy will not result in hazardous substances remaining onsite or restricted use of the site, 5-year reviews are not required.

XIII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Navy presented a Proposed Remedial Action Plan of selected excavation for remediation of Site 20 on May 23, 2000. The Navy has reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Remedial Action Plan, were necessary.

XIV. STATE ROLE

CTDEP has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment, and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. CTDEP concurs with the selected remedy for Site 20. A copy of the declaration of concurrence by CTDEP is provided as Appendix C.



EA ENGINEERING, SCIENCE, AND TECHNOLOGY	SITE 20 - AREA A WEAPONS CENTER NAVAL SUBMARINE BASE NEW LONDON, CONNECTICUT	FIGURE 2-1 SITE LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
CEM	BT	BT	CEM	AS SHOWN	3/23/2000	29600.90	I:\SITE20_GIS\ SITE20.APR

Source: base map provided by TetraTech NUS, 9/30/98.

0 1000 2000

SCALE IN FEET

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 5 – HAZARDOUS WASTE STORAGE FACILITY AT BUNKER A-85
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

APPROXIMATE BOUNDARY OF SITE 20

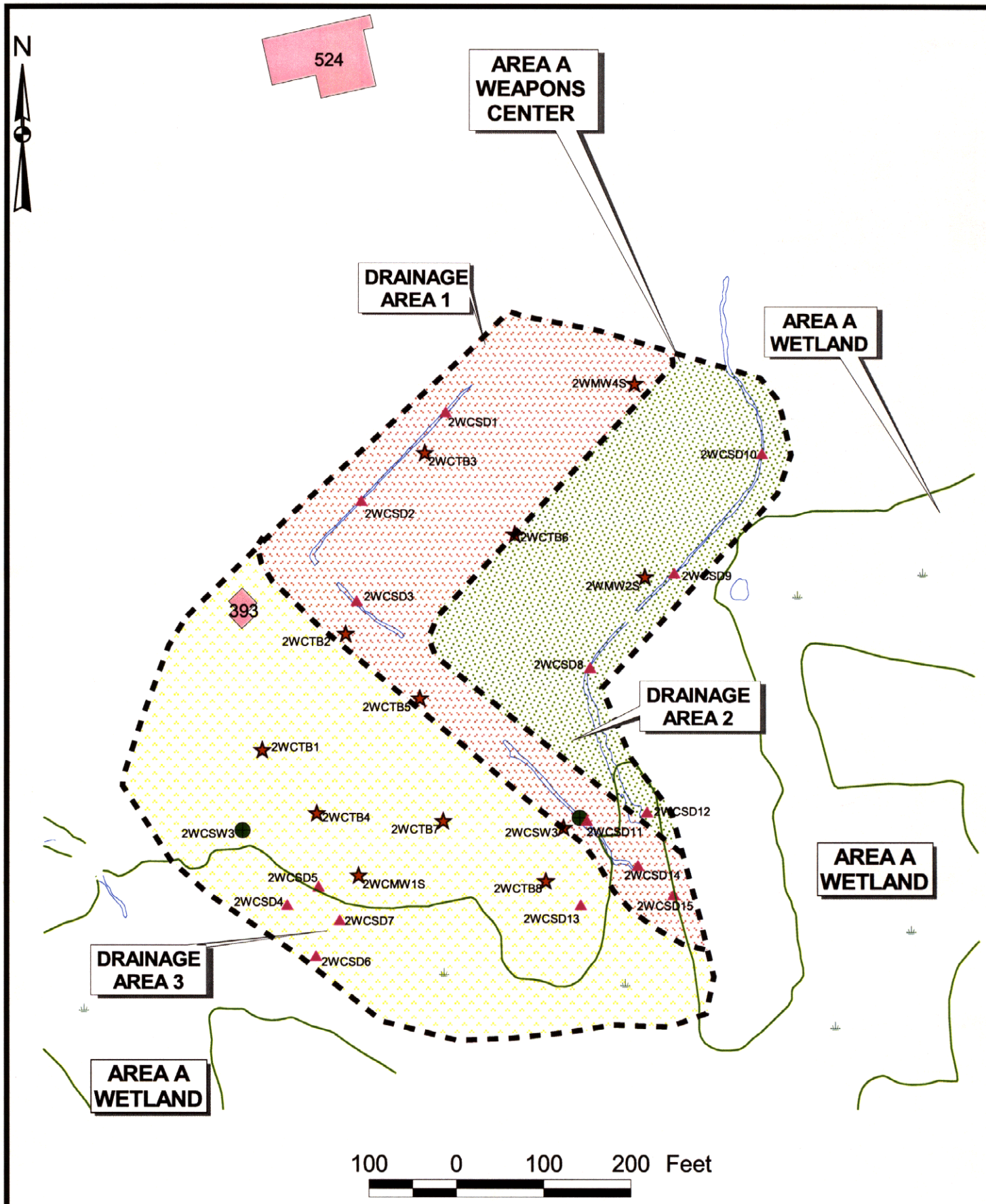
FILE: F:\FEDERAL\DOD\NAVY\29600\90\CAD\SITE-20\DRAFT FINAL\FIG2-2.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 20 – AREA A WEAPONS CENTER
NAVAL SUBMARINE BASE
NEW LONDON, CONNECTICUT

FIGURE 2-2
BASE MAP

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
BCL	BT	3/23/2000	29600.90	FIG. 2-2
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	FIGURE
JDR	CEM	AS SHOWN		2-2



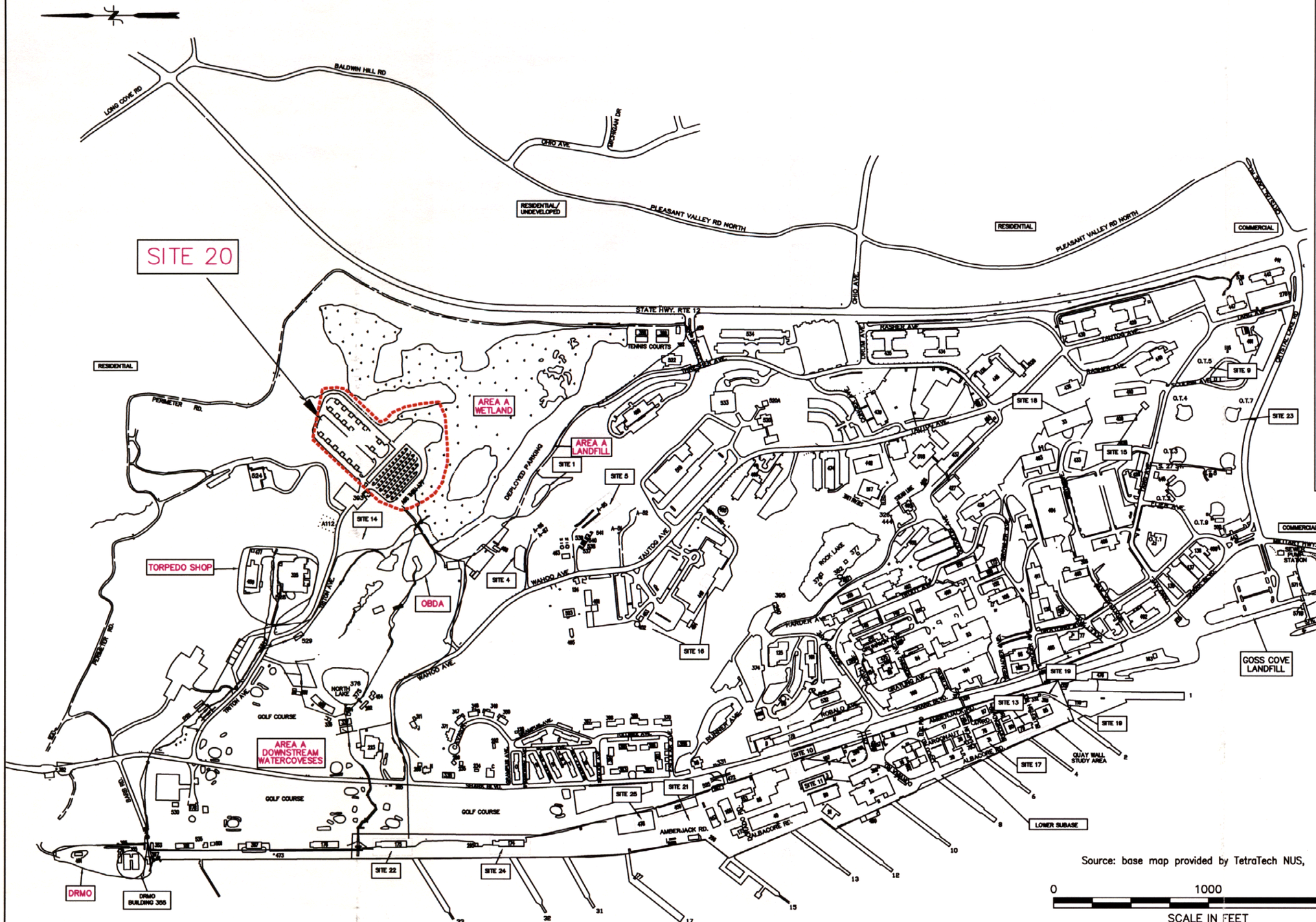
LEGEND:

- Sediment sample
- Soil sample
- Surface water sample
- Wetland
- Building
- Drainage area 1
- Drainage area 2
- Drainage area 3

FIGURE 2-3

DRAINAGE AREA BOUNDARIES AND SAMPLING LOCATIONS

SITE 20 - AREA A WEAPONS CENTER
NAVAL SUBMARINE BASE
NEW LONDON, CONNECTICUT



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)
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   - REMOVAL SITE EVALUATION FOR QUAY WALL (HNUS, MAY 1995)
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SITE 22 – PIER 33
SITE 23 – FUEL FARM
SITE 24 – CENTRAL PAINT ACCUMULATION AREA (BUILDING 174)
SITE 25 – LOWER SUBASE-CLASSIFIED MATERIALS INCINERATOR

APPROXIMATE BOUNDARY OF SITE 20

Source: base map provided by TetraTech NUS, 9/30/98.

0 1000 2000
SCALE IN FEET

FILE: F:\FEDERAL\000\NAVY\29600.90\CAD\SITE-20\DRAFT FINAL\FIG2-2.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 20 – AREA A WEAPONS CENTER
NAVAL SUBMARINE BASE
NEW LONDON, CONNECTICUT

FIGURE 2-2
BASE MAP

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
BCL	BT	3/23/2000	29600.90	FIG. 2-2
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	FIGURE
JDR	CEM	AS SHOWN		2-2

LEGEND

—80— POTENTIOMETRIC SURFACE CONTOUR (DASHED WHERE INFERRED)
(80.45) GROUND-WATER ELEVATION (ft MSL)
—10— EXISTING CONTOUR
123 BUILDING No.
WATERCOURSE
—STM—□ STORM SEWER AND CATCH BASIN
GROUND-WATER FLOW DIRECTION
FENCE
APPROXIMATE BOUNDARY OF SITE 20

NOTES:

1. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN (ATLANTIC, MAY 1993)
2. POTENTIOMETRIC SURFACE FOR WATER LEVELS MEASURED ON 23-24 AUGUST 1994

Source: base map provided by Brown & Root Environmental, 3/1/96.

0 250 500
SCALE IN FEET

AREA A WEAPONS CENTER
524
477
325
TRITON ROAD
393
OBDANE
STREAM 3
(DRY) STREAM 4
UPPER POND
LOWER POND
OBDA POND
STREAM 1
OVER BANK DISPOSAL AREA
DIKE
AREA A WETLAND
ROUTE 12
373
AREA A LANDFILL
CBU DRUM STORAGE AREA
DEPLOYED PARKING
(71.28)
460
TENNIS COURTS
RACQUET BALL BUILDING
CORSAIR
EAST GATE
WAHOO AVE.
70
80
60
50

FILE: F:\FEDERAL\0001\WAYA\29600\90\CAD\SITE-20\DRAFT FINAL\FIG2-4.DWG

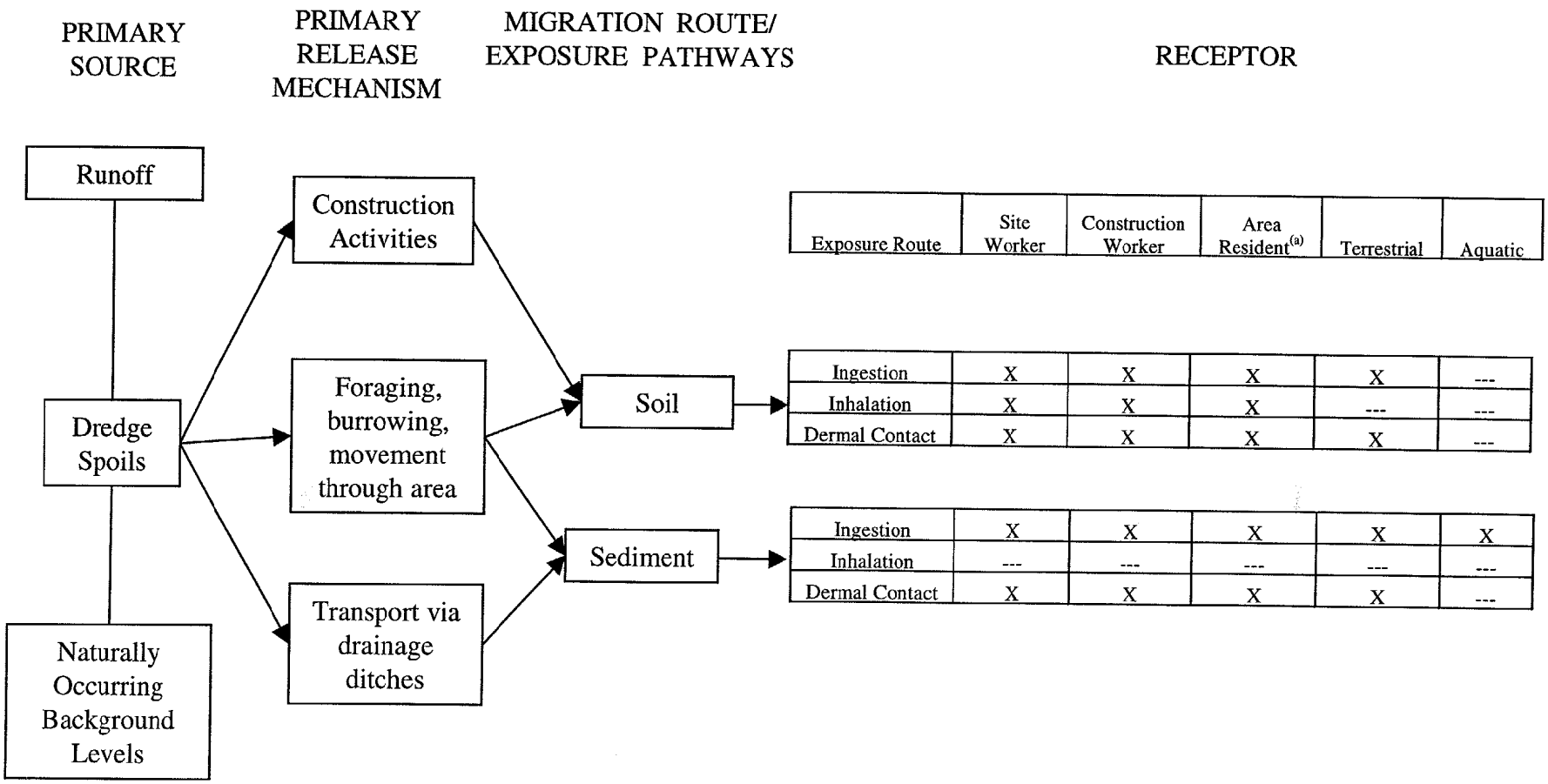
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 20 – AREA A WEAPONS CENTER
NAVAL SUBMARINE BASE
NEW LONDON, CONNECTICUT

FIGURE 2-4
SHALLOW OVERBURDEN SURFACE MAP

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
CEM	BT	3/24/2000	29600.90	FIG. 2-4
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	FIGURE
CEM	CEM	AS SHOWN		2-4

FIGURE 2-5. CONCEPTUAL SITE MODEL FOR SOIL AND SEDIMENT



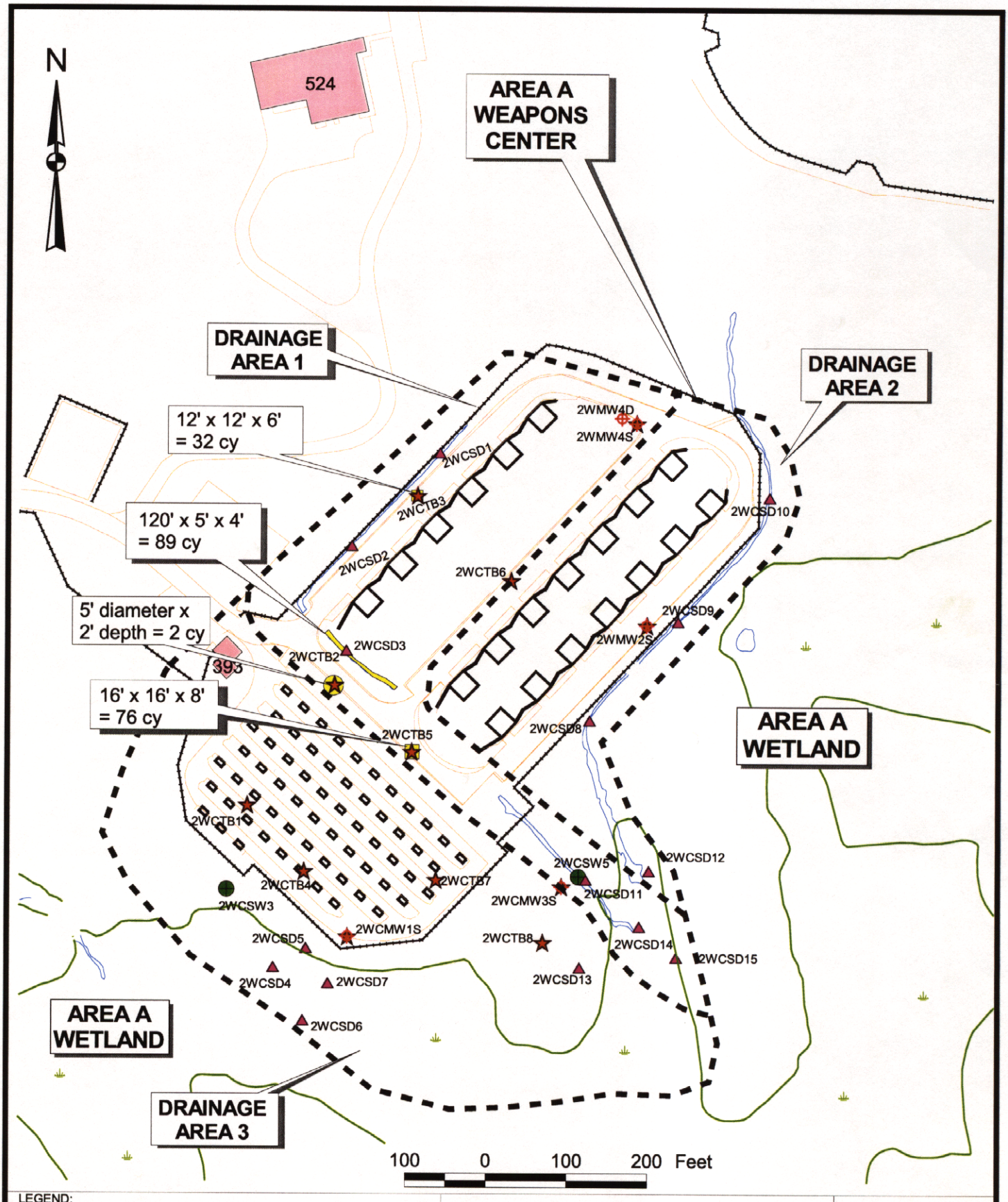
Exposure Route	Site Worker	Construction Worker	Area Resident[a]	Terrestrial	Aquatic
Ingestion	X	X	X	X	---
Inhalation	X	X	X	---	---
Dermal Contact	X	X	X	X	---
Ingestion	X	X	X	X	X
Inhalation	---	---	---	---	---
Dermal Contact	X	X	X	X	---

(a) Future Residential Scenario.

NOTES: X = Risk assessment performed.

Dashes (---) indicate exposure to receptor considered minimal; no risk assessment was performed.

From Appendix F of Risk Assessment of the Brown & Root Phase II Remedial Investigation Report (1997). modified to reflect Feasibility Study Site 20 – Area A Weapons Center, New London, Connecticut (EA 2000).



Note: Excavation limits not to scale. cy = cubic yard.

FIGURE 2-6

AREAS OF PROPOSED SELECTIVE EXCAVATION FOR ALTERNATIVE 3b (RESIDENTIAL LAND USE SCENARIO)

SITE 20 - AREA A WEAPONS CENTER
NAVAL SUBMARINE BASE
NEW LONDON, CONNECTICUT

EA®

99AB07Y

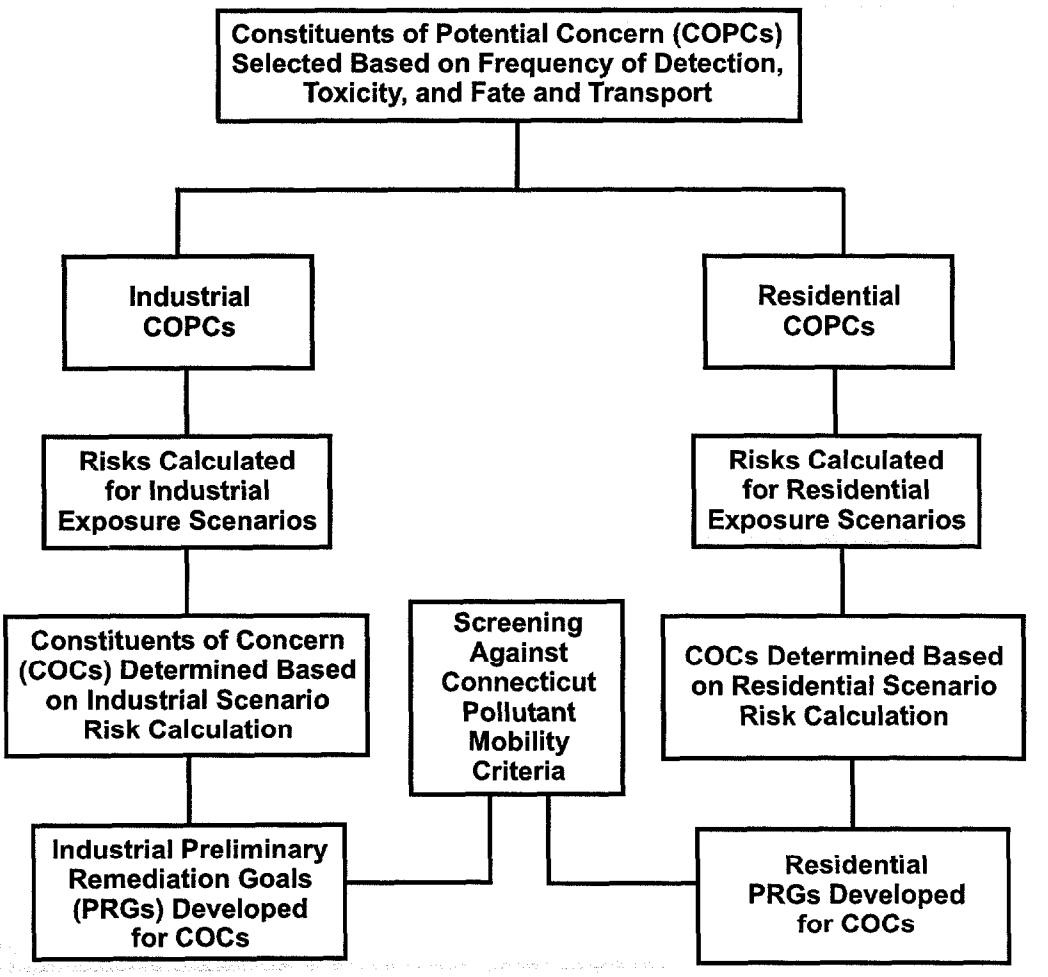


Figure 2-7. Risk-based cleanup criteria process diagram, Site 20 - Area A Weapons Center, Naval Submarine Base, New London.

TABLE 2-1 SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM – PHASE II REMEDIAL INVESTIGATION SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Sample ID	Sample Depth (ft below ground surface)	Analysis									
		Target Compound List				Target Analyte List Metals[a]					
		Volatiles	Semivolatiles	Pesticides	PCB	Total	Dissolved	TCLP[b]	Dioxin[c]	Engineering[d]	Radiological[e]
ROUND 1 – SOIL											
2WCMW1S-0002	0-2	●	●			●					
2WCMW3S-1618	16-18	●	●	●	●	●					
2WCMW3S-1618-D[f]	16-18	●	●	●	●	●					
2WCTB1-0002	0-2	●	●	●	●	●					
2WCTB2-0002	0-2	●	●	●	●	●					
2WCTB2-0002-D[g]	0-2	●	●	●	●	●					
2WCTB3-0406	4-6	●	●			●					
2WCTB4-0204	2-4	●	●	●	●	●					
2WCTB5-0608	6-8	●	●			●		●			
2WCTB6-0810	8-10	●	●			●					
2WCTB7-0810	8-10	●	●	●	●	●					
2WCTB8-1012.6	10-12.6	●	●	●	●	●					
ROUND 1 – GROUND WATER											
2WCGW1S	---	●	●			●	●				
2WCGW1S-D[h]	---	●	●			●	●				
2WCGW2S	---	●	●			●	●				
2WCGW3S	---	●	●			●	●				
2WCGW4D	---	●	●			●	●				●

(a) Target Analyte List metals plus boron. Water samples were also analyzed for hardness.
(b) TCLP for metals only.
(c) Dioxin analyses includes dioxins and dibenzofurans as specified in U.S. Environmental Protection Agency Contract Laboratory Protocol Statement of Work DFLM01.0.
(d) Engineering characteristics for sediments include grain size distribution, moisture content, specific gravity, organic content, carbon exchange capacity, pH, and total organic carbon content.
(e) Radiological analyses include gross alpha and beta and complete gamma spectrum analyses.
(f) 2WCMW3S-1618-D is a field duplicate of 2WCMW3S-1618.
(g) 2WCTB2-0002-D is a field duplicate of 2WCTB2-0002.
(h) 2WCGW1S-D is a field duplicate of 2WCGW1S.

NOTE: PCB = Polychlorinated biphenyls.
TCLP = Toxicity Characteristic Leaching Procedure.
● Indicates samples analyzed at a fixed base laboratory.
Dashes (---) indicate no depth specified, ground-water sample.

Sample ID	Sample Depth (ft below ground surface)	Analysis									
		Target Compound List				Target Analyte List Metals[a]					
		Volatiles	Semivolatiles	Pesticides	PCB	Total	Dissolved	TCLP[b]	Dioxin[c]	Engineering[d]	Radiological[e]
ROUND 1 – SEDIMENT											
2WCSD1	0-1	●	●	●	●	●					
2WCSD2	0-1		●			●		●			
2WCSD3	0-1	●	●	●	●	●					
2WCSD4	0-1	●	●	●	●	●					
2WCSD5	0-1	●	●	●	●	●				●	
2WCSD6	0-1		●			●					
2WCSD7	0-1	●	●	●	●	●					
2WCSD8	0-1		●			●					
2WCSD9	0-1		●			●					
2WCSD10	0-1		●			●					
2WCSD11	0-1	●	●	●	●	●			●	●	
2WCSD12	0-1		●			●					
2WCSD13	0-1		●			●					
2WCSD14	0-1		●			●					
2WCSD14-D[i]	0-1		●			●					
2WCSD15	0-1		●			●					
ROUND 1 – SURFACE WATER											
2WCSW3	Surface	●	●	●	●	●	●				
2WCSW5	Surface	●	●	●	●	●					
ROUND 2 – GROUND WATER											
2WCGW1S-2	---	●	●			●	●				
2WCGW2S-2	---	●	●			●	●				
2WCGW3S-2	---	●	●			●	●				
2WCGW4D-2	---	●	●			●	●				●

(i) 2WCSD14-D is a field duplicate of 2WCSD14.

TABLE 2-2 SUMMARY OF CONSTITUENTS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS

Exposure Point	Constituent of Concern	Concentration Detected (ppm)		Frequency of Detection	Exposure Point Concentration (ppm)	Statistical Measure
		Maximum	UCL			
Scenario Timeframe:	**Current**					
Medium:	**Soil**					
Exposure Medium:	**Soil**					
Total Soil	Arsenic	10.8	6.78	10/13	6.78	UCL
Total Soil	Chrysene	1.85	0.738	8/13	0.738	UCL
Total Soil	Benz(a)anthracene	1.70	0.687	8/13	0.687	UCL
Total Soil	Benzo(a)pyrene	1.55	0.973	10/13	0.973	UCL
Total Soil	Benzo(b)fluoranthene	2.75	1.07	8/13	1.07	UCL
Total Soil	Dibenz(a,h)anthracene	0.51	0.298	3/13	0.298	UCL
Surface Soil	Arsenic	6.4	9.87	4/7	6.4	MAX
Surface Soil	Chrysene	1.85	1.93	4/7	1.85	MAX
Surface Soil	Benz(a)anthracene	1.70	1.65	4/7	1.65	UCL
Surface Soil	Benzo(a)pyrene	1.55	1.55	4/7	1.55	UCL
Surface Soil	Benzo(b)fluoranthene	2.75	3.31	4/7	2.75	MAX
Surface Soil	Dibenz(a,h)anthracene	0.51	0.36	2/7	0.36	UCL
Scenario Timeframe:	**Reasonable Maximum Exposure**					
Medium:	**Sediment**					
Exposure Medium:	**Sediment**					
Sediment	Arsenic	13.5	8.68	13/13	8.68	UCL
Sediment	Antimony	9.8	6.88	12/12	6.88	UCL
Sediment	Cadmium	29.5	4.45	3/12	4.45	UCL
Sediment	Chromium	97.5	49.2	11/12	49.2	UCL
Sediment	Manganese	2,640	894	12/12	894	UCL
Sediment	Vanadium	56.7	43.9	12/12	43.9	UCL
Sediment	Benz(a)anthracene	3.4	3.46	12/13	3.46	UCL
Sediment	Benzo(a)pyrene	4.4	3.99	10/13	3.99	UCL
Sediment	Benzo(b)fluoranthene	4.9	3.88	12/13	3.88	UCL
Sediment	Dibenz(a,h)anthracene	0.83	0.49	3/13	0.49	UCL
Sediment	Indeno(1,2,3-c,d)pyrene	3.3	3.01	12/13	3.01	UCL

NOTE: UCL = 95% Upper Confidence Limit
MAX = Where the calculated 95 percent UCL exceeds the maximum measured value, the maximum value is used for comparison to standards.

Source: Site 20 – Area A Weapons Center Feasibility Study (EA 2000).

TABLE 2-3 CANCER TOXICITY DATA SUMMARY

Constituent of Concern	Oral Cancer Slope Factor	Adsorption Efficiency (for Dermal)	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence Cancer Guideline Description	Source
Pathway: Ingestion, Dermal						
Arsenic	1.5	0.95	1.58	1/mg/kg/day	A	IRIS (U.S. EPA 1999)
Benz(a)anthracene	0.73	1.0	0.73	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)
Benzo(a)pyrene	7.3	1.0	7.3	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)
Benzo(a)fluoranthene	0.73	1.0	0.73	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)
Benzo(k)fluoranthene	0.073	1.0	0.073	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)
Chrysene	0.0073	1.0	0.0073	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)
Dibenz(a,h)anthracene	7.3	1.0	7.3	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)
Indeno(1,2,3-c,d)pyrene	0.73	1.0	0.73	1/mg/kg/day	B2	IRIS (U.S. EPA 1999)

A – Human carcinogen
B2 – Probable human carcinogen – indicates sufficient evidence in animals

NOTE: IRIS = Integrated Risk Information System.

Source: Site 20 – Area A Weapons Center Feasibility Study (EA 2000).

TABLE 2-4 RISK CHARACTERIZATION SUMMARY – CARCINOGENS

Exposure Medium	Exposure Point Concentration[a] (ppm)	Constituent of Concern	Ingestion	Inhalation	Dermal	Exposure Routes Total
Scenario Timeframe: **Receptor Population:** **Receptor Age:**	**Current** **Full-Time Employee** **Adult**					
Soil	6.4	Arsenic	3.1×10^{-6}	2.85×10^{-8}	1.24×10^{-7}	3.26×10^{-6}
Soil	1.55	Benzo(a)pyrene	2.38×10^{-6}	9.21×10^{-10}	0	2.38×10^{-6}
Soil	1.85	Chrysene	2.96×10^{-9}	1.14×10^{-12}	0	2.96×10^{-9}
Sediment	8.68	Arsenic	1.36×10^{-6}	0	1.1×10^{-7}	1.47×10^{-6}
Sediment	3.99	Benzo(a)pyrene	3.05×10^{-6}	0	0	3.05×10^{-6}
Scenario Timeframe: **Receptor:** **Receptor Age:**	**Future** **Resident** **Adult**					
Soil	6.78	Arsenic	6.82×10^{-6}	9.27×10^{-8}	1.34×10^{-7}	7.05×10^{-6}
Soil	0.97	Benzo(a)pyrene	4.76×10^{-6}	2.73×10^{-9}	0	4.77×10^{-6}
Soil	0.74	Chrysene	3.61×10^{-9}	20.7×10^{-12}	0	3.62×10^{-9}
Soil	0.30	Dibenz(a,h)anthracene	1.46×10^{-6}	8.36×10^{-10}	0	1.46×10^{-6}
Sediment	8.68	Arsenic	4.37×10^{-6}	0	1.4×10^{-7}	4.5×10^{-6}
Sediment	3.99	Benzo(a)pyrene	9.77×10^{-6}	0	0	9.77×10^{-6}
Sediment	0.489	Dibenz(a,h)anthracene	1.2×10^{-6}	0	0	1.2×10^{-6}

(a) Exposure point is equal to the 95% UCL (if less than maximum concentration otherwise the maximum concentration was used).

NOTE: UCL = 95% Upper Confidence Limit.
ppm = Parts per million (mg/kg)
PRG = Preliminary Remediation Goal.
Only those analytes for which PRGs were calculated are shown in this table.

Source: Feasibility Study (EA 2000).

TABLE 2-5 CLEANUP LEVELS FOR CONSTITUENTS OF CONCERN

Constituent of Concern	Cleanup Level	Basis for Cleanup Level[a]	Risk at Cleanup Level
Media:	**Soil**		
Available Use:	**Residential**		
Controls to Ensure Restricted Use:	**Not applicable**		
Arsenic	9.62 mg/kg	Risk Assessment	Cancer risk = 1×10^{-5}
Benz(a)anthracene	1.0 mg/kg	CTDEP RSR	Not applicable
Benzo(a)pyrene	1.0 mg/kg	CTDEP RSR	Not applicable
Benzo(b)fluoranthene	1.0 mg/kg	CTDEP RSR	Not applicable
Chrysene	1.0 mg/kg	CTDEP RSR	Not applicable
Dibenz(a,h)anthracene	1.0 mg/kg	CTDEP RSR	Not applicable
Media:	**Sediment**		
Available Use:	**Residential**		
Controls to Ensure Restricted Use:	**Not applicable**		
Arsenic	19.27 mg/kg	Risk Assessment	Cancer risk = 1×10^{-5}
Benzo(a)pyrene	4.08 mg/kg	Risk Assessment	Cancer risk = 1×10^{-5}
Dibenz(a,h)anthracene	4.08 mg/kg	Risk Assessment	Cancer risk = 1×10^{-5}

(a) Cleanup level is the more stringent of Connecticut Remediation Standard Regulations or 10^{-5} risk-based Preliminary Remediation Goal for soil or 10^{-5} risk-based Preliminary Remediation Goal for sediment. Connecticut Remediation Standard Regulations are comprised of the Pollutant Mobility Criteria and the Residential Direct Exposure Criteria.

NOTE: CTDEP = Connecticut Department of Environmental Protection.
RSR = Remediation Standard Regulations.

REFERENCES

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

Brown & Root Environmental. 1997. Phase II Remedial Investigation Report. Naval Submarine Base, New London, Groton, Connecticut. Wayne, Pennsylvania. March.

EA Engineering, Science, and Technology. 2000. Final Feasibility Study, Site 20 – Area A Weapons Center, Naval Submarine Base, New London, Groton, Connecticut. Newburgh, New York. June.

Envirodyne Engineering, Inc. 1983. Final Initial Assessment Study of Naval Submarine Base, New London, Connecticut. NEESA (Naval Energy and Environmental Support Activity), 13-025. Port Hueneme, California. March.

Appendix A

Responsiveness Summary and Responses to Written and Oral Comments

RESPONSIVENESS SUMMARY

The Navy published a notice and brief analysis of the Proposed Plan in the New London Day on May 19, 2000 and made the plan and the administrative record available to the public at the Groton Public Library, and the Bill Library.

On May 23, 2000, the Navy held an informational meeting to discuss and present the Proposed Plan and accept any oral comments. A transcript of this meeting is included in Appendix A. From May 17, 2000 to June 15, 2000 the Navy held a 30-day public comment period to accept public comment on the Proposed plan.

Summary of Comments Received during the Public Comment Period

Oral comments received during the public meeting held on May 23, 2000 are provided in the transcript of the meeting in Appendix A. No written comments were received during the public comment period.

PUBLIC MEETING
23 MAY 2000

Site 20 – Area A Weapons Center

Chip McLeod of EA Engineering, Science, and Technology began the meeting with an overview of all of the Installation Restoration (IR) Program sites located at Subase. He showed the location of Site 20 relative to the other sites on the base.

Area A Weapons Center Site History

Using a poster board display (copy provided as an attachment), Mr. McLeod began with a brief overview of the site history of the Area A Weapons Center. Mr. McLeod stated that Building 524 is not included in the IR Program site due to a lack of contamination in and around the building.

Site Characteristics

Mr. McLeod proceeded to discuss the general layout of the site, using the site diagram as a reference. He stated that the area is mostly paved, is currently used for torpedo storage, and has three drainage areas associated with it.

Summary of the Site Cleanup Proposal

Next, Mr. McLeod provided a brief overview of the site cleanup proposal. The preferred cleanup method for Site 20 is selective excavation with offsite treatment of the removed contaminated soil and sediment. The preferred treatment method is asphalt batching, which is a process in which the polycyclic aromatic hydrocarbon (PAH) contamination gets bound with other PAHs already present in asphalt.

Industrial vs. Residential

Mr. McLeod also discussed why the most protective option of meeting residential criteria was chosen instead of simply cleaning up to industrial criteria. Given the required long-term monitoring that would be associated with a cleanup to industrial criteria, and the relatively small amount of material to be removed (approximately 199 yd^3 or about 10 truck loads of material), cleaning up to meet the residential criteria was also the most cost effective option, in addition to being the most protective.

Asphalt Batching vs. Offsite Disposal

Contaminant treatment is preferred by both the Navy and U.S. Environmental Protection Agency (EPA) for cleanup of this site. With the proposed asphalt batching, the Navy needs to identify a facility that will accept this material in their asphalt batching process.

Site Ground Water

A ground-water investigation at the base is currently underway to address all ground-water issues for the entire IR Program. Since this ground-water initiative is taking place, ground water was not included in the Site 20 Feasibility Study or Proposed Remedial Action Plan.

At this point, the meeting was opened up for a public question and answer forum.

Public Questions/Answers

Q: Noah Levine asked if removing the contaminants will improve ground-water quality.

A: It will be a relatively quick process to remove the soil. Removing the soil will eliminate a pathway to impact the ground water. With regard to sediments, they can potentially impact surface water and down gradient receptors as well as the Thames River. Figure 4-2 in the Feasibility Study shows the areas where exceedances in sediment and soil were found.

Q: Mr. Levine: Where did the contaminants come from?

A: Primarily from runoff from the parking areas. Also, some of the contamination likely came from torpedo assembly and storage. Dick Conant stated that historically and presently, Building 325, which is not part of this site, performs most of the torpedo repair and overhaul.

Q: Mr. Levine: Was the source of the contamination mostly from the torpedoes or mostly from the asphalt?

A: The contamination is mostly from the asphalt, and is a result of accumulation over a period of time in the drainage swales. The passage of time and accumulation is how we got to the present levels of contamination. You'll notice that there were only a few instances of arsenic. We had a few hits that were higher than the risk-based assessment, so arsenic also had to be addressed.

Q: Bart Pearson: If the removed material cannot be treated, then what will happen to it? Will it go to a landfill? Do they have landfills that accept these kinds of materials?

A: Yes, the material could go to a landfill. The landfill is chosen based on characterization and sampling of the material. Landfilling the removed material is not the preferred alternative; the Navy and EPA preferred alternative would be to treat the material in an asphalt batching process.

Q: Mr. Pearson: So the arsenic that was found is not related to the asphalt?

A: No. Arsenic is naturally occurring in Connecticut. Arsenic levels of 3.6-3.9 ppm are typically found in the area.

Only one area was identified with high arsenic levels. In addition, arsenic was found deep (10-12 ft) in that one area.

Q: Dick Conant: How would the arsenic would fare in the batch treatment plant?

A: We aren't sure at this point, but suspect that it will not be a problem since there are only approximately 2-3 yd^3 that are contaminated with arsenic versus the total (approximately 199 yd^3) to be removed from the entire site.

Q: Mr. Conant asked: If arsenic remains high, then we might have to go with the landfill alternative?

A: May still be able to asphalt batch – they will dictate based upon their guidelines. We would want to ensure that the arsenic is bound up in the asphalt.

Q: Mr. Pearson asked: Is there any way to neutralize arsenic?

A: Kymberlee Keckler answered that soil washing can be used, but this is not an issue given the levels and volume we have at this site.

Q: Mr. Levine asked: How close are the deep soil samples to bedrock? Are the arsenic levels attributable to the bedrock?

A: The two soil samples that indicated elevated levels of arsenic were taken at a location approximately 15-20 ft above the estimated bedrock depth. While the bedrock at Site 20 includes granite gneiss and granite can contain elevated levels of arsenic, no rock fragments were noted on the boring logs within the sample intervals. It is unlikely that the arsenic levels found in these two samples are attributable to the bedrock.

Q: Mr. Levine stated: It is not unusual to find arsenic in bedrock or granite. This may be natural.

A: Ms. Keckler responded: In the presence of some petroleum compounds, it may make arsenic more mobile or more toxic. The concentrations are higher than background levels and could potentially pose a threat.

Q: Mr. Levine asked: What are the differences in cost between Alternatives 3a and 3b?

A: Alternative 3a meets industrial criteria; people working there would be protected. Alternative 3b includes the cost to dig out the contaminated material and treat it. After removal, there are no further actions to take at the site. Alternative 3a has several additional costs that alternative 3b does not have, including the following: environmental land use restriction, yearly costs, and long-term monitoring costs, in addition to the excavation and removal costs.

Q: Mr. Levine asked: So, given Alternative 3b, there would be no sampling after that point?

A: No, confirmatory sampling would be performed as the site was being cleaned. There would be no need for 5-year reviews, since all of the contamination would be removed from the site.

Q: Mr. Levine asked: Briefly go over sampling, specifically the use of offsite laboratories vs. onsite laboratories.

A: It could go either way at this point. Bringing a laboratory onsite might be efficient to have quick turnaround time on the samples. We could get results the next day. However, mobile laboratories must be state-certified; they would not be using field screening techniques. State

certification is required to prove that the cleanup meets established goals. Typically, an offsite stationery laboratory is used with a 48-hour turnaround time on the samples. Another problem with onsite laboratories is that a certain percentage (typically 5-10 percent) of all the samples analyzed would need to be sent to an offsite laboratory for verification. Also, there is some question as to whether there are any laboratories in Connecticut that are able to provide onsite services. Mark Lewis indicated that the Connecticut Department of Environmental Protection might have the only state-certified mobile laboratory in Connecticut.

Chip McLeod pointed out that it is possible to use a photoionization detector or flame ionization detection for field screening. These tools are somewhat effective on some PAHs. In addition, there are test kits available, but their accuracy is not sufficient to prove that we are meeting the established remedial goals. These analytical procedures will be part of the work plan. After the Record of Decision is implemented and the Remedial Action Contractor is brought on board, these decisions will be made.

The meeting adjourned at 8:00 PM.

Appendix B

Applicable or Relevant and Appropriate Requirements

TABLE B-1 ASSESSMENT OF CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE FOR ALTERNATIVE 1 – NO ACTION SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Relevant and Appropriate Requirement
FEDERAL				
Cancer Slope Factors		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The No Action Alternative would provide no protection from risk posed by contaminants in the soil and sediment.
Reference Dose		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The No Action Alternative would provide no protection from risk posed by contaminants in the soil and sediment.
STATE OF CONNECTICUT				
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k-1 through 3	Applicable	These regulations establish direct exposure and pollutant mobility criteria for contaminated soils based on either industrial or residential uses of the site. Requirements are based on ground water in the area being classified by the state as a GB.	The No Action Alternative does not satisfy state standards for either site remediation nor for sufficient engineering controls to prevent risk to human health and the environment.

NOTE: CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-2 ASSESSMENT OF LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE FOR ALTERNATIVE 1 – NO ACTION SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
There are no federal location-specific applicable or relevant and appropriate requirements.				
STATE OF CONNECTICUT				
There are no state location-specific applicable or relevant and appropriate requirements.				

TABLE B-3 ASSESSMENT OF ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE FOR ALTERNATIVE 1 – NO ACTION SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
There are no federal action-specific applicable or relevant and appropriate requirements.				
STATE OF CONNECTICUT				
There are no state action-specific applicable or relevant and appropriate requirements.				

TABLE B-4 ASSESSMENT OF CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 2 – INSTITUTIONAL CONTROLS AND MONITORING SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Cancer Slope Factors		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would limit exposure to contaminants in the soil and sediment through institutional controls.
Reference Dose		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would limit exposure to contaminants in the soil and sediment through institutional controls.
STATE OF CONNECTICUT				
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k-1 through 3	Applicable	These regulations establish direct exposure and pollutant mobility criteria for contaminated soils based on either industrial or residential uses of the site. Requirements are based on ground water in the area being classified by the state as a GB.	Land use controls would limit direct exposure to contaminated soil to acceptable levels under industrial use. The alternative does not meet residential use standards.

NOTE: CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-5 ASSESSMENT OF LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 2 – INSTITUTIONAL CONTROLS AND MONITORING SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Clean Water Act, Section 404	33 USC 1344; 40 CFR Part 230 and 33 CFR Parts 320-323	Applicable	These rules regulate the discharge of dredge and fill materials in wetlands and navigable waters. Such discharges are not allowed if practicable alternatives are available.	Remedial action includes potential monitoring activities within contaminated wetlands and ditches. Measures will be taken to minimize adverse effects and to replace or restore protected wetland functions and values.
Executive Order 11990 RE: Protection of Wetlands	Executive Order 11990, 40 CFR Part 6, Appendix A	Applicable	This Order requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this Executive Order.	Remedial action includes potential monitoring activities within contaminated wetlands and ditches. However, measures to minimize adverse effects and to replace or restore protected wetland functions and values will be considered and incorporated into any plan or action wherever feasible.
Fish and Wildlife Coordination Act	16 USC Part 661 *et. seq.*, 40 CFR 122.49	Applicable	This Order protects fish and wildlife when federal actions result in control or structural modification of a natural stream or body of water.	Appropriate agencies would be consulted prior to implementation to find ways to minimize adverse effects to fish and wildlife from potential monitoring activities within contaminated wetlands and waterways.
STATE OF CONNECTICUT				
Inland Wetlands and Watercourses	CGS 22a-37 through 45, RCSA 22a-39-1 through 15	Applicable	These rules regulate all activities in wetlands and watercourses.	Remedial action includes potential monitoring activities within contaminated wetlands and watercourses. The substantive requirements of the Connecticut standards will be met to address any alteration of wetlands and watercourses.

NOTE: USC = United States Code.
CFR = Code of Federal Regulations.
CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-6 ASSESSMENT OF ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 2 – INSTITUTIONAL CONTROLS AND MONITORING SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Clean Water Act, Section 402, National Pollution Discharge Elimination System	33 USC 1342; 40 CFR 122 through 125	Applicable	These standards govern the protection of surface water sources.	Standards will be used to evaluate monitoring results to determine if further remedial action is required to protect resources.
STATE OF CONNECTICUT				
Hazardous Waste Management: Generator and Handler Requirements, Listing, and Identification	RCSA 22a-449(c) 100-101	Applicable	Connecticut is delegated to administer the Federal Resource Conservation and Recovery Act statute through its state regulations. These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-261 are incorporated by reference.	Hazardous waste determinations will be performed on all contaminated material generated during monitoring activities to determine that levels of regulated constituents do not exceed applicable limits. Any contaminated materials which exceed applicable limits will be managed in accordance with requirements of these regulations, if necessary.
Hazardous Waste Management: Treatment, Storage, or Disposal Facility Standards	RCSA 22a-449 (c) 104	Applicable	This section establishes standards for treatment, storage, and disposal facilities. The standards of 40 CFR 264 are incorporated by reference.	Any hazardous waste which is temporarily stored on this site as part of the remedy will be managed in accordance with the requirements of this section.
Connecticut Guidelines for Soil Erosion and Sediment Control	Connecticut Council on Soil and Water Conservation	To Be Considered	Technical and administrative guidance for development, adoption, and implementation of erosion and sediment control program.	Guidelines will be followed to protect wetland and aquatic resources.
Water Quality Standards	CGS 22a-426	Applicable	Connecticut's Water Quality Standards establish specific numeric criteria, designated uses, and anti-degradation policies for ground water and surface water.	Standards will be used to evaluate monitoring results to determine if further remedial action is required to protect resources.

NOTE: USC = United States Code.
CFR = Code of Federal Regulations.
RCSA = Regulations of Connecticut State Agencies.
CGS = Connecticut General Statutes.

TABLE B-7 ASSESSMENT OF CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 3a – SELECTIVE EXCAVATION, ASPHALT BATCHING OR OFFSITE DISPOSAL, AND INSTITUTIONAL CONTROLS AND MONITORING (INDUSTRIAL SCENARIO) SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Cancer Slope Factors		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would eliminate exposure to contaminants in the sediment and soil to industrial standards through excavation and offsite disposal. Institutional controls would prevent residential exposure.
Reference Dose		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would eliminate exposure to contaminants in the sediment and soil to industrial standards through excavation and offsite disposal. Institutional controls would prevent residential exposure.
STATE OF CONNECTICUT				
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k-1 through 3	Applicable	These regulations establish direct exposure and pollutant mobility criteria for contaminated soils based on either industrial or residential uses of the site. Requirements are based on ground water in the area being classified by the state as a GB.	The alternative would eliminate exposure to contaminants in the soil to industrial standards through excavation and offsite disposal. The alternative meets residential use standards through institutional controls. This alternative would eliminate exposure to soils with contaminants at concentrations that exceed the GB pollutant mobility criteria.

NOTE: CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-8 ASSESSMENT OF LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE
ALTERNATIVE 3a – SELECTIVE EXCAVATION, ASPHALT BATCHING OR OFFSITE DISPOSAL, AND INSTITUTIONAL CONTROLS AND MONITORING (INDUSTRIAL SCENARIO)
SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Clean Water Act, Section 404	33 USC 1344; 40 CFR Part 230 and 33 CFR Parts 320-323	Applicable	These rules regulate the discharge of dredge and fill materials in wetlands and navigable waters. Such discharges are not allowed if practicable alternatives are available.	Remedial action includes excavation of soil and sediment from the contaminated wetlands and ditches and replacement/restoration with uncontaminated material. Measures will be taken to minimize adverse effects and to replace or restore protected wetland functions and values.
Executive Order 11990 RE: Protection of Wetlands	Executive Order 11990, 40 CFR Part 6, Appendix A	Applicable	This Order requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this Executive Order.	Remedial action includes excavation of soil and sediment from the contaminated wetlands and ditches and replacement/restoration with uncontaminated material. However, measures to minimize adverse effects and to replace or restore protected wetland functions and values will be considered and incorporated into any plan or action wherever feasible.
Fish and Wildlife Coordination Act	16 USC Part 661 *et. seq.*, 40 CFR 122.49	Applicable	This Order protects fish and wildlife when federal actions result in control or structural modification of a natural stream or body of water.	Appropriate agencies would be consulted prior to implementation to find ways to minimize adverse effects to fish and wildlife from excavating and restoring the contaminated wetlands and waterways.
STATE OF CONNECTICUT				
Inland Wetlands and Watercourses	CGS 22a-37 through 45, RCSA 22a-39-1 through 15	Applicable	These rules regulate activities in wetlands and watercourses.	This alternative proposes to excavate soil and sediment from the contaminated wetlands and watercourses and to restore the areas using uncontaminated material. The substantive requirements of the Connecticut standards will be met to address the alteration of wetlands and watercourses.

NOTE: USC = United States Code.
CFR = Code of Federal Regulations.
CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-9 ASSESSMENT OF ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 3a – SELECTIVE EXCAVATION, ASPHALT BATCHING OR OFFSITE DISPOSAL, AND INSTITUTIONAL CONTROLS AND MONITORING (INDUSTRIAL SCENARIO) SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Clean Water Act, Section 402 National Pollution Discharge Elimination System	33 USC 1342; 40 CFR 122 through 125	Applicable	These standards govern the discharge of water into surface waters.	Ground water and surface water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, to meet discharge criteria according to substantive requirements of National Pollution Discharge Elimination System if the discharge occurs onsite. Standards will also be used to evaluate monitoring results to determine if further remedial action is required to protect resources.
STATE OF CONNECTICUT				
Water Pollution Control	RCSA 22a-430-1 through 8	Applicable	These rules regulate water discharge to surface water.	Surface water and ground water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, in compliance with these regulations if the discharge occurs onsite.
Water Quality Standards	CGS 22a-426	Applicable	Connecticut's Water Quality Standards establish specific numeric criteria, designated uses, and anti-degradation policies for ground water and surface water.	Surface water and ground water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, in a manner which is consistent with the anti-degradation policy in the Water Quality Standards if the discharge occurs onsite. Standards will also be used to evaluate monitoring results to determine if further remedial action is required to protect resources.

NOTE: USC = United States Code.
CFR = Code of Federal Regulations.
RCSA = Regulations of Connecticut State Agencies.
CGS = Connecticut General Statutes.

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement
Hazardous Waste Management: Generator and Handler Requirements, Listing and Identification	RCSA 22a-449(c)-100-101	Applicable	Connecticut is delegated to administer the Federal Resource Conservation and Recovery Act statute through its state regulations. These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-261 are incorporated by reference.	Hazardous waste determinations will be performed on contaminated soils/sediments excavated to determine that levels of regulated constituents do not exceed applicable limits. Any contaminated soils/sediments which exceed applicable limits will be managed in accordance with requirements of these regulations, if necessary. Also, wastes produced from surface water, ground water, and dewatering treatment will be tested to determine whether levels of certain regulated constituents exceed Toxicity Characteristic Leaching Procedure limits.
Hazardous Waste Management: Generator Standards	RCSA 22a-449(c)-102	Applicable	This section establishes standards for various classes of generators. The standards of 40 CFR 262 are incorporated by reference.	Surface water, ground water, and dewatering treatment residues (spent filtration media and activated carbon) could contain high concentrations of regulated constituents. Although the residues are not expected to fail hazardous characteristics, substantive requirements of these regulations will be met.
Hazardous Waste Management: Treatment, Storage, or Disposal Facility Standards	RCSA 22a-449(c)-104	Applicable	This section establishes standards for treatment, storage, and disposal facilities. The standards of 40 CFR 264 are incorporated by reference.	Any hazardous waste which is treated or temporarily stored onsite as part of the remedy will be managed in accordance with the requirements of this section.
Air Pollution Control	RCSA 22a-174-18b	Applicable	These regulations require permits to construct and operate specified types of emission sources and contain emission standards that must be met prior to issuance of a permit. Pollutant abatement controls may be required. Specific standards pertain to fugitive dust (18b).	Emission standards for fugitive dust from excavation and restoration operations will be met with dust control measures. Emissions will be managed to comply with these standards.
Connecticut Guidelines for Soil Erosion and Sediment Control	Connecticut Council on Soil and Water Conservation	To Be Considered	Technical and administrative guidance for development, adoption, and implementation of erosion and sediment control program.	Guidelines will be followed to protect wetland and aquatic resources.

TABLE B-10 ASSESSMENT OF CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 3b – SELECTIVE EXCAVATION AND ASPHALT BATCHING OR OFFSITE DISPOSAL (RESIDENTIAL SCENARIO) SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Cancer Slope Factors		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would eliminate exposure to contaminants in the sediment and soil through excavation and offsite disposal.
Reference Dose		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would eliminate exposure to contaminants in the sediment and soil through excavation and offsite disposal.
STATE				
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k–1 through 3	Applicable	These regulations establish direct exposure and pollutant mobility criteria for contaminated soils based on either industrial or residential used of the site. Requirements are based on ground water in the area being classified by the state as a GB.	The alternative would eliminate exposure to contaminants in the soil through excavation and offsite disposal. The alternative meets residential use standards. This alternative would eliminate exposure to soils with contaminants at concentrations that exceed the GB pollutant mobility criteria.

NOTE: CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-11 ASSESSMENT OF LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 3b – SELECTIVE EXCAVATION AND ASPHALT BATCHING OR OFFSITE DISPOSAL (RESIDENTIAL SCENARIO) SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Clean Water Act, Section 404	33 USC 1344; 40 CFR Part 230 and 33 CFR Parts 320-323	Applicable	These rules regulate the discharge of dredge and fill materials in wetlands and navigable waters. Such discharges are not allowed if practicable alternatives are available.	Remedial action includes excavation of soil and sediment from the contaminated wetlands and ditches and replacement/restoration with uncontaminated material. Measures will be taken to minimize adverse effects and to replace or restore protected wetland functions and values.
Executive Order 11990 RE: Protection of Wetlands	Executive Order 11990, 40 CFR Part 6, Appendix A	Applicable	This Order requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this Executive Order.	Remedial action includes excavation of soil and sediment from the contaminated wetlands and ditches and replacement/ restoration with uncontaminated material. However, measures to minimize adverse effects and to replace or restore protected wetland functions and values will be considered and incorporated into any plan or action wherever feasible.
Fish and Wildlife Coordination Act	16 USC Part 661 *et. seq.*, 40 CFR 122.49	Applicable	This Order protects fish and wildlife when federal actions result in control or structural modification of a natural stream or body of water.	Appropriate agencies would be consulted prior to implementation to find ways to minimize adverse effects to fish and wildlife from excavating and restoring the contaminated wetlands and waterways.
STATE OF CONNECTICUT				
Inland Wetlands and Watercourses	CGS 22a-37 through 45, RCSA 22a-39-1 through 15	Applicable	These rules regulate all activities in wetlands and watercourses.	This alternative proposes to excavate soil and sediment from the contaminated wetlands and watercourses and to restore the areas using uncontaminated material. The substantive requirements of the Connecticut standards will be met to address the alteration of wetlands and watercourses.

NOTE: USC = United States Code.
CFR = Code of Federal Regulations.
CGS = Connecticut General Statutes.
RCSA = Regulations of Connecticut State Agencies.

TABLE B-12 ASSESSMENT OF ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE ALTERNATIVE 3b – SELECTIVE EXCAVATION AND ASPHALT BATCHING OR OFFSITE DISPOSAL (RESIDENTIAL SCENARIO) SITE 20 – AREA A WEAPONS CENTER, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement
FEDERAL				
Clean Water Act, Section 402, National Pollution Discharge Elimination System	33 USC 1342; 40 CFR 122 through 125	Applicable	These standards govern the discharge of water into surface waters.	Ground water and surface water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, to meet discharge criteria according to substantive requirements of National Pollution Discharge Elimination System if the discharge occurs onsite.
STATE OF CONNECTICUT				
Water Pollution Control	RCSA 22a-430-1 through 8	Applicable	These rules regulate water discharge to surface water.	Surface water and ground water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, in compliance with these regulations if the discharge occurs onsite.
Water Quality Standards	CGS 22a-426	Applicable	Connecticut's Water Quality Standards establish specific numeric criteria, designated uses, and anti-degradation policies for ground water and surface water.	Surface water and ground water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, in a manner which is consistent with the anti-degradation policy in the Water Quality Standards if the discharge occurs onsite.
Hazardous Waste Management: Generator and Handler Requirements, Listing, and Identification	RCSA 22a-449(c) 100-101	Applicable	Connecticut is delegated to administer the Federal Resource Conservation and Recovery Act statute through its state regulations. These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-261 are incorporated by reference.	Hazardous waste determinations will be performed on all contaminated soils/sediments excavated to determine that levels of regulated constituents do not exceed applicable limits. Any contaminated soils/sediments which exceed applicable limits will be managed in accordance with requirements of these regulations, if necessary. Also, wastes produced from surface water, ground water, and dewatering treatment will be tested to determine whether levels of certain regulated constituents exceed Toxicity Leaching Characteristic Procedure limits.

NOTE: USC = United States Code.
CFR = Code of Federal Regulations.
RCSA = Regulations of Connecticut State Agencies.
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Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement
Hazardous Waste Management: Generator Standards	RCSA 22a-449(c)-102	Applicable	This section establishes standards for various classes of generators. The standards of 40 CFR 262 are incorporated by reference.	Surface water, ground water, and dewatering treatment residues (spent filtration media and activated carbon) could contain high concentrations of regulated constituents. Although the residues are not expected to fail hazardous characteristics, substantive requirements of these regulations will be met.
Hazardous Waste Management: Treatment, Storage, and Disposal Facility Standards	RCSA 22a-449 (c) 104	Applicable	This section establishes standards for treatment, storage, and disposal facilities. The standards of 40 CFR 264 are incorporated by reference.	Any hazardous waste which is treated or temporarily stored onsite as part of the remedy will be managed in accordance with the requirements of this section.
Air Pollution Control	RCSA 22a-174-18b	Applicable	These regulations require permits to construct and to operate specified types of emission sources and contain emission standards that must be met prior to issuance of a permit. Pollutant abatement controls may be required. Specific standards pertain to fugitive dust (18b).	Emission standards for fugitive dust from excavation and restoration operations will be met with dust control measures. Emissions will be managed to comply with these standards.
Connecticut Guidelines for Soil Erosion and Sediment Control	Connecticut Council on Soil and Water Conservation	To Be Considered	Technical and administrative guidance for development, adoption, and implementation of erosion and sediment control program.	Guidelines will be followed to protect wetland and aquatic resources.

Appendix C

Letter of Concurrence from the Connecticut Department of Environmental Protection

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

79 ELM STREET HARTFORD, CONNECTICUT 06106

PHONE: (860) 424-3001

Arthur J. Rocque, Jr.
Commissioner

June 28, 2000

Ms. Patricia L. Meaney, Director
United States Environmental Protection Agency, Region 1
Office of Site Remediation and Restoration
JFK Federal Building (HAA)
Boston, MA 02203-2211

H. A. Lincoln, Jr
Captain, USN
Commanding Officer
Naval Submarine Base New London
Box 00
Groton, CT 06349

Re: State Concurrence with Remedy for Site 20- Area A Weapons Center, Naval Submarine Base New London, Groton, Connecticut

Dear Captain Lincoln and Ms. Meaney:

The Connecticut Department of Environmental Protection (CTDEP) concurs with the remedy selected by the EPA and the Navy for Site 20- Area A Weapons Center, Naval Submarine Base New London, Groton, Connecticut. The selected remedy consists of: 1) Selective excavation of soils and sediments containing contaminants at concentrations greater than cleanup goals based on future residential land use; 2) Treatment of soil and sediment in an asphalt plant by using it as an ingredient to produce asphalt pavement, or if the facilities to do so are unavailable, disposing of soil and sediment in an off- site landfill; and 3) Collection of confirmation samples from excavation walls.

The remedy is described in detail in the proposed plan dated May 2000, and the draft Record of Decision dated June 2000.

The State is pleased that the Navy and EPA have chosen from among several possible remedies the remedy that provides the greatest level of protection for human health and the environment, and is the most cost effective in the long term. This represents wise stewardship of both the environment and of taxpayer dollars.

Thank you for your cooperation on this project. We look forward to working with you toward continued remediation at the Naval Submarine Base.

Sincerely,

Arthur J. Rocque, Jr.
Commissioner

AJR:MRL

RESPONSES TO
USEPA'S JANUARY 4, 2001 COMMENT LETTER
ON THE BIDDING DOCUMENTS SUBMISSION (REV 01 SEPTEMBER 2000)
FOR GOSS COVE LANDFILL (SITE 8)
NAVAL SUBMARINE BASE-NEW LONDON
GROTON, CONNECTICUT

March 20, 2001

GENERAL COMMENTS (Cover Letter)

General Comment 1

Comment: The Navy has edited the plans to more clearly indicate that a six-inch buffer layer of select fill will be required immediately beneath the gas management layer and geomembrane; however, the plans and specifications have not been changed to require that this six-inch layer be non-frost susceptible as requested by EPA. The Navy has stated, in response to inquiries by EPA, that it is their intention to provide a non-frost susceptible layer as a construction modification, although the Navy has indicated that the layer thickness may vary from three-inches to six inches depending on the availability of non-frost susceptible material at the site. EPA would strongly prefer that six inches of non-frost susceptible material be used for this layer. Please indicate how this construction modification has been incorporated into the construction requirements for the project.

Response: As stated, in part, in the Navy's December 7, 2000 response to USEPA's November 6, 2000 comment letter, "TtNUS and the Navy judge that the effect of frost heave on the geomembrane will not be detrimental to the long-term performance of the geomembrane considering the following:

- The engineered control cap will provide greater protection from frost effects compared to the existing asphalt pavement. The existing asphalt pavement does not exhibit perceptible frost heave or resultant damage.
- Frost heave should not damage the geomembrane based on qualitative consideration of the geomembrane's tensile properties, the degree of frost heave, and the area over which frost heave may occur.

TtNUS and the Navy therefore judge that including a 6-inch thick layer of non-frost susceptible soil beneath the geomembrane and gas management layer is not necessary."

At the February 22, 2001 design and construction modifications meeting with USEPA in Boston,

Massachusetts the Navy agreed to provide a minimum of three inches of the asphalt paved parking lot base course material below the geomembrane as this material has been excavated and stockpiled. In addition, the Navy indicated at the February 22, 2001 meeting that the curb height in the parking area will be reduced from nine to six inches by increasing the asphalt pavement area cap system thickness by three inches from 21 inches to 24 inches. The USEPA suggested and the Navy agreed to include visual inspection of the cap system for frost heaving and an appropriate plan of action if frost heave is observed, into the Operations and Maintenance (O&M) Plan for the Site. The proposed reuse of the base course material, increase in the asphalt pavement area cap system thickness, and incorporating inspection for frost heave into the O&M plan adequately addressed USEPA concerns per the February 22, 2001 meeting.

General Comment 2

Comment: Resolution of groundwater monitoring well locations installed within the footprint of the landfill cap is needed before installation of the geomembrane.

Response: The Navy submitted responses to USEPA's December 4, 2000 comment letter on the Groundwater Monitoring Plan to USEPA on January 4, 2000. In correspondence dated January 29, 2001, USEPA indicated that the Navy's responses addressed USEPA's concerns. The Navy indicated at the February 22, 2001 meeting that monitoring well 8MW3 had been reinstalled. The monitoring well 8MW3 log was included in the final Groundwater Monitoring Report. In addition, monitoring well 8MW7S, which was presumed abandoned, was located during excavation activities adjacent to the Submarine Force Library and Museum. Monitoring well 8MW7S was sounded and appears to be in operational condition. As a result, a replacement monitoring well north of the Submarine Force Library and Museum will not require installation.

UNRESOLVED PRIOR COMMENT (Cover Letter)

Comment: The Follow-up Comment (dated November 2000) to the October 2, 2000 response to General Comment #3 has not been addressed.

Original EPA General Comment #3. The settlement analysis appears to conclude that only consolidation settlement will contribute to differential settlement between the landfill cap located above the storm sewer culvert and the surrounding landfill cap. However, distortion settlement at two locations along the sewer culvert exceeds consolidation settlement. Because the storm sewer will be installed before the waste/fill is consolidated and the cap is constructed, distortion

settlement will also contribute to differential settlement between the cap located above the storm sewer culvert and the surrounding landfill cap. Therefore, the amount of differential settlement at Point D (see Appendix E), midway along the length of the storm sewer culvert, would be approximately 5.25 inches. It is not clear from the analysis in this submittal that the geomembrane or the geotextiles would remain in tact under these conditions. It appears that if the storm sewer culvert is prevented from settling in conjunction with the surrounding landfill cap, then some additional design provision may need to be implemented to ensure the survival of the geomembrane and geotextiles in the vicinity of the storm sewer culvert. Navy Oct. 2, 2000 Response (Summarized): New calculations (in Exhibit #1) are provided documenting the appropriateness of the design for geomembrane integrity and storm sewer pipe connection integrity. Follow-up EPA Comment (November 2000): Three additional considerations should have been reviewed when making these calculations. First, the soil above the pile cap, that extends 1.5 feet beyond the box culvert, will not settle. Therefore, unless there is sufficient soil deformation (and it is not clear this will occur due to compaction around the box culvert), the stresses will be transferred to the pipe not the joint, and the pipe, unless uniform circular bending occurs, will apparently fail. Second, to take advantage of the allowable deflection in the joint, the pipe will have to be installed in a particular way so that all the deflection can occur in one direction. The contractor needs to be aware of this. Third, the manufacturer's minimum allowable bending radius was determined at a temperature of 73.4°F, which is greater than the temperature the pipe will experience for much of its lifetime. A lower temperature will result in a greater allowable minimum bending radius (less bending can be tolerated). It appears that pipe "I" and possibly pipe "C" may be in jeopardy of failure and will at least be significantly stressed.

Response: The USEPA has indicated that three additional considerations should be made when assessing the acceptability of the pipe connections to the box culvert. Each of these considerations is addressed below.

1) The reviewer's concern is that the soil will not deform and settle close to the outer wall of the box culvert near the connection of the critical pipe to the box culvert because a pile cap extents 1.5 feet out from the box culvert. The pile cap may hold the soil and pipe in place near the box culvert not allowing the joint to flex, which was the assumption made in the supplemental calculations provided on October 2, 2000.

   Given the difficulty in compacting the soil around the pipe and closeness to the box culvert, it is not felt that perfect compaction will be obtained in this area. Therefore, it is judged that the soil will be able to deform in this area and accommodate the movement of the pipe.

2) The reviewer is concerned that if the pipe is not installed in a particular way, the joint will not function as was assumed in the calculation.

   If the pipe is installed according to manufacturer's recommendations the joint should function as intended. It is not felt that any additional instruction to the contractor is required.

3) The reviewer has correctly pointed out that the minimum bending radius used in the calculations were based on the manufacture's literature based on 73.4 °F and the soil will likely be colder.

   Although the actual minimum bending radius due to field conditions may be longer than what is cited in the calculation, the calculation provides a range of values and radii which could occur. The conclusion of the calculation is that the deformation of the pipe will occur over a distance between 5 and 8 feet from the box culvert. The calculation shows that the deformation of the pipe and joint is controlled by the joint deformation so that the bend radius that corresponds to the limiting case is more than twice the minimum bend radius at 73.4 °F. It is therefore judged that the minimum bend radius criteria will not adversely effect the integrity on the pipe.

If the conservatively calculated theoretical maximum settlement does occur, the Navy agrees that the pipes and the joints associated with the box culvert will sustain additional stresses, however, based on an analysis of the connections, it is judged that the pipe and joints will not be stressed beyond their serviceability.

The Navy will include routine inspection of the stormwater conveyance pipes and appropriate corrective measures if damage of the system occurs into the O&M Plan for the Site as discussed at the February 22, 2001 meeting.

SPECIFIC COMMENTS (Attachment A)

Comment No. 1

Comment: Sheet T-3 - Various Stages of the Construction Sequence refer to separation of the parking area for visitor parking. It appears from site visits that visitor parking will be eliminated from the parking area for the duration of the construction? Please correct as necessary.

Response: As stated in Note 1 on Sheet T-3, "The Remedial Action Contractor (RAC) will

develop the final construction sequence for the project. The detailed construction sequence will be provided with the RAC's Work Plan for review and approval prior to implementation."

The Submarine Force Library and Museum parking lot has been closed until construction activities have been completed. Visitor parking is generally available in a designated area of the Subbase.

Comment No. 2

Comment: Sheet R-4 - References to fuel oil piping have been changed to heating oil piping except for item 5B-15 and in the General Legend on Sheet T-2. Please correct as appropriate.

Response: The term "fuel oil" and "heating oil" for the Goss Cove landfill remedial design are synonymous; therefore, no modification is necessary.

Comment No. 3

Comment: Sheet C-5 - Is an easement also required for the landfill cap located on the Town of Groton property south of the lower junction box? Has an easement been obtained? Please correct as appropriate.

Response: The easement granted to the Town of Groton by the U. S. government has expired. The United States of America owns the property.

Comment No. 4

Comment: Sheet C-7 - According to recent correspondence from the Navy, the limit of waste in the area around the sewage lift station and electrical transformer has been changed so that a cap will not be constructed in that area. That change is not reflected in this revision of the plans. Please correct as appropriate.

1. Response: The Navy presented an overview of how the waste/fill limit indicated on the Design Drawings was developed at the February 22, 2001 meeting. In summary, the waste/fill limit was determined through review of all historical boring logs, test pit logs, topographic surveys, geotechnical field investigations, and a review of the design and as-built drawings for the Town of Groton sewage pump station, Submarine Force Library and

Museum, and Submarine Force Library and Museum additions. As indicated on Design Drawing T-2, the area east of the Submarine Force Library and Museum does not contain historic test borings, test pits, etc.

The Navy excavated test pits in this area and presented the results in the RAC's Change Request Form (CRF) No. 13. The CRF will be revised to include the sampling locations, depths, etc. per USEPA's request at the February 22, 2001 meeting. In addition, the Navy will forward analytical test results to USEPA upon receipt. The Navy and USEPA will then discuss the results and the proposed reduction in the engineered control cap limits in this area.

Comment No. 5

Comment: Sheet C-8 - A significant change has been made to the cap design in the area between the eastern side of the parking lot and the bedrock outcrop. Formerly, the geomembrane extended to bedrock and a geosynthetic clay liner and select fill provided a seal between the geomembrane and the bedrock. Now, the geomembrane terminates some 10 to 20 feet from the bedrock, a concrete sidewalk replaces most of the geomembrane formerly located east of the new termination point, and a porous bedding/gas management layer (see Sheet C-17, Detail 3) is located between the sidewalk and the bedrock. This design differs from that suggested in the Navy's response to Specific Comment #17 in the October 2, 2000 response document. There are several concerns with this change: 1) it appears that the porous area between the sidewalk and the bedrock will provide an area where surface runoff from the bedrock outcrop would easily migrate into the landfill waste material and will also provide a potential exit point for gas release to the atmosphere, 2) the porous area is subject to erosion from runoff from the bedrock outcrop, that could potentially jeopardize the drainage pipe and the sidewalk and expose waste material, 3) a large area beneath the sidewalk is created where gas could potentially collect, and 4) there is insufficient detail to construct this new configuration properly because it does not show how the detail interfaces with the bedrock outcrop. It is not clear why Detail 3 on Sheet C-17 was added rather than providing a grass area cap system with concrete paving (as was done to the north of this area). A french drain is a good idea for erosion control during construction but questionable as a final design element. Please clarify why this new configuration is appropriate or change the configuration to address the above-listed concerns.

Response: The reinforced concrete sidewalk, as indicated on Design Drawing C-8, has been removed from the design and will not be constructed. The grass area/bedrock outcrop cap termination detail will be used per the previous submission. The french drain component of the detail (perforated corrugated plastic pipe and granular drainage material) will be retained for the

cap termination at the bedrock outcrop per the USEPA's request at the February 22, 2001 meeting. The design/construction modification will be reflected in the RAC's as-built drawings.

Comment No. 6

Comment: Sheet C-8 - At the top-center of the sheet, the line style indicates a limit for an asphalt cap system but a grass area/bedrock outcrop cap termination is called out. Please correct as appropriate.

Response: The termination detail and adjacent cap termination transition detail are correctly identified. As requested, the line type will be adjusted accordingly on the RAC's as-built drawings.

Comment No. 7

Comment: Sheet C-8 - At the western edge of the bedrock outcrop, east of the parking lot, the line style indicates the limit of a grass cap system; however, that appears to have changed with the addition of the reinforced concrete sidewalk east of the parking lot. Please review and correct as necessary.

Response: Refer to Response to Comment No. 5. The design/construction modification will be reflected in the RAC's as-built drawings.

Comment No. 8

Comment: Sheet C-8 - The cap termination transition at the southern end of the new reinforced concrete sidewalk appears to be misplaced because the cap termination continues along the bedrock outcrop for approximately 15 feet south of the location where the transition to a grass cap termination supposedly begins. Please correct or clarify.

Response: Refer to Response to Comment No. 5. The design/construction modification will be reflected in the RAC's as-built drawings.

Comment No. 9

Comment: Sheet C-8 - Does the concrete walk continue from the southern end of the new reinforced concrete sidewalk south to the propeller display? It appears that it does, but a grass area cap system with concrete paving is not called out. Please correct or clarify.

Response: Refer to Response to Comment No. 5. The design/construction modification will be reflected in the RAC's as-built drawings.

Comment No. 10

Comment: Sheet C-8 - A connection detail for the slotted drain pipe and Inlet 5 is not referenced or provided. There is no convenient entry point into the catch basin (Inlet #5) for the slotted drain pipe with the specified catch basin configuration (see Sheet C-18). Either the catch basin configuration should be changed to provide an entry point, or a drop inlet (which requires a penetration of the geomembrane) should be specified. Please correct this.

Response: The grades around the Submarine Force Library and Museum have been revised due to the landscape plan. The referenced connection detail (i.e., slotted drain to storm sewer catch basin) will therefore not be used since the slotted drain detail has been deleted from the design.

Comment No. 11

Comment: Sheet C-8 - This sheet indicates that a gas vent will be located above the Lower Junction Box; however, Sheet C-10 indicates that the Lower Junction Box extends to grade. Is the gas vent located correctly, or does the Lower Junction Box terminate far enough below grade to allow the gas piping and vent to be located as shown? Please clarify.

Response: The design was prepared based on the lower junction box terminating below grade. It has been determined through construction that the lower junction box terminates nearer to final grade than previously thought. The geomembrane will therefore terminate at the lower junction box and the gas vent will be located between the lower junction box and the entrance sign. Should the actual location of the gas vent or gas management piping differ from what is shown on the Design Drawings, the modification will be reflected in the RAC's as-built drawings.

Comment No. 12

Comment: Sheet C-8 - The asphalt area cap termination at the Lower Junction Box appears to be misplaced since the geomembrane is apparently supposed to be anchored to the Lower Junction

Box. Presumably the cap will terminate along the western side of the Lower Junction Box. Was the cap termination line drawn where it is to identify waste that was formerly placed above the Lower Junction Box and now needs to be removed? Please clarify.

Response: The limit of waste as indicated on the Design Drawings was inferred based upon the information presented in Section 4.3 of the Basis of Design. Accordingly, the limit of the cap system coincides with the limit of the waste/fill. Should the actual waste/fill limit vary from what is indicated on the Design Drawings, it is understood that the limit of the cap system may be modified accordingly. Should the actual waste/fill and cap limits vary from what is shown on the Design Drawings, the modification will be reflected in the RAC's as-built drawings. The geomembrane will terminate at the lower junction box as stated at the February 2, 2001 meeting. The geomembrane will be mechanically anchored to the lower junction box as indicated on Design Drawing C-21 Detail 2.

Comment No. 13

Comment: Sheet C-8 - The concrete display slab located in the south-central portion of the sheet has been relocated and now serves as a portion of the landfill cap with the geomembrane anchored to the deep footing along the perimeter of the slab. This is an unwelcome change because it creates a discontinuity in the cap where surface runoff could potentially enter and gas could potentially exit. It also creates a gas collection area beneath the slab. Please clarify why the slab was designed this way rather than using a slab at grade and maintaining a continuous geomembrane across the site.

Response: The concrete display slab as shown on Design Drawing C-8 (Design Drawing 17 Detail 2) has been removed from the design due to the incorporation of the landscape plan and will not be constructed. The design/construction modification will be reflected in the RAC's as-built drawings.

Comment No. 14

Comment: Sheet C-13 - This sheet was revised but no revision is indicated in the title/revision block.

Response: Agree. A couple of the storm sewer sizes were rescaled. The modification will be reflected in the RAC's as-built drawings.

RESPONSES TO USEPA'S JANUARY 4, 2001 COMMENT LETTER
BIDDING DOCUMENTS SUBMISSION (REV 01 SEPTEMBER 2000)
GOSS COVE LANDFILL (SITE 8)
NSB-NLON, GROTON, CONNECTICUT

Comment No. 15

Comment: Sheet C-17 - Detail 3 is confusing because it appears to show a porous bedding material for the 8-inch perforated pipe. If this is correct, it is not acceptable for a number of reasons (as cited above), or additional detail needs to be provided to clarify the design intent and present an appropriate design.

Response: Refer to Response to Comment No. 5. The design/construction modification will be reflected in the RAC's as-built drawings.

Comment No. 16

Comment: Sheet C-18 - The catch basin penetration schedules show three 4-inch connections for Inlet 7 and two 4-inch connections for Inlet 12 (a yard drain according to sheet C-4). Unless the 4-inch conveyance pipe between Inlet 7 and Inlet 12 (as shown on Sheet C-7) actually connects to both inlets, there appears to be one too many connections. Sheet C-7 appears to show that the 4-inch pipe west of Inlet 7 does not connect with Inlet 7. Please review and correct as necessary.

Response: Agree, the HDPE Collection/Conveyance Pipe Penetration Schedule on Sheet C-19 reflects one penetration too many (5.99 (W)). The four-inch diameter collection piping does not connect to the west side of Inlet 7 as indicated. The modification will be reflected in the RAC's as-built drawings. It should be mentioned that since the grades around the Submarine Force Library and Museum have been revised due to the landscape plan, some of the details associated with the catch basins may require further modification.

Comment No. 17

Comment: Sheet C-18 - Inlet 12 is a yard drain, yet the penetration schedules show there are four connections to this "inlet." It is not clear how these connections will be made and no detail is presented. Based on the inverts shown in the schedule, the top of the 12-inch pipe will interfere with the 4-inch pipe coming from the NW, and the top of the 6-inch pipe will interfere with the 4-inch pipe coming from the east. There appears to be an error in the invert elevations. Is Inlet 12 really a yard drain as Sheet C-4 indicates? Please review and correct as necessary, providing a clarification if no change is warranted.

Response:

RESPONSES TO USEPA'S JANUARY 4, 2001 COMMENT LETTER
BIDDING DOCUMENTS SUBMISSION (REV 01 SEPTEMBER 2000)
GOSS COVE LANDFILL (SITE 8)
NSB-NLON, GROTON, CONNECTICUT

As stated at the February 22, 2001 meeting, storm sewer catch basins will be used in lieu of the yard drains due to the revised grades around the Submarine Force Library and Museum. The modification will be reflected in the RAC's as-built drawings.

Comment No. 18

Comment: Sheet C-19 - Edit the yard drain detail to indicate that a geomembrane boot with stainless steel clamp and neoprene gasket will be required for each yard drain that penetrates the geomembrane (all do).

Response: As stated at the February 22, 2001 meeting, storm sewer catch basins will be used in lieu of the yard drains due to the revised grades around the Submarine Force Library and Museum. The modification will be reflected in the RAC's as-built drawings.

SPECIFIC COMMENTS ON THE SPECIFICATIONS

Comment No. 19

Comment: Section 02372, p. 9 - The ninth sentence of subsection 3.3.1 reads "To be acceptable, 4 out of 5 ...." Please correct the grammar in this sentence which makes the meaning of the sentence ambiguous. The same correction is required at the top of page 11 in subsection 3.5.2.

Response: The sentence should read: "To be acceptable, 4 out of 5 replicate test specimens shall meet seam strength requirements specified in Table 2, and a peel resistance of at least 60 percent of the compared tension during 100 percent stretching of the unseamed geomembrane sheet must be reached."

Comment No. 20

Comment: Section 02525, p. 8 - Subsection 3.4.4 refers to a bentonite seal. The specification for the bentonite seal was contained in the previous version of the specifications, but has been deleted from this revision. Please correct as appropriate.

Response: The correspondence "Letter Work Plan for the Re-Installation of Monitoring Wells" prepared by TtNUS and submitted to the Navy and regulatory agencies on October 19, 2001

supercedes the requirements of Specification Section 02525 (September 2000 REV 1). The Letter Work Plan for the Re-Installation of Monitoring Wells stated the following:

> "A secondary filter pack will be used during monitoring well installation in place of the normal bentonite seal specified in Section 02525 of the Specifications. The use of a secondary sand filter pack is necessary because the monitoring wells will be installed across the groundwater table, and the bentonite seal will be above the water table and could become dehydrated, shrink, or crack, rendering it ineffective. Furthermore, the effectiveness of bentonite may be reduced in groundwater that contains several classes of contaminants (i.e., xylene, acetone, acetic acid, aniline, ethylene glycol, methanol heptane, some chlorinated solvents, and some petroleum hydrocarbons). The secondary sand filter pack will be unaffected by high total dissolved solids, high chloride content, or the class of contaminants. A secondary filter pack is a layer of material placed in the annulus between the primary filter pack and the cement-bentonite grout. The secondary filter pack should be uniformly graded fine sand with 100 percent by weight passing the No. 30 U.S. Standard sieve, and less than 2 percent by weight passing the No. 200 U.S. Standard sieve." and "A secondary filter pack (total thickness of 2 feet) will be installed above the primary filter pack described above. The remaining annular space will be backfilled with a cement-bentonite grout. Each monitoring well will be equipped with a slightly raised flush-mounted surface steel protective protective casing with a neat Portland cement pad. ..."

The bentonite seal was included in the July 2000 version of the specifications but was purposely deleted from the September 2000 (REV 1) version of the specifications based on the rationale presented above. The September 2000 (REV 1) version of the Specifications includes providing a cement/bentonite grout above the secondary filter pack.