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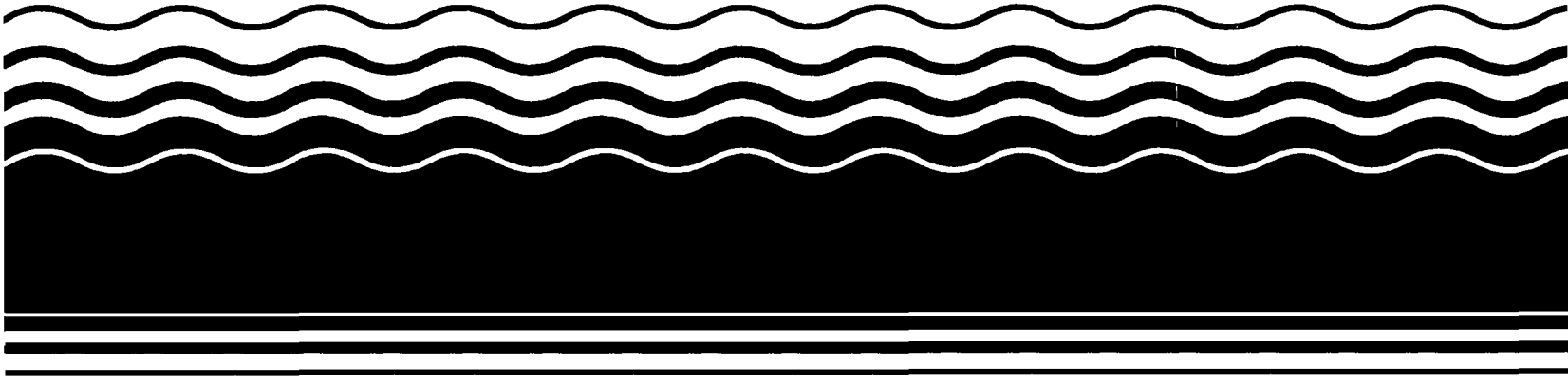
EPA/ROD/R01-95/108
February 1996

EPA Superfund Record of Decision:

New London Naval Submarine Base, (O.U. 1), Area A Landfill, Groton, CT 9/26/1995



RECORD OF DECISION

SOURCE CONTROL OPERABLE UNIT
AREA A LANDFILL

NAVAL SUBMARINE BASE
GROTON, CONNECTICUT

SEPTEMBER 1995

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

DECLARATION FOR THE RECORD OF DECISION

SITE NAME & LOCATION

Operable Unit 1 - Area A Landfill
Naval Submarine Base
Groton, Connecticut

STATEMENT OF BASIS & PURPOSE

This decision document presents the selected source control remedial action for Operable unit 1, the Area A Landfill, at the Naval Submarine Base ("NSB") in Groton, Connecticut. This decision document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA") and with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"). Through this document, the Navy plans to minimize the threat to human health and the environment posed by the presence of the landfill through the implementation of a source control action. This decision is based upon the contents of the Administrative Record for the Area A Landfill. The Administrative Record is available at the NSB in Groton, Connecticut.

Both the U.S. Environmental Protection Agency and the Connecticut Department of Environmental Protection concur with the selected remedial action.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision ("ROD"), may present a current or potential threat to human health and the environment.

DESCRIPTION OF THE SELECTED REMEDY

This remedy is the first of two operable units for the site and addresses source control. Management and migration of contaminants in the groundwater will be addressed as a separate operable unit.

The major components of the selected remedy include:

- Capping of the site with a RCRA Subtitle C multi-layer cap.
- Landfill gas controls to manage landfill gas migration.
- Surface controls to minimize erosion and manage runoff.
- Use of fencing and institutional controls to control site access and future site use.

- Provisions for conducting additional studies, including determining if additional measures, beyond capping, such as a leachate/groundwater collection system, must be taken to further contain contaminants and enhance stability.

- A leachate/groundwater collection system may be installed to further contain landfill wastes and to stabilize the cap if pre-design studies indicate that one is necessary.

- Five -year review.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. This source control remedial action uses permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy does not satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element because treatment of the entire landfill is not practicable. The selected remedy will reduce mobility of contaminants through its containment features. Because this remedy will result in contaminants remaining at the site above levels that allow unlimited use and unrestricted exposure, the Navy will review the remedial action to the extent required by law, to assure that it continues to protect human health and the environment.

The foregoing represents the selection of a remedial action by the Department of the Navy and the U.S. Environmental Protection Agency, Region I, with concurrence of the Connecticut Department of Environmental Protection. Concur and recommend for immediate implementation:

By: _____ Date: 9/15/95
Captain Leo Dominique

Title: Captain, U.S. Navy
Commanding Officer
Naval Submarine Base
Groton, Connecticut

By: _____ Date: September 26, 1995
Linda M. Murphy

Title: Director, Waste Management Division
U.S. Environmental Protection Agency, Region I
JFK Federal Building
Boston, Massachusetts

DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTIONS

The United States Navy Submarine Base - New London ("NSB-NLON") was placed on the National Priorities List ("NPL") on August 30, 1990 by the United States Environmental Protection Agency ("EPA") pursuant to the Comprehensive Environmental Response and Liability Act ("CERCLA") of 1980. There are several sites within NSB-NLON that are being addressed by CERCLA. This Record of Decision ("ROD") relates to soil contamination at the Area A Landfill site within the NSB-NLON.

The NSB-NLON consists of approximately 547 acres of land and associated buildings in southeastern Connecticut in the towns of Ledyard and Groton. NSB-NLON is situated on the east bank of the Thames River, approximately 6.0 miles north of Long Island Sound, and is bounded to the east by the Connecticut Route 12, to the south by Crystal Lake Road, and to the west by the Thames River. The northern border is a low ridge that trends approximately east-southeast from the river. Figures 1-1 and 1-2 show the NSB-NLON location and the Area A Landfill location, respectively.

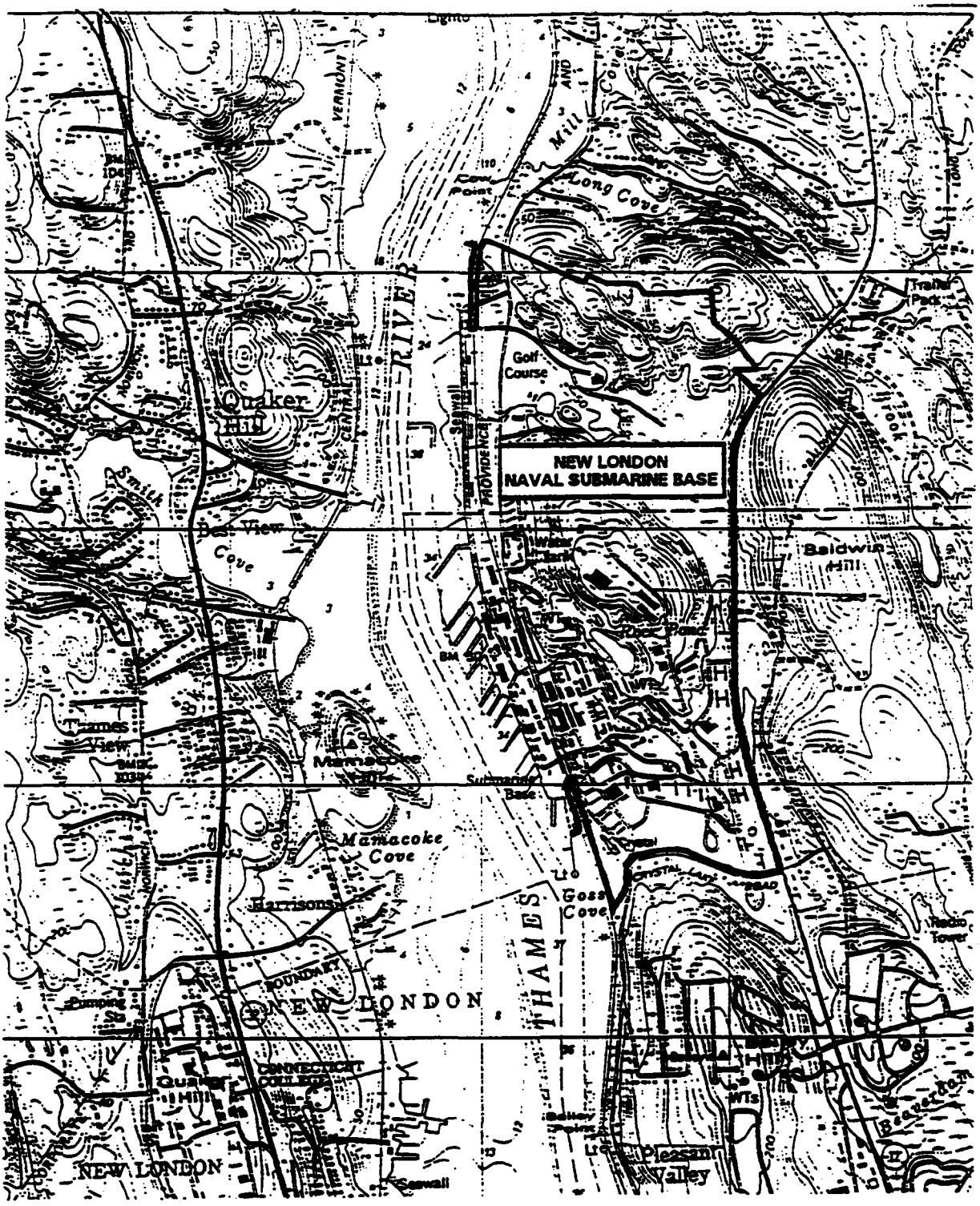
NSB-NLON currently provides a base command for naval submarine activities in the Atlantic Ocean. Additionally, NSB-NLON includes housing for Navy personnel and their families, submarine training facilities, military offices, medical facilities, and facilities designed for the maintenance, repair, and overhaul of submarines.

Land use adjacent to the NSB-NLON is generally residential or commercial. Residential developments border the NSB-NLON to the north and extend north into the Gales Ferry section of Ledyard. Property along Route 12 to the east of the NSB-NLON consists of widely spaced private homes and open, wooded land. Further south on Route 12, development is a mixture of commercial and residential properties that include automobile sales and repair facilities, convenience stores, restaurants, a church, and a gasoline station. Private residences and an automobile service station are located along the south side of the NSB-NLON along Crystal Lake Road; further south is housing for Navy personnel.

The Groton Water Department supplies potable water to NSB-NLON. The primary sources of the Groton water supply are reservoirs that are supplemented with wells. The water supplies are located within the Poquonock River Watershed, located east of NSB-NLON, which is not within the NSB-NLON watershed. Groundwater at NSB-NLON is not used for potable water.

The land around NSB-NLON consists of a series of low bedrock ridges that trend generally north to south. Lowlands between the ridges are commonly wetlands and poorly drained stream valleys. The Thames River adjacent to the west of NSB-NLON is flanked by glacially-derived terrace deposits and more recent flood-plain deposits.

The topography of NSB-NLON (see Figure 1-1) is dominated by bedrock ridges in the northern (elevation 180 feet mean sea level ["MSL"]) and central (elevation 230 feet MSL) portions of the NSB-NLON, as well as an off-site ridge (Baldwin Hill, elevation 245 feet MSL) to the east. The low-lying area (elevation 50 feet MSL) between these ridges slopes to the west (USGS, 1984). The eastern portion of the area is a wetland (Area A)



DECISION SUMMARY
AREA "A" LANDFILL
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CT

SOURCE: Uncasville, CT
U.S.G.S. Topographic Map
1984

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FIGURE 1-1
NSB-NLON LOCATION

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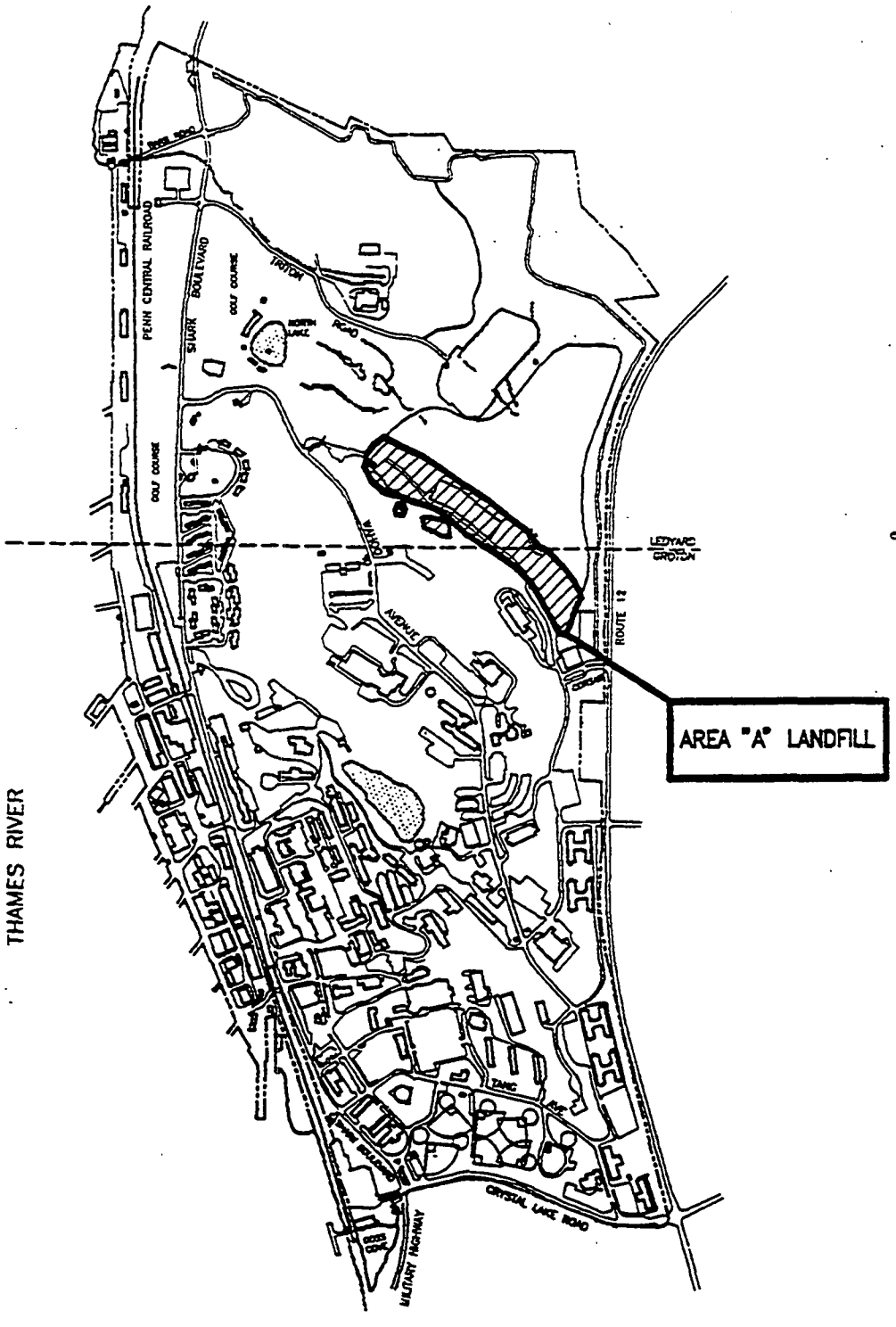


DECISION SUMMARY
AREA "A" LANDFILL
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

SOURCE: Naval Submarine Base
Existing Conditions
April 1985
Loureiro Engineering Associates

N
W E
S

0 600 1200
GRAPHIC SCALE IN FEET

FIGURE 1-2
LOCATION OF AREA A LANDFILL

ATLANTIC ENVIRONMENTAL SERVICES, INC.

which drains through an earthen dike into an area that is 30 to 40 feet below the elevation of the wetland. The southern and western portions of NSB-NLON are generally flat with sparse bedrock outcrops. The topography in several areas of NSB-NLON has been altered by landfilling and quarrying.

The Area A Landfill is located in the northeastern and north-central section of NSB-NLON. The site is approximately 13 acres in size. The Area A Landfill is a relatively flat area bordered by a steep, wooded hillside that rises to the south, a steep wooded ravine to the west, and a wetland, referred to as the Area A Wetland, to the north. Historic aerial photographs of the site indicate that filling in the eastern portion of the site occurred separately from landfilling in the western portion. Further investigations are to be performed in this area of the landfill and, based on those results, a decision will be made as to whether or not remedial activities are necessary in this area. Runoff from the landfill drains as overland flow north into the Area A Wetland, which discharges to the Area A Downstream and ultimately to the Thames River. The Area A Landfill is depicted in Figure 1-3.

II. SITE HISTORIES AND ENFORCEMENT ACTIVITIES

A. Site History

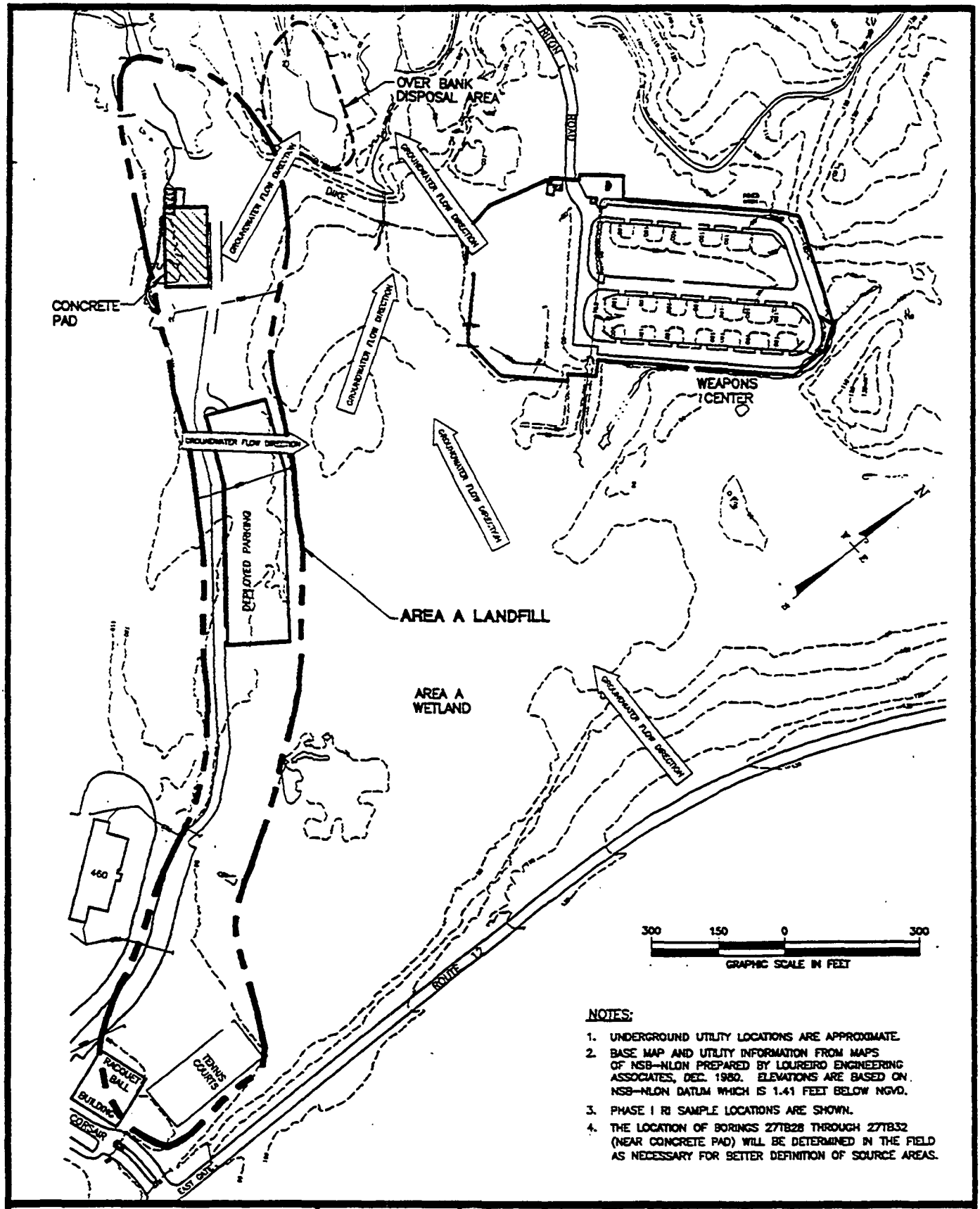
In 1867, the state of Connecticut donated a 112-acre parcel on the east bank of the Thames River to the Navy. The Navy began using the property in 1868 when it was officially designated as a Navy Yard. The property was then used as a mooring site for small craft and obsolete warships, and as a coaling station for the Atlantic fleet.

The Navy Department designated the site a Submarine Base in 1916. During World War I, facilities at the base were expanded extensively; 6 piers and 81 buildings were added. In 1917, a submarine school was established and, in 1918, the Submarine Medical Center was founded.

NSB-NLON experienced another period of growth during World War II. Between 1935 and 1945 the Navy built in excess of 180 buildings and expanded NSB-NLON from 112 to 497 acres through the acquisition of adjacent land.

The growth of NSB-NLON continued after World War II. The Medical Research Laboratory was established in 1946. In 1968 the status of the Submarine School was changed from an activity to a command and became the largest tenant on the base. The Naval Submarine Support Facility was established in 1974 and the Naval Undersea Medical Institute was established in 1975. NSB-NLON currently consists of over 300 buildings on 547 acres of land (U.S. Navy, 1988).

The Area A Landfill opened sometime prior to 1957. From 1963 to 1973, nonsalvageable materials generated by submarines and base operations were disposed in the Area A Landfill. There are no records indicating the volume or type of waste disposal in the landfill. However, they may include radioactive wastes and medical wastes from the hospital; industrial wastes from ship repair and maintenance facilities; commercial/residential wastes from housing and office facilities; and bulky wastes from construction activities. On-



DECISION SUMMARY
AREA "A" LANDFILL
NAVAL SUBMARINE BASE-NEW LONDON
GROTON, CONN.

FIGURE 1-3
AREA A LANDFILL

ATLANTIC ENVIRONMENTAL SEVICES, INC.

site landfilling operations ceased in 1973, and a bituminous concrete pad was constructed in the southwest portion of the landfill for staging of industrial materials and equipment.

At the time of the Initial Assessment Study (Envirodyne, 1982), 42 steel drums, 87 transformers (both mineral oil and polychlorinated biphenyl ["PCB"] filled), and 60 to 80 electric switches were stored on the bituminous concrete pad. Two transformers and several electrical switches were leaking at that time. Past leakage of oil was also evident. Most drums were stacked on wooden pallets. Drums with PCB labels were covered and bound with plastic sheeting. All of these materials have been properly disposed off site. There are no written records regarding storage of materials on the concrete pad. All available information regarding use of the pad is based on the IAS survey and interviews with Subase personnel, and has been provided herein.

In recent years, sand bags and contractor supplies and equipment have been stored over the former landfill. Several transformers, crane weights, excavated underground storage tanks ("USTs"), and other equipment were stored on the bituminous concrete pad in the southwest portion of the landfill. The specific items stored in this area change over time. A gravel-covered, long-term, vehicle parking lot (deployed parking) also exists on the former landfill.

B. Enforcement History

Previous investigations and the enforcement history of the Area A Landfill are summarized as follows:

- *Installation Restoration Program ("IRP"), 1975.* In response to the growing awareness of the potential effects of hazardous materials on human health and the environment, the Department of Defense ("DOD") developed the IRP to investigate and clean up potential problem areas created by past events at federal facilities. The IRP was the catalyst for environmental investigations at the NSB-NLON. All environmental investigations performed to date at Area A Landfill have been conducted under the IRP.

- *Initial Assessment Study ("IAS"), Envirodyne Engineers, Inc. (Envirodyne), 1982.* The purpose of the IAS was to identify and evaluate past hazardous waste disposal practices at NSB-NLON and to assess the associated potential for environmental contamination. Envirodyne recommended further investigation and testing of areas, including the Area A Landfill in the IAS report.

- *Verification Study, Wehran Engineering, Inc., 1988.* The purpose of the Verification Study was to determine whether toxic and hazardous materials identified in the IAS were present on site, and to further assess the potential impact of the contamination on human health and the environment. The presence of hazardous contaminants at Area A was confirmed during this study.

• *NSB-NLON is Placed on the National Priorities List ("NPL") by the EPA, 1990.* Area A Landfill was included among the list of sites of concern.

• *Phase I Remedial Investigation ("RI") NSB-NLON, Atlantic Environmental Services, Inc., 1992.* Area A Landfill was identified as one of several NSB-NLON sites posing potential risks to human health and the environment.

• *Draft Phase II RI NSB-NLON, Haliburton NUS, 1995.* Work performed during the Phase II RI addressed and filled data gaps from the Phase I RI and previous investigations in order to further delineate the extent and degree of contamination.

• *Federal Facility Agreement ("FFA") for NSB-NLON, January 5, 1995.* The Navy entered into an FFA with EPA and the Connecticut Department of Environmental Protection ("CTDEP") regarding the cleanup of environmental contamination at NSB-NLON. The FFA establishes the roles and responsibilities of each agency, sets deadlines for the investigation and cleanup of hazardous waste sites, and establishes a mechanism for the resolution of disputes among the agencies.

• *Focused Feasibility Study ("FFS"), Atlantic, May 26, 1995.* The FFS offers descriptions and evaluations of remedial alternatives considered for the Area A Landfill. The FFS for Area A Landfill considered all relevant supplemental data from the Draft Phase II RI in the evaluation of risk and remedial alternatives.

• *Addendum to the FFS, Atlantic, May 31, 1995.* The addendum to the FFS for the Area A Landfill was prepared in response to United States Environmental Protection Agency ("EPA") comments dated April 19, 1995 and May 8, 1995 regarding certain design issues not addressed in the FFS for the Area A Landfill. Specifically, this addendum addresses slope stability and leachate collection.

III. COMMUNITY PARTICIPATION

Throughout the history of the investigations and enforcement activities at NSB-NLON, the community has been involved. The Navy has kept community members and other interested parties aware of site activities through informational meetings, fact sheets and information updates, press releases, public meetings, and Technical Review Committee ("TRC") and Restoration Advisory Board ("RAB") meetings.

The TRC was established in 1988 and was later (late 1994) reorganized and renamed the RAB. The RAB (formerly TRC) has been an important vehicle for community participation in the NSB-NLON IRP. The RAB consists of representatives of the U.S. Navy, EPA, CTDEP, planners and officials of neighboring towns, Navy and EPA contractors, and local residents with scientific knowledge of or interest in the sites. The RAB meets regularly to review technical aspects of the NSB-NLON IRP and provides a mechanism for community input to the program.

To ensure that the community is well informed about NSB-NLON IRP activities, the Navy has provided and will continue to provide the public with the following sources or vehicles of information.

- ***Public Information Repositories.*** The Public Libraries in Groton, Ledyard, and the Naval Submarine Base are the designated information repositories for the Subase IRP.

- ***Key Contact Persons.*** The Navy has designated a Public Affairs Officer ("PAO") as an information contact for the Subase. The PAO maintains the site mailing list to ensure that all interested individuals receive more pertinent information on the IRP activities. Representatives from the Navy, EPA, and the Connecticut Department of Environmental Protection attend all public meetings and hearings. Addresses and phone numbers of key contact persons are included in all information materials distributed to the public, including any fact sheets or press releases.

- ***Mailing List.*** To ensure that information materials reach the individuals who are interested in or affected by the IRP activities at the Subase, the Navy maintains and will regularly update a mailing list of interested persons. Anyone interested in being placed on the list can do so by contacting the Subase Public Affairs Officer.

- ***Regular Contact With Local Officials.*** The Navy has managed and will continue to arrange regular meetings to discuss the status of the IRP with the RAB, which includes representatives from neighboring towns. The Navy contacts other town officials on an as-needed basis.

- ***Press Releases and Public Notices.*** The Navy has issued and will continue to issue press releases to local media sources to announce public meetings and comment periods, the availability of the IRP reports and plans, and to provide general information updates.

- ***Public Meetings.*** The Navy has held and will continue to hold informal public meetings as needed to keep residents and town officials informed about IRP activities at the Subase, and of significant milestones in the IRP. The meetings include presentations by Navy technical staff, EPA personnel, and/or support contractors for both agencies. The meetings also include a question-and-answer period. Minutes of meetings during public comment periods are included in the Administrative Record for public reference.

- ***Fact Sheets and Information Updates.*** The Navy has been developing a series of fact sheets which are mailed to public officials and other interested individuals and/or used as handouts at the public meetings. Each fact sheet includes a schedule of upcoming meetings and other site activities. The fact sheets may explain why the

Navy is conducting certain activities or studies, update readers on potential health risks, or provide general information on the IRP process.

A detailed formal NSB-NLON Community Relations Plan was published in February of 1994. The plan identifies issues of community interest and concern regarding the NSB-NLON. The plan also describes a program of community relations activities that the Navy will conduct during the IRP.

The activities of the community relations program outlined in this plan have the following specific objectives: (1) to keep local officials, citizens, military personnel, and the media informed of site activities; (2) to increase community awareness of the goals and procedures of the IRP; and (3) to provide opportunities for public involvement in the cleanup process.

The information in the Community Relations Plan is based upon:

- interviews with area residents and local officials conducted in Groton and Ledyard on October 2-3, 1991;

- interviews with area residents and local officials conducted by phone in September and October of 1991;

- input of the TRC or RAB which had regularly met to discuss progress at the Subase;

- public comments and questions at public information meetings held in 1990 and 1991;

- review of Navy site files; and

- discussions held with Navy, EPA, contractors, and technical and public affairs staff.

The Navy held several meetings to inform the public about the Area A landfill investigations, studies, and cleanup plans. These meeting occurred on November 9, 1994; February 22, 1995; April 5, 1995; and May 18, 1995 in Groton, CT.

The public comment period on the Area A Landfill Proposed Plan ended on June 30, 1995. An informational meeting was held on June 7, 1995 and the public hearing was held on June 28, 1995.

IV. SCOPE AND ROLE OF RESPONSE ACTION

The method chosen for remediation of soils at the Area A Landfill is the preferred alternative selected from numerous cleanup alternatives examined for the site. The preferred

alternative chosen for the Area A Landfill involves construction of a low-permeability surface cap. A low-permeability cap would be placed over an area of up to 13 acres where wastes have been disposed, as shown in Figure 1-3. Depending upon the results of a pre-design study, the area covered by the cap may vary from the current estimate of 13 acres. The cap will consist of a bedding/gas management layer, a double liner, topped with a drainage layer, and an operating surface (*see* Figure 4-1).

The low-permeability double liner will minimize water infiltration to the landfill. The bedding/gas management layer will provide a protective bedding for the liner and act as a conduit for any landfill gas which will be vented at appropriate locations. The drainage layer, installed over the double liner, will remove water to prevent ponding above the liner. The operating surface will protect the underlying cap layers from damage. This operating surface will consist of an aggregate base course covered by an asphalt surface. The cap will be graded to prevent run-on and promote runoff.

A groundwater interception system will be installed to collect shallow groundwater flowing to the landfill and reroute it around the landfill to reduce contact of the groundwater with landfill contents/soils. Existing storm drainage lines passing through the landfill will be plugged, and storm water will be rerouted around the landfill. All subsurface drains will be constructed to prevent leachate from the landfill moving off of the site.

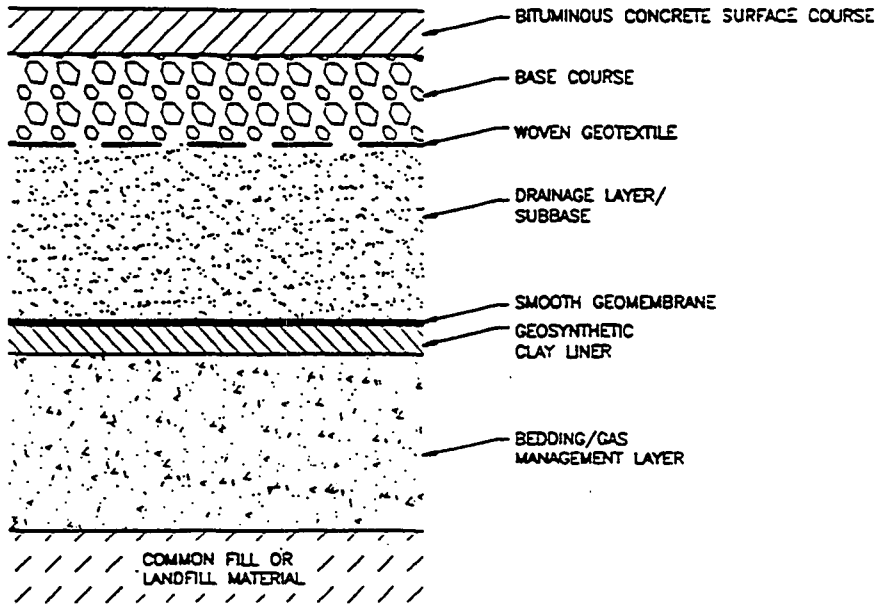
A leachate collection system may be installed to stabilize the cap and to further contain landfill wastes. The system will isolate and collect the leachate for treatment and/or disposal. Based upon the results of a pre-design study, the type of leachate collection system that may be installed will be selected and the need for such a system will be determined. The pre-design study shall estimate the leachate generation rate and transport both before and after the cap is installed. Construction of the cap shall not begin until such pre-design studies are completed and EPA, the CTDEP, and the Navy agree upon the results.

After completion of the cap, NSB-NLON current operations, such as parking and equipment storage, will be resumed on site. Access to the site will continue to be restricted via perimeter fencing and security procedures. Operation and maintenance procedures preventing any unauthorized digging or other activities that might jeopardize the cap's integrity would be implemented. In addition, groundwater will be monitored after the landfill is capped.

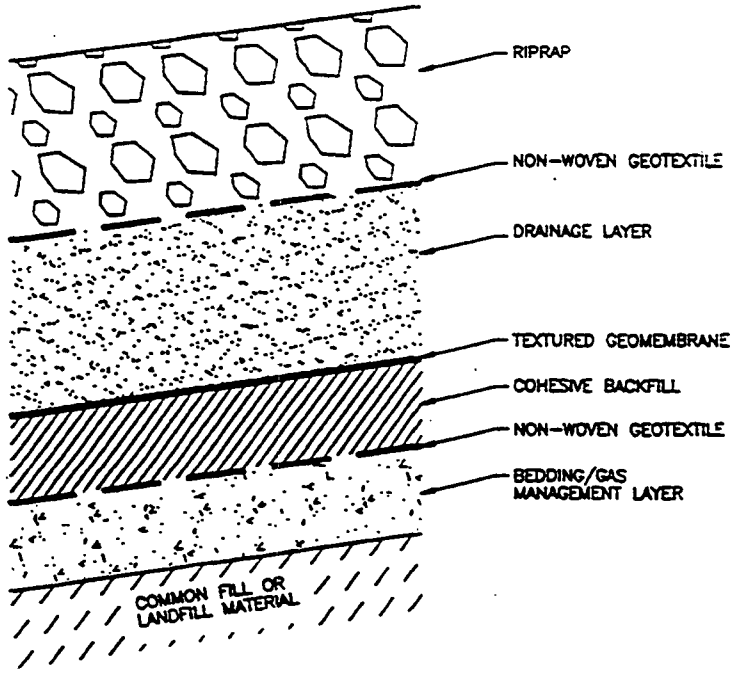
V. SUMMARY OF SITE CHARACTERISTICS

The nature and extent of soil and groundwater contamination detected at the Area A Landfill are summarized herein. Complete discussions of the characteristics and contaminants at the site can be found in the Phase I and Draft Phase II RI Report (Atlantic, August 1992 and Haliburton NUS Corp., February 1995, respectively) and the site FFS (Atlantic Draft Final, March 15, 1995). Note that the remedial actions described in this ROD address soil contamination, and have not been designed for the remediation of groundwater, although they may help improve groundwater quality at the site.

PLATEAU AREA FINAL COVER SYSTEM



SIDESLOPE AREA FINAL COVER SYSTEM



DECISION SUMMARY
AREA "A" LANDFILL
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

FIGURE 4–1
CAP DIAGRAM

ATLANTIC ENVIRONMENTAL SERVICES, INC.

The sources of contamination detected at the Area A Landfill are predominantly the materials discarded at the landfill. Documented soil contaminants detected, based on investigations performed to date, are summarized in Table 5-1 and include the following:

- Volatile organic compounds ("VOCs"), predominantly toluene, ethylbenzene and xylene, ranging in concentration from not detected to 75 parts per million ("ppm") for individual constituents, and 93.5 ppm for total VOCs. Benzene was not detected.

- Semivolatile organic compounds ("SVOCs"), predominantly polycyclic aromatic hydrocarbons ("PAHs"), ranging in concentration from not detected to 61 ppm for individual constituents, and 321 ppm for total PAHs.

- Pesticides, predominantly DDT, DDD, and DDE, ranging in concentration from not detected to 2.3 ppm for individual constituents, and 2.9 ppm for total constituents.

- Polychlorinated biphenyls ("PCBs"), ranging in concentration from not detected to 130 ppm for total PCBs.

- Inorganic constituents of concern (heavy metals), including beryllium, barium, cadmium, copper, nickel, zinc, chromium, and lead.

The areas of soil contamination that present risks were adjacent to the bituminous concrete pad area where PCBs were detected at concentrations of up to 130 ppm. The location of this area of soil containing elevated levels of PCB is depicted in Figure 1-3.

As discussed in Section VI, remediation is necessary at the Area A Landfill because of exceedances of several maximum contaminant levels ("MCLs") and historical records that indicate the disposal of hazardous substances. Groundwater contaminants detected at the Area A Landfill are summarized in Table 5-2. Groundwater contamination will be evaluated separately and incorporated as part of the final remedy. Placement of a RCRA C cap over the Area A landfill will reduce contaminant leaching to groundwater.

Table 5-1: Chemical Concentrations in Area A Landfill Soils

Constituents Exceeding "To Be Considered" Values in Soils				
Constituent	Concentration Range Detected (ppb)	Number of Values Above TBC	TBC (ppb)	Source of TBC
Arsenic	ND to 300	8 of 14	50 (in TCLP extract)	CTDEP Draft Proposal for CT Cleanup Standard Regulations
Barium	146 to 1,060	1 of 14	1,000 (in TCLP extract)	CTDEP Draft Proposal for CT Cleanup Standard Regulations
Cadmium	ND to 65	9 of 14	5 (in TCLP extract)	CTDEP Draft Proposal for CT Cleanup Standard Regulations
Lead	ND to 2,190	5 of 14	15 (in TCLP extract)	CTDEP Draft Proposal for CT Cleanup Standard Regulations
Selenium	ND to 230	5 of 14	36 (in TCLP extract)	CTDEP Draft Proposal for CT Cleanup Standard Regulations
DDTR	ND to 2,470	4 of 31	500	FFDC Act Tolerance Level
PCB	ND to 130,000[1] ND to 51,000[2]	6 of 57/9 of 57 2 of 31/3 of 31	10,000/2,000 10,000/2,000	U.S. EPA Regulations at 40 CFR Part 761/ CTDEP Guidance 22 Apr 94

[1]Field Screening Using Gas Chromatography
[2]Laboratory Analysis

Table 5-2: Chemical Concentrations in Area A Landfill Groundwater

Constituents Exceeding MCLs or "To Be Considered" Values in Groundwater				
Constituent	**Concentration Range Detected (ppb)**	**Number of Values Above MCL or TBC**	**MCL or TBC (ppb)**	**Source of MCL or TBC**
1,1,2,2-Tetrachloroethane	ND to 140	2 of 20	0.5	CTDEP GWPC
Benzene	ND to 10	1 of 20	5	U.S. EPA MCL
Chlorobenzene	ND to 220	1 of 20	100	CTDEP GWPC
Trichloroethene	ND to 10	1 of 20	5	U.S. EPA MCL
1,4-dichlorobenzene	ND to 99	1 of 20	75	U.S. EPA MCL
Cadmium	ND to 44.8	6 of 20	5	U.S. EPA MCL
Lead	ND to 22.4	1 of 20	15	U.S. EPA Action Level
Aluminum	ND to 2,060	1 of 20	200	U.S. EPA Secondary MCL
Iron	28.1 to 192,000	15 of 20	300	U.S. EPA Secondary MCL
Manganese	2.3 to 8,130	17 of 20	50	U.S. EPA Secondary MCL
Sodium	9,020 to 1,360,000	12 of 20	28,000	CTDOHS notification level

VI. SUMMARY OF SITE RISKS

A Risk Assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with soils at the Area A Landfill. The public health risk assessment followed a four step process: (1) contaminant identification, which identified those hazardous substances

which, given the specifics of the site, were of significant concern; (2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; and (3) risk characterization, which integrated the two earlier steps to summarize the potential and actual non-carcinogenic (toxic) and carcinogenic (cancer causing) risks posed by hazardous substances at the site. The results of the public health risk assessment for the Area A Landfill are discussed below, followed by the results of the ecological risk assessment.

Risk assessment is a tool used to determine the magnitude and probability of potential harm to human health by exposure to toxic substances. In a risk assessment, the chemicals of concern are identified, the rate of exposure to populations of concern are estimated, the potential toxicological responses to various doses of the chemicals are determined, and the potential risks of adverse health effects based on dose-response data and exposure data are estimated. The resulting numbers represent a potential upper-bound likelihood of adverse health effects.

Cancer risks are expressed in terms of predicted additional cases of cancer in an exposed population over a lifetime. For example, 2.7 additional cancer cases in 100,000 individuals would be expressed as 2.7×10^{-5}. Superfund selects remedies that reduce the threat from carcinogenic contaminants at each site such that the excess risk from any medium to an individual exposed over a lifetime generally falls within a range from 1 in 10,000 (10^{-4}) to 1 in 1,000,000 (10^{-6}).

Non-carcinogens are assumed to have a threshold below which health effects are not initiated. This threshold, or reference dose, is the estimated highest average daily exposure to humans over a lifetime unlikely to cause adverse health effects. Because the reference dose reflects the acceptable dose below which no adverse health effects would be expected, any observed dose below the reference dose would be considered acceptable. By comparing the reference dose to the dose from a particular area, a Hazard Ratio can be calculated. If the Hazard Ratio is less than one, the dose is considered safe. If the Hazard Ratio is one or greater, then adverse health effects may be likely, with the likelihood increasing as the Hazard Ratio increases. No non-cancer risks from exposure to the Area A landfill were identified. as all hazard ratios were well below one.

As described in the following sections, however, all risks evaluated for exposure to Area A landfill soils were acceptable. Remediation is necessary because of exceedances of several groundwater maximum contaminant levels ("MCLs"), and historical records that indicate the disposal of hazardous substances. Remediation of groundwater will not be addressed in this effort, but will be evaluated as part of the final remedy. Placement of a RCRA C cap over the Area A landfill will reduce contaminant leaching to groundwater.

Human Health

Contaminant Identification

The Area A Landfill is one of a number of sites under evaluation at NSB-NLON. Because of the potential for cumulative risks associated with this site, a single base-wide list of chemicals of concern was developed. This ensured that chemicals were consistently evaluated from location to location even though some of the chemicals included on the list may not have been detected at a particular location. The chemicals evaluated for this area and the Navy Base in general are listed below.

Non-carcinogenic PAHs (All TCL Compounds Included)	**Carcinogenic PAHs** (All TCL Compounds Included)	**PCBs** (Aroclors 1260 & 1254)
Other Semi-Volatiles (12 compounds: primarily phthalates and phenols)	**Pesticides** (7 compounds: DDT residues, endrin, methoxychlor)	**Metals** (14 compounds: Al, Sb, As, Be, B, Cd, Cu, Fe, Pb, Mn, Hg, Ni, Se, Zn)
BTEX Compounds (All BTEX compounds: Benzene, Toluene, Ethyl Benzene, Xylene)	**Chlorinated Volatiles** (13 compounds)	**Other Volatiles** (4 compounds)

Exposure Assessment

Based on information obtained through site visits, inspections, and discussions with personnel at the Area A Landfill or involved in future plans for the area, the following potential receptors were identified:

- utility workers repairing storm sewers in landfill;
- weapons center personnel exposed to fugitive dust from landfill;
- military servicemen moving palettes in Alpha A Storage;
- military servicemen exposed to fugitive dust while engaging in nearby recreational activities;
- Groton/Ledyard residents exposed to fugitive dust;
- citizens attending car auctions in Deployed Parking Area;
- subase children exploring the Area A Landfill and surrounding woodlands; and
- subase children playing in adjacent areas and exposed to fugitive dusts from Area A Landfill.

Risk Characterization

The results of the Risk Assessment for each scenario are tabulated as follows.

RISK SUMMARY TABLE
NAVAL SUBMARINE BASE, GROTON

Scenario	Total Cancer Risk		Total Hazard Indices	
	Average	Maximum	Average	Maximum
Utility Worker Repairing Storm Sewers in Area A Landfill	1.80E-07	1.10E-06	2.40E-02	8.50E-02
Weapons Center Personnel Exposed to Fugitive Dust From Area A Landfill	8.20E-08	2.60E-07	6.30E-04	1.50E-03
Military Servicemen Moving Palettes Within Area A Landfill	9.20E-06	4.20E-05	1.30E-01	3.30E-01
Military Servicemen Exposed to Fugitive Dust While Engaging in Nearby Recreational Activities	7.90E-10	1.60E-09	3.60E-05	5.40E-05
Groton/Ledyard Residents Exposed to Fugitive Dust	1.50E-08	2.90E-08	3.10E-04	5.80E-04
Citizens Attending Car Auctions in Deployed Parking	3.30E-07	5.80E-07	6.5E-03	1.0E-02
Subase Children Exploring the Area A Landfill and Surrounding Woodlands	3.06E-06	1.75E-05	7.0E-02	1.8E-01
Subase Children Exposed to Fugitive Dust From the Area A Landfill	6.40E-11	1.40E-10	4.4E-06	1.0E-05

Utility Worker Repairing Storm Sewers in Area A Landfill

The Hazard Indices do not exceed unity for this scenario. The carcinogenic risks were primarily due to the presence of PCBs in the subsurface soils and, to a lesser extent, the presence of carcinogenic PAHs. The maximum total cancer risk is approximately 10^{-6} risk. The distribution of the PCB and PAH contamination in the soil was patchy; therefore, the average risk is expected to be lower than that estimated using the maximum values. Based on the results of the analysis, the risks to the workers in this scenario are judged to be low.

Weapons Center Personnel Exposed to Fugitive Dust from Area A Landfill

The non-carcinogenic health risks and the carcinogenic risks are within levels considered to be acceptable.

Military Servicemen Moving Pallets within Area A Landfill

Non-carcinogenic health risks were negligible for these workers. Total cancer risks exceeded the 1E-06 goal but are within the EPA acceptable range. The risk is primarily due to the presence of PCBs in the landfill surface soils.

Military Servicemen Exposed to Fugitive Dust While Engaged in Recreational Activities Near Area A Landfill

The non-carcinogenic health risks and the carcinogenic risks are negligible for potential receptors in this scenario.

Groton/Ledyard Residents Exposed to Fugitive Dust from Area A Landfill

The non-carcinogenic health risks and the carcinogenic risks are negligible for potential off-site receptors in this scenario.

Citizens Attending Car Auctions in Deployed Parking Area

The non-carcinogenic health risks and the carcinogenic risks are negligible for auction participants in this scenario.

Subase Children Exploring the Area A Landfill and Surrounding Woodlands

Systemic (non-carcinogenic) health risks are negligible for this exposure group. However, the total cancer risks were 1.75E-05 and exceeded 1 in 1,000,000 (1E-6). The carcinogenic risk is due to the presence of PCB Arochlor 1260 through ingestion and dermal contact with surface soils.

Subase Children Exposed to Fugitive Dust from the Area A Landfill

Systemic (non-carcinogenic) and cancer risks are estimated to be negligible via exposure to fugitive dusts.

The human health risk assessment for the Area A Landfill indicates that, for the scenarios considered, the risks to human health from the landfill are minimal. These minimal risks are due primarily to the presence of PCBs in the landfill soils.

Ecological

Since the proposed remedial action is a containment presumptive remedy and only is applicable to the capping of the landfill, the ecological risk discussion is limited. Placement of a cap on the Area A landfill has eliminated the need to evaluate ecological exposure pathways resulting from direct contact of surface soils in the landfill to environmental

receptors. Risk based PCB screening levels were developed for the wetland soils/sediment sampled at the interface between Area A Landfill and Area A Wetland to ensure that elevated PCB sediment concentrations would not result in an unacceptable risk to ecological receptors. Any potential for ecological risk at downgradient (Area A Downstream) and adjacent locations (Area A Wetland) involving migration from landfill contaminants will be evaluated following the completion of subsequent investigations.

Contaminant Identification

The data evaluation and selection of compounds of interest for the ecological risk assessment were the same as for the human health risk assessment described above. Compounds of ecological concern were detected in soils and later sampled in wetland sediments adjacent to the landfill.

Exposure Assessment

Based on the presumptive remedy approach, the evaluation of exposure pathways based on direct contact of surface soils to ecological receptors was not necessary. However, wetland sediment samples were collected and analyzed for PCB concentrations at areas adjacent to the landfill to assess the potential ecological risk to terrestrial vegetation and soil invertebrates from landfill erosion.

Risk Characterization

Risks to terrestrial vegetation and soil invertebrates resulting from erosion of contaminated surface soils from the Area A Landfill were estimated through application of the equilibrium partitioning approach. The results indicated that the PCB concentrations in sediments were lower than risk based screening levels. Therefore, ecological risks to benthic invertebrates and terrestrial vegetation from erosion of contaminated soils from the Area A Landfill were considered low. Some risk to benthic invertebrates was associated with exposure to PAHs in two wetland soil samples, 2WMW5S and 2WSD9. Soil invertebrates may occasionally be exposed to contaminants in groundwater discharge. However, risks to these organisms from this source appear to be low because of the low contaminant concentrations detected in the groundwater in this area. Erosion of contaminated surface soils from the Area A Landfill to the adjacent wetlands present a continuing source of contamination which could present risks to biota and plants in the wetland.

VII. DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

A. Statutory Requirements/Response Objectives

The U.S. Navy is responsible for addressing environmental contamination at the Area A Landfill pursuant to Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") and the Federal Facility Agreement entered into by the Navy, EPA, and the CTDEP. The Navy's primary responsibility under these legal authorities is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that the remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitation, unless a waiver is invoked; a requirement that the remedial action is cost-effective and uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies that permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances 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 future potential threats to public health and the environment from contamination in the Area A Landfill. These objectives are:

- reduce exposure of persons and biota to contaminants within the landfill, in particular regarding exposure of workers to PCBs in soils located near the bituminous concrete pad; and

- prevent erosion of and infiltration through landfill soils/contents.

The remedy selected is a presumptive remedy and is an interim remedy, as described in the following paragraph.

Presumptive Remedies. Presumptive remedies are technologies preferred for use at common categories of sites such as landfills. These technologies are preferred based on historical information and data from site cleanups around the country. In reviewing remedy selection at many sites, as well as currently available performance data on remedial technologies, EPA has identified remedial actions that have been commonly selected for particular types of sites and have performed well at those sites. Therefore, EPA has determined what remedy or set of remedies are *presumptively* the most appropriate to address specific types or categories of sites. EPA encourages presumptive remedies to be considered at all appropriate sites. Presumptive remedies for landfills consist of containment remedies, such as landfill caps, source area groundwater control to contain the plume, leachate

collection and treatment, landfill gas collection and treatment, and/or institutional controls to supplement engineering controls.

Interim Remedies. The remedial actions selected are intended to be final remedial actions for only soils and landfill contents because the cap will be the final cap and no further excavation is expected to take place. However, the remedial actions are not final for the Area A Landfill site as a whole because risks to the environment from contaminated groundwater need to be evaluated after the source control remedies are completed. Based on this assessment, a determination will be made whether on-site groundwater remediation measures are necessary to protect water quality.

B. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan ("NCP") set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for Area A Landfill as part of the FFS. Treatments that reduce toxicity, mobility, or volume of the hazardous substances are principal elements of the alternatives. The alternatives developed included: alternatives that remove or destroy hazardous substances to the maximum extent feasible; eliminating or minimizing to the degree possible the need for long-term management; alternatives that treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternatives that involve little or no treatment but provide protection through engineering or institutional controls; and no action alternatives.

Chapter 2.0 of the FFS for Area A Landfill discusses the identification, assessment, and screening of technologies based on implementability, effectiveness, and cost. Chapter 3.0 of the FFS presents 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 NCP. 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. The alternatives for the site were then evaluated and screened in detail as described in Chapter 4.0 of the FFS. In summary, of the remedial alternatives screened in Chapter 3.0, only four alternatives for each site were retained for detailed and comparative analysis. Section VIII of this ROD and Appendix B present the alternatives and associated process options that were considered and the alternatives retained for detailed and comparative analysis. In addition, an addendum to the FFS was prepared which describes leachate collection and treatment alternatives.

VIII. DESCRIPTION OF ALTERNATIVES

This section provides a summary of each alternative considered for the Area A Landfill. In the FFS, eight alternatives were evaluated and four of those alternatives were retained for further analysis. Detailed descriptions of these alternatives can be found in

Sections 3.3 and 4.0 of the FFS. This section summarizes the four alternatives retained for further analysis and is summarized in a table in Appendix B.

Alternative 2L-1: No Action Analysis of the no-action alternative is required by federal law and is included for comparison with other alternatives. A no-action alternative is developed for each Superfund site to assess the impact on public health and the environment if no measures are taken to correct current site conditions. The no-action alternative would only be used if the site posed little or no risk to public health and the environment.

The no-action alternative for the Area A Landfill would consist of taking no action to either contain, treat, or otherwise minimize risk. In addition, no long-term maintenance, monitoring, or institutional controls would be implemented at the site.

Estimated Time for Construction:	*No construction*
Estimated Total Cost:	*0*

Alternative 2L-3: Capping This alternative consists of grading the site to promote runoff and prevent run-on and the installation of storm water management systems. A low-permeability cap would then be installed over all areas of the site where wastes have been disposed, as shown in Figure 1-3. Depending upon the results of a pre-design study, the area covered by the cap may vary from the current estimate of 13 acres. The cap would consist of a bedding/gas management layer, a double liner, topped with a drainage layer, and an operating surface (*see* Figure 4-1).

The low-permeability double liner would prevent water infiltration to the landfill. The bedding/gas management layer will provide a protective bedding for the liner and a conduit for any landfill gas which will be vented at appropriate locations. The drainage layer, installed over the double liner, would remove water to prevent ponding above the liner, and the operating surface would protect the underlying cap layers from damage. This operating surface will consist of an aggregate base covered by an asphalt surface. The cap will be graded to prevent run-on and promote runoff.

A groundwater interception system will be installed to collect shallow groundwater flowing to the landfill and reroute it around the landfill to reduce contact of the groundwater with landfill contents/soils. Existing storm drainage lines passing through the landfill would be plugged, and storm water would be rerouted around the landfill. All subsurface drains would be constructed to prevent leachate from the landfill moving offsite.

A leachate collection system may be installed to stabilize the cap and to further contain landfill wastes. The system will isolate and collect the leachate for treatment and/or disposal. Based upon the results of a pre-design study, the type of leachate collection system that may be installed will be selected and the need for such a system will be determined. The pre-design study shall estimate the leachate generation rate and transport both before and after the cap is installed. Construction of the cap shall not begin until such pre-design studies are completed and EPA, the CTDEP, and the Navy agree upon the results.

The Navy will develop operations and maintenance procedures that restrict digging or other activities that could jeopardize the integrity of the cap. Access to the site would be controlled by continued maintenance of the existing perimeter fence and security procedures.

The institutional controls would provide notice of hazardous materials on site and limit usage of the property to reduce risks to human health and the environment. Perimeter fencing would include existing fencing and some additional fencing around the area of elevated PCBs. NSB-NLON personnel would be allowed to access the site. A groundwater monitoring program would be implemented to monitor groundwater quality after closure of the landfill is complete.

Estimated Time for Construction:	*13 months*
Estimated Capital Cost:	*$3,910,869*
Estimated Operation and Maintenance Cost:	*$1,823,818*
Estimated Total Cost:	*$5,734,687*

Alternative 2L-4: Off-Site Incineration of the PCB Contaminated Soils and Capping Under this alternative, all surficial soils containing PCBs greater than 10 ppm and all deeper, accessible soils (to a depth of 10 feet) containing PCBs greater than 50 ppm would be excavated. These areas, totaling approximately 300 cubic yards, are located near the bituminous concrete pad.

After completion of the initial excavation, soil samples would be taken and analyzed to confirm that target cleanup levels were met. If not, excavation would continue until samples confirm that target cleanup levels were met or until a depth of 10 feet is reached.

The removed materials would be transported off site for treatment by incineration at a facility permitted to manage PCBs. The treated soils (incinerated) would then be disposed in a secure chemical landfill used by the incineration facility for ash disposal.

After contaminated soil removal, a low-permeability cap would be installed. The cap, associated runon and runoff controls, and leachate collection systems are the same as those described for Alternative 2L-3 (capping).

Operations and maintenance procedures would be developed to prevent/restrict any digging or other activities that could jeopardize the integrity of the cap. Access to the site would be controlled by continued maintenance of the existing perimeter fence and security procedures. Institutional controls, as described for Alternative 2L-3 (Capping), would also apply. In addition, a groundwater monitoring program would be instituted to monitor groundwater quality after closure of the landfill.

Estimated Time for Construction:	*Less than 14 months*
Estimated Capital Cost:	*$4,409,300*
Estimated Operation and Maintenance Cost:	*$1,823,818*
Estimated Total Cost:	*$6,233,118*

Alternative 2L-5: Off-Site Disposal of PCB Contaminated Soils at a Hazardous Waste Landfill and Capping Under this alternative, all surface soil containing PCBs greater than 10 ppm and deeper accessible soils (up to 10 feet) containing PCBs greater than 50 ppm would be removed and disposed at an off-site landfill permitted to manage PCBs. Accessible soils are defined as those soils that a person could potentially be exposed to, from

the ground surface to a depth of 10 feet. These areas, totaling about 300 cubic yards, are located adjacent to the bituminous concrete pad.

After completion of the initial excavation, soil samples would be taken and analyzed to confirm that target cleanup levels were met. If target levels are not met in any area sampled. excavation would be continued until excavation samples confirm that target cleanup levels were met (to a maximum depth of 10 feet).

After contaminated soil removal, a low-permeability cap would be installed. The cap, associated runon and runoff controls, and leachate collection system are the same as those described for Alternative 2L-3 (capping).

Operation and maintenance procedures would be developed to prevent any unauthorized digging or other activities that could jeopardize cap integrity. Access to the site would be controlled by continued maintenance of the existing perimeter fence and security procedures. Institutional controls as described in Alternative 2L-3 (Capping) would also apply. In addition, a groundwater monitoring program would be instituted to monitor groundwater quality after closure of the landfill.

Estimated Time for Construction:	*Less than 13 months*
Estimated Capital Cost:	*$4,127,300*
Estimated Operation and Maintenance Cost:	*$1,823,818*
Estimated Total Cost:	*$5,951,118*

IX. SUMMARY OF THE COMPARATIVE ANALYSIS ALTERNATIVES

Section 121(b)(1) of CERCLA establishes several factors that, at a minimum, EPA is required to consider in its assessment of alternatives. Building upon these specific mandates, the NCP specifies nine evaluation criteria to be used in assessing the individual remedial alternatives.

To select a site remedy, a detailed analysis was performed on the alternatives using the nine evaluation criteria. The remainder of this section is a summary of the comparison of each alternatives' strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described herein must be met in order for the alternatives to be eligible for selection in accordance with the NCP.

- *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.

- *Compliance with applicable or relevant and appropriate requirements ("ARARs")* addresses whether or not a remedy will meet all of the ARARs of other federal and state environmental laws and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

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

- *Long-term effectiveness and permanence* addresses the criteria that are utilized to assess alternatives for long-term effectiveness and permanence they afford, along with the degree of certainty of success.

- *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.

- *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 goals are achieved.

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

- *Cost* includes estimated costs of capital, and Operation and Maintenance ("O&M"), as well as present worth costs.

Modifying Criteria

The modifying criteria are used on the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan.

- *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.

- *Community acceptance* addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS 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. This comparative analysis can be found in Appendix B.

The responsiveness of each alternative to the nine criteria was evaluated, and, based on comparative analysis of the results, a preferred alternative was selected for the site. The Capping Alternative was the preferred alternative selected for the Area A Landfill (Alternative 2L-3).

A brief summary of the nine criteria and the strengths and weaknesses of each alternative subjected to the detailed and comparative analysis is provided below.

Overall Protection of Human Health and the Environment

The No Action Alternative (2L-1) provides no change in risk to human health and the environment. Capping (Alternative 2L-3), Off-Site Incineration of PCB Contaminated Soils and Capping (Alternative 2L-4), and Off-Site Disposal of PCB Contaminated Soils at a Hazardous Waste Landfill and Capping (Alternative 2L-5) would eliminate risks due to direct contact, ingestion and inhalation, and would prevent erosion and infiltration. Alternatives 2L-4 and 2L-5 would additionally reduce some on-site contamination via removal of PCB-contaminated soil, and thereby reduce risks for utility/construction workers who may work on site in the future, however such future work is unlikely.

Compliance With ARARs

The No Action (2L-1) Alternative would not meet federal and state RCRA hazardous waste disposal area closure standards. The remaining three alternatives meet all ARARs.

Long-Term Effectiveness and Permanence

The No Action Alternative would not reduce or control potential risks in the Area A Landfill. Alternatives 2L-3, 2L-4, and 2L-5 eliminate risks from direct contact with contaminants. Although capping does not reduce risks to future utility/construction workers since PCB contaminated soils will remain in place under this alternative, these risks would be eliminated through procedural means. Alternatives 2L-4 and 2L-5 offer a permanent risk reduction since there is a net reduction in on-site PCB contamination.

Reduction of Toxicity, Mobility, or Volume

The No Action Alternative (2L-1) offers no reduction in toxicity, mobility, or volume. Capping (2L-3) does not reduce toxicity or volume but will reduce human contact and the mobility of contaminants by reducing infiltration, erosion, and exposure to wind. Alternatives 2L-4 and 2L-5 would reduce the toxicity and volume of on-site soil contamination via removal of PCB-contaminated soil and would also reduce (via capping) the mobility of contaminants by reducing infiltration. The Alternative 2L-5, however, would not result in a net reduction in toxicity or volume since the PCB contaminated soil removed would be landfilled offsite. However, mobility would be prevented at the off-site landfill). Off-Site Incineration would cause a net reduction in volume, toxicity, and mobility since the contaminants in the removed soils would be destroyed via incineration.

Short-Term Effectiveness

The No Action Alternative (2L-1) does not increase protection of human health or the environment. No remedial activities are undertaken under this alternative, and therefore, risks to the community are not decreased due to remedial actions. However, the potential for off-site migration of contaminants remains.

The Capping, Offsite Incineration, and Offsite Hazardous Waste Landfill Alternatives all can be implemented within 12 to 14 months and would reduce the potential for human and environmental exposure to the contaminants when completed. The remedial activities that would be undertaken during implementation of any of these alternatives would create the potential for windblown contaminated dust during excavation and grading activities. Windblown dust can be minimized, however, via the use of dust suppression techniques. Protection from exposure to contamination from contact can be minimized by appropriate health and safety procedures. Under the capping alternative, there is no off-site transportation of waste materials and, therefore, associated transportation risks, are small.

Implementability

The No Action Alternative is the easiest to implement since there are no activities, approvals, services, or materials required.

All required services and materials are readily available for implementation of the Capping, Offsite Incineration, and Offsite Hazardous Waste Landfill Alternatives. Coordination with regulatory agencies would be required to ensure that cap and closure specifications meet ARARs, and that groundwater discharge and other impacts to wetlands meet substantive requirements. Approvals would be required for disposition of contaminated soil in the Off-Site Incinerator and Hazardous Waste Landfill Alternatives.

Costs

The total cost estimated for each alternative is:

No Action:	*$0*
Capping:	*$5,734,687*
Off-Site Landfill:	*$5,951,118*
Off-Site Incineration:	*$6,233,118*

State Acceptance

The Connecticut Department of Environmental Protection ("CTDEP") concurs with the preferred remedy. The CTDEP's letter of concurrence is included in Appendix D.

Community Acceptance

During the public comment period on the Proposed Plan and at the public hearing on June 27, 1995 no objections were voiced from the community. In fact, the only comment received praised the Navy's openness with the public and environmental progress at the site.

X. THE SELECTED REMEDY

The selected remedial alternative for Area A Landfill is Alternative 2L-3 (Capping). This remedy involves grading and installation of an impervious cap over contaminated areas of the site. The cap will form a barrier, reducing human and environmental exposure to site contaminants. The cap will also reduce migration of contaminants from the site by preventing exposure of contaminated soils from wind and erosive elements, and by preventing infiltration of rain water through contaminated areas of the unsaturated zone.

A. Description of Remedial Components

The Navy's selected alternative for Area A Landfill, Alternative 2L-3 (Capping), is designed to substantially reduce human and environmental exposure to site contaminants and to reduce the potential for the off-site migration of contaminants. The alternative includes the following components.

- Access Restrictions
- Site Grading and Storm Water Management
- Horizontal Barrier Cap Installation
- Leachate Collection and Treatment
- Post-Closure Groundwater Monitoring

Access Restrictions

Access to contaminated areas of the site will be limited via perimeter fencing and institutional controls. Access will be limited to workers and other persons having business in these areas.

Access during the implementation of remedial measures will be limited strictly to remedial workers, support personnel, and regulatory authorities. Use restrictions, directed at preserving the integrity of the cap, will be enforced after remedial measures are completed. The institutional controls would provide notice of hazardous materials at the site, and ensure maintenance of cap integrity, worker protection, and other considerations.

Site Grading and Storm Water Management

As part of the process for installation of the cap, the site will be graded to promote runoff and prevent run-on. In addition, a groundwater interception system will be installed to collect shallow groundwater flowing to the landfill and reroute it around the landfill to reduce contact of the groundwater with landfill contents/soils.

Horizontal Barrier Cap Installation

After grading, a low-permeability cap will be installed over contaminated areas of Area A Landfill, covering approximately 13 acres. The primary benefits of capping are the elimination of human contact with contaminated materials and the elimination of direct infiltration of storm water through the contaminated soils.

After completion of the cap, operations will resume at Area A Landfill (*i.e.*, non-landfill operations such as storage and deployed parking). Access will continue to be restricted via the perimeter fence.

Leachate Collection and Treatment

A leachate collection system may be installed to stabilize the cap and to further contain landfill wastes. The system will isolate and collect the leachate for treatment and/or disposal. Based upon the results of a pre-design study, the type of leachate collection system that may be installed will be selected and the need for such a system will be determined. The pre-design study shall estimate the leachate generation rate and transport both before and after the cap is installed. Construction of the cap shall not begin until such pre-design studies are completed and EPA, the CTDEP, and the Navy agree upon the results.

Post-Closure Groundwater Monitoring

Groundwater will be monitored after the cap is installed. Depending upon the results of this monitoring, groundwater remediation may be necessary. If groundwater remediation is necessary, it will be addressed in the final remedy for this site.

XI. STATUTORY DETERMINATIONS

The remedial actions for implementation at the NSB-NLON Area A Landfill sites are consistent with CERCLA and the NCP, to the extent practicable. The selected remedy is protective of human health and the environment, attains ARARs, and is cost effective. The remedy also significantly reduces the mobility, toxicity, or volume of hazardous substances as a principal element.

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

The remedy selected for implementation at the Area A Landfill will substantially reduce the risks posed to human health and the environment by reducing or controlling exposures to human and environmental receptors through engineering and institutional controls. Cap placement over contaminated areas will reduce mobility of contamination and eliminate human contact with contaminants. The cap will also prevent direct storm water infiltration through the contaminated soils. Moreover, the selected remedy will achieve potential human health risk levels that attain the 10^{-4} to 10^{-6} incremental cancer risk range and

a level protective of noncarcinogenic endpoints, and will comply with ARARs and to-be-considered ("TBC") criteria. Implementation of the selected remedy will not pose unacceptable short-term or negative cross-media impacts.

B. The Selected Remedy Attains ARARs

The remedy will attain all applicable or relevant and appropriate federal and state ARARs that apply to the site. All federal and state TBCs have been considered in the selection of the final remedy. ARARs identified for the selected remedial action include:

- Chemical-Specific ARARs:

  - CTDEP Water Pollution Control Regulations
  - CTDEP Water Quality Standards

- Location-Specific ARARs:

  - Federal Clean Water Act, Section 404 — Dredge and Fill Activities
  - Federal Executive Order 11900 Regarding Protection of Wetlands
  - CTDEP Inland Wetlands and Watercourses Regulations

- Action-Specific ARARs:

  - Federal RCRA Hazardous Waste Regulations (40 CFR Part 264)
    - General Requirements (Subpart A)
    - Preparedness and Prevention (Subpart C)
    - Contingency Plan and Emergency Procedures (Subpart D)
    - Releases from Solid Waste Management Units (Subpart F)
    - Closure and Post-Closure Requirements (Subpart G)
  - Federal Clean Air Act — National Emission Standards for Hazardous Air Pollutants ("NESHAPS")
  - Federal National Pollution Discharge Elimination System ("NPDES")
  - Federal PCB Regulations Under Toxic Substances Control Act ("TSCA")
  - CTDEP Hazardous Waste Management Regulations
    - Generator and Handler Requirements — General Standards, Listing, and Identification
    - Generator Standards
    - TSDF Standards
    - Interim Status Facilities and Groundwater Monitoring Requirements, Closure, and Post-Closure Requirements
  - CTDEP Solid Waste Management Regulations
  - CTDEP Regulations for Transportation of Oils and Chemical Liquids
  - CTDEP Regulations for the Control of Noise
  - State Air Pollution Control Regulations

Control of Organic Compound Emissions
Control of Odors
Control of Hazardous Air Pollutants
Control of Particulate Emissions
Stationary Sources
Sulfur Compound Emissions

Tables summarizing the detailed analysis of ARARs for Area A Landfill and discussions of why the requirements were determined to be applicable or relevant and appropriate were provided in Section 5.0 of the FFS. ARAR summary tables pertaining to the selected remedy for the site are provided in Appendix C of this ROD. The applicability (or non-applicability) of each ARAR is explained in the summary table.

The following policies, criteria, and guidances were also considered ("TBCs"):

- Chemical-Specific:
  - Federal EPA Human Health Assessment Cancer Slope Factors
  - Federal EPA Reference Doses
  - Proposed Connecticut Cleanup Standard Regulations

- Location-Specific:
  - State Inland Wetlands and Watercourses Act — General Requirements

- Action-Specific:
  - Federal EPA Technical Guidance — Final Covers on Hazardous Waste Landfill and Surface Impoundments
  - Federal Clean Air Act — Non-methane Organic Compounds ("NMOCs") - (Proposed Rule - 56 FR 24468)

All federal and state chemical-specific ARARs and TBCs were used in the screening of data from the site to help identify potential concerns. The use of chemical-specific ARARs and TBCs in establishing remedial action objectives is described in subsection 3.2 of the FFS for the site. ARARs and TBCs were also considered during the detailed evaluations of alternatives (Section 5.0 of the FFS). ARARs were also considered in the comparative analysis of alternatives (Section 6.0 of the FFS) and summarized herein in Section IX.

C. The Selected Remedial Actions Are Cost-Effective

In the Navy's judgment, the selected remedy is cost effective, *i.e.*, the remedy affords overall effectiveness proportional to cost. In selecting the remedy, the Navy identified alternatives that are protective of human health and the environment and that attain ARARs, and evaluated the overall effectiveness of each alternative by assessing in combination the relevant three criteria: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; and (3) short-term effectiveness.

The relationship of overall effectiveness of the remedial alternative was determined to be proportional to its cost. The cost of the remedial alternative is:

Estimated Capital Cost:	*$3,919,869*
Estimated Operation and Maintenance Cost:	*$1,823,818*
Estimated Total Cost:	*$5,734,687*

The selected alternative offers a net improvement in conditions at the site that is comparable or better than the other alternatives investigated and at the lowest cost of any alternative offering the same level of improvement.

Of the four alternatives retained for comparative analysis, the No Action (therefore no cost) Alternative was the least expensive, but offered no protection to human health or the environment. Off-Site Incineration of PCB Contaminated Soils (and Capping) was the most expensive alternative, with an estimated cost of $6,233,118, and was approximately 10 percent more expensive than the cost of the selected alternative. Alternative 2L-5, Disposal of PCB Contaminated Soils at an Offsite Landfill and Capping, was slightly more expensive than the selected alternative. The selected alternative, Capping, was estimated to be $5,734,687. It was determined that the Capping Alternative was the most cost effective since it could achieve the same level of reduction in human and environmental exposure as the Off-Site Incineration and Off-Site Landfill Alternatives, at a lower cost. A detailed cost estimate for implementation of the Capping Alternative for Area A Landfill is provided in Table 11-1 and Table 11-2.

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

The Navy identified those alternatives that attain ARARs and are protective of human health and the environment. The Navy also identified which alternatives utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which of the identified alternatives for each site provides the best balance of trade-offs among alternatives in terms of: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. The balancing tests considered: long-term effectiveness and permanence and the reduction of toxicity, mobility, and volume through treatment; the preference for treatment as a principal element; the bias against off-site land disposal of untreated wastes; and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives. The net on-site effect of the Capping Alternative in reducing pollutant mobility, the potential for human/environmental toxic exposures, and the associated long-term effectiveness and permanence, is virtually equivalent to, or better than, any of the

TABLE 11-1
DETAILED ALTERNATIVE COST ESTIMATE
AREA A LANDFILL - CONTAMINATED SOILS
ALTERNATIVE 2L-3, CAP

INPUT VARIABLES/ASSUMPTIONS	
Discount Rate (%) =	10%
Average # of years O & M =	30
Total volume insitu soil (cy) =	300
Total volume water (gal) =	0
Density of soil (ton/cy) =	1.50
Avg concentration of residual (%) =	1%
Moisture of soil (%) =	15%
# of recovery wells =	0
average pumping rate per well (gpm) =	0
surface area of contaminated soil (sf) =	566280

CATEGORY/DESCRIPTION	COMMENTS	CAPITAL COSTS QUANTITY	UNITS	UNIT COST	TOTAL	OPERATION & MAINTENANCE COSTS QUANT/YR	UNITS	UNIT COST	YRS	PW TOTAL
SOIL/SEDIMENT										
Limited action - access restriction	Deed restriction	1	LS	1000	$1,000				30	$0
	Fencing	0	LF	15	$0	2500	LF	1.3000	30	$33,887
Containment - horizontal barrier	Surface cap	566280	SF	3.5	$1,981,980	566280	SF	0.0125	30	$75,807
Containment - surface water control	Site grading and stormwater management	2600	LF	60	$156,000	2600	LF	0.3000	30	$8,133
Removal - excavation, dredging					$0				30	$0
Subsurface drainage trench		1800	LF	40	$72,000				30	$0
Gas venting trench		2225	LF	15	$33,375				30	$0
Groundwater monitoring					$0	1	LS	125000.00	30	$1,303,364
WATER										
Limited action - no action, access restriction					$0				30	$0
Containment - ground water control, horizontal barrier vertical barrier					$0				30	$0
Removal - subsurface drains, pumping					$0				30	$0
Insitu Treatment - biological, physical/chemical					$0				30	$0
Above ground Treatment - biological, physical/chemical thermal					$0				30	$0
Disposal - onsite/offsite					$0				30	$0
					$0				30	$0
INTERMEDIATE										
Residual Treatment/Disposal - onsite/offsite - biological, physical/chemical, thermal					$0				30	$0
Dewatering - filter press, centrifuge, drying bed, pumping					$0				30	$0
Trucking - onsite, offsite					$0				30	$0
Onsite containment (wastewater/soil) - lagoon, modu-tank, eq tank, berm, liner					$0				30	$0
Backfill - procure, place	Consists of 150cy to facilitate site grading	150	cy	10	$1,500				30	$0
					$0				30	$0
SUBTOTAL 1					$2,245,855					$1,419,192
OTHER										
Site Prep - office, utilities	0 % of subtotal 1				$0					
Mob/Demob - process equipment,	0 % of subtotal 1				$0					
Mob/Demob - construction equipment, workers		1	LS	1000	$1,000					
Treatability study	0 % of subtotal 1				$0					
Site Restoration - grading, seeding	0 % of subtotal 1				$0					
Other - health & safety, decon, project management, sampling & testing, travel & expenses		1	LS	20000	$20,000					
SUBTOTAL 2					$2,266,855					$1,419,192
Engineering Administration	10 % of Subtotal 2				$226,686					$141,919
Contingencies	15 % of Subtotal 2				$340,028					$212,879
Groundwater Collection and Disposal (see Table 11-2 for details)					$1,077,300					$49,828
TOTAL					$3,910,869					$1,823,818

TOTAL COST ESTIMATE OF THIS ALTERNATIVE INCLUDING CAPITAL AND O&M COSTS $5,734,687

PRESENT WORTH TOTAL (INCLUDES YEAR ZERO) = ((QUANT/YR*UNIT COST)*((1+DISCOUNT RATE)^(YRS))/(DISCOUNT RATE)*(QUANT/YR*UNIT COST))

Table 11-2
Preliminary Cost Estimates
Area A Landfill
Vertical Containment and Leachate/Groundwater
Collected and Disposed

Process Option		Quantity	Units	Unit Cost	ALT. 1a	ALT.2a	ALT. 3a	ALT. 4a
Slurry walls	CAP	50000	SF	$10.00	$500,000	$500,000	$500,000	$500,000
Sheet pile walls	CAP	50000	SF	$25.00				
Interceptor Trenches	CAP	2100	LF	$100.00	$210,000	$210,000		
	O&M	1	LS	$525.00	$4,949	$4,949		
Dewatering wells	CAP	7	EACH	$10,000.00			$70,000	$70,000
	O&M	1	LS	$350.00			$3,299	$3,299
POTW	CAP	1	LS	$20,000.00	$20,000		$20,000	
	O&M	5475	TGPY	$0.05	$2,581		$2,581	
On-site treatment	CAP	1	EACH	$100,000.00		$100,000		$100,000
	O&M	5475	TGPY	$0.63		$32,516		$32,516
Engineering & cont.	CAP 33%				$240,900	$267,300	$194,700	$221,100
	O&M 33%				$2,485	$12,363	$1,940	$11,819
				CAPITOL TOTAL:	$970,900	$1,077,300	$784,700	$891,100
				O&M TOTAL:	$10,015	$49,828	$7,820	$47,634
				GRAND TOTAL:	$980,915	$1,127,128	$792,520	$938,734

CAP - capital cost
O&M - operation and maintenance cost. Present value.
SF - square feet
LF - linear foot
LS - lump sum
TGPY - thousand gallons per year

Shading indicates cost selected for cost estimates in proposed plan.

alternatives evaluated for both sites. The short-term risks posed during implementation of the Capping remedy are easily controllable, and the short-term benefits are immediately equivalent to the long-term benefits once the remedial action is completed. Though treatment is not utilized in this alternative and there is no net reduction in the volume or the toxicity of contaminated soils, this alternative effectively prevents their mobility and availability of toxic characteristics.

The Capping Alternative is readily implementable at the site since all required materials and services are available and can be procured within a reasonable period. This alternative offers the greatest net improvement in conditions at the site at the lowest cost of any alternative offering the same general level of improvement.

E. The Selected Remedy Significantly Reduces the Toxicity, Mobility, or Volume of the Hazardous Substances as a Principal Element

The principal elements of the selected remedy are the management of migration of, and prevention of human and environmental exposure to, soil contamination present at Area A Landfill. This element addresses the primary threat at the site and contamination of potential worker exposure to contaminants in soils at the sites. Capping of the Area A Landfill will significantly reduce the mobility of, and potential for exposure to, toxic constituents in the soils.

XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Navy presented a proposed plan for the remediation of Area A Landfill on May 31, 1995. Based on a detailed analysis of factors at the site and available remedial alternatives, the Navy proposed the following remedial plan for the site.

The site will be graded to promote runoff and prevent run-on, a low-permeability cap will be placed over contaminated portions of the site, and a leachate collection system may be installed if the results of a pre-design study indicate that one is necessary. The pre-design study shall estimate the leachate generation rate and transport both before and after the cap is installed. The cap will consist of a bedding/gas management layer overlain with a geosynthetic clay liner and a geomembrane, a drainage layer, a woven geotextile, an aggregate base and an asphalt surface. Access to the sites would be controlled by perimeter fencing and security procedures. Although the cap would be designed to allow resumption of current operations at the site, proper maintenance of the cap and fences would be required to ensure long-term integrity. The Navy will develop institutional controls and operation procedures to prevent/control digging or other activities that could jeopardize the integrity of the cap.

The final remedy selected, as described in this document, does not differ significantly from the proposed plan. Although a few of the cap components described in the proposed plan differ somewhat, these variations are not substantial. Cap design issues were also discussed at the public informational meeting held on June 7, 1995.

XIII. STATE ROLE

The CTDEP has reviewed the various alternatives considered for each site and has indicated its support for the selected remedies. The CTDEP has also reviewed the Remedial Investigations, Risk Assessments, and Feasibility Studies for each site to determine if the selected remedies are in compliance with applicable or relevant and appropriate state environmental laws and regulations. The CTDEP concurs with the selected remedy for the Area A Landfill. A copy of the declaration of concurrence is attached as Appendix D.

APPENDIX A

RESPONSIVENESS SUMMARY

APPENDIX A
RESPONSIVENESS SUMMARY

Overview

At the time of the public comment period, the United States Navy had selected a preferred alternative to address source control of landfill wastes at the Area A Landfill. This preferred alternative was selected in coordination with the United States Environmental Protection (EPA) and Connecticut Department of Environmental Protection (CTDEP). Other members of the Restoration Advisory (RAB) for this project were also involved in discussions and planning of the selected alternative. Technical details of the alternative have been discussed and no fundamental objectives to its selection have been raised.

The sections below describe the background of community involvement with the project and the Navy's responses to comments received during the public comment period.

Background of Community Involvement

Throughout the history of the contamination investigations and remedial alternative development activities at Naval Submarine Base - New London (NSB-NLON), the community has been actively involved. Community members and other interested parties have been kept abreast of site activities through informational meetings, published "fact sheets and information updates," press releases, public meetings, and Technical Review Committee (TRC) and RAB meetings.

The TRC was established in 1988 and was later (late 1994) reorganized and renamed the RAB. The RAB (formerly TRC) has been an important vehicle for community participation in the NSB-NLON Installation Restoration Program (IRP). The RAB consists of representatives of the Navy, EPA, CTDEP, planners and officials of neighboring towns, Navy and EPA contractors, and local residents with scientific knowledge of or interest in the sites. The RAB meets regularly to review technical aspects of the NSB-NLON IRP and provides a mechanism for community input to the program.

To ensure that the community is well informed about NSB-NLON IRP activities, the Navy has provided and will continue to provide the public with the following sources or vehicles of information.

Public Information Repositories. The Public Libraries in Groton, Ledyard, and the Naval Submarine Base are the designated information repositories for the Subase IRP.

Key Contact Persons. The Navy has designated a Public Affairs Officer ("PAO") as an information contact for the Subase. Representatives from the Navy, EPA, and the

Connecticut Department of Environmental Protection attend all public meetings and hearings. Addresses and phone numbers of key contact persons are included in all information materials distributed to the public, including any fact sheets or press releases.

Mailing List. To ensure that information materials reach the individuals who are interested in or affected by the IRP activities at the Subase, the Navy maintains and will regularly update a mailing list of interested persons. Anyone interested in being placed on the list can do so by contacting the Subase Public Affairs Officer.

Regular Contact With Local Officials. The Navy has managed and will continue to arrange regular meetings to discuss the status of the IRP with the RAB, which includes representatives from neighboring towns. The Navy contacts other town officials on an as-needed basis.

Press Releases and Public Notices. The Navy has issued and will continue to issue press releases to local media sources to announce public meetings and comment periods, the availability of the IRP reports and plans, and to provide general information updates when and as the Public Affairs Officer sees fit.

Public Meetings. The Navy has held and will continue to hold informal public meetings as needed to keep residents and town officials informed about IRP activities at the Subase, and of significant milestones in the IRP. The meetings include presentations by Navy technical staff, EPA personnel, and/or support contractors for both agencies. The meetings also include a question-and-answer period. Minutes of meetings during public comment periods are included in the Administrative Record for public reference.

Fact Sheets and Information Updates. The Navy has been developing a series of fact sheets which are mailed to public officials and other interested individuals and/or used as handouts at the public meetings. Each fact sheet includes a schedule of upcoming meetings and other site activities. The fact sheets may explain why the Navy is conducting certain activities or studies, update readers on potential health risks, or provide general information on the IRP process.

A detailed formal NSB-NLON Community Relations Plan was published in February of 1994. The plan identifies issues of community interest and concern regarding the NSB-NLON. The plan also describes a program of community relations activities that the Navy will conduct during the IRP.

The activities of the community relations program outlined in this plan have the following specific objectives: (1) to keep local officials, citizens, military personnel, and the media informed of site activities; (2) to increase community awareness of the goals and procedures of the IRP; and (3) to provide opportunities for public involvement in the cleanup process.

The information in the Community Relations Plan is based upon:

- interviews with area residents and local officials conducted in Groton and Ledyard on October 2-3, 1991;
- interviews with area residents and local officials conducted by phone in September and October of 1991;
- input of the TRC or RAB which had regularly met to discuss progress at the Subase;
- public comments and questions at public information meetings held in 1990 and 1991;
- review of Navy site files; and
- discussions held with Navy, EPA, contractors, and technical and public affairs staff.

EPA published a notice and brief analysis of the Proposed Plan in the New London Day on June 1, 1995 and made the plan and the administrative record available to the public at the Groton Public Library, the Bill Library and the Naval Submarine Base Library. A fact sheet regarding the Proposed Plan was also prepared and distributed to all persons on the Navy's public mailing list.

On June 1, 1995, the Navy held an informational meeting to discuss the cleanup alternatives presented in the Focused Feasibility Study and to present the Proposed Plan. Also during this meeting, the Navy answered questions from the public. From June 1, 1995 to June 30, 1995 the Navy held a 30-day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan, and on any other documents previously released to the public. On June 28, 1995, the Navy held a public hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting is included in this responsiveness summary.

Summary of Comments Received During the Public Comment Period

During the public comment period one set of comments, dated June 30, 1995, was received. At the public hearing held on June 28, 1995 no comments were received.

1. Comment: The commentor had several detailed technical comments regarding the design of the cap, groundwater interception system and post-closure groundwater monitoring system.

   Response: These components of the final remedy are presently being designed. The

comments bring up several important points which the Navy will carefully address during the design phase of this project. The commentor will be given the opportunity to review preliminary designs and design analyses and provide further comments at that time.

2. Comment: There is an apparent conflict between the Proposed Plan and the accompanying Fact Sheet regarding whether the leachate collection system will be installed. The Proposed Plan states on pages 10 and 11 that a leachate collection system will be installed. However, the Fact Sheet states on page 3 that the design will include a leachate collection system "if necessary". It is the State's understanding that the Navy intends to decide, based on predesign studies, whether it will be necessary to install a leachate collection system. The State supports this approach. Any decision regarding the necessity of leachate collection must be by mutual agreement between the Navy, EPA, and the State, and must be based on data from a adequate groundwater monitoring program. If a leachate collection system is installed at the Area A Landfill, the Navy will still be required to evaluate whether additional steps are needed to address contaminated groundwater originating from the landfill.

Response: The Navy intends to perform a predesign study to determine the type of leachate collection system that may be installed as well as the need for such a system. The leachate collection system will only be installed if the EPA, CT DEP, and the Navy agree that it is necessary.

APPENDIX B

COMPARATIVE ANALYSIS OF ALTERNATIVES

TABLE 5-1
COMPARATIVE ANALYSIS SUMMARY
AREA A LANDFILL

Assessment Factors	Alternative 21-1 No Action	Alternative 21-3 Cap	Alternative 21-4 Off-Site Incineration	Alternative 21-5 Off-Site RCRA Landfill
1. Overall Protection of Human Health and the Environment	No significant reduction in risk.	Eliminates risk due to direct contact and ingestion/inhalation. Prevents erosion and infiltration.	Eliminates risk due to direct contact and ingestion/inhalation and, by removing hot spots, protects future utility construction workers. Prevents erosion and infiltration. Eliminates some contaminated material.	Eliminates risk due to direct contact and ingestion/inhalation and, by removing hot spots, protects future utility construction workers. Prevents erosion and infiltration. Eliminates some contaminated material.
2. Compliance with ARARs	The following ARARs are not met: - Federal and state RCRA hazardous waste disposal area closure standards ARARs for ground and surface water quality are not within the scope of this interim remedial action. This alternative does not improve water quality.	This alternative meets all ARARs. ARARs for ground and surface water quality are not within the scope of this interim remedial action. This alternative would improve water quality to the extent that infiltration is prevented.	This alternative meets all ARARs. ARARs for ground and surface water quality are not within the scope of this interim remedial action. This alternative would improve groundwater quality to the extent that some contaminated soils are removed and infiltration is prevented.	This alternative meets all ARARs. ARARs for ground and surface water quality are not within the scope of this interim remedial action. This alternative would improve groundwater quality to the extent that some contaminated soils are removed and infiltration is prevented.
3. Long-Term Effectiveness and Permanence • Magnitude of Residual Risk	No reduction in constituent concentrations in any media.	By preventing direct contact, risks to human health are prevented except for risks to potential future construction workers which are low.	By preventing direct contact, human health risks due to direct contact are eliminated and risks to future utility/construction workers are reduced to very low levels by removal of contaminated PCB hot spots.	By preventing direct contact, human health risks due to direct contact are eliminated and risks to future utility/construction workers are reduced to very low levels by removal of contaminated PCB hot spots.
• Adequacy and Reliability of Controls	No controls over remaining contamination.	Controls are considered reliable and adequate; however, if utility/ construction activities take place without adequate protection there would be potential health risks.	Controls are considered reliable and adequate. Contaminated soil hot spots are removed, thus long-term protection will be provided in these areas.	Controls are considered reliable and adequate. Contaminated soil hot spots are removed thus long-term protection will be provided in these areas.
4. Reduction of Toxicity Mobility, or Volume	No reduction of toxicity, mobility or volume.	No reduction in toxicity or volume. Contaminants in unsaturated zone will be less mobile due to the reduced infiltration.	No reduction in toxicity or volume for the majority of landfill soils. Contaminants in the unsaturated zone will be less mobile due to the reduced infiltration. Soil hot spots will be eliminated, thereby reducing the total volume of contaminated materials on site. Ultimately, these soil hot spots will be incinerated, thereby destroying the PCBs which will result in a net reduction in toxicity.	No reduction in toxicity or volume for the majority of landfill soils. Contaminants in the unsaturated zone will be less mobile due to the reduced infiltration. Soil hot spots will be eliminated, thereby reducing the total volume of contaminated materials on site. Ultimately, these soil hot spots will be landfilled, therefore there is no net reduction in toxicity. However, mobility will be reduced at the off-site RCRA landfill.

TABLE 5-1 (continued)
COMPARATIVE ANALYSIS SUMMARY
AREA A LANDFILL

Assessment Factors	Alternative 2L-1 No Action	Alternative 2L-3 Cap	Alternative 2L-4 Off-Site Incineration	Alternative 2L-5 Off-Site RCRA Landfill
5. Short-Term Effectiveness • Time until protection is achieved	Not applicable.	Cap placed within 12 months.	Soils excavated and removed within 14 months.	Soils excavated and removed within 13 months.
• Protection of community during remedial action	Risks to community not increased; however, contaminants still have the potential to migrate off site.	Potential for windblown dust during grading activities. Protection provided by use of dust suppressants.	Potential for windblown dust during grading and excavation activities. Protection provided by use of dust suppressants. Small potential for spills during transport.	Potential for windblown dust during grading and excavation activities. Protection provided by use of dust suppressants. Small potential for spills during transport.
• Protection of workers during remedial action	Not applicable.	Protection from ingestion, direct contact, and inhalation of soil provided by proper health and safety procedures.	Protection from ingestion, direct contact, and inhalations of soil provided by proper health and safety procedures.	Protection from ingestion, direct contact, and inhalations of soil provided by proper health and safety procedures.
6. Implementability • Technical feasibility	No activities to implement.	Cover installation easy to implement.	Cover installation and removal activities easy to implement.	Cover installation and removal activities easy to implement.
• Administrative feasibility	No approval necessary.	Some coordination required with hazardous waste agencies to ensure that cap and closure meet relevant and appropriate requirements, and with water discharge agencies to ensure that the groundwater discharge to the wetlands meets substantive requirements.	Some coordination required with hazardous waste agencies to ensure that cap and closure meet relevant and appropriate requirements, and with water discharge agencies to ensure that the groundwater discharge to the wetlands meets substantive requirements. Approvals required for disposition of PCB hot spots in the off-site incineration. No difficulties are anticipated.	Some coordination required with hazardous waste agencies to ensure that cap and closure meet relevant and appropriate requirements, and with water discharge agencies to ensure that the groundwater discharge to the wetlands meets substantive requirements. Approvals required for disposition of PCB hot spots in the off-site landfill. No difficulties are anticipated.
• Availability of services and materials	No services or material required.	Contractors and materials are locally available.	Contractors and materials are locally available. Off-site incineration capacity is available. Temporary capacity shortfalls are possible.	Contractors and materials are locally available. Adequate off-site landfill capacity is available.
7. Cost • Capital cost	$0	$3,910,869	$4,409,300	$4,127,300
• O&M (Present Worth) Costs	$0	$1,823,818	$1,823,818	$1,823,818
• Total Cost	$0	$5,734,687	$6,233,118	$5,951,118
8. State Acceptance	No comments received from the State regarding this alternative.	The State concurs (in a letter dated August 7, 1995) that this is the preferred alternative.	No comments received from the State regarding this alternative.	No comments received from the State regarding this alternative.
9. Community Acceptance	No comments received from the public regarding this alternative.	No comments received from the public regarding this alternative.	No comments received from the public regarding this alternative.	No comments received from the public regarding this alternative.

APPENDIX C

ARAR SUMMARY TABLES

NAVAL SUBMARINE BASE - NEW LONDON SUPERFUND SITE
AREA A LANDFILL
ALTERNATIVE 2L-3
RCRA SUBTITLE C CAP
CHEMICAL-SPECIFIC ARARs AND TBCs

Medium	Requirements	Status	Synopsis of Requirement	Action to be taken to Attain ARAR
STATE				
Soil	State Proposed Connecticut Cleanup Standard Regulations (CGS § 22a-133k)	TBC	These regulations are being adopted under the statutory authority provided by CGS § 22a-133k. They will provide specific numeric cleanup criteria for a wide variety of contaminants in soil. Separate criteria will be established for threats to human health and environmental receptors posed by direct contact with contaminants.	The Soil Cleanup Standards will be considered in the design of the proposed remedy.
Water	State Water Quality Standards (CGS § 22a-426)	Applicable	Connecticut's Water Quality Standards were adopted under this statute. They establish specific numeric criteria, and anti-degradation policies for groundwater and surface water.	Remedial activities will be undertaken in a manner that is consistent with the antidegradation policy in the Water Quality Standards. If any remedial activities occur that are regulated under these provisions, the use of engineering controls and best management practices may be required to prevent or minimize adverse impacts to the waters of the State.
Water	State Water Pollution Control (RCSA §§ 22a-430-1 to 8)	Applicable	These rules establish criteria for water and stormwater discharge to surface water, groundwater and POTWs.	The proposed alternative includes collection and discharge of upgradient surface and groundwater. Any discharges will meet the substantive requirements of these regulations, including treatment if necessary.

NAVAL SUBMARINE BASE-NEW LONDON SUPERFUND SITE
AREA A LANDFILL
ALTERNATIVE 2L-3
RCRA SUBTITLE C CAP
ACTION-SPECIFIC ARARs AND TBCs

Medium	Requirements	Status	Synopsis of Requirement	Action to be taken to Attain ARAR
FEDERAL				
Waste	Federal RCRA - General requirements (40 CFR Part 264 Subpart A)	Relevant and Appropriate	Establishes general requirements for owners and operators of hazardous waste treatment, storage, and disposal facilities.	The cap and associated systems will be designed to meet these requirements.
Waste	Federal RCRA - Preparedness and Prevention (40 CFR Part 264 Subpart C)	Relevant and Appropriate	Establishes requirements for minimizing the possibility of fire, explosion, or release of hazardous material.	The cap and associated systems will be designed to meet these requirements.
Waste	Federal RCRA - Contingency Plan and Emergency Procedures (40 CFR Part 264 Subpart D).	Relevant and Appropriate	Establishes contingency plan requirements in the event of fire, explosion, or release from a facility.	The remedy will meet the substantive requirements specified in these regulations through the preparation and implementation of appropriate plans and procedures.
Waste	Federal RCRA - Releases from Solid Waste Management Units (40 CFR Part 264 Subpart F	Relevant and Appropriate	Regulates releases from Solid Waste Management Units ("SWMUs").	The remedy will meet the substantive requirements specified in these regulations.
Waste	Federal RCRA - Closure and Post-Closure Requirements (40 CFR Part 264 Subpart G).	Relevant and Appropriate	Details general requirements for closure and post-closure of hazardous waste facilities.	The cap and associated systems will be designed to meet these requirements.

Waste	**Federal** USEPA Technical Guidance - Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530-SW-89-047.	TBC	Presents technical specifications for the design of multi-layer covers at landfills where hazardous wastes were disposed.	The cap and associated systems will be designed to meet these design specifications.
Waste	**Federal** PCB regulation under TSCA (40 Part CFR 761)	Applicable	These standards govern the storage of PCB items.	The management of PCB items during implementation of the remedy will be conducted in accordance with these standards.
STATE				
Waste	**State** Hazardous Waste Management: Generator & Handler Requirements - General Standards, Listing, & Identification (RCSA §§ 22a-449(c)100-101)	Applicable	These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR Parts 260 to 261 are incorporated by reference.	Hazardous waste determinations will be performed and the wastes will be managed in accordance with requirements of these regulations, if necessary.
Waste	**State** 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 Part 262 are incorporated by reference. Storage requirements given at 40 CFR § 265.15 are also included. These provisions are applicable if hazardous waste is generated on the site as part of the remedy.	Any hazardous waste generated through excavation or other activities will be managed in accordance with the substantive requirements of these regulations.
Waste	**State** Hazardous Waste Management: TSDF Standards (RCSA § 22a-449(c)104)	Relevant and Appropriate	This section establishes standards for closure, post-closure, and groundwater monitoring. The standards of 40 CFR Part 264 are incorporated by reference. Underground injection of hazardous wastes, and placement of free liquids in landfills are prohibited.	The proposed cap design will comply with the closure and post-closure requirements of this regulation. The proposed remedial action includes groundwater monitoring.

Waste	State Hazardous Waste Management: TSDF Standards (RCSA § 22a-449(c)104)	Relevant and Appropriate	This section establishes standards for closure, post-closure, and groundwater monitoring. The standards of 40 CFR Part 264 are incorporated by reference. Underground injection of hazardous wastes, and placement of free liquids in landfills are prohibited.	The proposed cap design will comply with the closure and post-closure requirements of this regulation. The proposed remedial action includes groundwater monitoring.
Waste	State Hazardous Waste Management: Interim Status Facilities and Groundwater Monitoring Requirements, Closure and Post-Closure Requirements (RCSA § 22a-449(c)105)	Relevant and Appropriate	This section establishes standards for closure, post-closure, and groundwater monitoring. The standards of 40 CFR Part 265 are incorporated by reference. The Commissioner may require groundwater monitoring based on site specific considerations.	The proposed cap design will comply with the closure and post-closure requirements of this regulation. The proposed remedial action includes groundwater monitoring.
Waste	State Solid Waste Management (RCSA §§ 22a-209-1 to 15)	Applicable	Establishes standards for closure of solid waste disposal areas.	These portions of the regulations that are more stringent than Federal RCRA Subtitle D regulations will be met.
Waste	State Safe Storage of Oil and Chemical Liquids (RCSA §§ 29-337-1 to 3)	Applicable	These rules govern the storage of hazardous materials, including flammable liquids and other chemicals.	Storage of oil and other waste materials will be conducted in accordance with the requirements of these regulations.
FEDERAL				
Air	Federal Clean Air Act - National Emission Standards for Hazardous Air Pollutants ("NESHAPs"), 40 CFR Part 61.	Relevant and Appropriate	Establishes emission levels for eight listed hazardous air pollutants emitted from particular types of facilities.	The gas collection and treatment system will be designed to attain the NESHAP numerical standards for potential landfill gases, including benzene and vinyl chloride.

Air	Federal Clean Air Act - Non-methane organic compounds ("NMOCs") (Proposed rule - 56 FR 24468, to be codified at 40 CFR Part 60 Subpart WWW).	TBC	Regulations would require NMOC-specific gas collection and control systems, monitoring, and gas generation estimates. The proposed rule would also establish a performance standard for NMOCs emissions from municipal solid waste landfills.	The proposed regulations will be considered in the design of the landfill gas collection and treatment system.
STATE				
Air	State Air Pollution Control - Control of Organic Compound Emissions (RCSA § 22a-174-20)	Applicable	Subsection (f) sets standards for emission of organic compounds. Incineration of organohalocarbons is prohibited under subsection (f)(6)(A).	The landfill gas collection and treatment system will be designed to comply with the substantive requirements of this regulation.
Air	State Air Pollution Control - Control of Odors (RCSA § 22a-174-23)	Applicable	This section prohibits emission of any substance that constitutes a nuisance because of objectionable odor. Several compounds are deemed to constitute a nuisance if they exceed specific concentrations.	Site remediation activities will be planned to control the release of objectionable odors from the site so that the activities comply with the substantive requirements of this regulation.
Air	State Air Pollution Control - Control of Hazardous Air Pollutants (RCSA § 22a-174-29)	Applicable	This section establishes testing requirements and allowable stack concentrations for many specific substances.	Direct discharges to the air from the landfill gas collection and treatment system will be designed to meet the substantive requirements of these regulations so that the numeric criteria are not exceeded.
Air	State Air Pollution Control - Control of Particulate Emissions (RCSA § 22a-174-18)	Applicable	This subsection sets specific standards for particulate emissions. Specific standards that may apply particularly to the landfill include Fugitive Dust (18b), and Incineration (18c). Gas flares are regulated as incinerators.	Any activities involving excavation, landfill cap construction, or landfill gas flaring will be designed to meet with the substantive requirements of these regulations so that the numeric criteria are not exceeded.

Water	State Water Pollution Control (CGS § 22a-430)	Applicable	This section prohibits discharge to the waters of the State without meeting the substantive requirements of the State's Water Quality Standards. This section establishes requirements for many categories of discharges, including stormwater.	The proposed remedy may create stormwater runoff that may require treatment under CGS § 22a-430b. Any discharges, including stormwater, will meet the substantive requirements of this section, including treatment if necessary.
Water	State Connecticut Water Diversion Policy Act (CGS §§ 22a-365 to 378)	Applicable	These rules regulate many diversions of the waters of the State. Several broad categories are exempt, including any diversion of less than 50,000 gallons per day and any discharge permitted under CGS § 22a-430. Under Section 22a-373, the Commissioner may impose limitations and conditions including monitoring, schedule of diversion, etc. Under CGS § 22a-378, the Commissioner may temporarily suspend such requirements if a water supply emergency has been declared.	Any non-exempt diversion will be carried out in accordance with the substantive requirements of these statutes. The Navy will coordinate with the Connecticut Department of Environmental Protection to identify any such requirements and ensure that they are met.

NAVAL SUBMARINE BASE-NEW LONDON SUPERFUND SITE
AREA A LANDFILL
ALTERNATIVE 2L-3
RCRA SUBTITLE C CAP
LOCATION-SPECIFIC ARARs AND TBCs

Medium	Requirements	Status	Synopsis of Requirement	Action to be taken to Attain ARAR
FEDERAL				
Wetlands	Federal Executive Order on Protection of Wetlands (E.O. 11990, 40 CFR Part 6, App. A).	Applicable	Requires federal agencies to avoid impacts associated with the destruction or loss of wetlands, minimize potential harm, preserve and enhance wetlands, and avoid support of new construction in wetlands if a practicable alternative exists.	The landfill cap will be designed to minimize impacts to the adjacent wetlands. To the extent necessary, wetlands restoration and/or replication will be undertaken.
Wetlands	Federal Clean Water Act § 404 - Dredge and Fill Activities (40 CFR Part 230; 33 CFR Parts 320-328).	Applicable	Requires that for dredging or filling of wetlands: no practicable alternatives exist; the activity will not cause a violation of state water quality standards or significant degradation of the water; and adverse effects will be minimized.	The landfill cap will be designed to meet these standards and minimize impacts to the adjacent wetlands. To the extent necessary, wetlands restoration and/or replication will be undertaken.
STATE				
Surface Water and Wetlands	State - Inland Wetlands and Watercourses Regulations (RCSA §§ 22a-39-1 through 15).	Applicable	Regulates any operation within or use of a wetland or watercourse involving removal or deposition of material, or any obstruction, construction, alteration or pollution of such wetland or watercourse.	The landfill cap and the dredging of waste materials will be designed to minimize impacts to the Area A Wetland. To the extent necessary, wetlands restoration and/or replication will be undertaken.

Surface Water and Wetlands	State - Inland Wetlands and Watercourses Act - General Requirements (CGS § 22a-45a)	TBC	This section governs minor activities including installation of water quality monitoring equipment such as staff gauges, water recording and water quality testing devices, and survey activities, including excavation of test pits and core sampling. The Commissioner may require implementation of best management practices. The Department is currently drafting these requirements, and expects to issue them before the final remedy is selected for this site.	Once regulations are adopted, any wells, test borings, soil sampling, or other similar activities will be conducted in accordance with the substantive requirements of these regulations, if any.

APPENDIX D

DECLARATION OF CONCURRENCE

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

79 ELM STREET HARTFORD, CONNECTICUT 06106

PHONE: (203) 424-3001

idney J. Holbrook
Commissioner

August 7, 1995

Ms. Linda M. Murphy, Director
United States Environmental Protection Agency
Waste Management Division
JFK Federal Building, HAA-CAN2
Boston, MA 02203-2211

Captain Leo Dominique, Commanding Officer
Naval Submarine Base New London
Box 00
Groton, CT 06349

Re: State Concurrence with Capping of Area A Landfill
Naval Submarine Base New London

Dear Captain Dominique and Ms. Murphy:

The Connecticut Department of Environmental Protection (CTDEP) concurs with the remedial action for source control selected by the US Navy and The US Environmental Protection Agency for the first Operable Unit of the Area A Landfill at the Naval Submarine Base New London in Groton, Connecticut. The source control remedial action is described in detail in the proposed plan dated May 1995, and in the Record of Decision dated September 1995.

Concurrence with EPA's selected remedy for source control at the Area A Landfill shall in no way affect the Commissioner's authority to institute any proceeding to prevent or abate violations of law, prevent or abate pollution, recover costs and natural resources damages, and to impose penalties for violations of law, including but not limited to violations of any permit issued by the Commissioner.

Sincerely,

Sidney J. Holbrook
Commissioner

SJH:MRL