PROPOSED REMEDIAL ACTION PLAN
SHORE REALTY SITE
AKA APPLIED ENVIRONMENTAL SERVICES SITE
APRIL 1991

I. INTRODUCTION

This proposed plan identifies the preferred option of the State of New York and the United States Environmental Protection Agency (USEPA) for cleaning up contaminated soils, groundwater, and sediments associated with the Shore Realty Site. In addition, the plan includes summaries of other alternatives that could be used to remediate the site.

The period from April 22, 1991 to May 24, 1991 has been designated as a time for interested citizens and agencies to comment upon the proposal. A public meeting will be held on May 15, 1991 at the North Shore High School (450 Glen Cove Avenue, Glen Head, New York) beginning at 7:30 PM to present the proposal and receive comments from interested parties.

Written comments may also be submitted to:

Mr. Joshua Epstein
NYS Department of Environmental Conservation
Office of Citizen Participation
Building 40 - SUNY
Stony Brook, New York 11790
(516)751-4078

or

Mr. Jonathan Hangartner
Project Manager
U.S. Environmental Protection Agency
26 Federal Plaza, Room 747
New York, New York 10278
(212)264-9213

II. SITE LOCATION AND DESCRIPTION

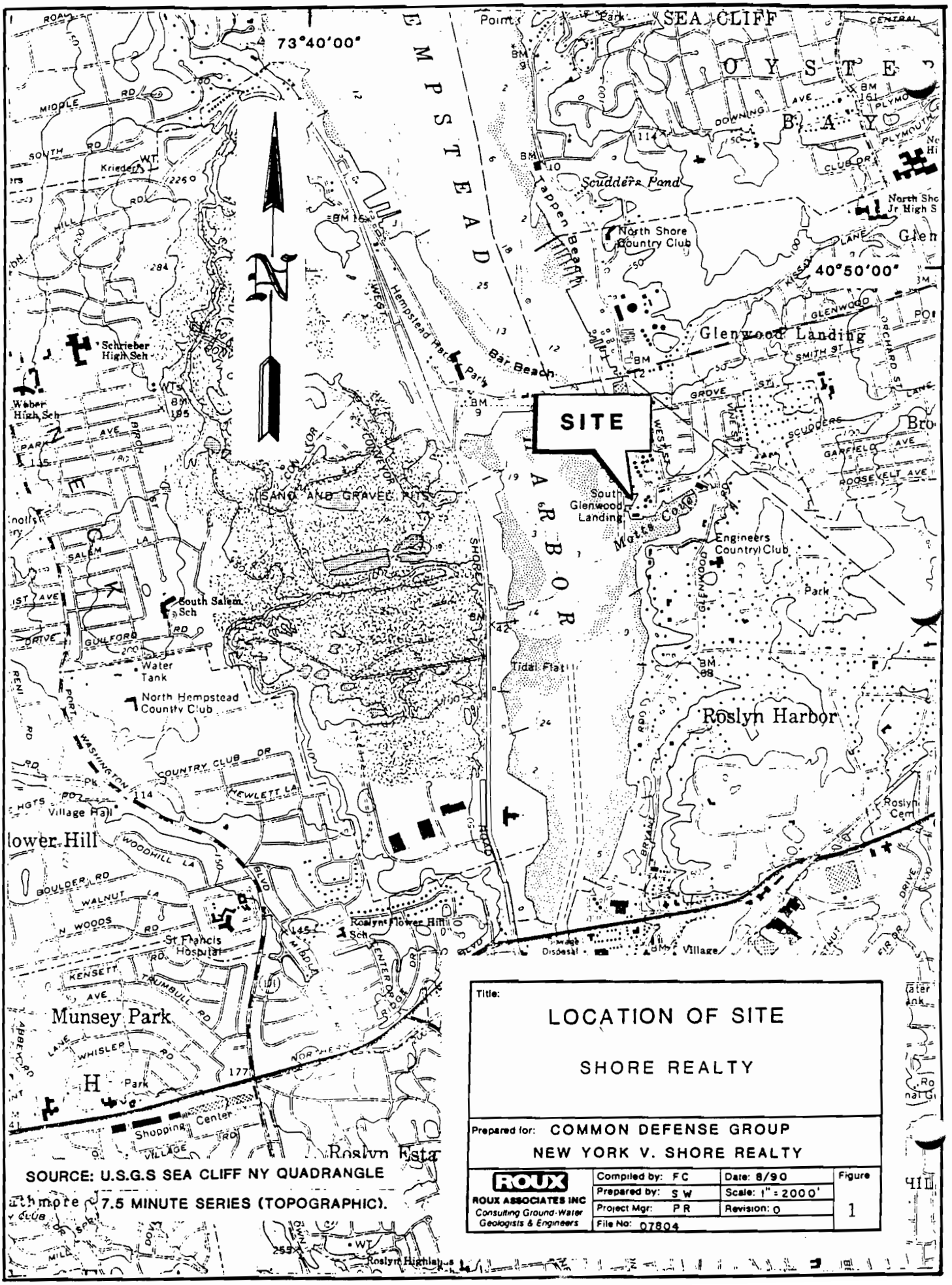
The Shore Realty Site, also known as the Applied Environmental Services (AES) Site, is located at One Shore Road, Glenwood Landing, Nassau County, New York. The site is part of a small peninsula on the east shore of Hempstead Harbor directly north of Mott's Cove. Mudflats around the site, designated as tidal wetlands, are periodically exposed by falling tides. Figure 1 shows the location of the site with respect to Hempstead Harbor. This 3.2 acre site is surrounded by industrial, commercial, and residential areas. Figure 2 is a site plan showing approximate borders and the layout of surface structures.

There are no drinking water supply wells within one mile of the site. Twelve non-public groundwater wells within one mile of the site are used for industrial, irrigation, and observation purposes. The principal aquifers beneath the site include the Upper Glacial, Port Washington, and Lloyd aquifers. These aquifers are used to varying degrees as sources of groundwater. The Magothy aquifer, often used on Long Island as a source of drinking water, is not present under the site. Groundwater beneath the site discharges to Hempstead Harbor to the west and south.

III. CITIZEN PARTICIPATION

Concurrent with the investigations and remedial measures performed at the site, there has been significant community involvement and input into the project. Between 1984 and 1987, regular meetings were held between interested citizens and federal, state, county, and local officials as often as once per month.

Before the work plan for the Remedial Investigation and Feasibility Study (RI/FS) was finalized, a public meeting was held at the nearby North Shore High School (August 12, 1987). Six local information repositories were established and the transcript from the meeting was placed into the repositories. A citizen participation workplan was developed by the NYSDEC in early 1988. Such site-specific plans help to ensure opportunities for the public to be informed and for the agencies to receive information from the public as the RI/FS proceeds. As part of the plan, a public contact list was developed and is being utilized to disseminate fact sheets, meeting announcements, and other information. The Citizen Participation Plan has been placed into the document repositories. A news release, public notice, and fact sheet were issued to announce the plan and summarize developments to that date.



SOURCE: U.S.G.S SEA CLIFF NY QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC).

Title:

LOCATION OF SITE

SHORE REALTY

Prepared for: COMMON DEFENSE GROUP
NEW YORK V. SHORE REALTY

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: F C	Date: 8/90	Figure
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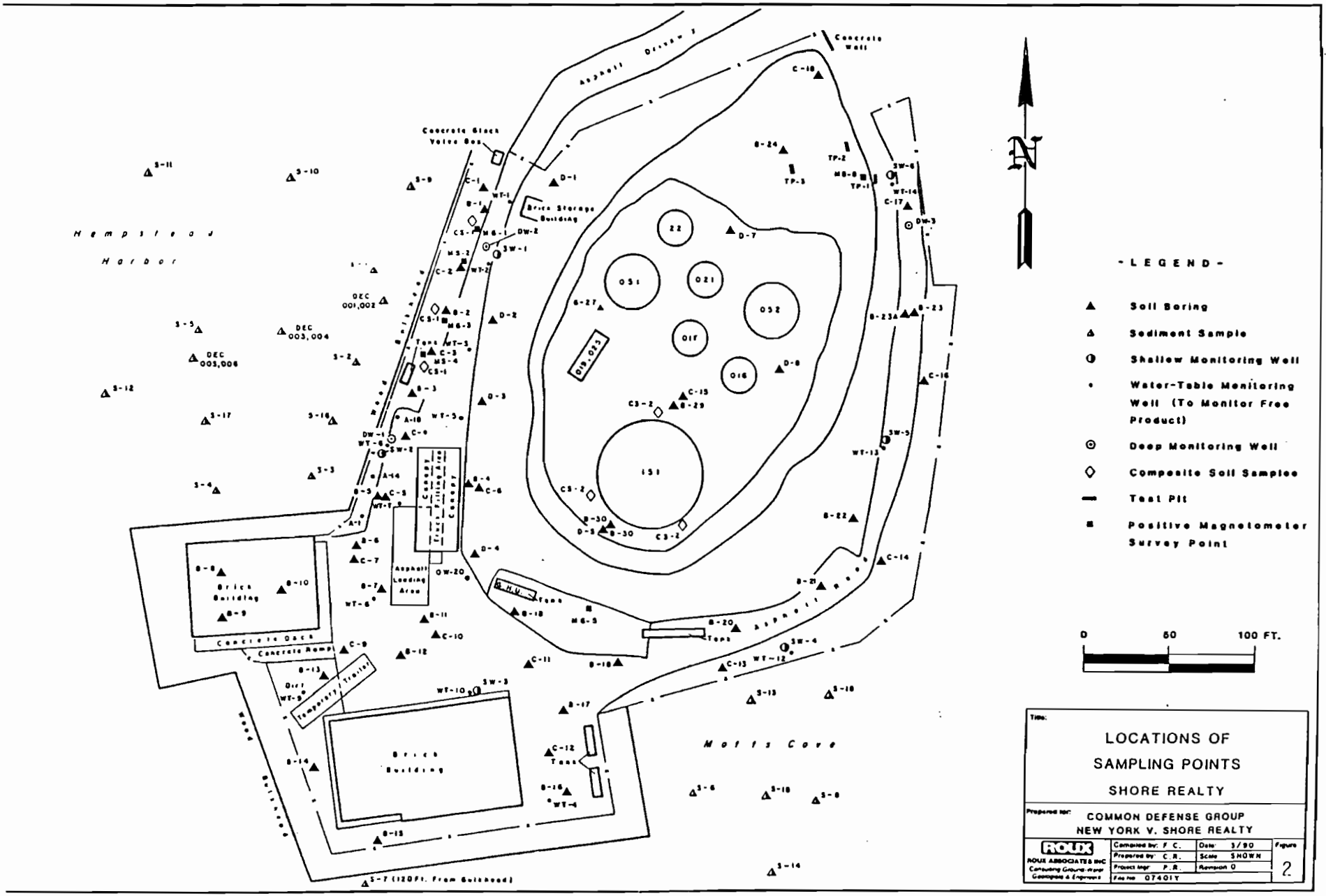
	File No: 07804		



Title:

LOCATIONS OF SAMPLING POINTS SHORE REALTY

Prepared for: COMMON DEFENSE GROUP
NEW YORK V. SHORE REALTY

ROUX ASSOCIATES INC
Consulting Ground-water Geologists & Engineers

Compiled by: F. C.	Date: 3/80	Figure
Prepared by: C.R.	Scale SHOWN	2
Project Mgr P.R.	Revision 0	
File No 07401Y		

When the first draft of the Remedial Investigation Report was submitted in February 1988, a news release and public notice were issued, and a fact sheet, briefly describing the draft report, was also distributed. Upon the receipt of the first draft of the Feasibility Study in September 1990, another news release, meeting notice, and fact sheet were issued. A public meeting was held on September 18, 1990 to describe the revised RI Report and the FS and again solicit comments. The RI/FS reports were also placed in the repositories.

A notice of the availability of the final drafts of the RI/FS Reports and this Proposed Remedial Action Plan (PRAP) has also been made. The reports, this PRAP, and the Administrative Record for the project have been placed into the repositories. A formal public meeting will be held on May 15, 1991 to present the PRAP and seek public comment. Based upon the comments received during the meeting and the comment period, a responsiveness summary will be prepared and incorporated into the Record of Decision (ROD) for the selected remedy.

When the agencies select the remedy, a news release and public notice will be issued and a summary will be placed in the repositories. The NYSDEC and the USEPA may modify the preferred alternative or select another of the response actions presented in this proposed plan and the FS report, based upon new information or on comments submitted during the public comment period. Therefore, the public is encouraged to review and comment upon all the alternatives identified here.

The documents in the Administrative Record are the basis for the proposed remedial action. The following documents are the primary components of the Administrative Record:

A. "Feasibility Study: Shore Realty Site; Glenwood Landing, New York," prepared by Roux Associates, Inc.; March 1991.

B. "Remedial Investigation: Shore Realty Site; Glenwood Landing, New York," prepared by Roux Associates, Inc.; March 1991.

A copy of the record is available for public review and/or copying at the following locations:

NYSDEC*
Office of Public Participation
Bldg. 40 - SUNY
Stony Brook, NY

NYS Dept. of Law
Nassau Co. Office
211 Station Road 6th Floor
Mineola, NY

Glen Cove Public Library
Reference Desk
Glen Cove Avenue
Glen Cove, NY

Sea Cliff Public Library
Reference Desk
Sea Cliff Avenue
Sea Cliff, NY

Town Hall
Town of N. Hempstead
Planning Dept.
220 Plandome Rd.
Manhasset, NY

Village Hall
Village of Sea Cliff
Village Clerk
Sea Cliff Avenue
Sea Cliff, NY

USEPA Region II
26 Federal Plaza 7th Fl.
New York, NY

* Contains a complete copy of the administrative record.

IV. SITE HISTORY AND ENFORCEMENT STATUS

A summary of the major events affecting the environmental conditions at the site is included as Table 1.

The site was first used for the bulk storage of petroleum products in 1939, by Texaco Oil Company. It has subsequently been used by other companies for the storage of petroleum and chemical products and the blending of waste chemicals. In 1980, a lessee (Mattiace Petrochemical Company) received 34 citations for the improper storage and handling of hazardous materials from the New York State Department of Transportation and the U.S. Coast Guard. The site was subsequently purchased by Shore Realty Corporation (Shore) in 1983. In 1984, New York State filed suit against Shore and its owner for failure to cleanup the site.

Shore was ordered by federal court to remove the hazardous wastes stored on the property. After removing some of the wastes from the site, Shore refused to complete the removal. After determining that the site presented an imminent danger, the New York State Department of Environmental Conservation (NYSDEC) hired a contractor to remove the hazardous wastes stored in tanks and containers at the site. The NYSDEC completed the removal of approximately 700,000 gallons of hazardous wastes from the site at a cost of over $3.1 million by the end of September of 1986. More than half of this amount was used for the disposal of wastes contaminated with polychlorinated biphenyls (PCBs).

After being nominated to the federal National Priorities List (NPL) in October 1984, the site was incorporated into the list in June 1986. This step formalized the involvement of the United States Environmental Protection Agency (USEPA)

TABLE 1
PROJECT MILESTONES
SHORE REALTY SITE (#130006)
AKA APPLIED ENVIRONMENTAL SERVICES SITE
(some dates approximate)

1939-1977	Site used for bulk storage of petroleum products.
1977-1980	Site leased to Mattiace Petrochemical Co. to store petrochemical products.
1978	Toluene spill.
1980-1983	Site leased to Applied Environmental Services (AES) and Hazardous Waste Disposal (HWD). Operated as hazardous waste storage and treatment facility.
10/83	Site purchased by Shore Realty Corp.
1/84	AES evicted from site
3/1/84	At request of NYS Attorney General, U.S. District Court orders Shore Realty to clean up site.
5/84-9/84	Shore Realty removes 255 of 410 drums containing hazardous wastes from the site then refuses to complete cleanup of remaining drums and tanks.
5/31/85	NYSDEC initiates procedures to complete cleanup at state expense.
9/13/85	After being held in contempt of court and fined, Shore Realty completes removal of drums of chemicals from site.
11/85-9/86	NYSDEC contractor performs surficial cleanup of site removing approximately 700,000 gallons of hazardous wastes at a cost of $3.1 million.
6/86	Site placed on federal National Priorities List.
8/12/87	Public Meeting - North Shore High School.
9/16/87	Court orders defendants to perform Remedial Investigation and Feasibility Study (RI/FS).
2/88	First draft of RI Report submitted to State.
3/88	Public notice of availability of RI Report.
5/88	State rejects RI Report.
8/88	Revised RI Report submitted.
10/88	Revised RI Report rejected.
10/88-1/89	Meetings and correspondence to develop work plan for additional site investigation work to complete RI. Work plan approved 10/10/89.
11/9/89	Field work for Supplemental RI begins.
4/90	Supplemental RI Report submitted.
6/90	Supplemental RI Report rejected.
8/90	RI Report resubmitted.
9/90	First draft of FS submitted.
9/18/90	Public Meeting - North Shore High School
11/1/90	RI/FS Reports rejected.
2/91	RI/FS Reports resubmitted.
3/5/91	RI/FS Reports rejected
3/28/91	RI/FS Reports resubmitted.
4/17/91	Public notice of availability of RI/FS Reports and public meeting to discuss proposed remedy.
5/15/91	Public Meeting - North Shore High School, Glen Head, NY
5/24/91	End of public comment period.

in the process of investigating and remediating the site.

In February 1987 a number of companies that allegedly sent waste chemicals to the site, now referred to as the Common Defense Group, retained a consultant (Roux Associates, Inc.) to perform the Remedial Investigation and Feasibility Study (RI/FS) for the site. An RI/FS work plan was created to specify the steps needed to define the nature and extent of the contamination at the site and evaluate the feasible alternatives for remediating the site. The results of the RI are summarized below in Section V (Current Site Status) and the conclusions of the FS are described in Section VII (Summary of the Evaluation of the Alternatives).

Investigations at the site began in October 1987. The first draft of the RI report was submitted in February 1988. Due to deficiencies in the report, it was rejected in May 1988. A revised report was submitted in August 1988 and was also rejected. A major problem with the report was that many of the analyses of samples from the site were found to be unreliable due to laboratory problems. The need to repeat much of the sampling and analysis work, along with the assessment that additional information was needed, led to the development of a supplementary RI work plan. After extensive negotiations, the supplementary work plan was approved in October 1989.

Field work began in November 1989 and the supplemental report was submitted in April 1990. A revised report that combined both phases of the RI was submitted in August 1990. A draft of the FS was submitted in September 1990 and resubmitted in March 1991.

V. CURRENT SITE STATUS

This 3.2 acre site is surrounded on three sides by the waters of Hempstead Harbor. The soil is predominantly sandy and the average depth from the surface to the water table is eight feet. Contaminated media at the site include soil, groundwater, surface water, tidal sediments, and the air above the sediments.

The contaminants found at the site can be grouped into the general categories of volatile organics, semi-volatile organics, and metals. The contaminants that are present in the highest concentrations are the volatile compounds ethylbenzene, toluene, and xylenes (ETX). PCBs were detected in only one unconfirmed sediment sample at 99 parts-per-billion (ppb). Pesticides were not found at the site. The following discussion gives representative examples of the findings. Figure 2 also shows sampling points at the site.

The distribution of the contaminants is best described by addressing the individual media of soil, groundwater, sediments, and air. Soils at the site can be divided into four "horizons," A through D. As shown in Figure 3, these horizons consist of layers of soils that progress with depth from A to D. Toluene, xylenes, and metals were found in the A-horizon at low concentrations. The B-horizon, the most contaminated soil layer, contains very high concentrations of ETX, up to one percent. This horizon includes soils immediately above and below the water table. Chlorinated volatile organics, polycyclic aromatic hydrocarbons, and phthalates were also detected in high to moderate concentrations. Elevated concentrations of metals were also detected.

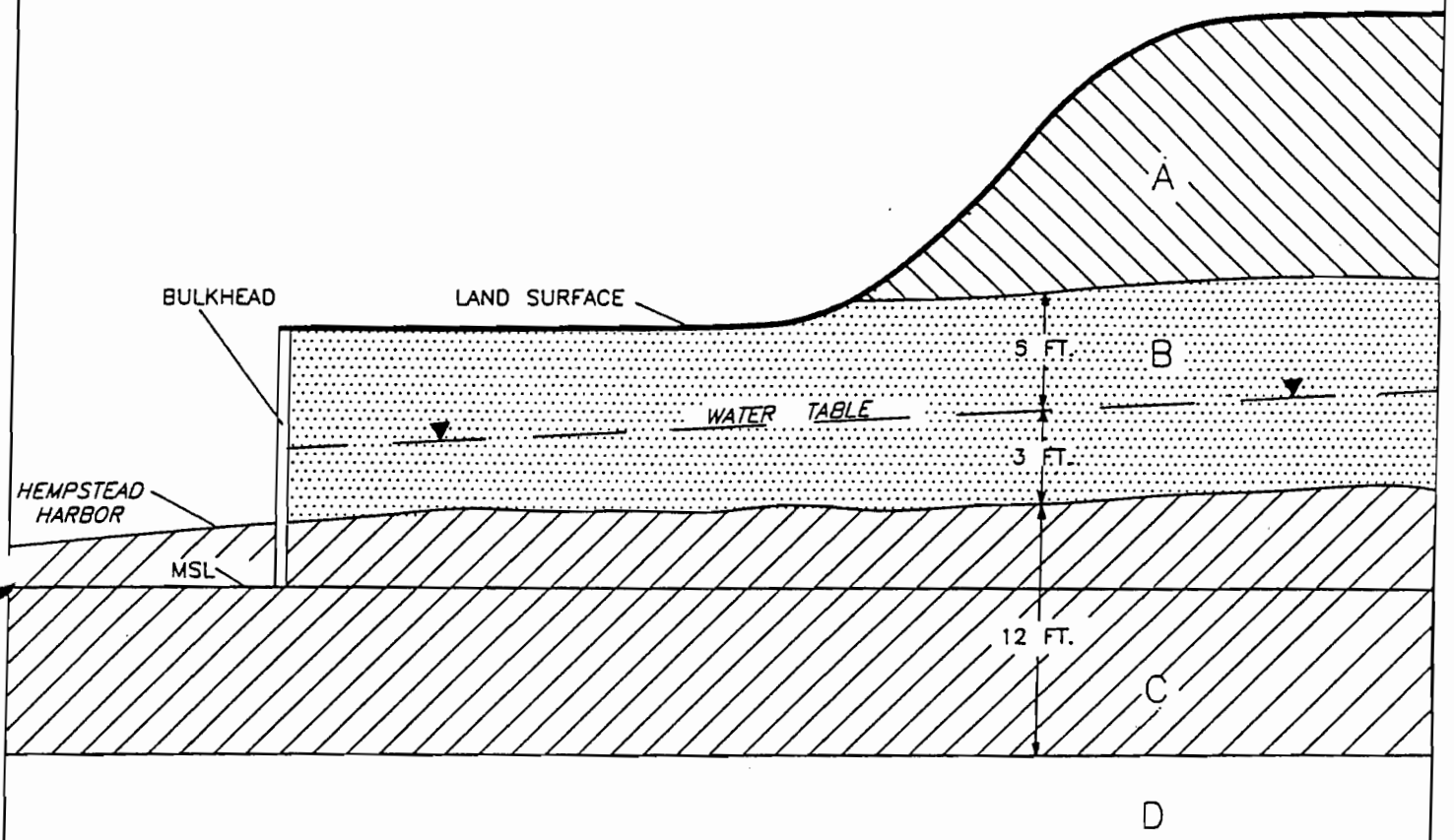
Concentrations of ETX in the C-horizon are lower than those in the B-horizon but are significant. Methylene chloride, PAHs, and phthalates were also found in moderate to low concentrations. Metals were not detected. Five soil samples were taken in the D-horizon. Concentrations of ETX compounds are low except for one location with moderate concentrations of xylenes. Tetrachloroethene was detected at one location at a low concentration.

Horizontally, the areas of highest soils contamination are along the western portion of the site (access road and bulkhead) and under the elevated tank farm.

Groundwater contamination can be described in terms of three levels; water table (WT-series), shallow (SW-series), and deep (DW-series). Although somewhat influenced by the tides, groundwater generally moves from east to west across the site and discharges into Hempstead Harbor.

The WT-series wells along the western portion of the site show heavy contamination, particularly with ETX compounds. Chemicals floating on the water table captured by these wells contribute to these high values. Other non-chlorinated, chlorinated, semi-volatile, and metal contaminants are present in this level. The high concentrations of ETX may mask the presence of additional contaminants. WT-series wells along the eastern portion of the site are relatively uncontaminated although some exceedances of groundwater standards have been found (e.g tetrachloroethene at 49 ppb).

The SW-series wells, screened at the interface of the C and D soil horizons, show low-level contamination by



Title:

SOIL HORIZONS USED TO MAP THE EXTENT OF CONTAMINATION AT THE SHORE REALTY SITE

Prepared For: COMMON DEFENSE GROUP
NEW YORK V. SHORE REALTY

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: L.W.	Date: 1/91	FIGURE
Prepared by: C.L.	Scale: NONE	3
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chlorinated volatile organic compounds (e.g. tetrachloroethene at 22 ppb). The DW-series wells, screened approximately 52 feet below the water table, are uncontaminated.

The analysis of sediment samples taken from the tidal mudflats in Hempstead Harbor and Mott's Cove show contamination by semi-volatile compounds and metals (e.g. benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, lead) at concentrations generally less than 1,000 ppb. The vertical distribution of the contaminants and the low concentrations of volatile contaminants suggest that the main source of contamination is the discharge of shallow groundwater onto the mudflats during low tide. There are no formal standards, but some of the PAHs and metals exceed guidance values established by the NYSDEC. There are indications that there may be off-site sources contributing to the PAH contamination in the sediments.

Since it is known that groundwater contaminated with volatile organic compounds discharges onto the mudflats, air samples were taken above the mudflats during low tide to evaluate air emissions. ETX and benzene were detected. Benzene was detected in three of the five samples at concentrations higher than the NYSDEC Ambient Guideline Concentration (AGC) of 0.12 ug/m3 (highest concentration was 3.23 ug/m3, or 1 ppb).

Baseline Risk Assessment

In accordance with the National Contingency Plan (NCP, 40 CFR Part 300), a baseline risk assessment has been completed as one component of characterizing the site. The results of the baseline risk assessment are used to help identify applicable remedial alternatives and select a remedy. The components of the baseline risk assessment for this site are as follows:

- a review of the site environmental [illegible]
- identification of site-related chem[illegible] media of concern;
- identification of the possible expo[illegible] and pathways based upon the possible fut[illegible] at the site;
- estimation of contaminant intake rates, [illegible]city, and resulting incremental risks and hazard [illegible]es; and
- an evaluation of the impacts of the site upon the environment.

Exposure routes are the mechanisms by which contaminants enter the body (e.g., inhalation, ingestion, absorption). Exposure pathways are the environmental media (e.g., soil, groundwater, air, etc.) through which contaminants are carried.

The risk assessment for this site has identified the soils at the site as the most likely medium for which a complete exposure pathway exists on a continuous basis at the site. A non-continuous pathway is the air over the mudflats at low tide. During the time where the mudflats are exposed, volatile organic compounds evaporate and produce concentrations that exceed state guidelines.

To estimate exposure rates, representative compounds were selected, conservative assumptions were made, and lifetime intake rates were calculated for the routes of inhalation, ingestion, and dermal absorption. Five different usage scenarios were evaluated; commercial use; recreational use by adults, recreational use by children, residential use, and exposure to chemicals associated with the sediments in the mudflats. Contaminants were divided into two categories, those that are possible/probable carcinogens, and those that may cause non-cancer health effects (systemic toxicants).

The results of the assessment indicate that left unremediated, the residential use scenario would present an incremental risk of cancer of approximately 9 X 10-5. That is, living at the site for a lifetime could increase an individuals risk of developing cancer by nine in one hundred thousand. This increased risk exceeds the one in one million (or 10-6) risk level used by New York State to indicate that remedial action may be needed. Contaminants in excess of State and federal standards were detected in groundwater at the site. EPA policies and regulations allow remedial actions to be taken whenever cross-media impacts result that exceeds one or more maximum contaminant levels (MCLs), which are enforceable water standards. The State and federal MCLs are set at levels that are protective of human health. Consequently, site remediation is warranted to remove this continuous source of contamination and expedite compliance with State and federal groundwater standards. There are a number of assumptions, uncertainties, and limitations associated with these estimates that are addressed in the feasibility study.

The risks associated with exposure to noncarcinogenic contaminants are determined using the "Hazard Index" approach. The Hazard Index is a comparison of potential levels of exposure to site-related contaminants with

conservative estimates of an acceptable level of exposure. For noncarcinogens, a Hazard Index greater than one indicates that adverse noncarcinogenic effects may occur, while a value below one indicates that such effects are unlikely to occur. At this site, the total Hazard Index for exposure to noncarcinogenic related contaminants is less than one, suggesting that adverse noncarcinogenic effects are not likely to occur.

The environmental assessment has identified impacts resulting from the contamination of the site. Impacts directly attributable to the site upon marine plant and animal life appear to be limited to the bulkheads and sediments directly adjacent to the site. This is thought to result primarily from the discharge of non-aqueous phase chemicals floating on the water table into the harbor.

The increased risks identified by the baseline risk assessment in combination with concerns regarding the criteria described below (especially exceedances of New York State groundwater standards) indicate the need to actively remediate soils and groundwater at the site.

VI. GOALS FOR REMEDIAL ACTIONS

The remedial alternative proposed for the site was developed in accordance with the New York State Environmental Conservation Law (ECL) and is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et. seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The criteria used in evaluating the potential remedial alternatives can be summarized as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. Protection of Human Health and the Environment--This criterion is an overall and final evaluation of the health and environmental impacts to assess whether each alternative is protective. This is based upon a composite of factors assessed under other criteria, especially short/long-term effectiveness and compliance with ARARs/SCGs (see below).

2. Compliance with Applicable or Relevant and Appropriate New York State and Federal Requirements (ARARs)--ARARs are divided into the categories of chemical-specific (e.g. groundwater standards), action-specific (e.g. design of a landfill), and location-specific (e.g. protection of wetlands). To distinguish between state and federal requirements, New York State refers to its ARARs as Standards, Criteria, and Guidelines (SCGs). Certain policies and guidance that do not have the status of ARARs/SCGs that are considered to be important to the remedy selection process are identified as To Be Considered (TBC) criteria. At this site, groundwater is contaminated to levels above the New York standards thereby contributing to the need for site remediation.

Primary Balancing Criteria - The next five "primary balancing criteria" are to be used to weigh major trade-offs among the different hazardous waste management strategies.

3. Short-term Impacts and Effectiveness--The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment is evaluated. The length of time needed to achieve the remedial objectives is estimated and compared with other alternatives.

4. Long-term Effectiveness and Permanence--If wastes or residuals will remain at the site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk presented by the remaining wastes; 2) the adequacy of the controls intended to limit the risk to protective levels; and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility, and Volume--Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility, and volume of the wastes at the site. This includes assessing the fate of the residues generated from treating the wastes at the site.

6. Implementability--The technical and administrative feasibility of implementing the alternative is evaluated. Technically, this includes the difficulties associated with the construction and operation of the alternative, the reliability of the technology, and the ability to effectively monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and materiel is evaluated along with potential difficulties in obtaining special permits, rights-of-way for construction, etc.

7. Cost--Capital and operation and maintenance costs are estimated for the alternatives and compared on a present

worth basis. Although cost is the last criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, lower cost can be used as the basis for final selection.

After the public has had opportunity to comment upon the remedy that is being proposed for the site, and the public comment period and hearing have been held, the agencies will also consider community acceptance as a "modifying criterion" before coming to a final selection of the remedy.

The site specific goals for remediating this site can be summarized in general as follows:

Soil - a. Reduce the concentrations of benzene and methylene chloride so that the presence of these chemicals at the site do not present an added risk of cancer of more than one in one million under the most conservative exposure scenario.

b. Reduce the concentrations of organic contaminants in soils so that, to the extent feasible, contaminants do not leach from soils and contaminate groundwater to levels above standards.

Groundwater - Reduce the concentrations of contaminants in groundwater to below NYS groundwater standards, to the extent technically feasible.

Sediments - Indirectly remediate sediments by treating the source of contaminants to the sediments, site soils and groundwater.

Air - Eliminate the exceedances of ambient air standards over the mudflats by eliminating the discharge of contaminants onto the mudflats from the site.

Surface Water - Eliminate the sheen on surface water to comply with applicable surface water quality standards.

The following section addresses the alternatives that have been evaluated to achieve these goals.

VII. SUMMARY OF THE EVALUATION OF THE REMEDIAL ALTERNATIVES

To determine the most appropriate method for remediating the site, the feasibility study completed a process that can be described in three parts. The first step identified and "screened" a large number of technologies that could be employed at the site to treat, contain, or dispose of the contaminants. Technologies that passed the initial screening phase were then grouped into different combinations to form remedial alternatives for further evaluation. After an initial analysis to identify the most promising alternatives, a detailed analysis was performed to serve as the basis for selecting a preferred alternative. A detailed analysis of the following six potential remedial alternatives was performed:

I. No action + monitoring.

II. Sheet piling vertical barrier + dewatering + water treatment + soil excavation + off-site incineration + monitoring.

III. Partial soil excavation + on-site thermal desorption + monitoring.

IV. In-situ soil venting + monitoring.

V. Sheet piling vertical barrier + dewatering + water treatment + in-situ soil venting + monitoring.

VI. In-situ soil venting + groundwater extraction + air stripping + in-situ biodegradation + monitoring.

The goal of the detailed analysis, as defined by the NCP, is to evaluate each of the viable alternatives against each of the seven criteria given in Section VI above (Goals for the Remedial Action). The information below briefly describes each of the alternatives retained for the detailed analysis and compares them to each of the criteria. It should be noted that the costs and implementation times given are initial estimates, and include the time needed to design the alternative. The present worth values below estimate how much money is needed today to finance projects that will take place over several years. The present worth of each alternative has been calculated based on the time to implement that particular alternative and assuming an interest rate of 10%.

Alternative I: No Action + monitoring.

Capital Cost: $0	Annual O&M: $80,000
Present Worth: $755,000	Time to Implement: 30 years

In accordance with the NCP, this alternative assumes no direct action at the site other than monitoring site conditions, in this case groundwater monitoring. Contaminants would continue to discharge into the harbor

and volatilize from soils. The annual operation and maintenance costs (O&M) are for groundwater monitoring and fence maintenance.

Alternative II: Sheet piling vertical barrier + dewatering + water treatment + soil excavation + off-site incineration + monitoring.

Capital Cost: $238,880,000 Annual O&M: $1,090,000
Present worth: $242,931,000* Time to Implement: 6 years

To make it possible to lower the site water table and expose all of the significantly contaminated soils, sheet piling would be installed around the site to limit the intrusion of water from the harbor. Because there is no shallow impermeable barrier (e.g., clay or rock) to seat the sheet wall, dewatering would induce salt water from the harbor into the site. It is estimated that to expose 15 feet of soil would require extracting 1.44 million gallons per day of fresh and brackish water. A total of 2.3 billion gallons would be treated and discharged to the harbor. All of the contaminated soils would be excavated (approximately 105,000 cubic yards) and transported off-site for incineration.

* The present worth values calculated for alternatives II & III are different than those presented in the FS. In the FS, capital costs were discounted over the time to implement. It is not EPA policy to discount the capital costs.

Alternative III: Partial soil excavation + on-site thermal desorption + monitoring.

Capital Cost: $10,045,000 Annual O&M: $80,000
Present Worth: $10,321,000* Time to Implement: 2.5 years

Contaminated soils would be excavated down to three feet below the water table (approximately 34,[illegible] cubic yards), treated in an on-site thermal desorption unit, and placed back into the ground. Deeper contaminated soils and groundwater would not be addressed. [illegible]s from the thermal desorption unit would be treated in an afterburner to prevent unacceptable emissions of volatile organic compounds. A 30-year monitoring period is included.

Alternative IV: In-situ soil venting + monitoring.

Capital Cost: $1,230,000 Annual O&M $440,000 +
Present Worth: $1,977,000 Time to Implement: 2.5 years

This alternative would remove volatile contaminants from soils above the water table by an in-situ soil venting technique. This entails a series of extraction wells and trenches around the site connected by piping to a vacuum extraction system. The exhaust from the venting system would be treated (e.g., catalytic oxidation) to prevent unacceptable emissions. Contamination of the saturated soils and groundwater would not be addressed.

Alternative V: Sheet piling vertical barrier + dewatering + water treatment + in-situ soil venting + monitoring.

Capital Cost: $8,650,000 Annual O&M: $1,550,000 +
Present Worth: $11,399,000 Time to Implement: 3 years

This alternative is similar to Alternative II except that soils are treated in-situ rather than excavated and transported off-site for incineration. Both soils and groundwater are addressed thereby removing the source of contamination to the other media of concern; sediments, surface water, and air. The soil venting process would be the same as in Alternative IV except that the dewatering would allow venting to 15 feet below the existing water table instead of to the water table.

Alternative VI: In-situ soil venting + groundwater extraction + air stripping + in-situ biodegradation + monitoring.

Capital Cost: $2,390,000 Annual O&M $970,000 +
Present Worth: $4,507,000 Time to Implement: 4 years

Both saturated and unsaturated soils would be treated along with groundwater under this alternative. Rather than dewatering the significantly contaminated soils entirely as with Alternatives II and V, the water table would be depressed approximately three feet by a combination of pumping and covering portions of the site with a synthetic material to reduce the infiltration of precipitation. Volatile contaminants would be removed from the unsaturated soils by vacuum extraction and treated to prevent release to the atmosphere.

A series of extraction wells would intercept contaminated groundwater before it discharges to Hempstead Harbor and Mott's Cove. The collected water (approximately 10-30 gallons per minute) would be treated in an air stripping tower. Air emissions would also be controlled by catalytic oxidation or an equivalent process. Treated water would be fortified with nutrients and an oxygen

source before being reinjected into the site. This will stimulate the growth of naturally occurring bacteria capable of degrading site contaminants. This will enhance the remediation of the groundwater and will also address contaminated saturated soils.

Comparative Analysis

As discussed above, the NCP requires that when evaluating potential remedial alternatives, the two threshold criteria of overall protectiveness of human health and the environment along with compliance with Applicable or Relevant and Appropriate Requirements (ARARs) must be met. The five primary balancing criteria (i.e., short-term impacts and effectiveness; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume by treatment; implementability; and cost) are then used to weigh trade-offs between the alternatives.

Overall Protection of Human Health and the Environment

Alternative II achieves the highest degree of protection by virtue of removing virtually all of the source of the contamination in the soils and groundwater. If implemented, Alternative II would allow unrestricted use of the site. This assumes that the PAH contamination in the sediments would be reduced to background levels in less than two years. This is considered to be a reasonable assumption.

Alternatives III and IV provide a much lower degree of protectiveness because they do not address contaminated saturated soils or groundwater. Significant exposure pathways would remain depending upon the degree of contaminant removal obtained.

Alternatives V and VI approach a high degree of protection by removing a high percentage of contaminants in the soils and groundwater. Alternative V is judged to be somewhat more protective based upon the likely higher degree of removal afforded by vacuum extraction versus biotreatment. Alternative V would entail lowering the site water table by approximately 15 feet and then extracting contaminants under vacuum.

The No-Action alternative (I) would not be protective because the only contaminant removal process available would be natural attenuation. It would take decades to reduce the concentrations to acceptable levels.

Compliance with ARARs:

The most significant of the ARARs at the site are the New York State groundwater standards. State regulations define the best usage of groundwater as a source of drinking water. Therefore, the assigned standards are stringent. Alternatives II, V, and VI include provisions for directly addressing groundwater contamination and are capable of achieving ARARs. They also address soil contamination as a source of contaminants to the groundwater by leaching. Alternatives I, III, and IV rely upon natural attenuation. Alternatives III and IV include the removal of chemicals in the unsaturated zone that contribute to groundwater contamination. Alternatives I, III, and IV do not comply with these chemical-specific ARARs.

All alternatives substantially comply with the action-specific and location specific ARARs except in one case. The New York State Coastal Zone Management Program includes an overall goal of encouraging the restoration of waterfront areas for beneficial and compatible uses. The No-Action alternative would not be in compliance with this goal and Alternatives III and IV would be in marginal compliance.

Currently, there are no ARARs for contaminated sediments, but the State of New York has developed guidance values for evaluating sediment contamination. The concentration of several contaminants in sediments at the site somewhat exceed these guidance values. Alternatives II, V, and VI would indirectly cleanup sediments by eliminating the source of contamination and allowing the contaminants to naturally degrade. Because of the difficulties associated with directly remediating sediments, and the habitat disruptions it would cause, indirect remediation is considered preferable in this case. A monitoring program will be required to ensure that the sediment contamination does naturally degrade.

Short-Term Impacts and Effectiveness:

Alternatives IV, V, and VI are capable of achieving the remedial goals in a fairly short period of time while minimizing impacts to the community. This results from employing in-situ techniques with little disturbance of the site. Short-term environmental impacts could be created by dewatering the site (Alt. II and V) resulting in salt water intrusion. The short-term effectiveness of Alternative IV would be low because it does not address saturated soil and groundwater contamination and possible impacts to the tidal wetlands. Air pollution control equipment would minimize atmospheric impacts.

Alternatives II and III involve significant soil excavations which would expose heavily contaminated soils. Controlling the emissions of vapors and contaminated particulate would be difficult but could be done using engineering controls. Transportation of excavated soil (II) would also present some risk of impacts.

Alternative I would have no short-term effectiveness and existing impacts would continue.

Long-Term Effectiveness and Permanence:

Alternatives III and IV would leave significant quantities of contaminants behind and rely upon natural flushing of the aquifer to complete the remediation. As with Alternative I, the problem would not become worse with time but would take many years to rectify itself. Alternatives II, V, and VI would significantly (or completely) remove contaminants from the site irreversibly.

Reduction of Toxicity, Mobility, and Volume by Treatment:

Alternatives II, V, and VI substantially remove contaminants from the site. Alternatives III and IV would remove the majority of contaminants but would leave the saturated soils and groundwater untreated. Alternatives III through VI satisfy the preference of on-site treatment over off-site treatment. Alternative I contains no provisions for treatment.

All alternatives rely upon volume reduction rather than altering toxicity or reducing mobility by containment techniques. All of the treatment methods are irreversible.

Implementability:

Alternative II is the most difficult to implement. Difficulties include: installing and maintaining a 1.3 million gallon per day water treatment system; maintaining a constant water drawdown over a long period of time; off-site incinerator capacity limitations; minimizing fugitive emissions; and the logistics of high volume (approx. 7,000 trips) truck traffic.

Alternatives III and V would encounter some of the same difficulties but to a lesser degree. The feasibility of the biotreatment component of Alternative VI is based on bench scale tests. The applicability of this technology will be confirmed by performing pilot scale tests before full scale implementation. Other concerns regarding technical/administrative feasibility and the availability of equipment and personnel are manageable.

Cost:

The present worth of the No-Action alternative (I) is $755,000. This provides for 30 years of monitoring and maintenance. The cost of Alternative II would be extremely high ($242,931,000) due to the excavation, transport, and incineration of large amounts of contaminated soil and the treatment of large amounts of collected water. The costs for excavation and thermal treatment account for the relatively high cost of Alternative III even though it contains no provisions for the treatment of groundwater or saturated soils. Alternative IV would accomplish nearly as much as Alternative III but at a much lower cost ($1,977,000 vs. $10,321,000). Alternatives V and VI would likely achieve similar levels of remediation but differ significantly in cost ($11,399,000 vs. $4,507,000 respectively). This is due to the more aggressive dewatering/venting approach of Alternative V. Alternative VI relies upon the passive method of bioremediation to address saturated soils and, in part, groundwater. The following list summarizes the cost estimates.

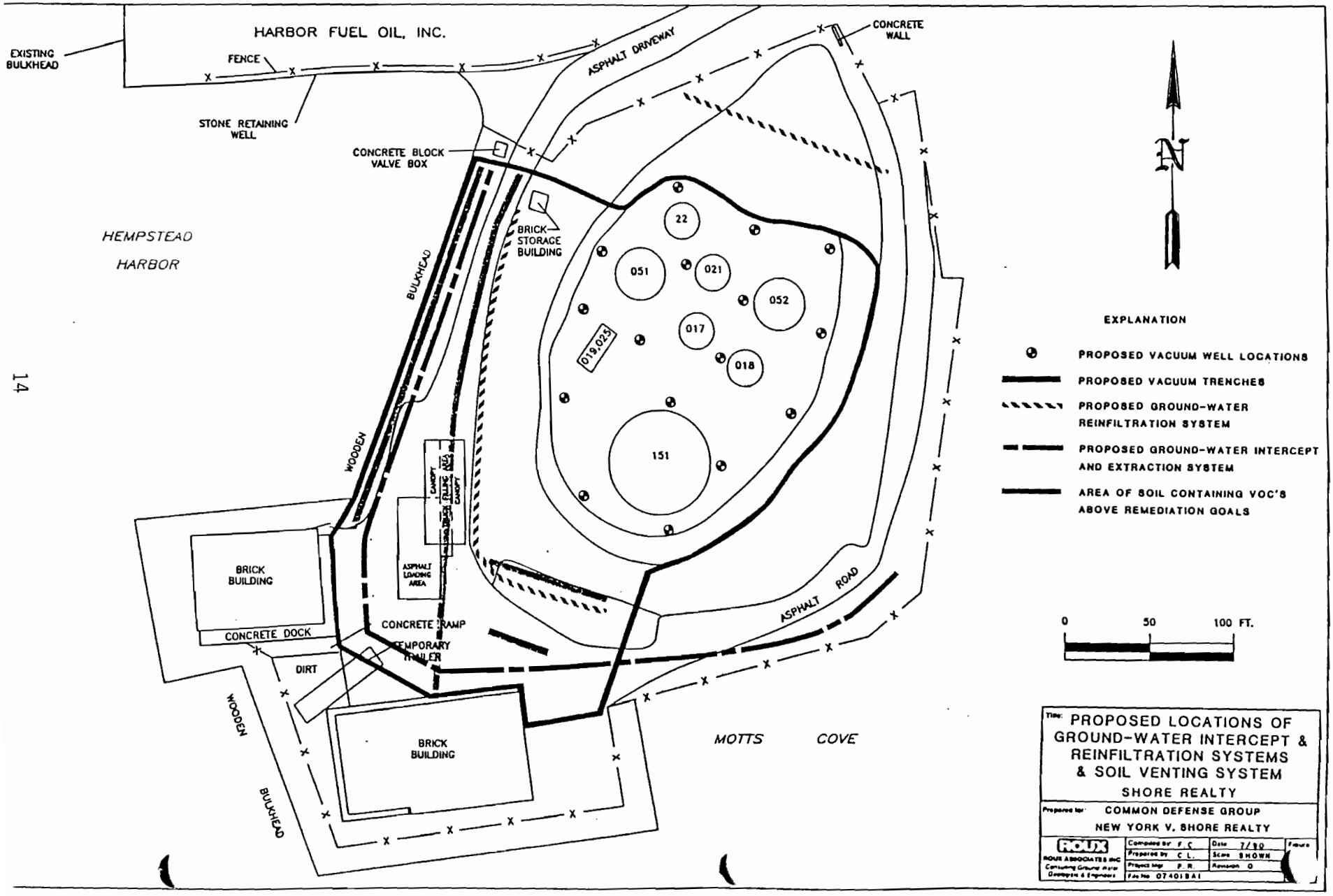
Estimated Present Worth of Costs of Alternatives

I	II	III	IV	V	VI
$755,000	242,931,000	10,321,000	1,977,000	11,399,000	4,507,000

VIII. Summary of the Government's Proposal

Based upon the results of the Remedial Investigation and Feasibility Study (RI/FS), and the criteria for selecting a remedy under the applicable laws and regulations, the NYSDEC and USEPA propose to select Alternative VI (In-Situ Soil Venting + Extraction of Groundwater + Air Stripping + In-Situ Biodegradation + Monitoring) to remediate the site. The elements of the proposed remedial program are as follows (see Figure 4):

1. A **biotreatability pilot study** will be performed as part of the design of the complete remedial program to determine the type and amount of nutrient and oxygen additives needed to stimulate the growth of indigenous bacteria capable of biodegrading site contaminants.


HARBOR FUEL OIL, INC.
EXISTING BULKHEAD
FENCE
STONE RETAINING WELL
CONCRETE BLOCK VALVE BOX
ASPHALT DRIVEWAY
CONCRETE WALL
BRICK STORAGE BUILDING
HEMPSTEAD HARBOR
BULKHEAD
WOODEN
22
051
021
052
017
019,025
018
151
CANOPY
PUMP ISLAND
CANOPY
ASPHALT LOADING AREA
BRICK BUILDING
CONCRETE DOCK
CONCRETE RAMP
TEMPORARY TRAILER
DIRT
ASPHALT ROAD
BRICK BUILDING
WOODEN
BULKHEAD
MOTTS COVE
N
EXPLANATION
PROPOSED VACUUM WELL LOCATIONS
PROPOSED VACUUM TRENCHES
PROPOSED GROUND-WATER REINFILTRATION SYSTEM
PROPOSED GROUND-WATER INTERCEPT AND EXTRACTION SYSTEM
AREA OF SOIL CONTAINING VOC'S ABOVE REMEDIATION GOALS
0
50
100 FT.
Title: PROPOSED LOCATIONS OF GROUND-WATER INTERCEPT & REINFILTRATION SYSTEMS & SOIL VENTING SYSTEM
SHORE REALTY
Prepared for: COMMON DEFENSE GROUP
NEW YORK V. SHORE REALTY
ROUX
ROUX ASSOCIATES INC
Consulting Ground Water Geologists & Engineers
Compiled by F.C.
Prepared by C.L.
Project Mgr P.R.
File No 07401BA1
Date 7/89
Scale SHOWN
Revision 0
Figure

2. A **remedial design program** to verify the components of the conceptual design and provide the details necessary for the construction, implementation, and monitoring of the remedial program.

3. Installation and operation of a **soil venting (vapor extraction)** system consisting of:

   a. installation of a cover system on the ground surface over the area to be vented to prevent short-circuiting of air into the venting system and reduce the infiltration of precipitation;

   b. installation of an adequate number of vacuum extraction wells and trenches to remove contaminants from the soils in accordance with the remedial goals;

   c. piping, pumps, and other appurtenances to extract contaminated vapors from the treatment zone; and

   d. **air pollution controls** to limit air emissions to levels acceptable to the NYSDEC and USEPA.

4. Installation and operation of a **groundwater collection and treatment system** consisting of:

   a. collection wells, points, or trenches capable of intercepting contaminated groundwater before entering Hempstead Harbor or Mott's Cove;

   b. collection wells under the existing tank farm to collect contaminated groundwater;

   c. pipes, pumps, and other appurtenances to collect groundwater to a treatment area;

   d. treatment of groundwater by air stripping (or equivalent process) to levels acceptable to the NYSDEC and USEPA;

   e. **air pollution controls** to limit air emissions to levels acceptable to the NYSDEC and USEPA; and

   f. reinjection/infiltration of treated water fortified with nutrients and an oxygen source to stimulate the biotreatment of contaminated saturated soils and groundwater.

5. A **biotreatment program** that, in conjunction with the other process options employed, will be designed to reduce the concentrations of contaminants in the saturated soils and groundwater to the extent practicable.

6. A **monitoring program** designed to evaluate the performance of the remedy while in operation and evaluate its effectiveness after discontinuation. The criteria for discontinuation will include an evaluation of the operating conditions and parameters as well as a statistical determination that the remedy has attained the feasible limit of contaminant reduction.

The agencies believe that the preferred alternative provides the best balance among the alternatives based on an evaluation using the criteria described above. Alternative VI would significantly reduce the concentrations of contaminants that are the source of the threat to human health and the environment. This alternative should achieve compliance with all applicable or relevant and appropriate state and federal requirements. The proposed alternative provides for treatment of the contaminated soils and groundwater, and uses in-situ methods that will minimize the short-term disturbance to the site and surrounding community. Alternative VI also provides a permanent solution, is relatively easily implemented, and is cost effective.

Each of the other alternatives have significant drawbacks in comparison to alternative VI. Alternative I would provide no protection of human health or the environment. Alternative II is prohibitively expensive and presents greater short-term risks. Alternatives III and IV do not adequately address contamination of the groundwater, and Alternative V is difficult to implement and relatively costly.

IX. CONCLUSION

As discussed in Sections I and III above, interested persons and agencies are invited to review and comment upon this proposed plan during the period from April 22, 1991 to May 24, 1991. All comments received during the comment period and public meeting on May 15, 1991 will be considered by the NYSDEC and USEPA during the final selection process. Additional information is available at the document repositories listed above in Section III.