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FINAL

INITIAL ASSESSMENT STUDY OF THE NAVAL EDUCATION AND TRAINING CENTER NEWPORT, RI

NEESA 13-024

NAVAL ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY
Port Hueneme, California 93043

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INITIAL ASSESSMENT STUDY
NAVAL EDUCATION AND TRAINING CENTER, NEWPORT, RI
UIC: N62661

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NAVY ASSESSMENT AND CONTROL
OF INSTALLATION POLLUTANTS (NACIP) DEPARTMENT
Naval Energy and Environmental Support Activity (NEESA)
Port Hueneme, California 93043

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FOREWORD

The Navy initiated the Navy Assessment and Control of Installation Pollutants (NACIP program in OPNAVNOTE 6240 ser 45/733503 of 11 September 1980, and Marine Corps Order 6380.1 of January 1981. The purpose of the program is to systematically identify, assess, and control contamination of the environment resulting from past hazardous materials management operations.

An Initial Assessment Study (IAS) was performed at the Naval Education and Training Center, Newport, Rhode Island by a team of specialists from Envirodyne Engineers, Inc., St. Louis, Missouri. Further confirmation studies under the NACIP program were recommended at several areas at the activity. Sections dealing with significant findings, conclusions, and recommendations are presented in the earlier section of the report. The later technical sections provide more in-depth discussion on important aspects of the study.

Questions regarding the NACIP program should be referred to the NACIP Program Director, NEESA 112N, Port Hueneme, CA 93043, AUTOVON 360-3351, FTS 799-3351, or commercial (805) 982-3351. Further information regarding this study may be obtained from NACIP Program Director at the above numbers.

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Martin Dwyer, Hazardous Waste Coordinator, NETC

Jeff Heath, Project Coordinator, NEESA

Mel Leifer, Northern Division, NAVFAC

Tom Sheckels, Northern Division, NAVFAC

EXECUTIVE SUMMARY

An Initial Assessment Study (IAS) was performed at the Naval Education and Training Center (NETC) in Newport, Rhode Island, to identify and evaluate past hazardous waste disposal practices and to assess the potential for environmental contamination. Based on information from historical records, aerial photographs, field inspections and personnel interviews, a total of 16 potentially contaminated sites were identified at NETC. Each of the sites was evaluated with regard to contamination characteristics, migration pathways and pollutant receptors.

The study concludes that, while none of the sites poses an immediate threat to human health or the environment, nine sites warrant a confirmation study primarily to assess potential long-term impacts.

Five of the sites (McAllister Point Landfill, Melville North Landfill, Tank Farm Four, Tank Farm Five, and Gould Island Disposal Area) are on land being excessed by the Navy. One of the purposes of the confirmation studies at the latter four sites is to ensure that no contamination is present prior to excessing the land for unrestricted use. At McAllister Point Landfill, the purpose of the confirmation study is to determine how completely contaminants are being retained by the soils at the site.

At three of the sites, Tank Farms One through Three, the primary concern is that oil sludge may have been disposed at these sites. It is probable that the sludge, if present, has been absorbed by the soils so that it cannot migrate from the sites. The proposed confirmation studies will determine if the sludge is present at the sites and how well the soils at the sites are holding it in place.

At one site, wastewaters from an abandoned plating shop on Gould Island may have discharged into Narragansett Bay during World War II. Sediments at the site may have been contaminated by the past discharges. It is probable, however, that storms and tides have washed the area clean. The purpose of the confirmation study is to ensure that the sediments are clean prior to opening the area to shellfishing.

No public or private drinking water wells are threatened by potential contamination at NETC Newport. However, if contaminants at the identified sites migrate, they would ultimately discharge into Narragansett Bay. It is believed that strong tidal action in the Bay would disperse the relatively small quantities of contaminants, minimizing any impact to fish and shellfish resources.

SECTION 1

INTRODUCTION

1.1 PURPOSE OF INITIAL ASSESSMENT STUDY

As directed by the Chief of Naval Operations (CNO), the Naval Energy and Environmental Support Activity (NEESA), in conjunction with the Ordnance Environmental Support Office (OESO), conducts Initial Assessment Studies (IASs) to collect and evaluate evidence which indicates the existence of pollutants which may have contaminated a site or pose a health hazard for people located on or off the installation. The IAS is the first phase of the Navy Assessment and Control of Installation Pollutants (NACIP) program, which has the objective of identifying, assessing, and controlling environmental contamination from past hazardous materials storage, transfer, processing, and disposal operations. The NACIP program was initiated by OPNAVNOTE 6240 ser 45/733503 of 11 September 1980 and Marine Corps Order 6280.1 of 30 January 1981.

1.2 SEQUENCE OF EVENTS

1. Naval Education and Training Center (NETC), Newport was designated for an IAS by CNO letter ser 451/397464 of 3 August 1981.

2. Contract to perform IAS was awarded to Envirodyne Engineers, Inc. (EEI), St. Louis on 26 April 1982.

3. The Commander of NETC was notified of the selection of EEI to perform the IAS. Activity support requirements for the IAS were forwarded to the installation to outline assessment scope, provide guidelines to personnel and request advance information for review by the IAS team.

4. NETC personnel were briefed by NEESA, Project Coordinator, Jeff Heath, and EEI's Don Monnot on 10-11 May 1982.

5. A records search at various government agencies was conducted 17-28 May 1982 for documents pertinent to the IAS effort. Agencies contacted include:

a. NEESA Library

b. NORTHDIV Facilities Planning and Real Estate Department, Environmental Branch, Utilities Division, Applied Biology and Natural Resources Branches

c. Federal Archives, Bayonne, New Jersey

d. Federal Archives, Boston, Massachusetts

e. Washington National Records Center, Suitland, Maryland

f. National Archives, Washington, D. C.

g. Naval History Office, Washington Navy Yard, Washington, D. C.

h. Department of Defense Explosives Safety Board, Alexandria, Virginia

i. U. S. Geological Survey, Reston, Virginia

j. Ordnance Environmental Support Office (OESO), Indian Head, Maryland

k. NAVFAC, Alexandria, Virginia

l. NAVSEA, Alexandria, Virginia

m. U. S. Coast Guard

n. Rhode Island Department of Environmental Management

o. USEPA

A complete list of the references used in conducting this IAS is included as Appendix A.

6. The on-site phase of the IAS was conducted from 28 June to 2 July 1982. The EEI team consisted of six members: two engineers, and four environmental scientists. Installation records were reviewed, interviews were conducted with present long-term and former employees, ground and aerial tours of the installation were made, and photographs were taken.

1.3 SUBSEQUENT NACIP STUDIES

The recommendation for the next phase of the NACIP program, the Confirmation Study, is based on the findings of the Initial Assessment Study. A Confirmation Study consists of extensive monitoring and sampling to determine and quantify the extent of suspected contamination and is conducted only if the IAS concludes that:

1. Sufficient evidence exists to suspect that an installation is contaminated, and

2. The contamination presents a danger to:

   a. The health of civilians in adjoining communities or personnel within the base fenceline, or

   b. The environment within or outside the installation.

If these criteria are not met, no further studies will be conducted under the NACIP program.

1.4 WASTE DISPOSAL SITES

All known or suspected hazardous waste disposal sites identified by the IAS team were evaluated using a Confirmation Study Ranking System (CSRS) developed by NEESA for the NACIP program. The system is a two-step procedure for systematically evaluating a site's potential hazard to human health and the environment based on evidence collected during the IAS.

Step one of the system is a flow chart which eliminates innocuous sites from further consideration. Step two is a ranking model which assigns a numerical scores, within a range of 0 to 100, to indicate the potential severity of a site. Scores are a reflection of the characteristics of the wastes disposed of at a site, contaminant migration pathways, and potential contaminant receptors on and off the installation. CSRS scores and engineering judgment are then used to evaluate the need for a confirmation study based on the criteria stipulated in Section 1.3. CSRS scores assigned to sites recommended for confirmation studies also assist Navy managers to establish priorities for accomplishing the recommended actions.

A more detailed description of the Confirmation Study Ranking System is contained in NEESA Report 20.2-042.

SECTION 2

SIGNIFICANT FINDINGS

A total of 16 potentially contaminated waste disposal sites were identified at NETC, Newport during the Initial Assessment Study (IAS). Figures 2-1 through 2-4 show the location of these disposal sites. The 16 sites identified were evaluated to determine if they met the criteria for recommending a confirmation study. This entailed showing that there was a potential contamination problem at a site, and that the contamination presents a danger to either human health or the environment.

Two additional sites were identified during the on-site survey but were subsequently found to be outside the scope of the NACIP program and are not discussed in this report.

A complete discussion of all 16 waste disposal sites is included in Section 6.6 (Waste Disposal Operations). The remainder of Section 2 addresses the significant findings with regard to each of the 16 identified waste disposal sites. The chapter is broken down into three sections: one which addresses those sites not requiring further action, another for those sites requiring further action, and a third section concerning general significant findings.

2.1 SITES NOT REQUIRING FURTHER ACTION

This section presents the significant findings for those sites not requiring further action. Included are sites numbered 4, 8, and 9.

2.1.1 Coddington Cove Rubble Fill, Site No. 4

This site contains inert rubble material which includes concrete, asphalt, metal, slate, wood, brush, and a small amount of ash. The site covers six to eight acres and has been used from 1978 to 1982. Demolition type materials are no longer being disposed of at this site.

2.1.2 NUSC Disposal Area, Site No. 8

This site has a rubble dump which contains inert items including scrap lumber, tires, wire, cable, and empty paint cans. Use of this site dates back to the early 1970s. Surface drainage from the entire site is into a pond located just to the north.

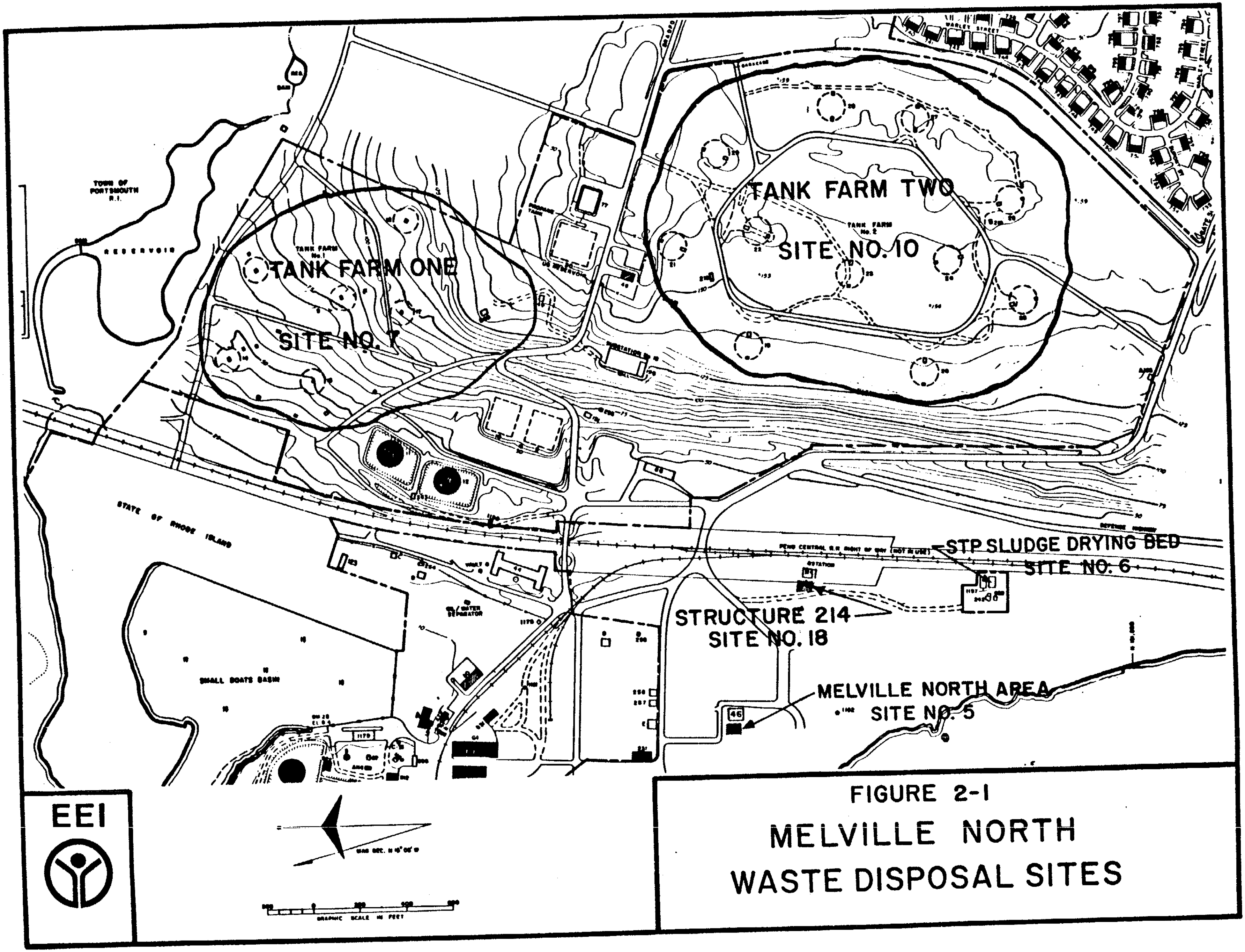

FIGURE 2-1
MELVILLE NORTH
WASTE DISPOSAL SITES

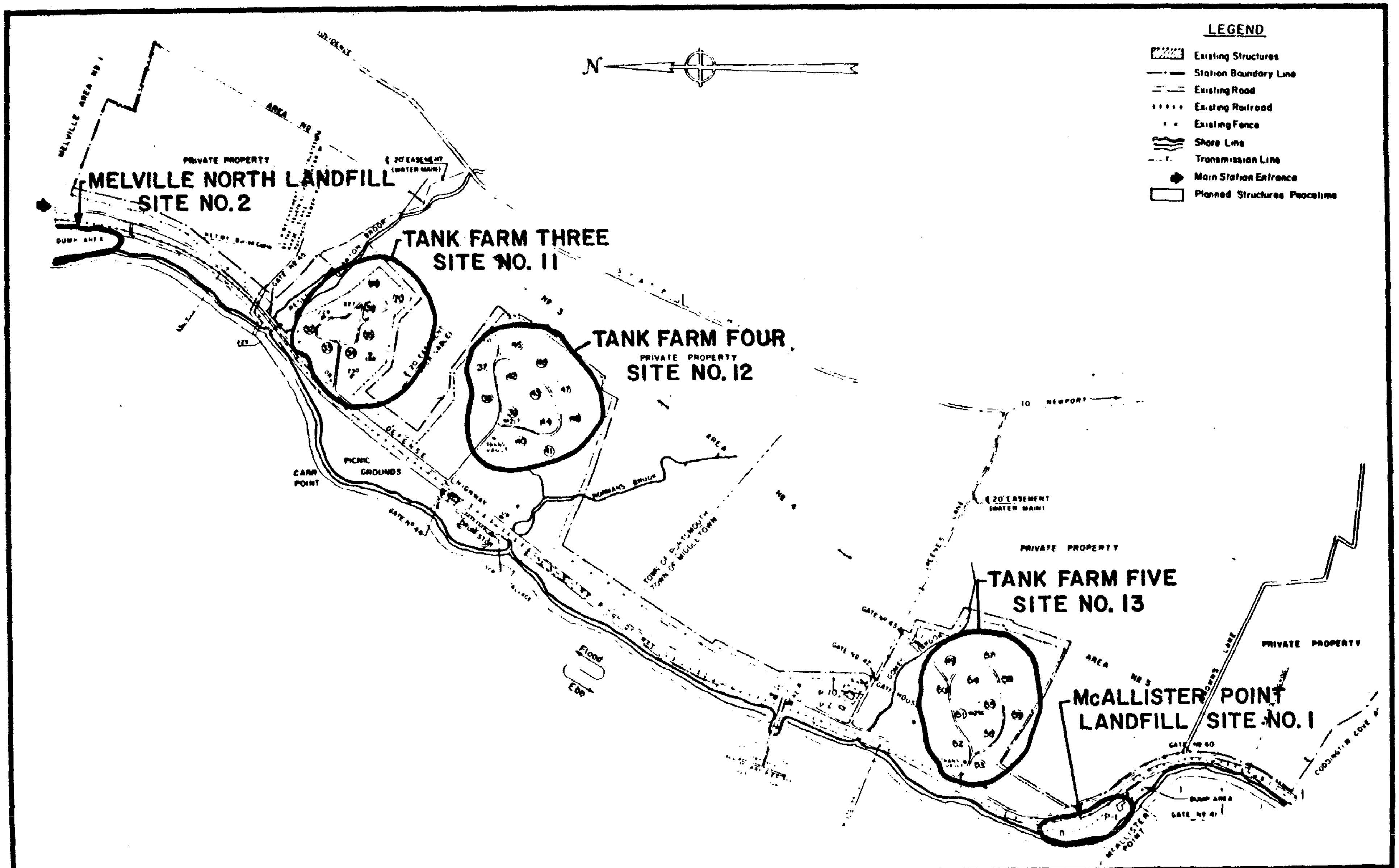

FIGURE 2-2

WASTE DISPOSAL SITES
MELVILLE SOUTH AND MIDWAY

EEI

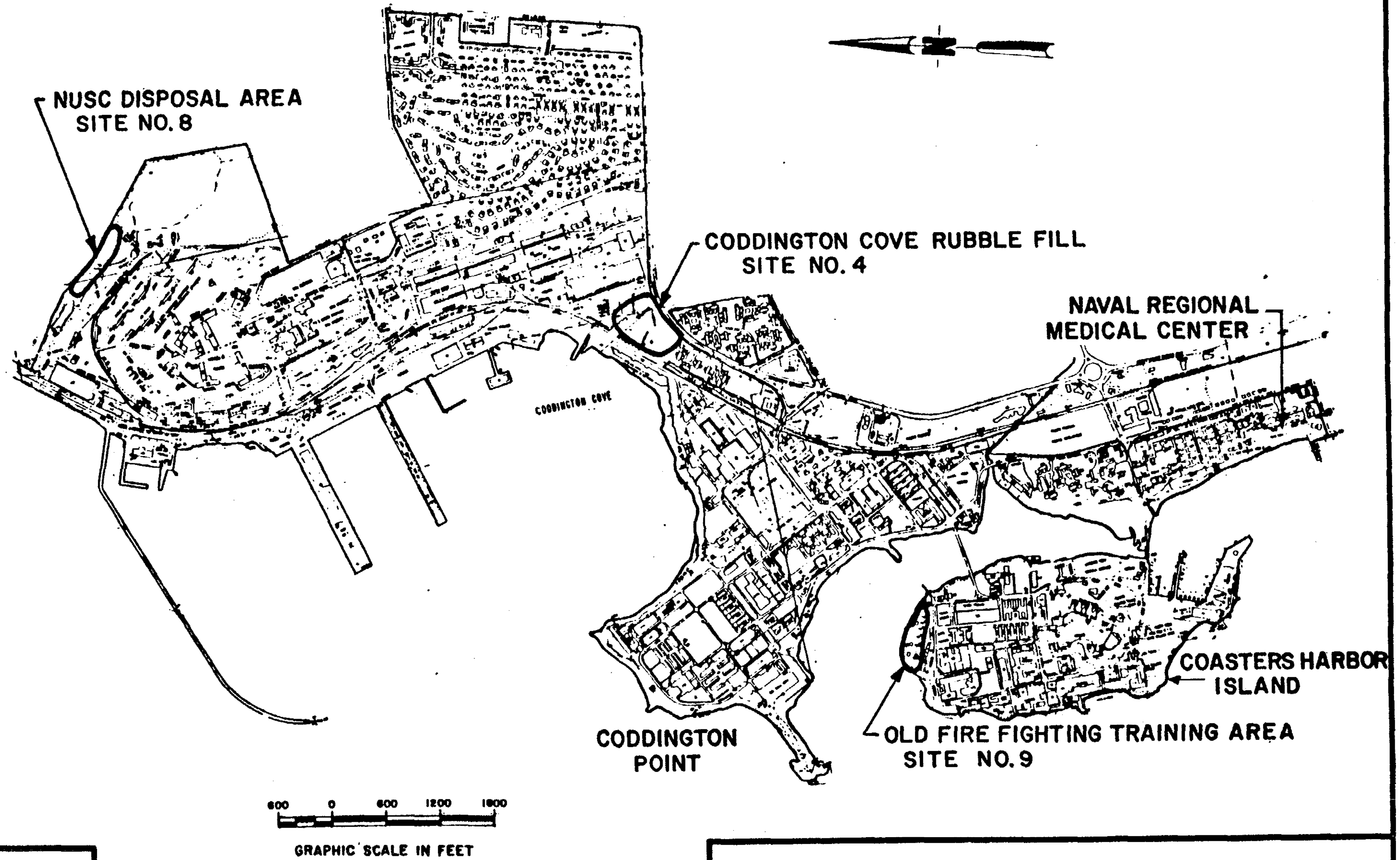

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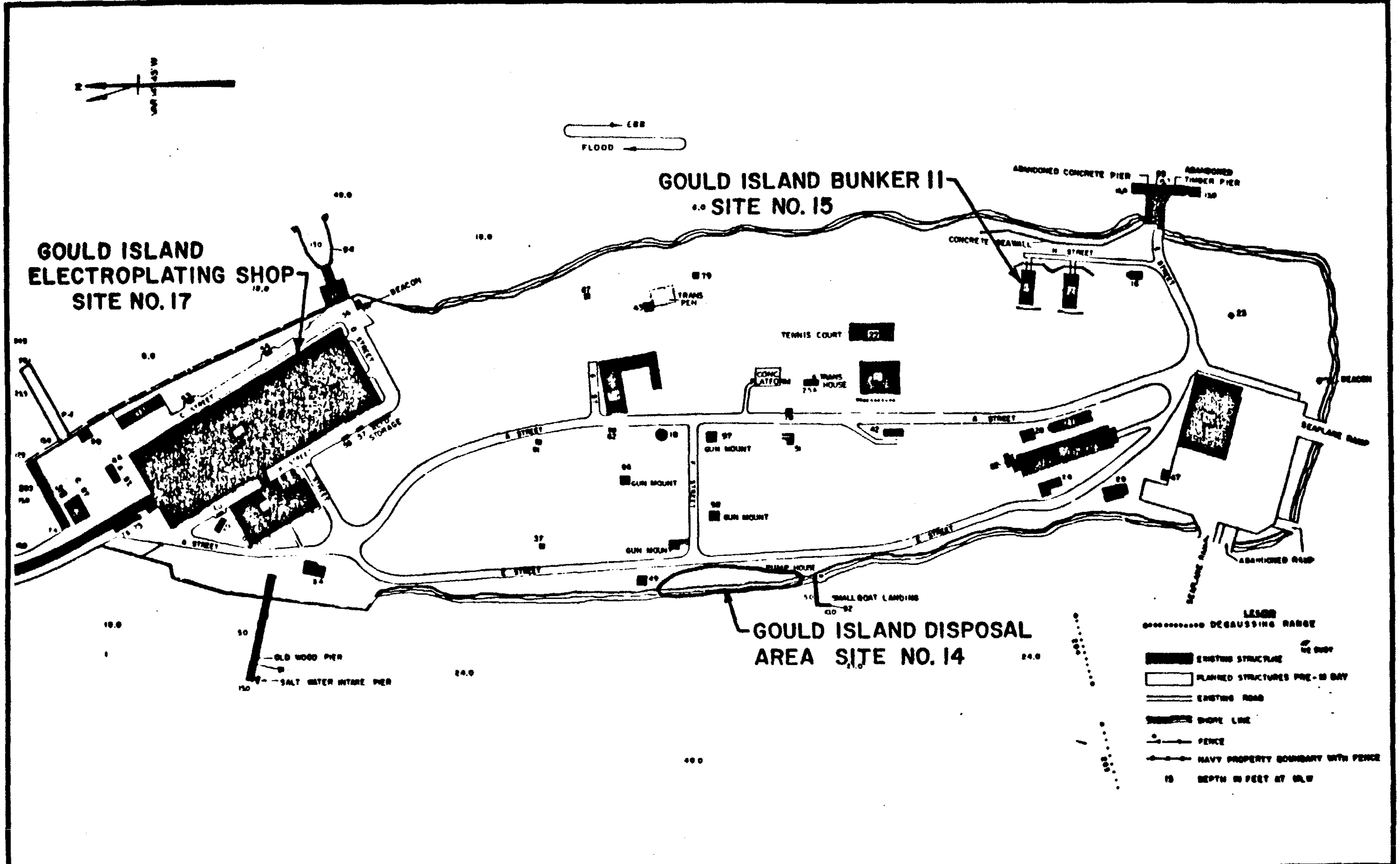
FIGURE 2-3

WASTE DISPOSAL SITES
CODDINGTON COVE, CODDINGTON POINT, COASTERS HARBOR ISLAND, AND NAVAL REGIONAL MEDICAL CENTER



EEI

FIGURE 2-4

GOULD ISLAND
. WASTE DISPOSAL SITES

2.1.3 Old Fire Fighting Training Area, Site No. 9

This site was used from World War II to 1972 as a fire fighting training area. Waste oils were probably used to train the personnel in putting out various types of fires.

2.2 SITES REQUIRING FURTHER ACTION

This section presents the significant findings for those disposal sites which require additional action. Included are sites numbered 1, 2, 5, 6, 7, 10, 11, 12, 13, 14, 15, 17 and 18.

2.2.1 McAllister Point Landfill, Site No. 1

From 1955 through the mid-1970's, this site was a landfill which received all the wastes generated at the Newport naval complex. This included wastes from the operational areas (machine shops, electroplating operations, etc.), Navy housing areas, and from the ships homeported at Newport prior to the 1973 SER action. The materials disposed of at this site would mostly be domestic type refuse but also include spent acids, paints, solvents, waste oils (lube, diesel, and fuel), and PCB contaminated oil. There were potentially hundreds of gallons of PCB contaminated oil placed in the landfill (Section 6.6.1).

The landfill is located along the shoreline of Narragansett Bay and encompasses approximately 6 acres. The site is located on land which is being excessed by the Navy. Throughout the time period that the site was used, the landfill was extended out into the bay using the wastes as fill material. Various unvegetated bare areas are found throughout the surface of the landfill. Surface runoff and leachate seepage from the landfill flows into Narragansett Bay. Two leachate streams were observed at the landfill during the NACIP team inspection.

2.2.2 Melville North Landfill, Site No. 2

This site was used as a landfill from World War II to 1955 and encompasses approximately 10 acres. Wastes disposed of in this landfill would have included mostly domestic type refuse and also spent acids, waste paints, solvents, waste oils (diesel, fuel and lube), and PCBs. Areas covered with oil and oil sludge are scattered throughout the site. The landfill is situated in the Melville North area in a low-lying wetland type area along the shoreline of Narragansett Bay. The site is subject to periodic flooding and lies within the 100 year flood plain (NETC Master Plan, 1980). The site is on land being excessed by the Navy.

2.2.3 Melville North Area, Site No. 5

Twenty barrels of waste oil are present on an asphalted area at this site. This site has been used from 1978 to 1982. Some of the barrels are on their sides, and some are rusted. Several of the barrels have leaked, and past spills have occurred at the site. There were 50 to 100 gallons of oil spilled staining an area 30 feet by 40 feet. Oil is a hazardous waste in the State of Rhode Island. The site is being excessed by the Navy. Since EEI's on-site survey, the activity has initiated actions to clean up this site.

2.2.4 STP Sludge Drying Bed, Site No. 6

This site is located in Melville North at the old sewage treatment plant (Building 242), and has been used for the disposal of oily waste. The oil, 100 to 500 gallons, has been disposed of in a 15-foot by 40-foot sewage sludge drying bed. The oil was disposed of at this site within the previous 6 months. There were no indications that disposal of oily waste had occurred prior to this time at the site. Oil is a hazardous waste in the State of Rhode Island. The site is being excessed by the Navy. Since EEI's on-site survey, the activity has initiated actions to clean up this site.

2.2.5 Tank Farm One, Site No. 7

This tank farm is located in Melville North and consists of six underground 60,000 barrel storage tanks. Disposal at this site was from World War II until the mid-1970's. These tanks were used for the storage of diesel oil, fuel oil, jet fuel, 100 octane gasoline, and aviation fuel. The tank bottom sludge, generated from cleaning the tanks, was placed in pits approximately 20 feet long, 10 feet wide, and 4 feet deep. There were 12 to 15 pits located throughout the tank farm. These pits were covered over and marked with signs warning of tetraethyl lead. These pits are spread throughout the tank farm, and each contains approximately 6,000 gallons of sludge, which is a hazardous waste in Rhode Island. Portions of the tank farm drain northward into the Melville Public Fishing Area, with other areas draining toward the bay. The groundwater is also moving toward the Melville Public Fishing Area area and the bay.

2.2.6 Tank Farm Two, Site No. 10

Tank Farm Two is located in Melville North and is used for the storage of diesel and fuel oil. Eleven underground 60,000 barrel storage tanks are at this site. Disposal at this site has been from World War II until the mid-1970's. When individual tanks were cleaned, the tank bottom sludge was disposed of on the ground in the general vicinity of the tank being cleaned. Between 100,000 and 175,000 gallons of sludge, which is a hazardous waste in Rhode Island, were disposed of at this site. The sludge is no longer evident on the surface but probably covered a large portion of the Tank Farm. Portions of this site drain into the Melville Ponds and toward Narragansett Bay.

2.2.7 Tank Farm Three, Site No. 11

Tank Farm Three is used for the storage of diesel and fuel oil. Seven 60,000 barrel storage tanks are at this tank farm. Disposal at this site has been from World War II until the mid-1970's. The tank bottom sludge, obtained during cleaning operations, was disposed of in burning chambers. Between 50,000 and 90,000 gallons of oil sludge, which is a hazardous waste in Rhode Island, were disposed of at this site. These burning chambers had steel sides and sand bottoms. The sludge was put in the chambers and burned. This site is located within 600 feet of Narragansett Bay and Lawton Reservoir. Surface drainage and groundwater flow from this site flow toward these two bodies of water. Lawton Reservoir is not utilized.

2.2.8 Tank Farm Four, Site No. 12

Tank Farm Four was used for the storage of diesel and fuel oil and consists of twelve 60,000 barrel underground storage tanks. Disposal at the site was from World War II until the mid-1970's. The tank bottom sludge, obtained during cleaning operations, was disposed of directly onto the ground in the vicinity of the tank being cleaned. Between 100,000 and 190,000 gallons of oil sludge, which is a hazardous waste in Rhode Island, were disposed of at this site. The sludge is no longer evident on the surface but probably covered the entire Tank Farm. This site is located within one quarter mile of Narragansett Bay. Surface drainage and groundwater flows into the bay and Normans Brook. This site is on land which is being excessed by the Navy.

2.2.9 Tank Farm Five, Site No. 13

This site was used for the storage of diesel and fuel oil and consisted of eleven 60,000 barrel underground storage tanks. Disposal at this site has been from World War II until the mid-1970's. The tank bottom sludge, obtained during cleaning operations, was disposed of in a burning pit. This burning pit had steel sides and a sand bottom. The sludge was placed in the pit and burned. Between 100,000 and 175,000 gallons of oil sludge were disposed of at this site. This oil sludge is considered a hazardous waste in Rhode Island. This site is located within 1,000 feet of Narragansett Bay. Surface drainage and groundwater from this site flow into the bay and Gomes Brook. With the exception of Tanks 53 and 56, this site is being excessed by the Navy.

2.2.10 Gould Island Disposal Area, Site No. 14

Disposal has occurred along approximately 200 yards of the western shoreline of Gould Island. This site was used throughout the World War II period and reportedly received all the wastes generated on the island, including domestic trash, metal scrap, wood, pipes, rusted out drums, two diesel oil tanks, and concrete blocks. Wastes from the island's electroplating and degreasing operations could also have been disposed of at this site. The electroplating wastes would have included muriatic (hydrochloric) acid, chromic acid, copper cyanide, sodium cyanide, sodium hydroxide, nickel sulfate, and Anodex cleaner. Many of the liquid wastes would be gone by now, but residues at hazardous levels may remain. There is also an area where 20 drums (of unknown contents) are present.

The disposal area is situated along a steep embankment which drops down about 15 feet to a beach area. Wastes were disposed of down this embankment. The site was last used about 30 years ago and is on land being excessed by the Navy (see Figure 5.2-2).

2.2.11 Gould Island Bunker 11, Site No. 15

At least ten unmarked drums are at Bunker 11 in the southwestern portion of Gould Island. The drums may have been located here since 1946. The drums are unmarked and their contents unknown. The bunker's roof is collapsed, and it is possible that additional drums could be buried in the rubble. There was no visible evidence of leakage from these drums. The site is located within 100 feet of Narragansett Bay with surface drainage from the site flowing into the bay. This site is located on land which is being excessed by the Navy.

2.2.12 Gould Island Electroplating Shop, Site No. 17

Extensive electroplating and degreasing operations occurred on Gould Island (Building 32) during World War II. These operations existed only during the war. The wastes generated included muratic acid, chromic acid, copper cyanide, sodium cyanide, sodium hydroxide, nickel sulfate, Anodex cleaner, and degreasing solvents. It could not be verified how these wastes were disposed of. It is probable these wastes were disposed of directly into the bay and may still be present in sediments off-shore near discharge pipes. The site is located on a portion of Gould Island which is being retained by the Navy (Figure 5.2-2).

2.2.13 Structure 214, Site No. 18

Outside of Structure 214, in the Melville North area, drums of waste oil are present. There were 8 drums at the site during the NACIP team's inspection, and spills were evident. This site had only been used for the past two years. There were no indications that the site had been used extensively in the past for similar purposes. It appeared that 25 to 50 gallons of waste oil had spilled at the site. Oil is considered a hazardous waste in Rhode Island. The site is being excessed by the Navy. Since EEI's on-site survey, the activity has initiated actions to clean up this site.

2.3 GENERAL SIGNIFICANT FINDINGS

2.3.1 Surface Drainage

NETC is situated along the shoreline of Aquidneck Island, and surface runoff quickly finds its way into Narragansett Bay. All of the streams which receive drainage from areas of NETC also discharge directly into the bay. None of the streams or ponds within the boundaries of NETC, present or past areas, is used for potable water. The Melville Fishing Area occurs just off-site.

2.3.2 Groundwater

Groundwater at NETC, including Gould Island, is generally within a depth of 10 feet. The groundwater in areas close to the bay is often within just two or three feet of the surface. This shallow depth, coupled with the facts that the average annual precipitation is 43 inches and that the soils are moderately permeable, makes contamination of the groundwater possible. The groundwater moves in a westward direction and discharges into Narragansett Bay. The groundwater is not being utilized at NETC, although during World War II, wells supplied the potable water on Gould Island. NETC receives its potable water from the city of Newport which utilizes a series of reservoirs. There are no wells within the boundaries of NETC, with the exception of Gould Island, but numerous wells exist in close proximity. These are domestic wells, but they are upgradient from NETC and are not threatened by the activity.

2.3.3 Biology

The potential of impacting area biota through contaminants emanating from NETC is unknown. There have been no reports of negative impacts on area biota (Division of Enforcement, Rhode Island Department of Environmental Management). Along the NETC shoreline, there are also no visible signs of stress to the bay biota. The entire shoreline of NETC is closed to commercial shellfishing. However, much of the remainder of the bay is open to shellfishing.

The materials within the landfills and other potential contamination sites on the base are of the type that may have chronic or acute effects on area biota. The organisms most likely affected would be the shellfish and plankters. The shellfish have life histories which include filter feeding and burowing in the sediments. This tends to accumulate contaminants in the body tissues. Shellfish in the bay having these characteristics include quahogs, soft shelled clams, oysters, and blue mussels (Section 5). All of these organisms are heavily harvested and consumed by humans. The plankters most affected by potential contaminants would be the early life stages of fish and shellfish. The eggs and larvae are non-mobile and remain suspended in the water column. In this stage of development sensitive tissues and membranes are not protected as in adults and leaves them susceptible to contaminants. Mass chronic or acute effects on early life stages of finfish and shellfish are not easily detectible (as in an adult fish kill); however, the impact to the overall ecosystem of the bay may be significant. This may be seen years later by decreases in age, classes, or extirpiration of species completely from the area. However, as mentioned above, there have been no reports of negative impacts on area biota.

Ten species accounted for 91 percent of the fish catch in the bay with the winter flounder (Pseudopleuronectes americanus), the sand dab (Scophthalmus aquosus), scup (Stenotomus chrysops), and butterfish (Poronotus tricanthus) the most commonly occurring fish taken. These four species are also of commercial importance.

There is also a commercial mussel farm (Blue-Gold Sea Farm) located on the northern border of the NETC waterfront. Mussels from this farm are commercially harvested and shipped throughout the U.S. for human consumption.

2.3.4 Adjacent Non-Navy Disposal Areas

One possible off-site source of environmental contamination is an unofficial landfill on Portsmouth town property which is located adjacent to NETC in the Melville North area (Figure 5.1-4). This landfill receives mostly municipal refuse type wastes. The groundwater in the area could be adversely affected by potential contaminants disposed of at this site. The groundwater in the area of the landfill is migrating toward NETC.

2.3.5 Narragansett Bay Sediments

The sediments in the bay north of NETC have been shown to be contaminated with heavy metals, hydrocarbons, and sewage sludge (Section 5.3.5.1.1). This contamination has resulted from industrial and municipal discharges into the bay. The upper portion of the bay, in the vicinity of Providence, is much more industrialized than the lower portions of the bay where NETC is located and is likely to be more contaminated. No sediment sampling has been done in the vicinity of NETC.

SECTION 3

CONCLUSIONS

3.1 SITES NOT REQUIRING FURTHER ACTION

3.1.1 Coddington Cove Rubble Fill, Site No. 4

This site contains mostly demolition type materials including concrete, asphalt, metal, slate, wood, ash, and brush. This material presents no contamination threat, and the site was not recommended for confirmation study.

3.1.2 NUSC Disposal Area, Site No. 8

The rubble dump contains inert materials (scrap lumber, tires, wire, cable, and empty paint cans) which are no contamination threat. This site does not pose a threat to human health or the environment and is not recommended for confirmation study.

3.1.3 Old Fire Fighting Training Area, Site No. 9

This site was used as a fire fighting training area during World War II and up to 1972. Waste oils were likely used. There were no indications as to how much of these types of compounds was used. The site has since been extensively excavated, and there were no reports of any environmental problems resulting from the operations at the training site. Any oil used at the site is no longer present, and this site does not pose a threat to human health or the environment.

3.2 SITES REQUIRING FURTHER ACTION

3.2.1 McAllister Point Landfill, Site No. 1

This landfill received all of the wastes generated at the Newport Naval complex from 1955 through the mid-1970's and is known to contain at least 200 gallons of PCB contaminated oil (see Section 6.6.1). Also in the landfill are spent acids, waste paints, solvents, and waste oils (diesel, fuel and lube). Many of the wastes are in direct hydrologic contact with the groundwater and the bay, and surface runoff and leachate seepage from the landfill are directly into the bay. The pathways for pollutant migration at this site are readily available, and hazardous wastes are known to be present at the site. Contaminants entering the bay could adversely affect the biota (shellfish, finfish) which are harvested for human consumption. The shoreline in the immediate vicinity of the landfill is presently closed to shellfishing, but this may change when the land is excessed. This site is recommended for confirmation study.

3.2.2 Melville North Landfill, Site No. 2

This site was used following World War II and up until 1955. Wastes disposed of in this landfill would have been similar to those discussed for McAllister Point (Site No. 1). This site contained large piles of oil saturated soil and tar-like sludge. The site is situated along the shoreline of Narragansett Bay in a low-lying wetland type area. Surface drainage and groundwater flow from the site are directly into the bay, and the site is subject to flooding. Any contaminants disposed of at this site would have a high migration potential. Contaminants entering the bay could adversely affect the biota (shellfish, finfish) which are harvested for human consumption. The shoreline in the immediate vicinity of the landfill is presently closed to shellfishing, but this may change when the land is excessed.

3.2.3 Melville North Area, Site No. 5

All spills from the drums at this site have occurred on the asphalted area, with no indications of spills on the vegetated land. This site is being excessed by the Navy, which means access to the area will no longer be restricted.

3.2.4 STP Sludge Drying Bed, Site No. 6

The 15-foot by 40-foot sludge drying bed into which the oil has been placed is coated with an oil sludge. If the sludge drying bed continues to be used for oily waste disposal, this site could cause significant groundwater contamination.

3.2.5 Tank Farm One, Site No. 7

Bottom sludge from the tanks, obtained during cleaning operations, was disposed of in pits. This sludge was contaminated with tetraethyl lead. Due to the shallow depth of the groundwater, it is very possible that contaminants from the sludge migrated vertically into the groundwater. Groundwater flow from this site is into Narragansett Bay or the Melville Public Fishing area. Contaminants entering the bay could adversely affect the biota (shellfish, finfish) which are harvested for human consumption. The fish in the Melville Public Fishing area could also be adversely affected.

3.2.6 Tank Farm Two, Site No. 10

Tank Farm Two is used for the storage of diesel and fuel oil. Sludge was placed on the ground in the general vicinity of the tank being cleaned. It is possible, through surface runoff, that contaminants are carried into the Melville ponds or into Narragansett Bay. Due to the shallow depth of the groundwater, it is also possible that contaminants in the sludge could have migrated vertically and reached the groundwater. The groundwater in this area discharges into the bay or the Melville ponds. Both of the water bodies contain fish species consumed by humans which could be adversely affected by contaminants emanating from the site.

3.2.7 Tank Farm Three, Site No. 11

The tank bottom sludge, obtained during cleaning operations, was disposed of in burning chambers at this site. Due to the shallow depth of the groundwater, it is possible that contaminants in these chambers migrated vertically into the groundwater. These chambers had sand bottoms which would not have prevented the contaminants from moving downward. Surface drainage and groundwater flow from this site would be toward the bay and Lawton Reservoir. Lawton Reservoir is not utilized. Contaminants entering the bay could adversely affect area biota (shellfish and finfish) which are harvested for human consumption.

3.2.8 Tank Farm Four, Site No. 12

Tank bottom sludge from this tank farm was disposed of directly onto the ground in the vicinity of the tank being cleaned. Surface drainage and groundwater flow from this site are directly into the bay and Normans Brook. It is possible that contaminants are being transported, via surface drainage, into either of these bodies of water. The shallow groundwater could also have been contaminated by the vertical movement of contaminants. Contaminants entering the bay could adversely affect the biota (shellfish and finfish) which are harvested for human consumption.

3.2.9 Tank Farm Five, Site No. 13

Tank bottom sludge from this tank farm was disposed of in burning chambers. Due to the shallow groundwater, contamination resulting from the vertical movement of contaminants is possible at this site. Groundwater flow from the site is either directly into the bay or into Gomes Brook. Contaminants entering the bay could adversely affect the biota (shellfish and finfish) which are harvested for human consumption.

3.2.10 Gould Island Disposal Area, Site No. 14

This site could have received the World War II electroplating wastes. The site is situated along the shore of Narragansett Bay, with many of the wastes coming in contact with the waters of the bay during high tide. Surface drainage and leachate seepage from the site are directly into the bay. The pathways for contaminant migration are readily available at this site. Any hazardous wastes would be transported into the bay where it could adversely affect the biota (shellfish and finfish) which are harvested for human consumption. The shoreline of Gould Island is presently closed to shellfishing, but this may change when the land is excessed.

3.2.11 Gould Island Bunker 11, Site No. 15

The contents of drums located here are unknown, but they may contain hazardous wastes. The site is located within 100 feet of Narragansett Bay, with surface drainage from the site going into the bay. This site could have an adverse effect on the biota of the bay. The site is on land being excessed by the Navy. When excessed, the Navy will no longer be able to restrict access to the site. If hazardous wastes are present, the site could pose a threat to human health.

3.2.12 Gould Island Electroplating Shop, Site No. 17

Electroplating and degreasing operations wastes were possibly discharged directly into the bay. If these wastes were discharged into the bay, they could be adversely affecting the biota (shellfish and finfish). The bay is an important tidal estuary from which shellfish and finfish are heavily harvested for human consumption. The shoreline of Gould Island is presently closed to shellfishing, but this restriction may end with the excessing of land.

3.2.13 Structure 214, Site No. 18

Several of the drums at this site are leaking, and 25 to 50 gallons of oil have been spilled. The site is being excessed by the Navy. The site could pose a threat to the environment.

SECTION 4

RECOMMENDATIONS

Based on the significant findings and conclusions, 9 sites at the Naval Education and Training Center have been recommended for confirmation study, with an additional 4 sites requiring remedial action. The remainder of this chapter addresses the specific recommendations for each of these sites. Section 4.1 discusses those sites requiring confirmation studies, and Section 4.2 covers those sites requiring other remedial actions. A summary of the recommendations and CSRM scores for all of the sites recommended for confirmation study at NETC are shown in Table 4.1-1.

4.1 CONFIRMATION STUDIES

The areas which warrant further investigation are listed below.

McAllister Point Landfill, Site No. 1
Melville North Landfill, Site No. 2
Tank Farm One, Site No. 7
Tank Farm Two, Site No. 10
Tank Farm Three, Site No. 11
Tank Farm Four, Site No. 12
Tank Farm Five, Site No. 13
Gould Island Disposal Area, Site No. 14
Gould Island Electroplating Shop, Site No. 17

The specific recommendations in regard to each of these individual areas will be discussed below.

4.1.1 McAllister Point Landfill, Site No. 1

The landfill is located along the shoreline of Narragansett Bay, with surface runoff and leachate seepage going directly into the bay, potentially affecting the biota (shellfish and finfish). Therefore, it is recommended that a sampling program be implemented at this site to determine whether or not contaminants are present at the site and migrating into the bay.

It is recommended that the two leachate springs at the base of the landfill along the shoreline of Narragansett Bay (Figure 4.1-1) be sampled quarterly. These leachate samples should be taken at low tide. There are also various unvegetated, bare areas situated throughout the landfill. Soil samples, down to a depth of one foot, should be taken from six of

TABLE 4.1-1

SUMMARY OF RECOMMENDATIONS
NAVAL EDUCATION AND TRAINING CENTER, NEWPORT, RHODE ISLAND
STUDY NUMBER 24
SITES RECOMMENDED FOR CONFIRMATION STUDY

Site Number	Site Name	CSRM Score	Sampling Recommended	Frequency of Sampling	Lab Testing Parameters
1	McAllister Point Landfill	43	Two surface water samples from leachate springs, and four sediment cores in bay (shellfish if contaminants found).	Surface water quarterly, soil and sediment one time.	Priority pollutants on soil and water samples, heavy metals and PCBs on sediment samples
2	Melville North Landfill	30	Sample oil saturated soil and sludge areas, surface water and sediment sample from bay (shellfish if contaminants found).	Surface water quarterly, soil and sediment one time only.	Sediment samples for heavy metals and PCBs; soil samples for lead petroleum-based hydrocarbons and PCBs; water sample for priority pollutants.
7	Tank Farm One	21	Soil samples at the two marked disposal pits. If contamination found install six monitoring wells.	Soil one time only, monitoring wells quarterly for the first year.	Lead and petroleum-based hydrocarbons.
10	Tank Farm Two	17	Soil samples and monitoring wells if contamination found at Tank Farm Four	Soil one time only, monitoring wells quarterly.	Lead and petroleum-based hydrocarbons.
11	Tank Farm Three	11	Soil samples and monitoring wells if contamination found at Tank Farm Four	Soil one time only, monitoring wells quarterly.	Lead and petroleum-based hydrocarbons.
12	Tank Farm Four	16	Six soil and seven monitoring wells	Soil one time only, monitoring wells quarterly.	Lead and petroleum-based hydrocarbons.
13	Tank Farm Five	15	Soil samples and monitoring wells if contamination found at Tank Farm Four	Soil one time only, monitoring wells quarterly.	Lead and petroleum-based hyrocarbons.
14	Gould Island Disposal Area	21	Sample contents of drums at site and take four sediment samples in bay	All samples need be taken only once.	Heavy metals and PCBs for sedment samples, RCRA hazardous wastes for drums.
17	Gould Island Electroplating Shop	9	Two sediment samples and one shellfish sample (if found that drains discharge into bay).	All samples need be taken only once.	Cadmium, chrome, copper, lead, mercury, nickel, silver and cyanide.

OTHER RECOMMENDED ACTIONS

Site Number	Site Name	Recommendation
5	Melville North Area	Remove old drums and clean up spill area prior to excessing.
6	STP Sludge Drying Bed	Remove oily sludge from drying bed prior to excessing.
15	Gould Island Bunker 11	Sample contents of drums for RCRA hazardous wastes. If contaminants found, remove to proper disposal facility.
18	Structure 214	Remove drums from site and clean up spill areas prior to excessing.

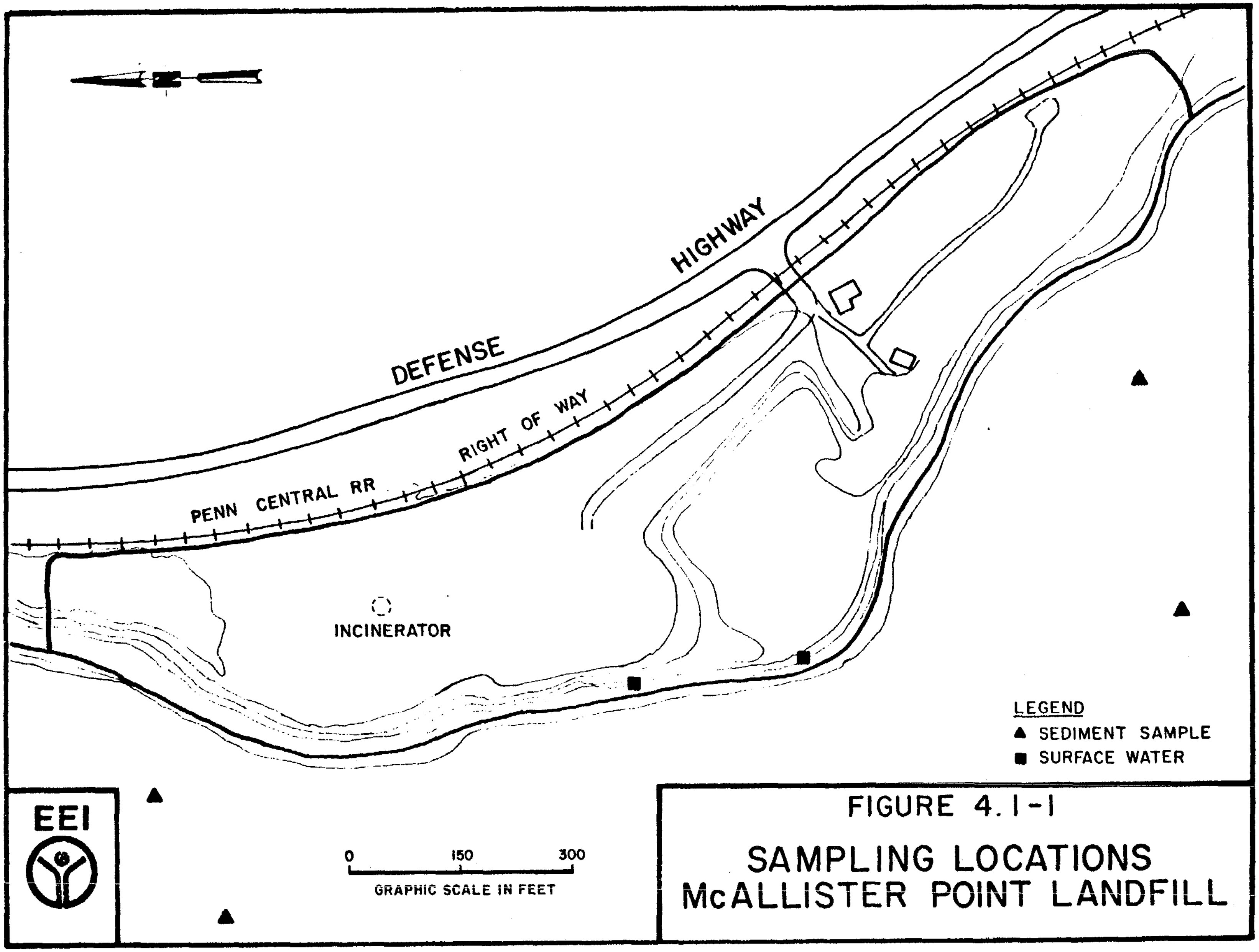


FIGURE 4.1-1

SAMPLING LOCATIONS McALLISTER POINT LANDFILL these bare areas and composited for analysis to see if chemical contaminants are the cause of the lack of vegetation. Four sediment cores, down to a depth of four feet, should also be taken from Narragansett Bay. The recommended location of the sediment core is shown in Figure 4.1-1. Due to the wide assortment of materials disposed of at this site, the soil and water samples taken should be put through a priority pollutant scan (See Appendix B). The bay sediment samples should be initially analyzed for heavy metals and PCBs. If high concentrations of contaminants are found, a priority pollutant scan may be warranted at these sites. Shellfish samples should be taken from the bay surrounding the landfill if contaminants are found in the sediment samples.

In order to help differentiate between contaminants that originated from the site and those that originated from off-site activities, two background bay sediment samples are recommended (4.1.8.1).

Types of Samples: Surface water, soil and sediment cores

Number of Samples: Two surface water samples from leachate springs, six soil samples from bare areas, and four sediment cores from the bay

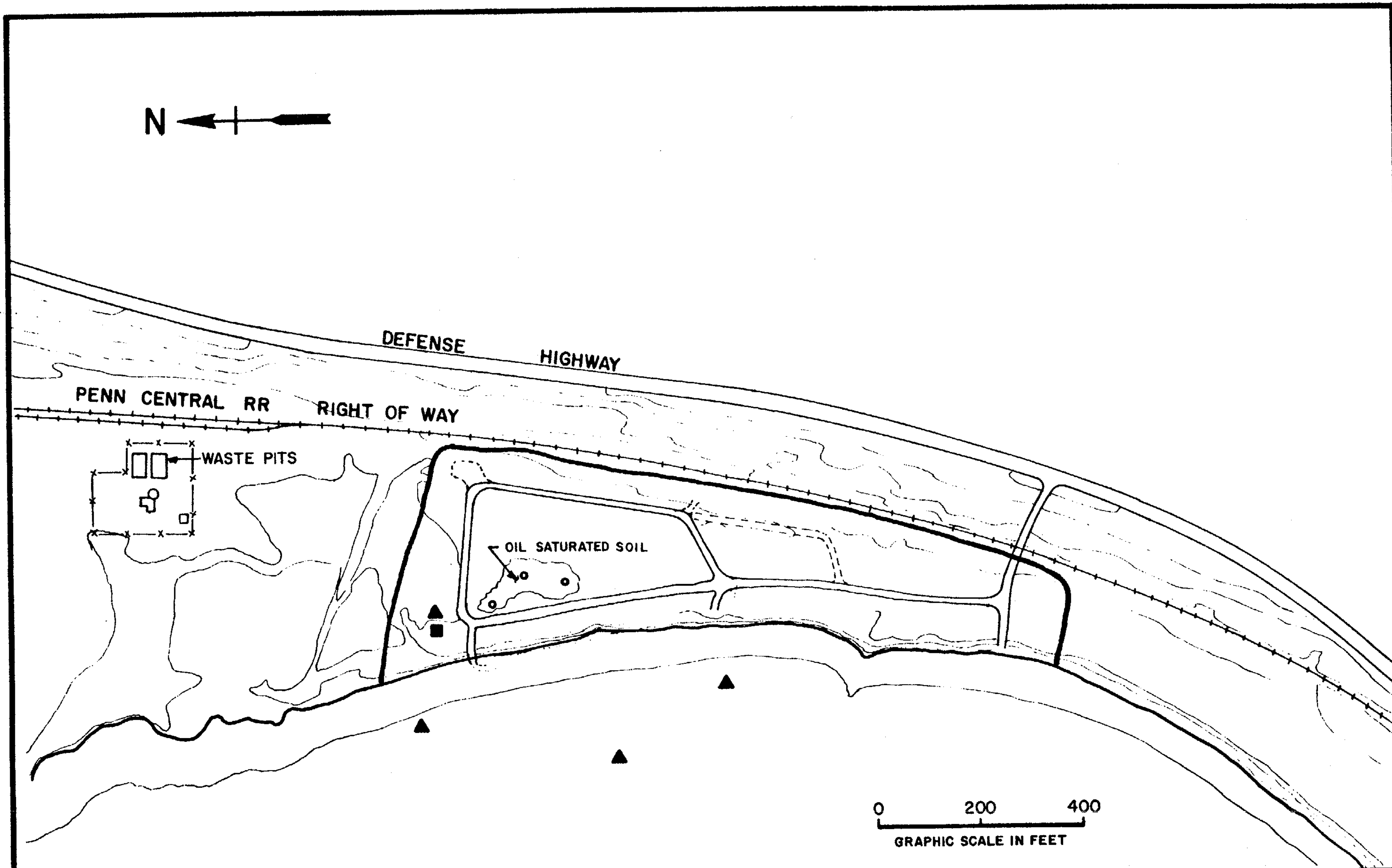
Sampling Frequency: The two surface water sites should be sampled quarterly for one year; the soil and sediment sites need only be sampled once

Testing Parameters: Priority pollutants on soil and water; sediments for cadmium, chromium, copper, lead, mercury, nickel, silver and PCBs

4.1.2 Melville North Landfill, Site No. 2

The site is situated in a low-lying wetland area along the shoreline of Narragansett Bay. The pathways for contaminant migration are readily available at this site, with surface drainage and groundwater flow going directly into the bay and potentially affecting the biota (shellfish and finfish). Therefore, it is recommended that a sampling program be implemented at this site to determine whether or not contaminants have entered the bay or the wetland.

The oil sludge areas, as well as the mounds of oil saturated soil should be analyzed for petroleum based compounds, lead, and PCBs. It is also recommended that a surface water sample (taken quarterly) and sediment sample be obtained from the wetland area (approximate location for sample is shown in Figure 4.1-2). The sediment sample can be taken with a ponar dredge. In addition, three sedimment cores from Narragansett Bay should be taken from the soft sediments near shore (approximate locations shown in Figure 4.1-2). These cores should be to a depth of three feet. Due to the wide assortment of materials disposed of at this site, the surface water sample should be analyzed for priority pollutants (See Appendix B). The sediment samples should be analyzed for heavy



LEGEND
- ▲ SEDIMENT SAMPLE
- ■ SURFACE WATER
- ○ SOIL SAMPLE

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FIGURE 4.1-2

SAMPLING LOCATIONS
MELVILLE NORTH LANDFILL

metals and PCBs. If high concentrations of contaminants are found, a priority pollutant scan may be warranted at these sites. Shellfish samples should be taken from the bay surrounding the site if contaminants are found in sediment samples.

In order to help differentiate between contaminants that originated from the site and those that originated from off-site activities, two background bay sediment samples are recommended (4.1.8.1).

Types of Samples: Surface water, sediment and soil

Number of Samples: One surface water sample should be taken from the wetland area, three soil samples from the oil saturated mounds; three sediment samples from the bay and one from the wetland area

Sampling Frequency: Surface water site should be sampled quarterly; soil and sediment samples need only be sampled once

Testing Parameters: Water for priority pollutants; soil for lead, petroleum-based hydrocarbons and PCBs; sediment for cadmium, chromium, copper, lead, mercury, nickel, silver, and PCBs

4.1.3 Tank Farm One Sludge Disposal Area, Site No. 7

The tank bottom sludge, obtained during cleaning operations, was disposed of in pits at this site. This sludge is contaminated with tetraethyl lead and could result in the contamination of the groundwater and the sediment, water, and biota of the Melville fishing area. A confirmation study is recommended to determine whether or not contaminants have migrated into the groundwater or the fishing area.

Two of the disposal pits are marked, and it is recommended that they be sampled to determine the levels of tetraethyl lead and petroleum-based hydrocarbons present in the sludge. Three 5-foot cores should be taken from each of the two pits and the sludge layer composited and analyzed for tetraethyl lead and petroleum-based hydrocarbons.

If lead and petroleum-based hydrocarbons are found, it is also recommended that 6 monitoring wells be installed at this site and sampled quarterly for one year. Their locations are shown in Figure 4.1-3. These wells should be completed to a depth of 15 feet below the water table. They should be screened starting at 5 feet above the water table and continued to the total depth of the well (20 feet of screen) to allow for several feet of fluctuation of the water table. These wells should be analyzed for petroleum-based hydrocarbons and lead.

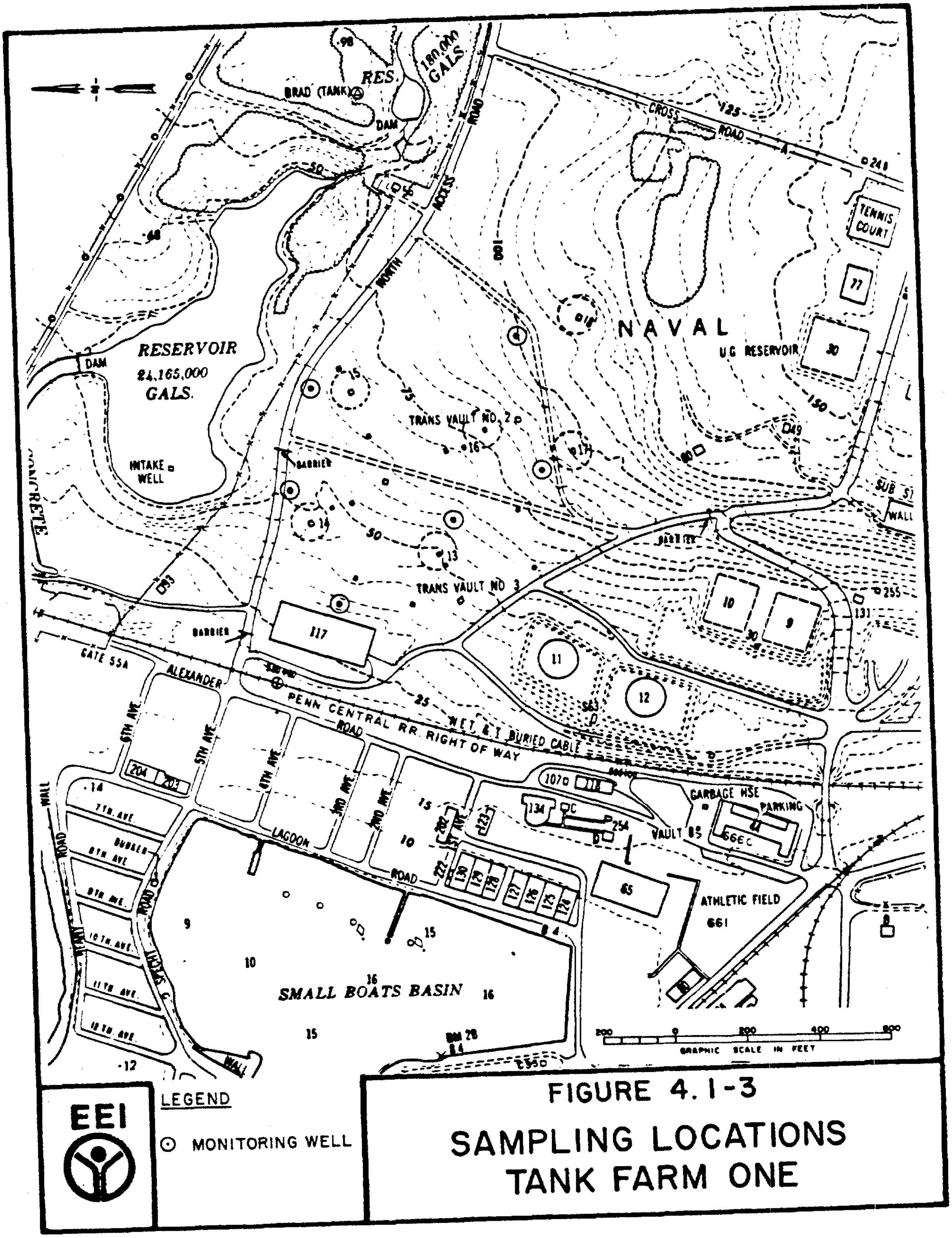

FIGURE 4.1-3
SAMPLING LOCATIONS
TANK FARM ONE

Types of Samples: Groundwater (if necessary), and soil

Number of Samples: 6 monitoring wells, 2 soil

Sampling Frequency: Monitoring wells quarterly for one year (24 samples); soil sites need only be sampled once

Testing Parameters: Lead and petroleum-based hydrocarbons

4.1.4 Tank Farms 2, 3, 4, 5; Sites 10, 11, 12, 13

These tank farms were all used to store diesel and fuel oil. The tank bottom sludge, obtained when the tanks were cleaned, was either disposed of directly onto the ground or into burning chambers. These practices could have resulted in surface or groundwater contamination with lead and petroleum-based hydrocarbons. The disposal methods and hydrologic settings at all of these tank farms are similar. Rather than recommend that a sampling and analysis program be developed for each of these individual tank farms, it is instead recommended that one tank farm be sampled first. If contamination is shown to exist at this tank farm, then additional sampling is warranted at the rest of the tank farms. However, if no contamination shows up in the analysis, additional sampling at the other tank farms is not necessary. Tank Farm Four was chosen to be sampled first because it is being excessed by the Navy.

Six soil samples down to a depth of three feet should be taken down slope from six of the tanks (EEI's assumption as to where sludge may have been disposed). These samples can be composited and should be analyzed for lead and petroleum-based hydrocarbons. These samples are recommended to determine if contamination exists in the soil which has not yet migrated into the groundwater.

The shallow depth to the groundwater coupled with the fact that the exact locations of the sludge disposal areas are unknown, make groundwater monitoring necessary. The groundwater gradient at this site appears to be the steepest (assuming it follows the topography) of all the tank farms and relatively uniform. Therefore, groundwater would tend to migrate faster and in a more easily predicted direction at this site. Seven groundwater monitoring wells are recommended at this site (Figure 4.1-4). An up-gradient well is included to provide an indication of the background groundwater quality. All of these wells should be completed 15 feet below the water table, with the well screen starting 5 feet above the water table and continuing to the bottom of the well. These wells should be sampled quarterly for the first year and analyzed for lead and petroleum-based hydrocarbons. Based on the findings at this tank farm, the results should be extrapolated to the other tank farms.

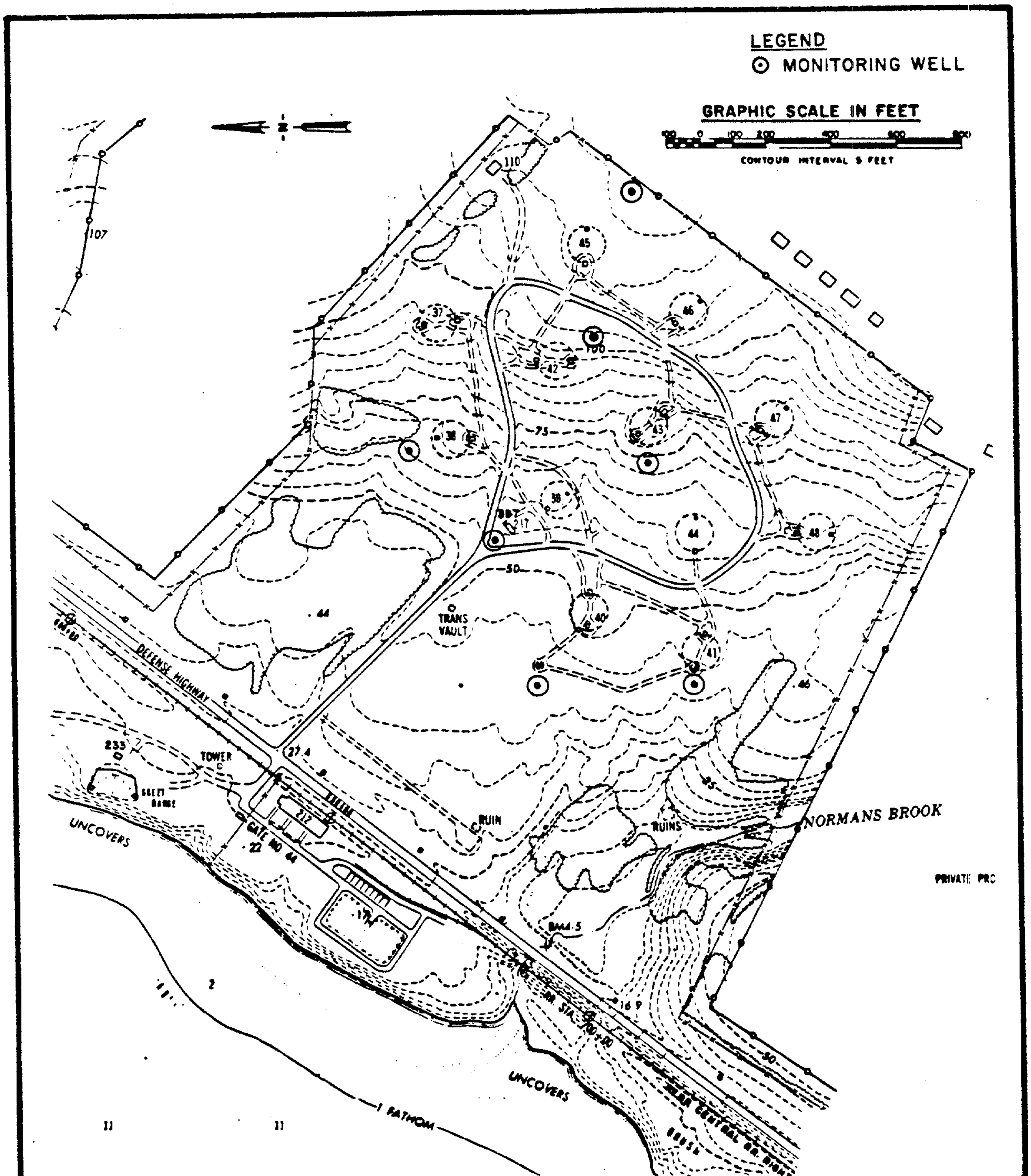

FIGURE 4.1-4
SAMPLING LOCATIONS TANK FARM FOUR

Types of Samples: Soil, groundwater

Number of Samples: 6 soil samples and 7 monitoring wells

Sampling Frequency: Soil sites need only be sampled once; the 7 monitoring wells should be sampled quarterly for the first year

Testing Parameters: Lead and petroleum-based hydrocarbons

4.1.5 Gould Island Disposal Area, Site No. 14

The site is situated along the shoreline of the island, with runoff and groundwater flow going directly into Narragansett Bay. It is recommended that a confirmation study be initiated at this site.

Four sediment cores, completed to a depth of three feet, should be taken just offshore of Gould Island (Figure 4.1-5). These samples should be taken in about 20 feet of water. The sediment samples should be analyzed for heavy metals and PCBs. If contamination is found to exist, a priority pollutant scan may be warranted.

In order to help differentiate between contaminants that originated from the site and those that originated from off-site activities, two background bay sediment samples are recommended (4.1.8.1).

The 20 barrels which are located along the top of the embankment (along fence line), should also be analyzed for the RCRA hazardous waste criteria and disposed of according to the RCRA regulations.

Types of Samples: Sample contents of drums stored at site and take sediment cores

Number of Samples: 4 off-shore sediment cores, and sample contents of drums stored at site

Sampling Frequency: All samples need to be taken only once

Testing Parameters: Sediments for cadmium, chromium, copper, lead, mercury, nickel, silver, and PCBs; RCRA hazardous wastes for drums

4.1.6 Gould Island Electroplating Shop, Site No. 17

It is possible that rinse water from the electroplating operations was discharged, via the floor drains, into Narragansett Bay. If it turns out that floor drains from the electroplating shop did discharge into the bay, it is recommended that sediment and shellfish samples at the outfall be taken and analyzed for electroplating wastes (Section 6.6.17).

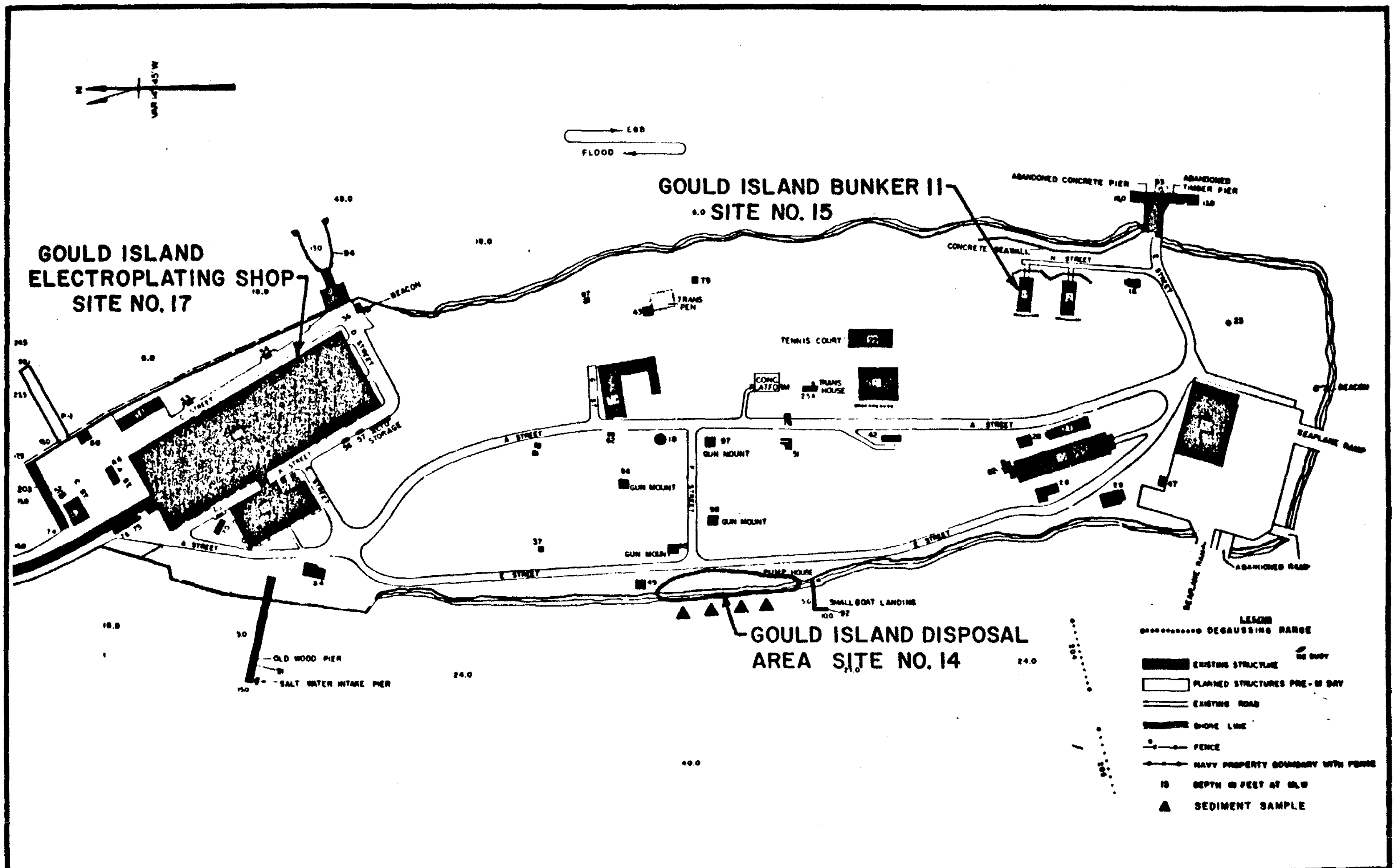

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FIGURE 4.1-5

SAMPLING LOCATIONS
GOULD ISLAND DISPOSAL AREA

Types of Samples: Sediment and shellfish

Number of Samples: Two off-shore sediment and one composite shellfish sample

Sampling Frequency: One time only

Testing Parameters: Cadmium, chromium, copper, cyanide, lead, silver, mercury, and nickel

4.1.7 General Recommendations

4.1.7.1 Narragansett Bay - Sediment sampling in Narragansett Bay has been recommended in regard to three sites at NETC: the McAllister Point Landfill (Site No. 1), the Melville North Landfill (Site No. 2), and the Gould Island Disposal Area (Site No. 14). The Electroplating Shop on Gould Island (Site No. 17) may also have sediment samples. The contaminants suspected to be migrating from these sites are, or were, relatively commonly used chemicals (tetraethyl lead, PCBs, chromium). In order to help to differentiate between contaminants that originated from the site in question and those that originated from off-site activities, two background sediment samples are recommended. These should be collected from areas of the bay well removed from NETC but from areas having sediment textures similar to those encountered during the sampling at NETC.

4.1.7.2 Mark Sites - Put all identified waste disposal sites on the installation maps.

4.2 OTHER RECOMMENDED ACTIONS

4.2.1 Melville North Area, Site No. 5

The waste oil drums at this site should be removed and the spill area cleaned up. This action should be undertaken prior to completion of excessing the site.

4.2.2 STP Sludge Drying Bed, Site No. 6

The oil sludge at this site should be removed and disposed of according to the RCRA guidelines.

4.2.3 Gould Island Bunker 11, Site No. 15

Sufficient evidence could not be obtained to verify that any hazardous materials were disposed of at this site. However, the possibility does exist that hazardous wastes are contained in the drums at this site, possibly from the electroplating operations which occurred during World War II. Therefore, it is recommended that the contents of the drums in the bunkers be thoroughly investigated. All drums found should be sampled and analyzed for RCRA hazardous wastes and disposed of according to RCRA regulations. This should be done prior to excessing and disposing the site.

4.2.4 Structure 214, Site No. 18

The drums of waste oil should be removed from this site and spill areas cleaned up before the site is excessed.

SECTION 5

BACKGROUND

5.1 GENERAL

5.1.1 Location

The Naval Education Training Center, Newport, Rhode Island (NETC), is located along the western shore of Aquidneck Island in Newport County. The site is some 60 miles south of Boston and 25 miles southeast of Providence. Long Island Sound and the Atlantic Ocean are approximately 6 miles south of the naval complex at Newport. A general location map is shown in Figure 5.1-1.

NETC presently encompasses some 1,063 acres of active land, significantly below the 2,692 acres held prior to the 1973 Shore Establishment Realignment Program (SER). NETC is spread out along some 6 miles of the western shoreline of Aquidneck Island and borders Narragansett Bay, which is an important regional estuary. Portions of NETC lie within the boundaries of three towns: Newport, Middletown, and Portsmouth (refer to Figure 5.1-2).

5.1.2 Command and Tenant Command Relationships and Missions

NETC is a unique command with the dual mission of serving as a training facility and also providing logistic support for the entire Newport naval complex, including support of ships homeported or visiting. The Commander of NETC is also the area coordinator for naval activities in Rhode Island. NETC is under the command of and receives primary support from the Chief of Naval Education and Training, Pensacola, Florida.

NETC is the Navy's largest officer training facility, accounting for nearly 40 percent of all officers entering the naval service each year. NETC also provides training for senior enlisted personnel, midshipmen candidates, foreign officers and officer candidates, communication officers, and chaplains. There are eight separate schools through which NETC accomplishes its training mission. These include the Officer Candidate School, Officer Indoctrination School, Communication School, Naval Academy Preparatory School, Instructor Training School, Chaplain's School, International Officers Training School, and the Senior Enlisted Academy.

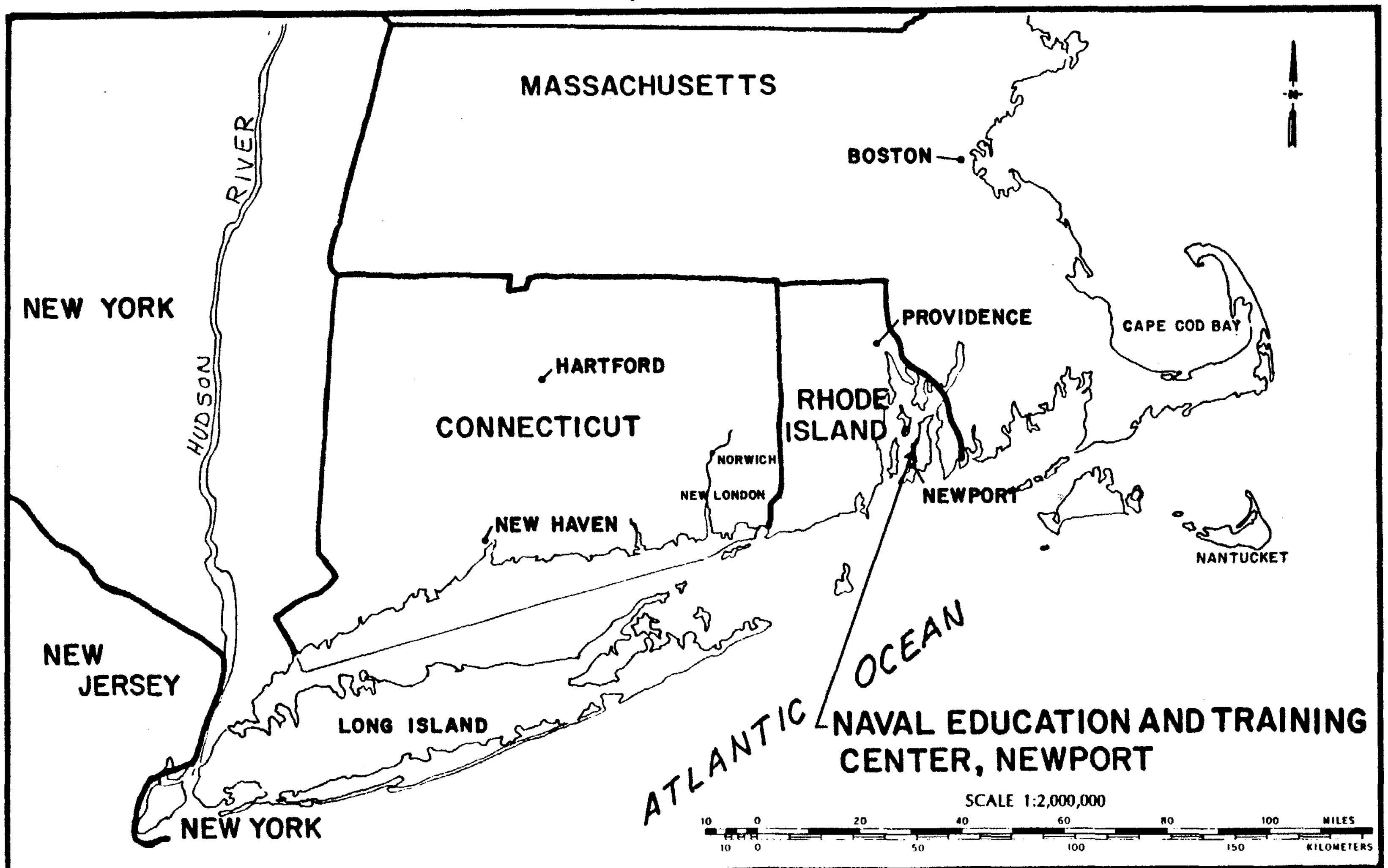

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FIGURE 5.1-1

NAVAL EDUCATION AND TRAINING CENTER
LOCATION MAP

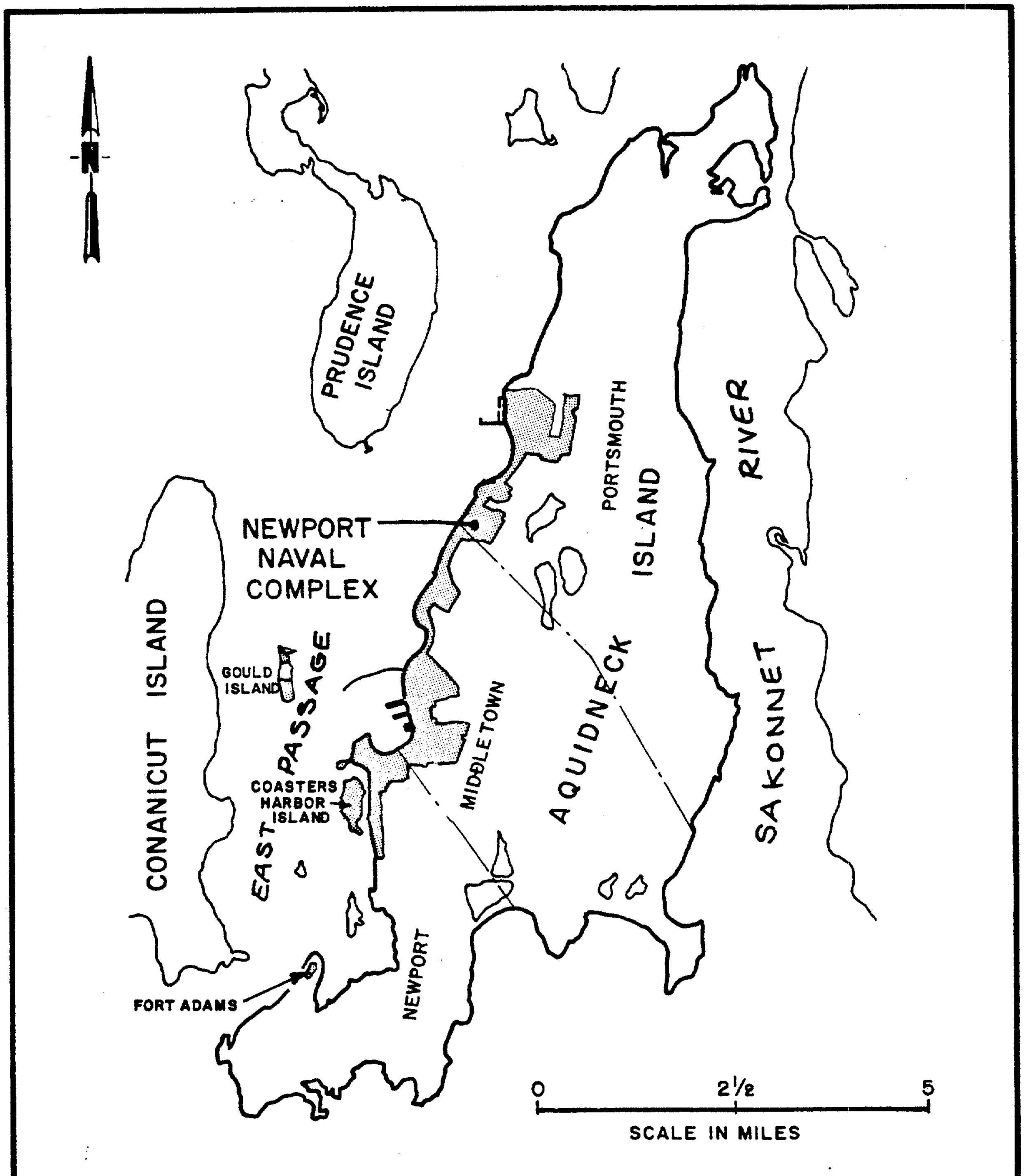

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FIGURE 5.1-2
NAVAL EDUCATION AND TRAINING CENTER
VICINITIES MAP

In its logistic support role, NETC provides a variety of services to the other commands and activities located at the naval complex at Newport. The Public Works Department of NETC furnishes design, maintenance, repair, transportation, and utility services to the naval complex and is responsible for the administration and maintenance of the 1,459 navy-owned housing units and 40 mobile home parking spaces. The Comptroller/Supply Department provides supplies and fiscal support, with the Administration Department providing fire, police and perimeter protection, operation of a brig, Navy Exchange Services, and the Morale, Welfare and Recreation Division.

5.1.2.1 Naval Surface Group Four, Newport - Seven ships assigned to Naval Surface Group Four are homeported in Newport. Three are destroyers, and four are fast frigates. The mission of the group is to maintain ships of the Reserve Force ready to deploy as sea control or antisubmarine forces in a national emergency, as well as ships of the Regular Force which deploy overseas for extended operations. The ships of the group operate on training exercises, provide research and development tests, and provide services to Surface Warfare Officers School, Officer Candidate School, and the Naval Underwater Systems Center. Two Naval Reserve Force minesweepers, assigned to Mine Squadron 12 in Charleston, South Carolina, are also stationed at NETC. These minesweepers are represented by the Commander, Naval Surface Group Four, in his capacity as Senior Officer Present Afloat, Narragansett Bay.

5.1.2.2 Naval Underwater Systems Center (NUSC) - NUSC is headquartered in Newport and operates under the cognizance of the Naval Material Command. NUSC has been stationed in Newport since 1869 when the Naval Torpedo Station was established. NUSC is the principal Navy research, development, test, and escalation center for submarine warfare and submarine weapons systems.

5.1.2.3 Shore Intermediate Maintenance Activity (SIMA) - SIMA provides training to Naval Reservists whose units would mobilize ship repair personnel in the event of a national emergency. SIMA also provides repair and maintenance capabilities for ships homeported in the New England area. SIMA has machine shop lathes, milling machines, and welding shops in Building 68 on Pier 2.

5.1.2.4 Naval Reserve Readiness Command Region One - The mission of the Readiness Command is to command assigned Naval Reserve units to ensure mobilization readiness and to act as field manager for the Chief of Naval Reserve for assigned resources.

5.1.2.5 Navy Surface Force Atlantic Readiness Support Group (RSG) - The RSG coordinates repairs and maintenance required at the Newport naval complex and supervises shipbuilding and associated contracts to obtain the most cost effective and efficient repairs of ships. The RSG is located in Building 68 on Pier 2.

5.1.2.6 Explosive Ordnance Disposal Detachment, NUSC - The mission of the detachment is to identify, render safe, and dispose of all explosive ordnance, nuclear weapons, chemical munitions, and biological agents. Diving, salvage, and demolition operations are performed in conjunction with this mission. The detachment provides its services to all Navy installations in Rhode Island, Connecticut, Massachusetts, and northern New York. It also provides assistance to federal, state, and local law enforcement agencies.

5.1.2.7 Defense Fuel Support Point (DFSP), Melville - The mission of the facility is to receive, store and issue petroleum products to military and federal civilian agencies, including NETC, Navy fleet units, Coast Guard units, General Electric (government contract work), and various Air Force bases and Naval Air Stations. DFSP is operated as a government-owned, contractor-operated facility. The facility covers 159 acres and has three tank farms with 33 tanks, one deep water fuel pier, one waste oil reclamation tank, and 25 miles of pipeline. Storage capacity of petroleum is 1,300,000 barrels. There are 14 buildings. Two are occupied by government employees, and three are occupied by National Service Corporation employees.

A list of the remaining tenant commands and local activities is provided below.

Surface Warfare Officers School Command
Naval War College
Naval Regional Medical Center
Naval Justice School
Personnel Support Activity
Newport Branch Commissary Store
Navy Data Automation Facility
Naval Regional Contracting Office Detachment
Trident Command and Control System Maintenance Activity
Navy Commissary Store Division
Naval Regional Dental Center
Northeastern Navy Band
Naval Legal Services
Navy Publications and Printing Service Office
Naval Telecommunications Center
Officer in Charge of Construction, Narragansett Bay Area
Naval Investigative Service Resident Agency, Newport
Commercial Industrial Services Program
Defense Investigative Service
Naval Audit Site
Marine Corps Administrative Detachment
Office of Naval Research Patent Counsel Office
Northeast Judicial Circuit Branch Office, Navy-Marine Corps
Trial Judiciary
Naval Electronic Engineering Office

5.1.3 Adjacent Land Use

Aquidneck Island has a population of around 60,000, with Newport accounting for 30,000, Middletown 16,400, and Portsmouth 13,600. The Newport area is an important tourist and resort center, upon which much of the area's economy is centered. The land use on Aquidneck Island has been classified by the State of Rhode Island as either commercial, residential, industrial, or open space (Figure 5.1-3). Most of the areas surrounding NETC are residential and open space. There are, however, two areas classified as industrial in the Melville area.

One possible off-site source of environmental contamination is the unofficial Portsmouth landfill. The landfill is located adjacent to NETC in the Melville North area (Figure 5.1-4). This landfill receives mostly general municipal refuse and is unlikely to contain hazardous materials. The groundwater upgradient from NETC could be affected by potential contaminants at this landfill. Any contaminants reaching the groundwater would migrate toward NETC.

One other source of off-site contamination is the City of Newport's STP outfall. This outfall is located several hundred yards off of Coddington Point.

There are currently no other active federal military installations in the Narragansett Bay area. The Naval Construction Battalion Center at Davisville is presently on cadre status, while the Naval Air Station at Quonset Point has been closed as a result of the 1973 Shore Establishment Realignment (SER) program.

5.2 HISTORY

The Newport area was first used by the Navy during the Civil War when the Naval Academy was moved from Annapolis, Maryland to Newport in order to protect it from Confederate troops. The Naval Academy operated at Newport for about four years before returing to Annapolis.

In 1869, the experimental Torpedo Station at Goat Island was established. This was the Navy's first permanent activity at Newport. The station was responsible for developing torpedoes and conducting experimental work on other forms of naval ordnance.

In 1881, Coasters Harbor Island was acquired by the Navy from the City of Newport and used for training purposes. In 1884, the Naval War College was established on the island. A causeway and bridge linking the island to the mainland was constructed in 1892. In 1894, the USS Constellation was permanently anchored as a training ship for the Naval War College.

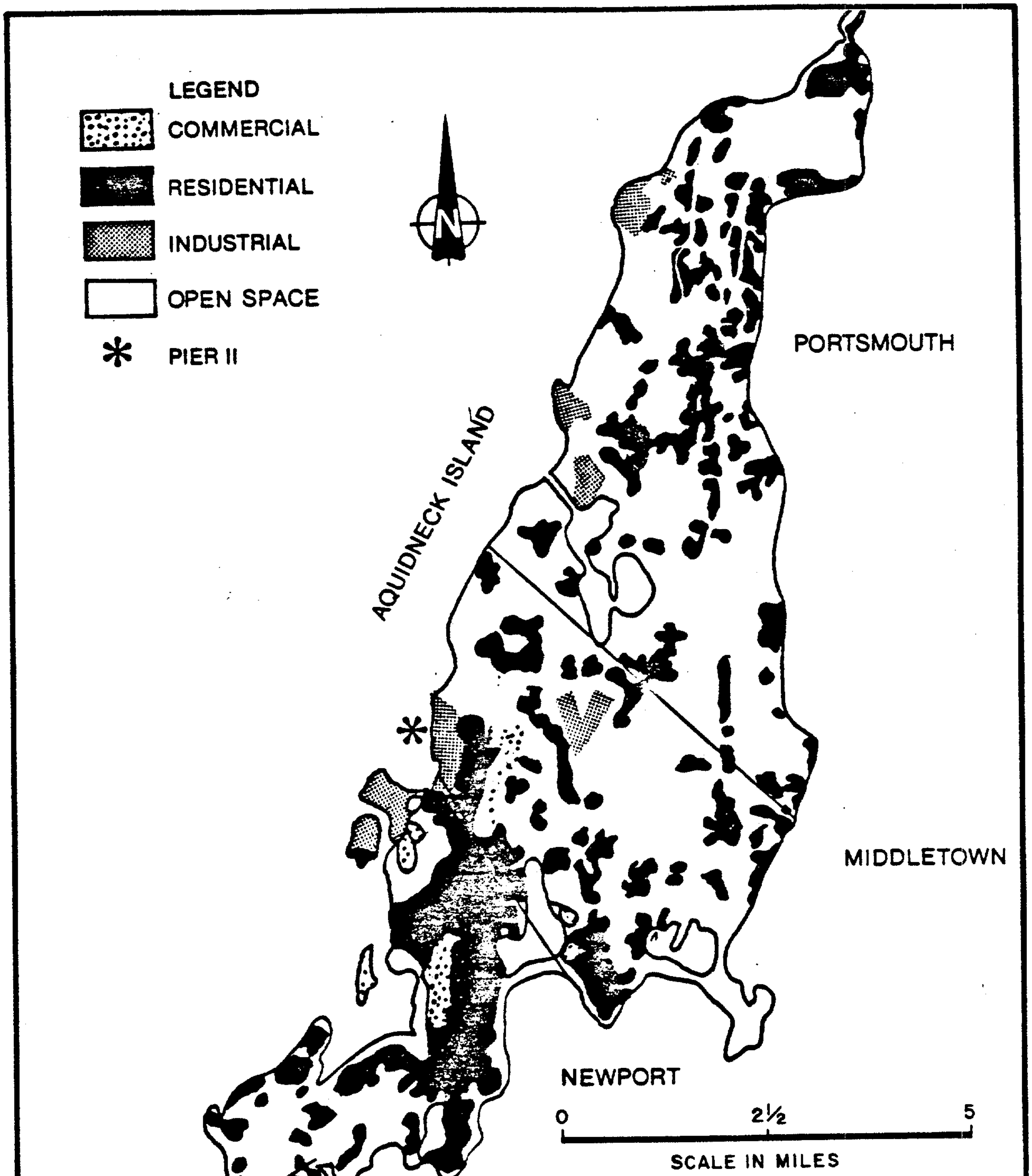

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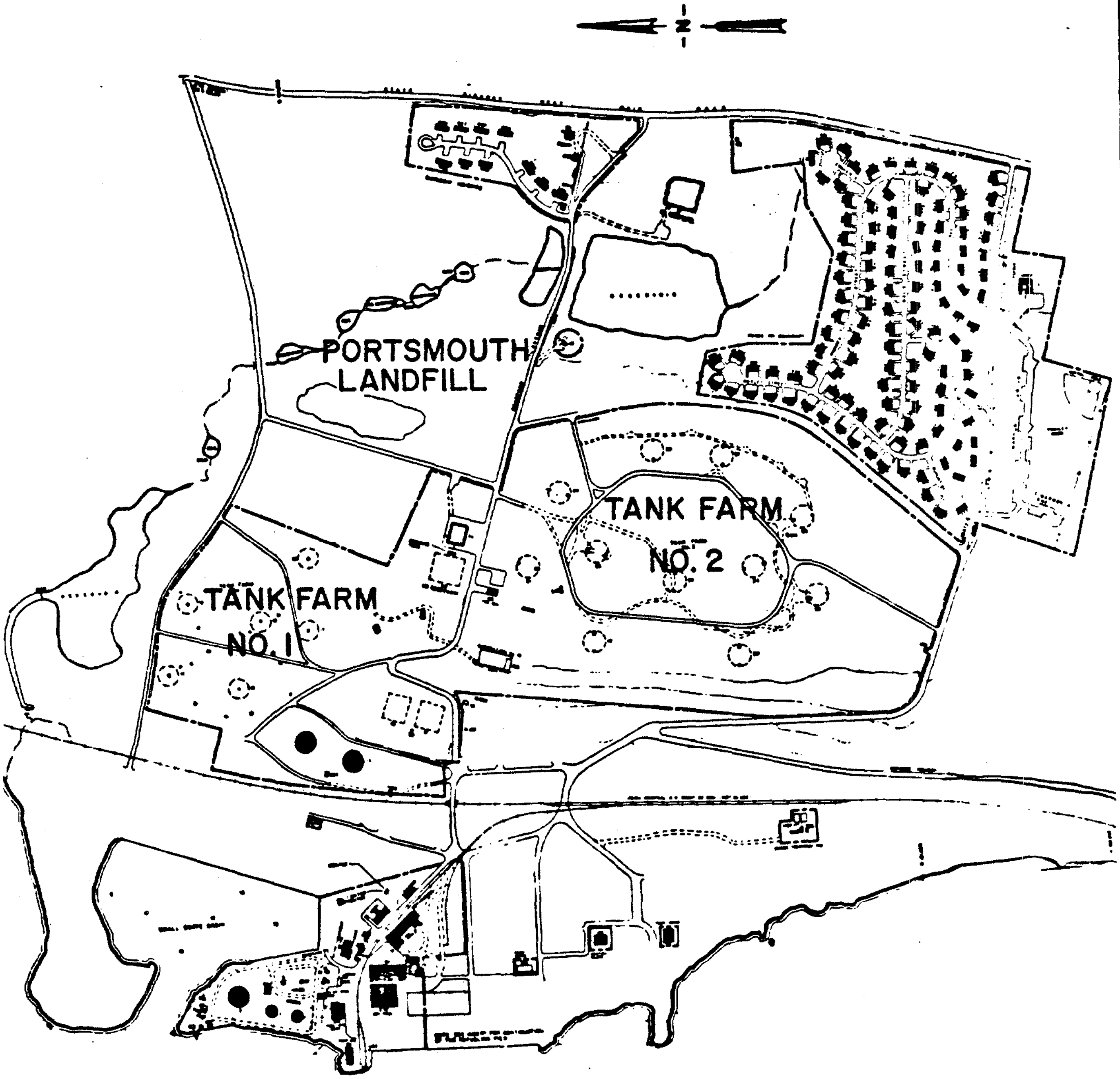
FIGURE 5.1-3

REGIONAL LAND USE OF AQUIDNECK ISLAND

Source: 1982 Draft EIS for Homeporting at NETC



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200 0 200 400 800 ft.
GRAPHIC SCALE

FIGURE 5.1-4

PORTSMOUTH LANDFILL
MELVILLE NORTH

The Melville area was established as a coaling station for the steam powered ships in 1900. The Navy purchased 160 acres of land and constructed the Narragansett Bay Coal Depot. With the advent of ships burning liquid fuel, it became necessary to add oil tanks. Consequently, in 1910, four fuel oil tanks were added in the Melville area. These tanks are still used today.

In 1913, the Navy established the Naval Hospital on the mainland of Aquidneck Island, directly adjacent to Coasters Harbor Island. At this time, the main hospital building was constructed.

The outbreak of World War I caused a significant increase in military activity at Newport. Some 1,700 men were sent to Newport and housed in tents on Coddington Point and Coasters Harbor Island. A bridge was built at this time connecting Coddington Point with Coasters Harbor Island. In 1918, Coddington Point was purchased by the Navy. Much of the base organization was then transferred to Coddington Point. During the war, numerous destroyers and cruisers were fueled by the Melville coal depot and fuel tanks. By this time, a pipeline had been extended to the north fueling pier and two additional fuel oil tanks constructed.

Following World War I, fuel oil gradually replaced the use of coal by the Navy fleet. In 1921, the Coal Depot was changed to the Navy Fuel Depot. In 1931, the coal barges and coaling equipment were sold to the highest bidder.

In 1923, some two hundred buildings, which were part of the emergency war camps established on Coddington Point, were stripped and sold for scrap. The station was put on caretaker status in 1933. The base remained relatively inactive until the onset of World War II.

Reactivation of the base occurred in the late 1930's as a result of military build-up in Europe. Just prior to the reactivation, a 1938 hurricane and tidal wave had destroyed or severely damaged over 100 buildings and much of the sea walls. In 1940, Coddington Cove was acquired for use as a supply station, and hundreds of quonset huts were constructed throughout the base. Additional barracks were constructed on Coasters Harbor Island, increasing the base housing capacity to over 3,500 men. Power plant facilities were also constructed at this time. Coddington Point was reactivated to house thousands of recruits. The Anchorage housing complex in the Coddington Cove area was constructed in 1942. In the Melville area, additional fuel facilities were constructed along with a Motor Torpedo Squadron Boat Training Center and nets for harbor defense were constructed. Tank Farms 1 through 5 were constructed during this time period. The Fire Fighting School, Fire Control Training Building, and the Steam Engineering Building were constructed in 1944.

The Torpedo Station at Goat Island was very active during World War II and had expanded its operation to Gould Island. The Torpedo Station employed more than 13,000 people and manufactured 80 percent of all torpedoes used by our country during the war. The station was the largest single industry ever operated in Rhode Island.

Following World War II, naval activities at Newport converted to a peace time status. This resulted in a reduction of naval activity. Some 300 quonset huts and buildings were removed, and the entire naval complex was consolidated into a single naval command designated the U. S. Naval Base in 1946.

The Naval Base adjusted to its peace time status by increasing its activities in the fields of research and development, specialized training, and preparedness for modern warfare. There was a brief period during the Korean War when some 25,000 sailors trained at Newport.

In 1951, the Torpedo Station was permanently disestablished after 83 years of service. Future manufacture of torpedoes was to be awarded to private industry. In place of the Torpedo Station, a new research and development facility, the Naval Underwater Ordnance Station, was established and given the responsibility of overseeing the private contractors. The Officer Candidate School was also established in 1951.

In 1952, the Training Station and other naval schools were disestablished, and the U. S. Naval Station and the U. S. Naval Schools Command were established.

In 1955, Pier 1 was constructed, with Pier 2 being added in 1957. Newport became the headquarters of the Commander Cruiser-Destroyer Force Atlantic in 1962. Some 55 naval warships and auxiliary craft were homeported at Newport. New housing and bachelor quarters were added in the late 50's and early 60's.

Major expansion of the Naval War College occurred during the late 60's and early 70's, transforming the college into a major university. In July of 1971, the Naval Schools Command was restructured and named the Naval Officer Training Center (NOTC).

In April of 1973, the Shore Establishment Realignment Program (SER) was announced and resulted in the largest reorganization of naval forces in the Newport area. The fleet stationed in Newport was relocated to other naval stations on the east coast. SER resulted in the disestablishment of the Naval Communication Station and the Fleet Training Center and related activities. The Public Works Center, Naval Supply Center, Naval Station and Naval Base were absorbed by NOTC. In April of 1974, NOTC was changed to the Naval Education Training Center (NETC).

The drastic changes which resulted from SER caused a reduction of Navy personnel, both military and civilian, in excess of 14,000. Coupled with the reductions at the Naval Construction Battalion Center at Davisville, and the close of the Naval Air Station at Quonset Point, SER had severe economic impacts in the Narragansett Bay area.

The reorganization brought about by SER resulted in the Navy excessing some 1,629 acres of its 2,420 acres. The areas excessed and those retained are shown in Figures 5.2-1 and 5.2-2. Some of this land has been leased to the State of Rhode Island pending final sale of the land by the General Services Administration. Table 5.2-1 shows an area by

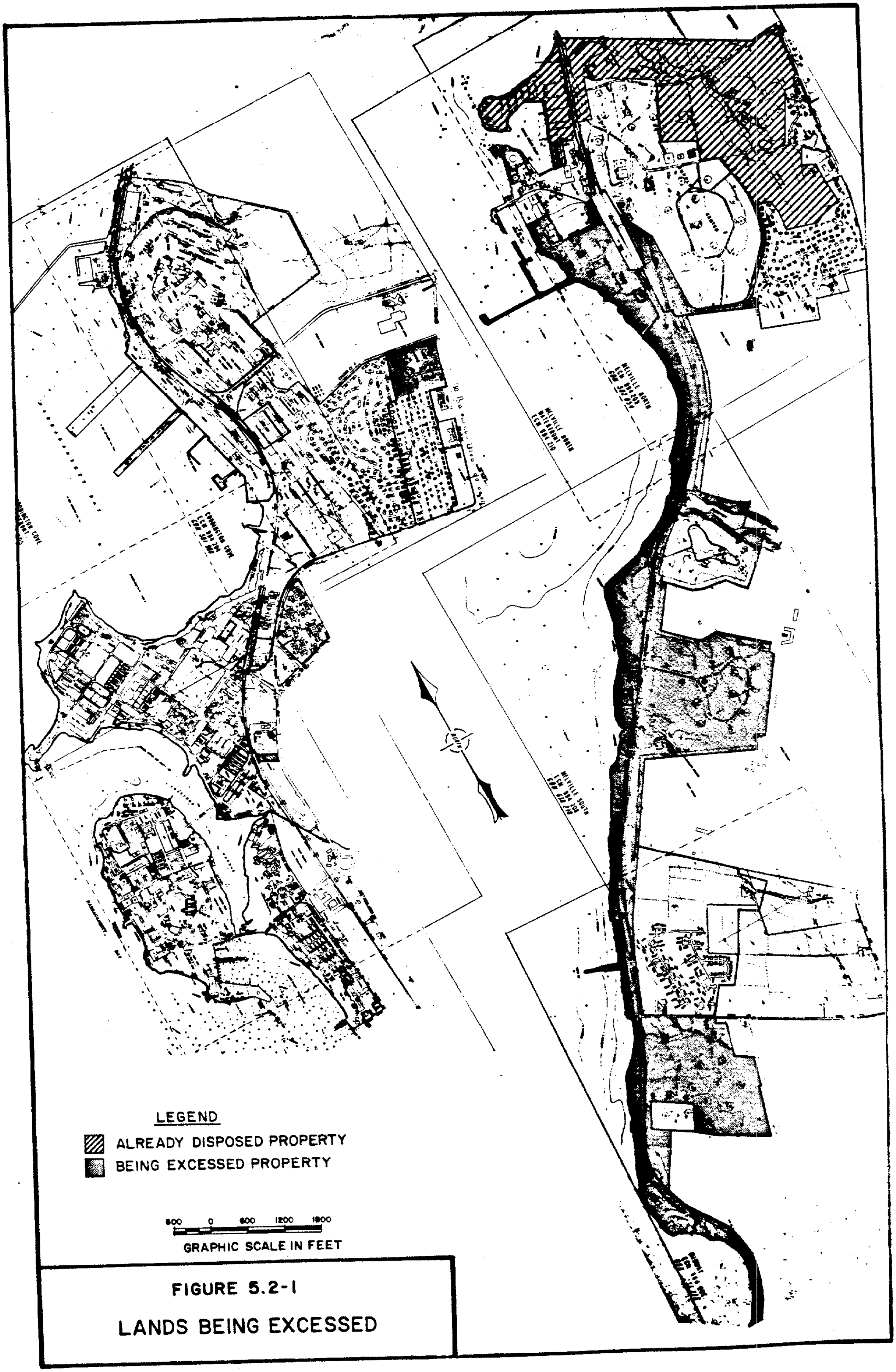
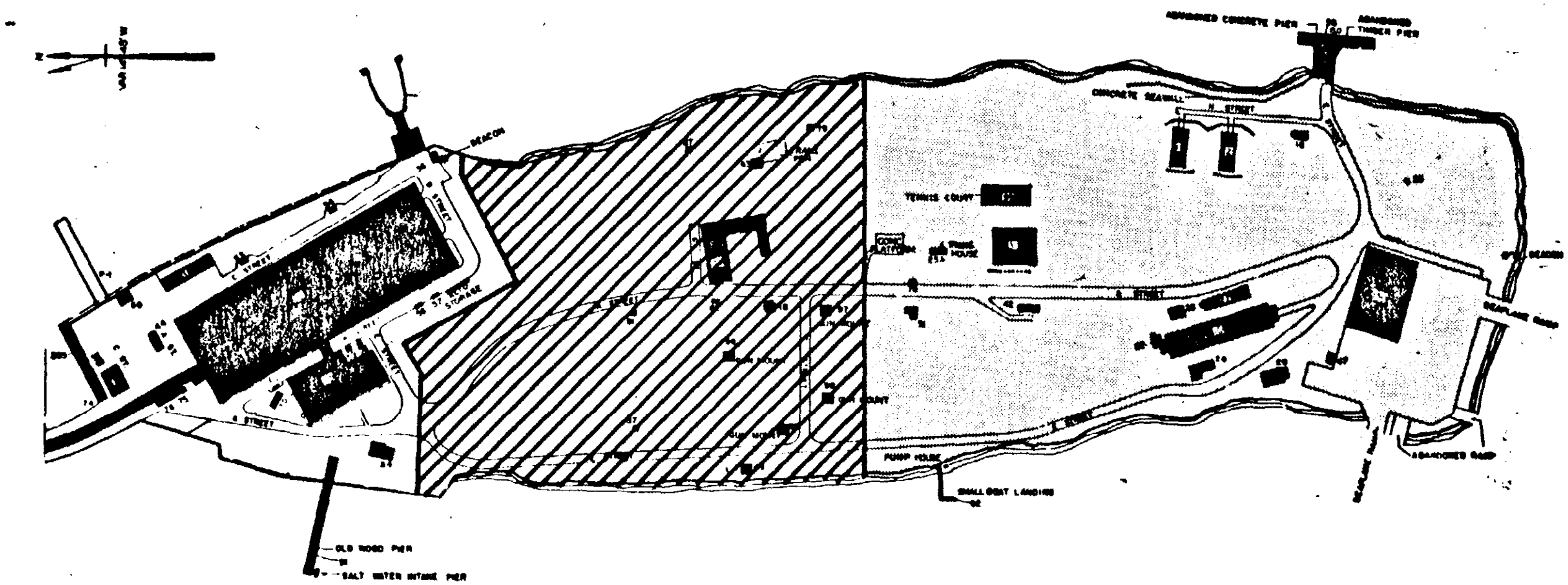


FIGURE 5.2-1

LANDS BEING EXCESSED



LEGEND

- RETAINED LAND
- ALREADY DISPOSED PROPERTY
- BEING EXCESSED PROPERTY

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FIGURE 5.2-2

GOULD ISLAND
LANDS BEING EXCESSED

Table 5.2-1

LAND HOLDINGS - NAVAL COMPLEX NEWPORT

Area	Acreage Pre-SER	Excessed	Retained
Coasters Harbor Island	112	0	112
Medical Center	42	0	42
Cloyne Court Housing	26	0	26
Coddington Point	160	0	160
Coddington Cove	226	74	152
NUSC	198	0	198
Melville South) Midway) Defense Highway)	441	319	122
Melville North	462	246	216
Prudence Island	600	600	0
Gould Island	52	43	9
Fort Adams	102	77	25
Sachuest Point	107	105	2
Fort Wetherill	7	7	0
Beavertail Point	158	158	0
	2,693	1,629	1,064

area breakdown on land holdings prior to SER and following. The Navy also leases 44 acres of land in Coddington Cove to the State of Rhode Island and Economic Development Corporation. The state has subleased this property to a private enterprise engaging in shipbuilding and repair. Also, a fish food processing operation utilizes the cold storage warehouse in Building 42 near Pier 1.

The above information on the history of the installation was obtained from the most recent Master Plan (NORTHDIV, 1980), the 1981 Annual Report of the Navy in the Rhode Island Area (NETC Public Affairs Office, 1981), and the Command Histories at the Naval History Office in Washington, DC.

5.3 PHYSICAL FEATURES

5.3.1 Climatology

The climate at NETC is greatly influenced by its proximity to Narragansett Bay and the Atlantic Ocean, which tend to modify the area's temperatures. Winter temperatures are somewhat higher and summer temperatures lower than more inland areas. Winters are moderately cold in the area, and summers are generally mild with many summer days cooled by sea breezes.

The temperature for the entire year averages around 50°F. January and February are the coldest months, with mean temperatures of around 29°F. The average temperature ranges for these two months are 20.6° to 37.6°F. July is the warmest month with a mean temperature of 72.1°F. Temperature ranges for the month are 81.1° to 63°F. The average date for the last freeze in spring is April 14, while the average date for the first freeze is October 26, resulting in an average growing season of 195 days. Subzero temperatures seldom occur, averaging less than one day for December and one or two days for January and February. Temperatures in excess of 100°F do not occur often and are confined to the months of June, July and August. The temperature extremes for the area are -13°F and 104°F.

The average annual precipitation for the area is 42.75 inches, but this has varied from as little as 25.44 inches to as much as 65.06 inches. Measurable precipitation (.01 inch or greater) occurs on about one day out of every three and is evenly distributed throughout the year. Thunderstorms are responsible for much of the rainfall from May through August. These thunderstorms often produce heavy amounts of rainfall, but their duration is relatively short. Summer thunderstorms are frequently accompanied by high winds which may result in property damage, especially to small boats. The average snowfall during winter is close to 40 inches, ranging from a low of 11.3 inches to a high of 75.6 inches. February is usually the month of greatest snowfall, but January and March are close seconds. It is unusual for the ground to remain snow covered for any long period of time.

Average wind speed is 10.7 miles per hour. The wind prevails from the northwest in the winter and from the southwest during the summer.

Relative humidity averages 55 percent in midafternoon. The humidity is higher at night, with the average at dawn being 75 percent. Lowest relative humidities occur in April and the highest in September.

Heavy fog, with a visibility of one-quarter mile or less, occurs on an average of 26 days per year. These days are spread throughout the year.

Severe weather from tropical cyclones (winds 39 to 73 miles per hour) and hurricanes (winds greater than 73 miles per hour) is a serious threat in the area of NETC. The probability that a tropical cyclone will invade the area is one in five in any year, while the probability of hurricane force winds invading the area is less than one in fifteen in any year (Outleasing EIS, 1977). The most damage from these severe storms results when they strike at high tide.

Table 5.3-1 summarizes the climatological data for the NETC area.

5.3.2 Topography

The topography of the NETC area owes its origin to the Wisconsin glaciation. As the glaciers advanced over the area, valleys were gouged and hilltops scarred. Movement of the glaciers accounts for the elongated shapes and general north to south orientation of many of the islands in Narragansett Bay. The coastline of Aquidneck Island, on which NETC is located, was shaped by the movement of the glaciers. As the glaciers began receding, due to climatic changes, they deposited silt, sand, gravel and boulders over the bedrock. NETC is located in the Narragansett Till Plains as shown in Figure 5.3-1.

Elevations at NETC range from near mean sea level to 175 feet in the Melville North area. Many areas of NETC have low elevations which are susceptable to flooding during hurricane storm surges. The 100 and 500 year tidal flood elevations for the NETC area are 12.6 feet and 15.6 feet above mean low water, respectively. Areas below these elevations are subject to flooding.

Ninety percent of the land within the boundaries of NETC has slopes of from 0 to 9 percent (Master Plan, 1980). The remaining land has slopes in the categories of 10 to 25 percent and greater than 25 percent. Maps showing slopes on all NETC areas are included in the most recent Master Plan for NETC.

TABLE 5.3-1

SUMMARY OF CLIMATOLOGICAL DATA

	Normal				Extremes		Precipitation (inches)			Relative Humidity		Wind		Mean Number of Days			
										Hour							
Months	Daily Max.	Daily Min.	Monthly	Highest	Record Lowest	Record Normal	Monthly	Monthly	24 hr.	07	13	Mean Speed (MPH)	Prevailing Direction	Precipitation 0.01 inches or more	Thunderstorms	90° F + Above	32°F + Below
(a)				27	27		27	27	27	17	17	27	10	27	27	17	17
Jan	36.2	20.6	28.4	66	-13	3.52	11.66	0.50	3.34	71	57	11.5	NW	11	0	0	12
Feb	37.6	21.2	29.4	69	-7	3.45	5.63	1.16	3.14	70	54	11.7	NNW	10	0	0	9
Mar	44.7	29.0	36.9	78	1	3.99	8.11	1.72	4.53	70	54	12.2	WNW	12	1	0	2
Apr	56.7	37.8	47.3	98	14	3.72	7.32	1.48	2.82	68	47	12.2	SW	11	1	0	0
May	66.8	46.9	56.9	94	29	3.49	7.62	0.71	3.78	72	52	10.9	S	11	3	1	0
June	76.3	56.5	66.4	96	41	2.65	6.83	0.39	2.09	76	56	10.0	SW	11	4	2	0
July	81.1	63.0	72.1	100	49	2.85	8.08	1.00	4.83	77	56	9.5	SW	9	5	3	0
Aug	79.8	61.0	70.4	104	40	3.90	11.12	0.91	6.71	80	56	9.3	SSW	10	4	2	0
Sep	73.1	53.6	63.4	97	33	3.26	7.92	0.77	4.89	82	56	9.5	SW	8	2	1	0
Oct	63.9	43.4	53.7	86	20	3.27	11.89	1.62	6.63	80	54	9.7	NW	8	1	0	4
Nov	52.0	34.6	43.3	78	14	4.52	8.45	0.81	3.13	77	58	10.5	SW	11	1	0	13
Dec	39.6	23.4	31.5	69	-10	4.13	10.75	0.58	3.85	75	59	11.0	WNW	12	0	0	25
Year	59.0	40.9	50.0	104	-13	42.75	11.89	0.39	6.71	75	55	10.7	SW	124	20	9	123

Notes: (a)Length of record (years)

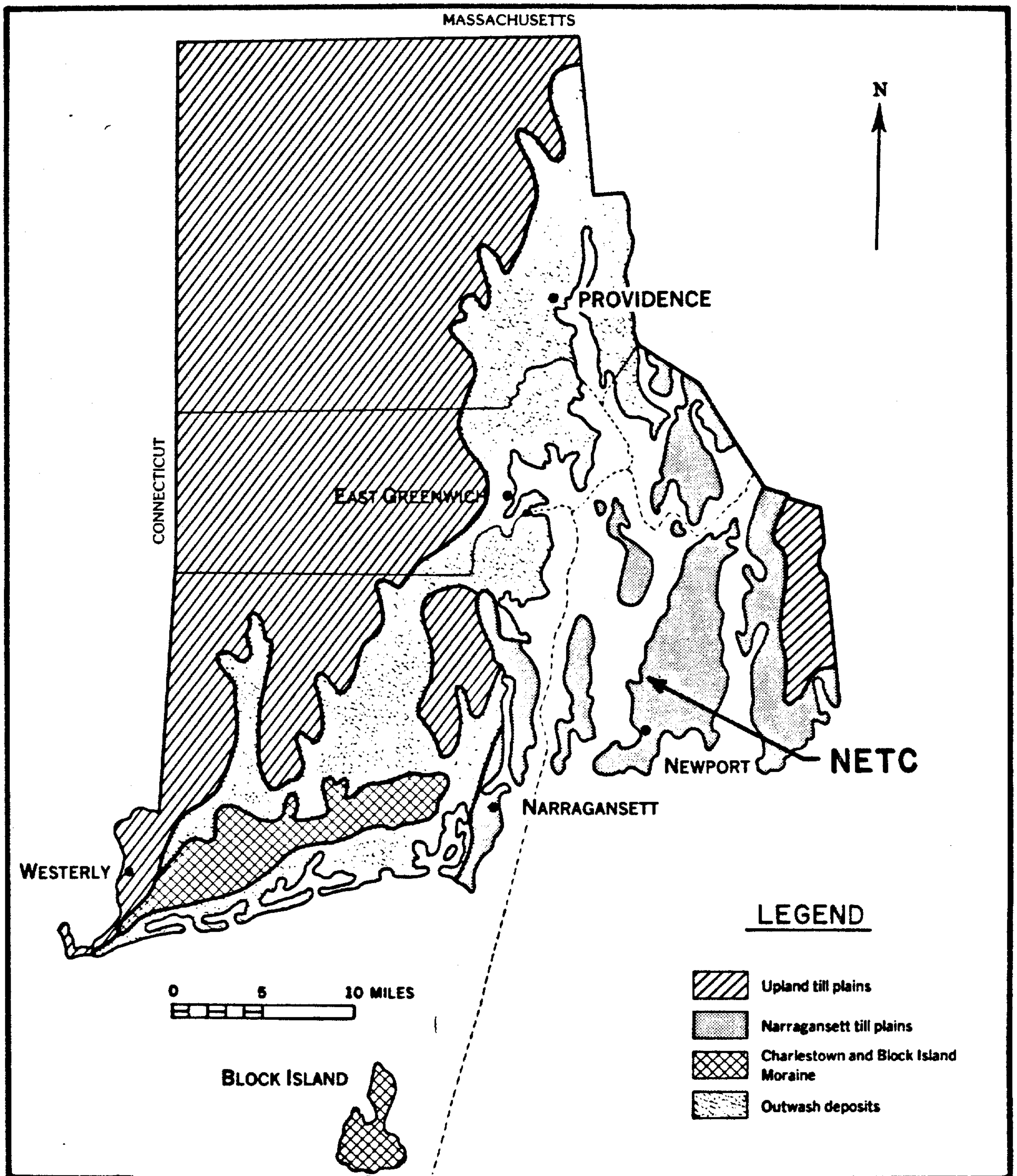


FIGURE 5.3-1
GENERAL PHYSIOGRAPHY AND GLACIAL GEOLOGY OF RHODE ISLAND

Source: SCS Soil Survey of Newport County

5.3.3 Geology

NETC is located at the southeastern end of the Narragansett Basin. This basin is a complex synclinal mass of Pennsylvanian aged sedimentary rocks and is the most prominent geologic feature in eastern Rhode Island and adjacent Massachusetts. Narragansett Basin is an ancient north to south trending structural basin originating near Hanover, Massachusetts. The basin has a length of approximately 55 miles and varies from 15 to 25 miles wide. The western margin of the basin is in the western portion of Providence, Rhode Island, and the eastern margin runs through Fall River, Massachusetts. Exposures of older rocks on Conanicut Island and in the vicinity of Newport suggest that the southern extent of the basin is near the mouth of Narragansett Bay.

The rocks of the Narragansett Basin are non-marine sedimentary rocks of Pennsylvanian age. The rocks are chiefly conglomerates, sandstones, shales, and anthracite. Total thickness of the strata in the Narragansett Basin has been estimated at 12,000 feet. Both vertical and lateral irregularities in the lithologic character of the rock are present within the basin. Many folds and some faults occur throughout the basin, but the character and amount of the folding and faulting are not clearly known. The sedimentary rocks of the basin are believed to have been deposited in a lowland area which was surrounded by an upland area of considerable relief. The presence of coal beds within the basin also indicates that there were fairly extensive swampy areas. Figure 5.3-2 shows a general geologic map of Rhode Island.

The bedrock of the Narragansett Basin has been divided into the following five units: the Rhode Island Formation, Dighton Conglomerate, Wansulta Formation, Pondville Conglomerate, and Felsite at Diamond Hill. At NETC and most of the surrounding area, the bedrock is entirely of the Rhode Island Formation, and thus, only this unit will be examined in detail. Figure 5.3-3 represents a detailed look at the geology at NETC and the surrounding areas.

The Rhode Island Formation is the most extensive and thickest of the Pennsylvanian formations in Rhode Island. The vast majority of the Narragansett Basin is underlain by this formation. Included within the Rhode Island Formation are fine to coarse conglomerate, sandstone, lithic graywacke, graywacke, arkose, shale and a small amount of meta-anthracite and anthracite. Most of the rock is gray, dark gray, and greenish, but the shale and anthracite are often black. Crossbedding and irregular, discontinuous bedding is characteristic of the formation. Rocks of the Rhode Island Formation, which are in the northern portions of the basin, are strong and indurated but are not metamorphosed. However, those rocks in the southern portion of the basin, such as at NETC, are metamorphosed, and these rocks contain quartz-mica schist, feldspathic quartzite, garnet-stacrolite schist, and some quartz-mica-sillimanite schist. The beds of meta-anthracite and anthracite are mostly thin, but many areas within the basin have been mined. Vein quartz, fibrous quartz, and pyrite are commonly associated with these coal layers, and the ash content is high.

Within the Rhode Island Formation, there are a few areas of thick conglomerates. These conglomerate layers are gray to greenish in color

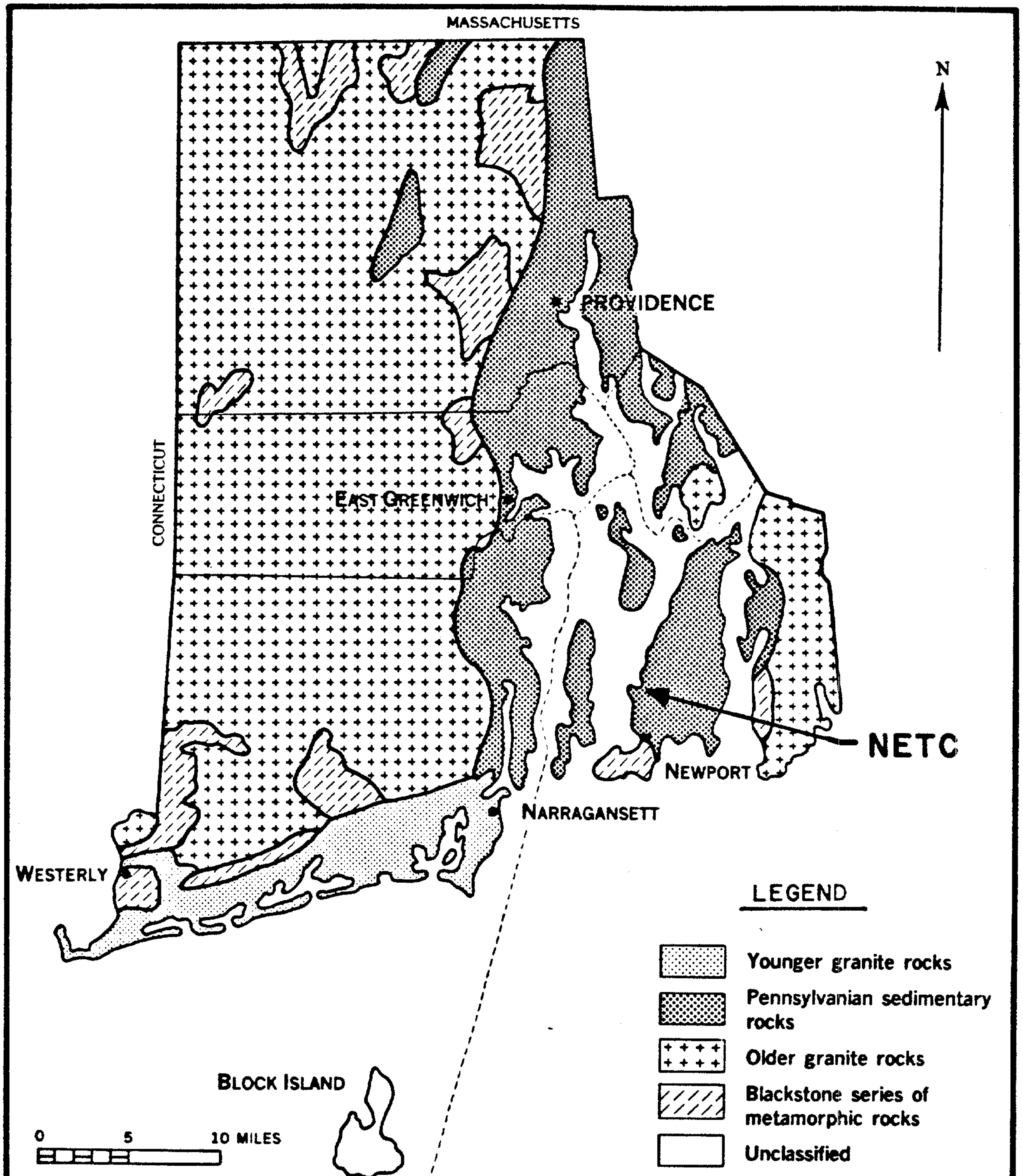
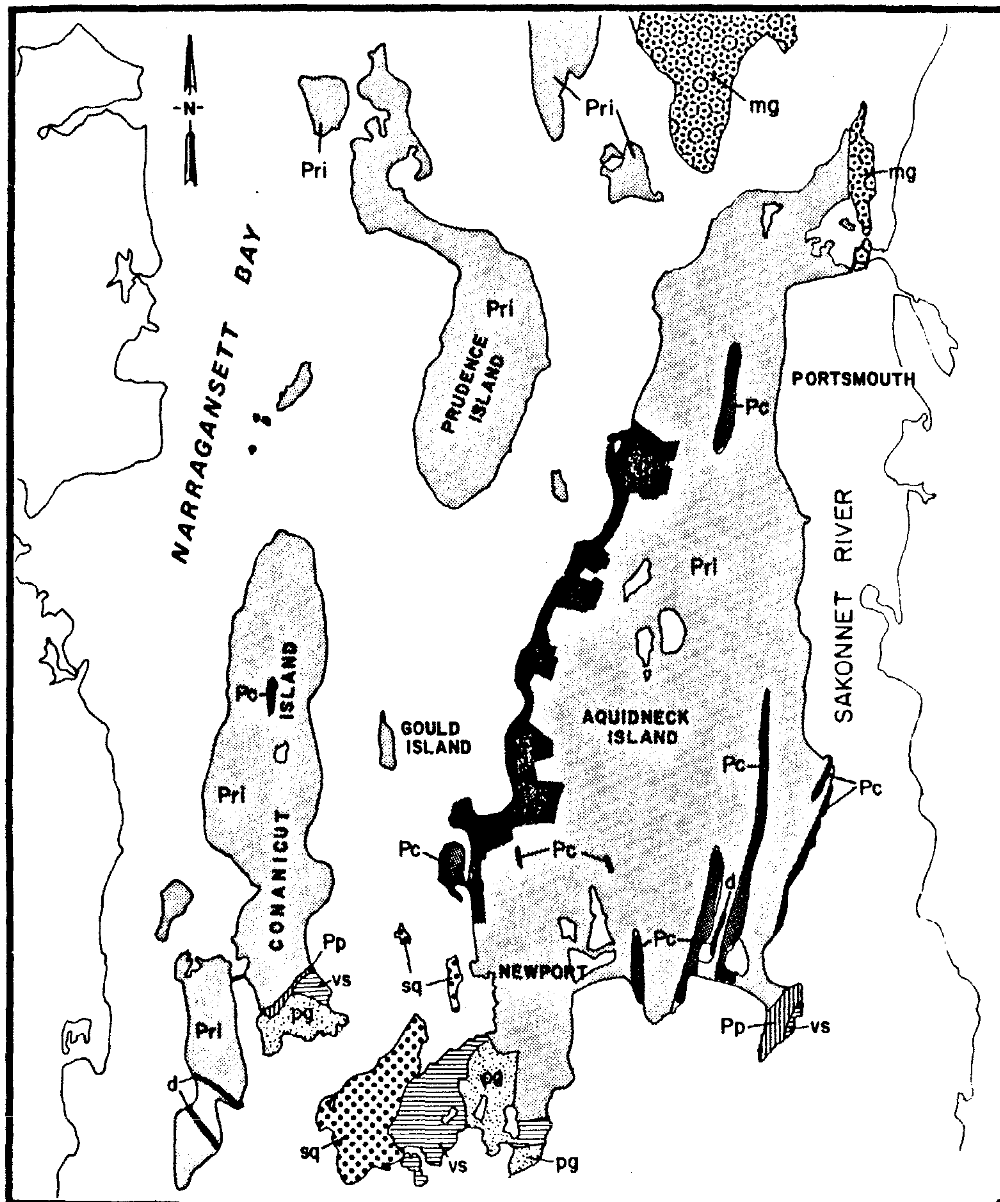


FIGURE 5.3-2
GENERAL GEOLOGIC MAP OF RHODE ISLAND

Source: SCS Soil Survey of Newport County



Mafic dikes and sills

d- - Dark-gray to black, fine-grained dikes and sills, in widely different parts of Rhode Island. Several are diabase and olivine diabase; a few are lamprophyres; some are altered and may be pre-Pennsylvanian; most are a foot or a few feet thick and are exposed for only a few feet.

Rhode Island Formation

Pri - Gray to dark-gray, fine- to coarse-grained sandstone and lithic graywacke, and dark-gray to black shale; also includes conglomerate and meta-anthracite; crossbedding and irregular discontinuous bedding characteristic; plant fossils abundant in a few places; in sowthwest includes quartz-mica schist, feldspathic quartzite, garnet-staurolite schist, and quartz-mica-sillimanite schist.

Pc - Gray coarse conglomerate, with pebbles, cobbles, and boulders chiefly of quartzite, interbedded with gray coarse-grained, crossbedded sandstone and lithic graywacke; pebbles and boulders much elongated in southeastern Rhode Island.

Pondville Conglomerate

Pp - Light-gray to gray or greenish, coarse- to fine-grained conglomerate, with irregularly interbedded sandstone and lithic graywacke; gray granule conglomerate in southeast; present discontinuously at margins of Narragansett basin.

Porphyritic Granite at Newport and Conanicut Island

pg - Grayish-pink to grayish-green, coarse-grained porphyritic granite, large phenocrysts of microcline and microperthite; main constituents are microperthite, microcline, albite, quartz, hornblende, biotite, chlorite, and epidote.

Metacom Granite Gneiss

mg - Gray to pink, medium-grained granite gneiss, locally porphyritic; lineated with streaks of biotite, locally foliated, consists chiefly of microcline and microperthite, albite, quartz, biotite, and muscovite; small aplite dikes and quartz veins common.

Volcanic Tuff, Conglomerate and Quartzite of Newport Vicinity

vs - Mostly dark-gray, dense flinty to fine-grained, felsic metavolcanic rocks that weather light gray to greenish gray; probably contains tuff, lapilli tuff, volcanic sandstone and volcanic siltstone; some more massive beds may be flows. Some conglomerate beds near base, as much as 50 feet thick, contain pebbles of quartzite, quartz, granite and volcanic rocks; a few thin lenses of white to gray marble near base.

Slate and Quartzite of Newport Vicinity

sq - Greenish-gray, green, gray-green, purplish-red, and reddish-purple alternating thin beds of slate and fine- to coarse-grained quartzite; quartzite commonly has cross bedding and graded bedding. Locally thin beds of conglomerate, light-gray quartzite, and lenses of fine-grained marble.

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FIGURE 5.3-3

BEDROCK GEOLOGY MAP OF NETC AREA

Source: Geological Survey Bulletin 1295 (Quinn, 1971) and are mostly very coarse. These conglomerates consist of pebbles, cobbles, and boulders (up to several feet long), interbedded with sandstone and graywacke. The stones are predominantly quartzite and have been elongated as a result of tectonic forces in the southern portion of the basin. These thick conglomerate layers are more resistant to erosion than are the surrounding rocks and thus, are topographically higher. Coasters Harbor Island is mostly covered with this conglomerate material.

Througout the Narragansett Basin, the Pennsylvanian rocks are underlain by pre-Pennsylvanian igneous and metamorphic rocks such as Bulgarmarch granite, Metacom granite gneiss, porphyritic granite and slate and quartzite. For the most part, these basement rocks are deeply buried beneath the Pennsylvanian rocks. However, these older rocks occur north of NETC in the Bristol area and south of NETC in the Fort Adams and Newport Neck areas and on the southern tip of Conanicut Island. Rose Island and Goat Island also have older metamorphic rocks of slate and quartzite.

Overlying the Pennsylvanian rocks of the Narragansett Basin are surficial deposits of Pleistocene sediments. These Pleistocene sediments owe their origin to the Wisconsin glaciation which covered the area with ice several thousand feet thick. As the glaciers receded some 10,000 to 12,000 years ago, they deposited unconsolidated glacial materials of variable thicknesses throughout the Narragansett Basin area. The unconsolidated glacial material ranges from 1 to 150 feet thick, being thicker in the valleys and thinner in the uplands. The glacial material consists of till, sand, gravel, and silt. These glacial deposits were derived from shale, sandstone, conglomerate, and in a few places, coal. The glacial materials serve as the parent materials for the soils in the area. Areas where sand and gravel were deposited serve as important regional mineral sources.

Much of the geologic information contained in this section was obtained from Geological Survey Bulletin 1295 (Quinn, 1971).

5.3.4 Soils

The soils in the area of NETC formed in glacial deposits of till and outwash. The glacial till consists of a mixture of unsorted particles ranging in size from large boulders to clay particles, whereas the glacial outwash is stratified deposits of sand, gravel and cobbles laid down by streams as the glaciers melted. The glacial deposits overlie the bedrock at a depth ranging from 1 to 150 feet. These glacial deposits were derived mainly from shale, sandstone, and conglomerates.

There are also a few areas with tidal marsh soils along the shores of Narragansett Bay. These tidal marsh areas receive deposits of silt and clay during tidal inundation and from upland areas. These sediments are deposited along with the plant remains of the salt tolerant plants growing in the marshes.

Figure 5.3-4 represents a detailed soils map of the NETC area. A description of each of the soils occurring at NETC, taken from the Soil Survey of Rhode Island, follows.

5.3.4.1 Adrian Muck - This nearly level, very poorly drained soil is in depressions and small drainageways of glacial till uplands and outwash plains. Slopes are dominantly less than 2 percent.

Typically the surface layer is black muck 20 inches thick. The substratum extends to a depth of 60 inches or more. It is gray, fine sand to a depth of 22 inches and grayish brown, gravelly sand at a depth of more than 22 inches.

The permeability of this soil is rapid. Available water capacity is high. Runoff is very slow, and water is ponded in some areas. A few areas adjacent to streams are subject to flooding. The surface layer is strongly acid through slightly acid. This soil has a high water table at or near the surface most of the year.

5.3.4.2 Beaches - These nearly level to gently sloping areas are along the shore of the ocean. They consist of sand dunes or escarpments and of sandy, gravelly, and cobbly areas that are exposed during low tide. Areas are long and narrow, are unprotected from the ocean and are subject to severe erosion during storms. Slopes range from 0 to 8 percent.

5.3.4.3 Mansfield Mucky Silt Loam - This nearly level, very poorly drained soil is in depressions and small drainageways of drumlins. Slopes range from 0 to 3 percent but are dominantly less than 2 percent.

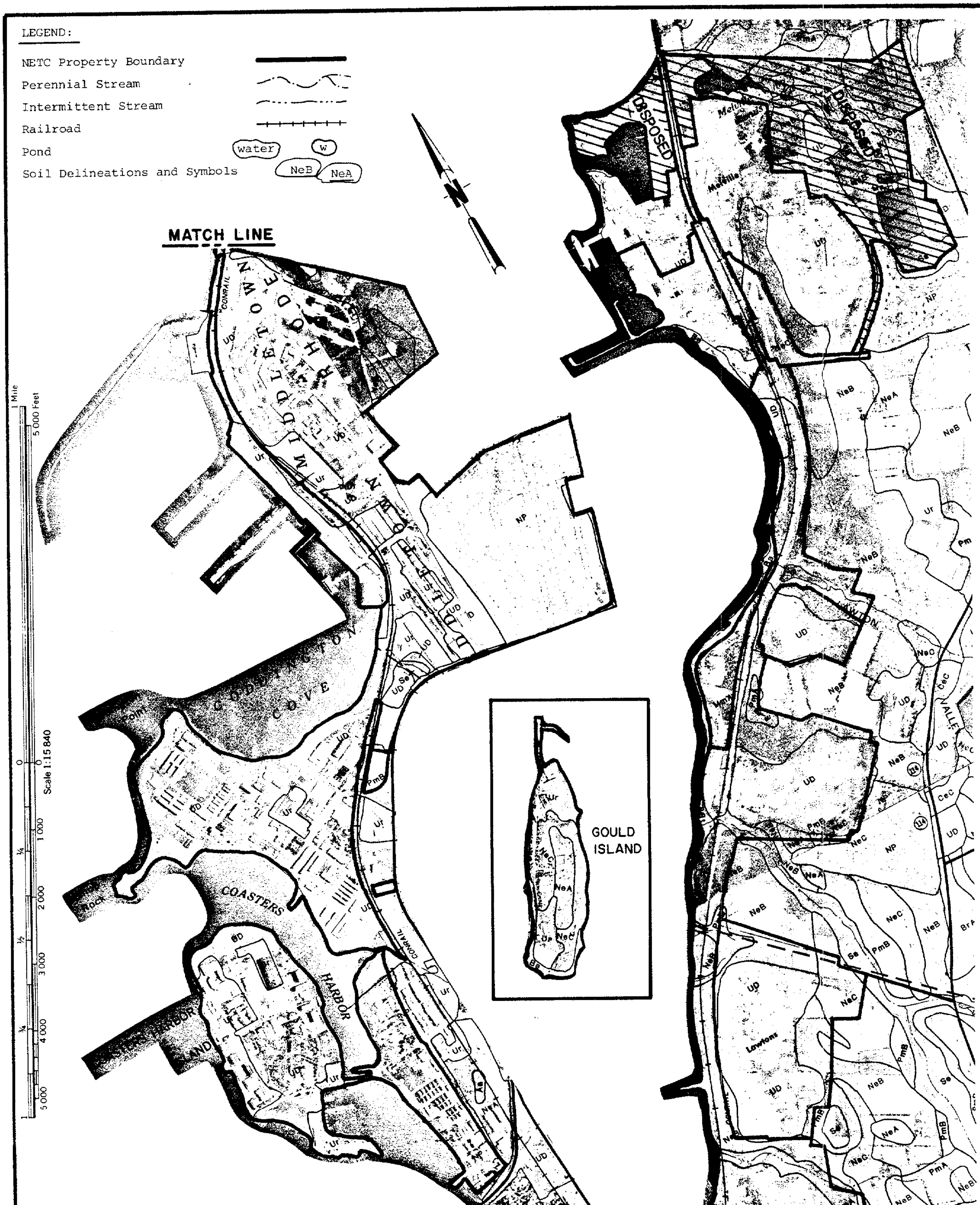
Typically the surface layer is black mucky silt loam about 8 inches thick. The subsoil is dark gray silt loam 7 inches thick. The substratum is dark gray and olive gray channery silt loam to a depth of 60 inches or more.

The permeability of this soil is moderate in the surface layer and subsoil and slow or very slow in the substratum. Available water capacity is moderate, and runoff is slow. This soil has a seasonal high water table at or near the surface from late fall through midsummer. The soil is extremely acid through medium acid.

5.3.4.4 Matunuck Mucky Peat - This nearly level, very poorly drained soil is in tidal marshes and is subject to tidal inundation. Most areas are in salt marshes. Slopes are dominantly less than 1 percent.

Typically this soil has a surface layer of very dark gray mucky peat 12 inches thick. The underlying material is gray sand to a depth of 60 inches or more.

The permeability of this soil is rapid in the surface layer, rapid to very rapid between depths of about 12 and 18 inches. Available water capacity is low. Runoff is very slow, and water is ponded on some areas. The soil is strongly acid through neutral.



Symbol	Name
Aa	Adrian muck
Ba	Beaches
Ma	Mansfield mucky silt loam
Mk	Matunuck mucky peat
MmA	Merrimac sandy loam, 0-3% slopes
NeA	Newport silt loam, 0-3% slopes
NeB	Newport silt loam, 3-8% slopes
NeC	Newport silt loam, 8-15% slopes
NP	Newport-Urban land complex
PmA	Pittstown silt loam, 0-3% slopes
PmB	Pittstown silt loam, 3-8% slopes
PsB	Poquonock loamy fine sand, 3-8% slopes
Se	Stissing silt loam
UD	Udorthents-Urban land complex
Ur	Urban land
WgB	Windsor loamy sand, 3-8% slopes

Source: SCS Soil Survey of Newport County

FIGURE 5.3-4

SOILS MAP

MATCH LINE

5.3.4.5 Merrimac Sandy Loam (0 to 3 percent slopes) - This nearly level, somewhat excessively drained soil is on outwash plains and terraces. Typically the surface layer is dark brown sandy loam about 8 inches thick. The subsoil is yellowish brown and dark yellowish brown sandy loam 17 inches thick. The substratum is light yellowish brown gravelly sand to a depth of 60 inches or more.

The permeability of this soil is moderately rapid in the surface layer and upper part of the subsoil, moderately rapid to rapid in the lower part of the subsoil, and rapid in the substratum. Available water capacity is moderate, and runoff is slow. The soil is extremely acid through medium acid.

5.3.4.6 Newport Silt Loam (0 to 3 percent slopes) - This well drained soil occurs on the crests and side slopes of drumlins and glacial till plains on slopes of from 0 to 15 percent. Typically the surface layer is very dark brown silt loam 8 inches thick. The subsoil is olive brown and olive silt loam 16 inches thick. The substratum is olive gray channery silt loam to a depth of 60 inches or more.

The permeability of this soil is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. Available water capacity is moderate, and runoff is medium. The soil is very strongly acid through medium acid.

5.3.4.7 Newport-Urban Land Complex - This complex consists of well drained Newport soils and areas of urban land. The complex is on drumlins and glacial till plains of densely populated areas. Slopes are about 6 percent but range from 1 to 15 percent. The complex is about 40 percent Newport soils, 30 percent urban land, and 30 percent other soils. The soil and urban land are so intermingled that it was not practical to map them separately.

Typically the Newport soils have a surface layer of very dark brown silt loam 8 inches thick. The subsoil is olive brown and olive silt loam 16 inches thick. The substratum is olive gray channery silt loam to a depth of 60 inches or more. The permeability of the Newport soils is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. Available water capacity is moderate. Runoff is medium to rapid on the Newport soils. The soils are very strongly acid through medium acid.

Urban land consists of areas that are covered by streets, parking lots, buildings, and other urban structures.

5.3.4.8 Pittstown Silt Loam (0 to 3 percent slopes) - This nearly level, moderately well drained soil is on the crests of glacial upland hills and drumlins. Typically the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is 20 inches thick. It is dark yellowish brown and olive brown silt loam that is mottled in the lower part. The substratum is olive gray, mottled channery silt loam to a depth of 60 inches or more.

The permeability of this soil is moderate in the surface layer and subsoil and slow in the substratum. Available water capacity is moderate, and runoff is slow. This soil has a seasonal high water table at a depth of about 20 inches from late fall through midspring. The soil is very strongly acid through medium acid.

5.3.4.9 Pittstown Silt Loam (3 to 8 percent slopes) - This gently sloping, moderately well drained soil is on side slopes of glacial upland hills and drumlins. Typically the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is 20 inches thick. It is dark yellowish brown and olive brown silt loam that is mottled in the lower part. The substratum is olive gray, mottled channery silt loam to a depth of 60 inches or more.

The permeability of this soil is moderate in the surface layer and subsoil and slow in the substratum. Available water capacity is moderate, and runoff is medium. This soil has a seasonal high water table at a depth of about 20 inches from late fall through midspring. The soil is very strongly acid through medium acid.

5.3.4.10 Poquonock Loamy Fine Sand (3 to 8 percent slopes) - This gently sloping, well drained to somewhat excessively drained soil is on side slopes of drumlins and glacial till uplands. Typically the surface layer is dark brown loamy find sand about 8 inches thick. The subsoil is 20 inches thick. The upper 10 inches are dark yellowish brown loamy find sand, and the lower 10 inches are light olive brown loamy sand. The substratum is dark gray and gray gravelly loam to a depth of 60 inches or more.

The permeability of this soil is rapid in the surface layer and subsoil and slow to very slow in the substratum. Available water capacity is slow, and runoff is medium. The soil is very strongly acid through medium acid.

5.3.4.11 Stissing Silt Loam - This nearly level, poorly drained soil is on glacial upland hills and drumlins. Slopes range from 0 to 3 percent. Typically the surface layer is very dark gray silt loam about 8 inches thick. The subsoil is dark grayish brown, mottled silt loam 7 inches thick. The substratum is dark gray, mottled silt loam to a depth of 60 inches or more.

The permeability of this soil is moderate in the surface layer and subsoil and slow in the substratum. Available water capacity is moderate, and runoff is slow. This soil has a seasonal high water table near the surface from late fall through spring. The soil is extremely acid through medium acid.

5.3.4.12 Udorthents-Urban Land Complex - This complex consists of moderately well drained to excessively drained soils that have been disturbed by cutting or filling, and areas that are covered by buildings and pavement. The areas are mostly larger than 5 acres. The complex is about 70 percent Udorthents, 20 percent urban land, and 10 percent other soils. Most areas of these components are so intermingled that it was not practical to map them separately.

Udorthents are in areas that have been cut to a depth of 2 feet or more or are on areas with more than 2 feet of fill. Udorthents consist primarily of moderately coarse textured soil material and a few small areas of medium textured material.

Most cut areas were used as a source of fill material, but in some areas, cuts were made in order to level sites for buildings, recreational facilities, and roads. Most of the filled areas were built up and leveled for urban development. In some areas, fill has been used to build up recreational areas and highways.

The permeability and stability of this unit are variable. The unit requires on-site investigation and evaluation for most uses.

5.3.4.13 Urban Land - These areas consist mostly of sites for buildings, paved roads, and parking lots. Most areas are in intensely built-up areas. The areas are mostly rectangular and range from 5 to 100 acres. Slopes range from 0 to 10 percent but are dominantly 0 to 5 percent.

Areas of this unit require on-site investigation and evaluation for most land use decisions. Capability subclass and woodland group not assigned.

5.3.4.14 Windsor Loamy Sand (3 to 8 percent slopes) - This gently sloping, excessively drained soil is on terraces, outwash plains, kames, and eskers. Areas are irregular in shape and range from 2 to 100 acres.

Typically the surface layer is very dark grayish brown and gray loamy sand 2 inches thick. The subsoil is dark yellowish brown and yellowish brown loamy sand 26 inches thick. The substratum is light brownish gray fine sand to a depth of 60 inches or more.

The permeability of this soil is rapid. Available water capacity is low, and runoff is medium. The soil is very strongly acid through medium acid in the surface layer and subsoil and very strongly acid through slightly acid in the substratum.

5.3.5 Hydrology

5.3.5.1 Surface Water - NETC is located within the Narragansett Bay Drainage Basin which is shown in Figure 5.3-5. This drainage basin covers an area of 1,850 square miles, 1,030 square miles of which are in Massachusetts and 820 square miles of which are in Rhode Island. All surface water drainage from the basin is into Narragansett Bay. Three major rivers, the Taunton, Blackstone, and Pawtucket, as well as the Providence River and a number of smaller rivers and streams, drain into Narragansett Bay. Discharge from Narragansett Bay is into the Atlantic Ocean between Point Judith and Sakonnet Point in Rhode Island.

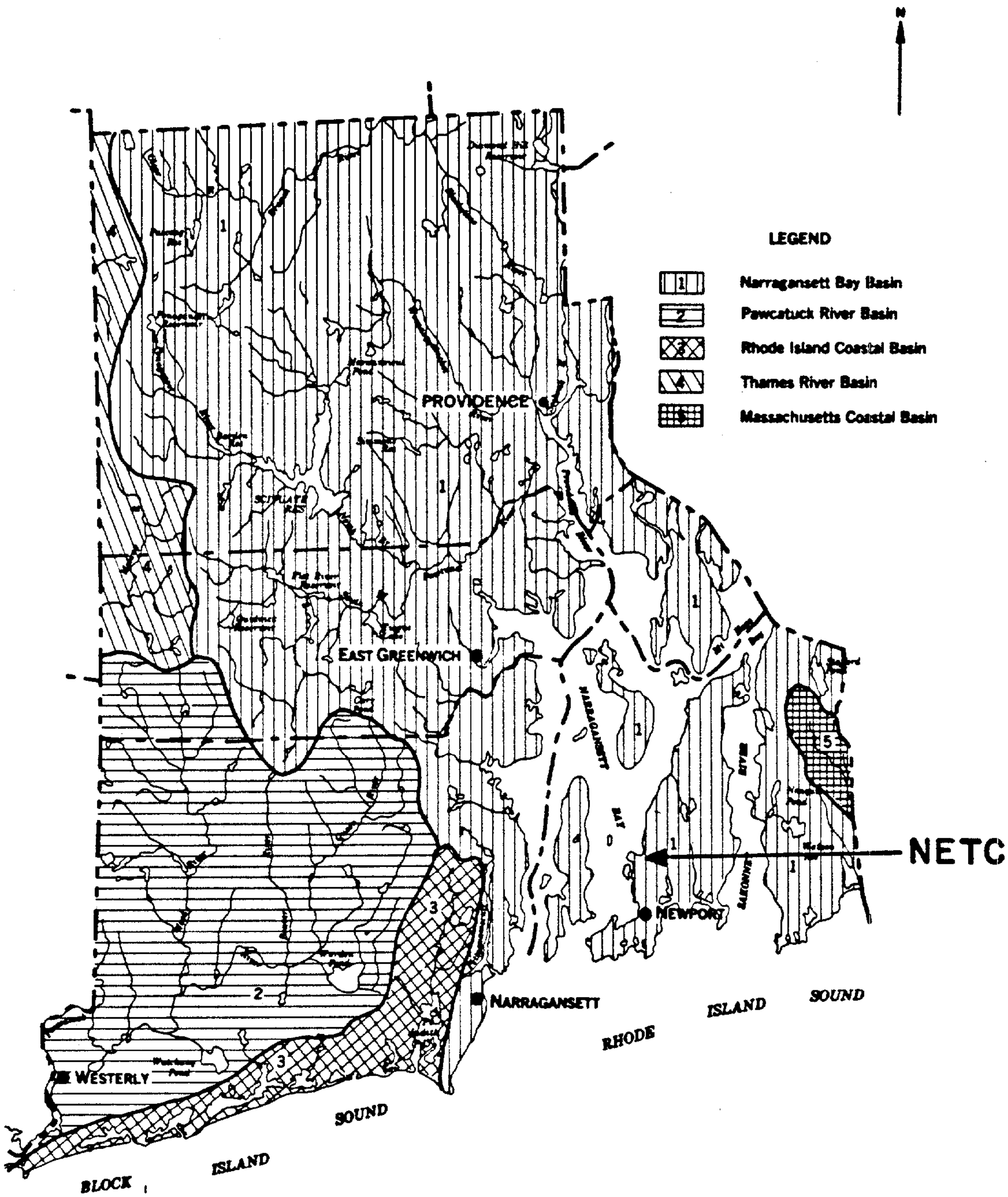


FIGURE 5.3-5
DRAINAGE BASIN MAP OF RHODE ISLAND

Source: SCS Soil Survey of Newport County

Throughout NETC, the surface drainage is westward toward Narragansett Bay with the exception of one area in Tank Farm #2 which drains eastward into Melville Reservoir. Surface drainage at NETC is provided by the Melville Ponds, Normans Brook, Lawton Brook and Reservoir, Gomes Brook, a stream and pond in the northeastern portion of NUSC, and a stream discharging into Coasters Harbor. The surface drainage for NETC is shown in Figure 5.3-6. All these streams discharge directly into Narragansett Bay.

The Melville Ponds receive surface drainage from portions of Tank Farms #1 and #2 and from the Navy housing in Melville North. Lawton Brook receives drainage from portions of Tank Farm #3, while portions of Tank Farm #4 drain into Normans Brook. Gomes Brook receives drainage from portions of Tank Farm #5.

Except for the stream and pond at NUSC and the stream which empties into Coasters Harbor, all of the other streams and ponds are on land which is being excessed by the Navy. The Melville Ponds have been disposed of by GSA and are now part of the Melville Public Fishing Area.

While these streams and ponds receive drainage from many of the areas within NETC, a substantial portion of the NETC area drains directly into Narragansett Bay or infiltrates into the soil before reaching a stream or body of water. Direct runoff into Narragansett Bay would especially occur following thunderstorms.

5.3.5.1.1 Narragansett Bay Estuary: Narragansett Bay occupies three former river valleys which have been drowned by the advance of the Atlantic Ocean. Narragansett Bay is 20 miles long and 11 miles wide. The bay has a surface area of 102 square miles. Figure 5.3-7 shows Narragansett Bay and the surrounding areas. The shape of the former river valleys has changed little since the last glaciation. The bay is divided into an eastern and western passage by Conanicut Island. The average depth of the bay is 30 feet. In the western passage, the average depth is 25 feet, while in the eastern passage, the average depth is 50 feet. The eastern passage, which NETC fronts, allows deep water access up to the south end of Prudence Island. Channel depth exceeds 80 feet in the eastern passage from Gould Island seaward, and depths in excess of 150 feet occur near the mouth of the bay.

Freshwater flows into the bay at an average rate of 1,239 cubic feet per second from a drainage area of 1,850 square miles. This accounts for 90 percent of the annual flow of fresh water into the bay. The other 10 percent is provided by direct rainfall into the bay and sewage effluent. An average of some 43 inches per year of precipitation falls directly into the bay. The freshwater input into the bay is small compared to the large volume of saline water in the bay. The relatively small freshwater input into the bay results in the bay water being well mixed with only small salinity gradients through the bay. Salinities range from about 22 parts per thousand (ppt) in the Providence River to 32 ppt at the mouth of the bay.

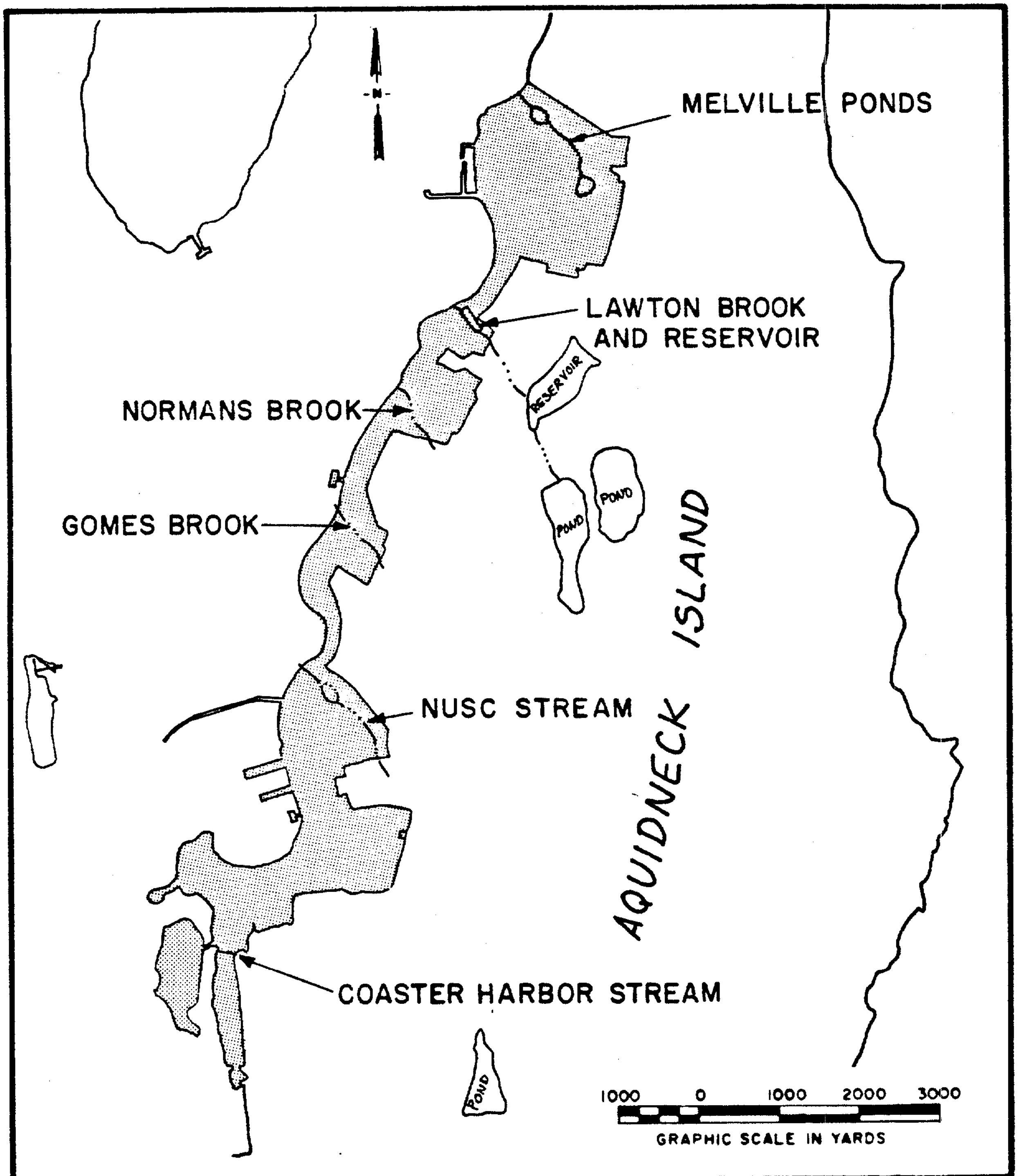


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FIGURE 5.3-6

NETC SURFACE DRAINAGE

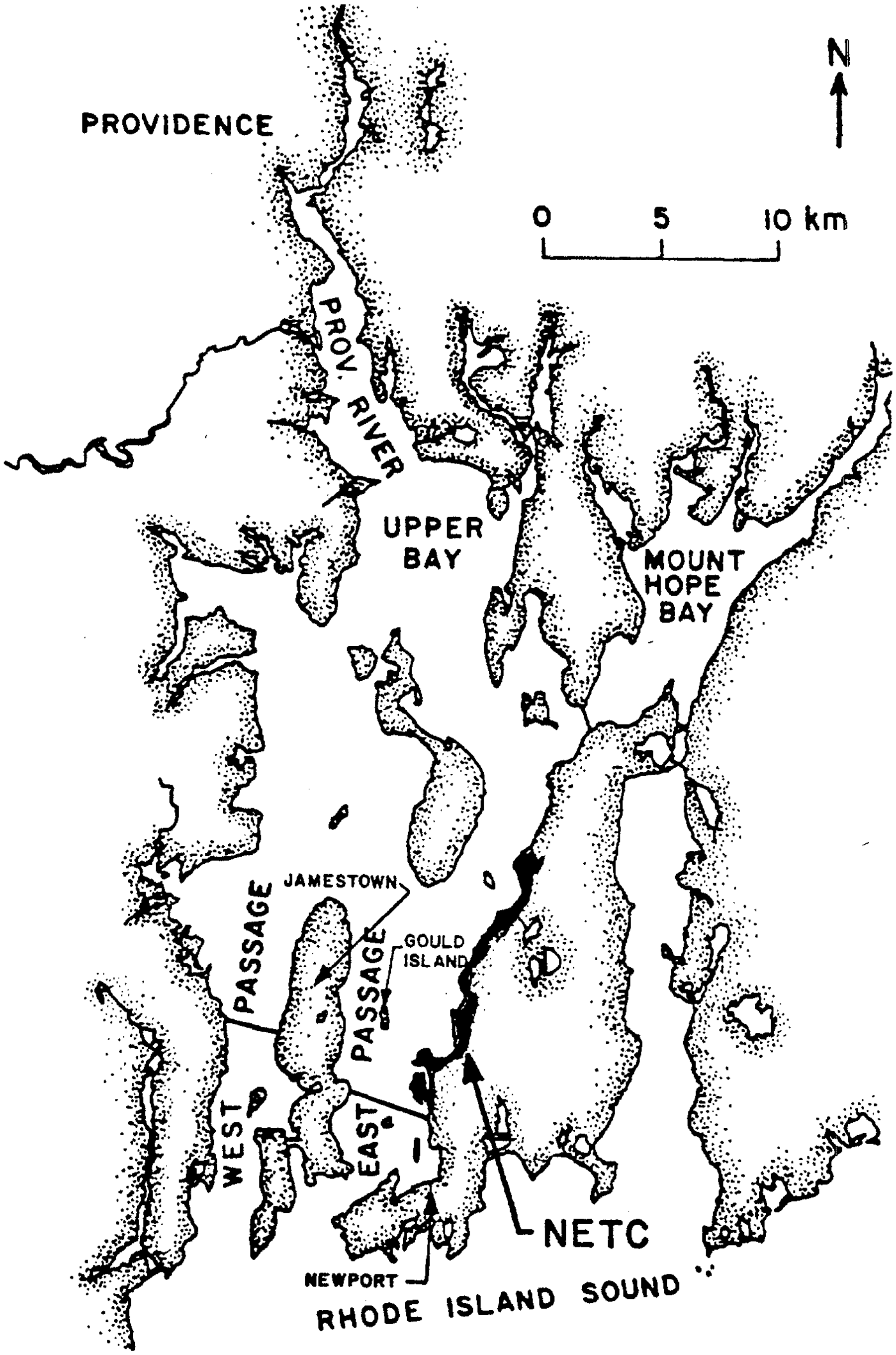

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FIGURE 5.3-7

NARRAGANSETT BAY

Source: 1982 Draft EIS for Homeporting at NETC

Tides are semi-diurnal in Narragansett Bay with a mean range of 3.6 feet at the mouth of the bay and 4.6 feet at the head. About 13 percent of the volume of water in the bay is exchanged each tidal cycle (Oviatt and Nixion, 1975). This is over 250 times the mean tidal river flow into the bay during a tidal cycle. The tidal movement is the single most important factor in water circulation in the bay. Tidal currents range in velocity from 0.07 to 2.3 feet per second (Atlantis Scientific, 1982). The faster velocities occur in the east and west passages near the mouth of the bay, while slower velocities occur in the upper bay.

Non-tidal current in the bay moves slowly at an average of 0.34 feet per second (Olsen, 1980). Although the non-tidal currents are slow, they are important in the exchange of water out of the bay and into Rhode Island Sound. The amount of time needed to transport a particle of water from Providence to the mouth of the bay is some 45 to 50 days (Olsen, 1980). However, this time can vary depending on the winds. Research seems to indicate that southeast winds blowing up the bay may prevent surface waters from flowing down the bay (Olsen, 1980).

Over most of the bay floors, thick glacial deposits are buried beneath up to 50 feet of sediments. These sediments are predominantly sand, gravel, silt, and clay. The sediments near the mouth of the bay are more sandy than those in the upper bay which have more silt and clays. This is a reflection of the current velocities in the bay.

The sediments in the bay are contaminated with heavy metals, hydrocarbons, and sewage sludge (Master Plan, 1980). A survey conducted by EPA (EPA, 1975) has shown the presence of heavy metal concentrations in the sediments in interstitial waters north of the Naval Complex. The values found were 7,048 mg/l manganese, 2,351 mg/l zinc, 559 mg/l iron, 55 mg/l lead, 46 mg/l nickel, 44 mg/l copper, and less than 1 mg/l cadmium. These contaminants are the result of industrial and municipal discharges into the bay. No sediment samples have been taken in the area of the Naval Complex.

The water quality for Narragansett Bay as determined by the State of Rhode Island is shown in Figure 5.3-8. Most of the bay is Class SA, which means it it suitable for direct shellfish harvesting, bathing and other water contact sports. Areas classified as SB are suitable for shellfish harvesting after deporation and for bathing and other recreational activities. Areas classified as SC are suitable for fish, shellfish, and wildlife habitat areas, but the shellfish cannot be harvested. The entire shoreline of NETC is closed to shellfishing.

5.3.5.2 Groundwater - Many areas on Aquidneck Island, on which NETC is located, obtain their water supply from wells. Areas relying on groundwater are mostly north of the Middletown area, but there are wells throughout the entire island. Most groundwater is used for domestic needs, although some is used by small industries and businesses.

Groundwater on Aquidneck Island is obtained from the unconsolidated glacial deposits of till and outwash and from the underlying Pennsylvanian bedrock. Throughout the area, depth to groundwater ranges from less than

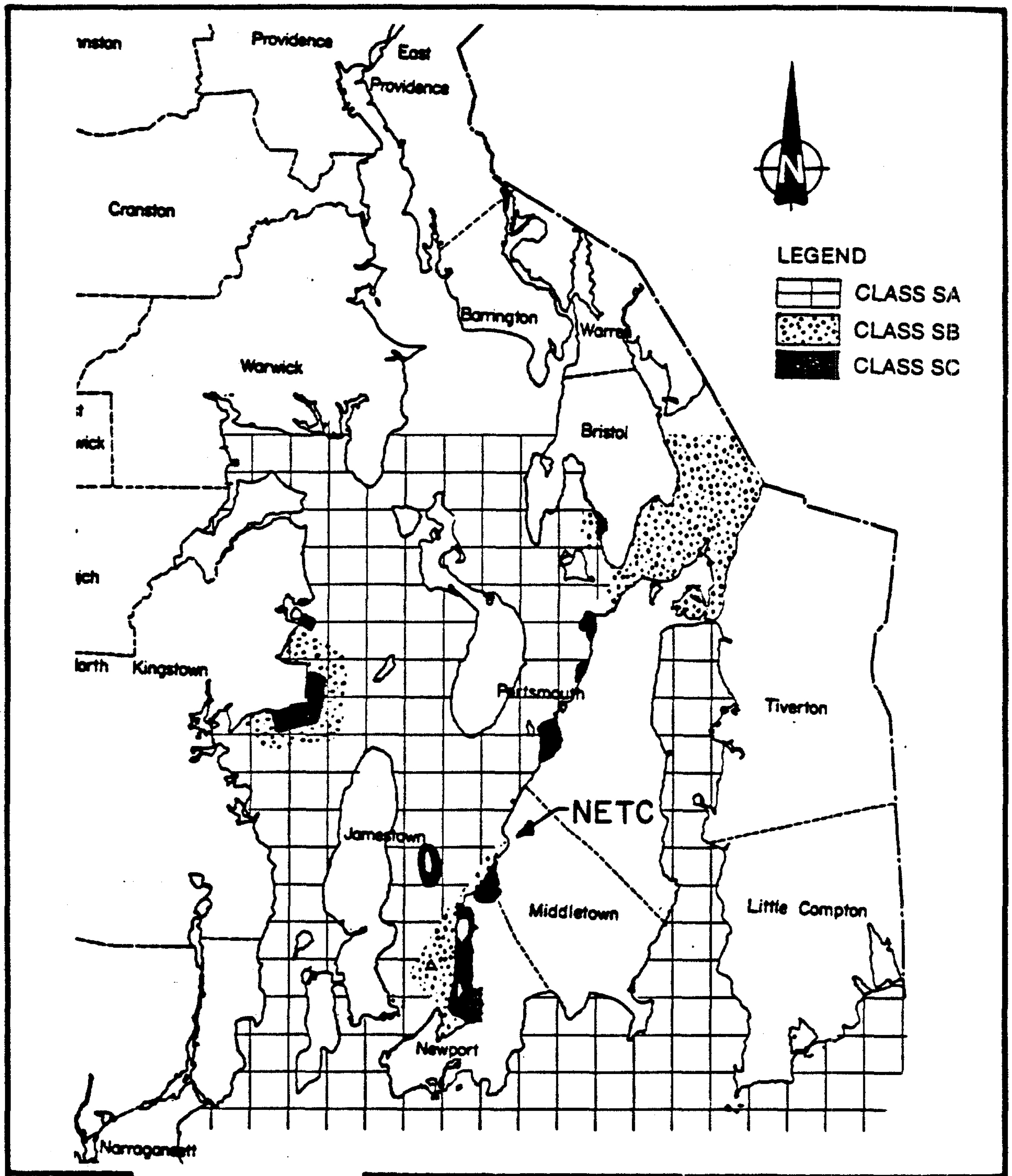

FIGURE 5.3-8
WATER QUALITY OF NARRAGANSETT BAY

Source: 1982 Draft EIS for Homeporting at NETC

one foot to about 30 feet, depending upon the topographic location, time of year, and character of subsurface deposits. The average depth to the groundwater is around 14 feet on Aquidneck Island and moves from areas of high elevations to Narragansett Bay or the Sakonnet River.

Seasonal water level fluctuations are common in the area. These fluctuations range from less than 5 feet to as much as 20 feet on the hills. In the valleys and lowland areas, the fluctuations are generally less than 5 feet. During the late spring and summer, the water table usually declines as a result of evaporation and the uptake of water by plants, and rises during autumn and following winter thaws.

The unconsolidated glacial deposits range in thickness from less than one foot near the rock exposures to about 50 feet throughout Aquidneck Island. Most of the glacial deposits are till, but isolated outwash areas occur. In the NETC area, the glacial deposits are till with a thickness of less than 20 feet. Wells completed in the till are usually dug and range in depth from less than 10 feet to as much as 75 feet. The average depth for these wells is about 20 feet. These dug wells are usually 2 to 3 feet in diameter and are usually dug down to the top of the bedrock.

The yield of till wells varies considerably depending upon the type and thickness of the water-bearing deposits penetrated. Yields range from less than one to as much as 120 gallons per minute. Under normal weather conditions, till wells yield a few hundred gallons of water per day and are adequate for domestic supplies. The large diameter of dug wells also provides substantial water storage area between periods of use. Each foot of water in a 3-foot diameter well represents storage of 53 gallons. However, these wells are subject to going dry during seasonal or unusual droughts.

Bedrock wells in the area range from 14 to 1,300 feet in depth. The average depth for these bedrock wells is 135 feet. Yields from bedrock wells range from less than one to as much as 55 gallons per minute. Most wells yield less than 10 gallons per minute. The yields vary considerably in the bedrock over short distances because the joints and fractures which transmit water to the wells occur intermittently. Joints and fractures are most numerous and widest near the top of the bedrock and become fewer and narrower with depth. Bedrock wells seldom go dry, but yields can be extremely low if not enough fractures and joints occur in the area of the well.

The chemical characteristics of the groundwater are similar throughout the area, and the water is generally satisfactory for most ordinary uses. Most groundwater in the area is soft or only moderately hard, with groundwater from till generally containing less mineral matter and being softer than groundwater from bedrock. Areas where the groundwater has high iron content are scattered throughout the area, being most numerous around Newport and Middletown and the northern part of Portsmouth. Wells which have a high iron content usually penetrate only rocks of Pennsylvanian age.

In scattered locations near the shoreline, overpumping has led to salt water intrusion in some wells. Bedrock wells are not as easily contaminated with salt water as are till wells, but the chance of contamination increases as the depth of the well below sea level increases.

No wells were identified within the boundaries of NETC other than on Gould Island, although there are numerous wells in close proximity. These wells are upgradient of NETC. Wells occurring in the area are shown in Figures 5.3-9 and 5.3-10. While other wells have since been added in the area, these maps provide information as to the depth of wells in the area, depth to bedrock, depth to groundwater, and yields in gallons per minute. This map also shows bedrock outcrop areas, wells high in iron, and wells where salt water intrusion has occurred.

5.3.6 Migration Potential

5.3.6.1 Surface Water - The potential for pollutant migration by surface drainage at NETC is greatly increased by its proximity to Narragansett Bay. Many of the waste disposal areas, such as the McAllister Point landfill, Melville North disposal site and Gould Island disposal site, are located right along the shoreline of Narragansett Bay. Surface drainage from these areas is directly into the bay. The NETC area is frequently subjected to thunderstorms during which intense periods of rainfall are common. Surface drainage into the bay would be greatest following these thunderstorms.

Pollutants from these portions of NETC drain into the Melville Ponds, Normans Brook, Lawton Brook, Gomes Brook, and the NUSC stream and would also migrate off-site. All of the streams discharge directly into Narragansett Bay.

5.3.6.2 Groundwater - The groundwater at NETC is very shallow, being less than 10 feet below the surface in most areas. This shallow depth makes groundwater contamination at NETC very possible. Those pollutants which do find their way into the groundwater would migrate to the west and discharge into Narragansett Bay. NETC extends along the western shoreline of Aquidneck Island, and the groundwater only has to migrate a short distance before discharging into Narragansett Bay.

The soils occurring at NETC have permeabilities which are moderate to moderately rapid, and they do not restrict the vertical movement of water. The glacial till, from which these soils were derived, is generally less permeable than the overlying soils but does not represent a barrier to the vertical migration of water. Therefore, it is possible that any contaminant transported in this water could contaminate the groundwater. There are also isolated areas where the bedrock occurs at the surface. Contamination is possible in these areas through the cracks and fissures which commonly occur in the bedrock.

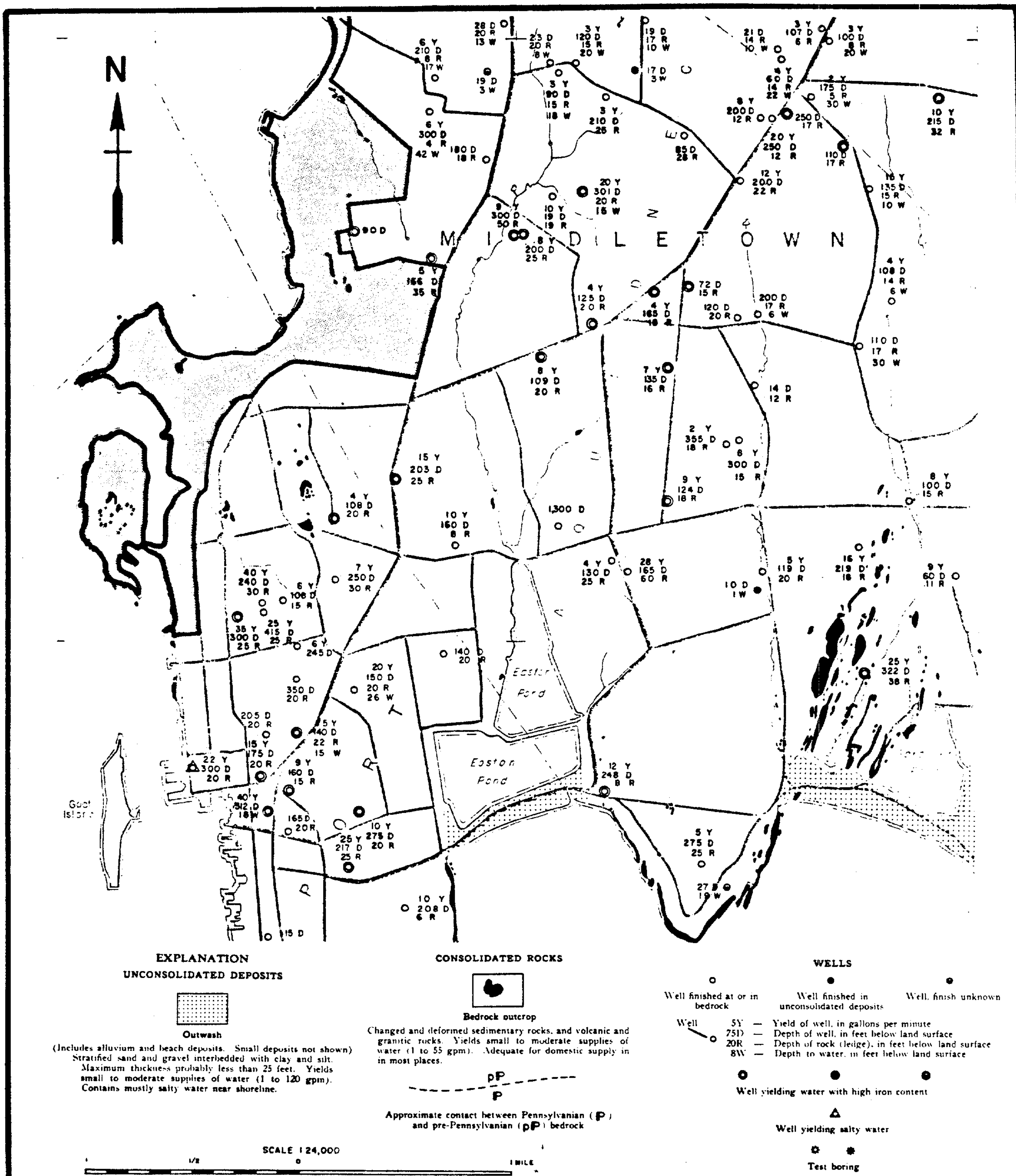

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FIGURE 5.3-9

WELL LOCATIONS

Source: Groundwater Map of Prudence Island and Newport Quadrangles, USGS

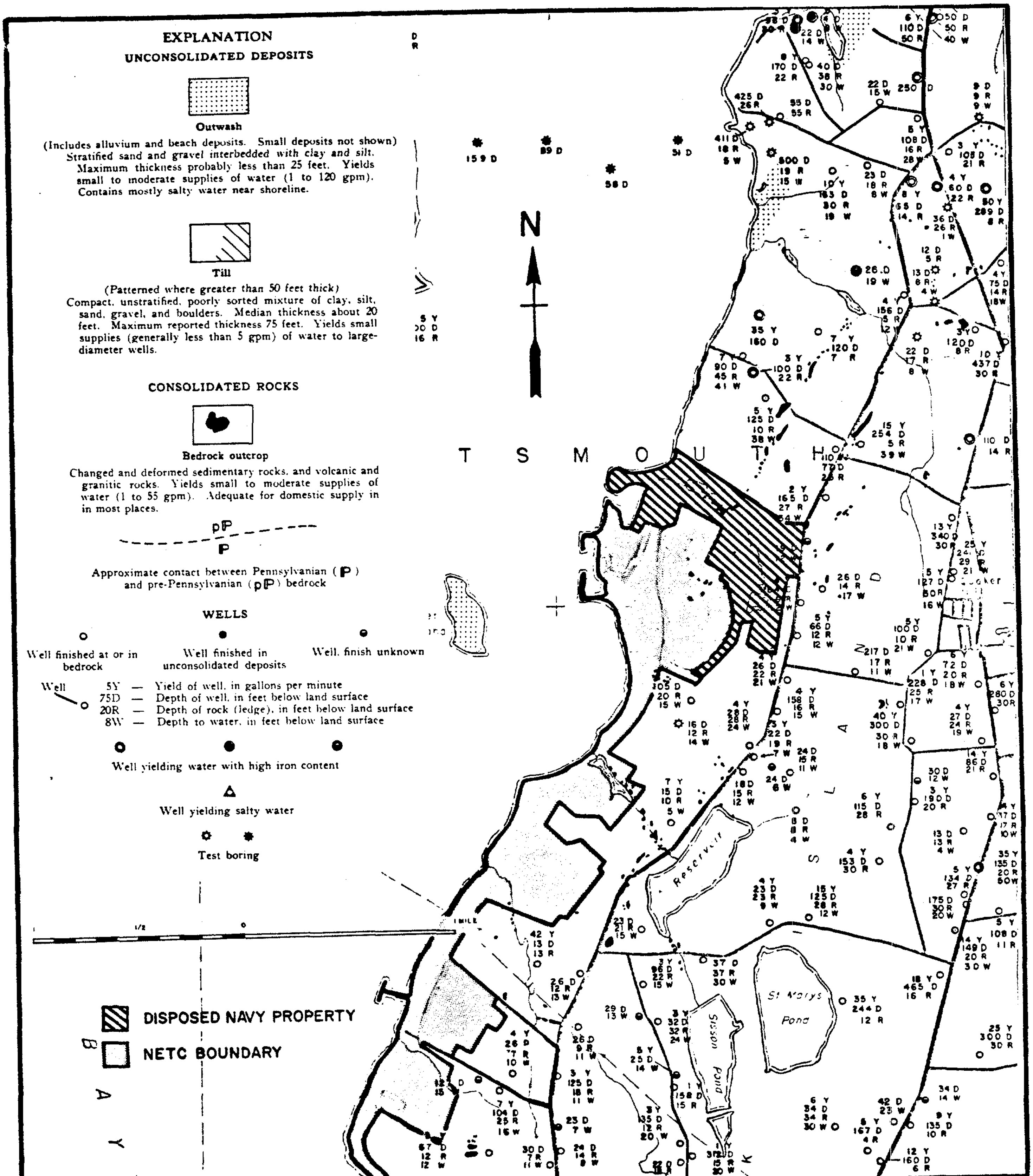

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FIGURE 5.3-10
WELL LOCATIONS

Source: Groundwater Map of Prudence Island and Newport Quadrangles, USGS

5.3.6.3 On-base Migration - The possibility of on-base contaminant migration from off-base sources is not very great at NETC. Most of the surface water and groundwater which is migrating on-site is from residential areas which represent no real contamination threat. The greatest threat of contamination migrating on-site is from the Portsmouth landfill which occurs just off-site of NETC in the Melville North area.

5.4 BIOLOGICAL FEATURES

5.4.1 General

The Naval Education Training Center (NETC) has been in operation as a fleet support facility since World War I. The base extends northward from Newport Along the Narragansett Bay shoreline for approximately 9 miles. The facility also includes Coasters Harbor Island, Gould Island, and Fort Adams.

The southern portion of the base is heavily industrial with machine shops and other support facility operations. The north portion of the base is divided in land usage between residential, vacant (held for expansion), tank farms, and storage-fueling facilities (industrial). There are no land areas on NETC which have not been disturbed at some time during base operations.

Narragansett Bay is a delicate ecosystem which is part of a larger marine and terrestrial system extending from Cape Cod to Cape Hatteras. The bay estuary is an extremely complex and fragile ecosystem. Any change in the physical-chemical parameters of the ecosystem can have deleterious effects.

Industrial wastes and municipal sewage from private sources have been the chief contributors of contaminants to the bay. These problems have been identified, and measures have been taken to improve conditions. The gradual cleanup of discharges and the high flushing rate of the bay have resulted in improved ecosystem conditions.

Narragansett Bay is a valuable recreational, industrial and commercial resource to the entire coastal area of the state. The economic, aesthetic and biologic worth of the area has been realized, and maintaining the estuary is taking precedence over all.

5.4.2 Upland Vegetation

Southern Rhode Island has relatively few forests of mature or climax successional stage. Fires, logging, and the agricultural conversion of forest land prior to the Civil War have greatly reduced the extent of climax forest acreage. The predominant forest vegetation in southern Rhode Island is that of abandoned fields in early successional stages, and forests of immature hardwoods. Pure stands of mature softwoods are the least abundant and may be considered most significant in terms of scarcity and aesthetic beauty.

Many of the mature forests which do exist in southern Rhode Island are in areas subject to the protection of property owners who successfully manage trees on their own acreage. Mature softwood stands are exceedingly rare in the area. There are no mature stands of hardwood-softwood mixtures.

On well drained soils, the regional forest vegetation is characterized by the dominance of red, white, and especially black oaks (Quercus rubra, Q. alba, and Q. velutina), hickories, especially mockernut (Carya tomentosa), black cherry (Prunus serotina), sassafras (Sassafras albidum), and logically, hemlock (Tsuga canadensis). Other tree species, characteristic of regions farther inland, are also commonly present. Red cedar (Juniperus virginiana) dominates the early phases of vegetation development on old fields in this region. Several species of vines and shrubs form dense, impenetrable thickets and tangles in the open forest and woodlands; among them are catbriar and greenbriar (Smilax spp.), poison ivy (Rhus radicans), Japanese honeysuckle (Lonicera japonica), and Asiatic bittersweet (Celastrus orbiculatus). Coastal Plain tree species occurring characteristically in this region include holly (Ilex opaca) and post oak (Quercus stellata).

The upland vegetation within the NETC is restricted primarily to perrennial weeds and grasses. The majority of trees is located near residences, drainageways and around the tank farms. The upland vegetation of NETC reflects complete management or recent disturbance of the area.

5.4.3 Lowland Vegetation

The habitats available for lowland vegetation on the NETC are located on the waterfront along Narragansett Bay and surrounging the small impoundments and their drainages further inland. Those areas located on the waterfront are comprised of borrow pits along the railroad tracks and abandoned disposal areas where excavation has created depressions.

The largest of these depressions is the Melville North landfill. This area was excavated during landfill operations and depressions were created. These depressions support a limited diversity of wetland flora including reeds (Phragmites communis) and various shrub and grass species. Borrow pits can be found along the railroad tracks which parallel the shoreline extending from McAllister Point northward to the Melville North landfill. These are individually less than one acre in size and contain similar wetland species with a lack of diversity.

The drainage from the NUSC disposal area and the golf course culminates in an impoundment directly north of the NUSC operations area. The wetland vegetation is restricted to the softer sediments surrounding the east end of the impoundment and the drainage. The vegetation is composed of a variety of grasses, reeds (Phragmites sp.), sumac (Rhus sp.), willow (Salix sp.) and perrennial weeds. The impoundment is partially maintained at the levee, and water is pumped from the impoundment to the golf course for irrigation purposes.

All lowlands on NETC have been artificially created and are in a disturbed condition. The potential for maintaining diversified floral species within the lowlands of NETC is poor. This area did not previously contain these habitats, and soils and drainage are not conducive to their successional development.

5.4.4 Terrestrial Fauna

The fauna of the region have been affected by similiar disturbances (clearing, excavation, construction) which led to the impoverishment of the flora. Field studies have indicated impoverished fauna, particularly of herptile and mammal types. Widespread habitat destruction over a period of several hundred years has caused emigration or elimination of many species. As a result, the present regional fauna consist primarily of species of wide distribution and ecological tolerances, high adaptability, and nonrestrictive habitat requirements.

No large animals such as deer, turkey, or cougar are known within the boundaries of NETC. However, red fox (Vulpes fulva), raccoon (Procyon lotor), rabbit (Sylvilagus floridans), and gray squirrel (Sciurus carolinensis) are present in the woodlands.

Mammalian forms expected to be found on base include: the Eastern chipmunk (Tamias striatus), New England cottontail rabbit (Sylvilagus transitionalis), white-footed mouse (Peromyscus luecopus), short tailed shrew (Blarina brevicauda), gray squirrel, and red squirrel (Tamiasaurus hudsonicus). Several of these species inhabit the few remaining wooded areas on base slated to be excessed.

Various herptiles (amphibians and reptiles) occupy NETC habitats. Common ones include the red backed salamander (Plethodon cinereus), American toad (Bufo americanus), wood frog (Rana sylvatica), eastern gartersnake (Thamnophis sirtalis), northern black racer (Coluber constrictor) and the wood turtle (Clemmys insculpta).

Common herptiles of the wet areas include the American toad, spring peeper (Hyla crucifer), bullfrog (Rana catesbeiana) and northern watersnake (Natrix sipedon), along with the snapping turtle (Chelydra serpentina).

Avian species which may be found within the NETC upland habitats include the bobolink (Dolichoryx oryzinories), meadowlark (Sterriella viagua), chimney swift (Chaetera pelagica), kingbird (Tyrannus tyrannus), eastern phoebe (Sayorius phoebe), barn swallow (Hirundo rustica), redtailed hawk (Buteo jamaiceusis) and kestrel (Falco sparverius).

In addition, game birds, such as the ring-necked pheasant (Phasianius colchicus), bobwhite quail (Colinus virginianus) and the mourning dove (Zenardura muacroura), are highly dependent on the plant communities on the base.

5.4.5 Aquatic Ecosystem

The freshwater aquatic ecosystems within NETC boundaries are restricted to small surface water drainages and one small impoundment of less than one acre at the NUSC disposal site. None of these has any recreational or aesthetic value, and they contain no viable fish populations. The streams serve as drainage ditches for the upper base, and the impoundment supplies irrigation water to the golf course.

The marine ecosystem of Narragansett Bay forms the shoreline of the base for approximately 9 miles. The bay is of great economic and aesthetic importance to the entire southern portion of Rhode Island. It is an estuary and the fishery resources of the bay are extremely important. The annual value of the combined commercial and sport fishing is estimated at several million dollars.

5.4.5.1 Plankton - In Narragansett Bay, the phytoplankton are by far the most important primary producers, synthesizing organic matter from carbon dioxide and inorganic nutrients with sunlight as the energy source. In shallower, less turbid estuaries, seaweeds and sea grasses may assume this role.

The planktonic organisms have been studied throughout Narragansett Bay. Phytoplankton was collected at three localities within the bay including one station in the east passage just south of the Newport Naval Base (EIS NETC Long Range Homeporting, January 1982). The phytoplankton was more or less uniform at these three stations. The diatom (*Skeletonema costarum*) was the dominant species of phytoplankton; 81.2 percent of the population consisted of this species. Population peaks occurred in September and again in January. Diatoms were the principal phytoplanktonic group with dinoflagellates and mastigophorans the other major groups present. All are included in Table 5.4-1.

Zooplankton was studied at three stations within Narragansett Bay over a two year period (Hulsizer, 1976). Copepods comprised 50 percent of the animal species present in the water. The copepod (*Acartia clausi*) was the dominant species of this group. Major peaks in the biomass and number of species occurred during the spring months when the water temperature was rising. Zooplankton dropped to near zero species present in late summer and fall. This two year study represents the most extensive study of zooplanktonic animals in Narragansett Bay.

The phytoplankton and zooplankton are rich and varied in Narragansett Bay. The species coposition is relatively uniform from station to station indicating a good movement of the water mass within the bay. The estimated productivity figure of 84 grams of carbon per square meter per year is also indicative of good environmental conditions.

TABLE 5.4-1

PHYTOPLANKTON AND ZOOPLANKTON REPORTED FROM NARRAGANSETT BAY

Phylum Chryosophyta
Achnathus sp.
Amphiprora sp.
Asterionella japonica
Biddulphia sp.
Chaetoceros survisetus
Chaetoceros gracilis
Chaetoceros lorenzianus
Chaetoceros socialis
Chaetoceros teres
Chaetoceros sp.
Gocconeis sp.
Corethron hystriz
Coscinodiscus centralis
Concinodiscus excentricus
Detonula cystifera
Fragilaria sp.
Grammatophora marina
Gyrosigma sp.
Leptocylindous danicus
Leptocylindrus minimus
Licmophora abbreviata
Melosira sulcata
Melosira sp.
Navicula sp.
Nitzchia closterium
Nitzchia delicatissima
Nitzchia longissima
Nitzchia paradoza
Nitzchia reversa
Nitzchia seriata
Pleurosigma sp.
Rhizosolenia alata
Rhizosolenia delicatula
Rizosolenia fragilissima
Rizosolenia stolterfothii
Skeletonema costarum
Striatella unipunctata
Surirella sp.
Thalassionema nitzchioides
Thalassiosira gravida
Thalassinsira rotula
Thalassiothrix Longissima

Phylum Mollusca
Gastropod larvae
Pelecypod larvae

Phylum Arthropoda
Class Crustacea
Barnacle larvae
Decapod larvae
Copepod larvae
Acartia clausi
Acartia tonsa
Acratia sp.
Centropages hamatus
Eurytemora herdmanni
Evadne nordmanni
Harpacticoida
Oithona sp.
Paracalanus parvus
Pondon leucharti
Pondon polyphemoides
Pseudocalanus minutus
Saphirella sp.
Tempora longicornis
Tortanus discandatus

Phylum Protozoa
Dinoflagellates
Amphidinium sp.
Ceratium fusus
Certium lineatum
Ceratium tripos
Cochodenium sp.
Dinophysis acuminata
Exuvlella marina
Gymnodinium spp.
Gynodinum spp.
Peridinium triquetrum
Peridinium trochoideum
Peridinium sp.
Polykrikos sp.
Procentrum sp.
Mastigophorans
Chilomonas spp.
Cryptomonas sp.
Distephanus speculum
Ebria tripartita
Euglena sp.
Phramimonas sp.
Ciliata
Codonella sp.
Mesodinium sp.
Tinitinnopsis sp.
Tintinnus sp.

Phylum Coelenterata
Medusae

Phylum Ctenophora
Ctenophores

Phylum Rotifera
Rotifers

Phylum Annelida
Polychaete larvae

Phylum Chaetognatha
Sagitta elegans

Phylum Chordata
fish larvae and eggs

5.4.5.2 Finfish - Most species move in and out of Narragansett Bay following well established seasonal patterns. These migratory movements, although different for each species, provide for distinct summer and winter populations of finfish. The migrations are related primarily to temperature, and the major shifts between winter and summer populations take place when the water temperature is about 10°C (50°F).

Narragansett Bay is visited each year by a great many species of fish because it lies along the boundary between southern and northern populations. Thus, herring from Georges Bank may visit the bay at the end of their southward midwinter migrations, and species such as scup and occasional exotic tropical strays brought up by the Gulf Stream make their appearance during the summmer. In all, over 100 species may appear in any given year, about half of which are occasional visitors.

In various studies during the 1970's a total of 99 species of fish have been taken from Narragansett Bay (Oviatt and Nixon, 1973; Jeffries and Johnson, 1974; Camp, Dresser and McKee, 1978; Department of the Navy, 1978). The more frequently encountered species are listed in Table 5.4-2. Ten species accounted for 91 percent of the fish catch with the winter flounder (Pseudopleuronectes americanus), the sand dab (Scophthalmus aquosus), scup (Stenotomus chrysops) and butterfish (Poronotus triacanthus) the most commonly occurring fish taken. These four species are also of commercial importance.

The winter, or blackback, flounder is the dominant bottom fish in the bay. The population is also a Rhode Island resource, since the species makes only small migrations to the Sound. In spring, as temperatures rise, adults move into deeper, cooler waters in the Sound and juveniles venture out of harbors and shallow embayments into the bay itself. In the fall, the adults move up bay and the juveniles return to the shallows. Winter flounder begin spawning in their third year, when they are 19 to 24 cm (7.5 to 9.5 inches) long. The eggs are laid on the bottom in shallow water in the late winter and early spring. Winter flounder feed on benthic worms and crustaceans and "graze" on the siphons of shellfish.

Unlike the winter flounder, most of the commercially important species of bottom fish make seasonal migrations of several hundreds of miles. Fluke and butterfish spend the winter in very deep water far off shore at the edge of the continental shelf. Whiting and pollack make similar journeys and are offshore in the summer. Of the most abundant species, only the sand dab is not migratory.

A year-long, bay-wide survey (excluding Mount Hope Bay and the Sakonnet River) of bottom fish made in 1972 yielded an annual minimum estimate of 117 individuals, or 28.5 pounds per acre. This translates into a standing crop of 1.9 million pounds of bottom fish. (The margin of error gives a range of 0.8 to 2.9 million pounds.) This is comparable to other estimates made using similar sampling techniques in New England estuaries and offshore fishing grounds. This bay-wide survey showed that despite the constant movement of species in and out of the bay, the total biomass of bottom fish is remarkably steady.

TABLE 5.4-2

LIST OF COMMONLY OCCURRING SPECIES OF FISH IN NARRAGANSETT BAY

Species, Common Name	Seasonability
Alosa aestivalis, Blue back herring	A
Alosa pseudoharengus, Alewife	S
Alutera schoepfi, Orange file fish	
Anchoa hepsetus, Striped anchovy	
Anguilla rostata, American eel	A
Apeltes quandracus, Fourspine stickleback	
Balistes capriscus, Gray triggerfish	S
Breuooria tyrannus, Menhaden	S
Centropristes philadelphicus, Rock bass	S
Centropristes striata, Black sea bass	S
Clupea harengus harengus, Sea herring	W
Cynoscion regalis, Weakfish	S
Cyprinodon variegatus, Sheephead	
Fundulus heteroclitus, Common mummichog	
Fundulus majalis, Striped mummichog	
Gadus morhua, Cod	W
Gastrosteus aculeatus, Threespine stickleback	
Hemitripterus americanus, Sea raven	W
Hypomesus pretosus, Smelt	W
Hyporhamphus unifasciatus, Halfbreak	
Limanda ferruginea, Yellow tail flounder	S
Lophius americanus, Angler fish	
Lucania parva, Rainwater fish	
Macrozoarces americanus, Eelpout	
Menidia menidia, Silverside	
Menticirrhus saxatilis, Kingfish	
Merluccius bilinearis, Whiting	S
Microgadus tomcod, Tomcod	W
Monacanthus hispidus, Common file fish	
Morone saxatilis, Striped bass	S
Myoxacephalus aencus, Grubby sculpin	W
Mugil cephalus, Mullet	
Myoxocephalus octodecimspinosus, Longhorn sculpin	W
Opsanus tau, Toadfish	A
Osmerus mordax, Rainbow smelt	W
Paralichthys albigatta, Gulf stream flounder	S
Paralichthys dentatus, Fluke	S
Paralichthys oblongus, Four spot flounder	S
Pomatomus saltatrix, Bluefish	S
Poronotus triacanthus, Butterfish	S
Pricanthus crucutatus, Glasseyed snapper	
Prionotus carolinus, Common searobin	S
Prionotus martis, Striped searobin	S
Pseudopleuronectes americanus, Winter flounder	A
Pungitius pungitius, Ninespine stickleback	
Raja binerinacea, Little skate	A
Roccus americanus, White perch	S
Scomber scombrus, Atlantic mackerel	S
Scophthalmus aquosus, Sand dab	A
Sphaeriodes maculatus, Puffer	
Squalus acanthias, Dog fish	S
Stenotomus chrysops, Scup	S
Syngnatus fuscus, Pipefish	
Tautoga onitis	S
Tautogolabrus adspersus, Cunner	S
Trinectes maculatus, Hog croker	
Urophyeis chuss, Red hake	W
Urophyeis regius, Spotted hake	
Urophyeis tenuis, White hake	W
Vomer setapennis, Moonfish	

W - Winter
S - Summer
A - All

There are fewer species of pelagic fish than of bottom fish in the bay, but they make up for this by their numbers and their importance to fishermen. All the pelagic species are highly seasonal, with anchovies and sea herring appearing in the winter, and menhaden, bluefish, and striped bass in the summer. When schools of menhaden are present, their biomass may be far greter than that of the bottom fish. Population estimates for the bay are for as much as 16 million pounds of menhaden and 2 million pounds of bluefish and stripers.

Menhaden are oily, herringlike fish that migrate up and down the east coast from Florida to Maine. There are periods of several years when no menhaden appear in the bay. When they do come, they are usually abundant and are caught in large numbers. In recent years, the annual commercial bay catch has ranged from 15 to 23 million pounds. Adult menhaden arrive in April, but since they do not form schools until May, they are not noticeable. During the summer, large schools move in and out of the bay and are most abundant in the upper bay. Menhaden move south as water temperatures cool in the fall.

Like other abundant species, bluefish and striped bass do not overlap their periods of greatest abundance. Stripers usually arrive in May, are most abundant in June, and leave as the bluefish appear in midsummer. The adult bluefish leave in the early fall as the bass return for another short stay. Juvenile, "snapper" blues that were spawned offshore earlier in the year are abundant in the fall, but they too leave as the waters cool. Bluefish have historically shown wide variations in abundance and have recently been extremely numerous. Most of the striped bass that appear in the bay are females and their abundance has been declining in recent years. Sport fishermen harvest a large segment of the striper and bluefish populations that come into the bay each summer. In 1976, it was estimated that 26 percent of the bluefish that entered the bay were caught. More than half of each catch was taken by a dozen highly effective fishermen.

Like any estuary, Narragnasett Bay is a valuable feeding and spawning ground for many species. Its high primary productivity and rich benthos provide abundant and diverse food. Its sheltered, shallow embayments are the nurseries for the eggs and larvae of many fish species. Our understanding of the bay's finfish populations beyond such generalities, however, is not great. The life histories of the major commercial and sport species are fairly well known, but it is not fully understood why the abundance of a particular species shows wide variation independent of fishing pressure.

5.4.5.3 Invertebrates (Benthos-Shellfish) - The benthic community in Narragansett Bay plays a critical role in the functioning of the ecosystem. Benthic filter feeders consume significant amounts of phytoplankton, and the bay's high primary productivity may be attributable in good part to the recycling activity of the benthos.

The knowledge of the benthic biological communities of Narragansett Bay has been summarized by the Coastal Resources Center of the University of Rhode Island (1977). Eight stations were sampled for benthos at NETC from Newport north to sites just above the breakwater. A total of 36 species and 705 specimens were collected (Table 5.4-3). The benthos was dominated by polychaetous annelids which comprised 23 (64 percent) of the species present. The pelecypod Nucula proximawas the most commonly encountered animal; a total of 458 (65 percent) specimens was collected from Coddington Cove. Population densities of invertebrates were greatest in the vicinity of Piers 1 and 2 largely as a result of the small clam Nucula. Ten species were unique to stations 7 and 8 located outside the base and breakwater.

The benthic invertebrate population in the vicinity of Piers 1 and 2 is characterized by the pelecypod Nucula proxima and the polychaetes Nephtys incisa and Mediomastus ambiseta. The faunal components at Stations 7 and 8 located north of the breakwater, not only differed from those located within the base but also from each other. Basically, however, with a certain degree of latitude, the species present at Stations 7 and 8 may coincide with the Ampelisca community described in the summary report by the Coastal Resources Center of the University of Rhode Island (1977).

The shellfish of Narragansett Bay include both bivalve molluscs (clams, oysters, scallops) and decapod crustaceans (crabs, shrimp, lobster). Lobster are caught both within and outside of Narragansett Bay. Lobsters are trapped in much of Narragansett Bay including the Coddington Cove area. Some lobster traps are located a short distance from Pier 2.

Bivalves harvested in the region of Narragansett Bay include the northern quahog (Mercenaria mercenaria - known as the bay quahog in Rhode Island), soft shell clam (Mya arenaria), and Atlantic bay scallop (Argopecten irradians).

The quahog is the most valuable shellfish resource within the bay system. The number of people harvesting this organism for individual or commercial use is increasing. Shellfishing areas open to the public do not include the NETC shoreline.

Quahogs are the most abundant benthic animal of their size in Narragansett Bay (URI, 1980, Bulletin #40). In recent years, the total Rhode Island harvest ranged from 5 million pounds of meats in 1955 to 2 million pounds in 1978, the great majority of which are taken from the bay.

Quahogs do not characterize a distinct community type but are distributed throughout the bay, from the low tide mark to depths of up to 18 meters (50 feet) in a wide range of sediments. Some of the potentially most productive areas in the Providence River are closed to fishing because of pollution. Quahogs have a clumped distribution, and their abundance from one small area to another varies widely. Quahogs are most abundant in fine sediments, but the presence of some coarse constituents is also important. Thus, quahogs are more abundant in mud containing sand, shell and small rocks than in mud without these constituents. Quahogs are least abundant in clayey sediments. Quahogs spawn in the summer when temperatures rise above 20°C (68°F) and become sexually mature

TABLE 5.4-3

NUMBER OF SPECIES AND SPECIMENTS OF BENTHIC INVERTEBRATES
FROM NEWPORT NAVAL COMPLEX, RHODE ISLAND
(October 19, 1981)

Species	Station Number							
	Pier I and II						North of Breakwater	
	1	2	3	4	5	6	7	8
Phylum Memertea								
Nemerteans, unidentified				2				
Phylum Annelida								
Class Polychaeta								
Anaitides sp.								
Autolytus sp.				1	3			
Brania clavata					19			
Chaetozone setosa	1							1
Cirratulus grandis	1							
Glycera americana								1
Harmothoe sp.								1
hesionids, unidentified					1		1	
Lepidonotus squamatus					1			
Lumbrineris sp.								2
Mediomastus ambuseta	29	2	4	50			13	
Nephtys incisa	8	10	6	3		1	2	
nereid, unidentified					1			
Ninoe nigripes				1	2			13
Pectinaria gouldii	4			2				
Pherusa sp.	1							
Phyllodocid, unidentified								1
Polycirrus eximius								2
Polydora ligni			1	1				
Spiochaetopterus costarum				1				
Spiophanes benedicti		1						
Streblospio benedicti				3	2			
Tharyx sp.			1	18				
Class Oligochaeta								
Oligochaetes,				2				
Phylum Mollusca								
Class Gastropoda								
Nassarius trivittatus				3				1
Class Pelecypoda								
Ceratoderma pinnulatus								1
Lyonsia hyalina								2
Mulinia lateralis						2		
Nucula proxima	158	134	92	37		34	1	2
Tellina agilis	2		1	2				
Thracia sp.								1
Phylum Arthropoda								
Class Crustacea								
Order Amphipoda								
Ameplisca vadorum					1		2	3
gammarids, unidentified							1	1
Leptocheirus pinguis								3
Phylum Phoronida								
Phoronis sp.				1				
Number of Species (36)	8	4	5	15	8	3	6	15
Number of Specimens (705)	204	147	105	127	30	37	20	35

in their second summer. It is thought that medium sized cherrystone quahogs are the most prolific spawners.

Water pollution continues to take a heavy toll in the reduced numbers of quahogs available for harvesting. The primary criterion used in closing areas to shellfishing is the abundance of fecal coliforms in the water; these are an indicator of sewage and the pathogenic bacteria and viruses it may contain. A shellfish depuration plant is capable of killing harmful microorganisms that might be found within the shellfish, but none has been built in the bay area. Unfortunately, pathogenic microorganisms are only one aspect of the pollution in the upper bay. There are signs that Providence River quahogs are not healthy and may be dying off at least in some areas. Several researchers are concerned that they may be accumulating significant levels of petroleum or heavy metals, which are not removed by the usual depuration methods.

Aquaculture within the bay includes the eastern oyster (Crassostrea virginica) and the blue mussel (Mytilus edulis). Two species of clams are harvested offshore and landed at bay fishing ports. They are the Atlantic surf clam (Spisula solidissima) and the ocean quahog (Arctica islandica). Most of the northern areas of the bay are closed permanently or opened on a conditional basis. Most of the lower bay localities are opened. The shellfish area just south of the Newport Naval Facility is permanently closed because of municipal sewage discharge.

A small commercial fishery for squid (Loligo paeli) occurs in the bay. A large squid trap is presently located in Coddington Cove (RI DEM, 1982). Sportsmen harvest squid with rod and reel throughout the spring and early summer months in the lower bay.

The blue crab (Collinectes sapidus) and the rock crab (Cancer borealis) are taken throughout the bay by recreational fishermen. Both of these species inhabit the shallow bays, sounds, and pools during the warm months and migrate to deeper water in the fall. The commercial fishing for blue crabs ended in 1938 with a severe population decline. The reason for the decline is not understood, but pollution from heavy metals and chlorinated hydrocarbons may have played an important role. At present, the population of blue crabs is increasing. The commercial use for rock crabs will be expanded with the development of new techniques for extracting the crab meat from the shells.

The Blue Gold Sea Farm, Inc. has leased five acres north of NETC for rearing the blue mussel. They suspend strings from floats to which the larval stages of the mussel attach. It takes about 18 months for these mussels to reach market size. Eastern oysters are being cultured on suspended strings in coastal ponds on Prudence Island and southwestern shores of the bay. Scallop seed is planted in the bay, and in 1978, the catch was valued at one million dollars (Rhode Island Statewide Planning Program, 1979).

5.4.6 Threatened and Endangered Species

The existing natural habitats remaining on NETC have a low potential for habitation of state or federal threatened or endangered species. The upland habitats are maintained (mowed) or are heavily disturbed. The vegetation is sparse and few indigenous species of flora in their original densities remain. The freshwater aquatic environments on base associated with low-lying areas are small in size and have a poor vegetational diversity. This along with the ephemeral nature of the drainages, make poor habitat for the majority of faunal species. The more mobile forms of threatened or endangered species (i.e., birds) may pass through the area. Peregrine falcons have been observed near Newport. However, there is little likelihood that any terrestrial forms of these species take up residence at NETC.

The marine habitat of Narragansett Bay is incorporated into 9 miles of NETC shoreline. One organism considered threatened or endangered may use the bay system during its life cycle. The shortnose sturgeon enters freshwater rivers in June and July to spawn. They may remain in these areas until September. Therefore, they would not be inhabiting the lower bay for any significant length of time. The potential for other threatened or endangered marine organisms to inhabit the bay would be low because of the morphology of the bay, fluctuating temperatures, salinity gradients, etc. Table 5.4-4 includes a list of state and federally classified threatened or endangered species which may be found in Rhode Island.

TABLE 5.4-4

FEDERALLY LISTED ENDANGERED AND THREATENDED SPECIES IN RHODE ISLAND

Common Name, Scientific Name	Status	Distribution
FISHES:		
Sturgeon, shortnose*, Acipenser brevirostrum	E	Atlantic Coastal Waters
REPTILES:		
Turtle, green*, Chelonia mydas	T	Oceanic straggler in Southern New England
Turtle, hawksbill*, Eretmochelys imbricata	E	Oceanic straggler in Southern New England
Turtle, leatherback*, Dermochelys coriacea	E	Oceanic summer resident
Turtle, loggerhead*, Caretta caretta	T	Oceanic summer resident
Turtle, Atlantic ridley*, Lepidochelys kempii	E	Oceanic summer resident
BIRDS:		
Eagle, bald, Haliaeetus leucocephalus	E	Entire state
Falcon, American peregrine, Falco peregrinus anatum	E	Entire state - re-establishment to former breeding range in progress
Falcon, Arctic peregrine, Falco peregrinus tundrius	E	Entire state Migratory - no nesting
MAMMALS:		
Cougar, eastern, Felis concolor cougar	E	Entire state - may be extinct
Whale, blue*, Balaenoptera musculus	E	Oceanic
Whale, finback*, Balaenoptera physalus	E	Oceanic
Whale, humpback*, Megaptera novaeangliae	E	Oceanic
Whale, right*, Eubalaena spp. (all species)	E	Oceanic
Whale, sperm*, Physeter catodon	E	Oceanic
Mollusks:		
NONE		
PLANTS:		
Small Whorled Pogonia, Isotria meleoloides	E (proposed)	Providence, Kent Counties
Pale Green Orchis, Platanthera flava (Habenaria acaule)	T	Mesic hardwoods
Thoroughwort, Eupatorium leucolepsis var. Novae-aniliae	T	Pond Shores
Rockrose, Helianthemum dumosum	T	Xeric, open areas
Panicum, Panicum aculeatum	T	Swampy woods
Gerardia, Agalinis acuta (Gerardia acuta)	T	Xeric sands
Sundew, Drosera sp.	R	Freshwater Wetlands
Pink Lady's Slipper, Cypripedium acaula	R	Xeric hardwoods

*Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

Names in parenthesis, are synonyms from Fernald (1950).

SECTION 6

ACTIVITY FINDINGS

6.1 GENERAL

The Naval Complex, Newport, is located along the western shore of Aquidneck Island which is in Narragansett Bay, Rhode Island. The complex now contains just over 1,000 acres of land situated in twelve separate areas. Approximately 1,600 acres of land were identified as excess to the Navy and turned over to the GSA following the 1973 SER program.

Once the homeport for over 70 active naval ships, the 1973 SER program resulted in the transfer of all homeported active fleet ships. Newport remained the homeport for ships of the reserve fleet until 1978 when four frigates were assigned active status at the complex. The complex presently has seven ships, four active and three reserve. The reduction in fleet operations that followed the SER resulted in a major change in the facility mission from fleet support to education of naval personnel. Ten schools are currently training some 1,700 students.

The primary activities which will be discussed in this section include NETC and NUSC. NETC is the largest host activity at the Naval Complex. This activity was established in 1974 following the SER program. NETC is the host for about 23 tenant and support units and is responsible for the majority of the facility. NUSC is a research and development type activity and operates independently of other naval commands.

A general overview of activity operations for each of the twelve areas depicted in Figure 6.1-1 is described herein.

The Naval Regional Medical Center (NRMC) occupies 42 acres at the southern end of the complex. The two dominant facilities, Buildings 1 and 43, provide inpatient and outpatient care, respectively, for all military personnel in the geographical region. Also located within the Medical Center compound is a new alcohol/drug rehabilitation center (Building 45) and several sets of family quarters. The Medical Center maintains much of its own facilities through its own Public Works staff which has shop space located in Building 46 at the east boundary of the Medical Center property.

Located due north of the NRMC compound is Cloyne Court, a 26 acre family housing area containing 18 officer units. Building 1929, currently vacant, is the former CPO club which has relocated to new facilities on Coddington Point.

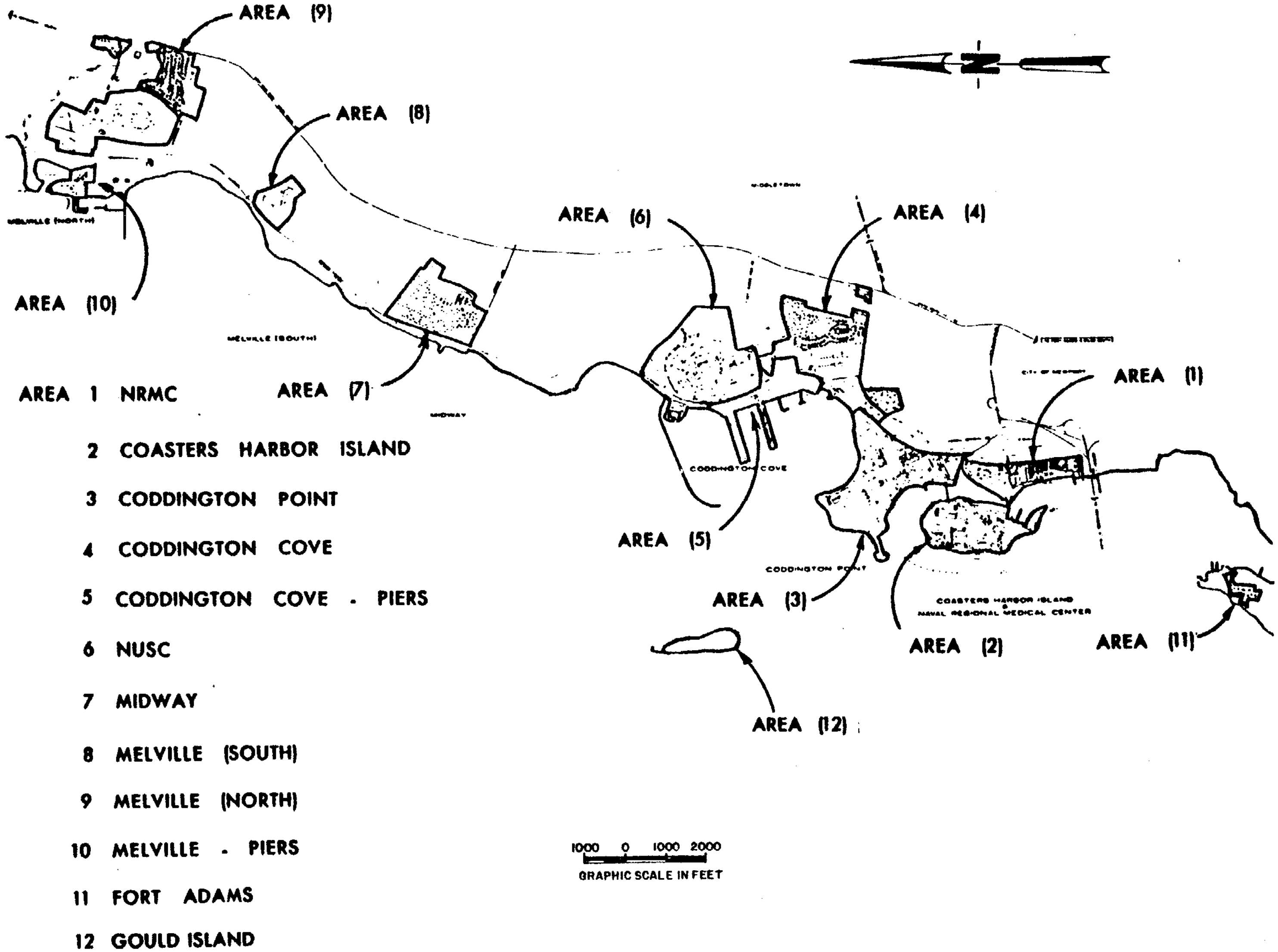

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FIGURE 6.1-1

OPERATIONS AREAS

Coasters Harbor Island is predominantly used for training (education). Located on the 111 acre island are the educational and administrative facilities of the Naval War College, Surface Warfare Officers School Command (except SWOS Basic Course), the Chaplains School and Communications School. Also on the island are ten sets of family quarters including the Quarters AA, the official residence of the President of the Naval War College, which has been nominated for inclusion on the National Register of Historic Places (NRHP).

Personnel support facilities on the island include the NETC bachelor officers quarters (BOQs), the commissioned officers club, the small boat marina, a gym and other recreational facilities. Founders Hall, on the NRHP, is the War College Museum.

Located on the island is the NETC Correctional Center. This facility is located at the northern tip of the island. Firefighting training was conducted on the northern coastline of the island. The exchange service station is also located on the island.

A few vacant buildings can be found on the island. The former chapel (Building 27) is vacant and unusable at this time. Building 85, once housing the Navy Finance Office, has been converted to provide space for the Communications School and the functions of the Naval Electronic Engineering Office.

Building 52, once housing the Photo Lab and other smaller functions, is also vacant. Building 71, located in the middle of the island adjacent to Sims Hall, once housed the Peoples Credit Union which has discontinued operations at the Naval Complex.

The remaining vacant structures on the island are two inactive magazines located atop a small hill overlooking the War College buildings. These magazines are no longer serviceable.

Located at the southern end of the island near the marina is a helicopter landing pad used for medical emergencies or VIP visits. Former designated landing pads at the NRMC and NUSC have been deactivated.

Personnel support and training are the primary activities on Coddington Point. The commissary, exchange, indoor recreational facilities, clubs, and shops and stores are appropriately located here along with the Center's bachelor enlisted quarters and mess hall. At the northern end of the "Point" are the NAPS and OCS student dorms and dining facility. The main academic instruction building is Perry Hall (Building 440), while Building 1112 houses (or will house) the applied instruction equipment including the ship handling tank and damage control trainer. Crew Served Weapons Firing training was conducted on the "Point" behind Building 1112. NETC administration headquarters is housed in Building K-61, located at the western shoreline. Recent consolidations and relocations of administrative functions have resulted in the conversion of a portion of Nimitz Hall, a student dormitory.

A few vacant buildings exist on the Point including two former BEQs, Buildings 345 and 346, and Building 305, the former fire station. Building 305 is scheduled for demolition, while Buildings 345 and 346 are being considered for renovation to return these buildings for use as BEQs.

Coddington Cove contains the Center's waterfront area, industrial and supply area, and several hundred family housing units in two locations. Approximately 44 acres of the waterfront area including several buildings and Pier 1 have been leased to the State of Rhode Island, which subsequently sub-leased the area to Robert E. Derecktor, Inc. for the development of a private shipyard.

Building 1, at the northern end of the Cove houses the administrative functions of the NETC Public Works Department. Building 11, adjacent to Building 1, along with approximately 11 acres of land and one set of family quarters has been transferred to NUSC plant account. It has been suggested that the Public Works Shops, located at Coddington Point, be relocated in the industrial/supply area of the Cove.

NUSC and the Stillwater Basin are located adjacent to Coddington Cove. This facility houses a wide variety of research and development facilities for underwater technology.

The Midway area is comprised of some 105 acres used for navy housing. The housing area contains 600 family residential units with an average density of 5 units per acre. A ball field and recreational center are also available at Midway. A storage area for private automobiles found abandoned throughout the Naval Complex is located in the southwestern corner of the housing area.

Melville South is occupied by one of several facility tank farms. This tank farm (No. 3) contains seven underground storage tanks with a combined capacity of 210,000 barrels.

At Melville North, which is about five miles north of the main complex via Defense Highway, there are 250 family housing units, a 40-unit mobile home park, and Tank Farms No. 1 and 2. Tank Farm No. 1 contains six underground fuel storage tanks and two above ground fuel tanks with a combined capacity of 263,000 barrels. Also located in Tank Farm No. 1 are two underground ballast/sludge tanks, each with a storage capacity of 2,100,000 gallons. Tank Farm No. 2 consists of 11 underground tanks having a total storage capacity of 660,000 barrels. Building 115, which is located at the south end of the family housing area, is leased to offshore Sue Sea, Inc.

Approximately 21 acres were retained at the Melville waterfront area including the north fueling pier. The south pier and the 1,000 foot FBM pier have been excessed and are used by the general public for fishing. The major operation conducted at Melville North presently is the Defense Fuel Support Point operated by the National Services Corporation. The operation, a government owned, contractor operated (GOCO) facility, is comprised of fuel storage and delivery along with equipment and facility maintenance support.

There are 110 family housing units located on some 24 acres retained at Fort Adams. The remainder of the peninsula has been excessed and is now a State Park. The Navy family housing units are served by a Navy owned/operated sewage treatment plant located on the western boundary of the housing area.

Finally, located about one and one-half miles from the main complex in Narragansett Bay, is Gould Island. Used during World War II to develop and test torpedoes, Gould Island contains approximately 52 acres, most of which has been reported as excess to GSA. The northern portion of the island (about 9.6 acres) has been retained and is occasionally used for torpedo testing. The land and facilities are listed on the NUSC plant account, while the utilities are owned and maintained by NETC.

A light beacon located on about 1/4 acre at the southern end of the island has been transferred to the Coast Guard, while 16.9 acres bordering the Navy retained property at the north end has been deeded to the State of Rhode Island.

Facilities on the retained portion of the island include the pier and wharf and the large production building built on piles over the water at the north end of the island. The pier is considered unsafe, and the wharf is currently used as the embarkation/debarkation point for the island. Building 33, the former power plant for the island, has also been retained though not operational.

Utility service (water and electrical power) on the island is provided by connection to the main complex. On site septic systems provide sanitary capability though their condition is questionable. Fuel storage capability on the island consists of six underground 10,000 gallon tanks though only gasoline for the fire truck is currently brought to the island.

The sections which follow provide more specific descriptions of the operations at NETC, Newport that utilize hazardous materials or generate hazardous waste. This discussion covers Ordnance Operation, Industrial Operation including Public Works Utilities and Departments, Materials Storage, and the Waste Disposal Sites identified during this study.

In addition to describing the specific operations, types of wastes generated by the activity are identified. Periods of operation and quantities of material disposed are given in as great a detail as was possible. In instances where a lack of historical information existed, an estimate was provided to assist in the evaluation. This was done only after careful review of the related operation was conducted. Generally, it was inferred that the order of magnitude of past generation rates compares closely to those of current operations.

6.2 INDUSTRIAL OPERATIONS

6.2.1 Public Works Department

Existing Public Works facilities are generally divided between Coddington Cove and the Point. The Public Works administrative operations are located in Building 1 on Coddington Cove. The majority of public works shops and facilities are located in buildings constructed durng World War II. PW functions have been conducted in the following buildings:

Building W-31	-	PW Shop
Building W-34	-	Pest Control Operations
Building W-36	-	PW Storage Areas
Building 47	-	Supply Department
Building 1921	-	PW Paint Shop
Building 354	-	Laborers Shop
Building 22	-	PW Equipment Storage

A brief description of the operations involved in the major PW Utilities follows.

6.2.1.1 Electric Power - Electrical service is provided by the Newport Electric Company (NEC) to the Naval Complex at an average demand level of 12 to 15 mega-volts (MVA). Service is supplied to the complex at 23,000 volts via two service feeder lines, #2211 and #2213. NEC line numbers 2201, 2210 and 2212 remain open for emergency power distribution to NETC. Total capacity of the two main lines is 37,800 KW at a power factor of 0.9. The 23,000 V electrical transmission system, providing approximately 49,000 KVA of transformer capacity, consists of about 12 miles of overhead, underground and submarine cables.

Available electric capacity for Piers 1 and 2 is 11,000 and 12,000 KVA, respectively. Utility requirements for homeported ships include an electrical AC three phase power supply.

6.2.1.2 Steam Production - Public Works maintain two of the three boiler plants at NETC, plant number one Building 7, Coddington Cove, and plant number two Building 86, Coasters Harbor Island (Figure 6.2-1). The Melville DFSP area is served by an independent steam production facility. A fourth steam plant (Building A-6) once serving the needs of the NRMC, has not been used since the mid-60's but is being reactivated. The steam distribution system serving the hospital area is interconnected with the main complex steam and condensate lines. The Coddington Cove plant has three boilers using Navy special fuel oil. Their combined capacity is 230,000 pounds per hour at 165 psig, although one boiler, an 80,000 pounds per hour unit, is not used. The two operating units were installed in 1959. The main plant has four boilers burning Navy special (No. 5 fuel oil) also, and collectively, they have a rated capacity of nearly 300,000 pounds per hour at 200 psig. Two of these boilers were installed in 1940, one in 1959, and the other in 1969.

Two boilers installed in 1977 are in service at the Melville facility and have a rated capacity of 20,000 pounds per hour at 100 psig. These units burn Navy special oil.

Ships tied up to Pier 2 are connected to the shore steam system. Condensate water on board the ships flows into a hot well on the vessel and is then pumped overboard. If any condensate overflows the hot well, it discharges into the bilge, which is in turn pumped into the shipside oil/water separator donut. The condensate discharge is clean and low in dissolved solids. The steam is high in CO_2 which will condense into carbonic acid (H_2CO_3). The only adverse effect of this action is that it slightly lowers the pH of the condensate wastewater discharge. Thermal pollution is not a significant problem due to the extreme volume differences between condensate discharge and the bay.

6.2.1.3 Potable Water - The potable water supply for the Newport Complex, used both for human consumption and fire protection, is purchased from the City of Newport. Potable water is supplied to the Newport system from seven reservoirs on Aquidneck Island and two off the island at Tiverton and Little Compton. These reservoirs have a combined capacity of 3.5 billion gallons. A majority of the system's water comes from the reservoirs on Aquidneck Island. Water held in reservoirs is treated for drinking at either the Newport Water Plant, a 5 MGD facility, or at the Lawton Valley Water Treatment Plant, an 8 million gallon plant. Newport treats the water through coagulation, flocculation, and sedimentation processes followed by rapid sand filtration, pH control, chlorination and fluoridation. The water supply is rechlorinated at eight locations after it enters the base distribution system. The activity has the chlorinating pump stations at the following locations:

Coddington Cove - Building 62; Gate 13 and Gate 32
Coddington Point - Gate 4
Coasters Harbor Island - Gate 1
Naval Regional Medical Center
Cloyne Court
Fort Adams - Building 439

Activity rechlorination is conducted since the chlorine added by the City at their facilities dissipates below standards set by the Navy Bureau of Medicine and Surgery prior to reaching NETC. Potable water enters the Complex at 14 metered locations. Water consumption throughout the complex generally averages between 1.5 and 2.0 MGD.

6.2.1.4 Non-Potable Salt Water System - A salt water pumping and distribution system is used solely by NUSC for fire protection and torpedo testing operations. Ships employ their own flushing/fire protection pumps. Approximately 10 percent of NUSC's fire hydrants are supplied with salt water. Salt water is pumped from the bay using two lift pumps located in Building 119. The pumps have a combined capacity of 600 gpm.

6.2.1.5 Stormwater Collection System - Originally, the stormwater collection system at the Complex was combined with sanitary sewers. Coasters Harbor Island and parts of Coddington Point have had separate systems constructed in the past few years which discharge to the bay.

6.2.1.6 Sewage Collection and Treatment - All sanitary wastewater generated at the complex, exclusive of the Fort Adams area and Gould Island, is discharged into the sewer system for treatment by the City of Newport. The complex's sanitary sewer network is presented in Figure 6.2-1. Sewage is pumped to the municipal plant which is located immediately adjacent to NETC, west of O'Connell Highway and south of Gate 4. Wastewater entering the plant undergoes primary treatment before being discharged into the bay off of Bishop Rock at Coddington Point. Discharge from the Naval Complex averages roughly 2.5 MGD. Inflow and infiltration of storm and sea water into the sanitary sewer system has been a problem for a number of years due to the age of the facility.

The Fort Adams treatment plant, located about four miles south of NETC, serves the Navy housing units. The plant, built in 1972, provides extended aeration activated sludge treatment and has a design capacity of 230,000 gpd. A block flow diagram of the plant is presented in Figure 6.2-2. Prior to the construction of the treatment plant, sewage from the housing units was treated by a septic tank system.

Until approximately 1973, the Navy operated a primary treatment plant with two sludge drying beds at Melville North to treat waste generated in this area. This plant, originally constructed in 1957, became severely overloaded. So, it was decided to convert the plant to a pumping station and connect to the City of Newport system.

The Ship Wastewater Collection Ashore (SWWCA) project was finally completed in 1980. The ship-to-shore sewage collection systems have been installed on the north side of Pier 2 and the YP (Yard Patrol) Pier. The system on Pier 2 can handle peak flows of 1.4 MGD. Average daily flows from all the homeported ships at Pier 2, including a tender, is estimated at about 0.2 MGD. Cold weather hose cleaning, handling, and storage facilities are provided in a portion of Building 68. Prior to the installation of this equipment in 1980, ship board sanitary wastes were discharged overboard.

The major portion of Gould Island at Newport was excessed during the SER. Sewage produced on the Navy portion of the island is treated and disposed of by means of septic tank and leaching field.

The Melville, Coddington Point and Gould Island power plants, Buildings 46, 7, and 33, respectively, had NPDES permits until 1975 when their cooling waters and boiler blowdowns were tied into the sanitary sewer. NPDES permit RI-0000621 was cancelled when boiler blowdown and cooling water discharges from the Building 86 power plant were connected to the sewer system.

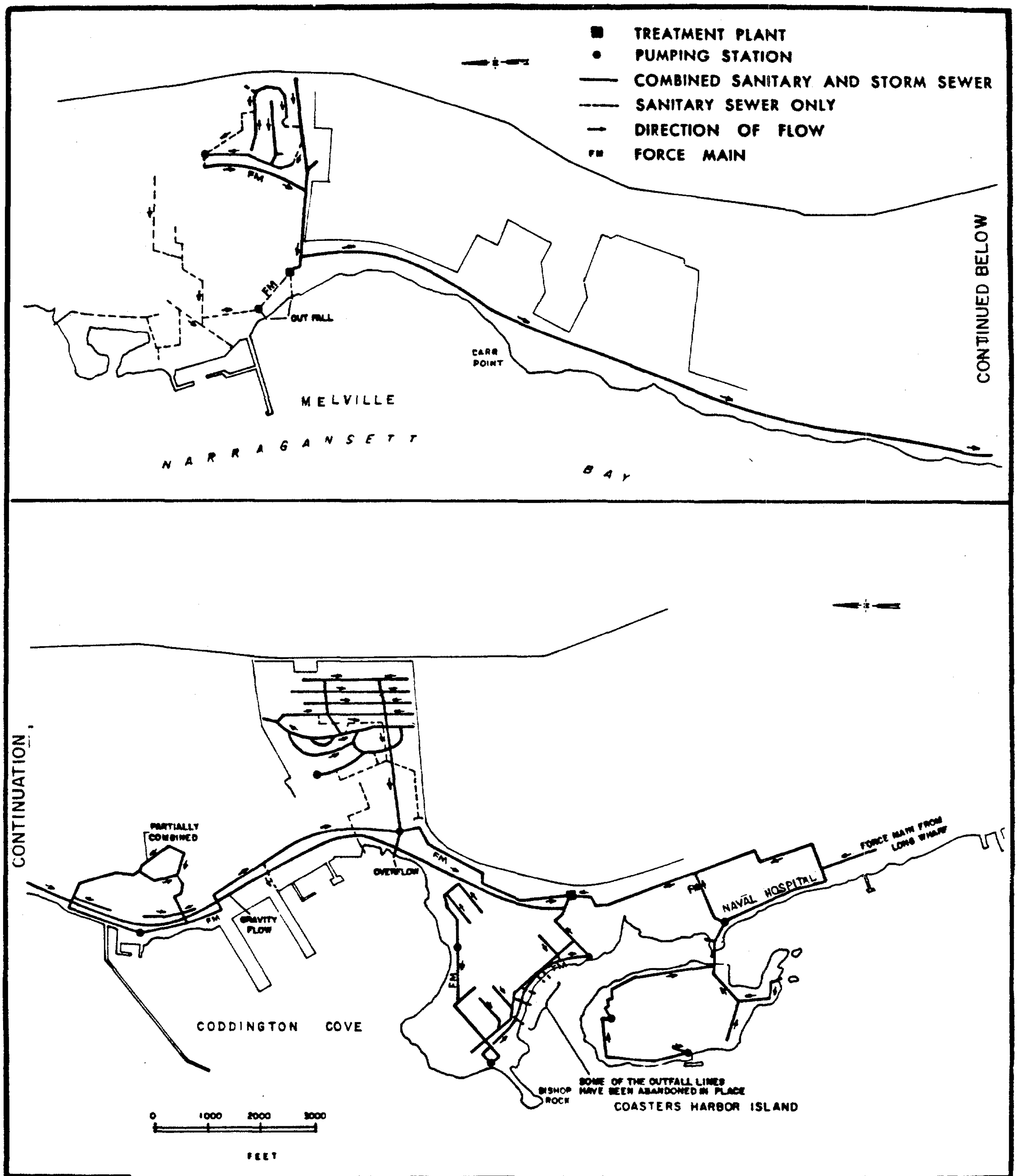

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FIGURE 6.2-1

SANITARY SEWER SYSTEM

Source: NETC Master Plan

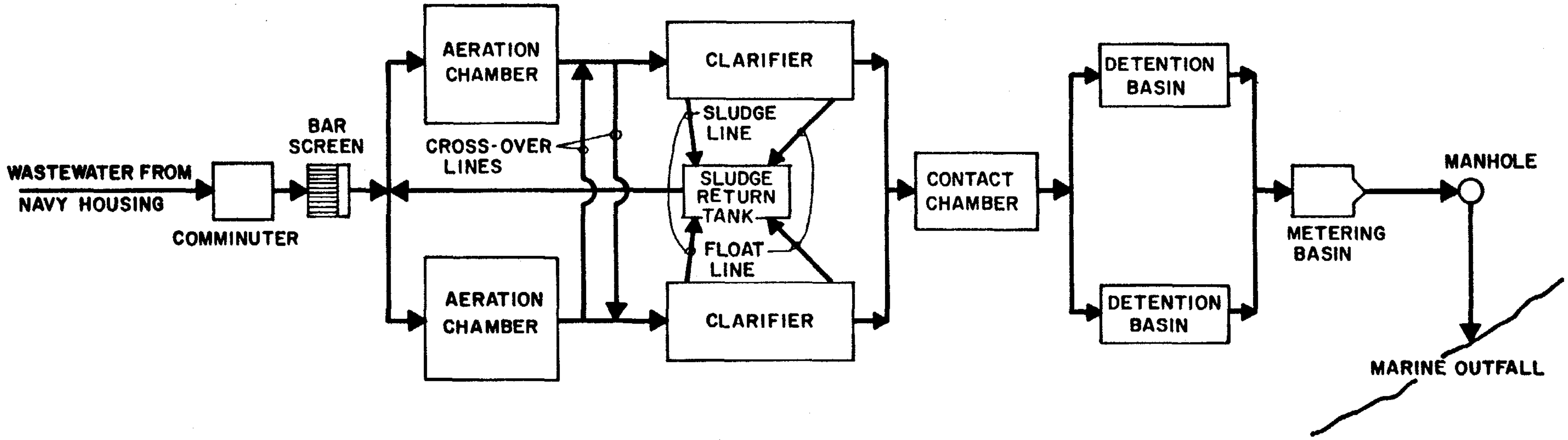

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FIGURE 6.2-2
FORT ADAMS
SEWAGE TREATMENT PLANT

In 1972, there were still some 40 miscellaneous facilities at the Naval Complex discharging raw sewage to Narragansett Bay. As funds became available, effluent from these buildings was routed to the sanitary sewer system.

6.2.1.7 Bilge Water Disposal - Bilge water generated by vessels homeported at NETC, Newport since the mid-70's has been off-loaded to floating waste oil rafts ("donuts") maintained by NETC, Public Works. The principal of operation is that of a simple oil/water separator. An adjustable floating skimmer in each of the two chambers (left and right) within the donut is used to skim separated oil into a pierside oil/water separator or directly into a tank truck for storage in one of two 60,000 barrel tanks (53 and 56, located at Tank Farm 5) and subsequent burning in NETC boilers for steam generation. The pierside oil/water separator is used primarily during summer months when higher temperatures tend to stagnate the donuts. The oil content of off-loaded bilge is approximately one percent of the total volume, requiring removal of oily waste from donuts every two weeks. Ships currently homeported at NETC, Newport cumulatively generate approximately 28,500 gallons of bilge each day while cold-ironed.

6.2.1.8 Compressed Air System - High pressure compressed air is produced in Building 119 and used exclusively for NUSC operations. The system consists of four 3,000 psig compressors and approximately 11,300 linear feet of one and one-half inch pipe installed in trenches throughout the NUSC compound. NUSC also has a low pressure compressed air system consisting of a 100 psig compressor and a distribution system installed in the same trench as the high pressure system.

6.2.1.9 Natural Gas - Natural gas, supplied by Providence Gas Company, is distributed to Navy family housing areas and the Complex and Hospital incinerators. The distribution system, with the exception of the Greene Lane FY-72 housing area and the Fort Adams housing areas, is owned and maintained by the Providence Gas Company.

6.2.2 Solid Waste Handling and Disposal Operations

6.2.2.1 Past Solid Waste Disposal Methods - Prior to disposal at the City of Newport transfer facility, solid wastes were disposed of at the Naval Complex. Before the 1973 SER, an estimated 50 tons per day was generated and disposed of on the base. Several locations have been used over the years. McAllister Point was in use as a landfill from approximately 1955 until 1973. This disposal site, located at Midway, covers an area of some 270,000 square feet. The area has been built up some 20 to 30 feet from sea level. Solid waste from the entire complex, including the large fleet of homeported ships, was disposed of at this site. A PCB transformer and several PCB capacitors are also reportedly buried in the landfill. For 11 years, a "teepee" type incinerator was operated at McAllister Point for destruction of solid waste generated by the fleet and shore commands. The Public Works Department stopped the open burning at McAllister point on 1 November 1971 and converted the refuse disposal to a sanitary landfill in accordance with state requirements. Trash was disbursed, covered and compacted with a bulldozer. Operators routinely crushed the liquid containing drums with the bulldozer. The incinerator was torn down on 14 June 1972. The site was closed and covered with three feet of soil material in May 1973.

A refuse disposal site existed in the Melville area prior to use of McAllister Point. This site was used from World War II to approximately 1955. A waste disposal operation was also located on the west side of Gould Island. This site dates back to World War II or before.

6.2.2.2 Classified Waste Disposal - Classified waste disposal was accomplished by burning in two 500 pounds per hour incinerators located in Building 687 on the waterfront in Coddington Cove. The incinerator facility was constructed in mid-1971 and deactivated in 1981. The incinerators were gas fired units with primary and secondary burning chambers. Scrubbers were later installed on the two units to meet State of Rhode Island emissions requirements. Classified materials are now shredded at Building 9 and wastes disposed with the other solid waste from the Navy complex.

6.2.2.3 Pathological Wastes - Prior to 1975, hospital waste was destroyed in the City of Newport incinerator. In May, 1975, a pathological incinerator was installed at the Regional Medical Center (Consumat System Model C-18). The 85 pounds per hour unit is gas fired and contains multiple burning chambers.

6.2.3 Hazardous Waste Disposal

NETC serves as agent for arranging the removal and disposal of hazardous wastes at the complex, including the wastes generated by homeported vessels. NETC contracts private contractors or the Defense Property Disposal Office (DPDO), Davisville, depending on the type of hazardous waste to be removed.

Four wastes generated by homeported vessels and disposed of by private contractors are: mercuric nitrate, used for boiler water testing; EDTA, used to clean the boiler; asbestos, used for pipe insulation; and PCBs, used in electrical equipment. The EDTA requires off-loading and disposal by tank truck. DPDO, Davisville, handles the PCB waste generated at the Newport Naval Complex.

Building 105 in Melville is used to provide limited storage. NUSC has also been used to store 55 gallon drums of PCB contaminated material and liquid. Ten transformers, which could contain PCBs, are also being stored at NUSC.

6.2.4 Fueling Operations

Diesel Fuel Marine (DFM) is provided to ships homeported at NETC, Newport, through a 16 to 24 inch pipeline between Pier 2 and the Defense Fuel Support Point (DFSP), Melville. DFSP is located at the northern end of the complex, some six miles from Pier 2. DFSP, Melville is a GOCO operation run by National Services Corporation. The commercial fueling company initiates operating procedures and supplies DFM, as requested, to homeported and visiting ships. This facility also provides fuel to all coastal military installations as far north as the State of Maine.

6.2.5 Waste Oil Recovery and Sludge Disposal

Waste oil can be defined as contaminated fuel oil and used lube oils. NETC instituted its program of waste oil recovery in September 1975. The program at NETC had evolved to accumulate waste oil, until 1980, from the New England area, store the product in underground fuel tanks, and utilize the waste oil product as a fuel extender by blending the waste with the clean fuel oils for use in the boiler plant. Waste oil is also recovered from the ships homeported at Newport. Ships seeking to off-load contaminated fuel or to pump their bilges merely request a tanker truck for direct off-loading or pump into one of the waste oil rafts (WOR). When full, the WOR is moved pierside where oily liquids are pumped out, passed through an oil/water separator, pumped into an oil receiver, and finally, trucked to one of the Waste Oil Recovery Program 60,000 barrel underground tanks (Tanks 53 and 56, located in Tank Farm No. 5). At the tank farm, the waste oil is stored until required for use at the boiler plant. Separation is accomplished by long detention periods without the use of heating coils. As of December 1979, the recovery program had reclaimed approximately 850,000 gallons of fuel oil.

From 1945 to 1979, it was common practice to bury tank bottom sludges from the oil tanks within a diked area surrounding the terminal's fuel storage tanks. Location of most of the burial pits can no longer be determined, and wastes were not characterized. Some of the sludges were generated from leaded fuel tanks and probably contained tetraethyl lead. One of the signs still remaining in Tank Farm No. 1 reads, "Danger: Materials with Tetraethyl Lead Buried Here - Do Not Uncover - 1 April 65." This site is further discussed in Section 6.6.7 (Site No. 7).

From 1945 to 1965, burning pits were used in Tank Farms No. 3 and No. 5 to dispose of tank bottom sludge generated during tank cleaning operations. Bulldozers were used to dig pits approximately 10 feet wide by 4 feet deep by 20 feet long. Steel plates were used for side walls, while sand was placed in the bottom for drainage. Oily water slops were pumped into the pits, allowed to drain and air dry, then burned. Burning operations were discontinued in the mid-60's because of air pollution regulations.

6.2.6 Pesticide Operations

Public Works pest control operations are now located in Building W-34 in Coddington Point. Disposal of pesticide and pesticide containers is conducted in strict accordance with federal, state, and Navy regulations. The need for disposal of excess dilute pesticide does not exist because of careful estimation of the amounts required. Hand spray equipment wash water is used as diluent for the next formulation of the same pesticide. Power spray equipment is triple rinsed. The rinse material is sprayed in accordance with the label. Empty organic pesticide containers are also triple rinsed. The rinse material is saved for use in the next formulation. After rinsing, containers destined for disposal are punctured, crushed and delivered to DPDO for disposition.

6.2.7 Electroplating Operations

6.2.7.1 NUSC Facility - The NUSC, Newport facility performed three industrial plating operations in Building 1170 until early 1981 (Figure 6.2-3). The electroplating processes included printed circuit board manufacture, anodizing, and chemical cleaning. The wastewater, including rinse water, from these operations is discharged to the sanitary sewer. The combined flow was estimated to be less than 1,000 gpd. The wastewater flows from the electroplating tanks into a holding/mix tank located in the corner of the building. The mixing of acids and bases neutralizes the wastewater prior to discharge. These processes use less than 100 gallons of plating chemical per year.

Chromic acid constitutes approximately 75 percent of the chemical usage. Sulfuric acid, fluoroboric acid, cleaners, activators, and nitric acid are among the other chemicals used in the plating operation. The non-sewerable or concentrated plating baths were disposed of under contract. Recycling Industries, Inc. of Braintree, Massachusetts, transports and treats the wastes. The contractor recycles the chromic acid baths.

The printed circuit board line operation is depicted in the schematic diagram of Figure 6.2-4. The wastewater discharged from this process was estimated at approximately 300 gpd. The NUSC anodizing line is shown in Figure 6.2-5. This is the largest electroplating process at Newport, generating about 400 gpd of wastewater. The chemical cleaning operation is the smallest operation conducted at the facility. It generates an average of 80 gpd of wastewater. The process steps are presented in Figure 6.2-6. The plating operations are conducted during an 8 hour day, 5 days per week.

6.2.7.2 Gould Island Facility - The Torpedo Overhaul Shop, Building 32, was constructed in 1942 and operated until approximately 1951, when the Navy disestablished the facility. The overhaul facility contained many overhead cranes, several large grinders, degreasing units, an

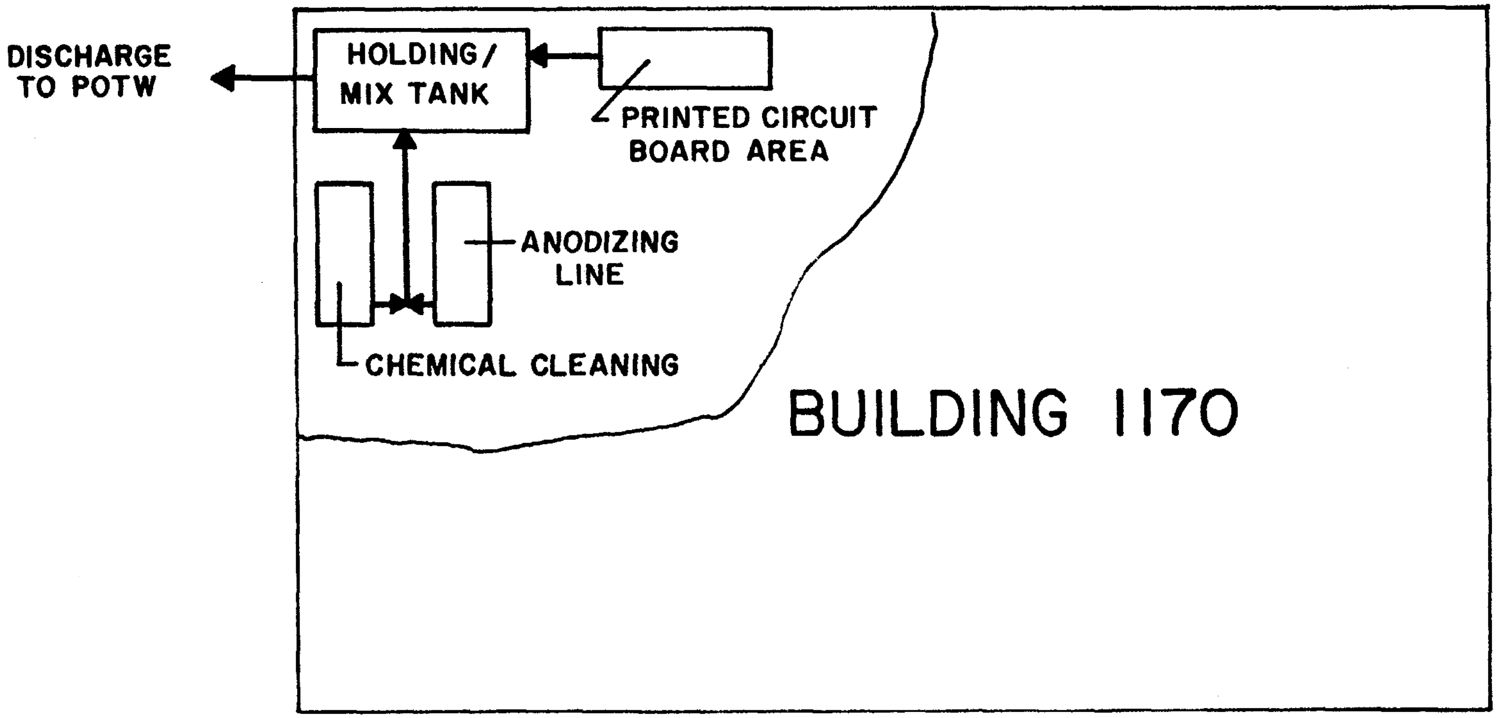

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FIGURE 6.2-3

NUSC ELECTROPLATING FACILITY

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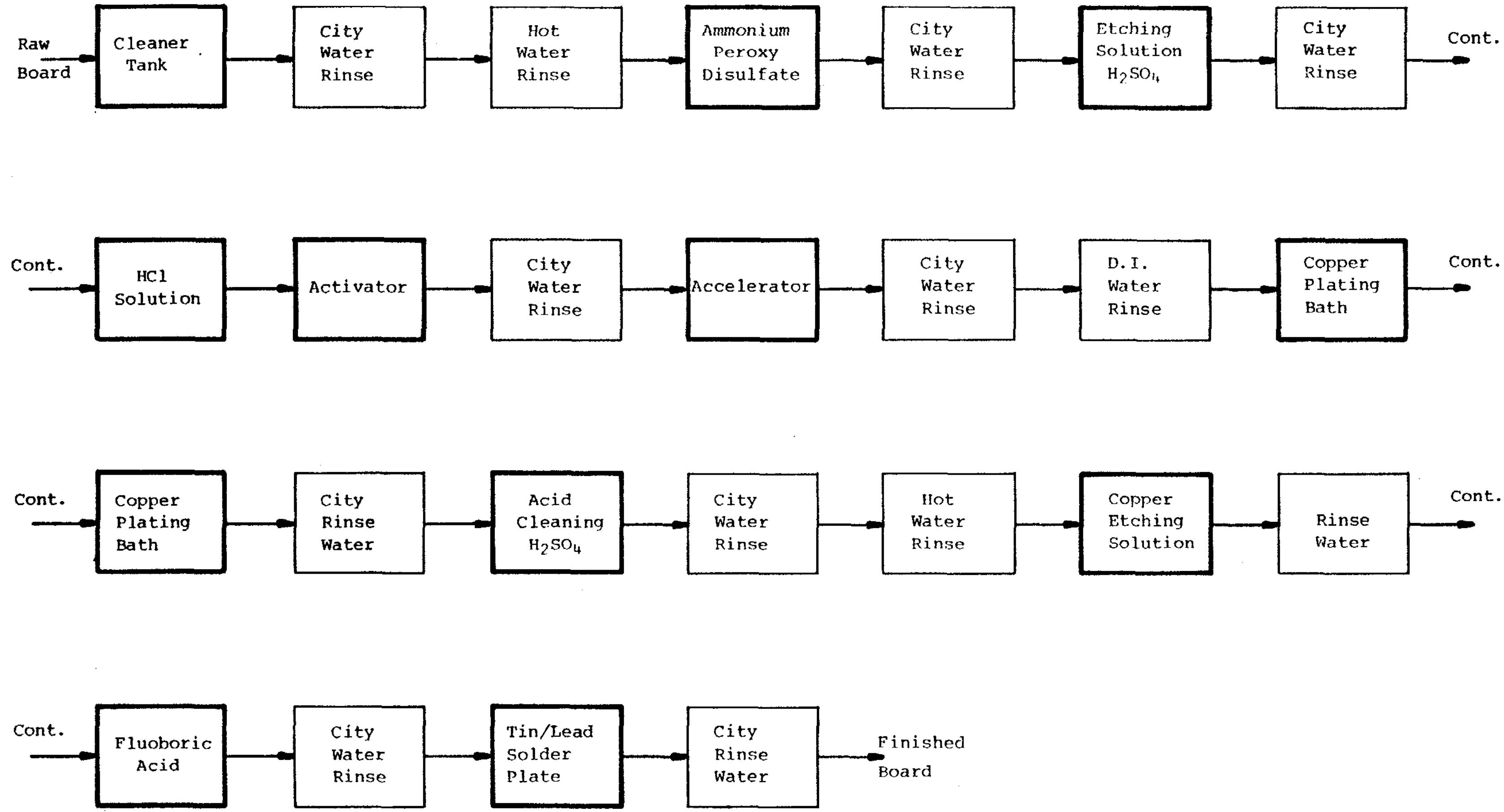

FIGURE 6.2-4
PRINTED CIRCUIT BOARD MANUFACTURING

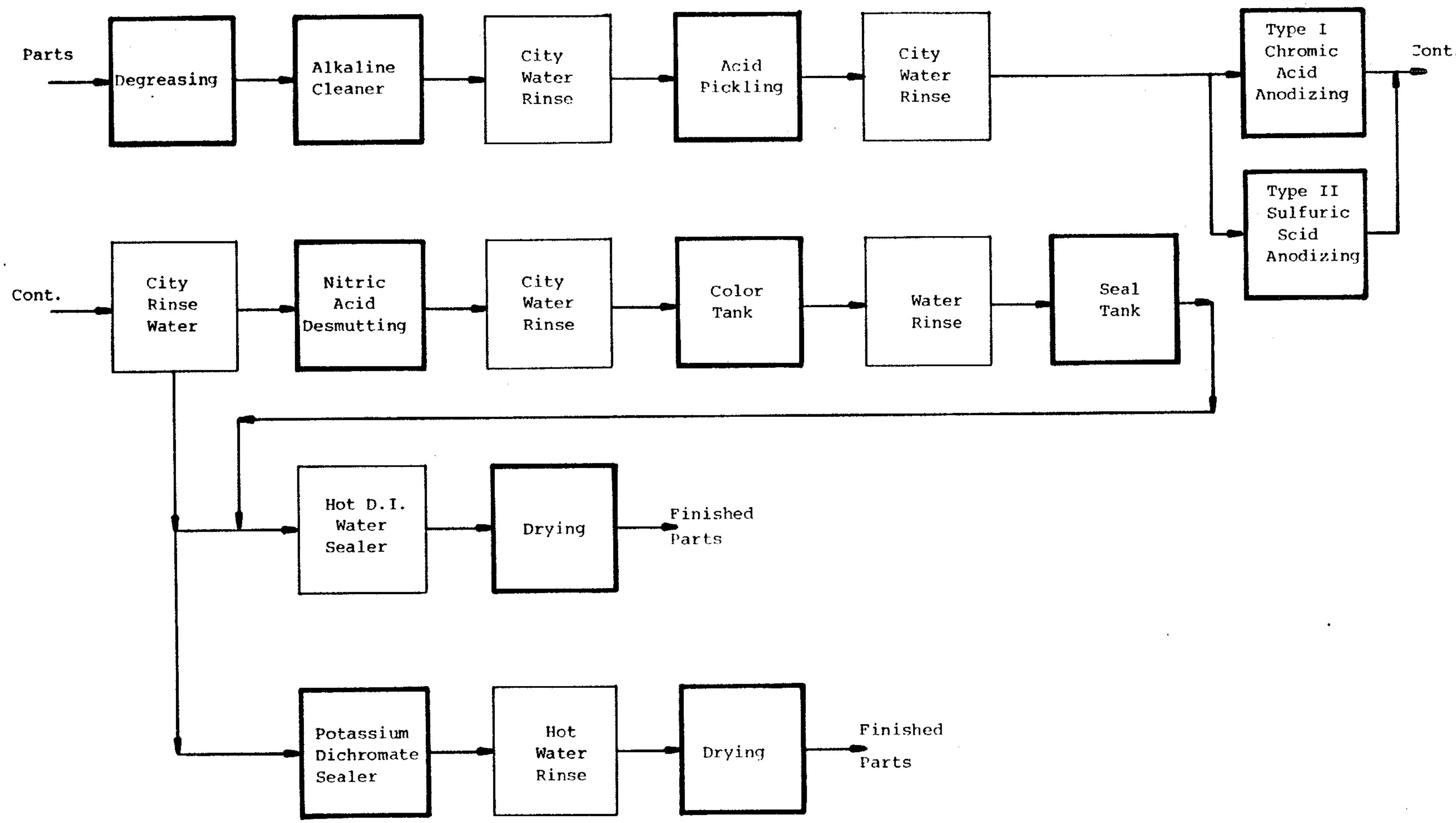

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FIGURE 6.2-5

ANODIZING

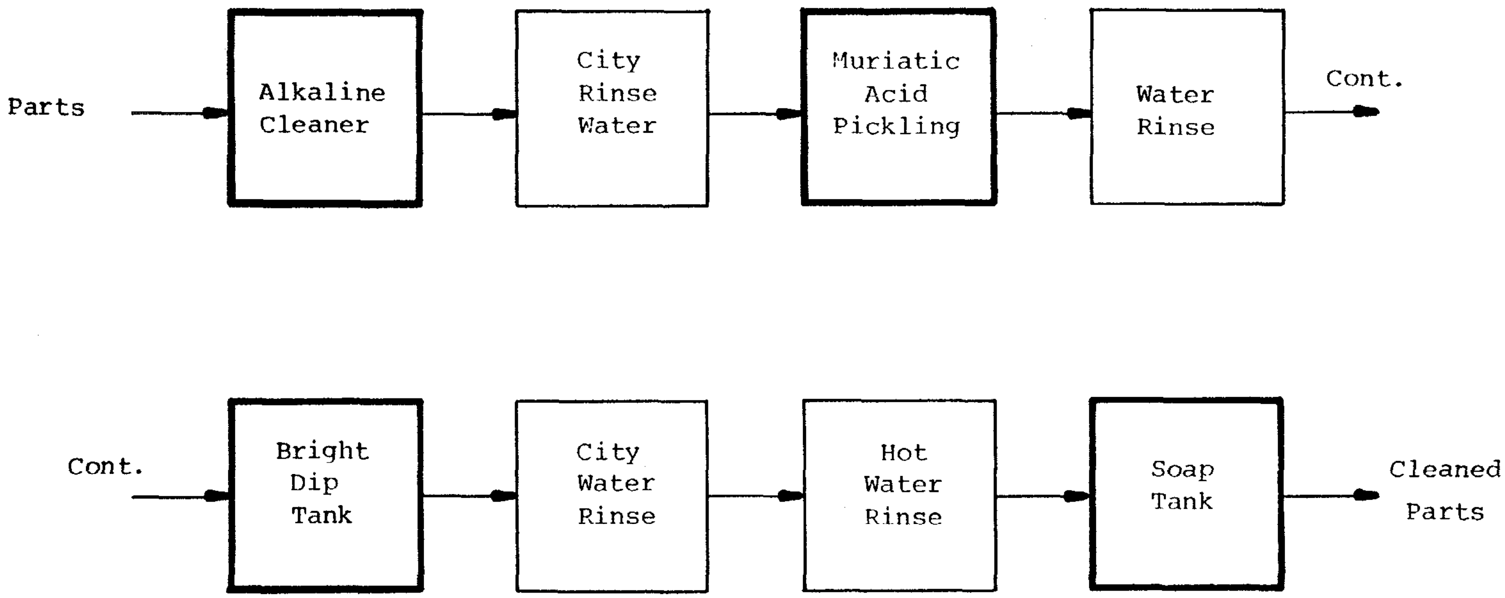

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FIGURE 6.2-6

CHEMICAL CLEANING

electroplating room, and an acid dipping unit. There were two degreasing units located adjacent to the plating room on the southern end of the building. These units were Detrex Solvent Machines, Model 1- D-700, manufactured by Detroit Rex Products of Detroit, Michigan and measured approximately 3 feet wide by 3 feet high by 20 feet long. A layout of the plating room in its present state is shown in Figure 6.2-7. Labels above the empty tanks indicated that muratic acid, caustic soda, chromic acid, nickel sulfate, sodium cyanide, and copper cyanide were used in the plating room. Because it has been over 30 years since the shop was operated, no personnel could be located to describe the operation or the past disposal practices. It is highly probably that shop rinse water was discharged to the bay.

Plating shop rinse water was most likely discharged into the bay while concentrated spent plating solutions were probably bled slowly into the wastewater stream. Plating sludges, on the other hand, were probably disposed of in the island landfill. Higher than normal concentrations of metals could, therefore, be present in the sediments near the outfall.

6.3 ORDNANCE OPERATIONS

6.3.1 General

Ordnance operations at the Naval Complex, Newport are limited to NUSC activities and the fleet ordnance requirements. Ordnance operations existed as early as 1869 when an experimental torpedo station was established in Newport on Goat Island. The facility operated for 83 years, reaching its peak performance and production during World War II when 80 percent of all torpedoes used were manufactured at this facility. Gould Island was used for torpedo overhaul and testing during this period. In 1951, the torpedo station on Goat Island was disestablished as the Navy began awarding contracts to private firms. The Naval Underwater Ordnance Station, forerunner to NUSC, was formed to oversee these ordnance contracts. Goat Island was then sold and developed by commercial enterprises.

6.3.2 Fleet Ordnance Operations

The reintroduction of fleet ships into Newport reinstated the need for ammunitions handling at the Complex piers. In order for homeported fleet ships to maintain operational and readiness, the periodic handling of ammunition and explosives is required. However, transfer (handling) involving large quantities of explosives in hazard classes 1.1 and/or 1.2 are normally done at naval weapons stations or by other approved methods. Currently, the occasional handling of high hazard class ordnance at the Complex piers is under an "event waiver" when and if required and justified.

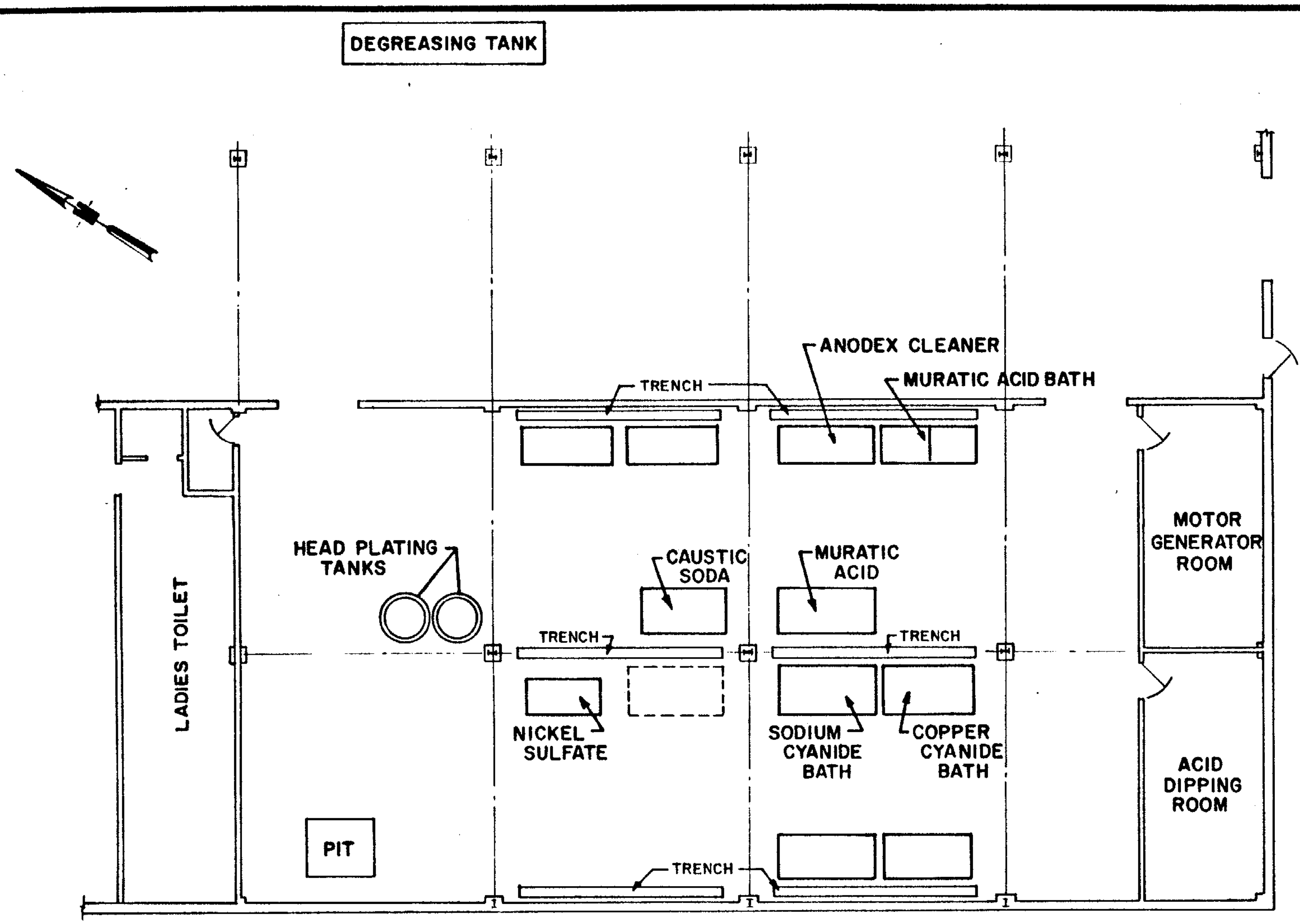

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FIGURE 6.2-7

GOULD ISLAND

ELECTROPLATING ROOM

Based on an on-board explosives loading of 30,000 pounds net explosive weight (NEW), an amount necessary to prevent degradation of tender operatonal readiness, the tender generates an ESQD arc of 1,250 feet when berthed. As such, the arc encompasses inhabited buildings and a waiver of explosive safety standards has been issued. The waiver, RI 1-79, authorizes the berthing of a destroyer tender at Newport with a total on board net explosive weight not exceeding 30,000 pounds and the handling or transfer of explosives between the tender and ships berthed at Newport for explosives in hazard classes 1.2 and/or 1.4 only.

6.4 RADIOLOGICAL OPERATIONS

6.4.1 General

There are no EMR or radiological hazard producing equipment presently in use at the Naval Complex. The NUSC laboratory does use several pieces of radiation producing equipment, primarily X-ray spectrograph and diffraction instrumentation, but all equipment is properly shielded to prevent hazardous emissions. X-ray equipment is also in use at NRMC and NPDC. The equipment is periodically inspected to ensure the EMR emissions are within safe limits.

6.5 MATERIALS STORAGE

6.5.1 Supply/Storage Facilities

The Supply Department Supply/Storage facilities are, for the most part, located on Coddington Cove. Table 6.5-1 provides a list of the buildings used at the complex for this function. Building 14 provides 30,000 square feet of warehouse space. Buildings 12 through 15 are wooden warehouse facilities constructed in 1943. Building A-8, which provides storage space for SURFGRU FOUR and Public Works family housing functions, is located adjacent to the Building 7 power plant.

6.5.2 Fuel Storage Tanks

Located between the Melville fuel pier (DFSP) and the destroyer pier in Coddington Cove are the three tank farms retained by the Navy following the 1973 SER. A total of 38 tanks provide a total storage capacity of approximately 1.4 million barrels. These tanks, most of which are located underground, were built during the early 1940's to contain a variety of fuel types including ship fuel (DFM, Diesel Fuel Marine), jet engine fuel (JP 4 and 5), aviation gasoline (AVGAS), bulk heat fuel, motor gasoline, lubricants, ballast/sludge, and wastewater. Tank sizes and types are listed in Table 6.5-2 and summarized by material type in Table 6.5-3. Included in these tables are the two tanks, Numbers 53 and 56, located in Tank Farm Five, which were withdrawn from excess for waste oil recovery.

TABLE 6.5-1

EXISTING SUPPLY/STORAGE FACILITIES

Building Number	Size (square feet)	CCN
12	30,000	441.10
13	15,000	441.10
14	30,000	441.10
15	30,000	441.10
47	40,628	441.10
Total	115,628	
9	1,840	441.30
1166	5,000	441.30
Total	5,000	
47	23,321	441.72
13	15,000	740.86
9	2,520	740.86
402	3,225	740.86
Total	18,225	
47	39,219	740.23

Source: NETC Master Plan

TABLE 6.5-2

FUEL STORAGE CAPACITY NAVAL COMPLEX

Tank No.	Size	Location	Type Storage
1	17,300 BL	M	Contaminated Fuel
2	17,300 BL	M	Ship Fuel
3	50,000 BL	M	Bulk Heat Fuel
5	2,160 BL	M	Jet Engine Fuel
9*	50,000 BL	TF-1 (u)	Ballast/Sludge
10*	50,000 BL	TF-1 (u)	Ballast/Sludge
11	56,000 BL	TF-1	Jet Engine Fuel
12	55,000 BL	TF-1	Ship Fuel
13**	27,000 BL	TF-1 (u)	Motor Gasoline
14	27,000 BL	TF-1 (u)	Aviation Gasoline
15	27,000 BL	TF-1 (u)	Aviation Gasoline
16	27,000 BL	TF-1 (u)	Aviation Gasoline
17	27,000 BL	TF-1 (u)	Aviation Gasoline
18**	27,000 BL	TF-1 (u)	Aviation Gasoline
19	60,000 BL	TF-2 (u)	Ship Fuel
20	60,000 BL	TF-2 (u)	Ship Fuel
21	60,000 BL	TF-2 (u)	Ship Fuel
22**	60,000 BL	TF-2 (u)	Bulk Heat Fuel
23	60,000 BL	TF-2 (u)	Ship Fuel
24	60,000 BL	TF-2 (u)	Ship Fuel
25	60,000 BL	TF-2 (u)	Ship Fuel
26	60,000 BL	TF-2 (u)	Ship Fuel
27	60,000 BL	TF-2 (u)	Ship Fuel
28	60,000 BL	TF-2 (u)	Ship Fuel
29	60,000 BL	TF-2 (u)	Ship Fuel
32	27,500 BL	TF-3 (u)	Jet Engine Fuel
33	27,500 BL	TF-3 (u)	Jet Engine Fuel
34	27,500 BL	TF-3 (u)	Jet Engine Fuel
35	27,500 BL	TF-3 (u)	Jet Engine Fuel
36	27,500 BL	TF-3 (u)	Jet Engine Fuel
60	19,782 GA	M	Lubricant
61	19,866 GA	M	Lubricant
62	45,528 GA	M	BS + W
63	45,528 GA	M	BS + W
64	19,950 GA	M	BS + W
67	13,986 GA	M	Empty - BS + W
53	60,000 BL	TF-5 (u)	Waste Oil Recovery
56	60,000 BL	TF-5 (u)	Waste Oil Recovery
Total=	1,381,180 BL		

NOTES:
- * - Substandard, in use
- ** - Substandard, not in use
- \+ - To be demolished
- M - Melville Pier area
- TF - Tank Farm
- (u) - underground tank

TABLE 6.5-3

SUMMARY OF FUEL STORAGE

No. of Tanks	Type Storage	Capacity
12	Ship Fuel	672,300 BL
5***	Aviation	135,300 BL
1**	Motor Gasoline	27,000 BL
7	Jet Engine Fuel	195,660 BL
1	Contaminated Fuel	17,300 BL
2****	Bulk Heat Fuel	110,000 BL
2	Lubricant	944 BL
6 * +	Ballast/Sludge	102,976 BL
2	Waste Oil Recovery	120,000 BL
38	Total =	1,381,180 BL

NOTES:
* 2 Tanks (100,000 BL) substandard in use
** Tank not in use, substandard
*** 1 Tank (27,000 BL) substandard not in use
**** 1 Tank (60,000 BL) substandard not in use
+ 3 Tanks (2,643 BL) to be demolished

6.5.3 Naval Underwater Systems Center (NUSC) Storage

Explosive materials used and stored at the Newport research and development facility primarily consist of ignitors, blasting caps, explosive bolts and propellants which are used in the testing of torpedoes and other weapon systems. Storage of these explosive devices is limited to four magazines located near the eastern boundary of the Center. Explosive Safety Quantity Distance (ESQD) arcs for the magazine complex are 400 feet for inhabited buildings based on design capacities of the magazines. Actual storage is considerably less than the design capacities.

Structure No. 128 is an intermittent storage facility used by EOD Detachment SUBLANT. Its use is limited to the quantities of explosives listed in Table 6.5-4. Testing of liquid propellants is conducted in facilities (test cells 178, 179, 180) located on the east side of the Center. Storage of liquid propellants is provided in Building 185. ESQD arcs for the storage and testing of liquid propellants are listed in Table 6.5-5.

6.6 WASTE DISPOSAL

The EEI investigative team identified 16 potential contamination sites at NETC, Newport. These are sites where wastes are presently being disposed of or where disposal occurred in the past. Figures 6.6-1 through 6.6-4 show the locations of the disposal sites at NETC. Two additional sites (No. 3 and No. 16) were also identified during the on-site survey but were subsequently found to be outside the scope of the NACIP program and are not discussed in this report.

A discussion of each of the identified waste disposal sites is provided below. Each of the disposal sites is discussed in terms of its history, types of materials disposed of at the site, how the site was operated, drainage, present land use, and its potential contamination threat.

6.6.1 McAllister Point Landfill, Site No. 1

This is the site of a sanitary landfill which was operational over a 20-year period. The site was first used in 1955 following the closure of the landfill in Melville North. The site continued to be used as a landfill until the mid-1970's and encompasses approximately 6 acres. The site is located on land which is being excessed by the Navy.

During the years that the site was operational, it received all the wastes which were generated at the naval complex. This included wastes from all the operational areas (machine shops, ship repair, NUSC, etc.), Navy housing areas (domestic refuse), and from the 55 ships which were homeported at Newport prior to the 1973 SER action. Generally, 25 to 30

TABLE 6.5-4

MAGAZINE CAPACITIES - NUSC

Magazine Nunber	Storage Capacities (lbs) Class	Approved	Future	Design	ESQD Arc* (ft)
1	1.4	200	250	1,000	400
	1.3	100	200		
	1.2	200	200		
2	1.3	500	500	1,000	75
3	1.1	5	750	1,000	400
4	1.1	5	50	50	150

*Inhabited building distance.

TABLE 6.5-5

EXPLOSIVE STORAGE STRUCTURE 128
NUSC (EOD Operations)

Ordnance Class	Amount (pounds)	ESQD Arc (feet)
1.4	200	100
1.3	500	75
1.2	0	-
1.1	50	150

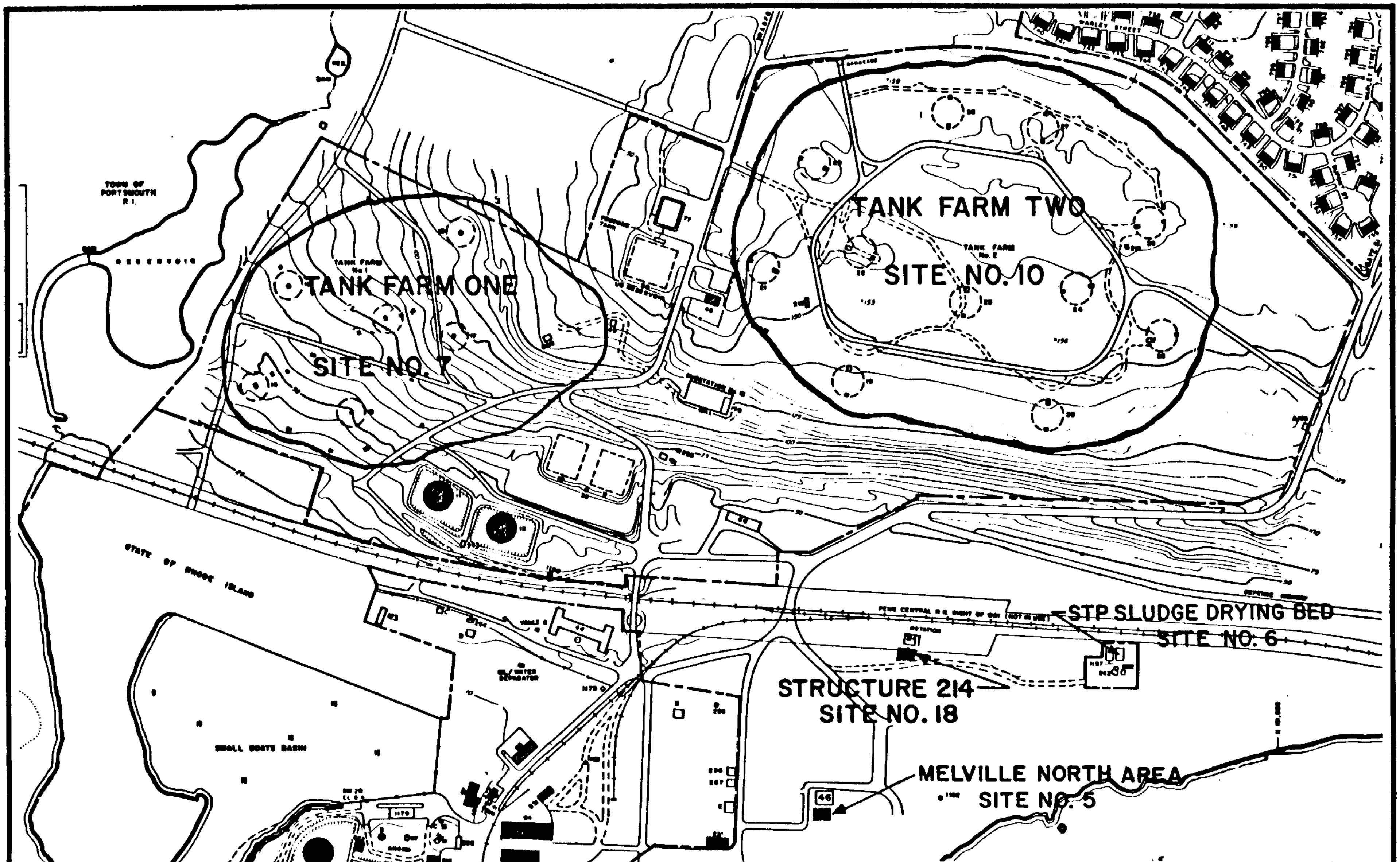

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FIGURE 6.6-1
MELVILLE NORTH
WASTE DISPOSAL SITES

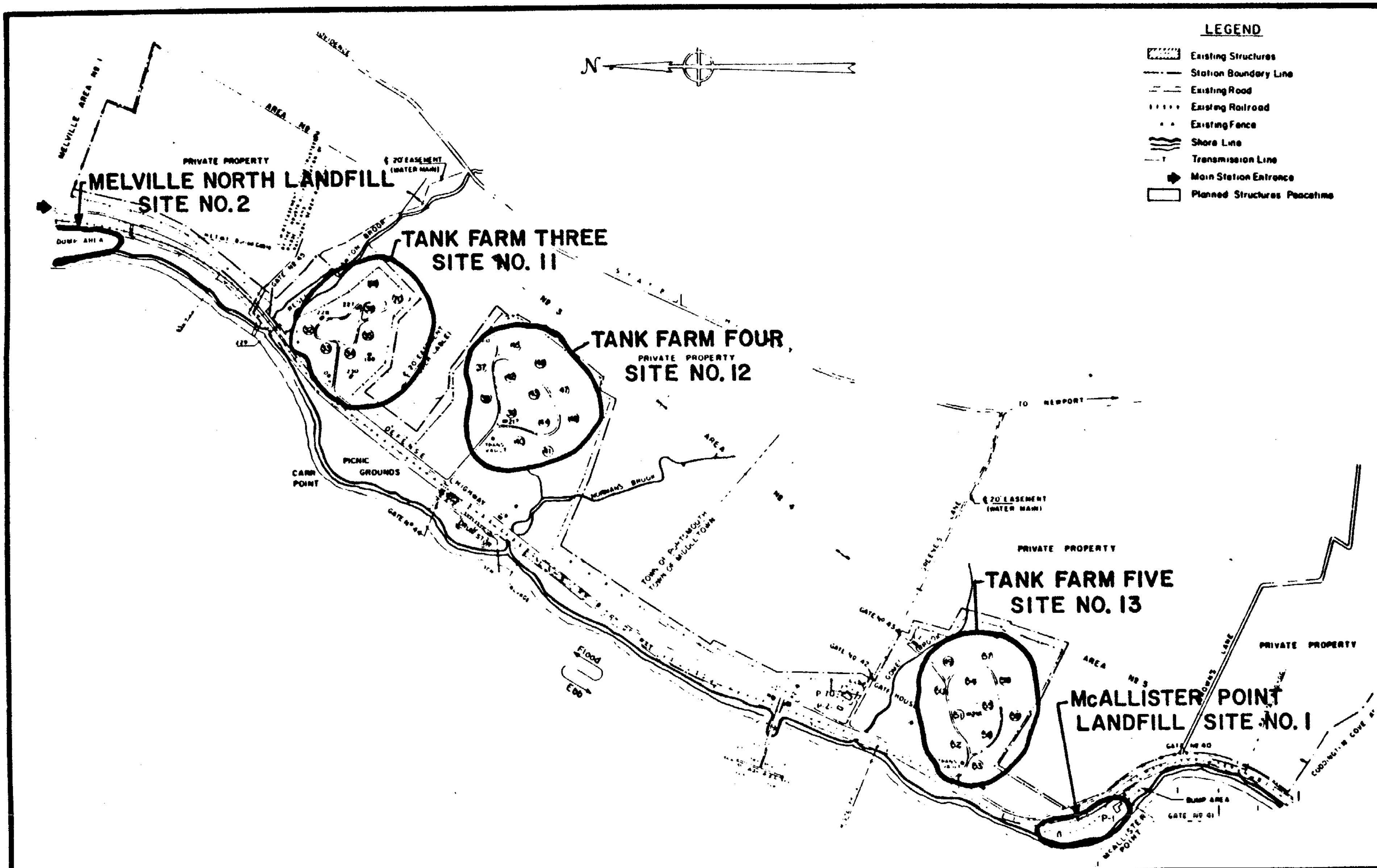

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FIGURE 6.6-2

WASTE DISPOSAL SITES
MELVILLE SOUTH AND MIDWAY

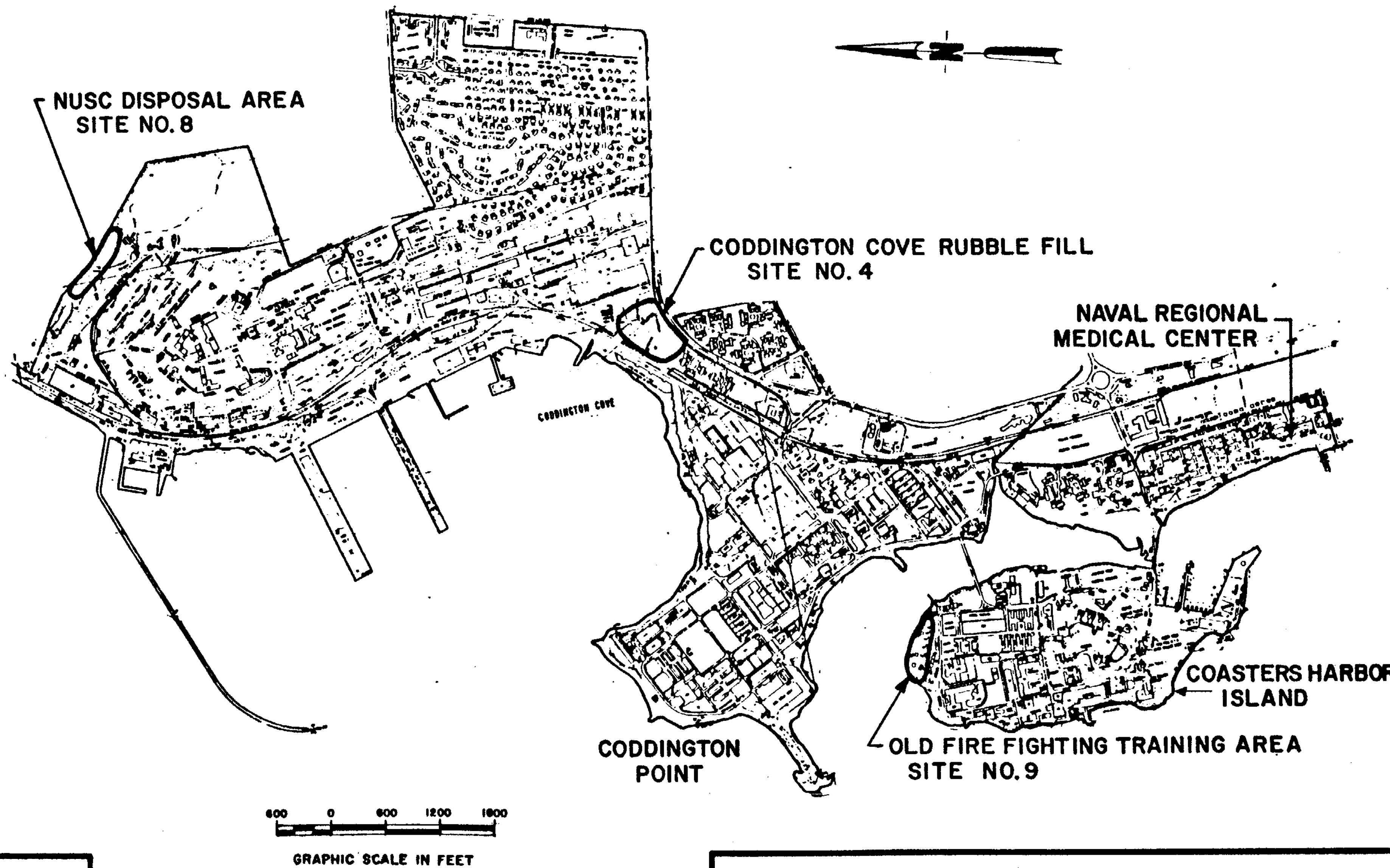

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FIGURE 6.6-3

WASTE DISPOSAL SITES
CODDINGTON COVE, CODDINGTON POINT, COASTERS HARBOR ISLAND, AND NAVAL REGIONAL MEDICAL CENTER

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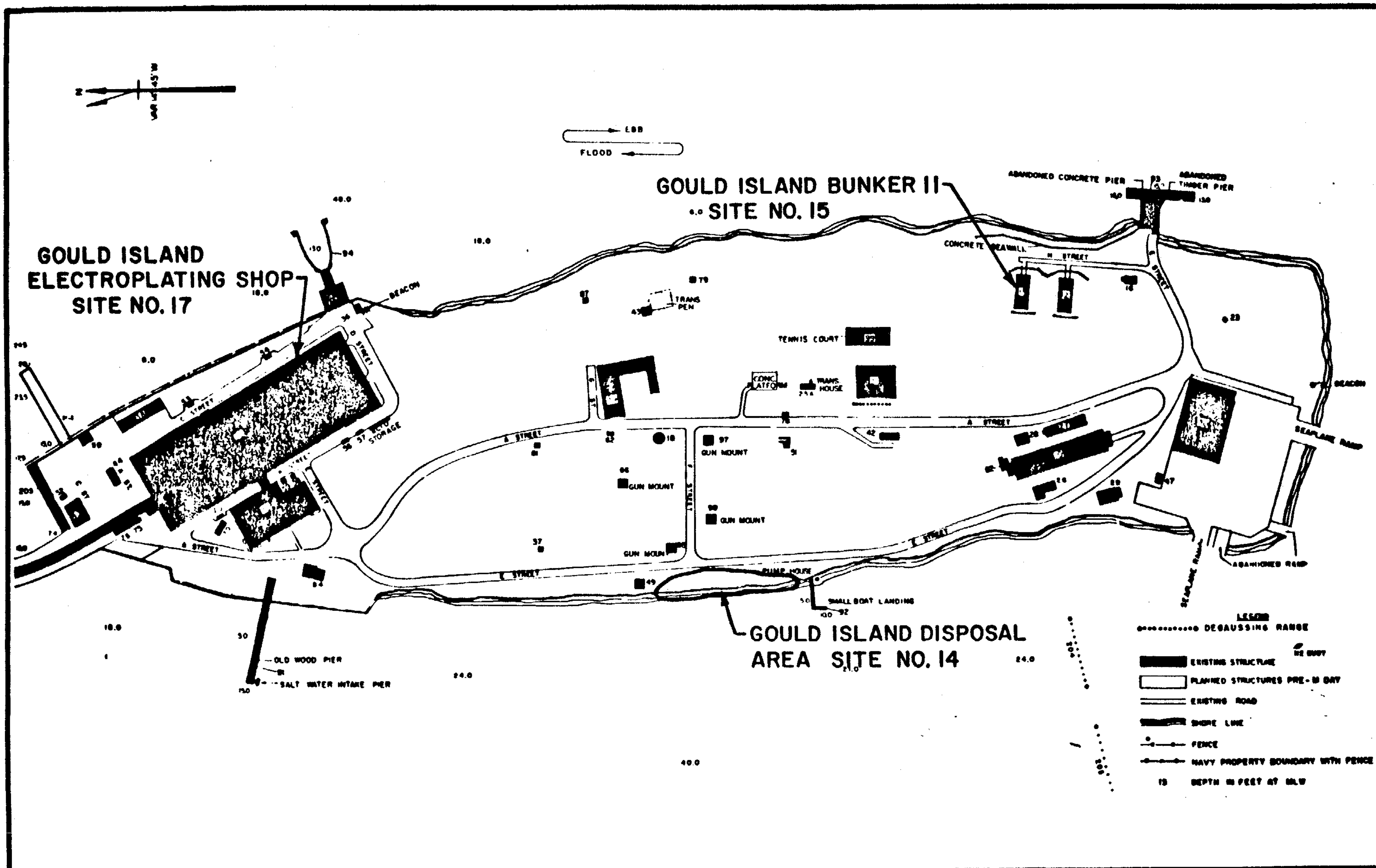


FIGURE 6.6-4

GOULD ISLAND
WASTE DISPOSAL SITES

of these ships were in port at any one time. Each day, fourteen 40 cubic yard containers were emptied from the pier areas and disposed of in the landfill. The materials disposed of at this site included spent acids, paints, solvents, waste oils (diesel, lube and fuel), and PCB contaminated transformer oil.

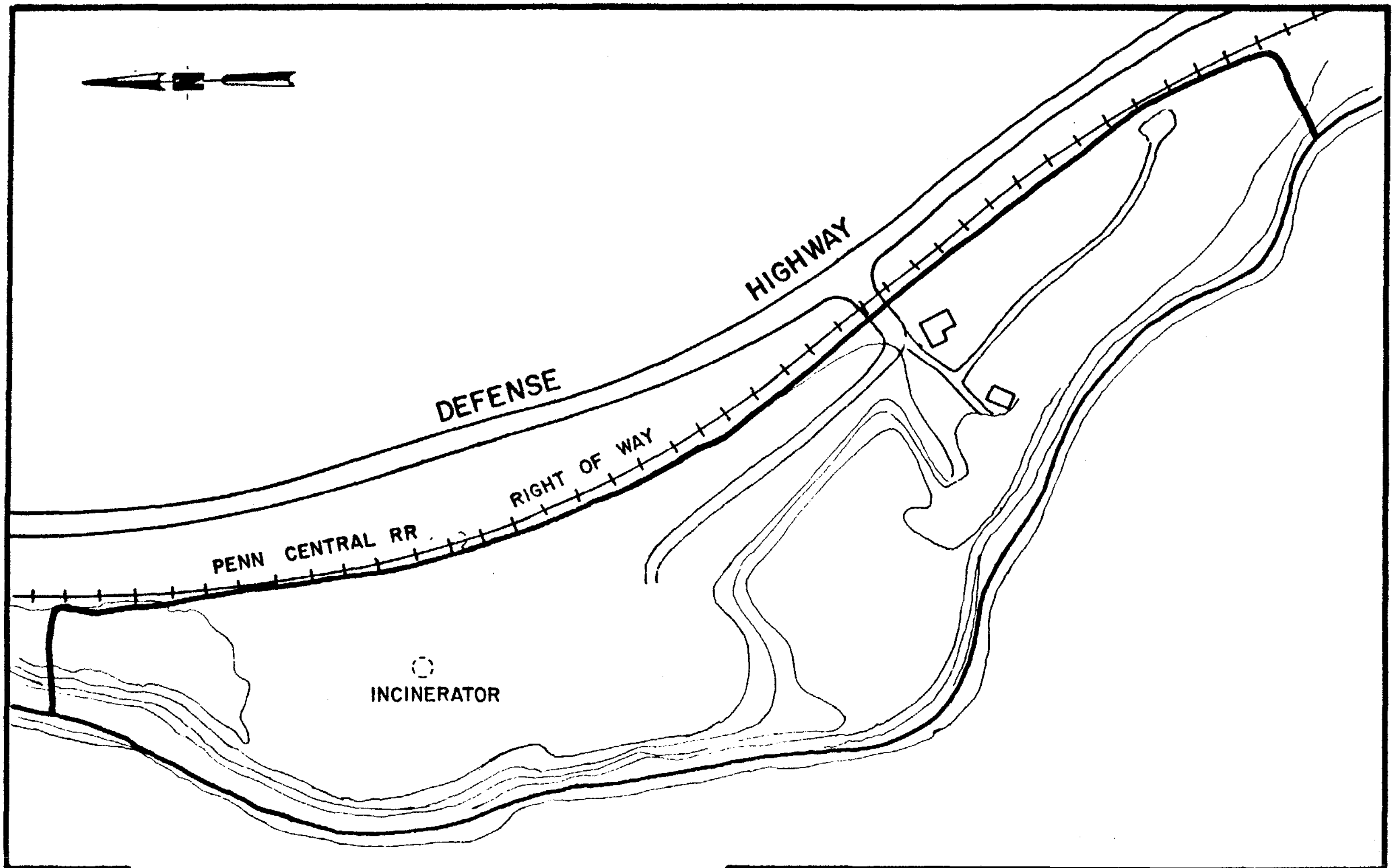
The operators of the landfill indicated that it was common practice for barrels filled with liquids to be brought to the landfill. These barrels contained paints, oils and other unidentifiable liquids. The barrels were crushed by the bulldozer operator before being covered. It was also discovered through interviews with base personnel that at least two transformers, each of which contained approximately 100 gallons of PCB contaminated oil, and at least 4 or 5 capacitors were disposed of in the landfill. The Superfund notification for McAllister Point indicated that PCBs were disposed of at the site.

For the period 1955 through 1964, wastes were simply trucked to the site, spread out with a bulldozer, and then covered over. In 1965, an incinerator was built at the landfill. From 1965 through 1970-71, some 98 percent of all the wastes were burned before being disposed of in the landfill. The incinerator was closed about 1970 as a result of the air pollution it was causing. During the remaining years that the site was operational, all wastes were again disposed of directly into the landfill.

The site is located along the shoreline of Narragansett Bay as shown in Figure 6.6-5. Throughout the time period that the site was operational, the landfill was extended out into the bay using the wastes as fill material. The site used to be subject to periodic flooding until the elevation of the site was increased through additional filling. Even though the site is no longer subject to flooding, the base of the landfill is still in hydrologic contact with the bay and the groundwater. Surface runoff and leachate seepage from the landfill is directly into Narragansett Bay.

Operations at the site were discontinued in the mid-1970's. Following this, all wastes generated at NETC were disposed of at the City of Newport's transfer station. A final covering of soil three feet thick was placed over the NETC landfill following its closure.

The landfill has a very high potential for environmental contamination. The landfill is located along the shoreline of Narragansett Bay, with much of the landfill extending out into what was once part of the bay. Thus, many of the wastes are or have been in direct contact with the waters of the bay. Furthermore, surface drainage and leachate seepage from the landfill is directly into the bay. Two leachate springs were observed at the landfill during the NACIP field inspection (Plate 6-1). All the wells in the area are upgradient from the site and beyond its influence.



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0 150 300
GRAPHIC SCALE IN FEET

FIGURE 6.6-5
McALLISTER POINT LANDFILL

Plate 6-1

The photograph above shows the McAllister Point Landfill (Site No. 1). The arrows show the location of the two leachate springs which discharge into Narragansett Bay. The numerous unvegetated areas which occur throughout the landfill are evidenced in this photograph. The circular area is used as a flight area for model airplanes.

6.6.2 Melville North Landfill, Site No. 2

This site was used as a landfill for at least the period following World War II until 1955. The date that the site first began to be used as a landfill is unclear, but all indications are that it was after the war. Following its closure in 1954, wastes generated at the naval complex were disposed of at the McAllister Point Landfill. The site encompasses approximately 10 acres.

The Melville North landfill would have received wastes similar to those which were disposed of in McAllister Point landfill, including spent acids, waste paints, solvents, waste oils (diesel, fuel, lube) and, potentially, PCBs. The quantity of these wastes disposed of in the landfill is unknown. During visual inspections of the site, areas covered with oil and oil sludge were found to be scattered throughout the site. There were mounds of oil-soaked soil which appeared to have been trucked to the site and dumped. These oil contaminated mounds could be the oil sludge material obtained from the tank farms during tank cleaning operations, or the result of cleanup operations following oil spills.

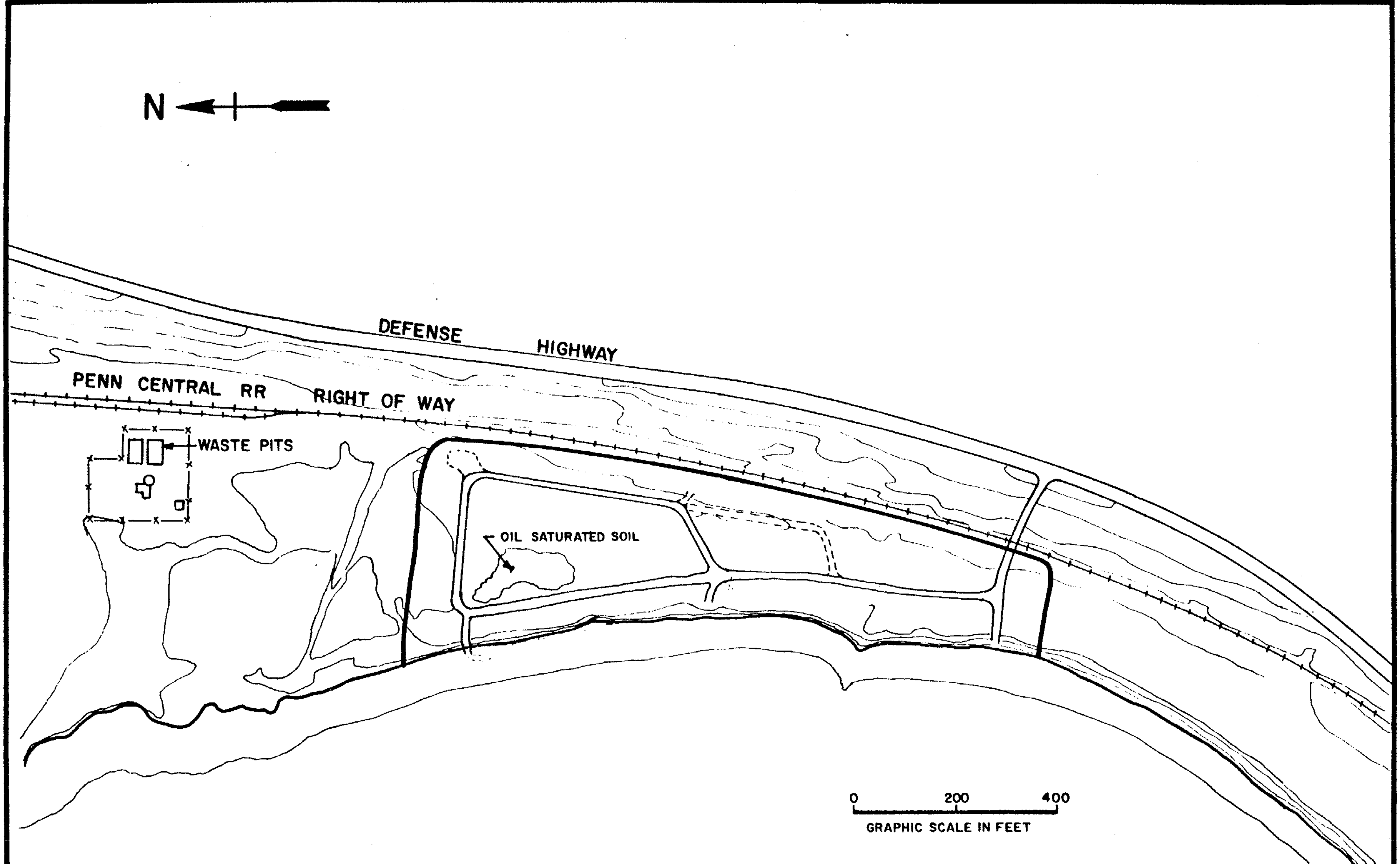
The site is situated in the Melville North area in a low-lying wetland type area along the shoreline of Narragansett Bay, as shown in Figure 6.6-6. Surface drainage and groundwater flow from the site is directly into the bay. The area is also subject to periodic flooding and lies within the 100 year flood plain (NETC Master Plan, 1980). Therefore, the pathways for pollutants to migrate off-site are readily available at the landfill. This site is located on land which is being excessed by the Navy and is pending final disposal by GSA. All wells in the area are upgradient from the site and would not be influenced by it.

6.6.3 Coddington Cove Rubble Fill, Site No. 4

This site is located in the Coddington Cove area, west of Building 47 and north of Coddington Road. The site has been used over the last five years and covers 6 to 8 acres. The site contains inert rubble material which includes concrete, asphalt, metal, slate material (apparently from the roof of a building), wood, brush, and a small amount of ash. This site is no longer used as a disposal site for demolition type materials. These wastes present no contamination threat.

6.6.4 Melville North Area, Site No. 5

This site is located in Melville North just west of Building 46. Directly behind Building 46 is a large, asphalted area. In the northeastern corner of this asphalted area, there are presently some 20 barrels which contain waste oil. The barrels have been present for the past five years. Some of the barrels are on their sides and many are in a rusted condition. Several barrels at the site have leaked. It was also apparent that other spills had occurred in the past, as evidenced by a 30-foot by 40-foot area which was oil stained. There were 50 to 100 gallons



EEI

FIGURE 6.6-6

MELVILLE NORTH LANDFILL

of oil spilled at this site. Since EEI's on-site survey, the activity has initiated actions to clean up this site.

6.6.5 STP Sludge Drying Bed, Site No. 6

This site was used for the disposal of waste oil. The oil was disposed of at this site within the previous six months. The site is located in Melville North at the old sewage treatment plant designated as Building 242. Located behind the treatment plant is a 15-foot by 40-foot sludge drying bed into which the oil has been dumped. The sewage treatment plant is not presently being used except as a pumping station.

At the time of our field inspection, tire tracks were clearly evident leading through the vegetation and up to the sludge drying bed. This indicated that the most recent oily waste had been dumped within the last couple of months. It appears as though a tank truck had simply pulled up to the sludge beds and dumped its oily waste. A thick oil sludge, approximately one-half inch thick, was on the bottom of the drying bed, and there were oil stains along the sides which indicated that the oil had at one time been higher. Between 100 and 500 gallons of oily waste were potentially disposed of in the drying bed.

There was also an area just north of the perimeter fence surrounding the treatment plant where oily waste (10 to 25 gallons) had been dumped. This oil was also of recent origin, as evidenced by the fact that it was still pooled, and tire tracks through the vegetation were clearly evident. There were no indications that the site had been used in the past for oily waste disposal purposes. Since EEI's on-site susurvey, the activity has initiated actions to clean up this site.

6.6.6 Tank Farm #1, Site No. 7

Tank Farm #1 is located in Melville North and consists of six underground steel tanks (Figure 6.6-7). Each of these tanks has a storage capacity of 60,000 barrels. These tanks are, or have been, used for the storage of diesel oil, fuel oil, jet fuel, 100 octane, and aviation fuel. Periodically, these tanks were cleaned to remove the sludge material which, over time, settles on the bottoms of the tanks. This practice occurred from World War II until the 1970's. There was no set interval for cleaning the tanks as this depended upon how frequently the tank was being used.

When the tanks were cleaned, the sludge material was placed in a pit which was approximately 20 feet long, 10 feet wide, and 4 feet deep. These disposal pits were simply dug in the general vicinity of the tank being cleaned. The sludge was placed in the pits and allowed to weather for a few weeks. The pits were then covered over and marked with signs warning of tetraethyl lead. These pits are spread throughout the tank farm, but through the years, most of the signs marking the disposal areas have disappeared.

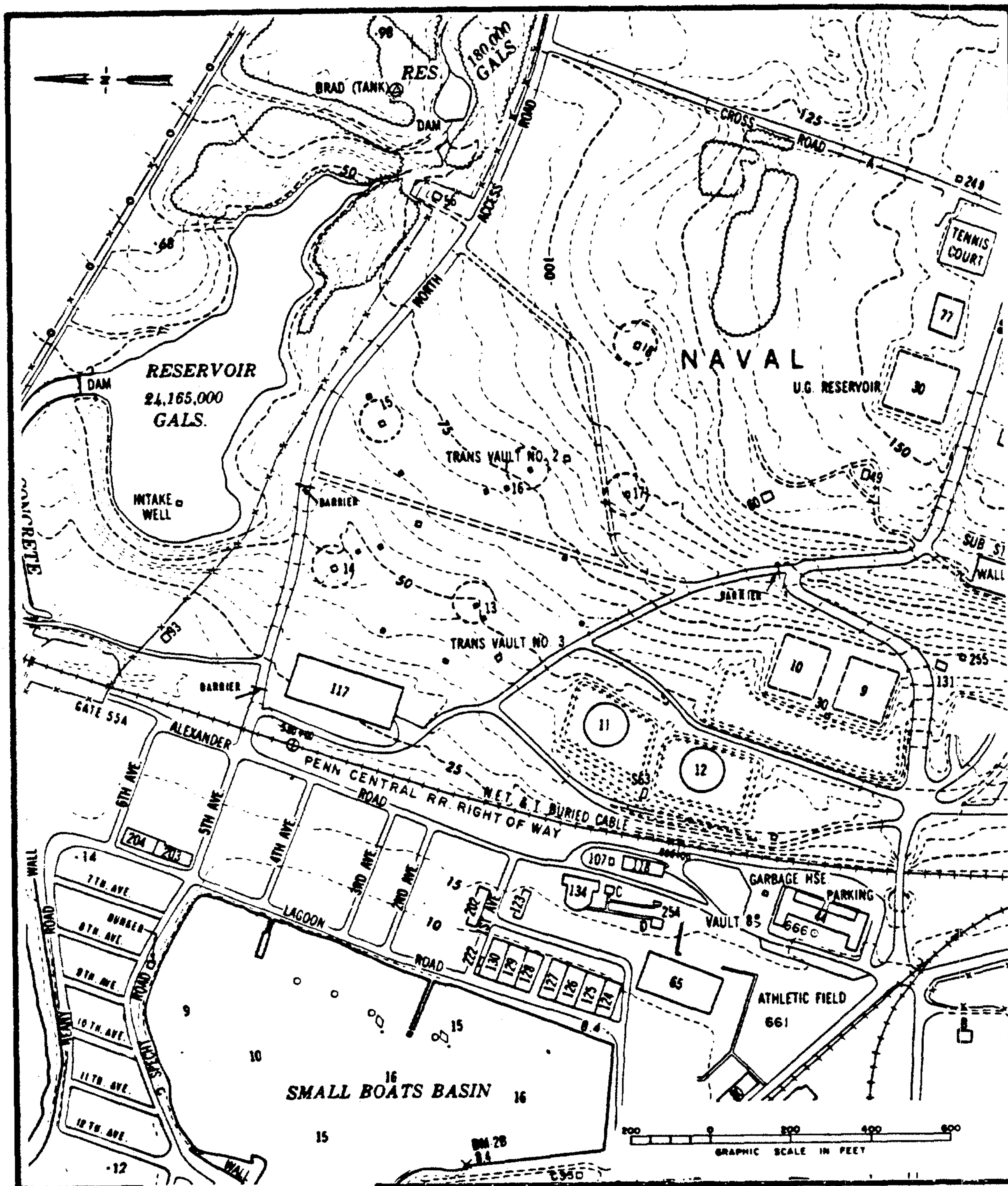


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FIGURE 6.6-7
TANK FARM ONE

The potential for contamination does exist at this site. Portions of the tank farm drain northward into the Melville Public Fishing Area, with other areas draining toward Narragansett Bay. The groundwater is generally within 10 feet of the surface. Considering that the waste sludges are in a pit, contaminants would not have to migrate far to reach the groundwater. The bedrock is also very shallow in this area (within 10 or 15 feet). If the bedrock is highly fractured, it would be possible to contaminate the bedrock aquifer.

6.6.7 NUSC Disposal Area, Site No. 8

This site is located in the northeastern portion of the Naval Underwater Systems Center (Figure 6.6-8). Located to the north of this site is the Wanumetonomy Golf Club. A rubble disposal area with scrap lumber, tires, wire, cable, and empty paint cans is located at this site.

Drainage from the above area is into the pond shown in Figure 6.6-8. This pond is some 300 yards long and 50 yards wide. Just east of the pond is a small wetland area which the rubble disposal area borders. Water from the pond is used to water the golf course, and there is a pump house near the western end of the pond. Discharge from the pond is into Narragansett Bay.

6.6.8 Old Fire Fighting Training Area, Site No. 9

This site is situated along the northern shoreline of Coasters Harbor Island (Figure 6.6-3). This site was used from the World War II period to 1972 as a fire fighting training area. Waste oils were probably used to give the trainees experience in putting out various types of fires. This site has since been extensively excavated, and no contamination has been reported. Runoff from this site is into Narragansett Bay, which it borders.

6.6.9 Tank Farms 2, 3, 4, 5, (Sites 10, 11, 12, 13)

Tank Farms 2, 3, 4, and 5 (sites 10, 11, 12, and 13, respectively) are discussed together in this section because of their similarities. Maps of each of these sites are included in Figures 6.6-9 through 6.6-12. Each of the underground tanks contained in these tank farms has a 60,000 barrel capacity. All the tanks are concrete except for two steel tanks in Tank Farm 3. These tanks are, or were, used to store diesel and fuel oil.

When individual tanks were cleaned, the tank bottom sludge was either dumped directly onto the ground, or into a burning chamber. At Tank Farms 2 and 4 (sites 10 and 12, respectively) the tank bottoms were simply disposed of on the ground in the general vicinity of the tank being cleaned. At Tank Farms 3 and 5 (sites 11 and 13, respectively) the tank bottoms were disposed of in burning chambers. These burning chambers had steel sides and a sand bottom. The sludge was put in the chambers and burned.

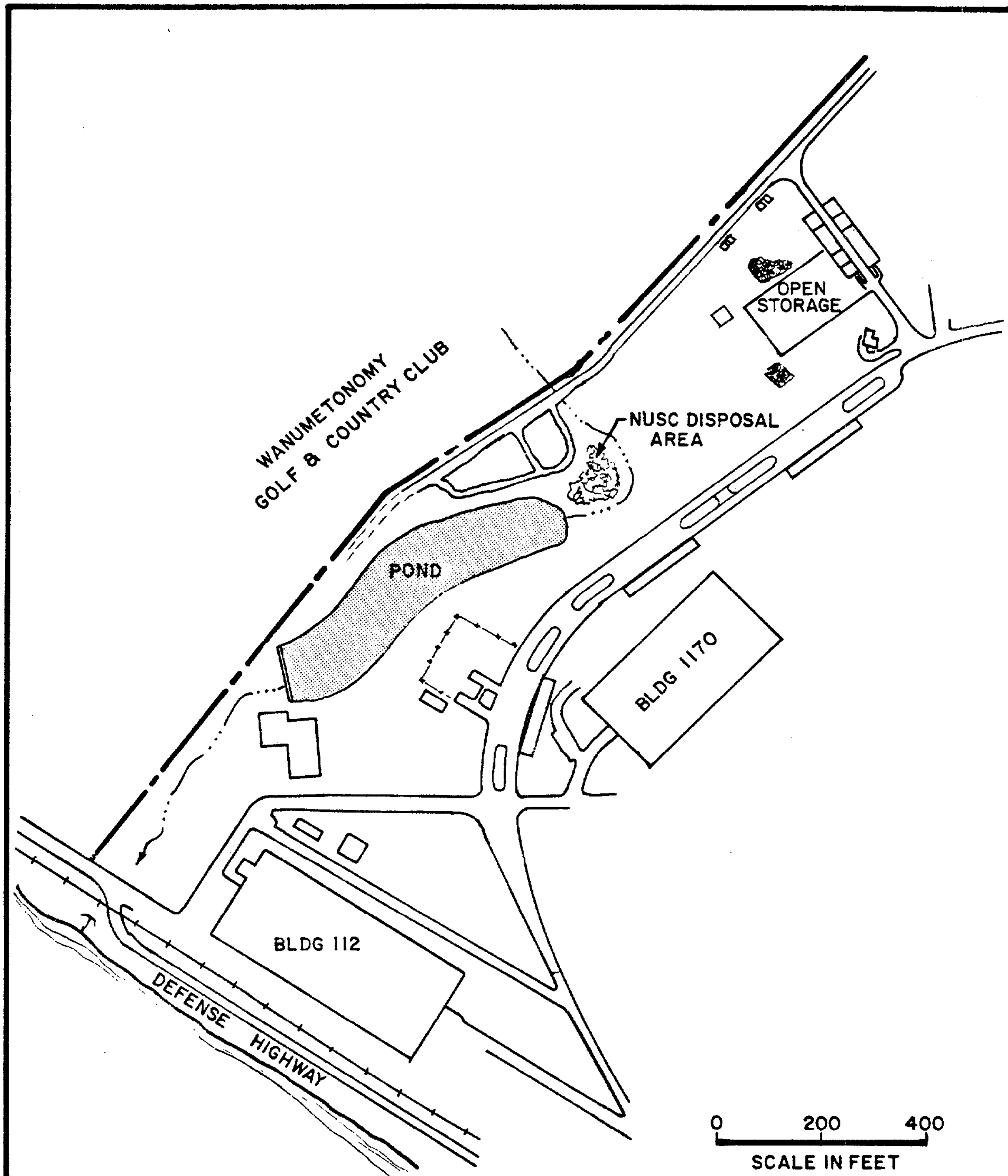

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FIGURE 6.6-8

NUSC DISPOSAL AREA

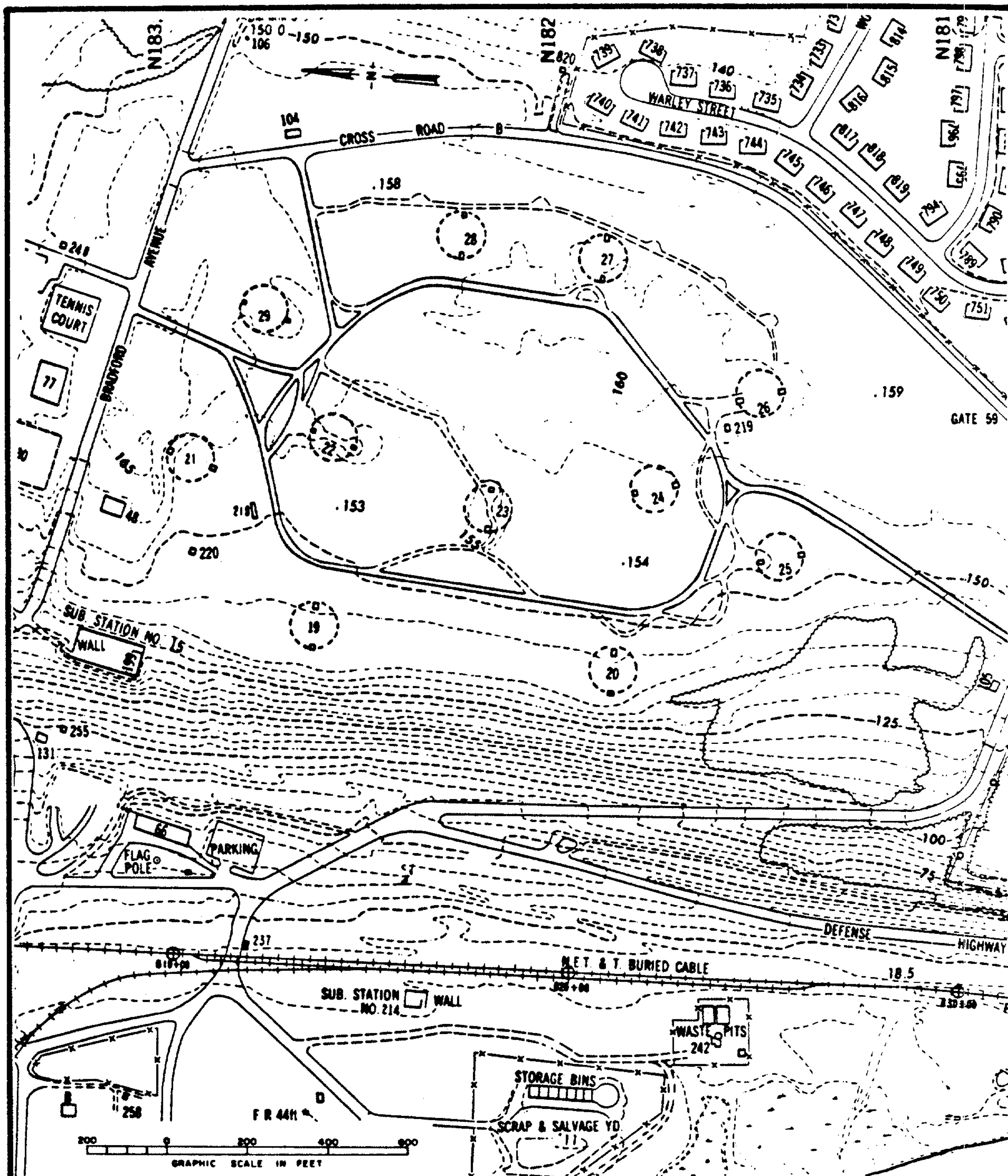

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FIGURE 6.6-9

TANK FARM TWO

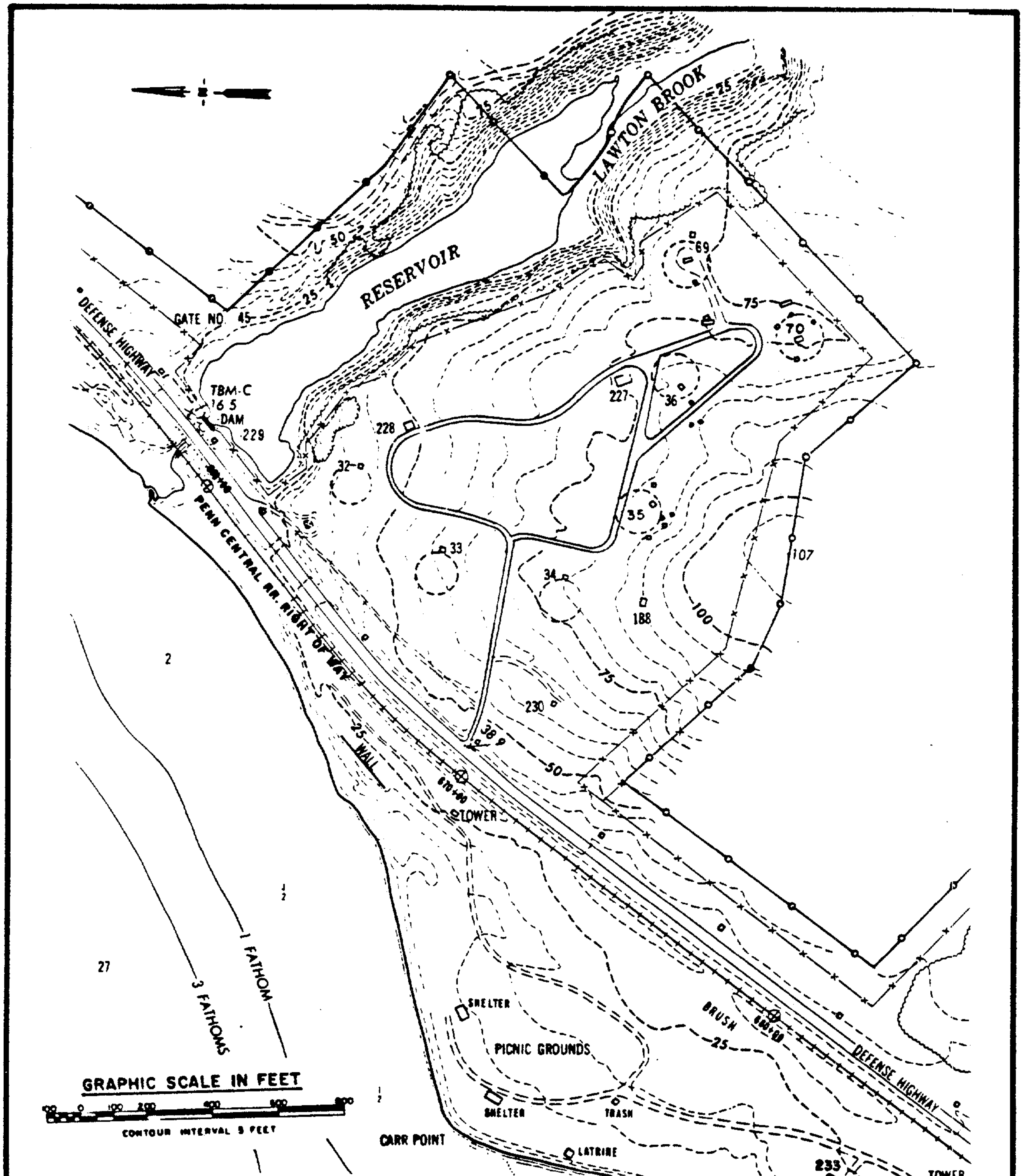

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FIGURE 6.6-10
TANK FARM THREE

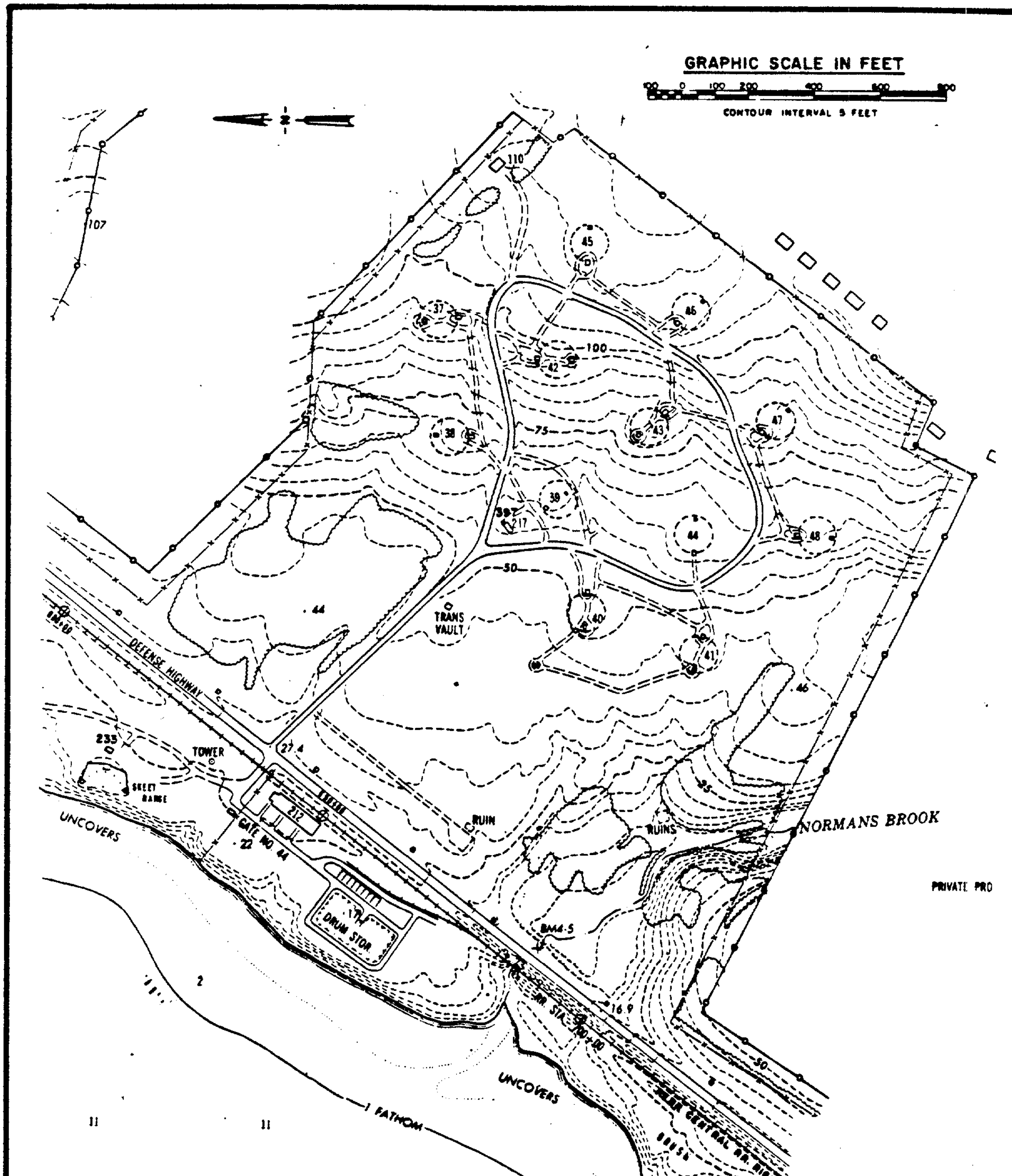

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FIGURE 6.6-11
TANK FARM FOUR

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FIGURE 6.6-12
TANK FARM FIVE

The potential for environmental contamination does exist at these tank farms. At Tank Farms 2 and 4 where the tank bottoms were simply dumped on the ground, contaminants (lead and petroleum-based hydrocarbons) could have been transported via surface drainage or infiltrated down through the soil into the shallow groundwater. At Tank Farms 3 and 5, where burning chambers were used, the groundwater could have been contaminated. Groundwater is very shallow in the area (less than 10 feet), and contaminants would not have to migrate very far vertically to reach the groundwater. This distance is even less considering that the tank bottoms are in an excavated burning chamber. These tank farms are all located in close proximity to Narragansett Bay. Surface drainage and groundwater flow from these tank farms are into the bay.

Tank Farms 2 and 3 are presently being used. However, Tank Farms 4 and 5 are being excessed by the Navy and are pending final disposal by GSA. Tanks 53 and 56 in Tank Farm 5 have since been withdrawn from excess and are being used for waste oil storage. Tank Farm Two is shown in Plate 6-2.

6.6.10 Gould Island Disposal Area, Site No. 14

Located along the western shoreline of Gould Island, approximately in the middle of the island, is an area where waste disposal has occurred (Plate 6-3). The disposal area extends along approximately 200 yards of the shoreline. This site was used throughout the World War II period and received all the wastes generated on the island. Base personnel indicated that no wastes were transported back to NETC on Aquidneck Island. The site was last used about 30 years ago and is on land being excessed by the Navy.

During visual inspection of this site, the types of material evident along the shoreline included metal scrap, wood, pipes, rusted out drums, and concrete blocks. Two diesel oil tanks were also at this site along with 20 barrels. There was also an extensive electroplating and degreasing operation on the island during World War II. Wastes from these operations would have gone to this site unless they were disposed of directly into Narragansett Bay. These wastes would have included muriatic acid, chromic acid, copper cyanide, sodium cyanide, sodium hydroxide, nickel sulfate, and Anodex cleaner.

This site is located along the shoreline of Narragansett Bay. The disposal area is situated along a steep embankment which drops down about 15 feet to a beach area. The wastes were simply dumped down this embankment. Many of the wastes went directly into the bay or were carried out during high tide. Runoff from this site is directly into the bay. Any contaminants at this site would be easily transported into the bay.

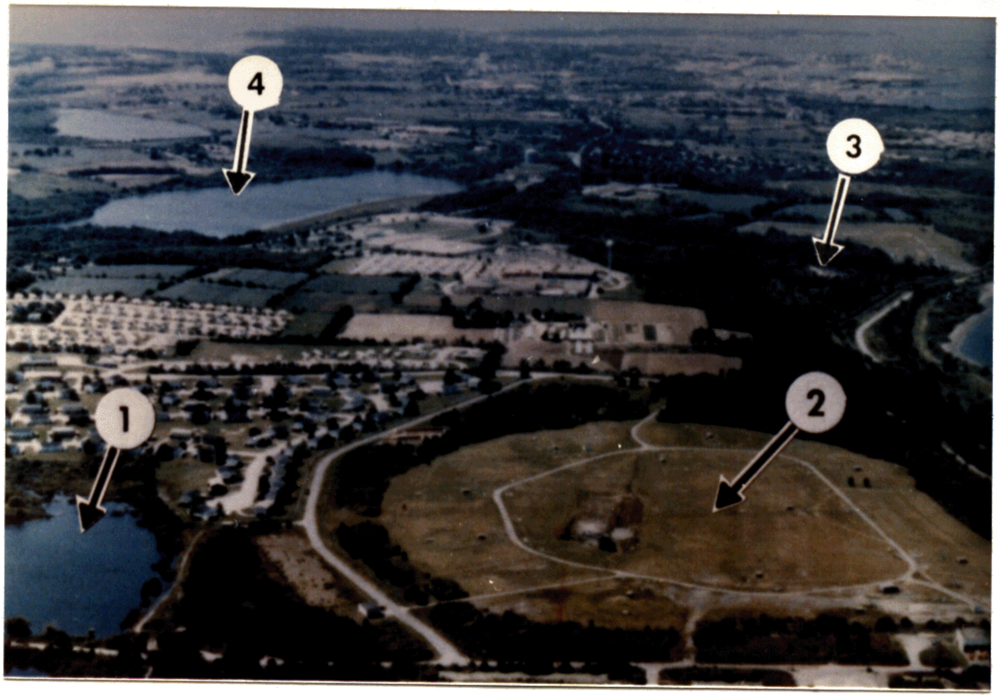

Plate 6-2

The photograph above depicts one of the Melville Ponds (No. 1), Tank Farm 2 (No. 2), Lawton Reservoir (No. 3), and Lawton Valley Reservoir (No. 4). No. 4 supplies potable water to the surrounding communities.

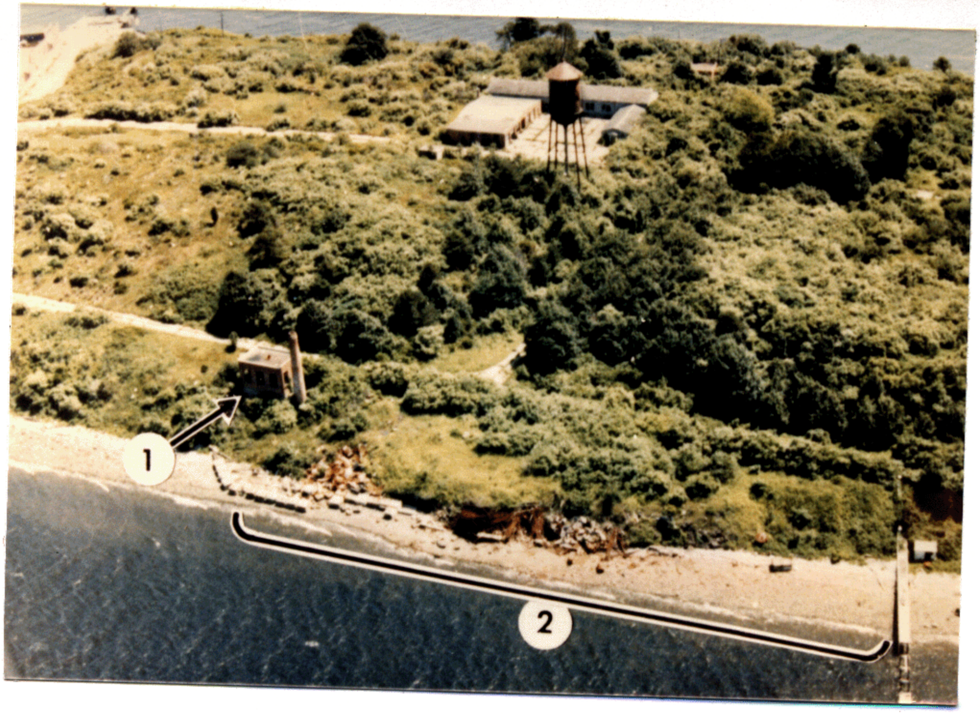

Plate 6-3

The photograph above shows an old incinerator (No. 1) and the Gould Island Disposal Area, Site #14 (No. 2) which are situated along the western shoreline of Gould Island.

6.6.11 Gould Island Bunker 11, Site No. 15

A drum storage area is located in the southwestern portion of Gould Island at Bunker #11 (Plate 6-4). The site is located on land which is being excessed by the Navy. There were 11 drums visible at this site. It could not be determined what was in the drums. The bunker was in a very deteriorated condition with the roof completely collapsed. It is possible that additional drums could be buried in this rubble. Bunker #12, located just to the south, was inspected by Navy personnel. No evidence of drums was uncovered.

6.6.12 Gould Island Electroplating Shop, Site No. 17

Gould Island had an extensive electroplating shop in Building 32 (Plate 6-5) during World War II. It could not be verified just how these wastes were disposed of. It is possible that the electroplating wastes (sludges) were disposed of at the disposal site on the island which was discussed previously. However, it is probable that liquid wastes were disposed of directly into the bay. These wastes would have included muriatic acid, chromic acid, copper cyanide, sodium cyanide, sodium hydroxide, nickel sulfate, Anodex cleaner, and degreasing solvents. These wastes may be present in the bay sediments.

6.6.13 Structure #214, Site No. 18

Located just outside of Structure 214, in the Melville North area, is a site of drums of waste oil. This site has only been used for the past two years. At the time of our inspection, eight drums with waste oil were at the site. Some of these drums were leaking, and it was apparent that the drums had been put there fairly recently. Twenty-five to thirty gallons of waste oil had been spilled at the site, and the oil was still pooled in places. There were no indications that the site had been used in the past for similar purposes. Drainage from this site is into Narragansett Bay which is some 900 feet to the west. This site is presently on land which is being excessed by the Navy. Since EEI's on-site survey, the activity has initiated actions to clean up this site.

Plate 6-4

The above photograph depicts the bunkers located at the southern tip of Gould Island. As evidenced by the photograph, these bunkers are situated within 100 feet of Narragansett Bay. The center-most Bunker (No. 11) contains at least 10 drums, while the other Bunker (No. 12) has no evidence of drums.

00001AB3Y

Plate 6-5

The above photograph shows the World War II Electroplating Shop located in Building 32 on Gould Island.

APPENDIX A

LIST OF REFERENCES

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APPENDIX B

LISTING OF PRIORITY POLLUTANTS

Compound Name

1. *Acenaphthene
2. *Acrolein
3. *Acrylonitrile
4. *Benzene
5. *Benzidene
6. *Carbon tetrachloride (Tetrachloromethane)

*Chlorinated benzenes (other than dichlorobenzenes)

7. Chlorobenzene
8. 1,2,4-Trichlorobenzene
9. Hexachlorobenzene

*Chlorinated ethanes (including 1,2-Dichloroethane, 1,1,1-Trichloroethane and Hexachloroethane)

10. 1,2-Dichloroethane
11. 1,1,1-Trichloroethane
12. Hexachloroethane
13. 1,1-Dichloroethane
14. 1,1,2-Trichloroethane
15. 1,1,2,2-Tetrachloroethane
16. Chloroethane

*Chloroalkyl ethers (chloromethyl, chloroethyl and mixed ethers)

17. bis(Chloromethyl) ether
18. bis(2-Chloroethyl) ether
19. 2-Chloroethyl vinyl ether (mixed)

*Chlorinated naphthalene

20. 2-Chloronaphthalene

*Chlorinated phenols (other than those listed elsewhere; includes trichlorophenols and chlorinated cresols)

21. 2,4,6-Trichlorophenol
22. Parachlorometa cresol
23. *Chloroform (Trichloromethane)
24. *2-Chlorophenol

*Dichlorobenzenes

25. 1,2-Dichlorobenzene
26. 1,3-Dichlorobenzene
27. 1,4-Dichlorobenzene

*Dichlorobenzidine

28. 3,3'-Dichlorobenzidine

*Dichloroethylenes (1,1-Dichloroethylene and 1,2-Dichloroethylene)

29. 1,1-Dichloroethylene
30. 1,2-trans-Dichloroethylene

31. *2,4-Dichlorophenol
*Dichloropropane and Dichloropropene
32. 1,2-Dichloropropane
33. 1,2-Dichloropropylene (1,3-Dichloropropene)
34. *2,4-Dimethylphenol
*Dinitrotoluenes
35. 2,4-Dinitrotoluene
36. 2,6-Dinitrotoluene
37. *1,2-Diphenylhydrazine
38. *Ethylbenzene
39. *Fluoranthene
*Haloethers (other than those listed elsewhere)
40. 4-Chlorophenyl phenyl ether
41. 4-Bromophenyl phenyl ether
42. bis(2-Chloroisopropyl) ether
43. bis(2-Chloroethoxy) methane
*Halomethanes (other than those listed elsewhere)
44. Methylene chloride (Dichloromethane)
45. Methyl chloride (Chloromethane)
46. Methyl bromide (Bromomethane)
47. Bromoform (Tribromomethane)
48. Dichlorobromomethane
49. Trichlorofluoromethane
50. Dichlorodifluoromethane
51. Chlorodibromomethane
52. *Hexachlorobutadiene
53. *Hexachlorocyclopentadiene
54. *Isophorone
55. *Naphthalene
56. *Nitrobenzene
*Nitrophenols (including 2,4-Dinitrophenol and Dinitrocresol)
57. 2-Nitrophenol
58. 4-Nitrophenol
59. *2,4-Dinitrophenol
60. 4,6-Dinitro-o-cresol
*Nitrosoamines
61. N-Nitrosodimethylamine
62. N-Nitrosodiphenylamine
63. N-Nitrosodi-n-propylamine
64. *Pentachlorophenol
65. *Phenol
*Phthalate esters
66. bis(2-Ethylhexyl) phthalate
67. Butyl benzyl phthalate
68. Di-n-butyl phthalate
69. Di-n-octyl phthalate
70. Diethyl phthalate
71. Dimethyl phthalate

*Polynuclear aromatic hydrocarbons

72. Benzo(a)anthracene (1,2-Benzanthracene)
73. Benzo(a)pyrene (3,4-Benzopyrene)
74. 3,4-Benzofluoranthene
75. Benzo(k)fluoranthane (11,12-Benzofluoranthene)
76. Chrysene
77. Acenaphthylene
78. Anthracene
79. Benzo(g,h,i)perylene (1,12-Benzoperylene)
80. Fluorene
81. Phenanthrene
82. Dibenzo(a,h)anthracene (1,2,5,6-Dibenzanthracene)
83. Indeno(1,2,3-c,d)pyrene (2,3-o-phlenepyrene)
84. Pyrene
85. *Tetrachloroethylene (1,1,2,2-Tetrachloroethene)
86. *Toluene
87. *Trichloroethylene
88. *Vinyl chloride (Chloroethylene)

Pesticides and Metabolites

89. *Aldrin
90. *Dieldrin
91. *Chlordane (technical mixture and metabolites)

*DDT and Metabolites

92. 4,4'-DDT
93. 4,4'-DDE (p,p'DDX)
94. 4,4'-DDD (p,p'TDE)

*Endosulfan and Metabolites

95. α-Endosulfan-Alpha
96. β-Endosulfan-Beta
97. Endosulfan sulfate

*Endrin and Metabolites

98. Endrin
99. Endrin aldehyde

*Heptachlor and Metabolites

100. Heptachlor
101. Heptachlor epoxide

*Hexachlorocyclohexane (all isomers)

102. α-BHC-Alpha
103. β-BHC-Beta
104. γ-BHC (Lindane)-Gamma
105. Δ-BHC-Delta

*Polychlorinated biphenyls (PCB's)

106. PCB-1242 (Arochlor 1242)
107. PCB-1254 (Arochlor 1254)
108. PCB-1221 (Arochlor 1221)
109. PCB-1232 (Arochlor 1232)
110. PCB-1248 (Arochlor 1248)
111. PCB-1260 (Arochlor 1260)
112. PCB-1016 (Arochlor 1016)

113. *Toxaphene
114. *Antimony (Total)
115. *Arsenic (Total)
116. *Asbestos (Fibrous)
117. *Beryllium (Total)
118. *Cadmium (Total)
119. *Chromium (Total)
120. *Copper (Total)
121. *Cyanide (Total)
122. *Lead (Total)
123. *Mercury (Total)
124. *Nickel (Total)
125. *Selenium (Total)
126. *Silver (Total)
127. *Thallium (Total)
128. *Zinc (Total)
129. 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)

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*Specific compounds and chemical classes as listed in the Consent Decree (8ERC 2120).