NETC Tank Farm Five Hazardous Waste Cleanup: An Investigation and Evaluation of Cleanup Practices for Waste Oil Tanks at NETC, Newport, RI

David J. Sisson

University of Rhode Island

NETC TANK FARM FIVE

HAZARDOUS WASTE CLEANUP

by

DAVID J. SISSON

AN INVESTIGATION AND EVALUATION OF CLEANUP

PRACTICES FOR WASTE OIL TANKS AT NETC, NEWPORT, RI

A MAJOR PAPER SUBMITTED

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF MARINE AFFAIRS PROGRAM

UNIVERSITY OF RHODE ISLAND

1992

MAJOR PAPER

OF

DAVID J. SISSON

APPROVED:

MAJOR PROFESSOR ______________________

UNIVERSITY OF RHODE ISLAND

1992

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

The concern for oil and hazardous substance spills and contaminated sites as a national concern grew slowly until the National Oil Pollution Act was passed in 1924. Later, in 1954, this concern began to quicken in pace and take on an international flavor with the 1954 convention for Prevention of Pollution of the Sea by Oil. Between 1954 and 1968 there was the 1962 Amending Convention and other international recognitions of the problem, but in September 1968 the United States formulated the first National Contingency Plan. The National Oil and Hazardous Substance Contingency Plan dated July 16, 1982 as amended is the current NCP and, while it evolved form an interagency agreement to a guideline at 33 CFR Part 1510, it today is published as law at 40 CFR Part 300.

Between 1965 and 1972 a number of landmark occurrences developed which, whether related of not, underscore how environmental concerns moved quickly into the 1970s and grew to profound proportions by the early 1980s. Oil and hazardous substance pollution was a large part of this phenomenon.

In 1965 the Federal Water Pollution Control Administration, later renamed the Federal Water Quality Administration, was formulated in the Department of Interior. In 1965 the National Water quality Act was passed.

In 1967 the tragic grounding of the Torrey Canyon occurred, followed by the Santa Barbara seep, the Ocean Eagle sinking, the two well blowouts in the Gulf of Mexico and the Delane Apollo in Tampa, Florida, all of which heightened public sensitivity to massive oil spills.

In 1970 the Water Quality Improvement Act of 1970 was passed and the Environmental Protection Agency was formed. In 1972 the Clean Water Act (actually the Federal Water Pollution Control Act) was passed. This edition of the basic 1956 Federal Water Pollution Control Act, added the $20,000,000.00 "Section K Fund."

Tagging along in name if not in substantive law were the hazardous substance events. National recognition of the hazardous substance problem was stimulated more by the discovery of huge abandoned sites of buried, stored, of lagooned chemical wastes than by spill-type events. Such discoveries as "Love Canal" and the "Valley of the Drums" in the late 1970s helped Congress to merge the cleanup and mitigation of damages from both sites and spills into what we now know as "Superfund." Many governmental agencies including the U.S. Navy have their own horror stories. The Navy is working with federal and state agencies in testing solutions for the cleanup of past and present hazardous waste sites. Naval Education and Training Center (NETC) was shocked to find out it had 18 past hazardous waste sites. Superfund is a nickname for the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Naval installations are still going through growing pains when it comes to implementing some of the more recent environmental laws of the past decade such as CERCLA and RCRA.

In December of 1980, the president signed the "Superfund" legislation. This very complex federal law basically left the oil spill sections of the Clean Water Act intact and placed all hazardous substance regulation under a new concept of management. This new concept placed a new burden on EPA; that of being the custodian of a 1.6 billion dollar clean-up fund. The EPA began by publishing a new NCP under 40 CFR Part 300.[1] This new plan was developed largely by the EPA and no longer is a guideline but is published as law. Not only does it address oil and hazardous substance spills but uncontrolled hazardous waste sites as well. In 1986 it was amended to include provisions for state/local planning and community right to know, and increase the clean up fund to about nine billion dollars.

My intention in this paper is to focus on the "chronic" hazardous waste problem steming from past disposal/storage practices. More

---

[1] International Technology Corporation, Knoxville, TN 37923; Hazardous Substance Incident Response Management Course book, 1991; page 2-2.

specifically, to focus on two underground storage tanks at NETC which were used for the storage of hazardous waste (waste oil tanks). It is now common knowledge that old underground storage tanks throughout the country present a potential ground water contamination hazard which must be dealt with. This contamination is commonly caused when the metal tank rusts thereby releasing its contents into the surrounding ground water. It is common for relatively smaller tanks to be made of metal, such as the type used at auto service stations. However, large underground storage tanks of 60,000 barrels or more were normally constructed of concrete. These tanks pose a potential leak hazard from cracks developed in the concrete joints and more commonly from overflow by infiltration of surface and ground water through cracks in the overhead which causes the oily contents to float on the water and overflow. The potential for spills is also present during the numerous transfer operations. Most naval installations store bulk quantities of fuels. The need for storing fuels is obvious especially at naval installations. They use it for everything from powering ships to powering generators and as a heating fuel. Over the past decade naval installations have heightened their awareness of environmental responsibilities and implemented recycling programs for the disposable of paper, glass, etc. and have even established programs for fuel collection and recycling for heating plants. It is for these reasons that many naval bases are presently where NETC was a decade ago. That is, they have found themselves in posession of old fuel tanks which over the years have been converted to oily waste tanks for recycling which now require permits from the host state. Upon inspection the tanks are found to leak into the surrounding ground water posing a health risk to the local population. Complicating the matter is the fact that most navy tanks were intentionally located in the coastal zone for easy transfer operations from and to ships. The close siting to coastal waters obviously increases the human health risk.

RESOURCE CONSERVATION AND RECOVERY ACT

The Resource Conservation and Recovery Act (RCRA) became law in 1976. EPA developed implementing regulations in 1980 and continues to add new regulations and revise existing rules. RCRA authorizes EPA to regulate the generation, transportation, and disposal of "hazardous wastes." Virtually all states including Rhode Island have promulgated rules "authorized" by the EPA for the handling of hazardous waste. In these cases the state rules take precedence over the federal rules. The navy and in this specific case the Naval Education and Training Center of Newport RI is currently paying the price for past hazardous waste mistakes. In the past, the navy and the public was ignorant of environmental issues. As awareness grew in the public arena, the attitude of navy leadership was slow to change from one of cavalier disregard for environmental regulations. The new regulations were viewed as interference from environmental "do gooders" who had no idea of the time and expense required to comply. There was no incentive nor mechanism for change. When attitudes finally did change the navy woke up to the realization that not only was there a massive problem with past hazardous sites which needed to be dealt with but the navy had to implement a new training program to educate its personnel concerning hazardous waste practices or face personal liability. Presently NETC is proactive concerning training its personnel regarding hazardous waste. In fact, the hazardous waste branch of the Public Works Department at NETC is the only area at NETC which is expanding in terms of the number of personnel.

The navy at NETC signed an official agreement with U.S. EPA and the Sate of Rhode Island in March of 1992 to coordinate with EPA and the State to correct past hazardous waste problems and specifically to:

> "Consult and coordinate with EPA and the State regarding testing and closure of underground storage tanks pursuant to applicable law; and, consult and coordinate with EPA and the State regarding groundwater monitoring and remediation based on the results of the Phase I RI activities of Tank Farm Five, for Tanks 53 and 56, pursuant to applicable law."[2]

The above agreement has been waiting for nearly 10 years. Part

---

[2] Federal Facility Agreement Under CERCLA #120 in the matter of Naval Education and Training Center (NETC) Newport RI; signed March 1992. Signatory parties includ: USEPA Region 1, the State of Rhode Island, and U.S. Department of the Navy; page 21.

of the problem of the long delay in remediating[3] Tanks 53 and 56 at Tank Farm Five stems from a slow start caused by the attitude described above. Other contributing causes stem from a learning curve which affects all new programs and regulations. And finally the infighting present between all parties slowed the process. Tanks 53 and 56 at NETC are important because a similar situation will most certainly arise at other bases throughout the navy. An analysis of the problems encountered here will save taxpayer money by using techniques learned by trial and error at NETC.

To fully understand the issue of storing oil one must understand how the term is used under the law. RCRA defines "storage," as opposed to "accumulation", as holding hazardous wastes on site for more than 90 days. Permits are required for storage. The U.S. Navy is routinely involved in obtaining permits from host states throughout the country for the storage of hazardous wastes at naval installations. Of importance is the regulatory distinction made between the storage of "product" oil and the storage of "waste" oil. When oil is classified as "waste" oil, its handling is then governed by CERCLA <u>and RCRA</u>. However, when oil is stored simply as "product" oil, RCRA does not apply. For example, heating oil is considered product oil; however, if it

---

[3] Remediation in this context of underground storage tanks is the process of: removing the waste oil from the tanks, cleaning the tanks, remediating the ground water, demolishing the tanks, and backfilling the area.

has been recycled from other uses and is being stored for re-use as a heating oil, it is then considered waste oil (presumably because of the probability of higher concentrations of contaminants). It is the task of the base commander and his hazardous waste advisers to sort out the applicable governing regulations and comply accordingly.

The act of disposing of hazardous wastes is tightly regulated by RCRA. Essentially these rules forbid disposal except at fully permitted sites. Today, navy installations are not normally in the business of "storing" and "disposing" of hazardous waste on the same base. Normally, a base commander will obtain a hazardous waste <u>storage</u> permit to store the waste for a period of greater than 90 days at an authorized site on board the base. The actual disposal of the waste is completed by transporting the waste off base to a civilian disposal site incurring a monetary cost to the base commander. There is a financial incentive for the base commander to recycle. During the early 80s bases recycled fuels on board by holding recycled fuel in convenient underground fuel storage tanks designed to hold fuels. With the advent of RCRA and as a greater understanding of the constituents of the recycled fuels grew it was reclassified as hazardous waste. The associated burden of complying with RCRA and the financial incentive to sell recyclable fuels to the civilian business community prompted base commanders to make the decision to get out of the "on board fuel recycling business." It is the problems encountered during the process of getting out of the on board fuel/hazardous waste storage business by the navy and specifically Naval Education and Training Center (NETC) Newport RI which is documented and analyzed in this paper.

The problem as I see it is the excessive delay and re-invention of the "wheel" concerning the discontinuation of storage of hazardous waste oil. It has been more than a decade since NETC made the decision to abandon the use of two 60,000 barrel underground storage tanks (specifically Tanks 53 and 56 at Tank Farm Five). To this day the contaminated ground water has not been remediated nor have the tanks been demolished and backfilled as planned. This paper will investigate the process and decisions made and conclude with recommendations for future similar situations at other navy bases.

CHAPTER 2

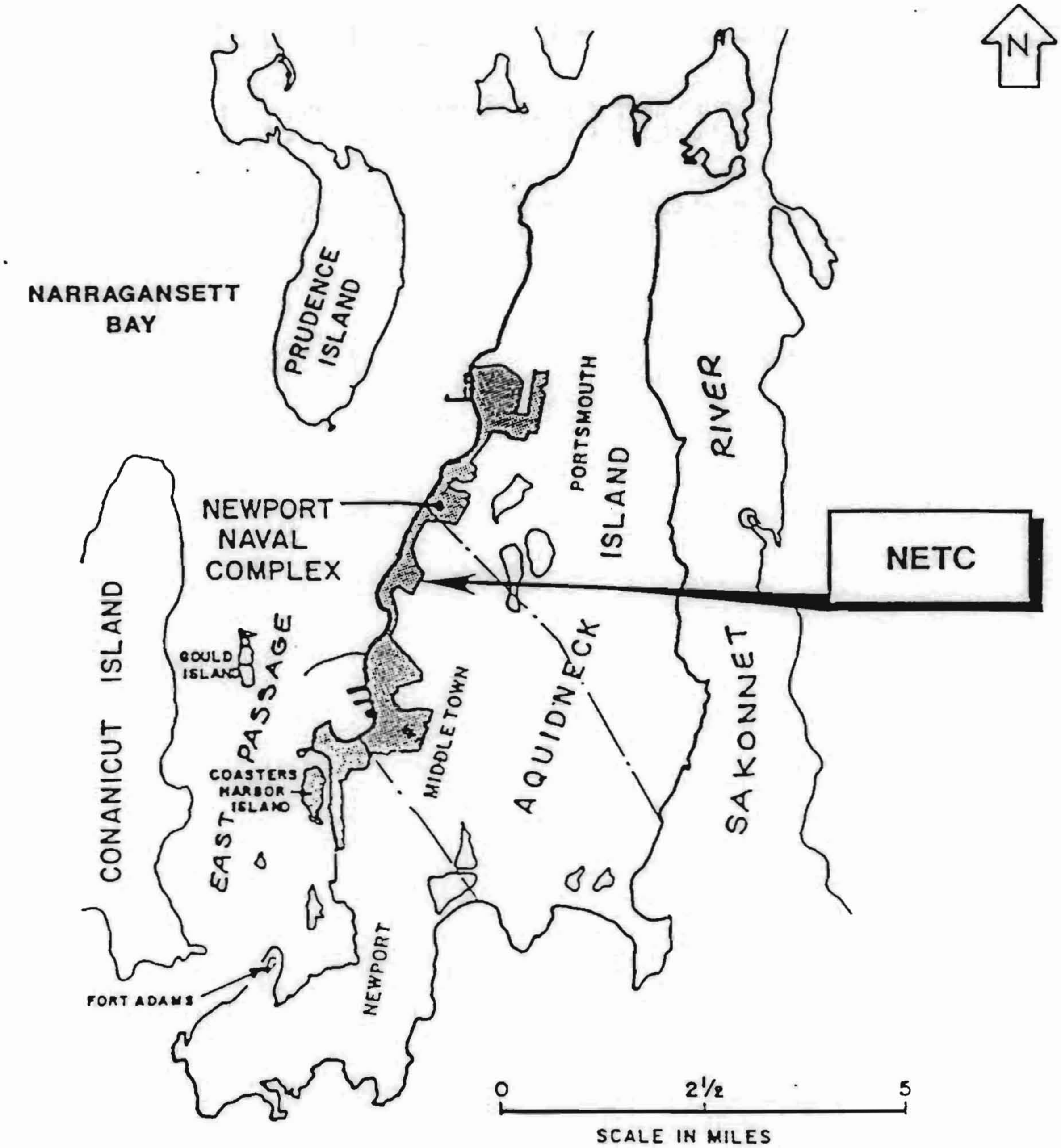
NETC, NEWPORT RI SITE HISTORY

NETC Newport is comprised of 1,400 acres of land and is spread out along approximately six miles of the western shoreline of Aquidneck Island. It is located north of Newport, Rhode Island on the west shore of Aquidneck Island facing the east passage of Narragansett Bay. NETC Newport is approximately 60 miles south of Boston, MA and 25 miles southeast of Providence, Rhode Island. Block Island Sound and the Atlantic Ocean are approximately 12 miles south of the NETC Newport naval complex. Portions of NETC Newport lie within the City of Newport and the Towns of Middletown and Portsmouth (see figure 1).

The Navy's first permanent activity at NETC Newport was in 1869 when the experimental Torpedo Station at Goat Island was established. In 1881, Coasters Harbor Island was acquired by the Navy and used for training purposes. In 1900 the Navy purchased 160 acres of land and constructed the Narragansett Bay Coal Depot. In 1910 four fuel oil tanks[4] were added in the Melville area. Some of these tanks are still in use today.

---

[4] FEDERAL FACILITY AGREEMENT UNDER CERCLA #120. Signed 23 March 1992 by representatives from: U.S. DEPT. OF THE NAVY; U.S. EPA; THE STATE OF RHODE ISLAND. Page 12.



SOURCE:

TRC
TRC Environmental Consultants, Inc.
5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631

NAVAL EDUCATION TRAINING CENTER
NEWPORT RHODE ISLAND

FIGURE 1; NETC MAP

The outbreak of World War I brought a significant increase in military activity at Newport and two additional fuel oil tanks[5] were constructed.

In 1941 the Navy constructed five tank farms containing a total of 47 tanks[6] to store fuel oils and other petroleum products with a total storage capacity of 2.8 million barrels. All of the tanks are concrete with the exception of two steel tanks in Tank Farm #3.

In April 1973, the Shore Establishment Realignment Program (SER) was announced and resulted in the largest reorganization of naval forces in the Newport area. The Public Works Center, Naval Supply Center, Naval Station and Naval Base were reorganized under the Naval Officer Training Center (NOTC). In April 1974, NOTC was changed to the Naval Education Training Center Newport. The reorganization resulted in the Navy excessing a portion of the base.

NETC Newport is currently under the command of, and receives primary support from, the Chief of Naval Education and Training in Pensacola, Florida and is currently the Navy's <u>largest</u> officer training facility. In 1980 the Department of the Navy developed the Navy Assessment and Control of Installation Pollutants

---

[5] Ibid.

[6] Ibid.

(NACIP) to identify and control environmental contaminants from past use and disposal of Hazardous Substances at Naval installations. The program was to be managed in three phases:

* Phase I - Initial Assessment Study (IAS) - identifies potential threats to human health or to the environment caused by past hazardous substance storage, handling or disposal practices at naval activities.
* Phase II - Confirmation Study - analyzes contaminants present at sites of concern and determines their migration paths.
* Phase III - Remedial Action - requires corrective measures to mitigate or eliminate confirmed problems. It is not until phase III that the problem is actually corrected. Phase III could be delayed for years awaiting completion of the initial phases.

A Phase I IAS study was concluded at NETC Newport in March 1983 by Envirodyne Engineers, Inc. (EEI). It included a review of archival and activity records, interviews with activity personnel, an on-site survey of the activity, and an off-site activity investigation. A copy was forwarded to and received by EPA on 1 October 1984. The IAS report identified a total of 18 potentially contaminated areas. The areas identified are as follows:[7]

---

[7] Ibid., page 13.

Area 1	McAllister Point Landfill
Area 2	Melville North Landfill
Area 3	Substation #14 - Transformer Vault
Area 4	Coddington Cove Rubble fill
Area 5	Melville North Area
Area 6	STP Sludge Drying Bed
Area 7	Tank Farm One
Area 8	NUWC (formerly Naval Underwater Systems Center (NUSC)) Disposal Area
Area 9	fire fighting Training Area
Area 10	Tank Farm Two
Area 11	Tank Farm Three
Area 12	Tank Farm Four
Area 13	**Tank Farm Five**
Area 14	Gould Island Disposal Area
Area 15	Gould Island Bunker 11
Area 16	Gould Island Incinerator
Area 17	Gould Island Electroplating Shop
Area 18	Structure 214 - Melville North Area

As discussed in the introduction, the focus of this paper is Tanks 53 and 56 of Tank Farm Five, Area 13. Tank Farm Five is unique because unlike the other tank farms, Tank Farm Five contained two tanks (#53 & #56) which were changed in the late 70s from "product" storage tanks to "waste oil" storage tanks. In doing so, these tanks became subject to RI hazardous waste storage regulations. As a result, more regulations of regulatory agensies must be complied with making the clean-up procedures much more involved, complicated and sometimes contradictory for Tanks 53 and 56.

The Defense Environmental restoration Program (DERP) was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at DoD installations. The Program currently consists of three major elements including:

A. The Installation Restoration Program (IRP)- where potential contamination at DoD installations and formerly used properties is investigated and, as necessary, site cleanups are conducted. The IRP provides for compliance with the procedural and substantive requirements of CERCLA, as amended by SARA, as well as regulations promulgated under these acts or by Applicable State Law and is managed in four phases. NETC is currently in phase 3 (Remedial Investigation/Feasibility Study) of the IRP. The four phases of the IRP are described below:

   1. Preliminary Assessment (PA) - An initial analysis of existing information to determine if a site requires additional investigation or action;
   2. Site Inspection (SI) - To augment data collected during the PA and to generate, if necessary, sampling and

other field data to determine if further action or investigation is appropriate;

3. Remedial Investigation/Feasibility Study (RI/FS) - An extensive technical study conducted to determine the nature and extent of the threat or potential threat posed by the release of hazardous material and determine what action, if any, should be taken to remediate the site; and
4. Remedial Design/Remedial Action (RD/RA) - RD is the translating of the FS into designs and specifications for site remediation. RA is the physical implementation of site remediation.

B. Other Hazardous Waste (OHW) Operations, through which research, development and demonstration programs aimed at reducing DoD hazardous waste generation rates are conducted.

C. Building Demolition and Debris Removal (BD/DR) - The third element of DOD's DERP includes demolition and removal of unsafe buildings or structures.

Tank Farm Five is one of four sites currently being investigated under the third phase Remedial Investigation/Feasibility Study (RI/FS) of the Installation Restoration Program (IRP). In March 1989 an RI/FS Work Plan was proposed by the Navy with final approval by EPA of a revised plan expected soon.

The chronology of the remediation of contaminated tanks, soil and ground water at Tank Farm Five follows two concurrent tracks because of the two regulatory agencies involved in the process. One can trace the clean up efforts of contaminated sites at NETC as these activities relate to the DoD's DERP program discussed above. More specifically, the IRP which supports CERCLA is a holistic clean up approach which initially investigates <u>all</u> areas of <u>past</u> contamination at a Federal installation. As noted above, NETC contained several such Areas Of Contamination (AOCs) which were investigated under the IRP program. All investigation and remediation practices under this program is overseen by the USEPA.

Tank Farm Five however, was also subject to RI RCRA rules in addition to CERCLA because it contained two tanks (#53 & #56) which were recently used for hazardous waste oil storage which therefore subjected them to RI RCRA and in addition the tanks are specifically addressed in NETC's hazardous waste permit which is regulated by RI RCRA. Because of the dual nature of Federal and State agencies involved in Tank Farm Five there is essentially two clean up tracks or plans which have sometimes paralleled each other and at other times opposed each other slowing the whole process.

Pursuant to 10 U.S.C. 2705(c), a technical Review Committee (TRC) was convened on April 6, 1988[8] to facilitate communication of information with regard to Response Actions to be undertaken at NETC Newport. Committee members meet periodically to review technical data, Remedial Investigation reports, work plans, funding status and Timetables for field work, and other documents relating to the Response Actions at NETC Newport. Membership on the TRC includes representatives from the U.S. Navy, the U.S. EPA - Region I, the State of Rhode Island Department of Environmental Management (RIDEM), representatives from the City of Newport, the Towns of Portsmouth and Middletown, and local citizen's groups.

On July 14, 1989, the EPA proposed adding NETC Newport to the National Priorities List (NPL) (54 FR 29820), and on November 21, 1989, NETC Newport was listed on the NPL (54 FR 48184).[9]

In June 1990, the Navy established Public Information Repositories for documents relating to NETC Newport Response Actions. The Repositories are located at the Towns of Newport, Middletown, and Portsmouth libraries.

As of the writing of this paper, there are four Areas of Contamination (AOCs) (see figure two) which have been identified as follows:

---

[8] Ibid., page 17.

[9] Ibid.

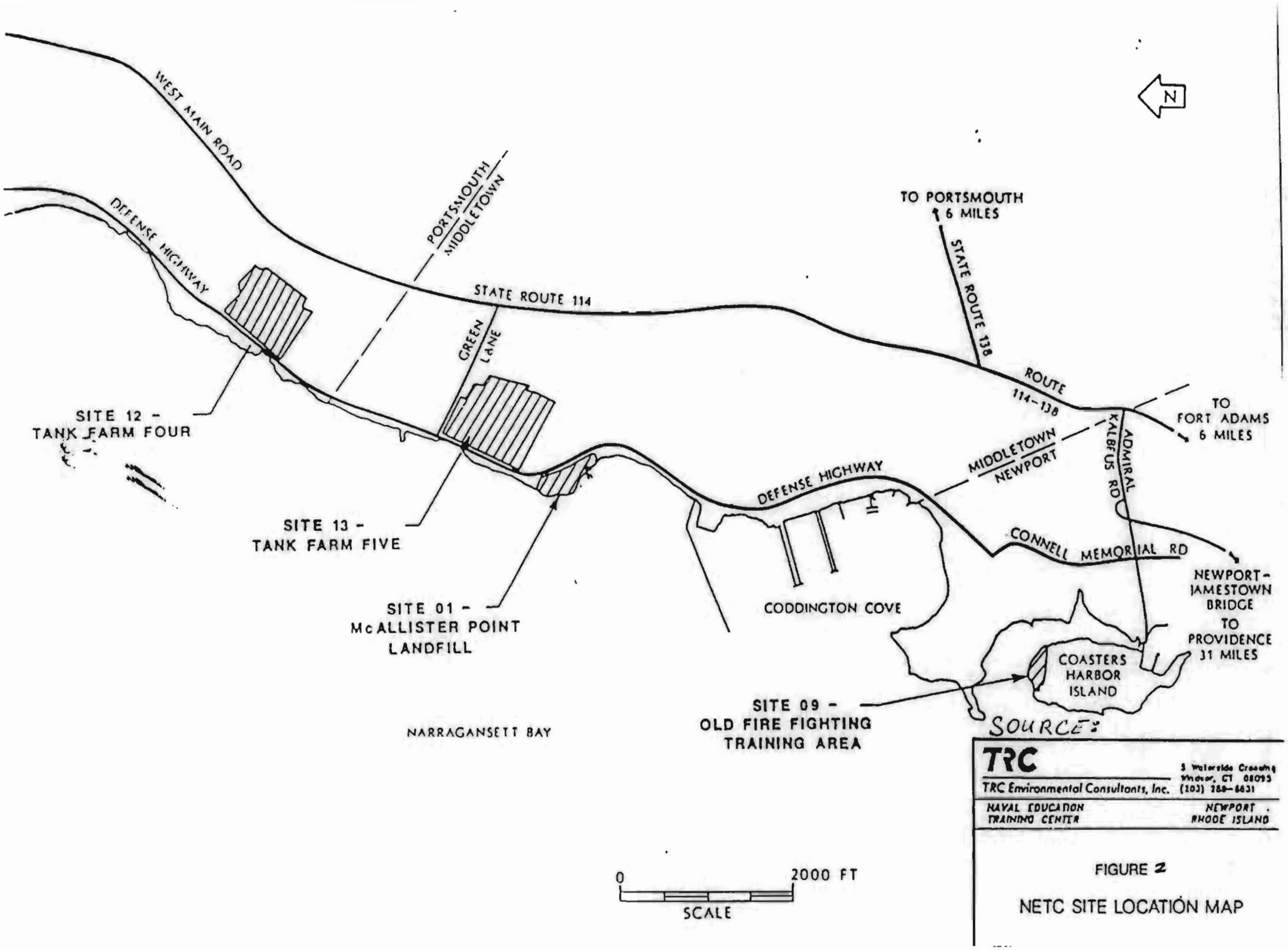


FIGURE 2; MAP OF 4 AOC's AT NETC

* AOC (1) McAllister Point Landfill
* AOC (9) Old Fire Fighting Training Area
* AOC (12) Tank Farm Four
* AOC (13) Tank Farm Five

As discussed earlier, while various AOCs at NETC were being investigated, Tank Farm Five (AOC 13) was also proceeding on a separate track under RCRA because Tanks 53 and 56 were classified as waste storage tanks. On September 10, 1986, NETC was issued a Rhode Island Department of Environmental Management Hazardous Waste facility Permit #RI1170024243 which stipulated that Tanks 53 and 56 at Tank Farm Five must be closed by CY 1988.

On February 12, 1988, NETC Newport was listed on the Federal Agency Hazardous Waste Compliance Docket which was established pursuant to CERCLA #120(c). The remaining areas of the original 18 have been either identified as a Study Area (SA) or have since been excessed by the Navy. These excessed areas are known as Formerly-Used Defense Sites (FUDS).

In a March 1992 Federal Facilities Agreement signed in Newport, RI, the Navy, EPA, and RIDEM agreed to the below schedule for the clean-up of Areas of Contamination (AOC) based on the Navy's March 1989 RI/FS Work Plan submitted to EPA and the State. The below schedule refers to <u>all</u> AOC's at NETC <u>including</u> Tank Farm

Five.[10]

RI/FS Work Plan	March 1989
Community Relations Plan	July 1990
Phase I RI Report	November 18,1991
Phase II RI Work Plan	July 30,1992
Phase II RI Report	September 1, 1993
RI/FS Report,	
Phase II RI	July 30, 1994
Proposed Plan,	
Phase II RI	March 15, 1995
Record of decision (ROD)	
(describes the Remedial Action	
alternative(s) selected to be	
implemented)	November 15, 1995

Of note is that the above list does not include the actual remedial action which would come after the Record of Decision (ROD) which is the last entry on the schedule. The RIDEM remediation schedule for Tanks 53 and 56 is considerably faster and less complicated. The specifics of the RIDEM remediation schedule will be discussed in chronological detail in the following chapters.

---

[10] Ibid., page 45.

DEFENSE FUEL SUPPORT POINT (DFSP), MELVILLE

The Defense Fuel Support Point is located at the north end of the Newport naval complex. Its headquarters are located at Defense Fuel Supply Center (DFSC), Cameron Station, Alexandria, Va., and the regional office is located at Defense Fuel Supply Center Region Office, McGuire Air Force Base, N.J.

The mission of the facility is to receive, store, and issue various petroleum products to military and federal civilian agencies, such as the Naval Education and Training Center, Newport; fleet units, Coast Guard units, General Electric (government contract work), and various Air Force Bases and Naval Air Stations. DFSC operates the facility as a government-owned, contractor-operated DFSP, with a small number of government employees monitoring contractor operation of the facility.

The following real property and equipment at DFSP, Melville, are maintained by DFSC: 200 acres, three tank farms (33 tanks), one deep water fuel pier, 25 miles of pipeline, 1,700 valves, and 100 steam and electric pumps. Storage capacity of petroleum is 1,300,000 barrels.[11] There are 14 buildings, two of which are occupied by government employees; three are occupied by Management Engineering Associates employees.

[11] Department of the Navy Rhode Island Area Annual Report 1991; page 49.

NAVY FUELS

The U.S. Navy uses enormous quantities of petroleum products to fuel and lubricate its vessels, vehicles, aircraft and stationary power stations. The maintenance and repair of these units requires a myriad of chemicals that are defined by the National Contingency Plan as "hazardous substances." The necessary products are centrally procured in bulk quantities by the Defense Fuel supply Center, Cameron Station, Alexandria, VA, to satisfy Navy worldwide requirements. After inspection by Government representatives, Navy products are delivered from refineries by tanker, pipeline, rail or truck.

In addition to the bulk fuels, the Department of Defense purchases bulk quantities of three commonly used Navy lubricating oils. The lubes are used for aircraft and diesel engines and ships' machinery. These bulk lubricating oils are normally delivered directly to naval vessels by tank truck at pier side. In the storage and handling of the quantities and variety of oil and hazardous substances used by the Navy, spills, leaks and other accidental releases are inevitable.

Fuel Oils - The Navy uses several types of fuel oil:

Diesel Fuel Oils: Three grades of diesel fuel oils are purchased for use in automotive diesel engines. These fuel grades, DF-A, DF-1, and DF-2, range in viscosity from 1.2 to 4.3

centistokes at 100° F and have flash points of 100° F or greater.[12] DF-A is an arctic grade fuel for cold temperature use, DF-1 for use in continental United States locations with low temperatures in the winter seasons and DF-2 for summer use and moderate ambient temperatures.

Naval Distillate Fuel (NDF): Another diesel fuel consumed by the Navy; NDF is used principally on Navy vessels. NDF was formerly called Diesel Fuel Marine (DFM), which replaced both Navy Special and Navy Distillate fuels. This low viscosity liquid will spread rapidly over any surface onto which it is spilled.

Burner Fuel Oils: The second principal type of fuel oils used by the Navy are the "Burner fuel oils" used for heat and power generation. The waste oil tanks referred to in this paper were used to store burner fuel oils used in heating buildings at NETC in addition to other waste oils. These oils are numerically graded 1 through 6; No. 3 is no longer used. Grades No.1 and No. 2 are distillate or "light end" fractions with maximum viscosities in the range of 2.2 to 3.6 centistokes at 100° F, flash point minimum to 100° F and specific gravity of approximately 0.85.[13] Generally No. 1 is used in space heaters

---

[12] Oil and Hazardous Substance (OHS) Spill Planning for NOSCs and NOSCDRs (DRAFT); Prepared by: En Safe Environmental and Safety Designs, Inc. Memphis, TN; 1-6.

[13] Ibid.

and No. 2 for residential heating.

The other extreme of burner fuel grades is the very viscous No.6 fuel oil. This residual oil, also known as Bunker C, is used in many commercial ships and shore station power plants. This oil has a flash point of 150° F and viscosity in the range of 92 to 638 centistokes at 122° F.[14] It must be heated prior to use to facilitate handling.

No. 4 oil is rarely used, though it is available as light residual or heavy distillate cuts. No. 5 burner fuel is also available in light and heavy cuts of the residual oil fraction. Heavy residual (NO. 5) has a viscosity range of 75 to 162 centistokes at 100° F and a flash point of 130° F[15] reflecting the intermediate characteristics of this fuel oil.

Navy Oil Spills and Regulations

The various petroleum products used by the Navy are delivered to Naval activities by pipeline, tanker, barge, rail car, or highway truck. The potential for spilling these products is inherent in their transportation, handling, and the transfer operations associated with storage and dispensing. OPNAVINST 5090.1A requires that all Navy-related oil spills must be reported to the Navy Energy and Environmental support Activity (NEESA). An

---

[14] Ibid., page 1-7.

[15] Ibid.

analysis of the reports generated in this overall Navy monitoring operation has been made by NEESA in "Naval Oil Spills Annual Report." Public law, the Code of Federal Regulations, and various Department of Defense instructions regulate oil spills on shore facilities. The Clean Water Act prohibits the discharge of oil from any waterborne vessel or from any onshore or offshore facility into or upon the navigable waters of the United States within the 12 nautical mile contiguous zone. Title 40, Code of Federal Regulations, Part 110 (40 CFR 110), prohibits discharges from shore facilities and vessels which cause a visible sheen to any waters of the United States. The Environmental Protection and Natural Resources Manual, (OPNAVINST 5090.1A of 2 October 1990)[16] is a Navy publication which provides guidance of implementation of Federal laws and regulations as they apply to Naval operations.

---

[16] Ibid., page 1-1.

CHAPTER 3

TANK FARM FIVE

Tank Farm Five is located approximately one mile north of NETC in the town of Middletown, RI. Tank farm Five is bordered to the north and northwest by Defense Highway, to the southwest by a cemetery, to the east by residences and to the north and northeast by Greene's Lane and Gomes Brook. Tanks 53 and 56 are located in the western portion of the 85-acre tank farm (see figure 3).

Eleven underground storage tanks, numbered 49 through 59, comprise Tank Farm Five. Each tank is constructed of prestressed concrete and has a capacity of 60,000 barrels.[17] The tanks were constructed in 1942 and 1943. The tanks are approximately 116 feet in diameter and 33.5 feet deep. The tanks are covered by approximately 4 feet of soil. Each tank is surrounded by a ring drain area which consists of 12 inch reinforced concrete drain pipe located within a permeable back fill approximately 4 feet wide. The drain is connected to a sump pump to remove the ground water from the back fill area, reportedly to prevent tank drainage or tank flotation.

---

[17] Tank Closure Plan for Tanks 53 and 56, Tank Farm Five, Naval Education and Training Center Newport, RI. Prepared by: Environmental Resource Associates, Inc. Warwick, RI. April 15, 1988; page 2.

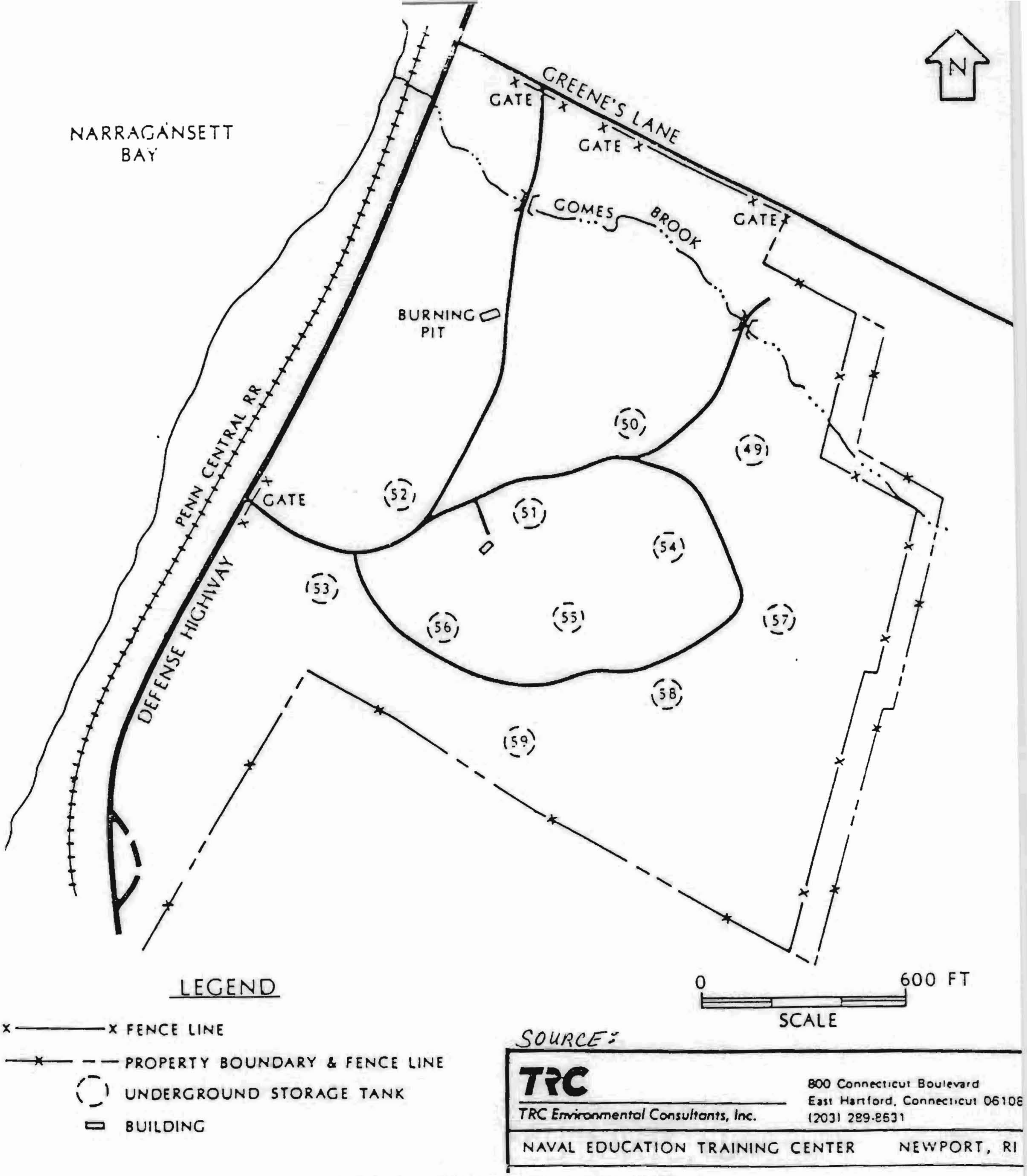


FIGURE 3; TANK FARM FIVE MAP

The underground storage tanks in Tank Farm Five were used for fuel storage from World War II to 1974. In 1975, the Navy began using Tanks 53 and 56 for used oil storage as part of an oil recovery program. Between 1975 and 1982, Tanks 53 and 56 were utilized to contain used oil for alternate use as heating fuel for Building 86[18]. In 1982, the State of Rhode Island Department of Environmental Management (RIDEM) adopted hazardous waste regulations which were applicable to the waste or used oils in tanks 53 and 56. In 1984, the Navy decided to discontinue use of the tanks. In 1986 NETC was issued a hazardous waste permit for another site not related to Tanks 53 and 56. However, a condition of the permit stipulated that NETC was to close the tanks in calendar year 1988. In 1988, a tank closure plan addressing Tanks 53 and 56 was prepared for the Navy by Environmental Resource associates, Inc. By definition tank closure includes: removal and disposal of the tank's contents, cleaning of the tank walls, and demolition. The current status of Tanks 53 and 56 is as follows: the contents of Tanks 53 and 56 have been decontaminated and removed, and the Tank walls steam cleaned and decontaminated. The Tanks have yet to be demolished and back filled.

History of Investigations

Sampling of the water, oil, and sludge in Tanks 53 and 56 was

---

[18] Ibid.

conducted in 1983 by Environmental Resources Associates, Inc.[19] The presence of three phases in the tanks was a result of the tanks being filled with water for ballast after their use was discontinued. According the ERA report, the sample analyses results indicated that the oil phase in both tanks was determined to be hazardous due to the concentration of lead in the oil. Similarly, the sludge layer in both tanks was also determined to be hazardous by ERA due to the presence of significant concentrations of lead, cadmium, chromium, barium, mercury and silver.[20] In addition, the water in Tank 56 was found to contain hydrocarbon compounds.

In 1985, a total of four ground water monitor wells (MW-53E, MW-53W, MW-56E, and MW-56W) were installed in the ring drains of Tanks 53 and 56. The ERA ground water sample results indicated the presence of several chlorinated and aromatic hydrocarbons in the samples from wells in the Tank 53 ring drain.[21] In addition, trace concentrations of mercury were detected in wells in both tank ring drains. Cadmium was also detected in one ground water sample from the ring drain of Tank 56. No other metals were detected in the ground water samples from the four wells. Split

---

[19] Ibid., page 3.

[20] Ibid.

[21] The resuls of ground water sample analyses are summarized in tables 1 through 4 from the Environmental Resouce Associates (ERA), Inc. Warwick, RI Tank Closure Plan; 15 April 1988.

spoon soil samples collected from the Tank 53 ring drain borings showed fuel oil staining and odor.[22]

Six additional monitor wells were installed around the tanks and sampled by ERA in 1986; five to the north and west of Tank 53 and one 300 feet south of Tank 56.[23] The analytical results of the ground water samples from their wells confirmed the presence of organic compounds in the Tank 53 ring drain. The sample results also indicated the presence of organic compounds in the ground water at a distance of 150 feet to the north of Tank 53. At the time of sampling, a floating oil layer was present in the Tank 53 ring drain wells. The hydraulic gradient data developed for the well network indicated a ground water flow direction to the northwest across Tank 53 and a downward vertical hydraulic gradient at a nested well pair installed to the northwest of Tank 53. Basically, the tanks are situated on the slope of a hill which continues down in a northwest direction to the east passage of Narragansett Bay.

In 1986, the four ring drain monitor wells were resampled by ERA.[24] The results of the volatile organic analysis of these

---

[22] Tank Closure Investigation Tanks 53 and 56, Tank Farm Five, Naval Education and Training Center, Newport, RI. Prepared by: TRC Environmental Consultants, Inc. East Hartford, Connecticut. Project number 6760-N81-90; June 1991; page 26.

[23] Ibid., page 4.

[24] Ibid., page 16.

samples confirmed the presence of several Volatile Organic Compounds (VOCs) in the ground water in the Tank 53 ring drain, and the absence of VOCs in the ground water in the Tank 56 ring drain. In 1990, the tank samples were characterized and surface soil samples were collected from above each of the tanks under a remedial investigation of the entire site by TRC Environmental Consultants, Inc (TRC). Highlights of TRC's investigation with respect to Tanks 53 and 56 are presented in this paper below.

TRC FIELD INVESTIGATION ACTIVITIES

The purpose of the TRC 1990 tank closure investigation was three-fold: 1) to install additional monitor wells and collect soil and ground water samples to determine the presence and extent of contamination near Tanks 53 and 56; 2) to replace monitor wells which were damaged by contractors working on the adjacent new Fire Fighting Training Center; and 3) to install a large-diameter well near Tank 53 for possible free-product recovery.

A total of five new wells were installed near the two tanks. Two additional monitor wells, MW-9 and MW-10, were installed northwest of Tank 56.[25] These wells were installed to provide information on the ground water quality down gradient of Tank 56. Based on the information presented in the ERA tank closure plan (ERA,1988), ground water in this area of the site flows to the west or northwest. Two monitor wells were also installed near

---

[25] Ibid., page 11.

Tank 53 to replace wells damaged during the construction of the adjacent Fire fighting Training Center. In addition, one 8-inch diameter well suitable for free-product recovery, was installed adjacent to the north side of Tank 53. Soil and ground water samples were collected for laboratory analysis to assess the nature and extent of contamination around each tank.

In addition to the new soil boring and monitor well sample results, this assessment considered the analytical results of tank and surface soil samples previously collected by TRC at the site. The tank contents were sampled during TRC's 1990 remedial investigation of the entire tank farm under the Navy's Installation Restoration Program managed under CERCLA. The tanks were sampled to characterize the tank contents. Surface soil samples were also collected under that investigation to assess the general surface soil quality around the tanks.

TANK CONTENTS Samples were collected of oil and water contained within Tanks 53 and 56. The samples contained high concentrations of chlorinated and aromatic hydrocarbons, base/neutral/acid extractable compounds and several metals. The oil sample from Tank 56 also contained a detectable concentration of PCB Aroclor 1016 (estimated 1.6 ppm).[26] Water samples from both tanks contained detectable concentrations of chlorinated and aromatic hydrocarbons, semi-volatile organics, and several

---

[26] Ibid., page 18.

metals.[27] The tank water samples were not analyzed for pesticides/PCBs.

GEOLOGY, HYDROGEOLOGY Tank farm five is located along the east shore of Narragansett Bay. Land surface slopes generally to the north and west across the tank farm site, from an elevation of over 90 feet above mean low water (MLW) to less than 10 feet above MLW along the eastern portion of Gomes Brook on the northern edge of the tank farm. The average slope of the land surface in the tank farm area is 0.04 ft/ft, slightly less to the north-northeast, and greater to the west.[28]

Site specific geologic data gathered during the site remedial investigation indicates that the bedrock surface slopes generally to the north and west across the site from an elevation of over 70 feet above MLW near Tank 59 to approximately 40 feet above MLW near Tank 49.[29] It should be noted that bedrock was excavated at most, if not at all, of the underground storage tank locations during the tank construction/installation. This may have required excavation 10 to 30 feet into bedrock to a total depth of approximately 40 feet below grade at the tank locations.[30] As a result, the existing bedrock surface at the tank farm is very

---

27 Ibid.

28 Ibid., page 15.

29 Ibid.

30 Ibid.

irregular.

Ground water levels in the tank Farm five monitor wells were measured on July 17, 1990 and October 25, 1990, in conjunction with ground water sampling activities.[31] The ground water level measurements and elevations are summarized in Table 4[32] appendix A. Figure 6[33] of appendix A shows the ground water level elevation contour map developed from water levels measured at site monitoring wells on July 17, 1990. This map shows that water level contours over the Tank Farm five area generally mimic the land surface contours with ground flow directions to the north and north west directions translating to a direct flow to the Narragansett Bay. Figure 7[34] of appendix A is a more detailed diagram of ground water level elevation contours in the area of Tanks 53 and 56. Figure 7 includes ground water level data from wells installed by ERA in 1985 and 1986. Generally, water level elevations obtained from the wells in the areas of Tanks 53 and 56 describe a smooth, east-to-west sloping water table around these tanks.

<u>CONTAMINATION MIGRATION</u> (see figures 3 and 4 appendix A for

---

31 Ibid., page 16.

32 Ibid., appendix D; table 4.

33 Ibid., appendix D; figure 6.

34 Ibid., appendix D; figure 7.

locations of monitoring wells in the vicinity of Tanks 53 and 56) Comparison of analytical results from samples collected as part of this sampling program to available background soil and ground water quality information indicates areas near the tanks have been affected by on-site activities. Surface soils above the tanks have been affected to some degree, based on the results of a limited soil sampling program. Petroleum hydrocarbons were detected in surface soil samples, but at low concentrations. It should be noted that the surface soil samples were collected from grade to a depth of six inches below grade. Since there may be two or more feet of soil above the tanks, the soils below 6 inches and immediately above the tank may have higher concentrations of oil residuals. This is dependant upon how any oil may have been deposited in the areas (e.g., spills or tank overflow), and upon what natural processes (e.g., biodegradation) may have occurred to reduce any contaminant concentrations.

Subsurface soil samples collected from borings (M-9 and M-10) down gradient of Tank 56 did not show oil residues. In the absence of oil residues, the apparently elevated concentrations of lead and a few other metals in the soil sample from boring M-9 cannot be clearly attributed to discharges from tank 56. At locations such as well MW-53W, down gradient of tank 53 where product has been observed on the well, soil contamination beyond the ring drain should be expected.

Ground water sample results from wells in the vicinity of Tank 56 show no significant indications of contamination. However, in the vicinity of Tank 53 free product has repeatedly been observed in the two ring drain monitor wells (MW-53W and MW-53E) and dissolved hydrocarbons have been detected in ground water samples from these wells and other nearby down gradient wells (RW-1 and MW-7). Other ground water sample results from the Tank 53 area indicate that dissolved hydrocarbons were observed in the ground water at least as far down gradient as well MW86-2.

Table 5[35] of appendix A provides a summary of ground water sample analytical results which exceeded developed action levels. No applicable action levels are available for the soil matrix. Soil cleanup levels are typically decided by the regulators on a case-by-case basis, taking into consideration factors such as human health risk, land use, toxicity, and feasibility of cleanup.

HUMAN HEALTH RISK ASSESSMENT A qualitative health risk assessment was performed by TRC to determine the potential impacts on human health associated with the use of Tanks 53 and 56 at Tank farm five. The primary objectives of the risk assessment were to examine exposure to pathways and to estimate the potential adverse effects associated with the contaminants of concern at the site under current conditions. The conclusions of the risk assessment indicated that while a variety of toxic

---

[35] Ibid., appendix D; table 13.

agents have been found on-site, including arsenic, lead, mercury, polycyclic aromatic hydrocarbons, and the pesticides DDT, and DDE, the potential for an adverse effect on human health is low. This was based on the levels of contaminants detected and the current uses of the site. The potential problem with this line of reasoning in risk assessment is that we have observed future land use following contamination which was not previously contemplated. For example another Area Of Contamination (AOC) at NETC mentioned previously is the old Fire Fighting Training area. Presently a day care center and playground are sited over the old Fire Fighting Training AOC. As noted previously the Navy has routinely bought and sold real property as needs change. The real property at Tank Farm Five could be sold when no longer needed and possibly be used for residential purposes. There are currently residential homes adjacent to the tank farm. The future use of excessed property needs to be considered in the risk assessment as well as the present use for reasons stated above. Another item not fully considered in the risk assessment report is the accessibility of young children to the contaminated sites. Tank Farm Five is located next to a major navy housing area where 100s of young children live. The area around Tank Farm Five is wooded and fenced off from intruders. However, the very nature of the property (wooded with hiking trails and a brook) is an alluring attraction for young people looking for the adventure of an afternoon hike in the woods. Several places in the perimeter fence are not adequately secured to intrusion. In fact, immediately across the street from a large Navy housing area (with 100s of small children) is a gate in the tank farm perimeter fence which has a ground clearance gap of about 2 feet allowing easy access to the grounds. In addition there is evidence of intrusion left on the trails in the form of food packaging.

CHAPTER 4

INTERIM GROUND WATER AND SOIL REMEDIATION PROPOSAL

In the spring of 1990, the Navy contracted with TRC Environmental Consultants, Inc. to install additional monitoring wells and to collect soil, water, and tank content samples to determine the presence and extent of contamination in and around Tanks 53 and 56. The oil product samples contained high concentrations of chlorinated and aromatic hydrocarbons, base/neutral/acid extractable compounds (BNAs) and several metals.[36] Water samples from both tanks contained detectable concentrations of chlorinated and aromatic hydrocarbons, semi-volatile organics, and several metals.[37] Surface soil samples showed low concentrations of petroleum hydrocarbons and lead. Five soil boring samples contained detectable concentrations of both BNAs and petroleum hydrocarbons. Ground water sample results indicated the presence of floating hydrocarbon product and ground water contaminated with chlorinated and aromatic hydrocarbons and polynuclear aromatic hydrocarbons in the vicinity of Tank 53.[38]

---

[36] Installation Restoration Program, Naval Education and Training Center, Newport, RI. Final Proposed Plan Tanks 53 and 56 at Tank Farm Five; May 1992. By: Naval Facilities Engineering Command, Department of the Navy, Philadelphia, PA. Page 9.

[37] Ibid.

[38] Ibid.

Pursuant to RIDEM tank closure requirements, the Navy during the past year (1992) contracted out and completed the removal of the sludge, oil and water layers from Tanks 53 and 56. After removal of the tanks contents to an off-site facility for treatment, the tank walls were steam-cleaned to ensure that no contamination was left prior to tank demolition. Confirmatory samples (to verify steam cleaning operations) of concrete from inside the tanks have been analyzed for Toxicity Characteristic Leaching Potential (TCLP) and have been found to be below detection levels.

Several pumping wells were installed around these two tanks prior to removal of their contents to avoid tank damage and potential tank flotation due to hydrostatic pressure from adjacent ground water. A sump pump, activated by an increase in hydrostatic pressure, was installed to remove ground water from the ring drains around the tanks during periods of high ground water flow, e.g. heavy rainfall. An air stripping system with activated carbon was constructed to treat the tank's contents as well as the contaminated ground water as it was removed from around the tanks.

Presently, ground water from the ring drains is being pumped and transferred to another tank nearby, pending approval of a permit modification with the City of Newport for discharge into their waste water treatment plant.

Remediation of soil contamination around Tanks 53 and 56 is being addressed as part of the Resource Conservation and Recovery Act (RCRA) tank closure activities previously discussed. The complete closure of Tanks 53 and 56 (e.g. demolition and back filling) has been postponed until additional information is obtained on the complete nature and extent of soil and ground water contamination around these two tanks. The Navy has recently initiated an investigation that will determine the horizontal and vertical extent of soil contamination. This information will be utilized to proceed with soil remediation in accordance with RIDEM's tank closure requirements.

THE NAVY'S PROPOSED INTERIM REMEDIAL ACTION

The Navy's proposal of the below interim remedial action for contaminated ground water, is the result of an evaluation of different ground water treatment options. A complete FS report, which will describe and evaluate final remedial alternatives for Tank Farm Five is scheduled for development upon conclusion of the Phase II investigation. Two different ground water treatment technologies were considered for this management of migration action: extraction and treatment with an air stripper; and ultraviolet oxidation (UV/oxidation). The following paragraphs describe the proposed interim action for ground water remediation.

The proposed interim remedial action would consist of extraction, treatment, and discharge of treated ground water. The extraction system would be constructed around tanks 53 and 56 and within the approximate boundaries of the contamination plume to maximize the collection of contaminated ground water. The Navy currently plans to install approximately five wells, pumping at various rates, which would contain the plume and collect contaminated water from around the tanks. Two of the wells would be placed near Tank 53 and another near Tank 56 to prevent ground water from migrating.[39] The remaining two wells would be placed near the tanks, in the overburden and at the weathered bedrock. A monitoring program would be developed during the design and submitted for regulatory approval.

The proposed treatment process would include removal of metals and VOC's from the water as follows: prior to VOC treatment, dissolved metals in the extracted ground water would be significantly reduced using a coagulation/filtration process so that they would not interfere with the VOC treatment process.[40] In this process, a chemical would be added to precipitate the metals out of solution in a settling tank. The remainder of the precipitated metal oxides would be separated from the water by passing the water through filters. The filters would be backwashed periodically to prevent clogging. The solid material cleaned from the filter would be handled in accordance with

---

[39] Ibid., page 15.

[40] Ibid.

Federal, State and local regulations. The water extracted from the solids would then be cycled through the on-site water treatment system.

Several ground water treatment options were considered to reduce VOC contamination, including air stripping and UV/oxidation (using either hydrogen peroxide or ozone as an oxidant). Both technologies are effective in treating VOCs.

The UV/oxidation process destroys organic compounds in water by exposing them to a chemical oxidant (for example, hydrogen peroxide) in the presence of UV light. The combined effects of UV light and the oxidant promote rapid breakdown of organic molecules. In the oxidation process, organic contaminants are broken down into simpler, non-hazardous substances such as carbon dioxide, water, salts, sulfates, nitrates, and organic and inorganic acids. Some by-products have discharge requirements (e.g., acetone, sulfates, nitrates), that would need to be met if this treatment technology is chosen. The contaminated ground water would be mixed with the oxidant and pumped into a reactor (or series of reactors) where water would be exposed to UV light. The resulting effluent would be sampled to ensure that the water meets appropriate discharge standards consistent with the final discharge option.

A treatability study would be conducted prior to the final design of the VOC treatment system to determine the appropriate oxidant and concentration necessary to destroy the VOCs. In addition, this study would provide information of the compounds and concentrations likely to be present in the effluent. In addition, a ground water model may be developed to support the design of this interim remedial action.

If the Navy obtains the appropriate permit, discharge of the treated ground water could be through a sewer connection from an on-site treatment facility to the public sewer system for conveyance to the local waste water treatment facility (WWTF) as was done just this summer (1992) in the case of the waste water constituent from inside the tanks. This is the preferred method of discharge. The treated water would meet retreatment requirements or other applicable standards before entering the sewer system. Final treatment and disposal would occur at the WWTF. The Navy is currently discussing this option with the Newport Waste water Treatment Facility (WWTF).[41] If the WWTF is unable to accept the pretreated water from the site due to flow restrictions or restrictions imposed by other requirements or standards, the treated water could be recycled back into the aquifer up gradient or discharged to a surface water body on base. The aquifer may not be able to accept all of the effluent from the ground water treatment facility if ground water were recharged up gradient. For either the aquifer recharge or the

---

41 Ibid., page 16.

surface water discharge option, the treated water would meet all applicable requirements or standards. If either up gradient recharge or discharge to surface water is selected as the discharge option, the exact location and treatment requirements would be determined and submitted for regulatory review and approval before implementation. The final discharge option for the treated water will be reevaluated at the time of the final ROD.

Because the purpose of this proposed action is to begin cleanup of the contaminated ground water around Tanks 53 and 56, and is not meant to be the permanent remedy for Tank Farm Five, the Navy has assumed that the action would last for five years. After five years (or after the ROD for the final remedy, whichever comes first), the Navy and the regulatory agencies will review the monitoring data and evaluate the effectiveness of the interim action. The remainder of Tank Farm Five and all of Tank Farm Four is being studied for clean up options under Installation Restoration (IR) program subject to CERCLA. Lessons learned in the interim action at Tank Farm Five will hopefully be incorporated down stream at other sites. If the interim action is performing up to the specifications in the final ROD, the interim action could become part of the overall site remedy. If modifications need to be made to the collection or treatment systems, they could be incorporated into the final ROD for the site.

COMPARATIVE ANALYSIS OF THE PROPOSED INTERIM REMEDIAL ACTION

In FS reports conducted for remediating hazardous waste sites under CERCLA, the USEPA requires that remedial alternatives be evaluated using nine criteria. The nine criteria are used to select a remedy that meets the national superfund program goals of protecting human health and the environment, maintaining protection over time, and minimizing untreated waste. Definitions of the nine criteria and a summary of the Navy's evaluation of the proposed interim remedial action using the nine criteria are provided below:

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Overall Protection of Human Health and the Environment includes an assessment of how human and environmental risks are properly eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

The Navy feels the interim remedial action for addressing ground water contamination would provide overall protection of human health and the environment. Protection would be provided by containment of the plume to prevent the migration of contaminated ground water to currently uncontaminated areas, and by permanent reduction of contaminant concentrations in the water through treatment and off-site disposal of the sludge produced by metals pretreatment.

2. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether or not a remedy complies with all State and Federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and cleanup options at a specific site. If an ARAR cannot be met, the analysis of the alternative must provide the grounds for invoking a statutory waiver. When comparing interim remedies, it is appropriate to analyze compliance with only those laws and regulation that are applicable or relevant and appropriate to the limited scope of the interim action. However, the interim action would be consistent with the final site remedy.

The use of an air stripper as the ground water treatment technology would meet the State of Rhode Island ambient air guidelines if air controls are provided. However, since this technology only removes hazardous chemicals from the ground water rather then destroying them, it was not selected as the preferred ground water treatment technology. The Navy selected UV/oxidation with RIDEM's endorsement because it would meet all applicable or relevant and appropriate requirements by destroying the volatile organic contaminations without generating large quantities of regulated waste.[42] However, the USEPA is turning negative on the oxidation process because it does leave some

---

42 Ibid., page 18.

solid waste which requires disposal. The EPA is pushing for further studies which will in turn postpone the ultimate clean up another year or more. RIDEM's position is that any method will have some solid waste problems. The oxidation process has previously proven itself when the waste water inside the tanks were emptied. The process is affordable and easily applicable to business. RIDEM does not want to waste another year or more while USEPA decides to reinvent the wheel through numerous and costly and time consuming studies.

3. LONG-TERM EFFECTIVENESS AND PERMANENCE

Long-term Effectiveness and Permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once the cleanup goals are met.

The proposed interim remedial action is expected to meet the cleanup objectives by preventing migration of the plume and by removing and treating the water. Potential residual risk would remain because the entire plume of contamination would not be remediated by the interim remedial action.

4. REDUCE TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT

Reduction of toxicity, Mobility, or Volume through Treatment are three principal measures of the overall performance of an alternative. The 1986 amendments to the Superfund statute emphasize that, whenever possible, a remedy should be selected that uses treatment to permanently reduce the level of toxicity of contaminants at the site, the spread of contaminants, or the volume or amount of contamination at the site.

Preventing the spread of contaminants by pumping to contain the plume will reduce the volume of contaminated ground water. Contaminated ground water from around Tanks 53 and 56 would be contained by controlling migration with extraction wells. The Navy feels that treating the extracted water using the UV/oxidation technology would permanently and significantly reduce the toxicity and mobility of contaminants.

5. SHORT-TERM EFFECTIVENESS

Short-term Effectiveness refers to the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until cleanup goals are achieved.

The community and environment are not expected to be adversely affected during implementation of the proposed action. workers installing the ground water extraction system and treatment plant operators would wear protective clothing, and follow appropriate safety procedures to minimize the chance of exposure to contaminants, and meet Occupational Safety and Health Act (OSHA) training requirements. Monitoring would also be conducted to ensure protectiveness.

6. IMPLEMENTABILITY

Implementability refers to the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement the alternative. The extraction and treatment technologies proposed for the interim action are implementable and have been successfully demonstrated at other sites.

7. COST

Cost includes the capital (up-front) cost of implementing an alternative as well as the cost of operating and maintaining the alternative over a 5-year period, and net present worth of both capital and operation and maintenance costs. The capital, operation and maintenance, and total cost of the interim action is presented in the description of the Navy's proposed interim remedial action.

8. STATE ACCEPTANCE

State Acceptance addresses whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the alternative the Navy is proposing as the remedy for the site. The State has reviewed, endorsed and commented on this Proposed Plan and the Navy has taken the State's comments into account.

9. COMMUNITY ACCEPTANCE

Community Acceptance addresses whether the public concurs with the Navy's Proposed Plan. Community acceptance of this Proposed Plan will be evaluated based on comments received at the upcoming public meetings and during the public comment period.

THE NAVY'S RATIONALE FOR PROPOSING THE INTERIM REMEDIAL ACTION

Based on current information and analysis of the tank closure investigation and phase I RI Reports, the Navy believes that the proposed interim remedial action for Tank Farm Five is consistent with the requirements of the Superfund law and its amendments, specifically Section 121 of CERCLA and to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP).

This interim remedial action focuses on containment of ground water contamination that has emanated from Tanks 53 and 56. The interim remedial action proposed by the Navy is an effort to begin remedial action to prevent further degradation of the ground water and potentially, the estuarine ecosystem, by capturing the ground water at the leading edge of the contaminant plume to prevent migration of contaminants. The cleanup goal is to extract ground water contaminated with chemicals at concentrations exceeding drinking water standards. The proposed action is consistent with any future source control or ground water remedial actions. It is readily implementable and would provide short and long term protection of human health and the environment, would attain all Federal and State applicable or relevant and appropriate public health and environmental requirements, would reduce the mobility and toxicity of contaminated ground water, and would utilize permanent solutions to the maximum extent practicable.

CHAPTER 5

NEGOTIATIONS & ADMINISTRATIVE ACTIONS

In 1985 the Commander, Naval Education and Training Center (NETC), became concerned that NETC would soon be in non-compliance with the proposed regulations for underground storage facilities for petroleum and hazardous materials regarding the abandoned tanks in Tank Farms 4 and 5 at NETC.[43] At that time the preliminary estimate for testing and closure of the abandoned tanks was 6 million dollars. The Commander, NETC requested assistance from the Northern Division, Naval Facilities Engineering Command (NORTHNAVFACENGCOM) regarding a waiver of non-compliance. The Commander, NETC also informed RIDEM in April of 1985 that the 180 day time constraint in the proposed legislation for the closure of the tanks was unrealistically short and should be extended to no less than three years.

In 1986 NETC received a permit from RIDEM for the storage of hazardous waste beyond ninety days. No hazardous waste treatment or disposal occurred at the facility. The permit identified a waste container storage site located adjacent to Building 1166 in the Coddington Cove area of the NETC complex in Newport, RI. Various hazardous wastes are stored in fifty-five gallon drums. The permit was issued on the condition that NETC would close

---

[43] Naval Education and Training Center (NETC), Newport, RI Letter ser. #5090 dtd. 5 Apr. 1985.

storage tanks 53 and 56 by 1988. As noted earlier, these tanks contained three layers: sludge, water, and oil.[44] (USEPA region I memo to Chief NH/RI Waste Regulation Section)

In July of 1988, the Director of Public Works, NETC forwarded a draft closure plan to RIDEM for Tanks 53 and 56 at Tank Farm 5.[45] The closure plan was prepared by Environmental Resource Associates, INC. RIDEM reviewed the plan and provided comments in November of 1988.[46] (Ltr dtd 10 November 1988 Fm RIDEM Division of Air and Hazardous Materials) RIDEM questioned the proper disposal method for the water portion of the tank contents and commented that each hazardous constituent in the effluent must correspond to EPA mandated discharge levels. RIDEM also concluded that the only acceptable tank closure plan alternative was "3B" of the plan which required the complete decontamination and removal of the tanks. Correspondence between RIDEM Division of Air and Hazardous Materials, Environmental Resource Associates, Inc., and the Navy continued through early 1989. In February 1989 RIDEM again responded to NETC's contractor ERA concerning the amended closure plan.[47] Some pertinent comments

---

[44] Environmental Protection Agency (EPA) Region 1 memo to Chief NH/RI Waste Regulation Section dtd.

[45] NETC Ltr. ser. #388/424E dtd. 12 July 1988.

[46] Rhode Island Department of Environmental Management (RIDEM) Division of Air and Hazardous Materials (HazMat) Letter dtd. 10 November 1988.

[47] RIDEM Division of HazMat Ltr. dtd. 1 Feb 1989.

included the following:

1 RIDEM agreed to the disposal of the water layer of the tanks contents via the Newport Waste Water Treatment plant assuming required permits were obtained from the Newport Waste Water Treatment Plant prior to discharge.

2. RIDEM agreed to leave in place the walls of the concrete tank along with rubble from the demolition of the tank roof and floor provided the material was cleaned of contamination and proved to be non-hazardous.

3. RIDEM agreed to the proposed method of purging the surrounding groundwater of contamination provided future investigation of the groundwater would be conducted in order to confirm the success of the operation.

In May of 1989, the Director for Public Works, NETC informed RIDEM Division of Air and Hazardous Materials that the closure of Tanks 53 and 56 would be included with the remedial actions of the other Areas of Contamination at NETC on the Supper Fund List. It would be incorporated into the newly instituted Installation Restoration (IR) program which identifies contamination as a result of past disposal practices and selects appropriate corrective measures. However, the Remedial Investigation/Feasibility Study (RI/FS) program scheduled for NETC was at a minimum, a two year study program in which <u>no remedial</u> action would be taken. According to NETC, this change in plans had the blessing of RIDEM through its Technical Review Committee (TRC) member assigned to the RI/FS NETC project under CERCLA.[48]

RIDEM Division of Air and HazMat responded in July 1989 via certified mail refusing to allow NETC to delay the closure of Tanks 53 and 56 by including them in the RI/FS of Tank Farm 5. RIDEM explained that NETC's hazardous waste permit specifically stated that site C, which included Tanks 53 and 56, was scheduled for closure during calendar year 1988 in accordance with the TSD regulations. The Permit also stated that noncompliance of the Permit conditions constituted a violation of the Rhode Island Hazardous Waste Management Act of 1978, and is grounds for permit revocation. In other words if NETC wanted to maintain the permit for their hazardous waste holding site adjacent to building 1196, they would have to continue with the closure plan previously agreed to. RIDEM directed NETC to begin closure of Tanks 53 and 56 immediately. RIDEM addressed the ground water contamination problem as well. NETC was offered the option of requesting a postponement of the groundwater remediation if it could be proved that groundwater contamination was being effected by leakage from tanks other than tanks 53 and 56 within Tank Farm 5. The reasoning being that the groundwater contamination could best be dealt with when all sources of the pollution at Tank Farm 5 were

[48] NETC ltr. ser. #602/424E dtd. 16 May 1989.

identified and corrected pursuant to CERCLA.[49]

The Director for Public Works NETC rebutted RIDEM's contention that failure to close Tanks 53 and 56 in 1988 was a violation of the conditions of their permit. The Director also informed RIDEM that at the time of the Permit application the closure cost was estimated at about $65K each and by 1989 had grown to $1,000K, a 1,500% increase.[50] The earliest that the funding would be available would be 1992. So in effect, NETC was saying - the closure of the tanks is already in the RI/FS program (as a component of AOC #13) managed by USEPA scheduled for closure in 92 in accordance with the Installation Restoration Program. And we (NETC) see no reason to expend the money and effort needed to excellarate EPA's schedule. NETC's reasoning continued along the lines that funds for the actual closure of Tanks 53 and 56 were lacking anyway, so why pursue something that in all probability will not happen any time soon. As will be explained later, although RIDEM pressed the issue, the actual closure of Tanks 53 and 56 had not commenced as of the writing of this paper (December 1992) due to budgetary and other reasons.

RIDEM and felt as though they had already bent over backwards when the Permit was issued by allowing NETC <u>over 2 years</u> in which

---

[49] RIDEM Division of Air and HazMat Cert. ltr. dtd. 7 July 1989.

[50] NETC ltr. ser. #671/424E dtd. 27 July 1989.

to close the Tanks when the Regulations called for just 180 days. In light of the growing public awareness of environmental issues and the cold shoulder they were getting from NETC, they felt it was time to flex a little regulatory muscle. On 28 July 1989 after NETC's latest refusal to comply, members from RIDEM and EPA Region 1 descended upon NETC Newport and conducted an inspection of NETC's Hazardous Waste Management Program. Of no surprise, NETC was found in violation Rhode Island Rules and Regulations for Hazardous Waste as amended 20 October 1988. Specifically NETC was found in violation of the following rules:

1. RI Rule 9.06; 40 CFR 264.16(c). Failure to ensure that all facility personnel complete an annual training program. At the time of the inspection it was determined that numerous personnel had not received the required annual training review.

2. RI Rule 2.02; 40 CFR 270.30(a). Duty to comply with permit conditions. Section VI of the hazardous waste storage permit issued to NETC 10 September 1986 clearly states that a permanent closure plan for Tanks No. 53 and 56 in Tank Farm 5 was to be submitted, and closure scheduled for calendar year 1988. DEM and EPA inspection report references NETC's correspondence leading to the inspection which indicated that closure of the tanks was not scheduled for completion as required. It was clear from the report

that the purpose of the inspection was to apply the regulatory hammer having failed to persuade NETC to comply with the permit conditions.

As part of the inspection report NETC was given a compliance schedule. Several mile-stones were included. The bottom line was that by approximately 1 December 1990 NETC was to have cleaned the tanks, implemented groundwater decontamination measures, and reballasted the tanks with sand.

It was made clear to NETC that maintenance of their current Hazardous Waste Permit was conditional upon closure of the Tanks in accordance with the Letter of Deficiency schedule. Failure to comply with requirements of the report would automatically result in the issuance of a Notice of Violation and Order and Penalty, and would be grounds for permit revocation. Enforcement actions resulting from continued noncompliance could result in a maximum fine of $10,000 per day and/or five (5) years imprisonment.[51]

Under Section VII(D) of the final Authorization Memorandum of Agreement between Rhode Island DEM and the USEPA, the State has the primary obligation to take action against persons in violation of RCRA. In September 1989 the Director, Waste Management Division, EPA Region 1 informed the Chief, Division of

---

[51] RIDEM Division of Air and HazMat Letter of Deficiency (LOD) under the Hazardous Waste Management Act; Cert. ltr. dtd. 29 August 1989.

Air and HazMat, RIDEM via official correspondence that EPA would accept the NETC case for Federal enforcement action should RIDEM find that they do not have the resources to pursue the matter. Copies of the letter were provided to NETC and Northern Division, Naval facilities Engineering Command (NORTHNAVFACENGCOM) to ensure NETC got the point that the Compliance Order was a serious matter and cooperation was in everyone's best interest. NETC was left with the realization of two main points. first, that the regulatory agencies were in agreement amongst themselves, and therefore, the chances of persuading one agency to make contradictory rulings (to buy some time regarding the tank closures) with the other agency was remote. Second, the matter had the highest level of visibility within RIDEM and EPA Region 1 Hazardous Waste Divisions. Therefore, NETC would need additional horsepower from the Navy chain of command and/or hopefully another Federal Agency to postpone the inevitable day of compliance.[52]

Following the Compliance Order, the Commander, NETC sent a message to his immediate superior (Chief of Naval Education and Training (CNET) in Pensacola FL) regarding the unfavorable inspection.[53] NETC informed CNET that the directed compliance schedule could not be met due to lack of funds ($2 Million) and

---

[52] RIDEM Chief of Division of Air and HazMat cert. ltr. dtd. 12 September 1989.

[53] NETC radio message date/time 211125Z SEP 89.

the unrealistic time line. NETC closed by asking legal, technical, and funding support from North Division Naval Facilities Engineering Command (NORTHNAVFACENGCOM PHILADELPHIA PA).

NETC responded to RIDEM in October 89 regarding the August Letter of Deficiency resulting from NETC's unfavorable July 89 inspection. In its response, NETC anticipated the required $2 Million funding late in calendar year 1990 and made a counter proposal to RIDEM in which the contract for cleaning and demolition would be awarded before 31 December 1990 with complete closure accomplished by the second quarter of calendar year 1992. In addition a request was made to defer groundwater remediation measures until the Remedial Investigation/Feasibility Study RI/FS phase of the IR under CERCLA is completed in late 1993. This response was totally unacceptable to DEM.[54]

RIDEM was riled by NETC's continued maneuvering and apparent stonewalling. In November 1989 following NETC's request for continued delays, the Chief of the Division of Air and HazMat, RIDEM wrote in frustration to the office of the Chief of Naval Operations, OP-45 with copies to congressional delegates, EPA and others (OP-45 is the ENVIRONMENTAL PROTECTION, SAFETY AND OCCUPATIONAL HEALTH DIVISION within the office of the Chief of

---

[54] NETC, Director for Public Works ltr. ser. #739/424E dtd. 3 Oct. 1989.

Naval Operations). RIDEM as with any regulatory agency preferred voluntary and expeditious compliance with its rulings and directives in order to avoid the necessity of negative enforcement tactics, which in this case could include: Notice of Violation (NOV), revocation of NETC's Hazardous Waste Permit, monetary fines, and imprisonment. I believe RIDEM did not feel completely confident in the outcome of a full scale battle with NETC and was therefore searching for alternatives short of negative enforcement actions. RIDEM may have felt they had partially bought into NETC's delaying tactics in the early days when they were learning how to apply the new Hazardous Waste Regulations. In other words, NETC's progress was slow in the early days but seemed to be reasonable given the large bureaucracy that it is. There may also have been a political reality check as well. The Navy pulled out of Newport in a big way in the early 1970s. Good relations between the defense industry and the State spells jobs and votes. Whatever the reason, RIDEM had <u>cut short on its original threat</u> in its Letter of Deficiency (LOD). Earlier, in the LOD, RIDEM had informed NETC that failure to comply with the directed schedule (tank closure within 90 days of 1 Nov. 1990) would <u>automatically</u> result in the issuance of a Notice of Violation (NOV) and permit revocation, and would constitute grounds for enforcement actions resulting in a maximum fine of $10,000 per day and/or five (5) years imprisonment. Now, RIDEM was backing off. In the compliant to the CNO's office, the Division Chief's strongest threat was meek at best, namely to <u>not renew</u> NETC's Hazardous Waste permit when it expires in 1991. By doing so RIDEM made it clear they wanted to continue to pursue all avenues of diplomacy and hopefully avoid long and drawn out proceedings resulting from continued noncompliance. Conspicuously missing in the Division Chief's letter to the CNO's office was any mention of the automatic issuance of the Notice of Violation to NETC.[55] RIDEM's goal in contacting the CNO's office was that they would somehow intervene in the procurement of the allocation of funds to facilitate NETC in awarding the contract in 1990 so that closure of the tanks could be completed or well underway prior to the expiration of NETC's Permit on 10 September 1991 and thus avoid a confrontation.[56]

Following the Division Chief's complaints to the CNO's office the Navy moved the matter to the front burner. NORTHNAVFACENGCOM and NETC began discussions via official correspondence on the details of awarding the service contract with copies to NETC's boss (CNET Pensacola, FL) and the office of the CNO (OP-45).[57] Wheels also began to turn regarding NETC's plan to discharge the contaminated water portion of the Tanks into Newport's Waste Water Treatment

---

[55] RIDEM Chief, Division of Air and HazMat cert. ltr. dtd. 10 November 1989.

[56] RIDEM Division of Air and HazMat ltr. dtd. 29 November 1989.

[57] Northern Naval Facility Engineering Command (NORTHNAVFACENGCOM) Philadelphia, PA ltr. ser. #0766/1412/BJH dtd. 6 December 1989.

Plant. The Senior Sanitary Engineer, Division of Water Resources, RIDEM informed the Director, Public Works of NETC exactly what the particulars were (including RI Regulations for Water Pollution Control) in order for NETC to proceed with its discharge plan for the Tank water.[58] By June of 1990 NETC received correspondence from the City of Newport Utilities Director that NETC's request to discharge treated waste water from the tanks through the sewer system would be approved provided they met water quality standards.[59] The planned waste water treatment at the site would consist of an oil-water separator, followed by a two-stage counter-current air stripper and two activated carbon absorbers in series.[60]

In late December RIDEM received a positive response from OP-45 regarding RIDEM's request for assistance. RIDEM was informed that NORTHNAVFACENGCOM had provided NETC with funds to complete the design documents required in order to award a closure contract. Also, funds for the actual closure of the tanks had been identified in the Fiscal Year 1990 budget and would be available upon completion of the design effort.[61]

---

[58] RIDEM Division of Water Resources ltr. dtd. 5 December 1989.

[59] City of Newport WPC Department ltr. dtd. 20 June 1990.

[60] NETC, Newport ltr. ser. #154/424E dtd. 5 July 1990.

[61] Chief of Naval Operations (CNO) OP-45 ltr. ser. #451C/9U587534 dtd. 26 December 1989.

However, it soon became increasingly apparent to NETC and NORTHNAVFACENGCEN that two issues needed to be resolved in order for the closure plan to proceed in a timely manner. First was the water discharge question. It was originally hoped that the 2.5 million gallons of the contaminated water constituent of each tank could be purified by Air Stripping and discharged to the Newport Waste Water Treatment Plant over a three month period. It now looked like that plan was in jeopardy because of the difficulty in meeting water quality standards prior to discharge. The subsequent removal and disposal of the sludge, tank cleaning, closure, and demolition would be held up until the water constituent was removed. The second and more pressing issue was the red tape and cumbersome process involved in awarding the service contract to the civilian contractor (which would do the actual work in cleaning, closing and backfilling the Tanks and remediating the surrounding ground water). In the Navy bureaucracy it is not uncommon for the awarding of contracts to stretch out for two or more years as each revision passes up and down the chain of command. It was clear to NETC and NORTHNAVFACENGCOM that if they followed the standard routine in awarding the present contract, there was a good chance that by the time the contract was awarded, the alloted funds for FY 90 would be lost. The battle for funding would have be refought for the next fiscal year, thereby delaying the whole process another year. The real potential "show stopper" was the Navy's own internal defacto deadline of 1 October 1990. The Navy, as part of the Federal government manages its fiscal budget in a 12 month cycle from 1 October through 30 September. Unexpended funds from the previous fiscal year are lost from the Navy budget. This meant that if the contract was not awarded in fiscal year 1990 (1 October 1989 through 30 September 1990) then the allotted $2 million for the project would be lost on 1 October 1990. A meeting was scheduled for 25 January 1990 with RIDEM, EPA, and the Navy to discuss the above potential roadblocks to the tank closures.[62] It was agreed at the meeting that the award of the tank closure contract would be targeted for September 1990 to ensure available funding and permanent tank closure operations would begin before 31 December 1990.[63] Any items resolved were somewhat academic however, because 4 days later NETC would have to deal with an oil/hazardous waste spill from tank 53 at tank farm 5.

---

[62] NORTHNAVFACENGCOM Philadelphia PA Radio message date/time 111451Z JAN 90.

[63] NETC, Newport ltr. ser. #026/424E dtd. 7 February 1990.

CHAPTER 6

NETC 1990 OIL SPILL INCIDENT AND PREVENTION PLAN

On 29 January 1990 there was an oil/hazardous waste spill from Tank 53, Tank Farm 5 at NETC which resulted in RIDEM's issuance of an Immediate Compliance Order. While the Navy, RIDEM, and EPA were meeting four days earlier on 25 January 1990 to iron out their differences and come to a consensus on a suitable tank closure schedule, an accident was in the making. As a result of the oil spill at tank 53 just 4 days after their meeting, the Navy appeared to the regulators as lackadaisical in their routine maintenance and monitoring of the tank farms as well as callous and not completely truthful their true effort and determination in closing the tanks. RIDEM felt it had accommodated NETC by compromising on the remediation schedule for awarding the closure contract.[64] In a sense, RIDEM went out on a limb for NETC and got burned for it. Now once again RIDEM found itself having to retrench back to a hard line position, in this case to get NETC to rectify the oil spill problem at Tank 53. RIDEM's frustration with NETC is understandable. NETC had observed a hazardous situation for months which lead up to the spill but because of the lack of training and appreciation of the consequences of groundwater and/or surface water infiltration into the tanks, no

---

[64] RIDEM grudgingly accepted NETC's plan to award the closure contract in late September 1990 at the end of the Navy's fiscal year; phone interview with Cynthia Gianfrancisco of RIDEM Division of Air and HazMat, 6 October 1992.

preventative action was taken to avoid the spill.

By NETC's own admission the gauging chamber (which is at the roof of the tank) of Tank 53 was routinely covered with water which eventually would leak down into the Tank through joints in the roof. Presumably the water came from surface runoff and/or ground-water. On 22 January during a weekly site visit, NETC's contractor conducted a routine inspection of the gauging chamber and found 3 to 4 inches of water on the roof and because it was a common occurrence no action was taken. The next week on 29 January the contractor observed approximately 8 inches of oil in the gauging chamber as well as oil seeping out of the earth near the northwest quadrant of the tank perimeter. The contractor personnel did not report their observations to NETC until the next day (30 January). On 30 January NETC personnel inspected the gauging chamber and found the oil level had increased to 16 inches deep in the bunker. In addition to the gauging chamber, oil was found in monitoring wells MW-53E and MW-53W. The mechanics of the problem were that the layer of oil in the Tank was riding on an ever increasing volume of water coming from either surface runoff or groundwater thus forcing the oil to overflow the tank. It was also discovered that the construction of the adjacent Fire Fighting Trainer may have contributed to the oil spill. During the construction, soil had been removed from one edge of the top of the tank, and two large piles of soil had been placed on the edge of another side of the tank. NETC of their RIDEM Hazardous Waste Treatment Facility permit.[66]

NETC requested $57,200 from NORTHNAVFACENGCOM in order to proceed with advertisement of contract No. N62472-90-B-1735 to comply with RIDEM's ICO. NETC also informed its boss, CNET of the situation.[67]

On 6 March 1990 NETC informed RIDEM that it had prepared a contract for removal of the oil phase of Tank 53 and anticipated that work under the contract would be completed by 5 April 1990. (Ltr Ser 041/424E dtd 06 MAR 1990 Fm NETC) As a result of the bad publicity from the oil spill at Tank 53, the Navy stepped up its efforts to permanently close Tanks 53 and 56.

NETC cleaned up the immediate problem of the oil spill and by the summer of 1990 had resolved how and where to dispose of all of the contaminated water constituent of the Tanks. Through extensive negotiations between DEM Division of Water Resources, Newport Waste Water Treatment facility (WWTF), and NETC a plan was agreed upon to discharge the water portion of the Tanks to Newport WWTF after Air Stripping and carbon filtering.

1991 was devoted for the most part to treatment and discharge of

---

[66] RIDEM ltr. dtd. 15 February 1990.

[67] NETC, Newport Navy messages: date/time 271326Z FEB 90 and date/time 271225Z FEB 90.

approximately 4 million gallons of water from Tanks 53 and 56. In September of 1991 it was discovered that three other abandoned tanks (50, 57, and 58) in tank farm 5 were in danger of overflowing in the same manner in which Tank 53 had overflowed. The tanks had somehow accumulated 800,000 gallons groundwater and/or surface water and as in the earlier spill accident at Tank 53 had a layer of old oil floating on top of the water phase.[68] The Navy already had its contractor (OHM) on the scene during the summer of 1991 treating and discharging the contents of Tanks 53 and 56. Therefor, it was a simple matter of adding these tanks to the current contract to have them emptied of the water constituent.

This begs the question, what is the status of the other Underground Storage Tanks (UST) on the base and navy wide? Is the intrusion of water into these tanks a chronic problem in the tank design? A natural question might be, why was it that only Tanks 53 and 56 were addressed in the closure contract? All of these questions are interrelated. To start with, Tanks 53 and 56 are unique from other USTs on the base only because they have in the past contained <u>used oil</u> or waste oil vice <u>product oil</u>. Only Tanks 53 and 56 are subject to Federal and State hazardous waste storage regulations. However, all tanks at Tank Farms 4 and 5 (including Tanks 53 and 56) are subject to the CERCLA Superfund

---

[68] NETC, Newport ltr. ser. #958/40E dtd. 30 September 1991.

program. It is because of this that RIDEM could force NETC to close Tanks 53 and 56 as a condition of NETC's base hazardous waste permit but had no control over the closure of the other tanks because they were used only for product oil and not waste oil. As was stated previously, NETC was placed on the National Priorities List (NPL) in 1989 at which time 13 Areas Of Contamination (AOC) were identified and subject to CERCLA for remediation. Tank Farms 4 and 5 were identified as AOCs. However, remediation of the Tank Farms under CERCLA are dealt with as part of the comprehensive base wide cleanup program and as a result takes considerably longer. Under CERCLA in 1991 the base was still in the investigation study phase and therefore, ballast waste water treatment at none of the other tanks had yet even been contemplated.

OIL SPILL PREVENTION, CONTROL & COUNTERMEASURE PLANS

USEPA has published, at 40 CFR 112, regulations intended to prevent the discharge of oil from non-transportation-related onshore and offshore facilities. Those regulations establish procedures, methods, equipment, and other requirements for equipment to prevent the discharge of oil into or upon the navigable waters of the U.S. or adjoining shorelines. The regulations require the preparation of Spill Prevention Control and Countermeasure (SPCC) Plans to minimize the potential for oil discharges.

REQUIREMENTS FOR AN SPCC PLAN Each shore activity which has facilities subject to which the governing regulations apply is required to prepare and maintain a current SPCC Plan. A separate SPCC Plan is not prepared for a particular facility, but one SPCC Plan applies to the entire shore activity and covers control and countermeasure plans for all facilities of the shore activity which meet the governing criteria.

An SPCC Plan is required for each shore activity with oil storage capacity located either along navigable waters, or along tributaries that empty into navigable waters. New SPCC Plans are prepared covering new facilities, or existing SPCC Plans are amended, as new facilities become operational.

GUIDELINES FOR THE PREPARATION & IMPLEMENTATION OF AN SPCC PLAN
The SPCC Plan must be carefully thought out, prepared in accordance with good engineering practices, and must have the full approval of management at a level with authority to commit the necessary resources. If the Plan calls for additional facilities, procedures, methods, or equipment not yet fully operational, these items should be discussed in separate paragraphs. The details of installation and operational start-up should be explained separately. The complete SPCC Plan should follow the sequence outlined in the following paragraphs, and include a discussion of the facility's conformance with the appropriate guidelines listed.

* A facility which has experienced one or more spill events within twelve months should include a written description of each such spill, corrective action taken, and plans for preventing recurrence.

* Where experience indicates a reasonable potential for equipment failure such as tank overflow, rupture, or leakage, the Plan should include a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each major type of failure.

* Appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching a navigable water course should be provided. At least one of the following preventive systems, or its equivalent, should be used. For onshore facilities, these elements are recommended:
    - dikes, berms or retaining walls sufficiently impervious to contain spilled oil;
    - curbing;
    - culverting, gutters or other drainage systems;
    - weirs, booms or other barriers;
    - spill diversion ponds;
    - retention ponds; or

- sorbent materials.

When it is determined that the installation of structures or equipment to prevent discharged oil from reaching the navigable waters is not practicable, the SPCC Plan should clearly demonstrate such impracticability. The Plan must provide a strong oil spill contingency plan and a written commitment of manpower, equipment and materials required to expeditiously control and remove any harmful quantity of oil discharged. In addition to the spill prevention elements listed above, the Plan should include other effective spill prevention and containment procedures in conformance with the following guidelines:

FACILITY DRAINAGE Drainage from diked storage areas should be restrained by valves or other positive means to prevent a spill or other excessive leakage of oil into the drainage system or in-plant effluent treatment system, except where plan systems are designed to handle that leakage. Diked areas may be emptied by pumps or ejectors; however, these should be manually activated and the condition of the accumulation should be examined before starting to be sure no oil will be discharged into the water. Flapper-type drain valves used for the drainage of diked areas should, as far as practical, be of manual, open-and-closed design. When plant topography drains directly into water courses and not into wastewater treatment plants, retained storm water should be inspected as required by the regulations.

BULK STORAGE TANKS No tank should be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage, such as pressure and temperature. All bulk storage tank installations should be constructed so that a secondary means of containment is provided for the entire contents of the largest single tank, plus sufficient freeboard to allow for precipitation. Diked areas should be sufficiently impervious to contain spilled oil.

Diked, containment curbs, and pits are commonly employed for this purpose, but they may not always be appropriate. An alternative system could consist of a complete drainage trench enclosure arranged so that a spill could terminate and be safely confined in an in-plant catchment basin or holding pond. Drainage of rainwater from the diked area into a storm drain or an effluent discharge bypassing the in-plant treatment system may be acceptable if:

- the bypass valve is normally sealed closed;
- inspection of the run-off rainwater ensures compliance with applicable water quality standards and will not cause a harmful discharge;
- the bypass valve is opened, and resealed following drain age under responsible supervision; and
- adequate records are kept of such events.

Buried metallic storage tanks represent a potential for undetected spills. A new, buried installation should be protected from corrosion by coatings, cathodic protection, or other effective methods compatible with local soil conditions. Buried tanks should at least be subjected to regular pressure testing.

New and old tank installations should, as far as practical, be fail-safe engineered or updated into a fail-safe engineered installation to avoid spills. Consideration should be given to providing one or more of the following devices:

* High liquid level alarms with an audible or visual signal at a constantly manned operation or surveillance station; in smaller plants an audible air vent may suffice.
* High liquid level pump cutoff devices set to stop flow at a predetermined tank content level, in relation to size and complexity of the facility.
* Direct audible or code signal communication between the tank gauger and the pumping station.
* A fast response system for determining the liquid level of each bulk storage tank such as digital computers, telepulse, or direct vision gauges or their equivalent.
* Liquid level sensing devices should be regularly tested to insure proper operation.

PERSONNEL, TRAINING AND SPILL PREVENTION PROCEDURES Commanding officers are responsible for properly instructing their personnel in the operation and maintenance of equipment to prevent the discharges of oil and applicable pollution control laws, rules and regulations. Each applicable facility should have a designated person who is accountable for oil spill prevention and who reports to line management. Spill prevention briefings for operating personnel should be conducted at intervals frequent enough to assure adequate understanding of the SPCC Plan for the activity. Those briefings should highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

CHAPTER 7

GROUND WATER CLEANUP ACTIVITIES

Surprisingly, USEPA Region 1 stepped in to rule against RIDEM concerning groundwater remediation. The EPA felt that groundwater remediation under RCRA would interfere with EPA's CERCLA Phase I investigation which included all of Tank Farm 5. As stated earlier, in November of 1989 NETC was placed on the National Priorities List (NPL). At that time NETC requested that the closure of Tanks 53 and 56 be delayed and incorporated into the remedial investigation/feasibility study (RI/FS) to be conducted pursuant to CERCLA. RIDEM refused, stating that this was not a viable alternative due to the fact that closure was a required element of the RCRA permit issued prior to the National Priorities Listing (NPL). Now however, EPA wanted to ensure that enough testing was done to adequately assess the nature and extent of contamination at Tank Farm #5. RIDEM was then blocked by EPA from initiating enforcement actions pursuant to RCRA concerning groundwater remediation unless the CERCLA phase I sampling data (phase I sampling of the ground water was scheduled for the Fall of 1990) failed to evince the presence of contamination from other tanks in Tank Farm #5. Since the overruling by EPA dealt only with groundwater remediation RIDEM continued to monitor NETC's overall progress in closing Tanks 53 and 56.

By June of 1990 a final proposed Tank closure contract (minus groundwater/soil remediation) was provided to RIDEM for review. The Tank closure plan was divided into three phases:[69]

(1) Removal of the Tank Contents.

(2) Initial Assessment Study.

(3) Remedial Design/Remedial Action and Long-Term Monitoring.

While RIDEM was reviewing NETC's proposed contract, NORTHNAVFACENGCOM was considering alternatives to the standard competitively awarded contract procedures. As stated earlier, because of the strong possibility of a delayed award, the allotted $2,000,000 for the project was in jeopardy of being lost. Representatives from NORTHNAVFACENGCOM visited the Army Corps of Engineers (ACE) and requested that the Tank closure work to be completed under ACE's "PRE-PLACED REMEDIAL ACTION CONTRACT."[70] It was concluded from the meeting with ACE that using the ACE "pre-placed remedial action contract" would insure a contract award in fiscal year 1990.[71]

Because of the overruling by USEPA concerning groundwater/soil remediation, RIDEM felt obligated to have NETC amend its contract

---

69 NETC, Newport ltr. ser. #123424E dtd.6 June 1990.

70 NORTHNAVFACENGCOM ltr. ser. #7569/1412/BJH dtd. 6 June 1990 and internal trip report memo dtd. 7 June 1990.

71 NETC, Newport (internal code 424E) memo dtd. 7 June 1990.

once again. RIDEM called for the inclusion of the installation of additional groundwater monitoring wells and sampling to determine the extent of groundwater and soil contamination. This would facilitate EPA's wish to delay any groundwater/soil remediation until the extent of the groundwater problem was known (Phase II: Initial Assessment Study). By August 1990 NETC had amended the proposed contract and submitted the final plan and revised tank closure time table to RIDEM for review.[72]

In September 1990 the contract was awarded to OHM Corporation of Hopkinton, Massachusetts. Work on the project was delayed due to the winter and the contractor proposed a tentative start date of 1 April 1991.[73] In addition to the new contractor delay, the completion of the Tank closure would suffer a further delay because of funding constraints. It was discovered in October 1990 after awarding the contract that there would only be enough money for removal and disposal of the tank's contents, and cleaning of the tank walls. The final task in closing the tanks which was the demolition phase was then postponed by NETC and NORTHNAVFACENGCOM to fiscal year 1991 and would be awarded under a separate contract.[74]

From NETC's perspective, they were addressing the same problem

---

[72] NETC, Newport ltr. ser. #210/424E dtd. 23 August 1990.

[73] NETC, Newport ltr. ser. #240/424E dtd. 16 October 1990.

[74] NETC, Newport ltr. ser. #251/424E dtd.30 October 1990.

from two angles and in effect had two agencies to deal with. It was not certain that remedial processes and techniques perfected by NETC during the remediation of Tanks 53 and 56 under RIDEM would be accepted by USEPA for the eventual trasferrence in remediating the other tanks in tank farms 4 and 5. In fact, USEPA is currently pressuring NETC to study and practice other techniques to clean the ballast water and ground water in and around the other tanks.

Because two different governmental agencies (RIDEM and USEPA) have managed different aspects of the remediation process, conflicts of appropriate remediation procedures and schedules for remediation have resulted. As 1991 drew to a close it became evident that NETC was once again falling behind on their closure schedule for Tanks 53 and 56. From a management perspective the problem was that while the investigation of <u>all</u> tanks under CERCLA progressed, the <u>immediate project</u> on Tanks 53 and 56 was deemphasized by NETC. In fairness to NETC it is easier to deal with one schedule vice two. The more that the investigation under CERCLA progressed, the further behind NETC became with the specific closure schedule pertaining to Tanks 53 and 56.

In November 1991 EPA was provided the "DRAFT FINAL PHASE I REMEDIAL INVESTIGATION REPORT - NETC" which confirmed contamination throughout Tank Farm Five. EPA determined that additional information would be necessary to adequately characterize the horizontal and vertical extent of soil and ground water contamination at this site. The additional work would be addressed in NETC's Phase II RI Work Plan under CERCLA. Since the ground water around Tanks 53 and 56 was affected by tanks throughout Tank farm 5, the EPA took over management of the ground water remediation issue under CERCLA. The closure of Tanks 53 and 56 was slowed because of the complications of coordinating activities between two agencies. At a meeting between EPA and RIDEM in December 1991, EPA approved the State's decision to proceed with the closure activities under RCRA with the exception of the ground water portion.[75] That meant that the demolition and back filling of the tanks could go forward before ground water/soil remediation. However, as will be described later, EPA's approval to go ahead with the demolition was short lived.

On 5 February 1992 NETC submitted a revised closure schedule and requested an extension (180 days) be granted to allow for completion of the closure of Tanks 53 and 56 by 15 October 1992. However, the plan called for <u>completion</u> of ground water/soil remediation <u>prior</u> to any demolition of the tanks. NETC knew that the ground water remediation of the entire Tank Farm was now under the purview of the EPA. NETC also knew that the ground water remediation under CERCLA would not be completed by 15 OCT

---

[75] United States Environmental Protection Agency (USEPA) Region 1 ltr. dtd. 3 February 1992.

(it would in fact take years) and would therefore further delay the demolition of Tanks 53 and 56.[76] By submitting the extension request in this manner NETC was attempting to slow the RIDEM schedule so that it would be overtaken by the EPA Superfund schedule. RIDEM would in effect be forced out of the picture and as a result NETC would only need to deal with only one agency. RIDEM responded to NETC's request for extension in March 1992. RIDEM approved the extension but stipulated several conditions to NETC for the revised closure plan as follows:[77]

(a) That the Tanks be demolished in conjunction with or shortly after soil remediation and that sampling under the tank floors for soil contamination be addressed in the plan.

(b) The schedule in the plan is not acceptable because of the long delay. A new schedule must be submitted within 30 days.

(c) NETC must enter into a Consent Agreement with RIDEM. The Consent Agreement will include the revised schedule approved by RIDEM with stipulated penalties should this schedule not be complied with.

NORTHNAVFACENGCOM argued against RIDEM's requirement to demolish Tanks 53 and 56 in conjunction with soil remediation for the

---

[76] NETC, Newport ltr. ser. #903/40E dtd.12 February 1992.

[77] RIDEM ltr. dtd. 17 March 1992.

following reasons:[78]

(a) If demolition begins during groundwater remediation, it is likely that this would seriously effect groundwater flow in the tank farm. Altering the groundwater flow will likely adversely effect the effectiveness of the remediation system (expected to be a pump and treat system). The result would be a delay in achieving cleanup of the aquifer.

(b) As stated before, demolition while the groundwater is still contaminated would result in contamination of the insides of the tank and the back fill material. Although RIDEM and USEPA have stated that they would not require remediation of the back fill, it is difficult to justify cleaning up the area around the tanks while ignoring contamination of the back fill within the tanks.

(c) Demolition of the tank in 1993 vs. 1994 would not provide additional protection of the environment. On the contrary, the environment would be better protected by delaying demolition. The Navy fully intends to carry out demolition, but we feel that delaying demolition is more prudent.

---

[78] NORTHNAVFACENGCOM memo (internal code 1812/BJH) dtd. 6 May 1992.

RIDEM backed off from their requirement for sampling through the floor of each tank. On the demolition issue, RIDEM compromised recommending the Navy to begin contracting arrangements so that once the additional information on the extent of the contamination is obtained and ground water remediation is completed, the Navy can instruct their contractor to commence with the tank demolition and back filling.[79] (Ltr dtd 18 May 1992 Fm: RIDEM Division of HazMat)

The present physical status of Tanks 53 and 56 is that they have been emptied, steam cleaned, and remain intact and in place. Awarding of a contract is expected in fiscal year 1993 assuming funding is available through the Navy's Defense Environmental Restoration Account (DERA).

---

[79] RIDEM Division of Air and HazMat ltr. dtd. 18 May 1992.

CHAPTER 8

CONCLUSION

ANALYSIS OF THE PROBLEM Several problems have been identified which have the potential to repeat themselves at navy bases throughout the country. We know that similar problems will arise because we as a nation and more specifically our navy has historically disposed of wastes aboard our bases without knowledge of the future consequences. Fuel depots, underground storage tanks, and transfer facilities are common aboard many navy bases. There close proximity to populated coastal zones and food chains increases the danger to human health.

In this case, training was a problem in the initial stages causing cleanup matters to be continually delayed. Employees and base military personnel were ignorant of the environmental laws, and of potential liability both personal and corporate. There was no base plan of action expressed to the troops. Even more importantly, although upper management eventually began to focus on the environmental problem on base, the new attitude was not impressed upon subordinates early on in the process. The base continually found itself in a catch up mode as far as hazardous waste procedures went because of the time lag between the initial awareness of the problem and the eventual proper training, tools, and expertise.

NETC never established a plan of action in the early stages. They continually found themselves in a reactionary mode having to respond to regulatory mandates. The base had a defacto goal however, to put off the inevitable for as long as possible. By that I mean, necessary investments were not made in proper funding and adequate personnel manning of the environmental office on the base until very late in the game. The base went about its normal business and took on this new environmental problem as if it were a thorn in its foot. Minimal effort was put into its solution.

A lackadaisical attitude was pervasive throughout the base and throughout the navy up through the mid 80s. That attitude originally condoned and allowed by upper management, later tied management's hands when it eventually desired a change. As with any large organization when a change is attempted, it is usually succeeded only after several fits and starts. In other words, when upper management finally decided to move in earnest on the problem it took years to change the lackadaisical environmental attitudes and behaviors of its employees and military personnel. Even the outside civilian contractors were slow to move in cases requiring fast action such as when an oil spill at Tank 53 was observed in progress and no report was made until the next day.

Breaking the above generalities down more specifically, I categorize them as follows: 1, poor attitude, or no incentive on the part of the navy to change; 2, lack of funding; and 3, lack of trained personnel.

There were several other problems encountered with all parties concerned including technical, interpersonal, and cross organizational. However, I feel these additional problems could have been solved sooner or avoided altogether had the above three cited problems received more attention early on.

These additional problems stem from the fact that the navy was dealing with two major governmental agencies to solve several environmental problems at once. EPA superfund goals and RIDEM RCRA goals were at odds at times. Sometimes it was felt a solution for one site would adversely impact other sites. And sometimes the EPA and RIDEM would disagree on the best remediating process or sequence of actions to take for a particular site. At other times either RIDEM or EPA would change their position as time passed during the cleanup process. Complicating the matter further was that RIDEM and USEPA were unfamiliar at implementing the relatively new regulations. In a gesture of good faith, they gave the navy a relatively free hand with schedules and solutions. RIDEM discovered to its dismay that it had given the navy too much free rein. The navy in essence squandered away time given it by RIDEM. It was not until RIDEM began to lower the regulatory hammer that NETC began to move on the problem. RIDEM and EPA were also on the learning curve concerning the best technical solutions and they were not always in agreement between themselves on the best course of action.

RECOMMENDATIONS

One has to remember that even with the best of intentions, problems will arise which were not encountered in previous cleanup evolutions. Although RIDEM and USEPA were in the cooperation and assistance mode in the early stages of the cleanup process, the navy was caught unprepared to take action. All the best technical solutions and organizational agreements will be for nought if all parties to the cleanup problem do not have the proper attitude. A proper attitude can be fostered through several avenues. Although attitudes cannot be regulated, consequences of decisions can be. After standard policies are in place then training is in order to heighten awareness in both negative and positive consequences of environmental decisions. Once enough people in an organization (about 10% - 20%) are on board with a new program then the entire attitude of the organization changes. The navy refers to this as "command climate." This is the real key in changing attitudes.

In this case the navy's command climate was found lacking. With a large organization such as the Navy, the process must be started with a blitz of actions on several fronts. I propose a simultaneous "Hammer" Front, "Carrot" Front, and "Training" Front attack on all government personnel on base. Specifics of this plan are described below.

<u>HAMMER FRONT ATTACK</u> Personal and organizational liability need to made clear to the navy and enforced by regulatory agencies. Enough laws are on the books already in this regard. Many environmental crimes penalize actions without specific criminal intent. For example, someone who knows that waste contains a noxious chemical and disposes of it without determining the proper way to do so may be convicted of illegally disposing of hazardous waste. It is not necessary that the individual specifically know ahead of time that the waste is one listed by EPA as a hazardous waste or that the method of disposal is forbidden. Because violation of many environmental laws threaten health and safety, the law imposes a burden on those who deal with potentially hazardous substances to find out the right way to handle and dispose of them. Other statutes, such as the Clean Water Act, criminalize actions that are simply negligent. Failing to use reasonable care can amount to a crime if an illegal discharge results. there are also a few statutes that apply strict liability - punishing certain actions without a showing that the actor was negligent or had criminal intent.

What needs to happen is for the EPA and state agencies to carry out a few enforcement actions in terms of jail and personal fines, and organizational fines for the most notorious abusers. Then the Chief of Naval Operations (CNO) needs to put out the word to all his commanders for dissemination. In addition, the CNO should set a policy that requires the local command to bear the cost of regulatory fines and penalties as appropriate following an internal investigation. Fines from events that are beyond the control of the local command would be born by the navy as a whole, or affixed to the appropriate command within the navy. Although regulatory agencies may not necessarily always resort to personal liability, the navy should explore this option in each of its internal investigations. The navy maintains strict accountability with regards to its sea commands. "Acts of God" concerning accidents at sea are few and far between. As in sea commands, although the navy may compensate an injured 3rd party, it often exercises the option to discipline the responsible navy personnel.

The recent conviction and imprisonment of a senior civilian manager of a fuel farm for discharge of nearly 500,000 gallons[80] of fuel oil into the tundra and water, as well as the prospect of a stepped up enforcement effort by EPA, demonstrates the viability of this option.

CARROT FRONT ATTACK The navy needs to provide incentives to help change attitudes. Environmental excellence should be rewarded. The status of environmental offices and personnel within these

---

[80] Chief of Naval Operations (CNO) radio message date/time 251435Z august 1992.

offices should be elevated at all commands throughout the navy. New ideas and solutions should be recognized with both citations and monetary rewards. The navy currently has a "Beneficial Suggestion" program in which people are rewarded for there money saving ideas by receiving a portion of the savings which their plan would generate. The program is used with success in several areas throughout the navy. An advertising and training campaign are needed to heighten awareness of the application of the program.

<u>TRAINING FRONT ATTACK</u> The navy knows the value of training to increase technical proficiency. Our edge as a military force has been attributed to our well trained personnel. However, when it comes to investing in changing attitudes, navy training is usually short lived and is only done in response to an immediate problem. The problem with this is that attitudes don't change over night. A serious investment needs to be made to beef up base environmental offices. Not just in terms of environmental engineers, but in terms of a cadre of new and permanent trainers dedicated to a continuing training program. A one time shot in the arm would do more harm than good. The navy has unfortunately taken a one time training and forget approach to past internal attitudinal problems. The problem usually turns out to be more serious and deeper than most wanted to admit. And once the heat is off, its back to business as usual. In addition to awareness training which contributes to a positive attitude, the navy also

needs to apply the tried and true technical training as well.

FUNDING To make all of the above happen the process has to be adequately funded. In addition to technical problems, tank closure delays were encountered because of funding shortages. The navy needs to realistically plan and budget for hazardous waste cleanup projects. This "hidden environmental cost" of doing business has only recently been accepted as a legitimate expense. In fact in this era of cutbacks, the environmental budget in terms of hiring environmental engineers is the only area of personnel expansion in the navy today. However, the account has to be increased to fund a project through to completion. The navy needs to beef up the financial viability of its Defense Environmental Restoration Account (DERA). As happened too often in this case, delays were caused when one portion of the project was complete but funds were then lacking to start on the next phase. In addition to these obvious funding requirements, a training budget needs to be established. This is critical because so many times as unfortunately happens in the navy, a training deficiency is recognized and a knee jerk order goes out to all navy commands to train its personnel to correct the problem. In many cases this is equivalent to the "blind leading the blind" because there is no clear direction; only the very initial stages of training are conducted using the base's own funds squeezed from other on board programs. When these funds run out and the heat is off the training stops. A comprehensive program throughout the country which builds from awareness raising to technical expertise as required is non existent.

Training links all of the above solutions; however, without a large funding infusion in the early stages and a smaller but steady allotment to follow, nothing will change. The environmental office on each base should be the first to get beefed up. After the command establishes its environmental goals then the on base environmental experts should move out and take charge training the rest of the base, and if necessary hire outside companies to augment the training.

BIBLIOGRAPHY

Administrative Record of official correspondence concerning Tank Farm Five, Newport RI. Maintained by: USEPA Region 1; RIDEM Division of Air and Hazardous Material; and Naval Education and Training Center, Newport, RI. 1983-present.

Chief of Naval Operations (CNO) radio message (paper copy) concerning personal liability for environmental problems.

Code of Federal Regulation, 40 CFR, Part 261, Subpart C, "Characteristics of Hazardous Waste" 1991.

Department of the Navy RI Area Annual Report; 1991.

Driscoll, F.G., 1987, Ground Water and Wells, Second Edition, Johnson Division, St. Paul, Minnesota 55112.

En Safe Environmental and Safety Designs, Inc. Memphis, TN. Oil and Hazardous Substance Spill Planning for NOSCs and NOSCDRs; 1992 Draft.

Envirodyne Engineers, Inc., 1983. Initial assessment study (IAS), Naval Education and Training Center, Newport, RI; prepared for the Navy.

Environmental Resource Associates, Inc. Warwick, RI. Tank Closure Plan for Tanks 53 and 56 Tank Farm Five Naval Education and Training Center Newport, RI; 15 April 1988.

Federal Facility Agreement Under CERCLA #120; NETC Newport, RI. 23 March 1992.

Gianfrancisco Cynthia. Environmental Engineer, RIDEM Division of Air and Hazardous Material, Providence, RI. Phone interview 6 October 1992.

International Technology Corporation, Knoxville, TN. Hazardous Substance Incident Response Management Course Book; 1991

Loureiro Engineering Associates, 1986. Confirmation Study Report, Naval Education and Training Center, Newport, RI; prepared for the Navy.

Marino, Rachel; Environmental Coordinator, Public Works Dept. NETC, Newport, RI. Phone interview 15 October 1992.

Naval Education and Training Center, Newport RI. Installation Restoration Program, Community Relations Plan; 1992.

Naval Facilities Engineering Command Department of the Navy, Philadelphia, PA. Installation Restoration Program NETC,Newport, RI. Final Proposed Plan Tanks 53 and 56 at Tank Farm Five; May 1992.

Tibbetts Engineering Corp. New Bedford, MA. Sampling and Testing Project Report for Tanks 53 and 56, Tank Farm Five, NETC, Newport, RI; 12 January 1984.

TRC Environmental Consultants Inc., Windsor Connecticut; Remedial Investigation Technical Report. Prepared for Northern Division, Naval Facilities Engineering Command, Philadelphia, Pennsylvania.

State of Rhode Island Department of Environmental Management, 1988. Water Quality Regulations for Water Pollution Control.

U.S. Environmental Protection Agency, Region 1, Remedial Project Manager NETC Final Proposed Plan for Ground Water Interim Remedial Action at Tanks 53 and 56 at Tank Farm Five, Newport, RI.

GLOSSARY

Activated carbon: A carbonaceous material used to remove unwanted chemicals from waters and air through adsorption.

Air stripping system: Air stripping removes volatile materials from water by passing air through the water. The basic concept in air stripping is to bring the contaminated water into intimate contact with air to facilitate a phase change in the volatile compounds from liquid phase to vapor phase. The air will then carry away the contaminant compound.

Aquifer: A layer of rock or soil that can supply usable quantities of ground water to wells and springs. Aquifers can be a source of drinking water and provide water for other uses as well.

Backwash: To clean a filter by forcing water through it in the direction opposite to normal flow.

Base/neutral/acids extractable compounds (BNAs): (also called semivolatiles) A class of compounds typically investigated for at sites containing petroleum products.

Bedrock: The layer of rock located below the glacially deposited soil and rock under the ground's surface. Bedrock can be either solid or fractured (cracked); fractured bedrock can support aquifers.

Coagulation: A process by which dissolved/suspended materials in a liquid join together to form larger particles capable of precipitating out of the solution.

Chlorinated and aromatic hydrocarbons: Chlorinated hydrocarbon is an organic compound containing one or more chlorine groups. Aromatic hydrocarbons is a class of unsaturated cyclic organic compounds containing one or more ring structures. The name aromatic is derived by the distinctive and often fragrant odors of these compounds.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, USEPA can either: (1) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work or (2) take legal action to force parties responsible for site contamination to clean up the site or pay back the Federal government for the cost of the cleanup.

Defense Environmental Restoration Account (DERA): Is an account containing funds appropriated by Congress to be used to fund the investigation and clean up of past hazardous chemical releases at Department of Defense (DOD) Sites.

Effluent: Waste water (treated or untreated) that flow out of a treatment plant, sewer, or industrial outfall.

Feasibility Study (FS) Report: Report that summarizes the development and analysis of remedial alternatives.

Filtration: Separation of suspended solids during waste water treatment by passing the water through a porous medium such as sand.

Geophysical: Relating to the science of the utilization of experimental physics to collect and interpret data regarding geological phenomena. Practical application of geophysical methods are typically used to find areas of chemical soil contamination, buried drums etc.

Ground water: Water found beneath the earth's surface that fills pores in soil and cracks in bedrock to the point of saturation. Ground water may transport substances which have percolated downward from the ground surface as it flows toward its point of discharge.

Hydrocarbons: Compounds which are composed of hydrogen and carbon atoms.

Interim Remedial Action: An option evaluated to address the source or migration of contaminants at a Superfund site to control or prevent further migration. This action is not intended to be the final remedy for the site, but must be consistent with the ultimate remedy chosen.

Management of Migration: An option evaluated to control or prevent movement or spreading of contaminants in ground water.

National Oil and Hazardous Substances Contingency Plan (NCP): The federal regulation that guides determination of the sites to be corrected under the Superfund program and the program to prevent or control spills into surface waters or other portions of the environment.

National Priorities List (NPL): USEPA's list used to prioritize uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund.

Oxidant: A substance containing oxygen that removes electrons, or oxidizes, another substance, changing its form. When dissolved iron is oxidized, for example, it changes to a more insoluble form.

Plume: A three dimensional zone within ground water that contains contaminants and generally moves in the direction of, and with, ground water flow.

Record of Decision (ROD): A public document that explains the cleanup alternative to be used at a NPL site. The ROD is based on information and technical analysis generated during the RI/FS and on consideration of the public comments and community concerns in the Responsiveness Summary.

Remedial Investigation (RI): The RI determines the nature and extent and composition of contamination at a hazardous waste site, and directs the types of cleanup option that are developed in the FS.

Toxicity Characteristic Leaching Procedure (TCLP): A test used to determine the mobility of organic and inorganic analytes present in waste. The results are used to determine disposal requirements for the waste.

Ultraviolet (UV)/Oxidation: Water treatment process in which organic contaminants are permanently destroyed by an oxidant (such as hydrogen peroxide) in the presence of UV light.

Upgradient Recharge: The processes by which water is added to the zone of saturation upgradient of the source, either directly into a formation, or indirectly by way of another formation. Upgradient means in the direction from which ground water flows.

Volatile Organic Compound (VOC): A group of chemical compounds composed primarily of carbon and hydrogen that are characterized by their tendency to evaporate (or volitize) into the air from water or soil. VOC's include substances that are contained in common solvents and cleaning fluids. Some VOCs are believed to cause cancer.

Water table: The upper surface of a zone of saturation except where that surface is formed by an impermeable body. It is the level to which a well screened in the unconfined aquifer would fill with water.

APPENDIX

GROUND WATER SAMPLE RESULTS AND AREA CHARTS

Source: TRC Environmental Consultants, Inc. East Hartford, CT. Appendix D of Tank Closure Investigation Report of Tanks 53 and 56, Tank Farm Five, NETC, Newport, RI; June 1991.

TABLE 1
SAMPLE ANALYSES SUMMARY
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

TANK CONTENTS (O = Oil, W = Water, June 27, 1990)

SAMPLE NUMBER	TCL VOA	TCL BNA	TCL PCB'S	TAL METALS	CYANIDE
O-53	X	X	X	X	X
O-56	X	X	X	X	X
W-53	X	X		X	X
W-56	X	X		X	X

SURFACE SOIL SAMPLES (May 10, 1990, June 14, 1990)

SAMPLE NUMBER	TCL VOA	TCL BNA	TCL PESTICIDES/PCB'S	TPH	LEAD	TAL METALS
SS-56	X	X	X	X		X
SS-53/SS-61				X	X	
SS-53D				X	X	
SS-56D				X	X	

SOIL BORINGS (September 11-20, 1990)

SAMPLE NUMBER	DEPTH (ft. below grade)	PARAMETERS TCL VOA	TCL BNA	TCL PESTICIDES/PCB'S	TPH	TAL METALS
M7-1	12-14	X				
M8-1	29-31	X	X	X	X	X
M9-1	27-29	X	X	X	X	X
M10-1	26-28	X	X	X	X	X
RW1-1	5-7	X	X	X	X	
RW1-2	33-35	X	X	X	X	X

TABLE 1
SAMPLE ANALYSES SUMMARY
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND
(continued)

GROUND WATER (July, 1990)

SAMPLE NUMBER	TCL VOA	TCL BNA	TCL PESTICIDES/PCB'S	TPH	LEAD	TAL METALS	CYANIDE
MW-53E				X	X		
MW-53W	X	X	X	X		X	X
MW-56E				X	X		
MW-56W	X	X	X	X		X	X
MW-86-1				X	X		
MW-86-2				X			
MW-86-4				X	X		

GROUND WATER (October 25, 1990)

SAMPLE NUMBER	VOA 8240	BNA 8270	PRIORITY POLLUTANT METALS	OIL & GREASE	TOTAL SUSPENDED SOLIDS
MW-7	X	X	X	X	X
MW-9	X	X	X	X	X
MW-10	X	X	X	X	X
RW-1	X	X	X	X	X
MW-53E	X	X			
MW-53W	X *				
MW-56E	X	X	X	X	X
MW-56W	X	X	X	X	X
MW-86-1	X	X	X	X	X
MW-86-2	X	X	X	X	X
MW-86-4	X				X

* = Oil Sample From Well

TABLE 2
SURFACE SOIL SAMPLE DESCRIPTIONS
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

SAMPLE NUMBER	DATE	ANALYSES	SOIL DESCRIPTION
SS-53	6/14/90	TPH, LEAD	SILT, SOME SAND, LITTLE GRAVEL, BROWN *DUPLICATE SAMPLE (SS-61) TAKEN
SS-53D	6/14/90	TPH, LEAD	SILT, LITTLE CLAY, SOME SHALE FRAGMENTS, BROWN
SS-56	5/10/90	VOA, BNA, PEST/PCB, INORG, TPH	SILT, SOME FINE-COARSE SAND, LITTLE GRAVEL, BROWN
SS-56D	6/14/90	TPH, LEAD	SILT, SOME FINE-COARSE SAND, LITTLE GRAVEL, BROWN

NOTES: D - INDICATES A DISCRETE SAMPLE

TABLE 3

BOREHOLE DEPTHS AND WELL CONSTRUCTION DETAILS
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

Well No.: Diameter: Materials:	MW-7 4-inch PVC	MW-8 4-inch PVC	MW-9 4-inch PVC	MW-10 4-inch PVC	RW-1 8-inch Stainless Steel
Land surface elevation (ftmlw)[1]	69.04	66.59	78.94	80.84	68.59
Total boring depth (ftbg)[2]	45.0	46.7	43.0	42.0	45.0
Depth to top of weathered rock (ftbg)[2]	40	21	26	20	33
Depth to top of competent rock (ftbg)[2]	--	33.5	33	--	--
Depth to bottom of well (ftbg)[2]	45.0	45.0	37.4	36.0	45.0
Depth to top of screen (ftbg)[2]	25.0	25.0	17.4	16.0	25.0
Depth to top of sand pack (ftbg)[2]	22.5	22.0	15.4	14.0	22.0
Depth to top of bentonite seal (ftbg)[2]	2.5	20.0	12.4	12.0	20.0
Top of casing elevation (ftmlw)[1]	71.81	69.81	82.26	83.53	72.52

[1] Feet above mean low water
[2] Feet below grade

Depth of well construction measurements are accurate to the nearest 0.5 feet.

TABLE 4

SUMMARY OF WATER LEVEL MEASUREMENTS AND ELEVATIONS IN MONITOR WELLS TANK FARM 5

Well No.	Top of Casing Elevation	Depth to Water on 07/17/90 (ft btoc)[1]	Water Level Elevation on 07/17/90 (ft mlw)[2]	Depth to Water on 10/25/90 (ft btoc)[1]	Water level Elevation on 10/25/90 (ft mlw)[2]
Tank 53					
MW-53E	71.16	35.16*	36.00*	40.70*	30.40*
MW-53W	68.50	32.82*	35.70*	36.60*	31.90*
MW-7	71.85	--	--	38.89	32.96
MW-8	69.49	--	--	>47.90	<21.59
MW-86-2	60.54	25.78	34.76	--	--
MW-86-4	62.66	30.12	32.54	34.88	27.78
MW-86-5	56.06	>28.24	<27.82	>28.24	<27.82
RW-1	72.12	--	--	39.21	32.91
Tank 56					
MW-56E	90.39	30.92	59.47	34.06	56.33
MW-56W	86.97	27.32	59.65	31.89	55.08
MW-9	82.27	--	--	25.93	56.34
MW-10	83.53	--	--	27.93	55.60
MW-86-1	90.45	25.37	65.08	33.10	57.35
Other Tank Farm 5 Wells					
MW-1	33.97	17.10	16.87	--	--
MW-2	42.83	13.43	29.40	--	--
MW-3	50.08	12.30	37.78	--	--
MW-4	52.89	32.03	20.86	--	--
MW-5	77.37	19.16	58.21	--	--
MW-6	75.33	9.20	66.13	--	--

* Approximate due to the presence of free product.

1 Feet below top of casing.

2 Feet above mean low water.

TABLE 5
SUMMARY OF GROUND WATER SAMPLE RESULTS
EXCEEDING DEVELOPED ACTION LEVELS
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

COMPOUND	WELL NUMBER	CONCENTRATION (ppb)	ACTION LEVEL[1] (ppb)
VOAs			
Vinyl Chloride	MW-53E	2	2[2] (F)
	RW-1	27	
1,2 Dichloroethene (total)	MW-7	140/140[5]	70[2*] (F)
1,1,1-Trichloroethane	MW-53E	690	200[2] (F)
Trichloroethene	MW-7	6/6[5]	5[2] (F)
	MW-53E	460	
	RW-1	5	
	MW-86-2	8	
Tetrachloroethene	MW-53E	33	5[2] (F)
Benzene	MW-7	16/15[5]	5[2] (F)
	MW-53E	200	
	RW-1	18	
Toluene	MW-53E	100	40[3] (F)
Ethylbenzene	MW-53E	150	30[3] (F)
Xylene	MW-53E	430	20[3] (F)
INORGANICS			
Arsenic	MW-56W	62.5	50[4] (F)
	MW-86-1	159	
	MW-86-2	51.6	
Nickel	MW-56W	138	100[2] (T)
	MW-86-1	250	
	MW-86-2	134	

TABLE 5
SUMMARY OF GROUNDWATER SAMPLE RESULTS
EXCEEDING DEVELOPED ACTION LEVELS
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

COMPOUND	WELL NUMBER	CONCENTRATION (ppb)	ACTION LEVEL[1] (ppb)
INORGANICS			
Lead	MW-7	31.6/32[5]	5[2] (P)
	MW-9	5.8	
	MW-10	11.4	
	MW-56E	35.6	
	MW-56W	25.2	
	RW-1	7	
	MW-86-1	48.6	
	MW-86-2	36.2	

(1) The most stringent Federal standard or criteria is listed as the action level.

(2) The Federal Maximum Contaminant Level (MCL).

(3) A secondary Federal Drinking Water Standard based on organoleptic data (i.e., taste and odor).

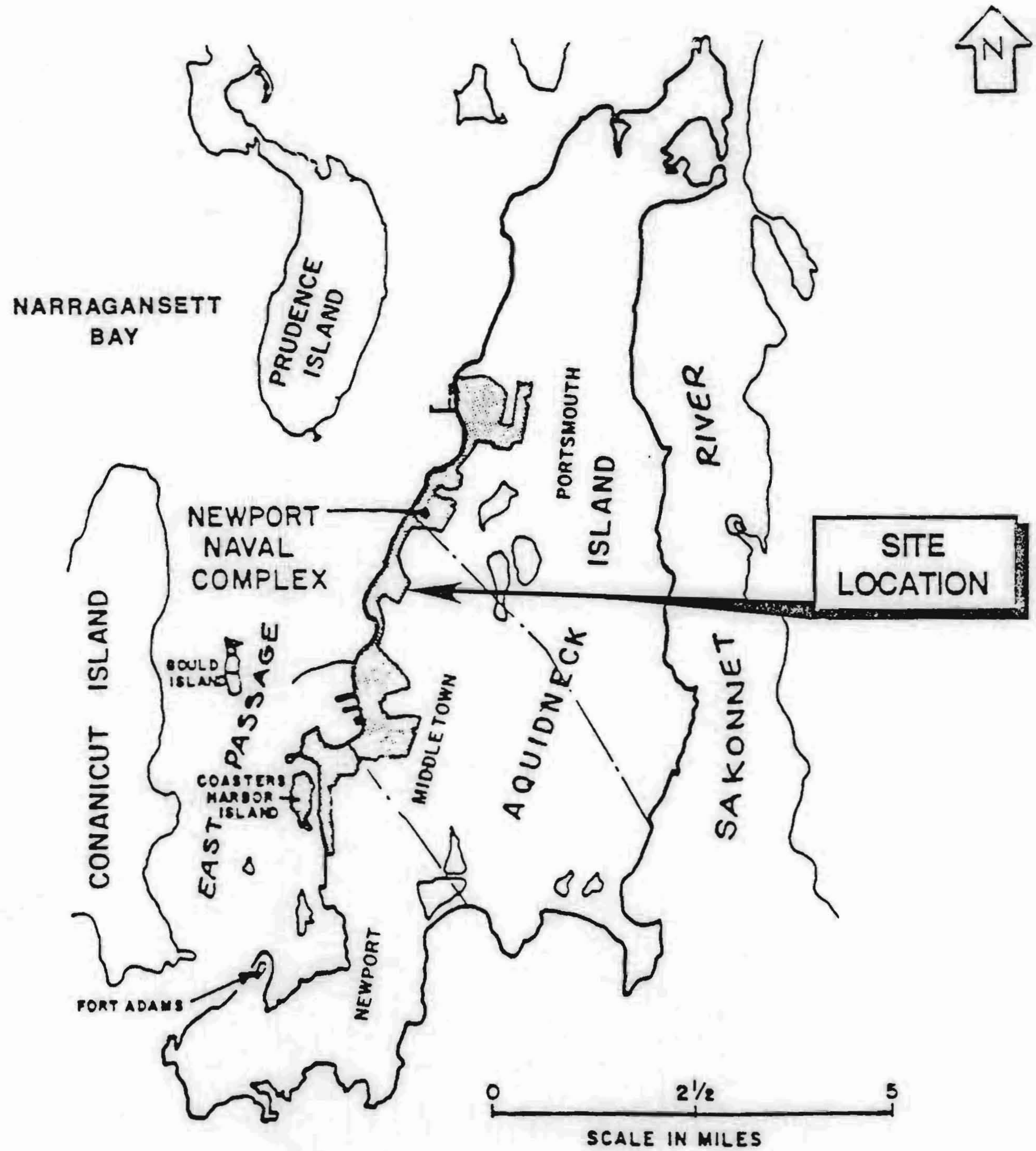
(4) The National Interim Primary Drinking Water Regulation (NIPDWR).

(5) Duplicate samples collected at this location.

(F) - Final
(P) - Proposed
(T) - Tentative

* - The action level for 1,2-Dichloroethene is based on cis-1,2-Dichloroethene and not 1,2-Dichloroethene (total).

FIGURES



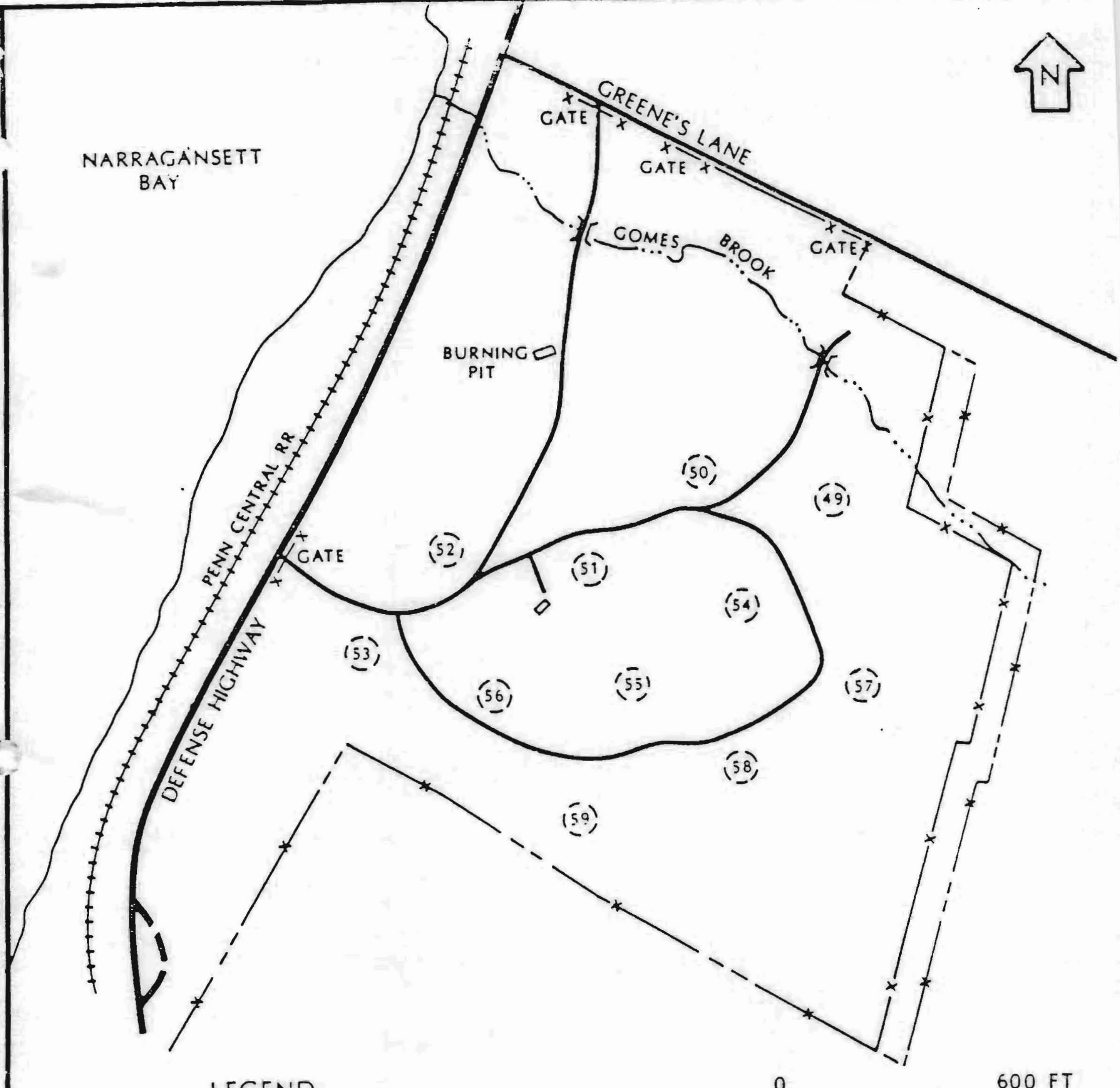
SOURCE: INITIAL ASSESSMENT STUDY
(ENVIRODYNE, 1983)

TRC
Environmental Consultants
800 Connecticut Boulevard
East Hartford, Connecticut 06108
(203) 289-8631

NAVAL EDUCATION TRAINING CENTER NEWPORT, RI

FIGURE 1.

NAVAL EDUCATION AND TRAINING CENTER VICINITY MAP



LEGEND

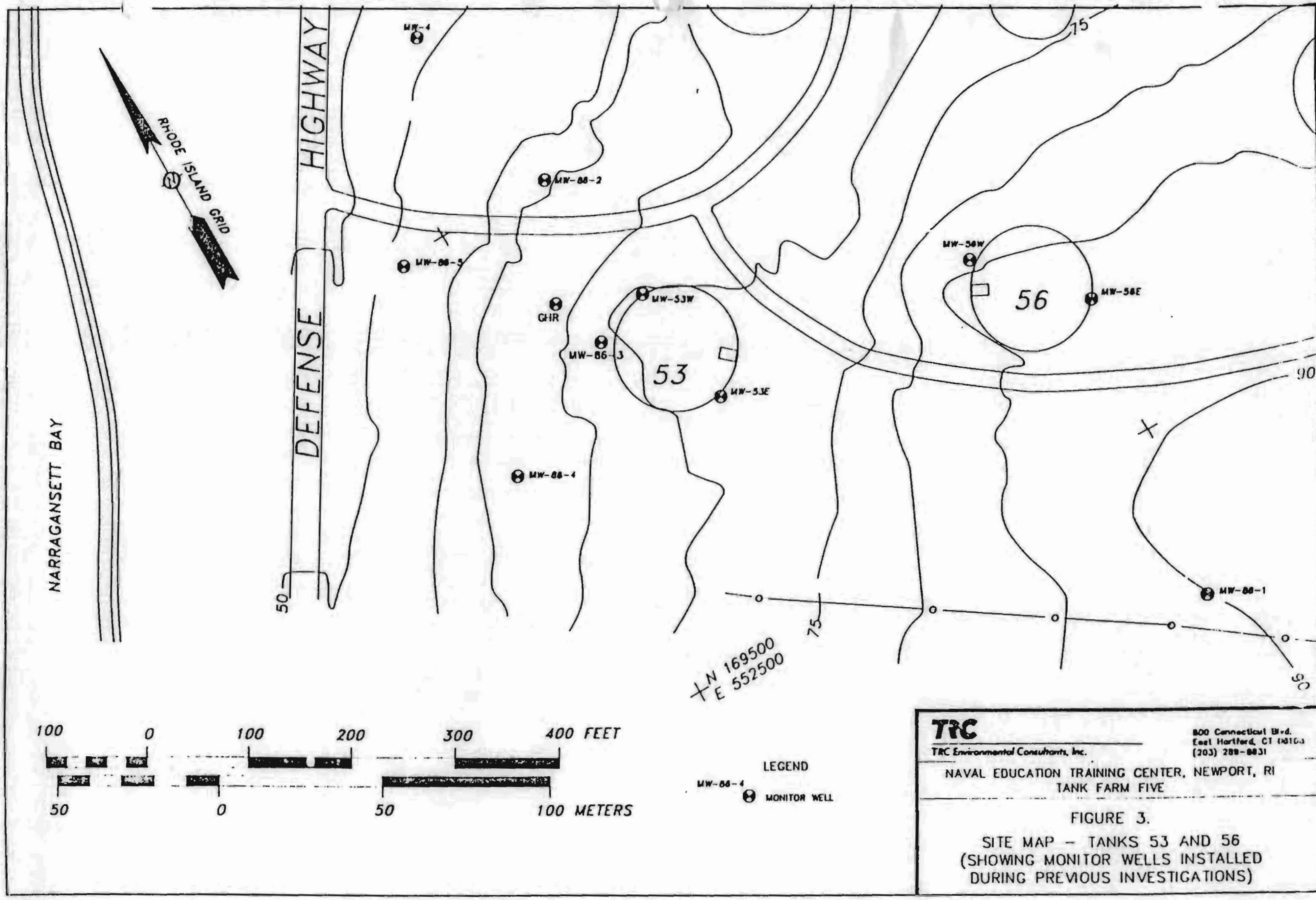
x———x FENCE LINE
—x— — — PROPERTY BOUNDARY & FENCE LINE
( ) UNDERGROUND STORAGE TANK
▭ BUILDING

TRC
TRC Environmental Consultants, Inc.
800 Connecticut Boulevard
East Hartford, Connecticut 0610[illegible]
(203) 289-8631

NAVAL EDUCATION TRAINING CENTER NEWPORT, RI

FIGURE 2.

TANK FARM FIVE SITE MAP



TRC
TRC Environmental Consultants, Inc.
800 Connecticut Blvd.
East Hartford, CT

NAVAL EDUCATION TRAINING CENTER, NEWPORT, RI
TANK FARM FIVE

FIGURE 3.
SITE MAP – TANKS 53 AND 56
(SHOWING MONITOR WELLS INSTALLED DURING PREVIOUS INVESTIGATIONS)

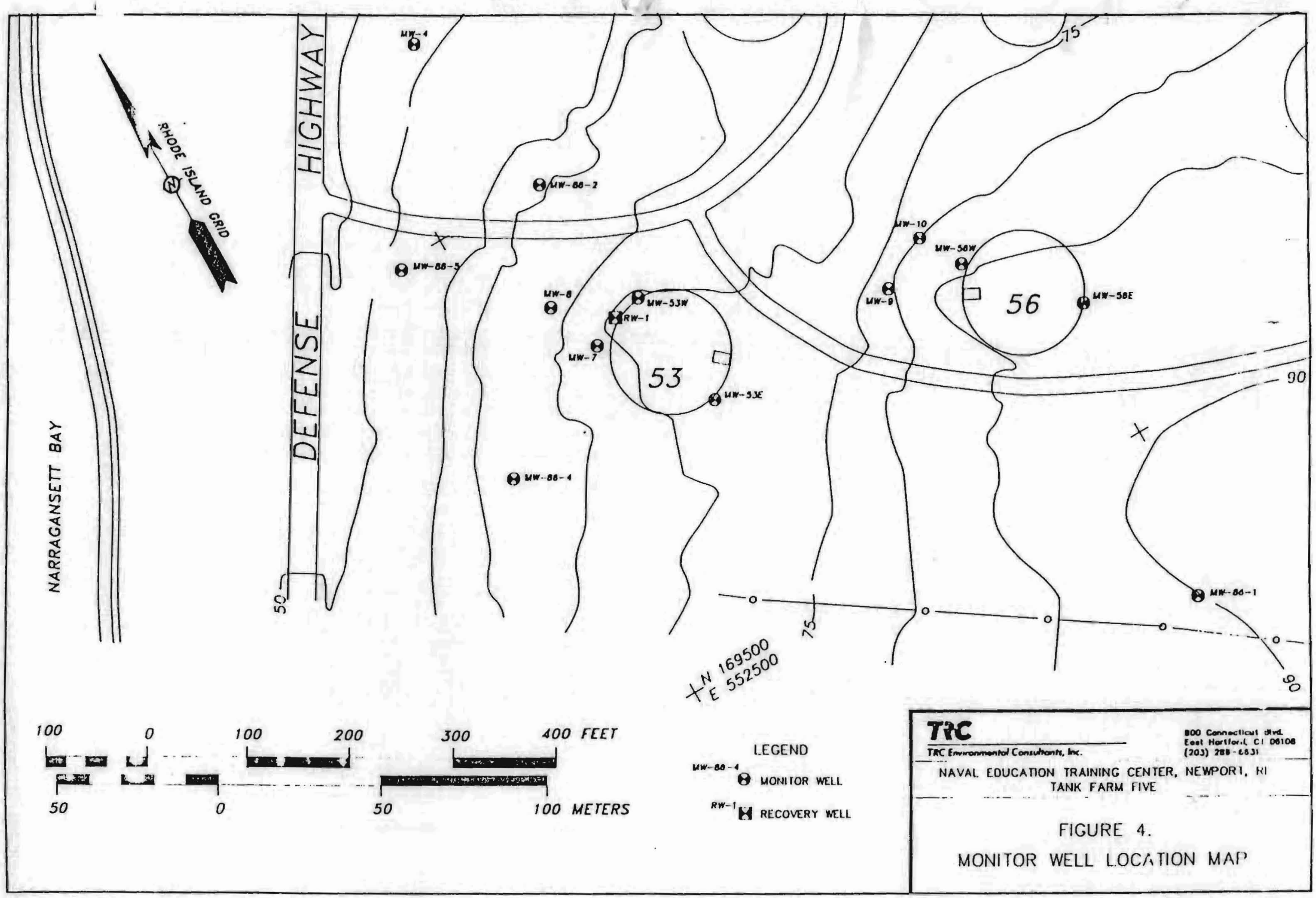
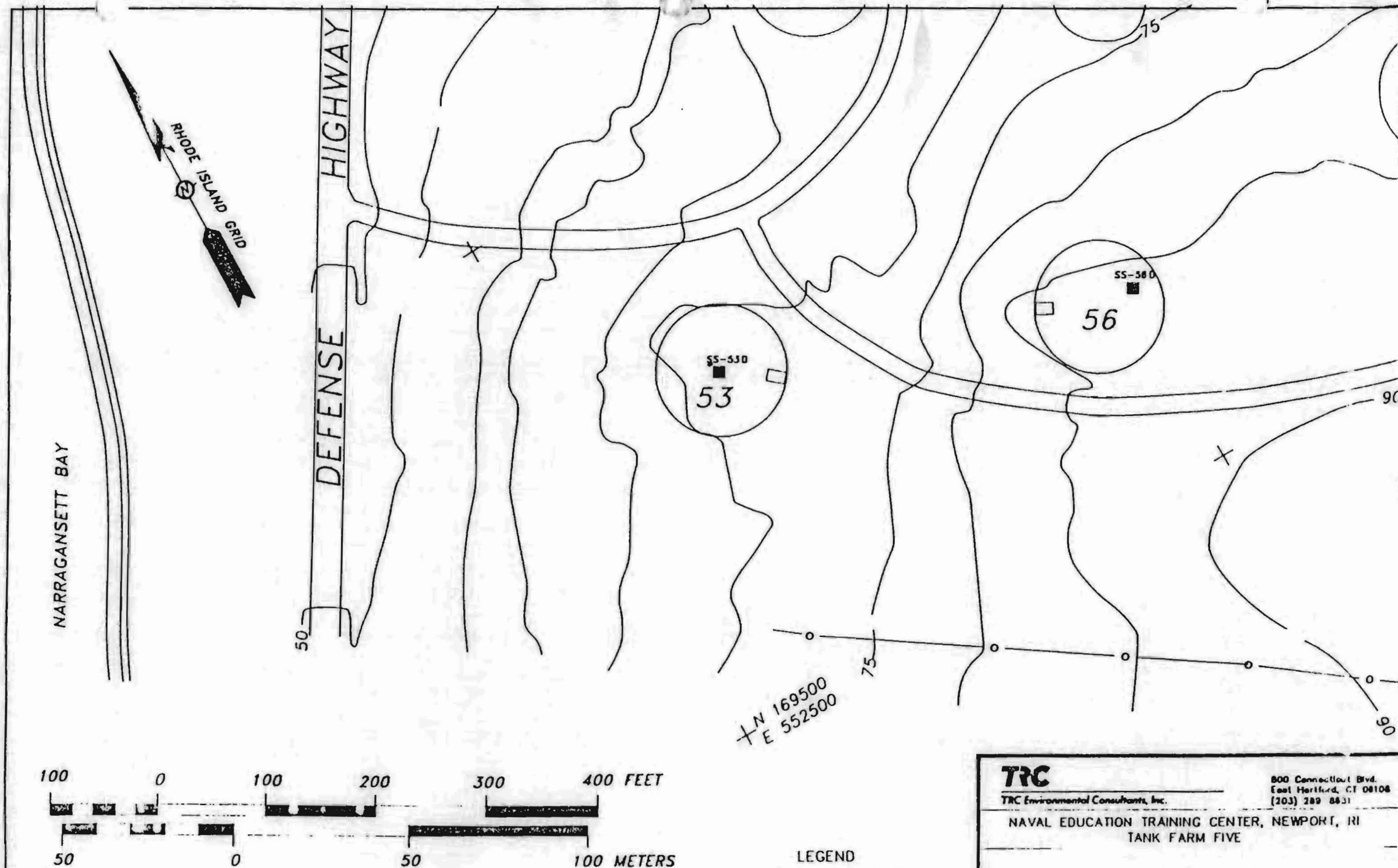


FIGURE 4.
MONITOR WELL LOCATION MAP



NOTE: One composite surface soil sample was also collected from each tank area.

LEGEND

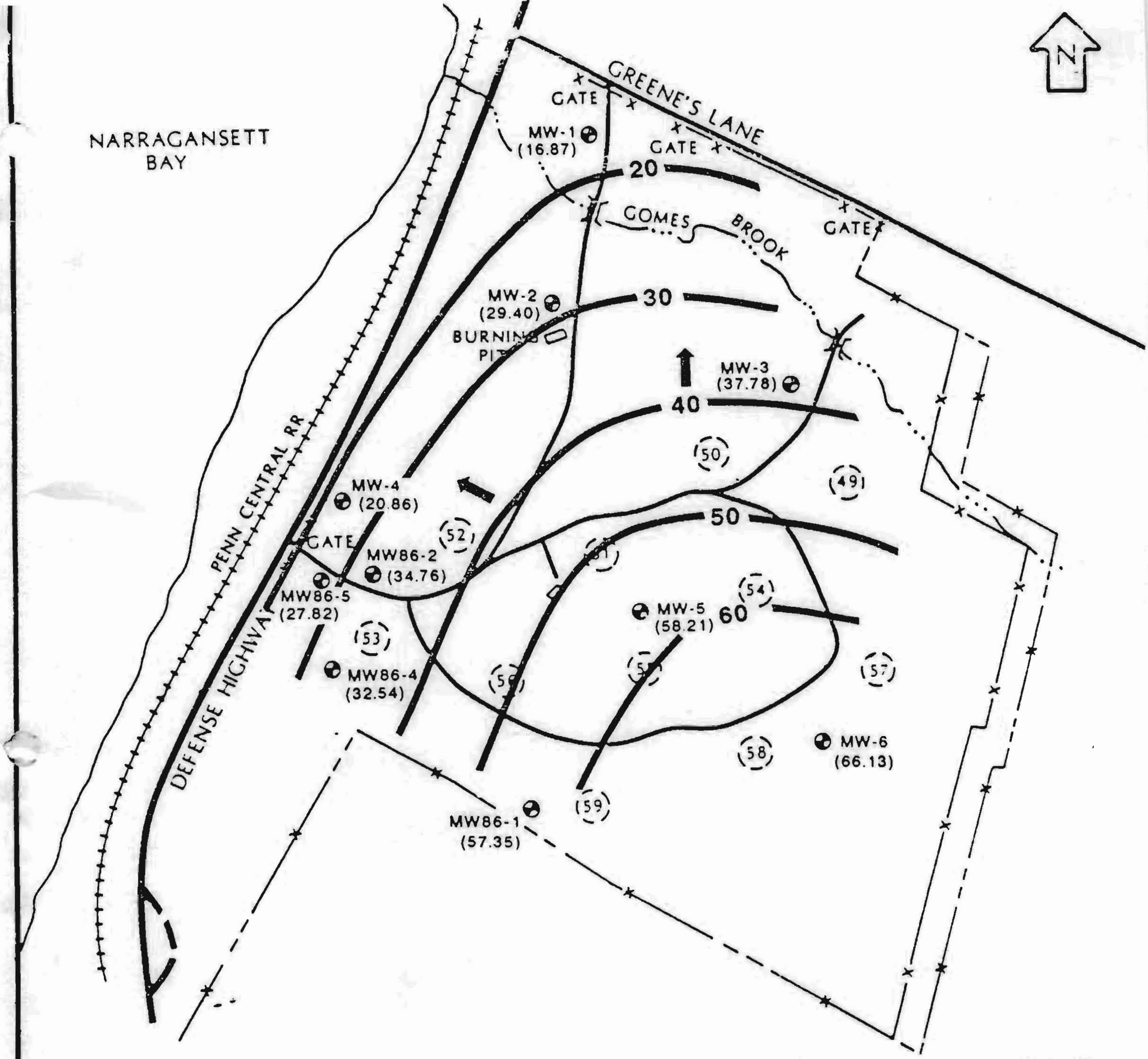
SS-53D ■ DISCRETE SOIL SAMPLE LOCATION

TRC
TRC Environmental Consultants, Inc.
800 Connecticut Blvd.
East Hartford, CT 06108
(203) 289 8631

NAVAL EDUCATION TRAINING CENTER, NEWPORT, RI
TANK FARM FIVE

FIGURE 5.

SURFACE SOIL SAMPLE LOCATION MAP



LEGEND

x———x FENCE LINE

—x— — - — PROPERTY BOUNDARY & FENCE LINE

UNDERGROUND STORAGE TANK

BUILDING

MW-6 (66.13) MONITOR WELL LOCATION AND WATER LEVEL ELEVATION ON 7/17/90 IN FEET ABOVE MEAN LOW WATER

—20— GROUND WATER ELEVATION CONTOUR IN FEET ABOVE MEAN LOW WATER

DIRECTION OF GROUND WATER GRADIENT

TRC

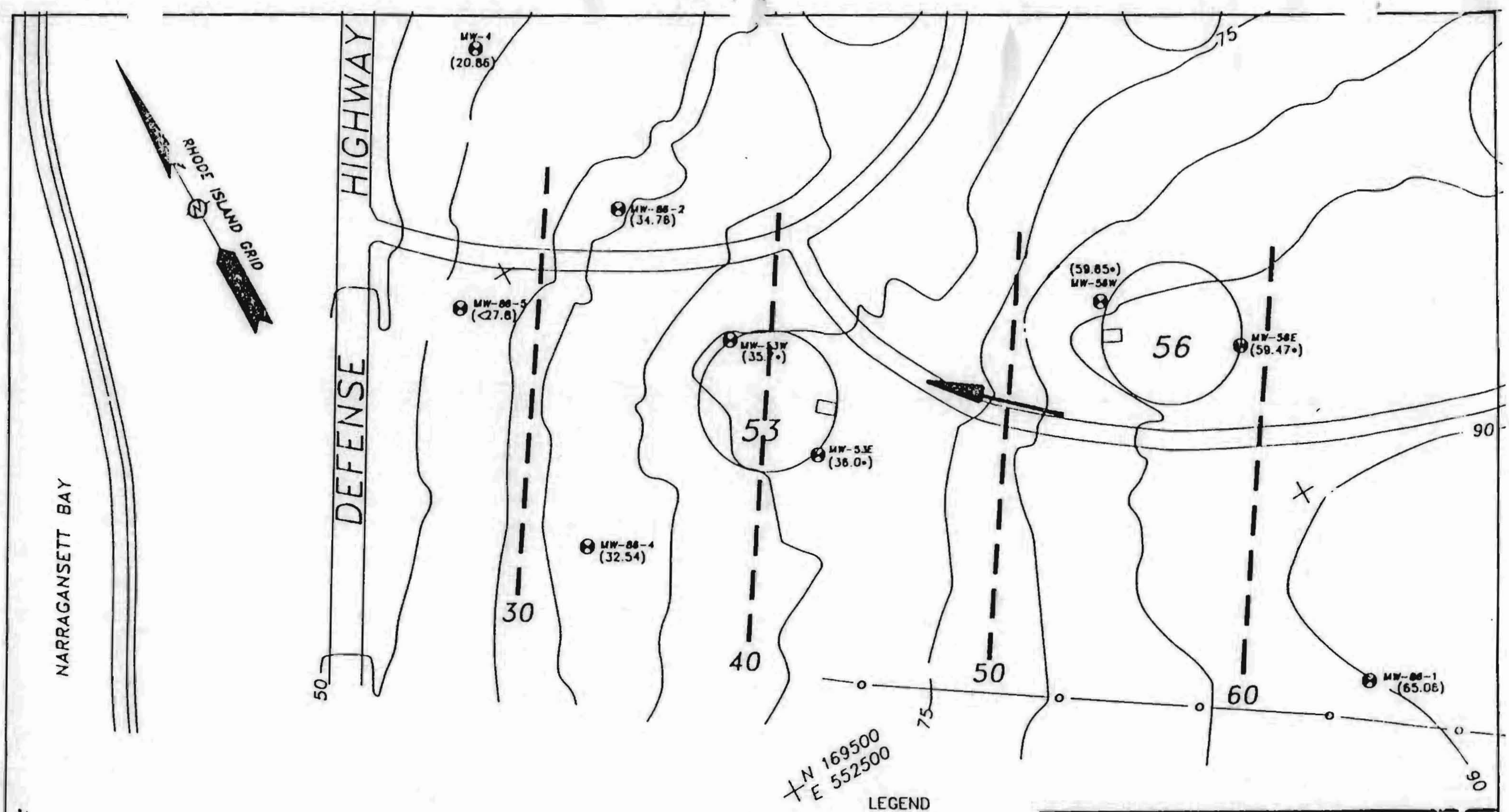
TRC Environmental Consultants, Inc.

800 Connecticut Boulevard
East Hartford, Connecticut 06108
(203) 289-8631

NAVAL EDUCATION TRAINING CENTER NEWPORT, RI

FIGURE 6.

GROUND WATER LEVEL CONTOUR MAP - TANK FARM FIVE JULY 17, 1990



100 0 100 200 300 400 FEET

50 0 50 100 METERS

LEGEND

MW-88-4 (32.54) MONITOR WELL LOCATION AND WATER LEVEL ELEVATION ON 7/17/90 IN FEET ABOVE MEAN LOW WATER (• DENOTES WATER LEVEL NOT UTILIZED IN CONTOURING)

30 — — GENERALIZED GROUND WATER ELEVATION CONTOUR IN FEET ABOVE MEAN LOW WATER

GENERALIZED DIRECTION OF GROUND WATER GRADIENT

TRC
TRC Environmental Consultants, Inc.
800 Connecticut Blvd.
East Hartford, CT 06108
(203) 289-8631

NAVAL EDUCATION TRAINING CENTER, NEWPORT, RI
TANK FARM FIVE

FIGURE 7.

GROUND WATER LEVEL ELEVATION CONTOUR MAP – JULY 17, 1990

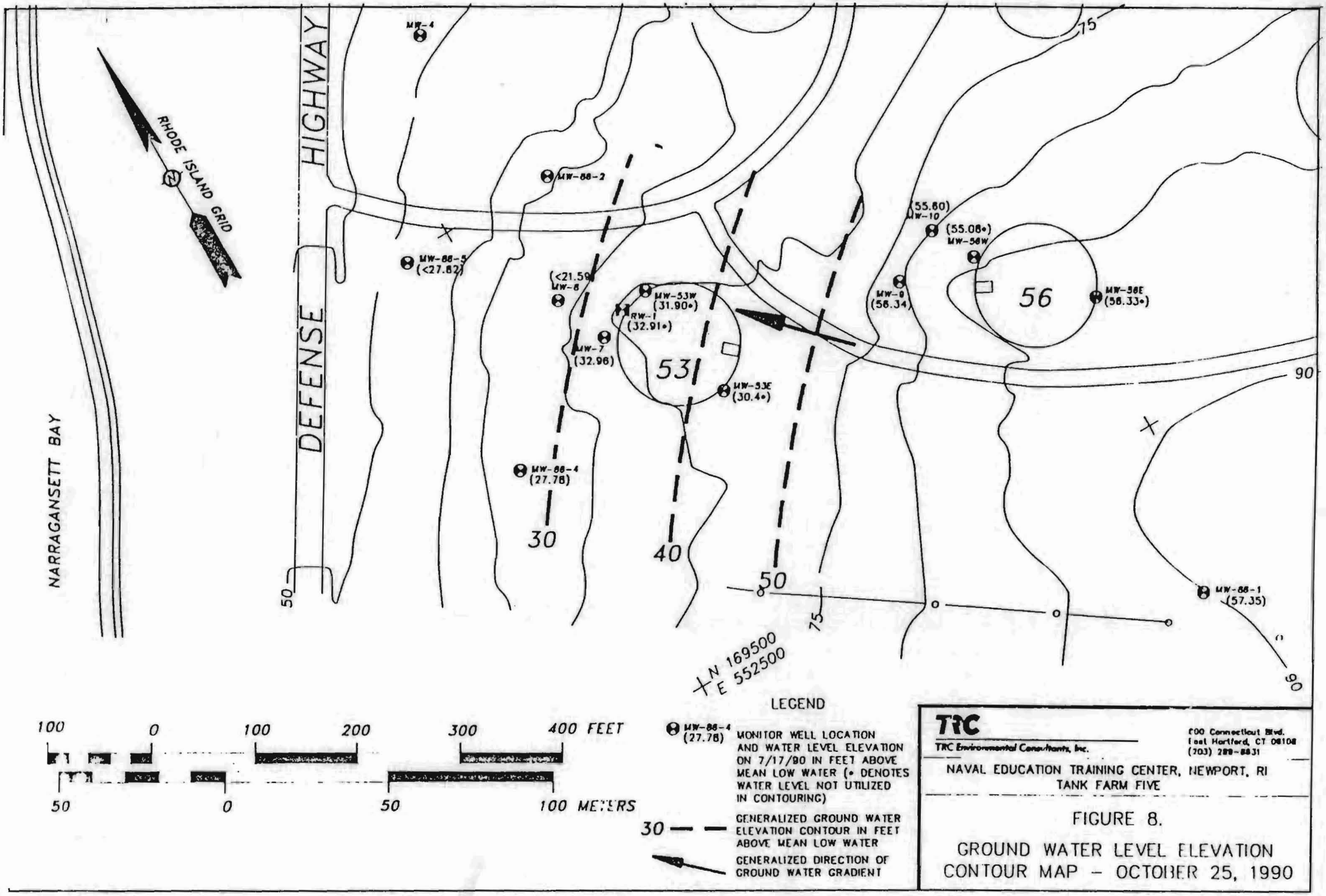


FIGURE 8.
GROUND WATER LEVEL ELEVATION CONTOUR MAP – OCTOBER 25, 1990