United States
Environmental Protection
Agency

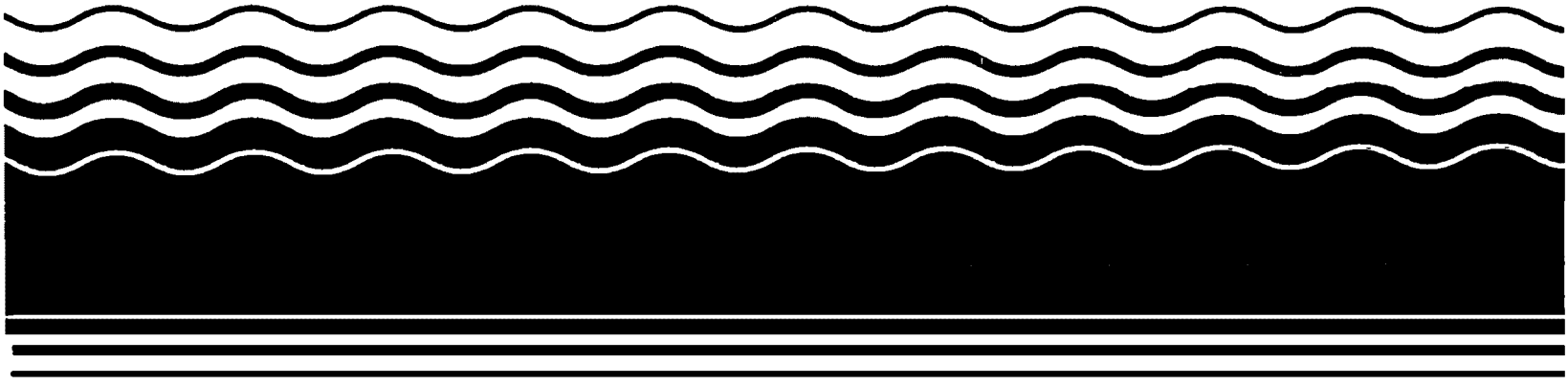
Office of
Emergency and
Remedial Response

EPA/ROD/R01-92/072
September 1992
PB93-963707

EPA

Superfund Record of Decision:

Newport Naval Education/ Training Center, RI



NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R01-92/072	2.	3. Recipient's Accession No.

4. Title and Subtitle
SUPERFUND RECORD OF DECISION
Newport Naval Education/Training Center, RI
First Remedial Action - Subsequent to follow

5. Report Date
09/29/92

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15. Supplementary Notes
PB93-963707

16. Abstract (Limit: 200 words)

The 85-acre Naval Education and Training Center (NETC) is a training facility and tank farm located on Aquidneck Island, Middletown, Rhode Island. The NETC facility is situated along 6 miles of shoreline bordering Narragansett Bay. There are currently four areas of contamination and six study areas, with NETC Newport under investigation. Tank Farm Five consists of 11 underground storage tanks (USTs), numbered 49 through 59, which were constructed between 1942 and 1943 for fuel storage and used until 1974. Between 1975 and 1982, Tanks 53 and 56 contained used oil for alternate use as heating fuel as part of an oil recovery program. In 1982, the state adopted hazardous waste regulations, which were applicable to the waste oils contained in Tanks 53 and 56. In 1983, sampling of the water, oil, and sludge in the tanks was conducted, and results indicated significant levels of lead, cadmium, chromium, barium, mercury, and silver. The water sample collected from Tank 56 contained various hydrocarbons. In 1985, analytical results collected from the monitoring wells installed in the ring drains of Tanks 53 and 56 revealed the presence of several chlorinated and aromatic hydrocarbons

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Newport Naval Education/Training Center, RI
First Remedial Action - Subsequent to follow
Contaminated Medium: gw
Key Contaminants: VOCs (benzene, TCE), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 56
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R01-92/072
Newport Naval Education/Training Center, RI
First Remedial Action - Subsequent to follow

Abstract (Continued)

and traces of mercury. In 1985, the state ordered the Navy to remove and close Tanks 53 and 56. In 1990, oil was observed to be leaking out of Tank 53. Subsequently, the state required the Navy to remove the contents of Tank 53, remediate the contaminated ground water and soil surrounding the tanks, and investigate the extent of oil contamination in the vicinity of Tanks 53 and 56. Later in 1990, the Navy performed removal activities of the sludge, water, and oil layers from Tanks 53 and 56 for treatment at an offsite facility and steam-cleaned the tank walls to ensure that no contamination was left prior to tank demolition. This interim ROD addresses management of the ground water in the vicinity of Tanks 53 and 56 to control or prevent further migration of contaminated ground water and remediation to begin to reduce the concentration of contaminants until a final remedy can be chosen. Future RODs will address the final remedy for the site, including both ground water and source operable units. The primary contaminants of concern affecting the ground water are VOCs, including benzene and TCE; and metals, including arsenic, chromium, and lead.

The selected remedial action for this site includes constructing an extraction system around Tanks 53 and 56 to contain the contaminated ground water plume and prevent migration and potential discharge to surface water bodies; treating ground water onsite with a precipitation process that involves a coagulation/filtration to remove metals, followed by using UV/oxidation to treat VOCs; conducting a treatability study during the final design of the UV/oxidation treatment system to determine the appropriate oxidant and concentration necessary to destroy the VOCs; disposing of the filtration solids in accordance with federal and state regulations; discharging the treated ground water offsite to either the local wastewater treatment facility, recycling treated water back into the aquifer upgradient, or onsite to surface water if the treatment facility is unable the accept the pretreated water; and monitoring ground water. The estimated present worth cost for this remedial action is $3,500,000, which includes a present worth O&M cost of $2,000,000 over 5 years.

PERFORMANCE STANDARDS OR GOALS:

Interim chemical-specific clean-up goals are based on the MCLs and MCLGs and include arsenic 50 mg/kg (MCL); benzene 5 mg/kg (MCL); chromium 100 mg/kg (MCLG); and lead 15 mg/kg (based on EPA action level).

RECORD OF DECISION
FOR AN
INTERIM REMEDIAL ACTION

AT TANK FARM FIVE, TANKS 53 AND 56
GROUND WATER OPERABLE UNIT

NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

DECISION SUMMARY FOR THE INTERIM RECORD OF DECISION
Tanks 53 and 56, Tank Farm Five

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Naval Education and Training Center

SITE NAME AND LOCATION

Ground Water Remediation near Tanks 53 and 56
Tank Farm Five
Naval Education and Training Center (NETC)
Middletown, Rhode Island

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the remediation of ground water near Tanks 53 and 56 at Tank Farm Five, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Through this document, the Navy plans to remedy, on an interim basis, by ground water extraction and treatment, the threat to human health and the environment posed by contaminated ground water. This decision is based upon the contents of the administrative record file for Tank Farm Five. The administrative record is available at the following locations: the Newport Public Library, the Middletown Free Library, and the Portsmouth Free Public Library Association.

Both the United States Environmental Protection Agency and the Rhode Island Department of Environmental Management concur with the selected interim remedial action.

A final remedy for the site including both ground water and source operable units is being developed through the Remedial Investigation/Feasibility Study process and a subsequent Record of Decision (ROD) will be issued to address the final site remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF REMEDY

This interim remedy addresses remediation of contaminated ground water near Tanks 53 and 56 by eliminating or reducing the risks posed by the ground water contamination, through extraction, treatment and discharge. This action is not intended to be the permanent remedy for Tank Farm

Five. A complete Feasibility Study will be prepared to evaluate final remedial alternatives for Tank Farm Five at the conclusion of Phase II investigations.

The major components of the selected interim remedy include the:

- Ground water extraction to contain contaminated ground water and prevent its migration and potential discharge to surface water bodies.
- Ground water treatment using coagulation/filtration and UV oxidation to treat organic and inorganic contaminants.
- Discharge of treated ground water to the local wastewater treatment facility.
- Continued ground water monitoring to confirm the capture of contaminated ground water.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate for this limited scope, and is cost-effective. This interim remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy is an interim measure, a review of the action will be conducted after five years or after the Record-of-Decision for the final remedy, whichever comes first.

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

By: _____ Date: 9-23-92
N. J. Pattarozzi

Title: Captain, U.S. Navy
Commanding Officer
Naval Education and Training Center
Newport, Rhode Island

The foregoing represents the selection of an interim remedial action by the Department of the Navy and the U.S. Environmental Protection Agency, Region I, with concurrence of the Rhode Island Department of Environmental Management.

By: Julie Belaga Date: 9/29/92

Julie Belaga

Title: Regional Administrator, USEPA

I. SITE NAME, LOCATION AND DESCRIPTION

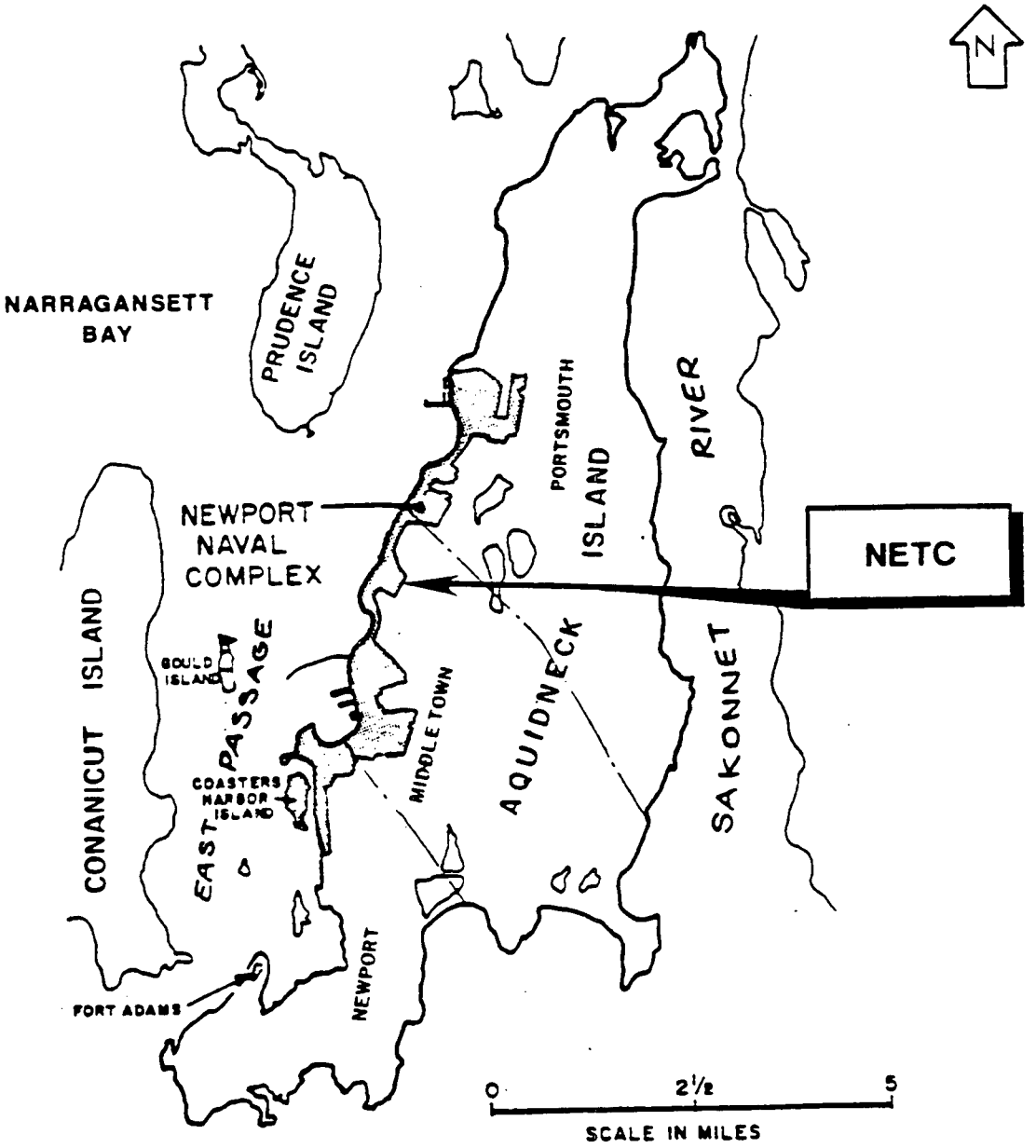
The U.S. Naval Education and Training Center (NETC) Newport is a National Priorities List (NPL) site. There are currently four areas of contamination (AOC) and six study areas (SAs) within NETC Newport that are under investigation. This interim Record of Decision (ROD) relates to the contaminated ground water plume originating from Tanks 53 and 56 in Tank Farm Five.

Tank Farm Five is located within the U.S. Navy Naval Education and Training Center (NETC) facility, portions of which are located in Newport, Middletown, and Portsmouth, Rhode Island. The NETC facility layout is long and narrow, following the shoreline of Aquidneck Island for nearly 6 miles bordering Narragansett Bay. A facility location map is provided on Figure 1. Tank Farm Five is located in the central portion of the facility, in the town of Middletown, Rhode Island, as shown in Figure 2.

The 85-acre tank farm is the site of eleven underground storage tanks (USTs), which are numbered 49 through 59. Tanks 53 and 56 are located in the western portion of the Tank Farm Five site (see Figure 3). Each tank is constructed of prestressed concrete and has a capacity of 60,000 barrels (2.52 million gallons each). The tanks are approximately 116 feet in diameter and 33 feet deep. Each tank is covered by approximately four feet of soil and is surrounded by a ring drain which consists of a 12-inch reinforced concrete drain pipe located within a permeable backfill approximately four feet wide. The drain is connected to a sump pump to remove ground water from the backfill area, thereby preventing tank damage or tank flotation.

A paved road provides access to the site, passing between the tank locations in a loop. Other facilities on-site include the recently constructed Fire Fighting Training Area, a small metal building, which was used as an electrical substation, and a concrete structure apparently used as an oil-water separator. The Fire Fighting Training Area occupies approximately 3 acres in the northwest portion of the site and is surrounded by a chain-link fence. A brook, Gomes Brook, crosses the northeastern portion of the site, and discharges to the Narragansett Bay. Topography generally slopes to the north. The central portion of the site in which the tanks are located is gradually sloping and well-drained. During periods of heavy rainfall, runoff from the site was observed to accumulate at the point where Defense Highway crosses Gomes Brook. Ponded water was also observed in a marshy area in the eastern corner of the site. The site is vegetated with grass, brush and some trees. Tank Farm Five is bordered to the northwest by Defense Highway, to the southwest by a cemetery, to the east by residences and to the northeast by Greene's Lane.

The overburden materials at the site consist of a fill layer around the tanks and native sand and silt, glacial till. The till was encountered in all site borings, ranging in thickness from 1 to 21 feet. The till directly overlies bedrock which consists of gray, highly weathered to competent, slightly metamorphosed shale with quartz lenses. A considerable zone (up to 22 feet) of weathered bedrock overlies the competent bedrock.



TRC
TRC Environmental Corporation

5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631

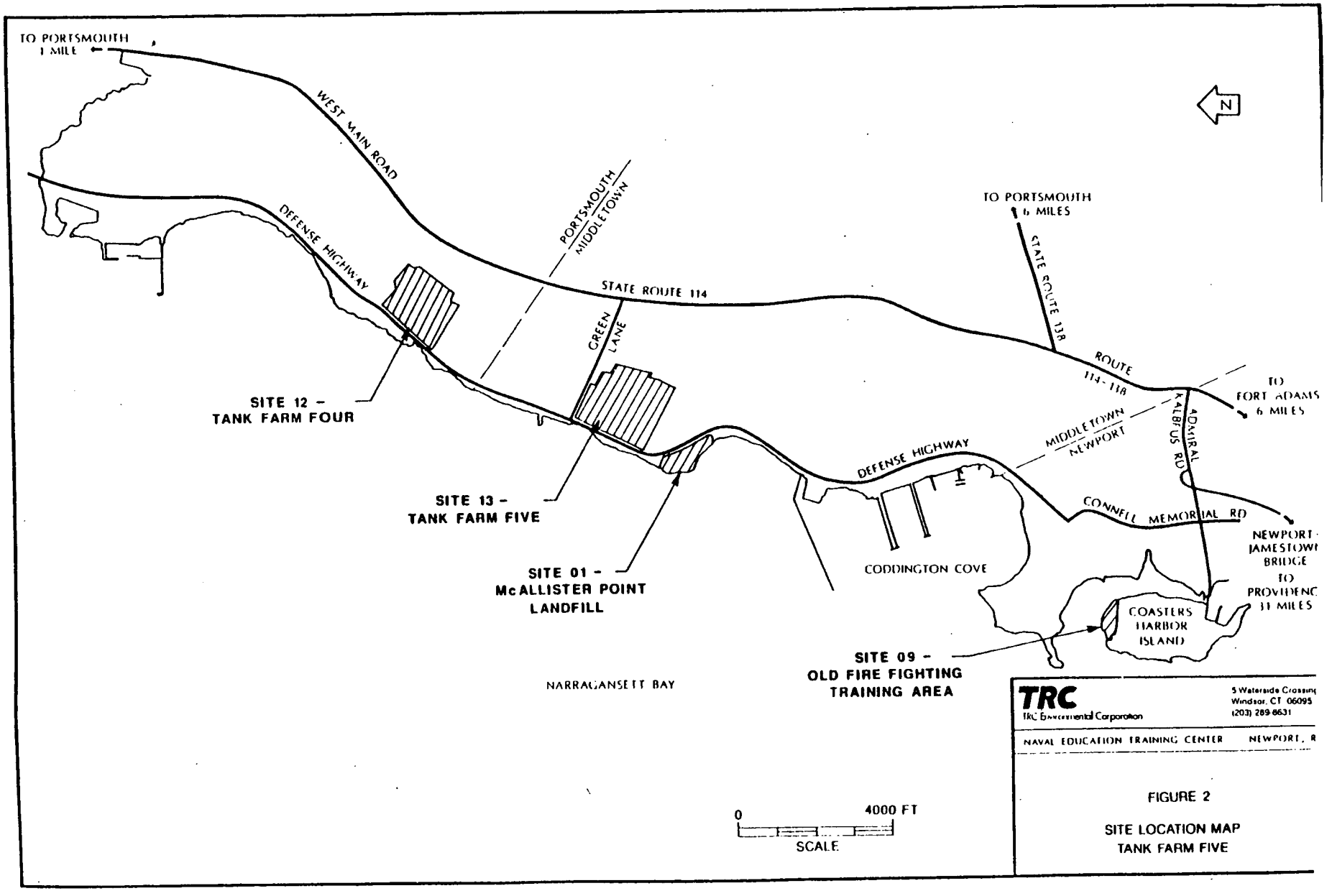
NAVAL EDUCATION TRAINING CENTER

NEWPORT
RHODE ISLAND

FIGURE 1.

NAVAL EDUCATION AND TRAINING CENTER VICINITY MAP

SOURCE: INITIAL ASSESSMENT STUDY (ENVIRODYNE, 1983)


TO PORTSMOUTH
1 MILE
WEST MAIN ROAD
DEFENSE HIGHWAY
PORTSMOUTH
MIDDLETOWN
STATE ROUTE 114
GREEN LANE
TO PORTSMOUTH
6 MILES
STATE ROUTE 138
ROUTE 114 - 138
TO FORT ADAMS
6 MILES
MIDDLETOWN
NEWPORT
ADMIRAL KALBFUS RD
DEFENSE HIGHWAY
CONNELL MEMORIAL RD
NEWPORT-JAMESTOWN BRIDGE
TO PROVIDENCE
31 MILES
SITE 12 -
TANK FARM FOUR
SITE 13 -
TANK FARM FIVE
SITE 01 -
McALLISTER POINT
LANDFILL
CODDINGTON COVE
COASTERS HARBOR ISLAND
SITE 09 -
OLD FIRE FIGHTING
TRAINING AREA
NARRAGANSETT BAY
0
4000 FT
SCALE
TRC
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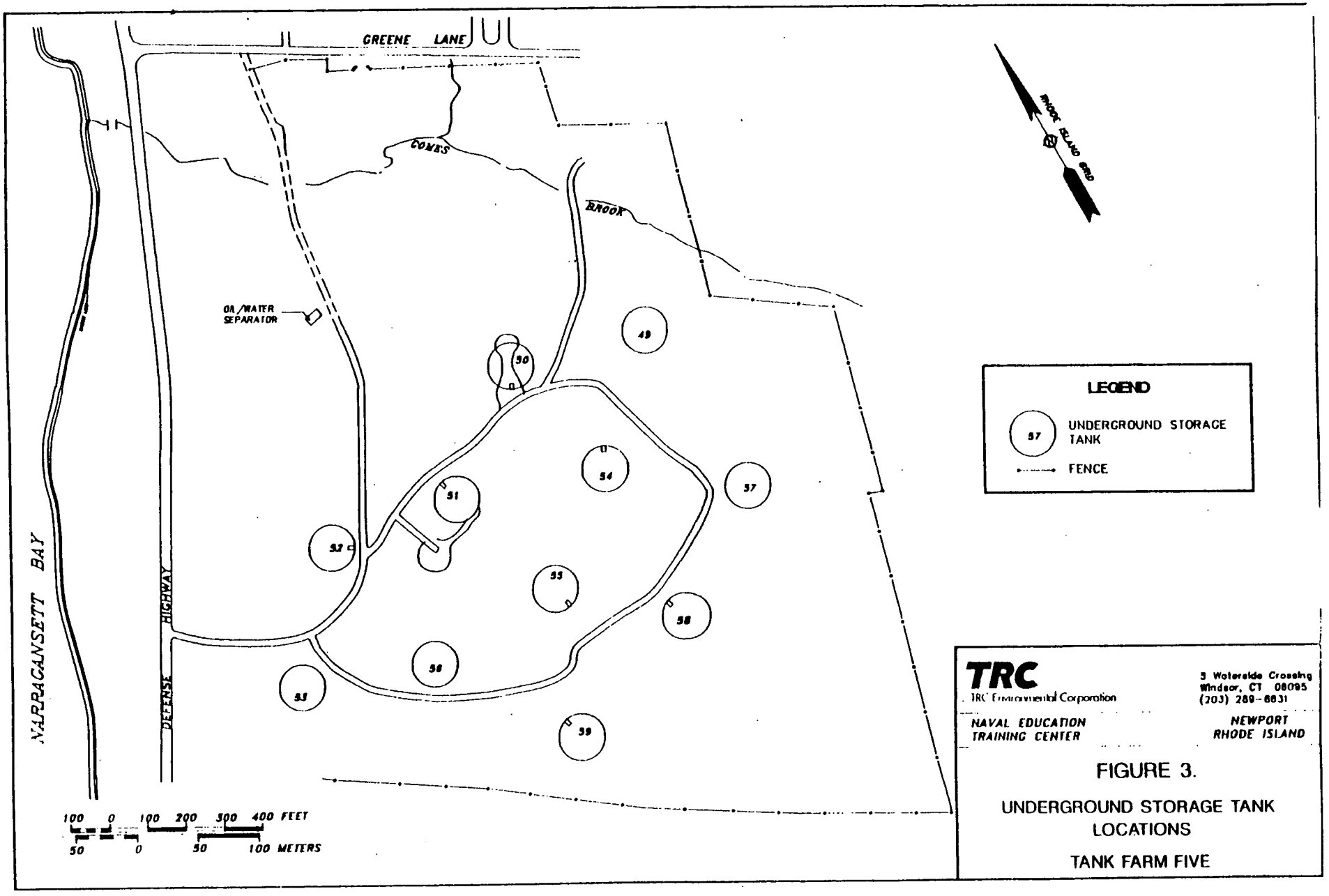
5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631
NAVAL EDUCATION TRAINING CENTER NEWPORT, R
FIGURE 2
SITE LOCATION MAP
TANK FARM FIVE


GREENE LANE
COMBS
BROOK
OIL/WATER SEPARATOR
NARRAGANSETT BAY
DEFENSE HIGHWAY
RHODE ISLAND GRID
49
50
51
52
53
54
55
56
57
58
59
LEGEND
UNDERGROUND STORAGE TANK
FENCE
100 0 100 200 300 400 FEET
50 0 50 100 METERS
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Windsor, CT 06095
(203) 289-8631
NAVAL EDUCATION TRAINING CENTER
NEWPORT RHODE ISLAND
FIGURE 3.
UNDERGROUND STORAGE TANK LOCATIONS
TANK FARM FIVE

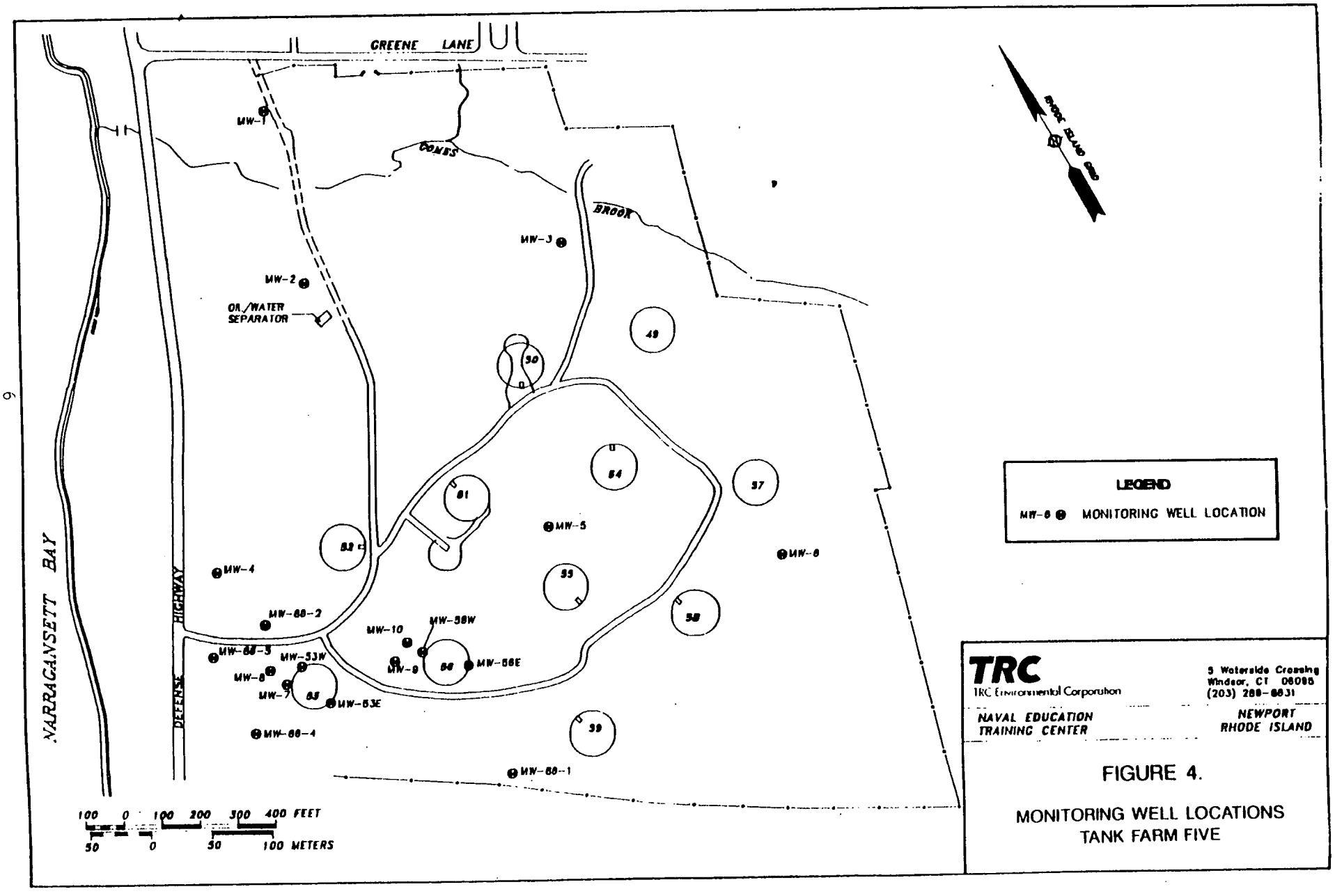
Ground water flow direction for the shallow ground water at Tank Farm Five is generally to the west-northwest, towards Narragansett Bay in the southern portion of the site, including the area in which Tanks 53 and 56 are located. In the northern part of the site, ground water flow is to the north, towards Gomes Brook. Piezometer and surface water level measurements indicate that Gomes Brook is a gaining stream (receives discharge from the ground water). The hydraulic conductivity determined from slug tests performed on five wells screened in the shallow, weathered bedrock (with the exception of one well screened in till overburden) ranged from 0.16 to 0.21 ft/day. Horizontal hydraulic gradients in the shallow bedrock and till ranged from 0.0128 to 0.0398 ft/ft. Estimated average linear velocities for shallow ground water range from 0.017 to 0.05 ft/day. The contaminated ground water associated with Tanks 53 and 56 is not currently flowing toward residential areas and is not discharging to or impacting any surface water bodies. The nearest residential areas are located approximately 1400 feet to the north-northeast and 1200 feet to the east-southeast. The current State of Rhode Island ground water classification applicable to the site is class GA-NA. GA indicates ground water sources which may be suitable for public or private drinking water without treatment. NA indicates areas of non-attainment which are known or presumed to be out of compliance with the ground water standards of the assigned classification. The nearest body of surface water off-site is the east passage of the Narragansett Bay. A more complete description of the site can be found in the Remedial Investigation Report on pages 1-23 and 1-24 (TRC, 1991).

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. LAND USE AND RESPONSE HISTORY

The USTs located at Tank Farm Five were constructed in 1942 and 1943 and 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 contained used oil for alternate use as heating fuel. In 1982, the Rhode Island Department of Environmental Management (RIDEM) adopted hazardous waste regulations which were applicable to the waste oils contained in Tanks 53 and 56.

Sampling of the water, oil, and sludge in the tanks was conducted in 1983. The sample results indicated that the oil phase in both tanks was hazardous due to the presence of significant concentrations of lead. The sludge layer in both tanks was also determined to be hazardous due to the presence of significant concentrations of lead, cadmium, chromium, barium, mercury, and silver. The water sample collected from Tank 56 contained various hydrocarbon compounds. In 1985, four monitoring wells (MW-53E, MW-53W, MW-56E, and MW-56W) were installed in the ring drains of Tanks 53 and 56 (see Figure 4). Analytical results of the ground water samples collected from the monitoring wells revealed the presence of several chlorinated and aromatic hydrocarbons as well as trace concentrations of mercury. Cadmium was also detected in one ground water sample from the ring drain of Tank 56. Subsequent investigatory activities conducted in 1986 confirmed the presence of organic compounds in the Tank 53 ring drain and in the ground water 150 feet downgradient of Tank 53.


GREENE LANE
CONES
BROOK
MW-1
MW-2
MW-3
OIL/WATER SEPARATOR
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-53W
MW-53E
MW-55E
MW-55W
MW-66-1
MW-66-2
MW-66-3
MW-66-4
49
50
54
57
51
53
55
58
59
NARRAGANSETT BAY
DEFENSE HIGHWAY
100 0 100 200 300 400 FEET
50 0 50 100 METERS
LEGEND
MW-6 MONITORING WELL LOCATION
TRC
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NAVAL EDUCATION TRAINING CENTER
NEWPORT RHODE ISLAND
FIGURE 4.
MONITORING WELL LOCATIONS
TANK FARM FIVE

On September 10, 1985, RIDEM issued a Hazardous Waste Facility Permit to NETC. In addition to permitting two hazardous waste storage areas, the permit stated that Tanks 53 and 56 were to be removed and closed in accordance with hazardous waste regulations and RIDEM requirements for underground storage tanks for oil and hazardous substances.

In January 1990, oil was observed leaking out of the gauging chamber of Tank 53 and onto the ground, potentially as a result of or compounded by construction projects underway at Tank Farm Five. Subsequently, RIDEM issued an Immediate Compliance Order which required the Navy to remove the contents of Tank 53, begin remediation of contaminated ground water and soils surrounding the tank, and initiate an investigation to determine the extent of oil contamination in the vicinity of Tanks 53 and 56.

In the spring of 1990, the Navy contracted with TRC Environmental Corporation (TRC) to install additional monitoring wells and to collect soil, water, and tank content samples in order to determine the nature 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. Water samples from both tanks contained detectable concentrations of chlorinated and aromatic hydrocarbons, semi-volatile organics, and several metals. Surface soil samples exhibited 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 a floating hydrocarbon product and ground water contaminated with chlorinated and aromatic hydrocarbons and polynuclear aromatic hydrocarbons in the vicinity of Tank 53. Chlorinated hydrocarbons were also detected in the ground water approximately 350 feet to the north-northwest of Tank 53.

Pursuant to RIDEM tank closure requirements, the Navy contracted out and completed the removal of the sludge, water, and oil layers from Tanks 53 and 56. After removal of the tank 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 were analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) and associated analytes were found to be below detection levels. Several pumping wells were installed around Tanks 53 and 56 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 backfilling) will be postponed until additional information is obtained on the complete nature and extent of soil and ground water

contamination around these two tanks. This information will be utilized to proceed with soil remediation in accordance with RIDEM's tank closure requirements. A more detailed description of the site history can be found in the Remedial Investigation Report at pages 1-24 and 1-25.

B. ENFORCEMENT HISTORY

In response to the environmental contamination which has occurred as a result of the use, handling, storage, or disposal of hazardous materials at numerous military installations across the United States, the Department of Defense (DOD) has initiated investigations and cleanup activities under the Installation Restoration (IR) Program. The IR Program parallels the Superfund program and is conducted in several stages, including:

1. Identification of potential hazardous waste sites;
2. Confirmation of the presence of hazardous materials at the site;
3. Determination of the type and extent of contamination;
4. Evaluation of alternatives for cleanup of the site;
5. Proposal of a cleanup remedy;
6. Selection of a remedy; and
7. Implementation of the remedy for the cleanup of the site.

As a part of the IR Program, an Initial Assessment Study (IAS) was completed in March 1983, detailing historical hazardous material usage and waste disposal practices at NETC Newport.

On November 21, 1989, NETC Newport was placed on the USEPA's National Priorities List. The investigations and cleanup of Tanks 53 and 56 are funded through the Defense Environmental Restoration Account (DERA).

In March 1992, a Federal Facility Agreement (FFA) was entered into by the U.S. Navy, the U.S. Environmental Protection Agency (USEPA) and the Rhode Island Department of Environmental Management (RIDEM) for the cleanup of hazardous substances pursuant to CERCLA. The FFA sets forth the roles and responsibilities of each agency, contains deadlines for investigation and cleanup of the hazardous waste sites, and establishes a mechanism to resolve disputes between the agencies.

III. COMMUNITY PARTICIPATION

Throughout the site's history, community concern and involvement has been fairly low. The Navy has kept the community and other interested parties apprised of site activities through informational meetings, press releases and public meetings.

In July 1990, the Navy released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities.

On May 26, 1992, the Navy finalized the Proposed Plan describing the interim remedial action. The Navy published a notice and brief analysis of the Proposed Plan in the Newport Daily News on June 8, 1992 and in the Providence Journal on June 13, 1992. The Proposed Plan and other administrative record information are available to the public at three public libraries, the Newport Public Library, Middletown Free Library, and Portsmouth Free Public Library Association.

On June 22, 1992, the Navy held an informational meeting to discuss the results of the tank investigation activities, as described in the Remedial Investigation Report and Tank Closure Investigation Report, and the cleanup alternatives considered in the development of the Proposed Plan. At this meeting, representatives from the Navy, TRC Environmental Consultants, Inc., USEPA, and RIDEM were available to answer questions about Tank Farm Five and the proposed interim remedial alternative. From June 10, 1992 to July 10, 1992, the Navy held a 30-day public comment period to accept public comment on the alternatives presented in the Proposed Plan and on any other documents previously released to the public. Immediately following the informational meeting on June 22, 1992, the Navy held a public hearing to accept formal comments on the Proposed Plan. A transcript of this hearing is included in the attached responsiveness summary. No public comments were received during the hearing.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The interim remedial action described herein is a management of migration alternative consisting of ground water extraction, treatment and discharge. It is designed to control or prevent further migration of contaminated ground water located around Tanks 53 and 56 and to begin to reduce the concentration of contaminants in the ground water until a final remedy can be chosen. The action is not intended to be a final remedy but will be consistent with the final remedy chosen for the site to the extent possible. A complete Feasibility Study Report, which will describe and evaluate final remedial alternatives for Tank Farm Five (including Tanks 53 and 56), will be developed and finalized upon the conclusion of Phase II Remedial Investigations. Potential remediation of other operable units at Tank Farm Five will be addressed at that time.

V. SUMMARY OF SITE CHARACTERISTICS

The Tank Closure Investigation Report (TRC, June 1991) and Chapters 4 and 5 of the Remedial Investigation Report contain an overview of the site investigations conducted with respect to Tanks 53 and 56 and Tank Farm Five as a whole. Figure 4 shows the locations of monitoring wells around Tanks 53 and 56. The significant findings of the site investigations with respect to ground water contamination associated with Tanks 53 and 56 are summarized below.

Six monitoring wells were installed during Remedial Investigations, supplementing the seven wells previously installed on-site and the five wells installed during tank closure investigation activities. Volatile organic compounds (VOCs), base neutral/acid extractable (BNA) compounds, and inorganics were present in the ground water samples collected from wells located near Tanks 53

and 56. VOCs were detected at levels exceeding Safe Drinking Water Act Maximum Contaminant Levels (MCLs) in wells located near Tank 53 and consisted mainly of petroleum-related VOCs. Petroleum product was also observed in wells MW-53W and MW-53E, both located in the ring drain of Tank 53. The presence of low VOC levels in downgradient well MW-4 indicates the potential migration of the ground water contamination from the area adjacent to Tank 53. BNAs were detected in wells near Tank 53 but no MCLs were exceeded. No pesticides nor PCBs were detected in the two ring-drain ground water samples submitted for PCB/pesticide analysis. While inorganic concentrations exceeded MCLs in all wells, including the background well, the highest levels of inorganic analytes were present in samples collected from wells in the central portion of the site.

Water level elevations in the area of Tanks 53 and 56 describe a smooth, east-to-west sloping water table around these tanks. The site ground water flow is toward the west to northwest in the southern portion of the site and north to Gomes Brook which crosses the northern portion of the tank farm. The contaminated ground water related to Tanks 53 and 56 is not currently flowing toward residential areas of the base and is currently not discharging to or impacting any surface water bodies.

VI. SUMMARY OF SITE RISKS

Human health risk assessments were conducted in 1991 as part of the Tank Closure Investigation and Phase I Remedial Investigation (RI) for Tank Farm Five. The primary objectives of these human health evaluations included the following:

- examine exposure pathways and contaminant concentrations in environmental media at each site;
- estimate the potential for adverse effects associated with the contaminants of concern at each site under current and future land use conditions;
- provide a risk management framework upon which decisions can be made regarding, what, if anything, should be done at the site;
- identify site or land use conditions that present unacceptable risks; and
- provide a basis from which recommendations for future activities at the site can be made which are protective of human health.

Details of these risk assessments can be found in Section 5.0 of the June 1991 Tank Closure Investigation Report and Volume II of the Final Phase I Remedial Investigation Report.

The human health risk assessments followed a four step process: 1) contaminant identification, which identified those hazardous substances which, given the specifics of the site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization, which integrated the

three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks. The results of the human health risk assessments are discussed below.

The qualitative human health risk assessment conducted in association with the Tank Closure Investigation Report focused on potential risks associated with exposures to surface soil contaminants. Potential impacts due to exposure to contaminants in ground water were not addressed as ground water is not used as a source of potable water in the area of Tank Farm Five. The risk assessment concluded that the potential for adverse health effects on human health is low.

The quantitative human health risk assessment conducted in association with the Phase I Remedial Investigation Report considered risks associated with Tank Farm Five as a whole and is not directly applicable to the potential risks associated with ground water contamination detected in the vicinity of Tanks 53 and 56 alone. Four exposure scenarios were evaluated, including a trespasser use scenario, a commercial/industrial use scenario related to use of a section of the site as a fire fighting training facility, a construction scenario and a residential use scenario. Of these four scenarios, only the future residential use scenario considered potential risks associated with ground water ingestion. Contaminants of concern evaluated under this scenario included nine VOCs, mainly consisting of chlorinated and aromatic hydrocarbons, five BNAs, mainly consisting of polynuclear aromatic hydrocarbons, and seventeen inorganic analytes, leaving only four contaminants (calcium, magnesium, potassium and sodium) which were detected but not considered as contaminants of concern. These thirty-one contaminants of concern were selected to represent potential site related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the contaminants of concern can be found in Appendix F of Volume II (the Risk Assessment Technical Report) of the Final Phase I Remedial Investigation Report (TRC, 1991).

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site. As discussed previously, the future use residential exposure scenario was the only scenario to consider exposure to contaminated ground water. Exposure to both adults and children was evaluated. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in Section 6.3 of the Risk Assessment Technical Report.

Exposures consisting of inhalation of volatile organic compounds released into bathroom air during showering and ingestion of contaminants in drinking water were assumed. Exposures to soil contaminants were also evaluated. Exposures were assumed to occur on 350 days/year for 6 years for children and for 30 years for adults. The exposure period for bathing was 12 minutes/day. Children were assumed to ingest 750 ml water per day while adults were assumed to ingest 2 liters of water per day. For each pathway evaluated, an average and a reasonable maximum exposure estimate was generated corresponding to exposure to the geometric mean concentration and the maximum concentration detected in that particular medium.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is very unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an adult is not likely to have greater than a one in a million chance of developing cancer over 30 years as a result of site-related exposure as defined for the compound at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard index was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic health effects. The hazard quotient is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects. Reference doses have been developed by EPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The hazard index is often expressed as a single value (e.g. 0.3) indicating the ratio of the stated exposure as defined to the reference dose value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard index is only considered additive for compounds that have the same or similar toxic endpoints (for example: the hazard index for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

Table 1 presents the carcinogenic risk summary, corresponding to the average and the reasonable maximum exposure scenarios, for the carcinogenic volatile organic and inorganic contaminants of concern in ground water at Tank Farm Five when evaluated to reflect potential future residential site use, specifically with respect to ground water ingestion by adults. Table 2 presents the non-carcinogenic risk summary, corresponding to the average and the reasonable maximum exposure scenarios, for the non-carcinogenic volatile organic and inorganic contaminants of concern under future residential use of the site, also specifically with respect to ground water ingestion by adults. While semi-volatile organics also contributed to the carcinogenic and non-carcinogenic risk estimates for Tank Farm Five, remediation of semi-volatile organics is not a goal of this interim remedial action. The semi-volatile organics in the ground water will be addressed within the final remedy for Tank Farm Five.

Arsenic, 1,2-dichloroethene and chromium, which accounted for a major portion of the estimated carcinogenic and/or non-carcinogenic risks to adults due to ground water ingestion, were detected in wells in the vicinity of Tanks 53 and 56 at levels exceeding MCLs. Therefore, ground water extraction, treatment and discharge is an appropriate response to identified ground water contamination associated with Tanks 53 and 56.

TABLE 1
CARCINOGENIC RISKS FOR THE POSSIBLE FUTURE INGESTION OF GROUND WATER
TANK FARM FIVE

EXPOSURE PATHWAY: INGESTION OF CHEMICALS IN DRINKING WATER

Contaminant of Concern	Concentration (ug/l) Avg.	Max.	Exposure Factor (l/kg/day)	Cancer Potency (mg/kg/day)	Risk Estimate Adult Avg.	Reas. Max.
VOLATILE ORGANICS						
Tetrachloroethene	2.8	7.0	0.012	5.1×10^{-02}	1.7×10^{-06}	4.3×10^{-06}
Trichloroethene	3.6	38	0.012	1.1×10^{-01}	4.6×10^{-07}	4.9×10^{-06}
INORGANICS						
Arsenic	73	265	0.012	1.75	3.6×10^{-03}	1.3×10^{-02}
Beryllium	3.4	10.2	0.012	4.3	4.1×10^{-04}	1.2×10^{-03}
				SUM:	4.0×10^{-03}	1.4×10^{-02}

TABLE 2
NON-CARCINOGENIC RISKS FOR THE POSSIBLE FUTURE INGESTION OF GROUND WATER
TANK FARM FIVE

EXPOSURE PATHWAY: INGESTION OF CHEMICALS IN DRINKING WATER

Contaminant of Concern	Concentration (ug/l) Avg.	Max.	Exposure Factor (l/kg/day)	Reference Dose (mg/kg/day)	Target Endpoint of Toxicity	Hazard Index Adult Avg.	Reas. Max.
VOLATILE ORGANICS							
1,2-Dichloroethene(Total)	5.7	630	0.029	$1x10^{-02}$	Decreased Hematocrit and hemoglobin	$1.6x10^{-02}$	1.8
Tetrachloroethene	2.8	7.0	0.029	$1x10^{-02}$	Hepatotoxicity, weight gain	$8.1x10^{-03}$	$2x10^{-02}$
1,1,1-Trichloroethane	4.7	190	0.029	$9x10^{-02}$	Liver	$1.5x10^{-03}$	$6.1x10^{-02}$
INORGANICS							
Arsenic	73	265	0.029	$1x10^{-03}$	Keratosis and hyperpigmentation	2	7.3
Beryllium	3.4	10.2	0.029	$5x10^{-03}$	None observed	$1.9x10^{-02}$	$5.6x10^{-02}$
Cadmium	1.7	5.0	0.029	$1x10^{-03}$	Proteinuria	$4.8x10^{-02}$	$1.4x10^{-01}$
Chromium	88	384	0.029	$5x10^{-03}$	None observed	$4.8x10^{-01}$	2.1
Lead	93	630	0.029	NA	Neurobehavioral effects	NA	NA
Manganese	5388	10,200	0.029	$1x10^{-01}$	CNS	1.6	3
Thallium	4	4	0.029	$7x10^{-05}$	Increased SGOT and LDH levels, alopecia	1.6	1.6
					SUM:	5.8	16

For ingestion of ground water, carcinogenic risks exceed the acceptable risk range of 1×10^{-4} to 1×10^{-6} for adults under both the average and reasonable maximum exposure scenarios. The presence of arsenic in the ground water presented the greatest individual risk.

Similarly, for ingestion of ground water, non-carcinogenic risk estimates exceeded the acceptable chronic hazard index value for adults under both the average and reasonable maximum exposure scenarios. The presence of arsenic in the ground water provided the greatest individual risk. Chromium, manganese, thallium and 1,2-dichloroethene also contribute significantly to the estimated total risk.

While risk to human health could result from ingestion of contaminated ground water, it is not a current risk because ground water is not currently used as a water supply on base, and the plume has not been found to affect off-base private drinking water wells. There are currently no homes which could be impacted by volatile organics emanating from ground water. If residents were to use the ground water within the Tank Farm Five area as a drinking water supply in the future, such use could pose long-term risks to human health. Similarly, potential migration of ground water contamination and subsequent exposures could, if not addressed by implementing the response action selected in this ROD, present an imminent and substantial endangerment to human health and the environment. The interim action for ground water extraction and treatment will prevent future migration and reduce contaminant concentrations in contaminated ground water within Tank Farm Five.

VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. STATUTORY REQUIREMENTS/RESPONSE OBJECTIVES

The Navy is responsible for addressing environmental contamination at Tank Farm Five pursuant to Section 120 of the Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA) and the Federal Facility Agreement entered into by the Navy, the USEPA and RIDEM. The Navy's primary responsibility under these legal authorities is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes other statutory requirements and preferences, including: a requirement that the remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that a remedial action be selected that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the

development and screening of alternatives. These remedial action objectives were developed to mitigate existing and future potential threats to human health and the environment. These response objectives were:

- To minimize further migration of the contaminated ground water;
- To minimize any future negative impact to Gomes Brook and Narragansett Bay resulting from discharge of contaminated ground water;
- To reduce the potential risk associated with the future ingestion of contaminated ground water; and
- To reduce the time required for restoration of the aquifer.

B. TECHNOLOGY AND ALTERNATIVE DEVELOPMENT AND SCREENING

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. As mentioned previously, the interim remedial action involves the extraction and treatment of ground water contaminated by Tanks 53 and 56 and the subsequent discharge of that treated ground water; therefore, this action comprises a management of migration alternative. Other alternatives (i.e., a no action alternative and alternatives that include a source control component) for other contaminated areas and media at Tank Farm Five will be evaluated in a comprehensive Feasibility Study (FS) to be prepared at the completion of Phase II Remedial Investigations. As discussed in Section 6.0 of the Proposed Plan, two ground water treatment options were considered, air stripping and UV/oxidation.

VIII. DESCRIPTION OF ALTERNATIVES

This section provides a narrative summary of the alternative options evaluated. Any combination of options would provide a management of migration remedial alternative. Management of migration alternatives address contaminants that have migrated from the original source of contamination. In the area of Tanks 53 and 56 at Tank Farm Five, contaminants have migrated from the underground storage tanks into the ground water. The ground water flow direction in the vicinity of the tanks is towards the west to northwest. Although contamination appears to be limited to the area near Tanks 53 and 56, available ground water sampling information indicates that a plume of contaminated ground water is migrating from this source area. The management of migration alternative considered for this interim remedial action consists of ground water extraction, treatment and discharge. One ground water extraction option and several treatment and discharge options were considered for this alternative, as summarized in the following sections.

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. If the interim action is

performing in accordance with the requirements of 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 proposed remedy for the site.

A. GROUND WATER EXTRACTION

The ground water extraction system would be constructed around Tanks 53 and 56 and within the approximate boundaries of the 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 will be placed near Tank 53 and another near Tank 56 to prevent ground water from migrating. The remaining two wells will be placed near the tanks to ensure that contamination in the weathered bedrock is also collected. The actual number of wells, pumping rates, and configuration of the extraction well network will be reevaluated and modified if required during remedial design. Existing wells and additional observation wells will be monitored during the interim remedial action to confirm the capture of contaminated ground water. A monitoring program will be developed during the design and submitted for regulatory approval.

B. GROUND WATER TREATMENT

The current State of Rhode Island ground water classification for Tank Farm Five is class GA-NA. GA indicates ground water sources which may be suitable for public or private drinking water without treatment. NA indicates areas of non-attainment which are known or presumed to be out of compliance with the ground water standards of the assigned classification.

Two combinations of ground water treatment technologies were evaluated. Each of the two combinations included removal of metals followed by removal of VOCs from the water. Each combination included the same metals removal technology, combined with one of two VOC treatment technologies.

Dissolved metals in the extracted ground water will be significantly reduced using a coagulation/filtration process to reduce any interference with the VOC treatment process the metals might produce. In this process, a chemical will be added to precipitate the metals out of solution in a settling tank. The remainder of the precipitated metal oxides will be separated from the water by passing the water through filters. The filters will be backwashed periodically to prevent clogging. The solid material cleaned from the filter will be properly handled in accordance with Federal, State and local regulations. The water extracted from the solids will be cycled through the on-site water treatment system.

The first of the two VOC treatment technologies considered was air stripping. Air stripping is a method frequently used to remove VOCs from ground water and is effective for removing the identified contaminants of concern. Contaminated water enters the top of the air stripping tower and trickles down, while air is blown into the tower from the bottom. The contaminants are

transferred from the liquid phase to the gas phase and carried off with the effluent air. The effluent air would be treated, if necessary, to meet State ambient air guidelines.

Another process option suitable for organics treatment is ultraviolet (UV)/oxidation. This process destroys organic compounds in water by exposing them to a chemical oxidant (i.e. 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 of the UV/oxidation process (e.g., acetone, sulfates, nitrates) have associated discharge requirements that would need to be met. In the UV/oxidation process, the contaminated ground water is mixed with the oxidant and pumped into a reactor where the water is exposed to UV light. The resulting effluent will be sampled to ensure that the water meets, as appropriate, discharge standards consistent with the final discharge option.

A treatability study will be conducted during the final design of the UV/oxidation treatment system to determine the appropriate oxidant and oxidant feed rate necessary to destroy the VOCs. In addition, this study will provide information on the compounds and concentrations likely to be present in the effluent of the UV/oxidation treatment system.

C. GROUND WATER DISCHARGE

Three discharge options were considered, discharge to the local wastewater treatment facility (WWTF), discharge to surface water and discharge to ground water. The first discharge option, discharge to the local WWTF, was given the primary consideration, as it is the preferred discharge option. Provided the Navy can obtain a discharge permit, discharge of the treated water will be through a sewer connection from the on-site ground water treatment facility to the public sewer system for conveyance to the local WWTF. The treated water will meet pretreatment requirements or other applicable regulatory 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 WWTF. 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 will be recharged into the aquifer upgradient or discharged to a surface water body. For either the aquifer recharge or the surface water discharge option, the treated water will meet all applicable local, state, and federal discharge requirements or standards. If either upgradient recharge or discharge to surface water are required, the exact discharge location and associated treatment requirements will be determined and submitted for regulatory review and approval before implementation.

In summary, a proposed interim remedial alternative including ground water extraction, treatment and discharge was developed. The alternative will treat contaminated ground water to meet Applicable or Relevant and Appropriate Requirements, such as Safe Drinking Water Act Maximum Contaminant Levels or Maximum Contaminant Level Goals, or State Ground Water Quality Standards and Preventive Action Limits. One extraction option was considered (extraction well system) and, three discharge options were considered, including the preferred option. The two ground water treatment options, coagulation/filtration combined with air stripping and

coagulation/filtration combined with UV/oxidation, were then combined with the preferred extraction and discharge options. Information pertinent to the implementation of the major components of these alternatives is as follows:

Estimated Time for Design and Construction: 1 year
Estimated Time of Operation: 5 years (or until final Record of Decision is developed for Tank Farm Five)

OPTION 1 - Treatment of VOCs by Air Stripping
Estimated Costs: Assuming air stripping and discharge to WWTF
Estimated Capital Cost (assuming discharge to WWTF): $1,000,000
Estimated O&M (Present Worth): $1,800,000
Estimated Total Cost (Present Worth): $2,800,000

OPTION 2 - Treatment of VOCs by UV/Oxidation
Estimated Costs: Assuming UV/oxidation and discharge to WWTF
Estimated Capital Cost (assuming discharge to WWTF): $1,500,000
Estimated O&M (Present Worth): $2,000,000
Estimated Total Cost (Present Worth): $3,500,000

IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, must be considered in the assessment of remedial alternatives. Building upon these specific statutory mandates, the National Contingency Plan (NCP) articulates nine evaluation criteria to be used in assessing the interim remedial action alternatives.

A detailed analysis was performed on the two extraction/treatment/ discharge alternatives developed using the nine evaluation criteria. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria and their definitions are as follows:

Threshold Criteria

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

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

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not a remedy will meet all of the ARARs of other Federal and State environmental laws and/or whether or not grounds for invoking a waiver are applicable. A summary of ARARs applicable to this site is presented in Appendix A.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of those alternatives which meet the threshold criteria.

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

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

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

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

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, calculated as present-worth costs for comparison purposes.

Modifying Criteria

The modifying criteria are used in the final evaluation of the interim remedial alternatives, generally after public comment on the Phase I Report and the Proposed Plan have been received.

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

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and Phase I report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of the two alternative against the nine criteria, was conducted. The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis.

Overall Protection of Human Health and the Environment

Both treatment alternatives (air stripping and UV/oxidation) 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 through extraction, and by permanent reduction of contaminant concentrations in the water through treatment and off-site disposal of the sludge produced by metals pretreatment. However, UV/oxidation provides a greater reduction of potential human health and environmental risks than air stripping because UV/oxidation chemically destroys the contaminants of concern whereas air stripping transfers the contaminants of concern from the water phase to the air phase without directly destroying the contaminants. Vapor phase treatment of the air stripping off-gas would be required to provide destruction of contaminants.

Compliance with ARARs

The UV/oxidation treatment alternative for Tanks 53 and 56 would be designed to meet all ARARs, so that the interim action would be consistent with the final site remedy. If air controls are provided, the use of an air stripper as the ground water treatment technology would meet the State of Rhode Island ambient air guidelines. Since air stripping removes volatile organic chemicals from the ground water and transfers them to the air phase without destroying them, ARARs would be attained with a secondary air treatment process.

Since the objective of the interim remedial action is to prevent further migration of contamination, all ARARs relating to ground water cleanup will not be attained.

Long-Term Effectiveness and Permanence

Both treatment alternatives would be expected to meet the cleanup objectives by preventing migration of the plume and by removing and treating the contaminants in the ground water. Potential residual risk would remain because the entire plume of contamination (Tank Farm Five) would not be remediated by the interim remedial action. UV/oxidation would provide greater long-term effectiveness because it destroys the contaminants of concern while air stripping transfers contaminants from the aqueous phase to the vapor phase, requiring secondary treatment of the vapor phase contamination. Maintenance is required of the air stripper and the associated systems. UV/oxidation requires replacement of UV bulbs and provisions for the particular oxidant.

Reduction of Toxicity, Mobility, or Volume Through Treatment

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, 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 to be treated by the final remedy. Contaminated ground water from around Tanks 53 and 56 would be contained by controlling migration with extraction wells, providing a barrier to further migration. Treating the extracted ground water using the UV/oxidation technology would permanently and significantly reduce the toxicity and mobility of contaminants. Air stripping reduces the concentration (toxicity) of volatile organic ground water contaminants through the transfer of contaminants from aqueous phase to vapor phase.

Short-Term Effectiveness

For both air stripping and UV/oxidation treatment alternatives, the community and environment are not expected to be adversely affected during implementation of remedial activities. Workers installing the ground water extraction system and treatment plant operators receiving the pretreated ground water would wear protective clothing and equipment, follow appropriate safety procedures to minimize the chance of exposure to contaminants, and be required to meet Occupational Safety and Health Act (OSHA) training requirements. Monitoring would also be conducted to ensure short-term effectiveness. With respect to air stripping, potential short-term risks to the community would be reduced through treatment of the off-gas, in accordance with State requirements. Process chemicals utilized in UV/oxidation systems may pose short-term risks to remedial workers, depending on the selected technology vendor.

Implementability

Air strippers and UV/oxidation systems are both easily implemented with services and materials readily available. In terms of administrative feasibility, both alternatives require compliance with the substantive requirements of a treatment works permit. Air stripping requires compliance with additional air discharge criteria.

Cost

In terms of cost, UV/oxidation is more expensive than the air stripping treatment alternative. The total present cost for the UV/oxidation treatment system over a 5-year remedial time frame is $3,500,000. The total present worth cost for the air stripping alternative is $2,800,000.

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. As a party to the FFA, the State has reviewed and commented on the Proposed Plan and the Navy has taken the State's comments into account.

Community Acceptance

The general public did not present any comments at the informational meeting on June 22, 1992 at the Gaudet Middle School Cafetorium, located in Middletown, Rhode Island. No written comments were received by the Northern Division.

X. THE SELECTED REMEDY

The interim remedial action has a management of migration component. Due to the interim nature of the remedial action, the selected alternative does not have a source control component. The soil contamination in the vicinity of Tanks 53 and 56 is being evaluated by a RCRA initiative and soil cleanup strategies will be evaluated separately.

A. INTERIM GROUND WATER CLEANUP LEVELS

Interim ground water cleanup levels have been established in ground water for those volatile organic and inorganic contaminants of concern identified in the Phase I Remedial Investigation baseline risk assessment found to pose an unacceptable risk to either human health or the environment. Interim ground water cleanup levels have also been established for two compounds, vinyl chloride and benzene, which were detected in ground water samples analyzed using non-Contract Laboratory Program (non-CLP) procedures at levels exceeding MCLs. It should be noted, however, that these two compounds were not detected in CLP analyses of ground water samples collected from the same monitoring wells on a different date. Only CLP analytical data were used in the baseline risk assessment and, therefore, were not previously discussed in the Summary of Site Risks. Interim cleanup levels have been set based on the ARARs (e.g. Drinking Water Maximum Contaminant Level Goals (MCLGs) and MCLs), if available, or other suitable criteria described below. The State of Rhode Island has promulgated Rules and Regulations for Ground Water Quality (Regulation DEM-GW-01-92, May 1992) which specify contaminant-specific Ground Water Quality Standards for Class GAA and GA ground waters. For the contaminants of concern, these levels are equal to or less stringent than MCLs or non-zero MCLGs; therefore the MCLs or non-zero MCLGs provide the basis for interim ground water cleanup levels. In the absence of a chemical-specific ARAR, or other suitable criteria to be considered, a 10^{-6} excess cancer risk level for carcinogenic effects or a concentration corresponding to a hazard index of one for compounds with non-carcinogenic effects was used to set cleanup levels. In instances in which the values described above could not be quantified, the laboratory practical quantification limit was used as the cleanup level. Periodic assessments of the protection afforded by remedial actions will be made as the remedy is being implemented and at the completion of the remedial action. If the interim remedial action is not found to be completely protective, further action shall be required.

Because the aquifer under the site is classified by the State of Rhode Island as GA-NA, which is a potential source of drinking water, MCLs and non-zero MCLGs established under the Safe Drinking Water Act are ARARs. Similarly, the State of Rhode Island Ground Water Quality Standards are ARARs based on the ground water classification.

Cleanup levels for known and probable carcinogenic compounds (Class A & B) have been set at the appropriate MCL or non-zero MCLG. Cleanup levels for the Class C,D and E compounds (possible carcinogens not classified and no evidence of carcinogenicity) have been set at the MCLG. In the absence of a MCLG, a MCL or a proposed drinking water standard or other suitable criteria to be considered (i.e. health advisory, state standard), a cleanup level was derived for carcinogenic effects based on a 10^{-6} excess cancer risk level considering the ingestion of ground water.

Cleanup levels for compounds in ground water exhibiting non-carcinogenic effects have been set at the MCLG. In the absence of a MCLG, cleanup levels for non-carcinogenic effects have been set at a level thought to be without appreciable risk of an adverse effect when exposure occurs over a lifetime (hazard index = 1).

Table 3 summarizes the cleanup levels for carcinogenic and non-carcinogenic contaminants of concern identified in ground water. These cleanup levels must be met at the completion of the remedial action at the points of compliance. The Navy has estimated that these levels will be obtained within 10 years: (assumes source controls are implemented within 5 years).

B. DESCRIPTION OF THE REMEDIAL COMPONENTS

A number of remedial components will be implemented in order to achieve efficient cleanup of the contaminated ground water. The main components comprise an extraction, treatment, and discharge system for the ground water. The extraction system would be constructed around Tanks 53 and 56 and within the approximate boundaries of the plume to maximize the collection of the contaminated ground water. The Navy 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 the tanks, in the overburden and at the deepest part of the aquifer, to ensure that contamination in the weathered bedrock is collected. The actual number of wells, pumping rates, and configuration of the extraction well network would be reevaluated and modified if required during remedial design. Existing wells and additional observation wells would be monitored during the interim remedial action to confirm the capture of contaminated ground water. A monitoring program would be developed during the design and submitted for regulatory approval.

The proposed treatment process would include the removal of metals and VOCs 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 metals will not interfere with the VOC treatment process. 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

TABLE 3
GROUND WATER CLEANUP LEVELS
TANKS 53 AND 56, TANK FARM FIVE

Carcinogenic Contaminants of	Cleanup Level (ppb)	Basis	Level of Risk
VOLATILE ORGANICS			
Benzene	5	MCL	$2x10^{-06}$
Tetrachloroethene	5	MCL	$4x10^{-06}$
Trichloroethene	5	MCL	$6x10^{-07}$
Vinyl Chloride	2	MCL	$4x10^{-05}$
INORGANICS			
Arsenic	50	MCL	*
Beryllium	1	MCL	$5x10^{-05}$
Lead	15	AL	NA
		SUM:	$1x10^{-04}$

Non-carcinogenic Contaminants of Concern	Cleanup Level (ppb)	Basis	Target Endpoint of Toxicity	Hazard Index
VOLATILE ORGANICS				
1,2-Dichloroethene(cis-)	70	MCLG	Decreased hematocrit and hemoglobin	$8x10^{-02}$
1,2-Dichloroethene(trans-)	100	MCLG	Decreased hematocrit and hemoglobin	$6x10^{-02}$
1,1,1-Trichloroethane	200	MCLG	Liver	$2x10^{-02}$
INORGANICS				
Cadmium	5	MCLG	Proteinuria	$1x10^{-01}$
Chromium (Total)	100	MCLG	None observed	$2x10^{-01}$
Manganese	3650	Risk	CNS	1
Thallium	.5	MCLG	Increased SGOT and LDH levels, alopecia	$9x10^{-02}$
			SUM:	1

Note: The Hazard Index is summed for only those indicator compounds with the same or similar target endpoints.

MCL – Maximum Contaminant Level. National Primary Drinking Water Regulations, Final Rule Amendments to Safe Drinking Water Act (SDWA), U.S.EPA, Effective July 1992.

MCLG – Maximum Contaminant Level Goal, based on health considerations only, Final Rule Amendments to SDWA, U.S.EPA, Effective July 1992

AL – Action Level representative of drinking water quality at the tap, U.S.EPA, May 7, 1991.

* – The cleanup level for arsenic has been set at the MCL of 50 ppb. The carcinogenic risk posed by arsenic at 50 ppb in ground water will be approximately 1 in 1,000. However, in light of recent studies indicating that many skin tumors arising from oral exposure to arsenic are non-lethal and in light of the possibility that the dose-response curve for the skin cancers may be sublinear (in which case the cancer potency factor used to generate risk estimates will be overstated), it is EPA policy to manage manage these risks downward by as much as a factor of ten. As a result, the carcinogenic risks for arsenic at this Site have been managed as if they were 1 in 10,000. (See EPA memorandum, "Recommended Agency Policy on the Carcinogenic Risk Associated with the Ingestion of Inorganic Arsenic" dated June 21, 1988.)

to prevent clogging. The solid material cleaned from the filter shall be properly handled in accordance with federal, state, and local regulations. The water extracted from the solids would then be cycled through the on-site UV/oxidation water treatment system.

A treatability study will be conducted during the final design of the UV/oxidation treatment system to determine the appropriate oxidant and its concentration necessary to destroy the VOCs. In addition, this study would provide information on the compounds and concentrations likely to be present in the effluent. Pump tests and ground water modeling efforts may be required to support the design of this interim remedial action.

After treatment, the ground water will be discharged to the Newport Waste Water Treatment Facility. If the Navy can obtain a permit, discharge of the treated ground water would be through a sewer connection from an on-site treatment facility to the public sewer system for conveyance to the Newport wastewater treatment facility. This is the preferred method of discharge. The treated water would meet pretreatment requirements or other applicable standards before entering the sewer system. (See Appendix A for pre-treatment requirements). Final treatment and disposal would occur at the wastewater treatment facility. If Newport wastewater treatment facility 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 would be recycled back into the aquifer upgradient or discharged to a surface water body on base. If either the upgradient 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 during design and approval obtained before implementation. The discharge option for the treated water will be reevaluated during the preparation of the final site remedy.

Because the purpose of the proposed action is to manage migration and begin cleanup of the contaminated ground water around Tanks 53 and 56, and is not meant to be the permanent remedy for Tank Farm 5, the Navy has assumed that the action would last for five years. After five years (or after the ROD for the final remedy), the Navy and the regulatory agencies will review the monitoring data and evaluate the effectiveness of the interim action. If the interim action is performing in accordance with project goals, the interim action could become part of the overall site remedy. If modifications need to be made to the extraction or treatment systems, they could be incorporated into the final remedy for the site.

XI. STATUTORY DETERMINATIONS

The interim remedial action selected for ground water remediation near Tanks 53 and 56 at Tank Farm 5 is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected interim remedy also satisfies the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principle element. Additionally, the selected interim remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

A. THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The interim remedy for ground water near Tanks 53 and 56 will permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through treatment and engineering controls. More specifically, 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 UV/oxidation treatment and off-site disposal of the sludge produced by metals pretreatment. Moreover, the selected remedy will result in human exposure levels that are within the 10^{-4} to 10^{-6} incremental cancer risk range and that are within the hazard index of one for non-carcinogens. Finally, the implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts.

B. THE SELECTED REMEDY ATTAINS ARARS

This interim remedy will attain all applicable or relevant and appropriate federal and state requirements that apply to this limited scope interim action. Environmental laws from which ARARs for the selected remedial action are derived, and the specific ARARs are presented in Appendix A and are discussed below.

Chemical-Specific ARARs

- Safe Drinking Water Act (SDWA) - MCLs and non-zero MCLGs
- Resource Conservation and Recovery Act (RCRA) - Ground water protection standards
- Rhode Island Public Drinking Water Regulations
- Clean Water Act (CWA) Ambient Water Quality Criteria
- CWA Effluent Discharge Requirements
- Rhode Island Water Quality Standards

The following chemical-specific policies, criteria and guideline were also considered:

- USEPA Risk Reference Doses (RfDs)
- USEPA Human Health Assessment Group Cancer Slope Factors (CSFs)

Location-Specific ARARs

- Executive Order 11990
- Wetland Construction and Management Procedures
- Rhode Island Wetlands Laws
- Rhode Island Ground Water Protection Act

Action-Specific ARARs

- Hazardous and Solid Waste Amendments of 1984 (HSWA) Land Disposal Restrictions
- RCRA Land Disposal Regulations
- RCRA Generator Requirements for Manifesting Waste for Off-Site Disposal
- RCRA Transporter Requirements for Off-Site Disposal
- Hazardous Materials Transportation Act Rules for Transportation of Hazardous Materials
- RCRA General Facility Standards
- RCRA Preparedness and Prevention
- RCRA Contingency Plan and Emergency Procedures
- RCRA Miscellaneous Units
- Rhode Island Hazardous Waste Management Regulations
- Rhode Island Hazardous Substance Community Right-to-Know Requirements
- SDWA Underground Injection Control Requirements
- Rhode Island Underground Injection Control Regulations
- CWA National Pollutant Discharge Elimination System (NPDES) Permit Requirements

- CWA Discharge to Publicly-Owned Treatment Works (POTW)
- Federal Water Pollution Control Act Ocean Discharge Criteria
- Rhode Island Pollutant Discharge Elimination Systems Regulations
- Rhode Island Pretreatment Regulations
- Rhode Island Water Quality Regulations
- Occupational Health and Safety (OSHA) Recordkeeping, Reporting and Related Regulations
- OSHA General Industry Standards
- Safety and Health Standards

Federal and State Drinking Water Regulations - The chemical-specific ARARs identified for the site can be applied to the interim remedial action in two ways. Drinking water standards, MCLs and other guidance and criteria to be considered (TBCs) were used in the development of target cleanup levels for ground water remediation. Drinking water standards may also be applicable to the development of discharge limits for treated ground water.

The ground water classification at the site is GA-NA, which indicates ground water sources which may be suitable for public or private drinking water without treatment but which are located in an area of non-attainment which is known or presumed to be out of compliance with the ground water standards of the assigned classification. The quality and safety of drinking water sources are regulated by the SDWA and the Rhode Island Public Drinking Water Regulations. MCLs are enforceable standards under the SDWA that represent the maximum level of contaminants that is acceptable for users of public drinking water supplies. MCLs are relevant and appropriate because, while ground water is not a current source of drinking water at NETC, the goal for ground water in non-attainment areas is restoration to a quality consistent with drinking water standards.

Target cleanup levels for ground water were developed based on the results of the human health risk assessments conducted for the site. Federal MCLs were the first order of standards used in establishing cleanup levels. For those contaminants for which no MCLs were available, other criteria and guidelines (i.e., TBCs) were used. TBCs used during the risk assessment and in establishing cleanup levels included USEPA RfDs and USEPA CSFs.

The objective of the interim remedial action is to prevent further migration of the contaminated ground water. As discussed in Section IX above, since this is an interim action which is designed to prevent migration of contamination, not all ARARs relating to ground water cleanup will be attained. Attainment of ground water standards and risk-based target cleanup levels will be addressed as part of the ROD for the final site remedy.

Federal and State Water Quality Criteria - Drinking water standards and surface water quality criteria identified as chemical-specific ARARs may be applicable to the development of discharge limits for the interim remedial action, depending on the final discharge option. The interim remedy considers three options for discharge of treated ground water. The Navy's preferred option is discharge of the treated ground water to the Newport wastewater treatment facility (WWTF). Under this option, chemical-specific discharge requirements would be established under the requirements of the WWTF's NPDES permit, pretreatment regulations and water pollution control laws.

Pretreatment standards will be developed in cooperation with the Newport WWTF. Both the state and federal NPDES requirements and pretreatment regulations will be attained upon successful establishment of pretreatment standards for discharge from the ground water treatment system.

Another option for discharge of the treated ground water is discharge to the ground water through reinjection. Discharge limits would be developed for this discharge option in accordance with the requirement of state and federal underground injection control requirements, which are discussed further under the action-specific ARARs.

Discharge to surface water is also an option for discharge of the treated ground water. Discharge limits governing this action would be developed in accordance with state and federal NPDES requirements, state and federal water quality regulations and ocean discharge criteria.

Compliance with the applicable treated ground water discharge regulations, depending on the discharge option selected, will be achieved through treatment and monitored through effluent sampling and analysis.

Federal and State Location-Specific Regulations - Federal and state wetlands regulations may be applicable if the interim remedial alternative impacts wetland areas. Such impacts could occur if erosion material from construction activities enters wetlands, if wetland hydrology is altered due to either direct discharge to wetlands or due to alteration of the ground water hydrology or if the wetlands are otherwise impacted by the implementation of the remedial action. The Rhode Island Ground Water Protection Act is applicable to the interim remedial actions since the site is located is an area where the ground water is classified as GA-NA. This law provides protection of state ground waters which are or could be used as drinking water sources.

Federal and State Hazardous Waste Regulations - The applicability of RCRA and Rhode Island Hazardous Waste Regulations depends in part on whether the wastes handled are RCRA-hazardous wastes as defined under these regulations. Because NETC was issued a Hazardous Waste Facility Permit by RIDEM in 1985, which permitted Tanks 53 and 56 as hazardous waste storage areas, and because toxic constituents are present in the source materials and ground water, the federal and state hazardous waste regulations are relevant and appropriate to the interim remedy.

RCRA General Facility Standards, Preparedness and Prevention, and Contingency Plan and Emergency Procedures will be attained during construction and operation of the ground water

treatment plant. The treatment facility will be designed, constructed and operated to minimize potential impacts to human health and the environment. Contingency and emergency planning will be conducted.

As a result of the ground water treatment process, a residual of the coagulation/filtration system will be produced, requiring off-site disposal. Chemical analysis (including Toxicity Characteristic Leaching Procedure or TCLP testing) of this residual will be conducted to determine if the residual is considered a hazardous waste based on the regulatory definition. If determined to be a hazardous waste, RCRA regulations, including land disposal regulations, generator requirements, and transportation requirements, will apply to the ultimate disposal of the residual.

Because toxic constituents are present on-site, OSHA regulations which govern worker health and safety and recordkeeping and reporting will apply to the implementation and operation of the interim remedial action. Site workers will have the required health and safety training and will be equipped with the proper health and safety equipment. Contractors and subcontractors will comply with required health and safety procedures.

Federal and State NPDES, Water Pollution Control and Underground Injection Regulations - As previously mentioned, the preferred ground water discharge option is discharge to the Newport WWTF but final approval from the WWTF has not yet been received. Discharge to ground water and discharge to surface water are also being considered as discharge options in the event that discharge to the WWTF is not possible.

State and federal pretreatment standards and PDES regulations would be met by the ground water treatment and discharge system, should discharge to the WWTF be approved. If discharge is to the ground water, compliance with state and federal underground injection control regulations would be required. If treated ground water discharge is to the surface water, compliance with state and federal PDES regulations would apply. Under this option compliance with the substantive requirements of a NPDES permit would be required. Discharges to Narragansett Bay would also require approval from the Rhode Island Coastal Resource Management Council (CRMC).

C. THE SELECTED REMEDIAL ACTION IS COST-EFFECTIVE

In the Navy's judgement, the selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. In selecting this remedy, once the Navy identified alternatives that are protective of human health and the environment and that attain ARARs, the Navy evaluated the overall effectiveness of each alternative by assessing the relevant three criteria--long term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs. The costs of this remedial action are:

- Estimated Capital Cost (assuming discharge to wastewater treatment facility): $1,500,000
- Estimated Operation and Maintenance Costs (net present worth, based on a 10% discount factor and 5 years of operation): $2,000,000
- Estimated Total Cost (net present worth, based on a 10% discount factor and 5 years of operation): $3,500,000

The selection of an UV/oxidation treatment system represents a reasonable value in regard to the destruction of VOC ground water contaminants when compared with other options evaluated.

D. THE SELECTED REMEDY UTILIZES SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

Once the Navy identified those alternatives that attain ARARs and that are protective of human health and the environment, the Navy identified that alternative which utilizes solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment: 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives considered.

While both treatment alternatives are comparable with respect to short-term effectiveness and implementability, the UV/oxidation treatment system provides greater long-term effectiveness and a greater reduction of toxicity, mobility and volume through treatment by permanently and significantly reducing the toxicity and mobility of the contaminants. Air stripping reduces the concentration (toxicity) of contaminants by transferring the contaminants from the aqueous phase to the vapor phase, requiring secondary treatment of the vapor phase to destroy the contaminants. While UV/oxidation is more costly than air stripping, the greater long term effectiveness and reduction of toxicity, mobility and volume through treatment offered by the UV/oxidation provides the basis for its selection as the applicable treatment methodology.

E. THE SELECTED REMEDY SATISFIES THE PREFERENCE FOR TREATMENT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES THE TOXICITY, MOBILITY OR VOLUME OF THE HAZARDOUS SUBSTANCES AS A PRINCIPAL ELEMENT

The principal element of the interim selected remedy is ground water treatment using UV/oxidation to effectively treat volatile contamination. The remedy will manage the migration of contaminated ground water through a ground water extraction system which will provide an effective barrier to contaminated ground water migration. This element addresses the primary threat at the site, contamination of ground water near Tanks 53 and 56, and the potential for further contaminant

migration. The selected interim remedy satisfies the statutory preference for treatment as a principal element by destroying the organic compounds in ground water.

XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

On June 22, 1992, the Navy presented a proposed plan (UV/oxidation) for the interim remedial action. The plan addresses ground water near Tanks 53 and 56. The management of migration portion of the preferred alternative included well extraction, UV/oxidation treatment, and discharge. Since the interim remedial action is identical to the proposed plan, no significant changes need to be addressed.

XIII. STATE ROLE

RIDEM has reviewed the various alternatives and has indicated its support for the selected remedy. The state has also reviewed the Phase I Remedial Investigation and Proposed Plan to determine if the selected interim remedial action is in compliance with applicable or relevant and appropriate state environmental laws and regulations. As a party to the FFA, Rhode Island concurs with the selected interim remedy for ground water remediation near Tanks 53 and 56. A copy of the letter of concurrence is attached as Appendix C.

APPENDIX A
ARARs AND TBCs SUMMARY
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

TABLE A–1
FEDERAL CHEMICAL–SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Ground Water– –				
	Safe Drinking Water Act (40 CFR 141.11–.16) Maximum Contaminant Levels (MCL's)	Relevant and Appropriate	MCL's directly apply to "public water systems", defined as systems with at least 15 connections which service a minimum of 25 persons.	Ground water at NETC is not a current source of drinking water; therefore, MCLs are not applicable, but may be relevant and appropriate. Contaminant concentrations were compared to MCLs to assess potential risks associated with ingestion of ground water.
	Safe Drinking Water Act (40 CFR 141.50–.51) Maximum Contaminant Level Goals (MCLGs)	Relevant and Appropriate	Non–enforceable health goals for public water supply systems, set at levels which result in no known or anticipated adverse health effects.	Ground water at NETC is not a current source of drinking water; therefore, MCLGs are not applicable, but may be relevant and appropriate. Non–zero MCLGs are to be used as remedial goals for current or potential sources of drinking water, per the NCP (40 CFR 300). Contaminant concentrations were compared to MCLGs to assess potential risks associated with ingestion of ground water.
	Resource Conservation and Recovery Act, Subpart F (40 CFR 264.94) Ground Water Protection Standards, Alternate Concentration Limits	Relevant and Appropriate	Sets ground water protection standards or allows for the development of alternate concentration limits for facilities which treat, store or dispose of hazardous waste.	Ground water at NETC is not a current source of drinking water; therefore, RCRA ground water concentration limits are not applicable, but may be relevant and appropriate.
	USEPA Risk Reference Doses (RfDs)	To Be Considered	Toxicity values for evaluating noncarcinogenic effects resulting from exposures to contamination.	USEPA RfDs were used to characterize risks due to noncarcinogens in ground water.

TABLE A-1 (Continued)
FEDERAL CHEMICAL-SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Ground Water (Continued) --	USEPA Human Health Assessment Group Cancer Slope Factors (CSFs)	To Be Considered	A slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen.	USEPA CSFs were used to compute the individual incremental cancer risk resulting from exposure to certain compounds.
Surface Water --	Clean Water Act (Section 304)	Ambient Water Quality Criteria (AWQC)	Non-enforceable guidelines established for the protection of human health and/or aquatic organisms.	AWQC will be applicable if treated ground water is discharged directly to surface water. The preferred alternative is to discharge treated ground water to the Newport WWTP, however, approval as not been received from the treatment plant.
	Clean Water Act (40 CFR 401.15)	Effluent Discharge Limitations	Regulates the discharge of contaminants from an industrial point source.	Regulation will be applicable if treated ground water is discharged directly to surface water. The preferred alternative is to discharge treated ground water to the Newport WWTP, however, approval as not been received from the treatment plant.

TABLE A-2
STATE CHEMICAL-SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Ground Water--				
	RI Ground Water Protection Act (RIGL, 46-13 et seq.) Public Drinking Water Regulations	Applicable	Establishes provisions for the protection and management of potable drinking waters, including the development of ground water classifications and associated standards which specify maximum contaminant levels for each classification.	Ground water at NETC is not a current source of drinking water, but is classified as GA Non-attainment. These regulations are applicable and contaminant concentrations will be compared to the established ground water quality standards.
Surface Water --				
	RI Water Pollution Control Law (RIGL 46-12 et seq.) RI Water Quality Standards	To be determined	Establishes water use classification and water quality criteria for all waters of the state. Also establishes acute and chronic water quality criteria for the protection of aquatic life.	Regulation will be applicable if treated ground water is discharged directly to surface water. The perferred alternative is to discharge treated ground water to the Newport WWTP, however, approval as not been received from the treatment plant.

TABLE A–3
FEDERAL LOCATION–SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wetlands– –	Executive Order 11990	To be determined	Regulates activities conducted in a wetland area to minimize the destruction, loss, or degradation of the wetlands.	Regulation will be applicable if implementation of the remedial action impacts wetland areas.
	Wetlands Construction and Management Procedures (40 CFR 6, Appendix A)	To be determined	Sets forth EPA policy for carrying out the provisions of Executive Order 11990 (see above)	Regulation will be applicable if implementation of the remedial action impacts wetland areas.

TABLE A–4
STATE LOCATION–SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wetlands– –	Rhode Island Wetlands Laws (RIGL 2–1–18 et seq.)	To be determined	Defines and establishes provisions for the protection of swamps, marshes and other freshwater wetlands in the state.	Regulation will be applicable if implementation of the remedial action impacts wetland areas.
Ground Water– –	RI Ground Water Protection Act (RIGL, Title 46, Chapter 13.1 et. seq.)	Applicable	Provides for protection of state ground waters, requiring the maintenance or upgrading of existing or potential drinking water sources.	Applicable since ground water at Tank Farm Five is designated GA–NA.

TABLE A–5
FEDERAL ACTION–SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Hazardous and Solid Waste Amendments of 1984 (HSWA) Land Disposal Restrictions	To be determined	Prohibits placement of hazardous wastes in locations of vulnerable hydrogeology and lists certain wastes, which will be evaluated for prohibition by EPA under RCRA.	A residual sludge containing hazardous constituents will be generated from the coagulation/filtration treatment system. Analysis of the sludge will be required to determine how the material can be disposed. If the material fails TCLP analysis, Land Disposal Restrictions are potentially applicable.
RCRA (40 CFR 262) Generator Requirements for Manifesting Waste for Off–Site Disposal	To be determined	Standards for manifesting, making and recording off–site hazardous waste shipments for treatment/disposal.	This regulation will be applicable for the off–site disposal/treatment of the coagulation/filtration treatment system residual, if determined to be hazardous.
RCRA (40 CFR 263) Transporter Requirements for Off–Site Disposal	To be determined	Standards for transporters of hazardous waste materials.	This regulation will be applicable for the off–site disposal/treatment of the coagulation/filtration treatment system residual, if determined to be hazardous.
RCRA (40 CFR 264.10–264.18) Subpart B – General Facility Standards	Relevant and Appropriate	General requirements regarding waste analysis, security, training, inspections, and location applicable to a facility which stores, treats or disposes of hazardous wastes (a TSDF facility).	Because NETC was issued a Hazardous Waste Facility Permit by RIDEM in 1985, RCRA General Facility Standards are relevant and appropriate to interim remedial actions conducted at the facility.
RCRA (40 CFR 264.30–264.37) Subpart C – Preparedness and Prevention	Relevant and Appropriate	Requirements applicable to the design and operation, equipment, and communications associated with a TSDF facility, and to arrangements with local response departments.	Because NETC was issued a Hazardous Waste Facility Permit by RIDEM in 1985, RCRA Preparedness and Prevention Standards are relevant and appropriate to interim remedial actions conducted at the facility.

TABLE A-5
FEDERAL ACTION-SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER
(continued)

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
RCRA (40 CFR 264.50-264.56) Subpart D - Contingency Plan and Emergency Procedures	Relevant and Appropriate	Emergency planning procedures applicable to a TSDF facility.	Because NETC was issued a Hazardous Waste Facility Permit by RIDEM in 1985, RCRA Contingency Plan and Emergency Procedures are relevant and appropriate to interim remedial actions conducted at the facility.
RCRA (40 CFR 264.600-264.999) Subpart X - Miscellaneous Units	Relevant and Appropriate	Environmental performance standards, monitoring requirements and post-closure care requirements applicable to miscellaneous units (not otherwise defined in the RCRA regulations) used to treat, store or dispose of hazardous waste.	Because NETC was issued a Hazardous Waste Facility Permit by RIDEM in 1985, RCRA requirements for Miscellaneous Units are relevant and appropriate to interim remedial actions conducted at the facility.
RCRA (40 CFR 268) Land Disposal Restrictions	To be determined	Identifies hazardous wastes that are restricted from land disposal and sets treatment standards for restricted wastes.	A residual sludge containing hazardous constituents will be generated from the coagulation/filtration treatment system. Analysis of the sludge will be required to determine how the material can be disposed. If the material fails TCLP analysis, Land Disposal Restrictions are potentially applicable.
Safe Drinking Water Act (40 CFR 144 and 146) Underground Injection Control Requirements	To be determined	Establishes the general requirements, technical criteria and standards for underground injection wells.	This regulation will be applicable if treated ground water is discharged back to the ground water. The preferred alternative, discharge to the Newport WWTP, has yet to be approved.
Clean Water Act (40 CFR 122-125) National Pollutant Discharge Elimination System (NPDES) Permit Requirements	To be determined	Permits contain applicable effluent standards (i.e., technology-based and/or water quality-based), monitoring requirements, and standards and special conditions for discharge.	This regulation will be applicable if treated ground water is discharged to surface waters or back to the ground water. The preferred alternative, discharge to the Newport WWTP, has yet to be approved. A permit would be required if the treated ground water is discharged on-site.

TABLE A–5
FEDERAL ACTION–SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER
(continued)

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Clean Water Act (40 CFR 403) Discharge to Publicly– Owned Treatment Works (POTW)	Applicable	A national pretreatment program designed to protect municipal wastewater treatment plants and the environment from damage that may occur when hazardous, toxic or other non–domestic wastes are discharged into a sewer system.	This regulation is applicable since the preferred discharge alternative is to the Newport WWTP; however, approval from the treatment plant has not been received. The treated ground water will be required to meet discharge limitations established by the WWTP.
Hazardous Materials Transportation Act (49 CFR 170, 171) Rules for Transportation of Hazardous Materials	To be determined	Procedures for packaging, labelling, manifesting, and off–site transport of hazardous materials.	This regulation will be applicable for the off–site disposal/treatment of the coagulation/filtration treatment system residual, if determined to be hazardous.
Federal Water Pollution Control Act (40 CFR 220–233) Ocean Discharge Criteria	To be determined	Establishes general requirements for discharge into United States oceans.	This regulation will be applicable if treated ground water is discharged to surface waters, which ultimately discharges to the Narragansett Bay. The preferred alternative, discharge to the Newport WWTP, has yet to be approved. A permit would be required if the treated ground water is discharged on–site.
Occupational Safety and Health Act (29 CFR 1904) Recordkeeping, Reporting and Related Regulations	Applicable	Outlines recordkeeping and reporting requirements.	Because hazardous substances are present at Tank Farm Five, OSHA regulations are applicable. These requirements will apply for all contractors/ subcontractors involved in hazardous activities.
Occupational Safety and Health Act (29 CFR 1910) General Industry Standards	Applicable	Establishes requirement for 40–hour training and medical surveillance of hazardous waste workers. Establishes Permissible Exposure Limits (PELs) for workers at hazardous waste operations and during emergency response.	Because hazardous substances are present at Tank Farm Five, OSHA regulations are applicable. These requirements will apply for all contractors/ subcontractors involved in hazardous activities. If PELs are exceeded during site activities, approriate respiratory equipment will be worn.

TABLE A–5
FEDERAL ACTION–SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER
(continued)

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Occupational Safety and Health Act (29 CFR 1926) Safety and Health Standards	Applicable	Regulations specify the type of safety equipment and procedures for site remediation/excavation.	Because hazardous substances are present at Tank Farm Five, OSHA regulations are applicable. During remedial activities, appropriate safety equipment will be kept on–site and a health and safety plan will be followed.

TABLE A-6
STATE ACTION-SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, NAVAL EDUCATION TRAINING CENTER

REQUIREMENT	SYNOPSIS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
RI Water Pollution Control Act RI Water Quality Regulations (RIGL 46-12 et seq.)	To be determined	Establishes general requirements and effluent limits for discharge to area waters.	This regulation will be applicable if treated ground water is discharged to area surface water or ground water. The preferred discharge option is to the Newport WWTP, however, approval has not been received from the treatment plant.
RI Pollutant Discharge Elimination Systems (RIGL 46-12 et seq.)	Applicable	Permits contain applicable effluent standards (i.e., technology-based and/or water quality-based), monitoring requirements, and standards and special conditions for discharge.	This regulation will be applicable if treated ground water is discharged to area surface water or ground water. The preferred discharge option is to the Newport WWTP, however, approval has not been received from the treatment plant.
RI Pretreatment Regulations (RIGL 46-12 et seq.)	Applicable	Establishes rules concerning pretreatment of water prior to discharge to a Rhode Island POTW.	This regulation will be applicable if approval to discharge to the Newport WWTP is received. Effluent levels established by the WWTP will achieved prior to discharge.
RI Underground Injection Control Regulations (RIGL 46-12 et seq.)	To be determined	Establishes the general requirements, technical criteria and standards for underground injection wells.	This regulation will be applicable if treated ground water is discharged back to the ground water. The preferred discharge option is to the Newport WWTP, however, approval has not been received from the treatment plant.
RI Hazardous Waste Management Act of 1978 (RIGL 23-19.1 et seq.) Hazardous Waste Management	To be determined	Rules and regulations for hazardous waste generation, transportation, treatment, storage, and disposal.	These rules will be applicable for the off-site disposal/treatment of the coagulation/filtration treatment system residual, if determined to be hazardous.

TABLE A-6
STATE ACTION-SPECIFIC ARARs AND TBCs
RECORD OF DECISION
TANKS 53 AND 56, NAVAL EDUCATION TRAINING CENTER
(Continued)

REQUIREMENT	SYNOPSIS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
RI Hazardous Substance Community Right to Know Act (RIGL, Title 23, Chapter 24.4) Public Right-to-Know Requirements	Applicable	Establishes rules for the public's right-to-know concerning hazardous waste storage and transportation.	These rules may be applicable for the off-site disposal/treatment of the coagulation/filtration treatment system residual, if determined to be hazardous. Documents applicable to remediation of ground water in the vicinity of Tanks 53 and 56 at Tank Farm Five will be available for public review.

APPENDIX C
RIDEM LETTER OF CONCURRENCE
RECORD OF DECISION
TANKS 53 AND 56, TANK FARM FIVE, NAVAL EDUCATION TRAINING CENTER

State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of the Director
9 Hayes Street
Providence, RI 02908

23 September 1992

Ms. Julia Belaga
Regional Administrator
Environmental Protection Agency, Region 1
John F. Kennedy Building
Boston, MA 02203

Dear Ms. Belaga:

The purpose of my writing is to express the State of Rhode Island's concurrence with the remedy detailed in the September 1992 Record of Decision for an Interim Remedial Action of the groundwater operable unit at Tank Farm 5, Tanks 53 and 56, of the Naval Education and Training Center Superfund Site.

This concurrence is based upon all aspects of the abovementioned Record of Decision being adequately addressed and implemented during the design, construction and operation of the remedy. The Department wishes to particularly emphasize the following aspects of the Record of Decision:

The remedy as proposed and implemented must meet all applicable or relevant and appropriate State and Federal statutes, regulations and policies.

The groundwater remedial objective is to restore the groundwater to federal and state drinking water quality standards as rapidly as possible.

The selection and development of a final remedial action for Tank Farm Five will continue throughout the implementation and operation of the interim remedy.

The State will continue to participate in the Federal Facilities Agreement and in the review and approval of operational designs and monitoring plans.

Finally, I urge EPA to make every effort to ensure that the Navy will implement the remedy in a timely and efficient manner.

Sincerely,

James W. Fester

James Fester, Assistant Director for Regulation
Department of Environmental Management

cc: Merrill Hohman, Director, EPA Waste Management Division
Richard Boynton, EPA, RI Superfund Section
Louise Durfee, Director DEM
Thomas Getz, Chief, Division of Air and Hazardous Materials
Claude Cote, Esq., Office of Legal Services