INSTALLATION RESTORATION PROGRAM

NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

FINAL PROPOSED PLAN
TANKS 53 AND 56 AT TANK FARM FIVE
MAY 1992

NORTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

DEPARTMENT OF THE NAVY

PHILADELPHIA, PA

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1.0 INTRODUCTION

The U.S. Navy is responsible for addressing environmental contamination at the Naval Education and Training Center (NETC) Newport pursuant to Section 120 of the **Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA)**[1] and a Federal Facility Agreement (FFA) entered into by the U.S. Navy, the U.S. Environmental Protection Agency (USEPA) and the Rhode Island Department of Environmental Management (RIDEM). In March 1992, the Navy entered into a FFA with USEPA and RIDEM which 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.

As per the FFA the Navy is currently investigating four sites at NETC Newport: McAllister Point Landfill, Old Fire Fighting Training Area, Tank Farm Four, and Tank Farm Five (see Figure 1). The Navy is proposing a cleanup plan to address, on an interim basis, an area of **ground water** contamination around Tanks 53 and 56 in Tank Farm Five. An **interim remedial action** is designed to be a timely solution 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. An interim remedial action is not intended to be a final remedy but should be consistent with the final remedy chosen for that site.

This **management of migration** proposal is part of the remedial (cleanup) alternatives that are currently being evaluated during the **Remedial Investigation (RI)** and **Feasibility Study (FS)** underway at the site and will be consistent with the final ground water remedy chosen for Tank Farm Five.

In accordance with Section 117(a) of CERCLA, the Navy is publishing this Proposed Plan to give the public the opportunity to review and comment on the interim remedial action proposed for Tank Farm Five before selecting a remedy. The Navy will consider public comments as part of the decision-making process for selecting the cleanup remedy for this site. The Proposed Plan serves to summarize the results and conclusions of the Phase I RI. A Phase II RI is planned to address data gaps that were identified during earlier investigations. A Draft RI/FS is scheduled to be completed in July 1994.

The interim remedial action for the ground water surrounding Tanks 53 and 56 includes pumping the contaminated ground water, treating

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[1]Technical terms are highlighted in bold print and defined in the glossary located at the end of this Proposed Plan.

it, and discharging the treated water. The interim remedial action is described in greater detail on pages 14 through 17 of this document.

Because this Proposed Plan relates to an interim remedial action, it does not propose a final remedy for the entire ground water operable unit at Tank Farm Five. Further ground water investigation at Tank Farm Five will be conducted during Phase II RI activities to assist the Navy in developing a final remedial action for this site.

This Proposed Plan:

1. explains the opportunities for the public to comment on the interim remedial action (see Section 2.0);
2. includes a brief history of the site and the principal findings of site investigations (see Sections 3.0 and 4.0);
3. provides a brief description of the proposed interim remedial action (see Sections 5.0, 6.0, and 7.0);
4. outlines the criteria used by the Navy to propose an action at the site, and briefly analyzes whether the proposed action would meet each criterion (see Section 8.0); and
5. presents the Navy's rationale for implementing an interim remedial action around Tanks 53 and 56 at Tank Farm Five (see Section 9.0).

To help the public review the proposed interim remedial action for the site, this document also includes information about wher interested citizens can find more detailed descriptions of the remedy selection process.

2.0 THE PUBLIC'S ROLE IN EVALUATING REMEDIAL ACTIONS

2.1 PUBLIC INFORMATIONAL MEETING AND PUBLIC HEARING

The Navy will hold a public informational meeting on June 22, 1992 at 7:30 p.m. at Joseph H. Gaudet Middle School Cafetorium, located on Aquidneck Avenue in Middletown, Rhode Island to describe the proposed interim remedial action. The public is encouraged to attend the meeting to hear the presentations and to ask questions. The Navy also will hold a formal public hearing immediately following the informational meeting, to accept verbal comments on the proposed interim remedial action under consideration for Tanks 53 and 56 at Tank Farm Five. This hearing will provide the opportunity for people to formally comment on the cleanup plan after they have heard the presentations made at the informational meeting. Comments made at the hearing will be transcribed, and a copy of the transcript will be added to the site Administrative Record available at the following locations:

Newport Public Library
Aquidneck Park
Newport, Rhode Island 02840
(401) 847-8720

Hours:	Monday	12:30 p.m. - 9:00 p.m.
	Tuesday-Thursday	9:30 a.m. - 9:00 p.m.
	Friday-Saturday	9:00 a.m. - 6:00 p.m.

Middletown Free Library
West Main Road
Middletown, Rhode Island
(401) 846-1573

Hours:	Monday-Thursday	10:00 a.m. - 8:00 p.m.
	Friday-Saturday	10:00 a.m. - 5:00 p.m.

Portsmouth Free Public Library Association
2658 East Main Road
Portsmouth, Rhode Island 02871
(401) 683-9457

Hours:	Monday-Thursday	9:30 a.m. - 8:00 p.m.
	Friday-Saturday	9:30 a.m. - 5:00 p.m.

2.2 PUBLIC COMMENT PERIOD

The Navy is conducting a 30-day public comment period from June 10, 1992 to July 10, 1992, to provide an opportunity for public involvement in the cleanup decision. During the comment period, the public is invited to review this Proposed Plan and the Phase I RI Report and to offer written comments to the Navy.

2.3 WRITTEN COMMENTS

If, after reviewing the information on Tank Farm Five, you would like to comment in writing on the Navy's proposed interim remedial actions or on other issues relevant to the Tanks 53 and 56 ground water remediation, please deliver your comments to the Navy's Remedial Project Manager at the Public Hearing or mail your written comments (postmarked no later than July 10, 1992) to:

U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania 19113-2090
Attn: Francisco A. La Greca, Code 1823
Remedial Project Manager

2.4 THE NAVY'S REVIEW OF PUBLIC COMMENT

The Navy will consider comments received from the public prior to implementing the proposed interim remedial action for cleanup of contaminated ground water around Tanks 53 and 56. The Navy's final choice of an interim remedy will be documented in a **Record of Decision (ROD)** for the ground water operable unit at Tank Farm Five and submitted to the USEPA and RIDEM for review, approval and signature. Public comment is an important part of the ROD proc ss and will be considered in selecting the interim remedial action. A document, called a Responsiveness Summary, that summarizes the Navy's responses to comments received during the public comment period, will be issued with the ROD. Once the ROD is signed by the USEPA Regional Administrator, it will become part of the Administrative Record, containing documents used by the Navy to choose a remedy for the site.

2.5 ADDITIONAL PUBLIC INFORMATION

This Proposed Plan provides only a summary description of the field investigations and the interim remedial action considered for ground water around Tanks 53 and 56. The public is encouraged to consult the Administrative Record for more detailed information on the site. The Administrative Record is available for review at the addresses listed on page 6.

If you have any questions about the site or would like more information, you may call or write to:

Mary Silvia, Public Affairs Officer
Naval Education and Training Center
Newport, Rhode Island 02841-5000
(401) 841-3538

or

Carol Keating, Remedial Project Manager
U.S. Environmental Protection Agency
JFK Federal Building (HAN-CAN1)
Boston, Massachusetts 02203
(617)573-5764

or

Paul Kulpa, Project Manager
State of Rhode Island Department of Environmental Management
Division of Air and Hazardous Materials
291 Promenade Street
Providence, Rhode Island 02908
(401) 277-2797

3.0 SITE HISTORY

NETC Newport is approximately 1,400 acres in size, with portions of the facility located in Newport, Middletown, and Portsmouth, Rhode Island. The site is approximately 60 miles south of Boston and 25 miles southeast of Providence. The facility layout is long and narrow, following the shoreline of Aquidneck Island for nearly six miles (see Figure 2). The Navy's first permanent activity at NETC Newport was in 1869 when the experimental Torpedo Station at Goat Island was established. In 1881, Coasters Harbor Island was acquired by the Navy and used for training purposes. Military activities at the base significantly increased during times of war. During World Wars I and II, service men were housed on the base. In 1941, the Navy constructed five tank farms with a total of 47 tanks to store fuel oils and other petroleum products with a total storage capacity of 2.8 million barrels. In subsequent peacetime years, on-site facilities were slowly disassembled, until the headquarters of the Commander Cruiser-Destroyer Force Atlantic was located there in 1962. In April 1973, the Shore Establishment Realignment Program (SER) reorganized Naval forces in the Newport area under the Naval Officer Training Center (NOTC). In April 1974, NOTC was changed to the Naval Education Training Center (NETC) Newport. The reorganization resulted in the Navy excessing a portion of the base.

In response to environmental contamination which has occurred as a result of the use, handling, storage, or disposal of hazardous materials at many military installations across the United States, the Department of Defense (DOD) has initiated investigation 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 cleanup of the site.

In March 1983, the Initial Assessment Study (IAS) was completed detailing historical hazardous material usage and waste disposal practices at NETC Newport. Tank Farm Five is located approximately one mile north of the NETC in the Town of Middletown. Tank Farm Five is comprised of eleven underground storage tanks (UST), numbered 49 through 59. Tanks 53 and 56 are located in the south western portion of the 85-acre tank farm. Each tank is constructed of prestressed concrete and has a capacity of 60,000 barrels. The tanks were constructed in 1942 and 1943 and 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 area which consists of a 12-inch reinforced concrete drain pipe located within a permeable backfill approximately four feet wid . The drain is connected to a sump pump to remove the ground water from the backfill area, designed to prevent tank damage or tank flotation.

The USTs in Tank Farm Five were used for fuel storage from World War II to 1974. In 1975, the Navy began using Tanks 53 and 56 for used oil storage as part of an oil recovery program. Between 1975 and 1982, Tanks 53 and 56 contained used oil for alternate use as heating fuel. In 1982, RIDEM adopted hazardous waste regulations which were applicable to the waste oils 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. In addition, the water in Tank 56 was found to contain hydrocarbon compounds. In 1985, results of ground water samples collected from monitoring wells installed in the ring drains of both tanks revealed the presence of several chlorinated and aromatic hydrocarbons and 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.

On September 10, 1985, NETC was issued a Hazardous Waste Facility Permit by the RIDEM. In addition to permitting the 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, as well as RIDEM requirements for underground storage tanks for oil and hazardous substances.

On November 21, 1989, NETC Newport was placed on the USEPA's National Priorities List (NPL). Private-sector NPL sites are eligible for funding from the national environmental trust fund called Superfund. Investigation and cleanup of DOD sites, such as NETC Newport, are funded through the Defense Environmental Restoration Account (DERA).

3.1 CLEANUP ACTIVITIES TO DATE

In January 1990, oil was observed leaking out of the gauging chamber of Tank 53 and onto the ground. Although the actual cause of the release was unknown, it was suspected that it may have resulted from, or been compounded by, construction projects underway in Tank Farm 5 close to Tank 53. RIDEM issued an

Immediate Complianc Order which required the Navy to remove of 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 Consultants, Inc. (TRC) to install additional monitoring wells and to collect soil, water, and tank content samples to determine the presence and extent of contamination in and around Tanks 53 and 56. The oil product samples contained high concentrations of chlorinated and aromatic hydrocarbons, **base/neutral/acid xtractable 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 showed low concentrations of petroleum hydrocarbons and lead. Five soil boring samples contained detectable concentrations of both BNAs and petroleum hydrocarbons. Ground water sample results indicated the presence of floating hydrocarbon product and ground water contaminated with chlorinated and aromatic hydrocarbons and polynuclear aromatic hydrocarbons in the vicinity of Tank 53.

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

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

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

Remediation of soil contamination around Tanks 53 and 56 is being addressed as part of the **Resource Conservation and Recovery Act (RCRA)** tank closure activities previously discussed. The complete closure of Tanks 53 and 56 (e.g. demolition and 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. The Navy has recently initiated an investigation that will determine the horizontal and vertical extent of soil contamination. This information will be utilized to proceed with soil remediation in accordance with RIDEM's tank closure requirements.

3.2 RESULTS OF SITE INVESTIGATIONS

The Phase I RI Report is currently being finalized. This report addresses the investigation activities conducted and findings to date at Tank Farm Five. The general purposes of the overall investigation were to:

- determine the presence, nature and extent of contamination resulting from historic site activities, including on-site and off-site impacts to soils, ground water, surface water, sediment and biota;
- identify potential contaminant migration routes;
- identify potential receptors of site contaminants; and
- characterize related environmental impacts and potential human health risks.

The Navy implemented a field sampling program to evaluate the ambient air and radiological surveys, geophysical surveys, soil gas surveys, and the collection and analysis of soil, sediment and ground water samples. A total of 88 samples were collected from Tank Farm Five during the Phase I RI.

Because of additional underground storage tanks (USTs) and an oil/water separator at the site, it was suspected that there may be additional sources of ground water contamination across Tank Farm Five. In addition to seven wells previously installed, six new monitoring wells were installed and sampled. The additional wells were added to more thoroughly investigate the nature and extent of ground water contamination and the effect of the Gomes Brook on the site hydrology. Five additional wells were installed under tank closure investigation activities around Tanks 53 and 56 at Tank Farm Five.

3.2.1 Ground Water Flow and Subsurface Geology

The overburden deposits on this site consist of a fill layer around the tanks, native sand and silt, and till which lies directly on the bedrock. Bedrock was encountered at depths ranging from 1 foot to 33 feet at all boring locations across the site. A considerable zone of weathered bedrock overlying competent bedrock was observed.

Although previous well data indicated that the ground water tabl is within the bedrock, the position of the ground water table is difficult to predict, given the variable topographic relief of the

site. Therefore, ground water samples were collected from various depths across the site.

Water level information was used to develop a ground water contour map for the site. It appears the shallow ground water at the site is affected by the presence of Gomes Brook and Narragansett Bay at the northern end of the site. The ground water contours also generally reflect the site topography. Ground water from the southern end of the site (near tanks 53 and 56) appears to be flowing to the west-northwest. Ground water from the northern portion of the site becomes increasingly affected by Gomes Brook and flows to the north (toward the brook).

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.

Although the contamination was limited to the area near Tanks 53 and 56 during the aforementioned investigations, available ground water sampling information indicates that a plume of contaminated ground water is migrating from this source area.

This interim remedial action is intended to contain ground water contamination in the vicinity of Tanks 53 and 56 and to prevent it from migrating further toward Narragansett Bay. As part of this containment action the contaminated ground water pumped from the site will be treated on site and discharged into the public sewer system and conveyed to the local wastewater treatment facility.

3.2.2 Ground Water Quality

Ground water sample results indicate the presence of volatile organic compounds (VOCs) and inorganics at levels exceeding th Maximum Contaminant Levels (MCLs), which are standards for drinking water established by the USEPA under the 1986 Federal Safe Drinking Water Act. VOC contamination is currently limited to the area near Tank 53 and consists mainly of petroleum-related compounds. However, the presence of low levels of chlorinated hydrocarbons in a downgradient well indicates that migration of contamination is likely. Base Neutral/Acid Extractable Organic Compounds (BNAs) were also detected from around Tank 53 at levels that do not exceed MCLs. While inorganic concentrations exceeded MCLs in all wells, the highest levels of inorganic analytes were detected in the central portion of the site. This interim remedial action is being taken to remediate the existing contamination from known source areas (Tanks 53 and 56), prevent further migration of contaminants from these sources and subsequent impacts on soil and ground water

quality. The current State of Rhode Island ground water classification for Tank Farm Five is class GA-NA. Tables 1 and 2 list the contaminants and maximum concentration detected in ground water samples collected from Tank Farm Five.

4.0 SUMMARY OF SITE RISKS

Human health risk assessments were conducted in 1991 as part of th Tank Closure Investigation and Phase I 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 decision 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 Appendix II of the Final Phase I RI Report. These documents are part of the Administrative Record, available at the locations listed in Section 2.1.

The risk assessment estimates the present and future potential risks to human health posed by exposure to contaminated ground water based on existing conditions as determined by the RI. The risk assessments showed that risk to human health could result from ingestion of contaminated ground water because contaminants were detected at concentrations exceeding MCLs. This is not a current risk, however, 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, in the future, residents were to use the ground water within the Tank Farm Five area as a drinking water supply, such use could pose long-term risks to human health.

Although contaminated ground water is not currently discharging to Gomes Brook or to Narragansett Bay, if contaminated ground water were to flow into either surface water body, ecological risks could occur. While some contaminants have been detected in the sediments of Gomes Brook, the source of such contamination is unclear at this

time. Additional studies will be conducted during the Phase II RI to further characterize the nature and extent of contamination in Gomes Brook and Narragansett Bay.

5.0 PROPOSED CLEANUP OBJECTIVES AND LEVELS

Using the information gathered from site studies, the Navy identified objectives for the interim remedial action for cleanup of contaminated ground water around Tanks 53 and 56. The cleanup objectives are:

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

As an interim step to meeting these objectives, the Navy proposes to extract and treat ground water from the most highly contaminated portion of the plume. This interim remedial action, which is intended to quickly respond to the plume of contamination around Tanks 53 and 56, will eventually become part of the overall remediation strategy for Tank Farm Five and NETC Newport as a whole. Therefore, the interim remedial action selected for ground water remediation must be consistent with the cleanup goals established for ground water site-wide and for the final remedy for the Tank Farm. The Navy's long-term cleanup goals for reducing contamination in ground water at NETC Newport are to meet MCLs, Maximum Contaminant Level Goals (MCLGs), or risk-based levels for compounds for which drinking water standards have not been set.

6.0 THE NAVY'S PROPOSED INTERIM REMEDIAL ACTION

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

The proposed interim remedial action would consist of extraction, treatment, and discharge of treated ground water. The extraction system would be constructed around Tanks 53 and 56 and within the approximate boundaries of the plume to maximize the collection of contaminated ground water. The Navy currently plans to install approximately five wells, pumping at various rates, which would contain the plume and collect contaminated water from around the tanks. Two of the wells would be placed near Tank 53 and another near Tank 56 to prevent ground water from migrating. The remaining two 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 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 they would 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 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 water treatment system.

Several ground water treatment options were considered to reduce VOC contamination, including air stripping and UV/oxidation (using either hydrogen peroxide [H_2O_2] or ozone [O_3] as an **oxidant**). Both technologies are effective in treating VOCs.

Air stripping is a method frequently used to remove VOCs from ground water and is effective for removing the contaminants of concern. Contaminated water enters the top of the air stripping tower and trickles down, while air enters at 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 to remove contamination so that State ambient air guidelines are met.

Another process option suitable for organics treatment is UV/oxidation. This process destroys organic compounds in water by exposing them to a chemical oxidant (for example, hydrogen peroxide) in the presence of UV light. The combined effects of UV light and the oxidant promote rapid breakdown of organic molecules.

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

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

If the Navy can obtain a permit, discharge of the treated water would be through a sewer connection from an on-site treatment facility to the public sewer system for conveyance to the local wastewater treatment facility (WWTF). This is the preferred method of discharge. The treated water would meet **pretreatment** requirements or other applicable standards before entering the sewer system. Final treatment and disposal would occur at the WWTF. The Navy is currently discussing this option with the Newport Wastewater Treatment Facility (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 could be recycled back into the aquifer upgradient or discharged to a surface water body on base. The aquifer may not be able to accept all of the effluent from the ground water treatment facility if ground water were recharged upgradient. For either the aquifer recharge or the surface water discharge option, the treated water would meet all applicable requirements or standards. If either **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 and approval before implementation. The final discharge option for the treated water will be reevaluated at the time of the final ROD.

Because the purpose of this proposed action is to begin cleanup of the contaminated ground water around Tanks 53 and 56, and is not meant to be the permanent remedy for Tank Farm Five, the Navy has assumed that the action would last for five years. After five years (or after the ROD for the final remedy, whichever comes first), the Navy and the regulatory agencies will review the monitoring data and evaluate the effectiveness of the interim action. If the interim action is performing up to the specifications in the final ROD, the interim action could become

part of the overall site remedy. If modifications need to be made to the collection or treatment systems, they could be incorporated into the final ROD for the site.

6.1 DESIGN, CONSTRUCTION, AND OPERATION COSTS FOR UV OXIDATION SYSTEM FOR TANKS 53 AND 56

Estimated Time for Design and Construction: 1 years
Estimated Capital Cost (assumes discharge to the WWTF): $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

7.0 OTHER ALTERNATIVES TO BE EVALUATED IN THE FEASIBILITY STUDY

Other alternatives (i.e., a no action alternative and alternatives that include a source control component) will be evaluated in the FS for the entire Tank Farm. However, for this interim remedial action, only the containment of ground water contamination around Tanks 53 and 56 will be addressed (i.e., action alternatives). As discussed in Section 6.0, two ground water treatment options were considered, air stripping and UV/oxidation. UV/oxidation is the preferred treatment alternative because it permanently destroys the chemicals of concern. Although the air stripping technology would be effective in removing VOCs from the ground water, sophisticated air controls would be required. Similarly air stripping would not destroy the chemicals of concern (as in UV oxidation) and hence the potential for the generation of large quantities of hazardous wast exists as a result.

The public is invited to review and comment on the proposed interim remedial action at this time, and will have the opportunity to comment on the other alternatives when the Navy proposes an overall remediation strategy for the site.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF THE PROPOSED INTERIM REMEDIAL ACTION

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

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

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

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

8.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether or not a remedy complies with all State and Federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and cleanup options at a specific site. If an ARAR cannot be met, the analysis of the alternative must provide the grounds for invoking a statutory waiver. When comparing interim remedies, it is appropriate to analyze compliance with only those laws and regulations that are applicable or relevant and appropriate to the limited scope of the interim action. However, the interim remedial action proposed for Tanks 53 and 56 would be designed to meet all ARARs, so that this interim action would be consistent with the final site remedy.

The use of an air stripper as the ground water treatment technology would meet the State of Rhode Island ambient air guidelines if air controls are provided. Since this technology only removes hazardous chemicals from the ground water rather then destroying them, it was not selected as the preferred ground water treatment technology. UV/oxidation, on the other hand, would meet all applicable or relevant and appropriate requirements by destroying the volatile organic contaminations without generating larg quantities of regulated waste.

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

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

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

8.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

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

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

8.5 SHORT-TERM EFFECTIVENESS

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

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

8.6 IMPLEMENTABILITY

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

8.7 COST

Cost includes the capital (up-front) cost of implementing an alternative as well as the cost of operating and maintaining the alternative over a 5-year period, and net present worth of both capital and operation and maintenance costs.

The capital, operation and maintenance, and total cost of the interim action is presented in the description of the Navy's proposed interim remedial action.

8.8 STATE ACCEPTANCE

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

8.9 COMMUNITY ACCEPTANCE

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

8.10 APPLICATION OF CRITERIA

Of the nine criteria, protection of public health and compliance with all ARARs are considered threshold requirements that must be met by all remedies. The Navy balances its consideration of alternatives with respect to long-term effectiveness and permanence; reductions of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. State and community concerns are considered as modifying criteria in the selection of a remedy. Consideration of USEPA, State, and community comments may prompt the Navy to modify aspects of the interim remedial action or decide that another alternative provides a more appropriate balance.

9.0 NAVY'S RATIONALE FOR PROPOSING THE INTERIM REMEDIAL ACTION

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

This interim remedial action focuses on containment of ground water contamination that has emanated from Tanks 53 and 56. The interim remedial action proposed herein is an effort on the part of the Navy to begin an early remedial action to prevent further degradation of the ground water and potentially, the estuarine ecosystem, by capturing the ground water at the leading edge of the contaminant plume to prevent migration of contaminants. The cleanup goal is to extract ground water contaminated with chemicals at concentrations exceeding drinking water standards (see Tables 1 and 2). This action will be consistent with any future source control or ground water remedial actions.

This interim remedial action would provide overall protection of human health and the environment. It is readily implementable and would provide short- and long- term protection of human health and the environment, would attain all Federal and State applicable or relevant and appropriate public health and environmental requirements, would reduce the mobility and toxicity of contaminated ground water, and would utilize permanent solutions to the maximum extent practicable.

GLOSSARY

Activated carbon: A carbonaceous material used to removed unwanted chemicals from waters and air through the process of adsorption.

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

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

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

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

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

Biota: Biological entities such as plants, animals, etc.

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

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

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

contamination to clean up the site or pay back the Federal government for the cost of the cleanup.

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

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

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

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

GA-NA: Rhode Island Department of Environmental Management Ground Water Classification Delineations February 1991. GA- ground water sources which may be suitable for public or private drinking water without treatment. -NA means areas of non-attainment and are known or presumed to be out of compliance with the ground water standards of the assigned classification.

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

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

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

Hydrology: The science that studies the storage, movement, and cycling of water.

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

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

Maximum Contaminant Levels (MCLs): The maximum permissible level of a contaminant in water that is consumed as drinking water. These levels are determined by USEPA and are enforceable standards applicable to all public water supplies.

Maximum Contaminant Level Goals (MCLGs): The maximum level goal of a contaminant in drinking water at which no known or anticipated adverse effect on human health would occur. The USEPA establishes MCLGs under the Safe Drinking Water Act at threshold levels, with a margin of safety for non-carcinogens, and at a zero level for carcinogens where the threshold level is not known.

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

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

N t Present Worth: Is the net equivalence of any future amount to any present amount. $P=F(1+i)^{-n} = F(P/F,i\%,n)$

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

Permeable: Porous, allowing water to flow through.

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

Precipitate: To remove solids from liquid waste so that the hazardous solid portion can be disposed of safely. Also, thos solids which have been precipitated.

Pretreatment: Treatment of waste water performed prior to discharge to a public sewer system.

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

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

Soil Gas: Those gases which are found in void spaces and pockets within the soil. Some of these gases may be identified by inserting a probe into the soil, and analyzing the gas which diffuses into the probe.

Source: Area at a hazardous waste site from which contamination originates.

Till: Nonsorted, non stratified sediment and materials originally carried or deposited by a glacier.

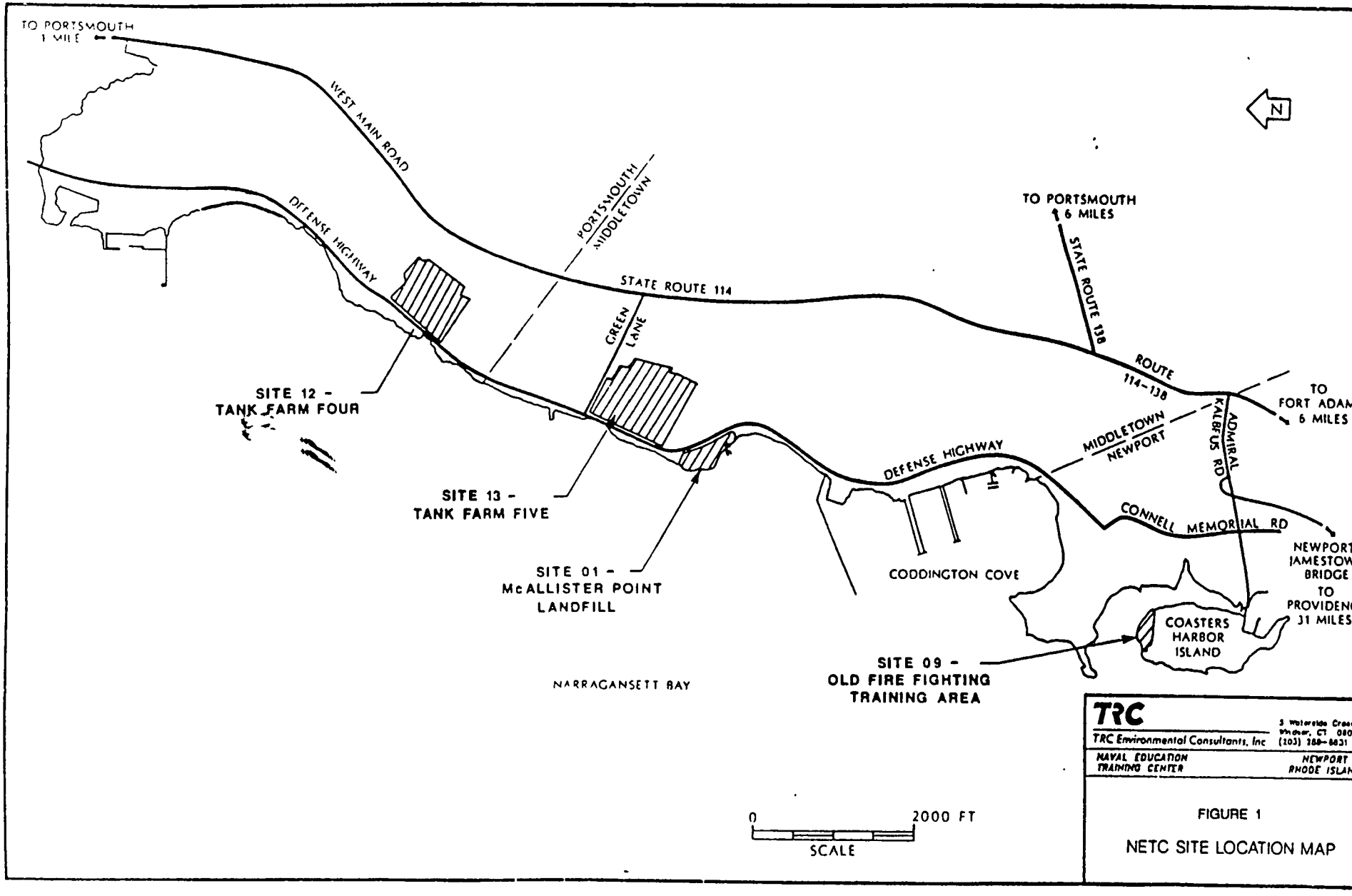
Toxicity Characteristic Leaching Procedure (TCLP): A test used to determine the mobility of organic and inorganic analytes present in waste. The results are used to determine disposal requirements for the waste.

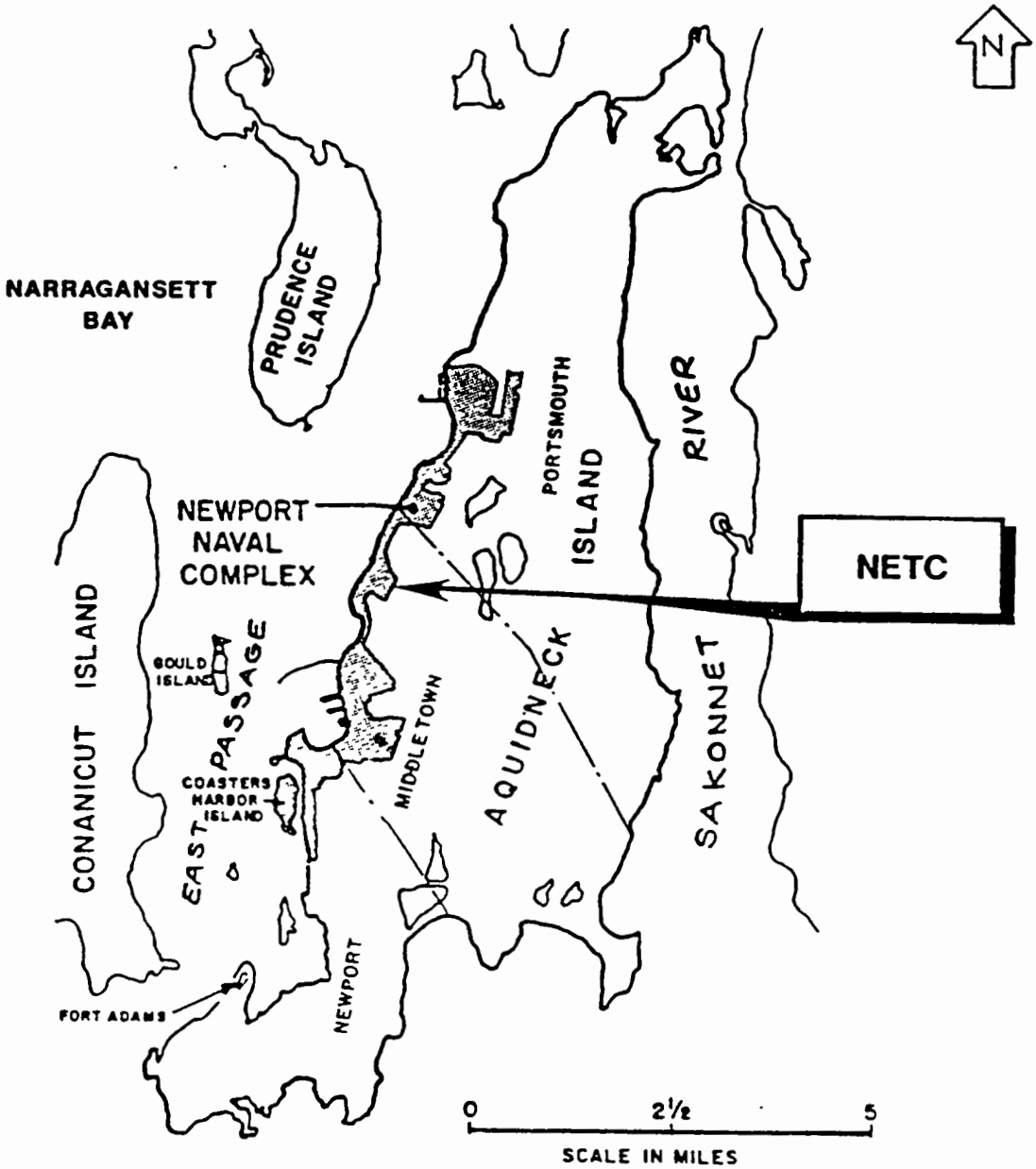
Ultraviolet (UV)/Oxidation: Water treatment process in which organic contaminants are permanently destroyed by an oxidant (such as hydrogen peroxide) in the presence of UV light.

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

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

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


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 ADAM
6 MILES
SITE 12 -
TANK FARM FOUR
SITE 13 -
TANK FARM FIVE
SITE 01 -
McALLISTER POINT
LANDFILL
MIDDLETOWN
NEWPORT
DEFENSE HIGHWAY
ADMIRAL
KALBFUS RD
CONNELL MEMORIAL RD
NEWPORT
JAMESTOWN
BRIDGE
TO
PROVIDENCE
31 MILES
CODDINGTON COVE
COASTERS
HARBOR
ISLAND
SITE 09 -
OLD FIRE FIGHTING
TRAINING AREA
NARRAGANSETT BAY
N
0
2000 FT
SCALE
TRC
TRC Environmental Consultants, Inc
NAVAL EDUCATION
TRAINING CENTER
NEWPORT
RHODE ISLAND
FIGURE 1
NETC SITE LOCATION MAP



SOURCE. INITIAL ASSESSMENT STUDY (ENVIRODYNE, 1983)

TRC
TRC Environmental Consultants, Inc

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

NAVAL EDUCATION TRAINING CENTER

NEWPORT RHODE ISLAND

FIGURE 2

NAVAL EDUCATION AND TRAINING CENTER VICINITY MAP

TABLE 1
SUMMARY OF GROUND WATER SAMPLE RESULTS
EXCEEDING DEVELOPED ACTION LEVELS
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

10/25/90

COMPOUND	WELL NUMBER	CONCENTRATION (ppb)	ACTION LEVEL[1] (ppb)	
VOAs				
Vinyl Chloride	MW-53E RW-1	2 27	2[2]	(F)
1,2 Dichloroethene (total)	MW-7	140/140[5]	70[2*]	(F)
1,1,1-Trichloroethane	MW-53E	690	200[2]	(F)
Trichloroethene	MW-7 MW-53E RW-1 MW-86-2	6/6[5] 460 5 8	5[2]	(F)
Tetrachloroethene	MW-53E	33	5[2]	(F)
Benzene	MW-7 MW-53E RW-1	16/15[5] 200 18	5[2]	(F)
Toluene	MW-53E	100	40[3]	(F)
Ethylbenzene	MW-53E	150	30[3]	(F)
Xylene	MW-53E	430	20[3]	(F)
INORGANICS				
Arsenic	MW-56W MW-86-1 MW-86-2	62.5 59 51.6	50[4]	(F)
Nickel	MW-56W MW-86-1 MW-86-2	138 250 134	100[2]	(T)

TABLE 1
SUMMARY OF GROUNDWATER SAMPLE RESULTS
EXCEEDING DEVELOPED ACTION LEVELS
TANK FARM 5
NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

10/25/90

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

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

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

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

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

(5) Duplicate samples collected at this location.

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

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

TABLE 2

SITE 13 - TANK FARM FIVE
SUMMARY OF GROUND WATER ANALYSES RESULTS
EXCEEDING DEVELOPED ACTION LEVELS

07/20/90

COMPOUND	WELL NUMBER	CONCENTRATION (ug/l)	ACTION LEVEL[1] (ug/l)	
VOLATILE ORGANICS				
1,2-Dichloroethane	53W	23	5[2]	(F)
1,2-Dichloroethene	53W	630	70[2*]	(F)
Trichloroethene	53W	38	5[2]	(F)
Tetrachloroethene	53W	7	5[2]	(F)
Ethylbenzene	53W	47	30[3]	(F)
			700[2]	(F)
Xylene	53W	100	20[3]	(F)
			10,000[2]	(F)
INORGANICS				
Aluminum	1	9480	90[3]	(P)
	2	161000		
	3	107000		
	5	190000/158000[5]		
	6	88000		
	53W	3900		
	56W	39800		
Arsenic	2	154	50[4]	(T)
	3	73.7		
	5	265/204[5]		
Beyllium	2	10.2	1[2]	(T)
	3	7.2		
	5	9.4/7.9[5]		
	6	5.5		
	56W	2.4		
Cadmium	2	5[6]	5[2]	(F)
			10[4]	(P)
Chromium	2	271	100[2]	(F)
	3	183	50[4]	(P)
	5	384/312[5]		
	6	116		

TABLE 2

SITE 13 - TANK FARM FIVE
SUMMARY OF GROUND WATER ANALYSES RESULTS
EXCEEDING DEVELOPED ACTION LEVELS

07/20/90

COMPOUND	WELL NUMBER	CONCENTRATION (ug/l)	ACTION LEVEL[1] (ug/l)
INORGANICS (CONT'D)			
Copper	1	52.4	1000[3] (P)
	2	182	1300[2] (P)
	3	67.3	
	5	304/254[5]	
	6	297	
	56W	92.6	
Iron	1	101000	300[3] (F)
	2	679800	
	3	452000	
	5	787100/471000[5]	
	6	288000	
	53W	34700	
	56W	144000	
Manganese	1	1240	50[3] (P)
	2	8440	
	3	10200	
	5	5430/4470[5]	
	6	7650	
	53W	4720	
	56W	7600	
Nickel	2	474	100[2] (T)
	3	10200	
	5	530/447[5]	
	6	341	
	56W	210	
Lead	1	66.4	5[2] (P)
	2	630	
	3	170	
	5	530/447[5]	
	6	108	
	53W	13.4	
	53E	115	
	56W	44.5	
	56E	80.5	
	86-1	21.6	
	86-4	20.2	

TABLE 2

SITE 13 - TANK FARM FIVE
SUMMARY OF GROUND WATER ANALYSES RESULTS
EXCEEDING DEVELOPED ACTION LEVELS

07/20/90

---

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

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

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

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

(5) Duplicate samples collected at this location.

(6) Detected concentration is equal to the action level.

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

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