RECORD OF DECISION

OPERABLE UNIT 2

SOIL AND GROUNDWATER AT

SITE 7 – FUEL DEPOT AREA

NAVAL WEAPONS INDUSTRIAL

RESERVE PLANT

Calverton, New York

Engineering Field Activity, Northeast
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Lester, Pennsylvania 19113-2090

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Site Name and Location

Installation Restoration Site 7 – Fuel Depot Area
Naval Weapons Industrial Reserve Plant (NWIRP), Calverton
Town of Riverhead
Suffolk County, New York
EPA ID: #NYD003995198
Funding Source: Environmental Restoration, Navy (ER,N)

Statement of Purpose and Basis

This Record of Decision (ROD) document presents the selected remedial action for Operable Unit (OU) 2 – soils and groundwater at Site 7 - Fuel Depot Area, located at the Naval Weapons Industrial Reserve Plant (NWIRP) in Calverton, New York. The U.S. Navy (Navy), in consultation with the New York State Department of Environmental Conservation (NYSDEC), Suffolk County Department of Health Services (SCDHS), and New York State Department of Health (NYSDOH) is issuing this remedy in accordance with State applicable requirements. The site is not listed on the National Priorities List (NPL); however, a copy of this document will be sent to the USEPA Region II offices for information.

This decision is based on the Administrative Record for the site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the Navy. A listing of the documents in the Administrative Record are provided in Attachment A of this ROD.

Assessment of the Site

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

Description of Selected Remedy

The selected remedy in this ROD, Alternative 4, consists of installing an air sparging/bioventing system and conducting short-term groundwater monitoring. The treatment system will be installed to treat soil and groundwater within an area of approximately 2.8 acres, which corresponds to the extent

of groundwater contamination. The air sparging system will inject air into the saturated groundwater zone. Vapor extraction wells will be installed in the overlying soils to remove the VOCs released from the groundwater and contaminated soils and biodegradation products.

The air sparging/bioventing system will be operated until (1) the selected remediation goals for soil and groundwater are achieved or (2) such time that the system is determined to no longer operate in an effective manner. The determination of effectiveness will be made by the Navy and the NYSDEC and will be considered to be the point at which contaminant concentrations in groundwater become "diffusion controlled". In other words, when the plot of contaminant concentration versus time becomes flat or asymptotic. Upon making the determination that contaminant concentrations have become diffusion controlled, the Navy will submit this conclusion in writing to NYSDEC, along with the recommendation to switch the cleanup technology to natural attenuation with monitoring. Monitoring will then be conducted until the remediation goals have been met. Media sampling will be conducted on a semi-annual basis and the analytical data collected from each year's sampling events will be presented in a single report that will be submitted annually.

The selected remedy in this ROD also includes institutional controls for this Site. The institutional controls will be in the form of existing use and development restrictions that prevent the use of groundwater as a source of potable or process water without necessary water quality treatment, as determined by the Suffolk County Department of Health Services.

Regulatory Acceptance

The New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health (NYSDOH) and the Suffolk County Department of Health Services (SCDHS) concur with the remedy selected for this site as being protective of human health and the environment.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

6 JAN 03
Date

Francis P. Castaldo, CDR, CEC, USN
Military Deputy, Shore Station Management
Naval Air Systems Command

RECORD OF DECISION
OPERABLE UNIT 2
Naval Weapons Industrial Reserve Plant
Calverton, New York
January 2003

SECTION 1 SUMMARY OF THE RECORD OF DECISION

The Navy, in consultation with the New York State Department of Environmental Conservation (NYSDEC), Suffolk County Department of Health Services (SCDHS), and New York State Department of Health (NYSDOH) is issuing a remedy to address the significant threat to human health and/or the environment created by the presence of hazardous materials (Operable Unit 2) at Site 7 – Fuel Depot Area at the NWIRP in Calverton, New York (see Figures 1 and 2). As more fully described in Section 3 of this document, historical operations that resulted in hazardous material generation at the facility included, but were not limited to, metal finishing processes, maintenance operations, fueling operations, painting of aircraft and components, and various training operations. Site 7 was used from 1954 to 1996 for the storage and distribution of fuel products, such as JP-4 and JP-5 jet fuel, at the facility. Fuels were stored in underground storage tanks (USTs). The material was then transferred to trucks for use in the flight preparation areas of NWIRP Calverton. These activities have resulted in groundwater contamination by fuels. The contamination may have occurred by tank and pipe leakage, overfilling, and spills. The NYSDEC, NYSDOH, and SCDHS concur with the selected remedy. The Navy is the lead agency for the project and provides funding for site clean-ups. Site 7 (see Figure 2) is one of several Installation Restoration (IR) sites located at the NWIRP facility.

SECTION 2 SITE LOCATION, AND DESCRIPTION

NWIRP Calverton is located in Suffolk County, Long Island, approximately 80 miles east of New York City (see Figure 1). NWIRP Calverton consists of four separate parcels of land totaling approximately 358 acres. Eight Areas of Concern (AOCs) are included within these parcels as follows (see Figure 2):

- Parcel A (32 acres): Site 2 – Fire Training Area
- Parcel B (171 acres): Site 6A – Fuel Calibration Area, Site 10B – Engine Test House, and Southern Area
- Parcel C (10 acres): Site 7 – Fuel Depot and Site 10A – Jet Fuel Systems Laboratory
- Parcel D (145 acres): Site 1 – Northeast Pond Disposal Area and Site 9 – ECM Area

Site 7 is located approximately 3,000 feet north of the south gate near the geographic center of the NWIRP Calverton. It is located on the eastern side of the road leading from the south gate and is approximately 2 acres in area, measuring 150 feet in width and 400 feet in length (see Figure 3). The principal site features are a large concrete truck parking area covering the southern half of the depot and a gravel and soil covered area where a series of underground storage tanks were located. A fuel pump house is located at the western edge of the fuel depot, and a maintenance garage was located at the southeastern corner.

SECTION 3 SITE HISTORY AND ENFORCEMENT ACTIVITIES

3.1 Operational History

The former NWIRP Calverton facility was owned by the Navy since the early 1950's and originally consisted of approximately 6,000 acres. The Northrop Grumman Corporation (formerly Grumman Aerospace Corporation) was the sole operator of the facility, which was known as a government-owned, contractor-operated (GOCO) facility. The facility was used in the testing, refitting, and retrofitting of combat naval aircraft. The majority of industrial activity at NWIRP Calverton was confined to the developed area in the center and south center of the facility between the two runways. Northrop Grumman ceased operations in February 1996. In September 1998, the majority of land within the fenced-in portion of the facility was transferred to the Town of Riverhead for redevelopment. Because of the need for additional environmental investigations and the potential need for remediation, the Navy retained four parcels of land within the developed section. In September 1999, an additional 2,935 acres of undeveloped land outside the fenced areas was transferred to NYSDEC who will continue to manage the property for resource development and recreational uses. An additional 140 acres of the northwest buffer zone was transferred to the Veteran's Administration (VA) for expansion of the Calverton National Cemetary.

Site 7 – Fuel Depot Area was used for the storage and distribution of fuel products, such as JP-4 and JP-5 jet fuel. Fuels were stored in underground storage tanks. Seven tanks, ranging in size from 4,000 to 15,000 gallons, were originally used for storage of jet fuel and gasoline. More recently, three 50,000-gallon tanks stored jet fuel, two 10,000-gallon tanks stored diesel fuel and gasoline, and one 20,000-gallon tank stored gasoline. The 50,000-gallon tanks were removed in August 1997, and the 10,000-gallon and 20,000-gallon tanks were removed in April 1998. One 550-gallon aboveground storage tank, (also removed in April 1998), stored JP-4 jet fuel and was located on a concrete pad east of the pump house. Fuels were transferred from the USTs to trucks. The trucks transported the fuel to the flight preparation areas of the facility.

3.2 Remedial History

The work at Site 7 is part of the Navy's Installation Restoration (IR) Program, which is designed to identify contamination at Navy and Marine Corps lands and facilities resulting from past operations and to institute corrective measures, as needed. There are typically four distinct stages. Stage 1 is the Preliminary Assessment (PA), which was formerly known as the Initial Assessment Study (IAS). Stage 2 is a RCRA Facility Assessment – Sampling Visit (RFA), which is also referred to as a Site Investigation (SI), which augments the information collected in the PA. Stage 3 is the RCRA Facility Investigation/Corrective Measures Study (RFI/CMS), also referred to as a Remedial Investigation/Feasibility (RI/FS), which characterizes contamination at a facility and develops options for remediation of a site. Stage 4 is the Corrective Action, also referred to as the Remedial Action, which results in the control or cleanup of contamination at sites.

An IAS (or PA) was performed for the NWIRP Calverton facility in 1986. This study identified eight potential areas of concern, including Site 7. A follow-up SI (or RFA) was conducted for these sites. Spills were documented at Site 7, and floating free product was identified in monitoring wells.

A RFI (or RI) was conducted in 1994 and 1995 to identify the nature and extent of contamination that was found in previous investigations and estimate potential risks to human health and the environment. A Phase 2 RI (or Phase 2 RFI) was conducted in 1997 to fill data gaps identified after the previous RFI.

Floating free product was identified at the site in 1989. Recovery of free product was conducted by Northrop Grumman until 1995 and since then, a separate floating free product layer has not been identified at the site.

Field work to support monitored natural attenuation (MNA) as a potential remedial alternative was conducted in 2000. A Feasibility Study/Corrective Measures Study (FS/CMS) was finalized in 2002 that developed and evaluated remedial alternatives to address the contamination and risks to human health and the environment.

3.3 Enforcement History

Portions of NWIRP Calverton (IR Sites 2 and 6a) are listed on the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites. None of the IR Sites at NWIRP Calverton are listed on the Federal National Priorities List (NPL).

The RCRA Facility Investigation (RFI) and Phase 2 Remedial Investigation (RI) were conducted in accordance with the requirements of the previous New York State RCRA Hazardous Waste Permit for the facility (NYSDEC 1-4730-00013/00001-0) dated March 25, 1992. The NYSDEC was the lead oversight agency. The work was also conducted in accordance with the previous EPA facility permit (EPA ID Number NYD003995198) dated May 11, 1992. The EPA supported NYSDEC in its oversight activities. The requirements of both permits are basically the same, although the terminology and format varied.

The FS/CMS was conducted in accordance with the requirements of the NYSDEC Division of Solid & Hazardous Materials Part 373 Permit that was re-issued to the Navy on April 18, 2000, under the NYSDEC implementing regulations (6 NYCRR Part 621). This permit supercedes and replaces the original Part 373 Permit to Operate a Hazardous Waste Storage Facility that was issued to then Grumman Aerospace Corporation on March 25, 1992. The new permit, issued only to the Department of the Navy, deals exclusively with those Solid Waste Management Units that remain on the former NWIRP Calverton property and any corrective actions that may be required to adequately address each site. Although the Part 373 Permit is the enforceble document governing the Navy's remedial actions, the NYSDEC Division of Environmental Remediation, located in the Albany office, retains primary responsibility for regulatory oversight of the Navy's actions at Site 7. As such, the Navy has agreed to a request by the NYSDEC Division of Environmental Remediation to utilize terminology associated with the NYSDEC State Superfund program that is closely related to the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The CERCLA terminology parallels the RCRA terminology. The implementation phases of each program have been determined to meet the substantive requirements of both programs and will also satisfy the corrective action requirements included in Module III of the Part 373 Permit.

SECTION 4 SITE CONTAMINATION

To evaluate the contamination present at the site, and to evaluate alternatives to address the significant threat to human health and the environment posed by hazardous materials, the Navy has conducted a RI/FS for Site 7.

4.1 Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of soil and groundwater contamination resulting from previous activities at Site 7. The RI was conducted in two phases. The first phase was conducted in 1994 and 1995, and the second phase was conducted in 1997. Two reports entitled "RCRA Facility Investigation for Naval Weapons Industrial Reserve Plant, Calverton, New York", dated August 1995, and "Phase 2 RCRA Facility Investigation for Site 7 – Fuel Depot Area, Naval Weapons Industrial

Reserve Plant, Calverton, New York", dated January 2000, describe the field activities and findings of the RIs in detail.

An FS/CMS was prepared to address soil and groundwater contamination. A report entitled "Feasibility Study/Corrective Measures Study for Site 7 – Fuel Depot, Naval Weapons Industrial Reserve Plant, Calverton, New York", dated January 2001, describes the development and analysis of remedial alternatives in detail.

The following investigation techniques were used to achieve the goals for the RI:

- A soil gas survey was conducted to identify potential soil and groundwater volatile organic contamination.

- Soil samples were collected to confirm the results of the soil gas survey. Additional soil samples were collected from the bottom of the excavation when the 50,000-gallon USTs were removed to refine the magnitude of contamination in the source area.

- Groundwater samples were collected from monitoring wells that were installed as part of the investigations. Temporary monitoring wells were installed to determine the extent of groundwater contamination and aid in the placement of permanent monitoring wells.

To determine whether the soil and groundwater were contaminated at levels of concern, the RI analytical data were compared to environmental Standards, Criteria, and Guidance values (SCGs). A human health risk assessment was also conducted. Soil SCGs are based on the NYSDEC Technical and Administrative Guidance Memorandum on Determination of Soil Clean-Up Objectives and Soil Clean-Up Levels (TAGM 4046). Soil SCGs are based on protection of groundwater and protection of human health. Groundwater SCGs are based on Federal drinking water standards, Part 5 of the New York State Sanitary Code (state drinking water standards), and NYSDEC ambient groundwater quality standards and guidance values.

Based on the RI results, comparison to the SCGs, and potential public health and environmental exposure routes, the soil and groundwater at Site 7 require remediation. The RI results are summarized below. More detailed information can be found in the RFI and Phase 2 RFI reports on file in the document repository.

4.1.1 Site Geology and Hydrogeology

NWIRP Calverton is underlain by the following five geologic/hydrogeologic formations (descending from ground surface):

- Upper Glacial Formation (Upper Glacial aquifer) consisting of silty, fine-grained sand with varying amounts of peat and clay near the ground surface and fine-grained sand with varying amounts of medium- to coarse-grained sand and pebbles farther below the ground surface. This formation extends from the ground surface to approximately 250 feet below ground surface. The groundwater table is encountered within this formation, at a depth of 17 to 19 feet below ground surface.

- Magothy Formation (Magothy aquifer) consisting of stratified, fine to coarse sand and gravel. This formation is approximately 520 feet thick.

- Raritan Clay Member of the Raritan Formation consisting of clay and silty clay. This formation is approximately 170 feet thick.

- Lloyd Sand Member of the Raritan Formation (Lloyd Sand aquifer) consisting of fine to coarse sand and gravel. This formation is approximately 400 feet thick.

- Bedrock.

The Upper Glacial Formation, Magothy Formation, and Lloyd Sand are the major regional aquifers and the sole source of drinking water for residents of Long Island. The Upper Glacial and Magothy aquifers are of principal importance in Suffolk County because of their proximity to the land surface. They are used the most as a source of drinking water. The Lloyd Sand aquifer is not widely used because of its depth and the abundant water in the overlying aquifers. The Upper Glacial and Magothy aquifers are believed to be hydraulically interconnected and to function as a single unconfined aquifer. The confining nature of the Raritan Clay is believed to minimize potential contamination to the underlying Lloyd Sand aquifer

4.1.2 Nature of Contamination

As described in the RFI reports, soil and groundwater samples were collected at the site to characterize the nature and extent of contamination. The main categories of contaminants that exceed their SCGs are VOCs, PAHs, and inorganics (lead).

A summary of the soil analytical data generated during the RI is presented in Table 1. The primary soil contaminants are VOCs and PAHs that were present in the fuels stored at the site. The VOCs are ethylbenzene and xylenes. The PAHs are anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene. Most of the exceedances of SCGs were for samples collected beneath the former USTs.

Several rounds of groundwater sampling were conducted during the RI. This included the sampling of temporary and permanent monitoring wells. Table 2 shows the chemicals detected in groundwater at concentrations above the SCGs. The maximum concentration detected at the site is also provided. The groundwater contaminants are VOCs, PAHs, and lead. The VOCs are benzene, toluene, ethylbenzene, and xylenes (BTEX compounds) and freon. The PAHs are 2-methylnapthalene and naphthalene. Lead was only detected in one well at a concentration greater than the SCG. With the exception of freon, the contaminants found at the site would be expected to be present based on the site history.

Freon is believed to be present at the site because of its use as an inert fluid for the initial pressure testing of fuel pipelines and/or freon may have been introduced into drains at the nearby Jet Fuel Systems Lab that lead to a fuel leaching chamber. This chamber was investigated by Northrop Grumman during the Environmental Baseline Survey (EBS) Program conducted in 1996. Regardless of the source, the extent of freon contamination at Site 7 is well defined.

4.1.3 Extent of Contamination

PAHs and phthalates were detected at several locations throughout the site. The phthalates were not detected at a concentration above the SCG. The highest concentrations of PAHs were found at depth near the water table (14 to 16 feet deep). These concentrations correspond to the location of the former floating free product layer.

The RI determined that there are two separate groundwater plumes at the site. The larger plume contains fuel-related chemicals, and the smaller plume contains freon. The larger groundwater plume is approximately 520 feet long and 220 feet wide (2.6 acres). The smaller plume is approximately 120 feet long and 60 feet wide (0.17 acre). The estimated extent of groundwater contamination is shown on Figure 4.

4.2 Interim Remedial Measures

An Interim Remedial Measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS. The only interim remedial measure

conducted at Site 7 was floating free product recovery. Floating free product was identified at Site 7 in 1989. The location of the free product corresponded to the location of the most contaminated groundwater. Northrop Grumman recovered floating free product for several years until 1995. Their efforts yielded recovery of approximately 175 gallons of free product. In 1999, the Navy conducted recovery tests and determined that there was no recoverable product remaining. A separate floating free product layer has not been identified at the site since 1995.

4.3 Summary of Human Exposure Pathways

This section describes the types of human exposures that may present added health risks to persons at or around the site. A baseline human health risk assessment was conducted as part of the RFI. A more detailed discussion of the potential health risks can be found in Section 7.6 of the RFI Report entitled "Baseline Risk Assessment".

An exposure pathway is the manner by which an individual may be exposed to a contaminant. The five elements of an exposure pathway are as follows: the source of contamination, the environmental media and transport mechanisms, the point of exposure, the route of exposure, and the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

The potential receptor evaluated for the current land use scenario was a maintenance worker performing tasks near Site 7. The exposure pathway for the maintenance worker includes direct contact with (dermal absorption) and ingestion of contaminated soil 250 days per year over a 25-year period. According to the risk assessment, no unacceptable health risks to current workers would be expected.

Risks to hypothetical receptors assuming a future residential land use scenario were also evaluated. The exposure pathways for this receptor are direct contact with (dermal absorption), ingestion of, and inhalation of contaminated soil and contaminated groundwater. Carcinogenic health risks were within the EPA target risk range. Unacceptable noncarcinogenic health risks were only identified for a child resident and were associated with exposure to groundwater.

4.4 Summary of Environmental Exposure Pathways

There are no wetlands, surface water, aquatic communities, special status species, or unique terrestrial communities located on or adjacent to contaminated areas at Site 7. Therefore, it was concluded that there is negligible risk to wildlife in the area from exposure to chemicals detected at the site.

Although impacted groundwater at Site 7 is not being used as a source of drinking water, the impacted groundwater is part of a sole-source aquifer for Long Island.

SECTION 5 ENFORCEMENT STATUS

Resource Conservation and Recovery Act

The purpose of this ROD is to set forth the corrective measures for the remediation of the Site 7 – Fuel Depot Area, in accordance with the requirements of the New York State Department of Environmental Conservation Division of Solid and Hazardous Materials Part 373 Permit that was issued to the Navy on April 18, 2000 under the NYSDEC implementing regulations [6 New York Codes, Rules, and Regulations (NYCRR) Part 621]. 6 NYCRR Part 373 is commonly known as the Resource, Conservation and Recovery Act (RCRA) program. The permit deals exclusively with those Solid Waste Management Units (SWMUs) that remain on the former NWIRP Calverton property and any Corrective Actions that may be required. The RCRA program as promulgated under NYSDEC regulations is authorized by the USEPA to issue RCRA permits.

NWIRP

The United States Navy has undertaken their environmental studies pursuant to the Navy's Installation Restoration Program. The State of New York provided oversight of the work conducted by the Navy pursuant to a Memorandum of Agreement (MOA) between the State and the Department of Defense. The Department of the Navy entered into a MOA with the NYSDEC in 1993. The MOA brought the NYSDEC into the Department of the Navy's Installation Restoration program. Upon issuance of the Record of Decision for Site 7 – Fuel Depot Area, the NYSDEC will approach the Navy to implement the selected remedy.

SECTION 6 SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all SCGs and be protective of human health and the environment. Chemical specific remediation goals are based on SCGs. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the chemicals detected at the site through the proper application of scientific and engineering principles.

The remediation goals selected for this site are as follows:

Soil

- Prevent human exposure (ingestion, dermal contact, dust inhalation) to contaminated soils in concentrations greater than the remediation goals.

- Prevent leaching of contaminants at resultant groundwater concentrations in excess of groundwater remediation goals.

- Comply with chemical-specific, location-specific, and action-specific ARARs and guidance.

Groundwater

- Prevent human exposure (ingestion, dermal contact, and inhalation) to groundwater having contaminant concentrations greater than the remediation goals.

- Restore contaminated groundwater quality to the remediation goals to the maximum extent that is technically feasible.

- Comply with chemical-specific, location-specific, and action-specific ARARs and guidance.

If groundwater remediation goals cannot be achieved or the aquifer cannot be restored, then at a minimum, the following remediation goals should be met:

- Reduce human exposure (ingestion, dermal contact, and inhalation) to groundwater having contaminants in concentrations greater than remediation goals.

- Prevent further migration of contaminants.

SECTION 7 SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for Site 7 were identified, screened, and evaluated in the April 2002 report entitled, "Feasibility Study/Corrective Measures Study for Site 7 – Fuel Depot, Naval Weapons Industrial Reserve Plant, Calverton, New York".

Remedial alternatives for groundwater were developed and evaluated in the FS. Separate alternatives were not developed for soil based on the following factors:

- The soil contaminants were detected at the groundwater interface, and the source was the former floating product layer.

- The contaminated soil was detected at depths greater than 14 feet. This depth effectively eliminates direct contact with the contaminants.

- The VOCs detected at concentrations above remediation goals would be effectively addressed by active groundwater remediation technologies or would be expected to biodegrade naturally.

- The SVOCs detected in soil at concentrations above remediation goals were not detected in groundwater at concentrations above groundwater remediation goals. None of the SVOCs were detected in soil at a concentration higher than that recommended for protection of groundwater.

- The concentrations of PAHs in soil are expected to biodegrade naturally, although slowly. Half-lives for the PAHs detected in soil at concentrations higher than remediation goals range from 1.45 years for benzo(a)pyrene to 5.86 years for benzo(k)fluouranthene.

- The groundwater alternatives will also address existing soil contamination.

7.1 Description of Alternatives

Alternative 1: No Action

This alternative is the baseline alternative to which the other alternatives will be compared. Under this alternative, no remedial actions would be implemented at the site. Implementation of Alternative 1 would

leave the site in its present condition and would not provide any additional protection of human health or the environment.

There are no costs associated with the No Action alternative.

Alternative 2: Institutional Controls and Natural Attenuation

This alternative consists of natural attenuation and institutional controls (i.e., monitoring of natural attenuation and site development restrictions). This alternative would monitor natural attenuation of groundwater contaminants. Approximately four new monitoring wells would be installed. Groundwater monitoring would be conducted quarterly for the first year and annually for the next 30 years. Modeling would be conducted to estimate contamination migration and natural attenuation. Site development restrictions would be implemented in the facility transfer documents. A reevaluation of the site would be performed every 5 years to determine whether any changes to the controls or remedy would be required. Modeling conducted for the FS predicted that it could take over 100 years to attain the remediation goals for some chemicals.

The estimated costs for Alternative 2 are as follows:

Capital Cost:	$70,300
O&M Cost:	$0
Annual Monitoring Cost:	$220,000 (Year 1); $79,4000 (years 2 through 30)
Present Worth:	$1,230,000

Alternative 3: Groundwater Extraction, Treatment, and Discharge

Plume remediation would be used to accelerate the cleanup of groundwater and ensure that contaminated groundwater is not migrating off site. Soil would be addressed through natural degradation processes including biodegradation and flushing to groundwater. Five groundwater extraction wells would be used. One well would be located near the downgradient edge of the larger plume to contain contaminated groundwater from migrating off site. Three wells would extract highly contaminated groundwater. One extraction well would be placed in the area contaminated only with freon. The total flow rate for the groundwater extraction system was estimated to be 40 gallons per minute.

Extracted groundwater would be treated to meet remediation goals prior to reinjection. The treatment system would consist of the following unit operations: equalization, precipitation, clarification, filtration, and air stripping. Air stripping would be used to remove VOCs. Precipitation, clarification, and filtration

would be used if necessary to remove metals or other solids that could interfere with air stripping. Based on the low volume of treated groundwater and low VOC concentrations, treatment of off-gas from the air stripper may not be required. Granular activated carbon could also be used to remove organics. Pretreatment using precipitation, clarification, and filtration would be used if necessary to remove metals or other solids that could interfere with air stripping (or activated carbon). Residuals generated during pretreatment would be disposed off site. After treatment, the treated groundwater would be reinjected into the aquifer. The reinjection wells would be placed to enhance contaminant removal.

Groundwater monitoring would be conducted quarterly for the first year and annually thereafter. Groundwater analytical data would be reviewed periodically to evaluate the effectiveness of the groundwater extraction system. The groundwater extraction system would be operated until (1) the selected remediation goals for soil and groundwater are achieved or (2) such time that the system is determined to no longer operate in an effective manner. If the groundwater extraction system becomes ineffective, then natural attenuation with monitoring would be implemented until the remediation goals have been met.

The estimated costs for Alternative 3 are as follows:

Capital Cost:	$2,240,000
Annual O&M Cost:	$150,000
Annual Monitoring Cost:	$116,000 (Year 1); $55,900 (Years 2 through 30)
Present Worth:	$4,900,000

Alternative 4: Air Sparging/Bioventing

Alternative 4 was developed as an in-situ treatment alternative. This alternative consists of installing an air sparging/bioventing system and conducting short-term groundwater monitoring. Air sparging would be used in combination with soil vapor extraction to remove volatile contaminants from the groundwater. Soil vapor extraction would remove the volatilized contaminants as they move through unsaturated soil. The addition of air would also enhance biological activity in groundwater and soil. The treatment system would be installed to treat soil and groundwater within an area of approximately 2.8 acres, which corresponds to the extent of groundwater contamination shown on Figure 4.

In the air sparging system, approximately 340 cubic feet per minute of air would be injected into the saturated zone. Approximately 56 air injection wells would be installed to a depth of 10 to 20 feet below the water table, which corresponds to the maximum depth of the VOC contamination. Air injection causes volatilization of VOCs and supplies oxygen to enhance the biodegradation in the groundwater and

capillary zone. Approximately 30 vapor extraction wells would be installed in the vadose zone to remove the VOCs released from the groundwater and contaminated soils and biodegradation products. Horizontal spacing between wells would be designed to ensure that there are no contaminated areas left untreated and to minimize overlap of treatment zones. The contaminated air stream would then be treated. Gas phase granular activated carbon was assumed based on anticipated air stream contaminant concentrations. Spent carbon would be regenerated off site.

Groundwater monitoring would be conducted quarterly for the first year and semi-annually thereafter. Groundwater analytical data would be reviewed periodically to evaluate the effectiveness of the treatment system. The air sparging/bioventing system would be operated until (1) the selected remediation goals for soil and groundwater are achieved or (2) such time that the system is determined to no longer operate in an effective manner. If the air sparging/bioventing system becomes ineffective, then natural attenuation with monitoring would be implemented until the remediation goals have been met. Modeling conducted for the FS predicted that remediation goals for BTEX compounds could be attained in 10 years or less by natural attenuation if the contaminant mass was reduced by 90 percent at the source.

The estimated costs for Alternative 4 are as follows:

Capital Cost:	$700,000
Annual O&M Cost:	$59,400 (4 years)
Annual Monitoring Cost:	$78,000 (Year 1); $42,280 (Years 2 through 10)
Present Worth:	$1,328,000

Alternative 5: Bioremediation with Oxygen Releasing Compounds

Alternative 5 was developed as an active in-situ bioremediation alternative to avoid extracting contaminated groundwater or air. This alternative consists of adding oxygen-releasing compounds (ORC) to the groundwater and groundwater monitoring. The ORC would be installed to treat groundwater within an area of approximately 2.8 acres, which corresponds to the extent of groundwater contamination shown on Figure 4.

The ORC provides oxygen to the indigenous microorganisms and enhances their ability to degrade contaminants. The addition of ORC has been demonstrated to remediate fuel contaminated groundwater. However, biodegradation of freon is not expected. The ORC can be added through drive point injection, placement of ORC socks or briquettes into existing wells, or installing borings or trenches to place ORC in contact with the groundwater. The FS assumed that ORC would be added using wells installed on 5-foot centers. The ORC would be added periodically over a 4-year period. Site

development restrictions would be implemented into the facility transfer documents. A reevaluation of the site would be performed every 5 years to determine if any changes in the controls would be required.

Groundwater monitoring would be conducted quarterly for the first year and semi-annually thereafter. Groundwater analytical data would be reviewed periodically to evaluate the effectiveness of the ORC in enhancing the biodegradation of the petroleum contamination. The ORC system would be operated until (1) the selected remediation goals for soil and groundwater are achieved or (2) such time that the system is determined to no longer operate in an effective manner. If the ORC system becomes ineffective, then natural attenuation with monitoring would be implemented until the remediation goals have been met. Modeling conducted for the FS predicted that remediation goals for BTEX compounds could be attained in 10 years or less by natural attenuation if the contaminant mass was reduced by 90 percent at the source.

The estimated costs for Alternative 5 are as follows:

Capital Cost:	$3,800,000
Annual O&M Cost:	$0
Annual Monitoring Cost:	$80,160 (Year 1); $55,000 (Years 2 through 10)
Present Worth:	$4,241,000

7.2 Evaluation of Alternatives

The criteria used to compare potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided, followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS.

The first two evaluation criteria are termed ***threshold criteria*** and must be satisfied in order for an alternative to be considered for selection.

1. **Protection of Human Health and the Environment.** This criterion is an overall evaluation of each Alternative's ability to protect public health and the environment. This evaluation is based upon a composite of factors assessed under other criteria, especially short/long term effectiveness and compliance with ARARs.

Under current conditions, Alternative 1 would be mostly protective of human health because site groundwater is not used as a source of drinking water and a soil barrier exists between the contaminated

soils and potential receptors. However, this alternative would not be protective of human health in the future if site groundwater was used for potable purposes or contaminated subsurface soils were brought to the surface and not properly managed. In addition, the potential for off-site contaminant migration would not be monitored.

Alternative 2 would protect human health by limiting site access, land use, and groundwater use. The contaminant concentrations at the site and the potential for contaminant migration would be monitored.

Alternative 3 would protect human health and the environment by containing and treating contaminated groundwater. Restrictions on groundwater use would be implemented to prevent exposure to contaminated groundwater during the remediation process.

Alternative 4 would protect human health and the environment by treating the organic contamination in place. Air sparging would volatilize or degrade the majority of the groundwater contaminants. Restrictions on groundwater use would be necessary until contaminant concentrations are below remediation goals.

Alternative 5 would protect human health and the environment by treating most of the organic contamination in place. ORC assisted bioremediation would degrade the majority of the groundwater contaminants. It would not be effective for the freon plume. Restrictions on groundwater use would be necessary until contaminant concentrations are below remediation goals.

For all alternatives, some SVOCs would remain in soil near the water table. These SVOCs are primarily PAHs, which are naturally biodegradable, but over relatively long periods. The PAHs are at depth near the water table and only represent potential risk under a long-term direct contact scenario, which is unlikely. However, land use restrictions would be implemented to prevent exposure.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).*** Compliance with ARARs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

The most significant groundwater ARARs for this ROD are the New York State Drinking Water Supply Regulations (10 NYCRR Part 5) and the NYSDEC Groundwater Quality Standards (6 NYCRR Part 703). NYSDEC has cleanup goals for soils that include NYSDEC Technical and Administrative Guidance Memorandum on Determination of Soil Clean-up Objectives and Clean-up Levels (TAGM 4046). Air Quality Regulations (6 NYCRR Part 200 series) are relevant to air discharges from the groundwater treatment systems.

Alternative 1 would not comply with ARARs for groundwater. In the short term, Alternative 2 would not comply with ARARs for groundwater. It is anticipated that groundwater would eventually achieve ARARs because the contaminants present are biodegradable or subject to other natural attenuation processes. However, the time required and the potential for contamination to spread to a new area is uncertain. Modeling conducted for the FS predicted that it could take over 100 years to attain ARARs for some BTEX compounds.

Alternatives 3 and 4 would comply with ARARs for groundwater. The groundwater treatment system (Alternative 3) and soil vapor extraction system (Alternative 4) would be designed to comply with the NYSDEC Part 200 Air Quality Regulations.

Alternative 5 would comply with most ARARs for groundwater. Freon would not be effectively removed by ORC; however, it is anticipated that natural attenuation would eventually reduce the freon concentration to the ARAR.

None of the alternatives include active measures to specifically address remediation goals for soil. In addition, some SVOCs would remain in soil near the water table. These SVOCs are primarily PAHs, which are naturally biodegradable, but over relatively long periods. The addition of air under Alternative 4 or the addition of ORC under Alternative 5 would be expected to enhance the biodegradation rate.

The next five ***primary balancing criteria*** are used to compare the positive and negative aspects of each of the remedial alternatives.

3. **Short-Term Effectiveness.** This item evaluates the potential short-term impacts of the remedial action upon the community, the workers, and the environment. The length of time needed to achieve the remedial objectives is also estimated and compared against other alternatives.

No short-term impacts to the workers would be expected to occur as the result of implementing Alternative 1. Short-term impacts to the workers from potential exposure to contaminated media under Alternatives 2 through 5 are possible, but would be controlled by the use of personal protective equipment and appropriate health and safety training.

Alternative 4 would remove the majority of the contaminants in the quickest time frame (approximately 2 to 5 years), and Alternative 5 should be able to remediate the site in 3 to 10 years. However, SVOC contamination may not be addressed within these times for either alternative. Groundwater cleanup under Alternative 3 may take more than 30 years. For Alternatives 1 and 2, groundwater modeling

conducted for the FS predicted that it could take over 100 years to attain remediation goals for some BTEX compounds.

No short-term impacts to the community or the environment would be expected to occur as the result of implementing any of the alternatives.

4. **Long-Term Effectiveness and Permanence.** This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk posed by the remaining wastes; 2) the adequacy of the controls intended to limit the risk; and 3) the reliability of these controls.

For Alternative 1, the future potential threat to human health would remain because there would be no land use or groundwater use controls. Organic contaminants would remain in groundwater above remediation goals except for any decrease through natural attenuation. The long-term effectiveness would not be known because no monitoring would be conducted.

Although no removal would occur under Alternative 2, potential threats to human health would be minimized. This limited action alternative would use institutional controls such as NWIRP Calverton transfer documents to limit future use of the site. Institutional controls have uncertain long-term effectiveness. The protection of future human receptors would depend on effective administration and management of the transfer documents. New areas could be impacted if the contaminated groundwater migrates faster than it is attenuating. Monitoring would be conducted to address this concern, evaluate the effectiveness of natural attenuation, and determine whether additional actions would be required.

Alternatives 3, 4, and 5 would provide for good long-term effectiveness. Groundwater extraction (Alternative 3) can be very effective at containing contaminated groundwater. Air sparging (Alternative 4) can be very effective in treating groundwater contaminated with VOCs and SVOCs. Bioremediation using ORC can be very effective in treating groundwater contaminated with fuel-related VOCs. Freon would not be effectively treated using bioremediation. Monitoring would be conducted to determine the effectiveness of these alternatives.

For Alternatives 3, 4, and 5, groundwater extraction and in-situ treatment can result in residual contaminant concentrations leveling off at relatively low concentrations that are greater than the remediation goals. If this occurs, these alternatives include provisions for switching to monitoring natural attenuation (Alternative 2).

5. **Reduction of Toxicity, Mobility, or Volume.** Preference is given to alternatives that permanently, and by treatment, reduce the toxicity, mobility, or volume of the wastes at the site.

Alternatives 1 and 2 do not include treatment to reduce toxicity, mobility, or volume.

Alternative 3 includes treatment of extracted groundwater before it is reinjected. Alternative 4 (air sparging) and Alternative 5 (ORC) include in-situ treatment of contaminated groundwater and soil.

6. **Implementability.** The technical and administrative feasibility of implementing each alternative is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

Alternative 1 is readily implementable because no actions would occur.

Alternative 2 is expected to be readily implementable because the site is located within a controlled facility, where local rules and local ordinances can be strictly enforced. Restrictions for future property use would involve legal assistance and regulatory approval. Provisions in NWIRP Calverton transfer documents would be defined and enforced relatively easily because the site is located within a Federal facility. Sampling and analysis are also readily implementable.

Alternatives 3 and 4 are readily implementable. Drilling contractors and equipment are readily available for well construction. The remedial technologies are well-proven and established in the remediation and construction industries. Treatment and disposal facilities are available for any treatment residuals that would be generated during remediation. Sampling and analysis are also readily implementable.

Alternative 5 is readily implementable. It involves using an innovative technology (i.e., ORC). Contractors and equipment are available for well installation and injection of the ORC. This technology has been shown to be viable for petroleum contaminated groundwater. Sampling and analysis are also readily implementable.

7. **Cost.** Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost

effectiveness can be used as the basis for the final decision. The costs for each alternative are summarized in Table 3.

The last two criteria are identified as ***modifying criteria***. These are taken into account after evaluating those above and after receipt of public comments on the proposed plan. They can alter the preferred remedy if the alternative does not receive favorable public response.

8. **State Acceptance.** State acceptance (NYSDEC) of the preferred alternative described below has been given. NYSDEC has reviewed the Navy's document and provided comments. All comments have been incorporated and NYSDEC concurs with the selected remedy.

9. **Community Acceptance.** Community acceptance of the preferred alternative outlined in the Proposed Remedial Action Plan (PRAP) was evaluated at the conclusion of the public comment period. The public comment period ran from April 2, 2002 through May 3, 2002. A public meeting was held on April 17, 2002. No comments pertaining to the PRAP were received at the public meeting or via mail.

SECTION 8 SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, the evaluation presented in Section 7.0, and the reasons presented below, the Navy is selecting Alternative 4, as described in detail in this ROD. The selected remedy, Alternative 4, consists of air sparging, soil vapor extraction, institutional controls in land and groundwater use, operation and maintenance of the treatment system, and long-term groundwater monitoring. The air sparging/soil vapor extraction system is depicted on Figures 5 and 6.

To measure the effectiveness of the air sparging/bioventing system, media (soil, groundwater, and/or soil vapor) sampling will be conducted on a quarterly basis for the first year of system operation and then semi-annually thereafter. Analytical data collected from each year's sampling events will be presented in a single report that will be submitted annually.

The air sparging/bioventing system will be operated until (1) the selected remediation goals for soil and groundwater are achieved or (2) such time that the system is determined to no longer operate in an effective manner. The determination of effectiveness will be made by the Navy and the NYSDEC and will be considered to be the point at which contaminant concentrations in groundwater become "diffusion controlled". In other words, when the plot of contaminant concentration versus time becomes flat or asymptotic. Upon making the determination that contaminant concentrations have become diffusion

controlled, the Navy will submit this conclusion in writing to NYSDEC, along with the recommendation to switch the cleanup technology to natural attenuation with monitoring. Monitoring will then be conducted until the remediation goals have been met. Media sampling will be conducted on a semi-annual basis and the analytical data collected from each year's sampling events will be presented in a single report that will be submitted annually.

The Alternative 4 selection is based on the evaluation of each of the five alternatives developed for this site. It was determined that Alternative 4 would meet remediation goals, prevent exposure to site-related contaminants in the soil and groundwater, actively restore a natural resource (sole source aquifer), and prevent further deterioration of downgradient groundwater conditions.

Off-site groundwater will be protected by a long-term monitoring program that includes sampling of on-site groundwater monitoring wells located downgradient of the contaminated groundwater.

The estimated present worth cost to implement the remedy in this ROD is $1,328,000. The cost to construct the remedy is estimated to be $700,000. The estimated annual cost for operation and maintenance is $59,000 per year for 4 years. The estimated annual monitoring cost is $78,400 for Year 1 and $42,280 per year for Years 2 through 10. The present worth cost also includes $20,000 for each 5-year review.

The elements of the selected remedy are as follows:

- A remedial design program to verify the components of the conceptual design and provide details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.

- Installation of approximately 56 air injection wells to a depth of 10 to 20 feet below the water table. Approximately 340 cubic feet per minute of air will be injected into the saturated zone. Groundwater in the upper 20 feet of the aquifer represents the vertical extent of the most contaminated groundwater.

- Installation of approximately 30 soil vapor extraction wells in the vadose zone. The soil vapor extraction rate will be approximately 1.1 to 1.5 times the air injection rate.

- Installation of air emission controls, if required, to comply with NYSDEC and any other applicable air regulations.

- For costing purposes, operation and maintenance of the treatment system was estimated to be approximately 4 years, which corresponds to the Navy's prediction that source area contaminant mass would be reduced by 90% within that timeframe.

- Long-term groundwater monitoring. Testing will be done, at a minimum, on a quarterly basis for the first year and on a semi-annual basis thereafter.

- Institutional controls in the form of existing use and development restrictions that prevent the use of groundwater as a source of potable or process water without necessary water quality treatment, as determined by the Suffolk County Department of Health Services.

- A performance evaluation conducted at least every 5 years to determine whether the remedial goals have been achieved and whether monitoring should continue.

SECTION 9 COMMUNITY PARTICIPATION

In 1997, the Navy established a Restoration Advisory Board (RAB) for NWIRP Calverton. The purpose of the RAB is to discuss and exchange information between the Navy, regulatory agencies, and the community on environmental restoration topics. As of June 2002, 11 RAB meetings have been held to discuss past activities and future plans for NWIRP Calverton sites, including Site 7. The Navy's preferred remedy for Site 7 was discussed at the September 19, 2001 and February 26, 2002 RABs. The Proposed Remedial Action Plan was distributed to the RAB members for review.

A copy of the Proposed Remedial Action Plan was available to the public in the Administrative Record and at the Navy's information repository located at the Riverhead Free Library. Public notice was provided in the Suffolk Life Newspaper on April 3, 2002 and April 10, 2002. A poster session and public meeting was held in the Riverhead Town Hall on April 17, 2002. In addition to the Navy, the Navy's consultant, and the NYSDEC, only one member of the local community and one member of the Town of Riverhead were in attendance at the public meeting. There were no comments regarding the Navy's planned remedy for Site 7. In addition, no other written comments were submitted during the 30-day public comment period. Therefore, a responsiveness summary was not prepared.

TABLE 1

NATURE AND EXTENT OF SOIL CONTAMINATION
SITE 7 – FUEL DEPOT
NWIRP CALVERTON, NEW YORK

Chemical	Frequency of Detection	Range of Positive Detections	Frequency Exceeding Remediation Goal	Remediation Goal
Volatile Organics (µg/kg)				
Ethylbenzene	1/32	590	1/32	550
Methylene chloride	1/32	5.5	0/32	100
Toluene	3/32	4 – 10	0/32	150
Xylene	2/32	8.3 – 2,600	1/32	120
Semivolatile Organics (µg/kg)				
2-Methylnaphthalene	1/32	2,600	0/32	36,400
Acenaphthene	1/32	87	0/32	50,000
Anthracene	3/32	310 – 1,200	0/32	50,000
Benzo(a)anthracene	8/32	94 – 3,300	6/32	224 or MDL
Benzo(a)pyrene	10/32	36 – 2,200	9/32	61 or MDL
Benzo(b)fluoranthene	10/32	50 – 1,700	3/32	1,100
Benzo(g,h,i)perylene	9/32	190 – 1,100	0/32	50,000
Benzo(k)fluoranthene	8/32	57 – 1,700	2/32	1,100
Carbazole	1/32	120	NA	NA
Chrysene	8/32	82 – 3,100	6/32	400
Dibenzo(a,h)anthracene	1/32	240	1/32	14 or MDL
Di-n-butyl phthalate	4/32	26 – 360	0/32	8,100
Di-n-octyl phthalate	1/32	30	0/32	50,000
Fluoranthene	8/32	130 – 7,400	0/32	50,000
Fluorene	2/32	180 – 550	0/32	50,000
Indeno(1,2,3-cd)pyrene	10/32	36 – 1,400	0/32	3,200
Phenanthrene	4/32	250 – 2,100	0/32	50,000
Pyrene	8/32	120 – 10,000	0/32	50,000

NA No published remediation goal available in TAGM 4046.
MDL Method Detection Limit

TABLE 2

NATURE AND EXTENT OF GROUNDWATER CONTAMINATION
SITE 7 – FUEL DEPOT
NWIRP CALVERTON, NEW YORK

Chemical	Maximum Concentration	Remediation Goal
Volatile Organics (µg/L)		
Benzene	17	1
Ethylbenzene	480	5
Freon	100	5
Toluene	710	5
Xylenes	2,400	5
Semivolatile Organics (µg/L)		
2-Methylnaphthalene	78	50
Naphthalene	150	10
Inorganics (µg/L)		
Lead	25	15/25[1]

1 Federal action level for potable water supplies is 15 µg/L; NYSDEC groundwater quality standard is 25 µg/L.

TABLE 3

REMEDIAL ALTERNATIVE COSTS
SITE 7 – FUEL DEPOT
NWIRP CALVERTON, NEW YORK

Remedial Alternative	Capital Costs	Annual O&M Costs	Annual Monitoring Costs	Total Present Worth
Alternative 1	$0	$0	$0	$0
Alternative 2	$70,300	$0	$220,000 (Year 1) $79,400 (Years 2 through 30)	$1,230,000
Alternative 3	$2,240,000	$150,000 (Years 1 through 30)	$116,000 (Year 1) $55,900 (Years 2 through 30)	$4,900,000
Alternative 4	$700,000	$59,400 (Years 1 through 4)	$78,000 (Year 1) $42,280 (Years 2 through 10)	$1,328,000
Alternative 5	$3,800,000	$0	$80,160 (Year 1) $55,000 (Years 2 through 10)	$4,241,000

5-year review costs of approximately $20,000 each are not shown but are included in the present worth.

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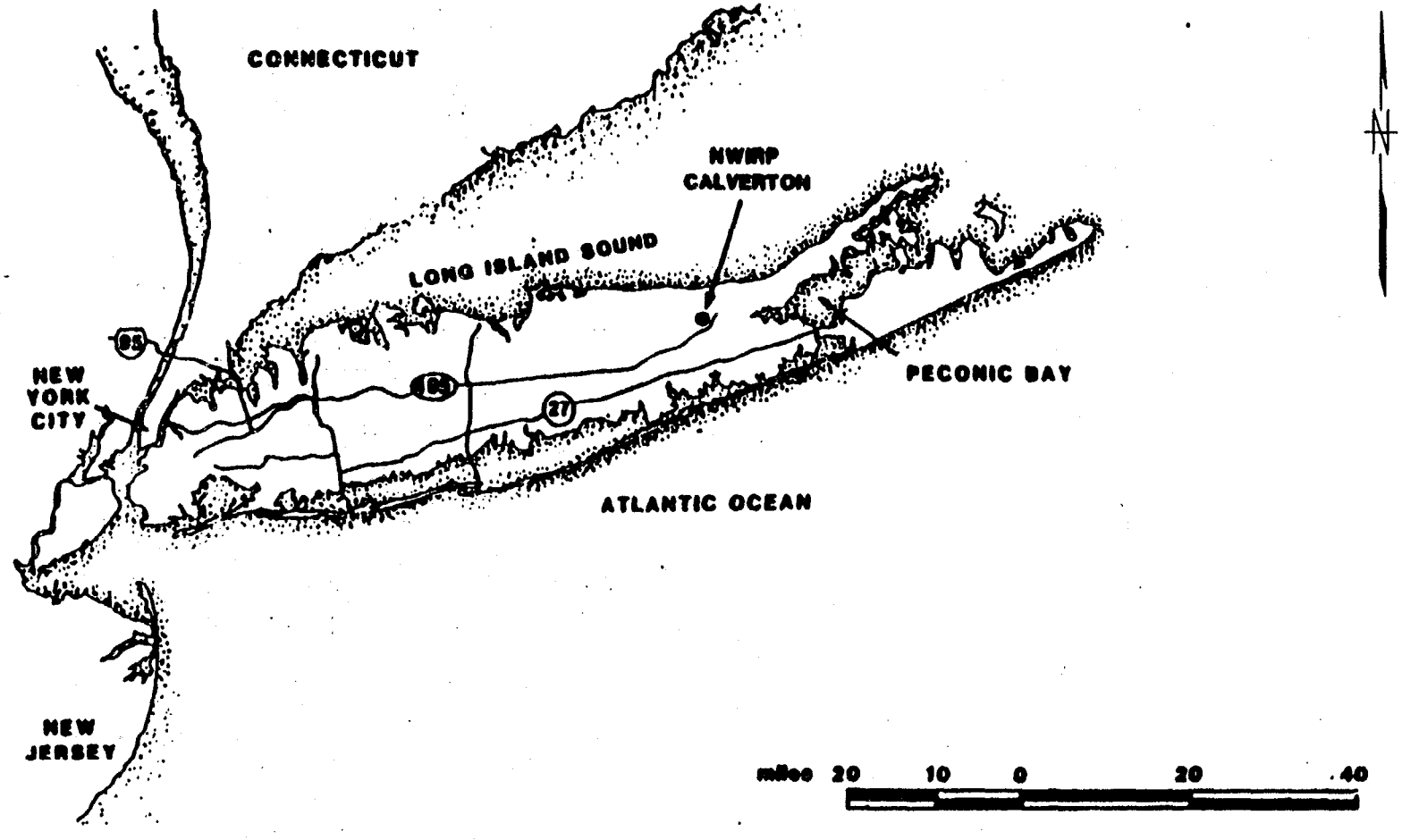

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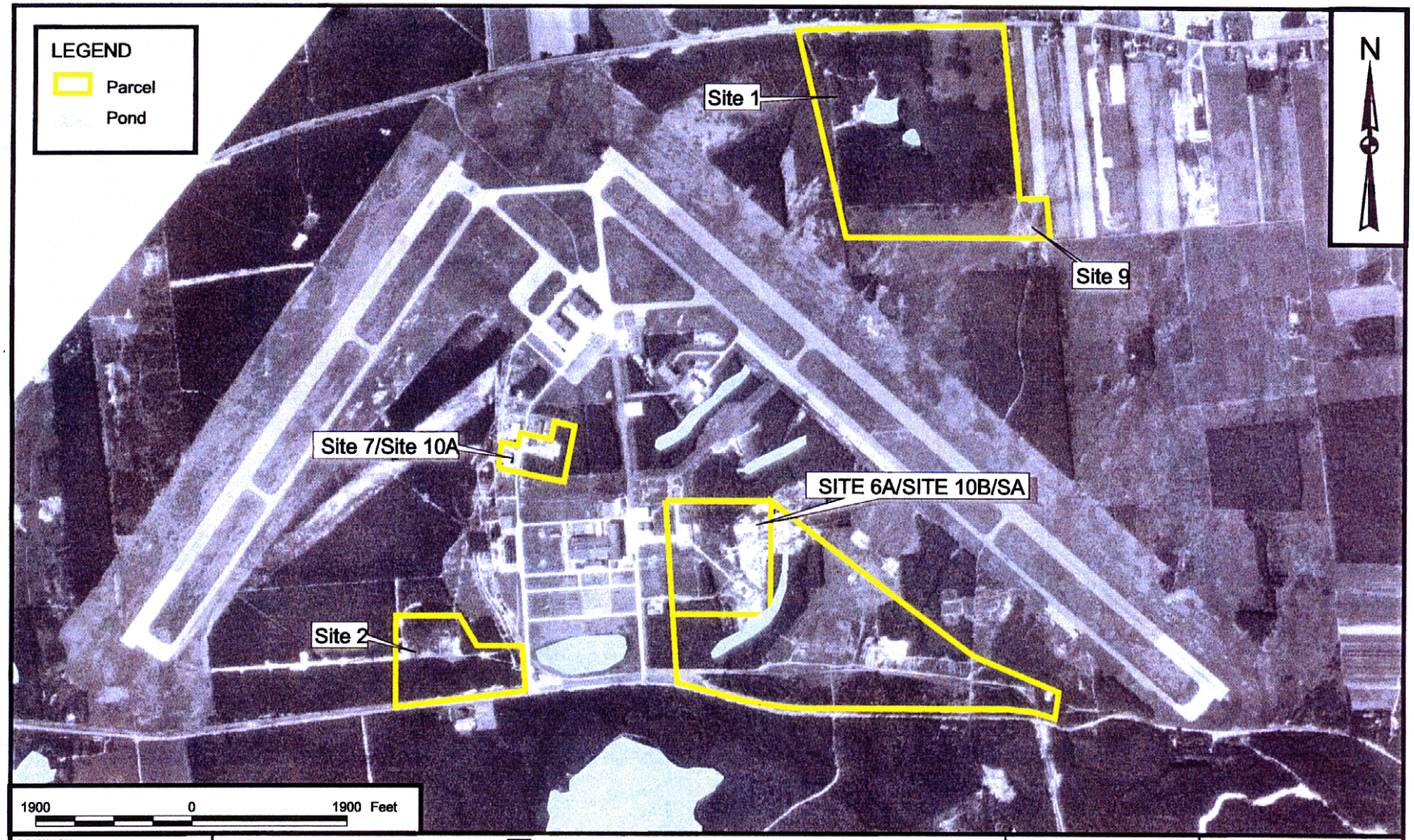
COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 1	REV. 0

FORM CADD NO. TtNUS_AH.DWG - REV 0 - 1/22/98



DRAWN BY: J. LAMEY	DATE: 11/22/99	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 7398 / OWNER NUMBER: 0270
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COST/SCHEDULE-AREA			APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			DRAWING NO.: FIGURE 2 / REV: 0

P:\GIS\NWIRP_CALVERTON\SURFACE_WATER_HYDROLOGY.APR SITE LOCATION MAP 01/04/01 JAL

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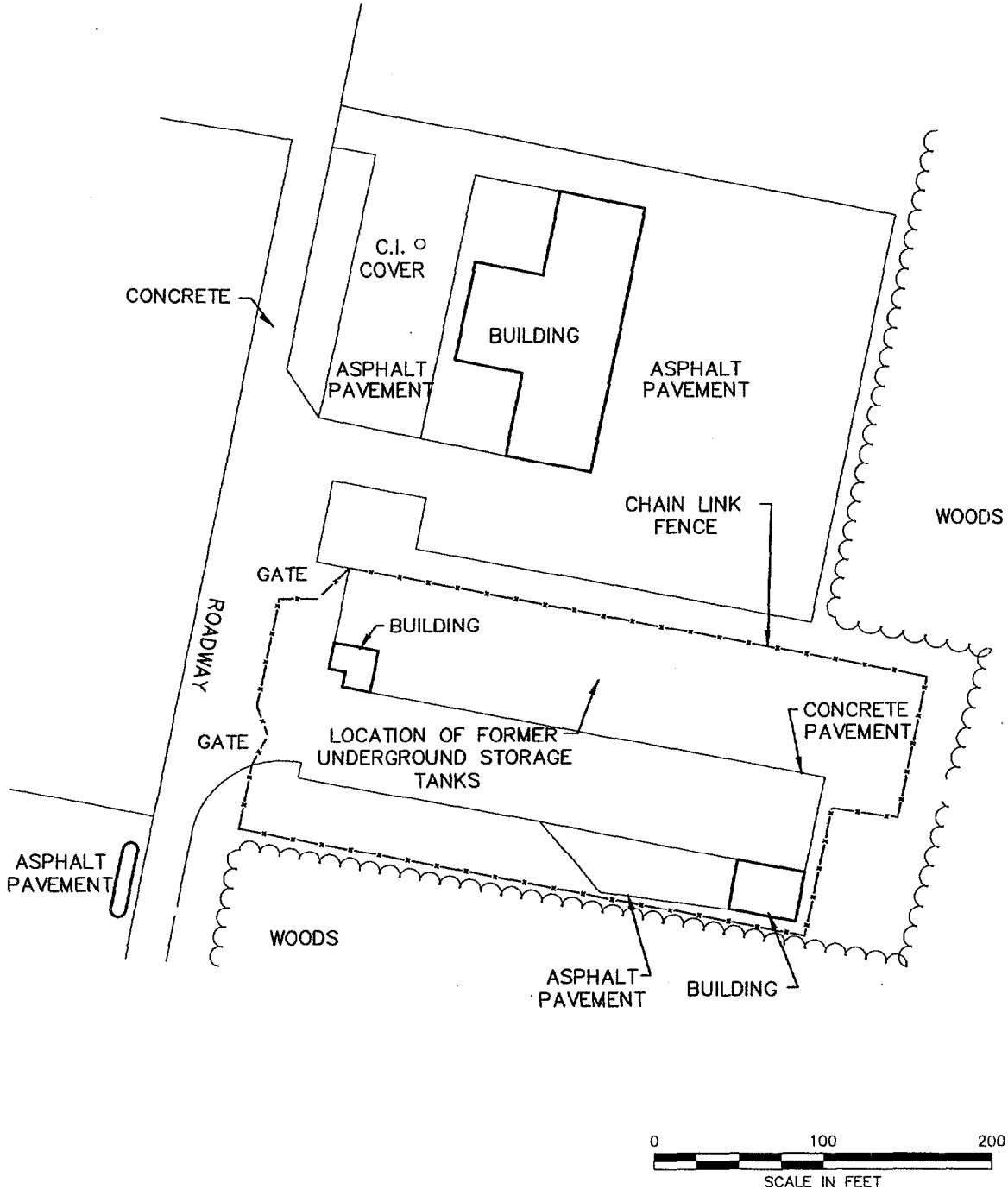

DRAWN BY HJP DATE 9/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 4570	OWNER NO. 0189
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COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3	REV. 0

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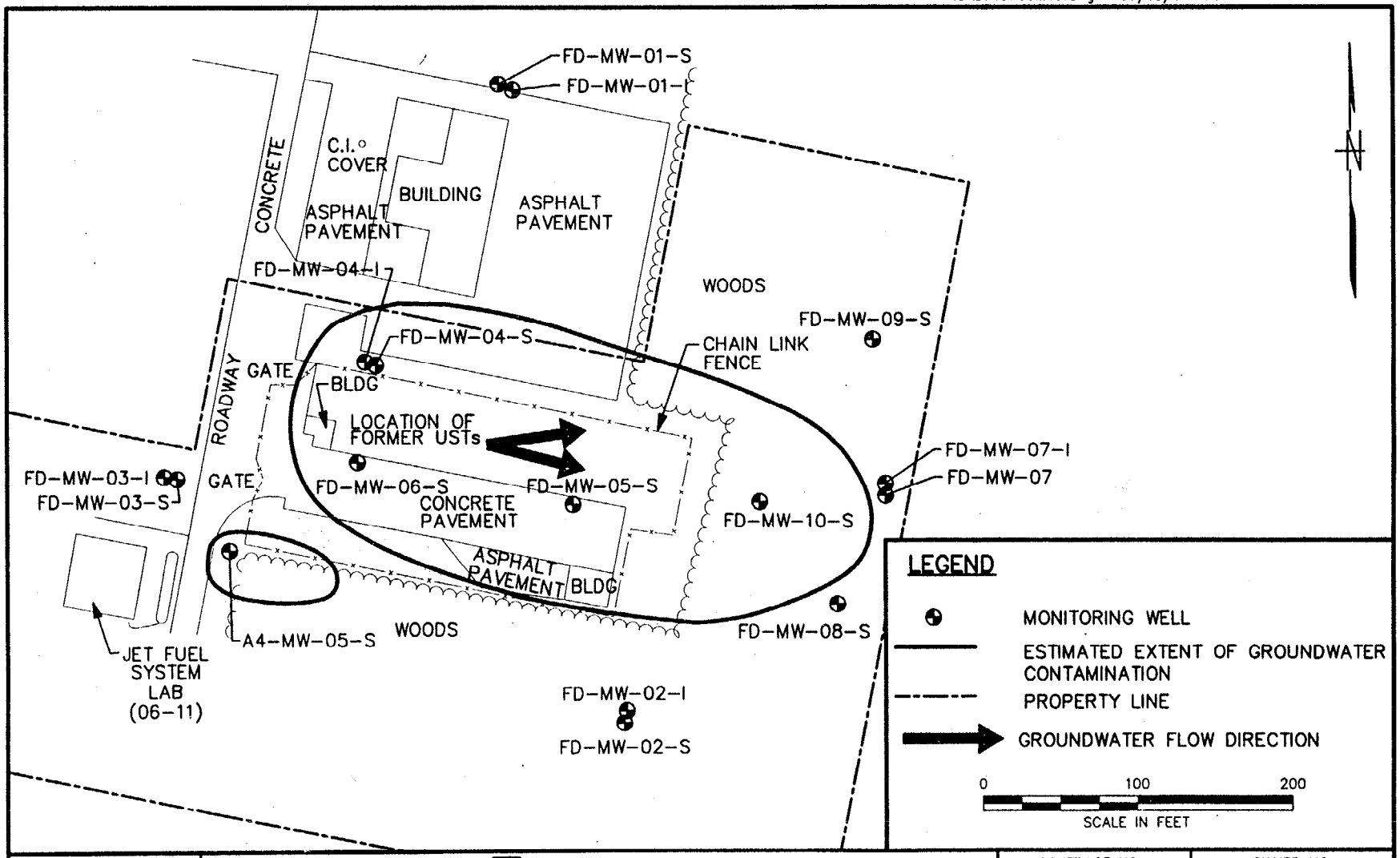

DRAWN BY HJP DATE 9/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 4570	OWNER NO. 0189
CHECKED BY DATE	ESTIMATED EXTENT OF GROUNDWATER CONTAMINATION SITE 7 – FUEL DEPOT NWIRP, CALVERTON, NY	APPROVED BY DATE	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 4	REV. 0

FORM CADD NO. TtNUS_AH.DWG - REV 0 - 1/22/98

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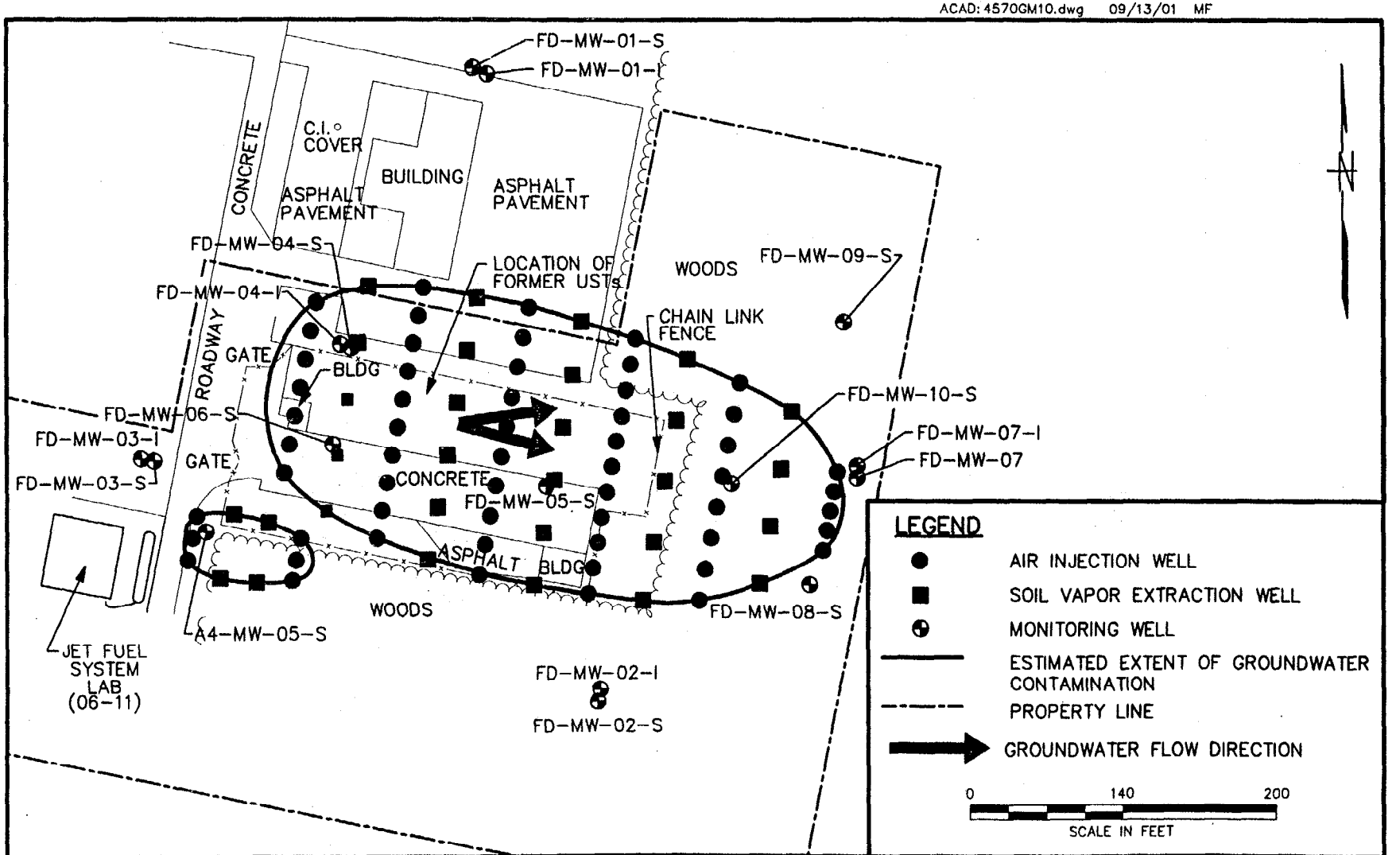

DRAWN BY HJP DATE 9/12/01	Tetra Tech NUS, Inc.	CONTRACT NO. 4570	OWNER NO. 0189
CHECKED BY DATE	ALTERNATIVE 4: AIR SPARGING/BIOVENTING LAYOUT SITE 7 – FUEL DEPOT NWIRP, CALVERTON, NY	APPROVED BY DATE	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 5	REV. 0

FORM CADD NO. TtNUS_AH.DWG - REV 0 - 1/22/98

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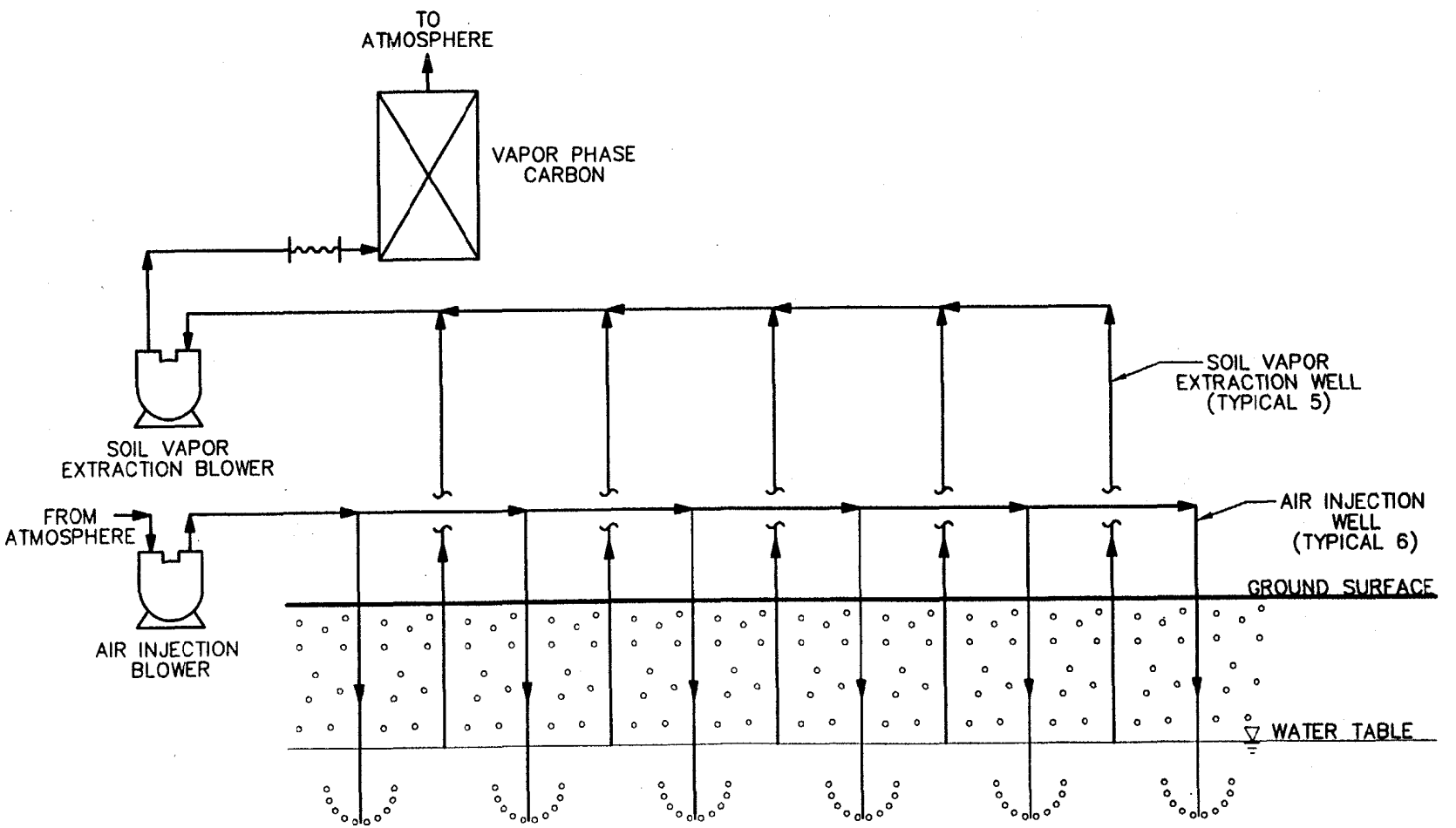

DRAWN BY MF DATE 9/28/99	Tetra Tech NUS, Inc.	CONTRACT NO. 4570	OWNER NO. 0189
CHECKED BY DATE		APPROVED BY DATE	
COST/SCHED-AREA	ALTERNATIVE 4 – AIR STRIPPING/BIOVENTING SCHEMATIC SITE 7 – FUEL DEPOT NWIRP, CALVERTON, NY	APPROVED BY DATE	
SCALE NOT TO SCALE		DRAWING NO. FIGURE 6	REV. 0

FORM CADD NO. T+NUS_AH.DWG - REV 0 - 1/22/98

GLOSSARY OF TERMS

ARARs	Applicable or Relevant and Appropriate Requirements
AOCs	Areas of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
DD	Decision Document
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
GOCO	government owned, contractor operated
IAS	Initial Assessment Study
IR	Installation Restoration
IRM	interim remedial measure
MDL	Method Detection Limit
ug/l	micrograms per liter
ug/kg	micrograms per kilogram
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
NPL	National Priorities List
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PA	Preliminary Assessment
PAH	polynuclear aromatic hydrocarbon
PRAP	Proposed Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RAB	Restoration Advisory Board
ROD	Record of Decision
SCDHS	Suffolk County Department of Health Services
SCGs	standards, criteria, and guidance
SI	Site Investigation
SVOC	semivolatile organic compound
TAGM	Technical Assistance and Guidance Memorandum

TBCs	To Be Considered (guidances)
UST	Underground Storage Tank
VA	Veterans Administration
VOC	volatile organic compound

ATTACHMENT A

ADMINISTRATIVE RECORD

ADMINISTRATIVE RECORD FOR
SITE 7 - FUEL DEPOT AREA
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
CALVERTON, NEW YORK

1. Initial Assessment Study of Naval Weapons Industrial Reserve Plant, Bethpage, New York and Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Naval Energy and Environmental Activity, 1986.

2. Natural Resources Management Plan, Naval Weapons Industrial Reserve Plant, Calverton, New York 1989.

3. Hazard Ranking System Preliminary Scoring and Site Inspection Report Form, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Halliburton NUS Corporation, 1992.

4. Final Site Investigation, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Halliburton NUS Corporation, 1992.

5. RCRA Facility Investigation, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Halliburton NUS Corporation, 1995.

6. RCRA Facility Investigation Addendum, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Halliburton NUS Corporation, 1995.

7. Final Environmental Impact Statement, Transfer and Reuse, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Naval Facilities Engineering Command, Northern Division, 1997.

8. Engineering Evaluation/Cost Analysis (EE/CA) for Sites 2, 6A, 9, and 10B, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Tetra Tech NUS, Inc., September 1998.

9. Phase 2 RCRA Facility Investigation Report – Site 7 – Fuel Depot Area, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Tetra Tech NUS, Inc., January 2000.

10. Feasibility Study/Corrective Measures Study for Site 7 – Fuel Depot, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Tetra Tech NUS, Inc., April 2002.

11. Fact Sheet, Site 7 – Fuel Depot Area, Proposed Remedial Action Plan, April 2002.

12. Proposed Remedial Action Plan for Site 7 – Fuel Depot, Naval Weapons Industrial Reserve Plant, Calverton, New York, prepared by Engineering Field Activity Northeast, Naval Facilities Engineering Command, April 2002.

13. Transcript of April 17, 2002 Public Meeting on Proposed Remedial Action Plan for Site 7 – Fuel Depot Area, Naval Weapons Industrial Reserve Plant, Riverhead Town Hall, Riverhead, New York.