RECORD OF DECISION

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT

BETHPAGE, NEW YORK

OPERABLE UNIT 2 - GROUNDWATER

NYS REGISTRY: 1-30-003B

PREPARED BY

ENGINEERING FIELD ACTIVITY, NORTHEAST

NAVAL FACILITIES ENGINEERING COMMAND

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DECLARATION STATEMENT – RECORD OF DECISION

Site Name and Location

Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage
Town of Oyster Bay
Nassau County, New York
New York Registry Number: 1-30-003B
Funding Source: Environmental Restoration, Navy (ER,N)

Statement of Basis and Purpose

This Record of Decision (ROD) document presents the selected remedial action for Operable Unit (OU) 2 – Groundwater at the Naval Weapons Industrial Reserve Plant (NWIRP) in Bethpage, New York. The Department of Navy (Navy), in consultation with New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH), is issuing this remedy in accordance with New York 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.

The Navy's decision for groundwater is based on the Administrative Record for NWIRP Bethpage. A listing of the documents in the Administrative Record are provided in Attachment A of this ROD. The Navy's remedy for groundwater was also based upon public input to a Proposed Remedial Action Plan (PRAP) for regional groundwater prepared and presented by NYSDEC in December 2000. NYSDEC then issued *a Record of Decision for Operable Unit 2 Groundwater Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites, Nassau County Site Numbers 1-30-003A&B* in March 2001. Much of the information presented in this Navy ROD for Groundwater was taken from the NYSDEC OU 2 ROD referenced above.

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, present a current or potential threat to human health and the environment.

Description of the Selected Remedy

The remedial action described in this document represents the second remedial phase or operable unit involving the NWIRP Bethpage site. It addresses on-site contaminated groundwater beneath the Navy's 105-acre parcel and it also addresses contaminated groundwater that has migrated off-site and has commingled with a contaminated groundwater plume located beneath property owned by the Northrop Grumman Corporation (NGC). Due to the existence of this commingled plume, NYSDEC issued a Record of Decision for "regional groundwater" that described a remedial strategy to address contaminated groundwater beneath both Navy and NGC property and also addresses that portion of contaminated groundwater that has migrated downgradient of both properties into the surrounding community. The United States Environmental Protection Agency (USEPA) Region II previously issued a Record of Decision in September 2000 for that portion of the groundwater contaminant plume that lies beneath and downgradient of property owned by Occidental Chemical since this facility is presently designated as a National Priorities List (NPL) site.

The NYSDEC Groundwater ROD was based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Northrop Grumman and the Naval Weapons Industrial Reserve Plant Class 2 Inactive Hazardous Waste Disposal Sites and the criteria identified for evaluation of alternatives. The selected remedy included a number of response measures that were categorized into a Groundwater Remedial Program and a Public Water Supply Protection Program.

This document describes those components of NYSDEC's OU 2 ROD that will be implemented by the Department of Navy subject to the availability of Environmental Restoration, Navy (ER,N) funds in future fiscal years that will allow for implementation of the various remedial groundwater components discussed below.

NYSDEC's Groundwater ROD discusses regional groundwater beneath the Navy and NGC properties plus the downgradient, commingled portion as a single entity or operable unit. For the purposes of the Navy's Groundwater ROD, groundwater has been subdivided into an on-site and off-site component. The Navy's selected remedy for ON-SITE GROUNDWATER includes the following:

1. An **institutional control** consisting of the placement of a restriction in the deed of transfer to the County of Nassau, New York prohibiting extraction of groundwater from within the boundaries of the 105-acre or Plant 20 parcels located at the Navy's former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage facility. In order to aid in the compliance with the deed restriction, the Navy has completed the abandonment of the seven (7) deep production wells formerly located on the 105-acre parcel. The production wells were used for the extraction of groundwater as non-contact cooling water to support operations conducted by NGC during a time when Northrop Grumman leased the 105-acres from the

Navy. If a future occupant of the Navy's 105-acre parcel wishes to pursue groundwater extraction, language will be included in the appropriate deed(s) of transfer requiring prior Navy notification and securing written permission from the Nassau County Department of Health and/or NYSDEC.

Further, the selected remedy for ON-SITE GROUNDWATER is also based on the recognition that an existing groundwater extraction and treatment system, known as the Onsite Containment (ONCT) System, continues to contain and remediate VOC-contaminated groundwater emanating from the Navy's property. The ONCT system was constructed, and is currently being operated on an annual basis, by the Northrop Grumman Corporation and was installed as a component of NYSDEC's Regional Groundwater ROD. The Navy recognizes that continued operation of the ONCT system is paramount to ensuring that the Navy's selected remedy for ON-SITE GROUNDWATER remains protective of human health and the environment. In the event that the ONCT system fails to continue to operate, the Navy also recognizes that it's ON-SITE GROUNDWATER remedy would no longer be protective of human health or the environment. In this case, the Navy will re-evaluate the protectiveness of the ON-SITE GROUNDWATER remedy and implement all requisite measures as determined by the Navy in consultation with NYSDEC, NYSDOH, and the Nassau County Department of Health to ensure the continued protection of human health and the environment.

As stated above, NYSDEC's selected remedy for groundwater included a number of response measures that were categorized into a Groundwater Remedial Program and a Public Water Supply Protection Program. The components of these two programs for which the Department of Navy has agreed to implement are all considered to be located off of Navy property and are, therefore, being considered as OFF-SITE GROUNDWATER issues. The Navy's selected remedy for OFF-SITE GROUNDWATER includes the following:

Groundwater Remedial Program

- mass contaminant removal through groundwater extraction and treatment in an offsite area near the GM 38 monitoring well cluster;
- pre-design investigation to determine the optimal groundwater extraction location(s) in the GM 38 offsite treatment area(s);
- operation and maintenance of the GM 38 area remedy;
- additional groundwater investigation in the vicinity of well GM-75D2 in order to determine whether groundwater contamination in this area represents a significant threat to downgradient public water supply wells.

Public Water Supply Protection Program

The Navy recognizes the importance of continued provision of potable water to those communities/populations served by water supply wells that are, or that may become, impacted by site-related contamination. To this end, the NYSDEC Groundwater ROD required that a public water supply protection program be implemented. The components of this program for which the Department of Navy will implement include:

- installation of Vertical Profile Borings (VPBs) to gather water quality and lithologic data that will be used in the regional groundwater computer model to aid in the placement of outpost monitoring wells;
- development of a Public Water Supply Well Contingency Plan that uses data gathered during the VPB installation program and the regional groundwater computer model to identify the locations of the outpost monitoring wells and to also assign "trigger values" to each outpost well in order to determine if treatment or other comparable alternative measure will be required for other public water supply wellfields located downgradient of the VOC-contaminant plume. If triggered, this will alert the Navy to begin discussions with the appropriate water district regarding various treatment alternatives;
- installation of the outpost monitoring wells in areas upgradient of potentially affected water supply wellfields as outlined in the Public Water Supply Well Contingency Plan;
- public water supply wellhead treatment or comparable alternative measures, as necessary, for wellfields that become affected in the future.

It should be noted that another component of the Public Water Supply Protection Program was the treatment of wellfields 4, 5, and 6 associated with the Bethpage Water District (BWD). Wells at these Plants had either been, or would likely be, adversely impacted by VOC-contaminated groundwater emanating from Navy and NGC properties prior to issuance of NYSDEC's Groundwater ROD in 2001. Due to the immediate threat to public health, the Navy supplied funding to BWD, in June 1996, for the construction and 30-year operation of an air stripping treatment system for BWD's Plant 5 facility. This action was considered to be an interim action that was part of the Navy's Operable Unit 1 Soils ROD issued by the Navy in July 1995. In the mid-1990's, NGC took similar action to protect the water supplies at BWD Plants 4 and 6.

Regulatory Acceptance

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) concur with the components identified in this document and that their implementation will result in the protection of human health and the environment. In addition, NYSDEC has indicated that the Navy's ROD for Groundwater would have to include all elements of the remedial strategy outlined in NYSDEC's OU 2 ROD issued in March 2001 before State concurrence would be issued. However, the only components of NYSDEC's OU 2 ROD that are not included in the Navy's ROD for Groundwater is the continuing operation of the ONCT system, monitoring of the permanent groundwater well network and continued payments to Bethpage Water District for the Plants 4 and 6 treatment systems. Therefore, the Navy feels that with these components already in place and being operated by another party, it is not necessary for the Navy to include them in this document. Further, the Navy recognizes that the continued operation of the ONCT system is paramount to ensuring that the Navy's ROD remains protective of human health and the environment. In the event that the other party fails to continue to operate the ONCT system, then the Navy also recognizes that the Navy would have to re-evaluate the effectiveness of the remedy and propose changes that would ensure that the remedy remains 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 to the remedial action to the extent practicable. Because this remedy will result in hazardous substances remaining at the Site above levels that allow for unlimited use of and unrestricted exposure to the Site, a review will be conducted at least every five years after commencement of remedial action to ensure that the remedy continues to be protective of human health and the environment.

_____ 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
Bethpage, New York
January 2003

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The Department of Navy in consultation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health has selected this remedy to address the significant threat to human health and/or the environment created by the presence of hazardous waste at the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, an inactive hazardous waste disposal site. In particular, this ROD addresses contaminated groundwater located beneath NWIRP Bethpage and also includes a portion of contaminated groundwater that has migrated off of NWIRP Bethpage property. As more fully described in Sections 3 and 4 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, painting of aircraft and components and other activities that involve aircraft manufacturing. Wastes generated by plant operations were disposed directly into either drainage sumps, dry wells and/or on the ground surface resulting in the disposal of a number of hazardous wastes, including the volatile organic compounds (VOCs) perchloroethene (PCE) and trichloroethene (TCE), the semi-volatile organic compound (SVOC) polychlorinated biphenyls (PCBs) and the inorganics chromium and cadmium at the site. Some of these contaminants have migrated from the points of disposal to surrounding areas, including the soils of these sites and the groundwater beneath and downgradient of NWIRP Bethpage property.

These disposal activities have resulted in the following significant threats to the public health and/or the environment:

- a significant threat to public health associated with contaminated soils, groundwater and drinking water;
- a significant threat to the environment associated with contaminated soils and groundwater.

A previous record of decision for soils (Operable Unit 1) was issued by the Navy in July 1995 and is currently being implemented to address the significant threat to human health and the environment from the hazardous waste disposal activities mentioned above.

The Department of Navy is the lead agency for this project and provides funding for remedial activity to address contamination that has occurred on or has emanated from Navy-owned property. This authority has been delegated to the Department of Navy as part of Presidential Executive Order 12580. Regarding groundwater, the remedy discussed below was selected by the Department of Navy in order to eliminate the significant threats to the public health and/or the environment to the maximum extent practicable caused by the hazardous waste disposal activities that occurred at NWIRP Bethpage.

The Navy's selection, however, was heavily based upon a Record of Decision for Regional Groundwater developed by NYSDEC to address a commingled, regional groundwater contaminant plume located beneath properties owned by the Navy as well as property's owned by the Northrop Grumman and Occidental Chemical Corporations. NYSDEC's Operable Unit 2 ROD described a remedial strategy that would address contaminated groundwater beneath both Navy and Northrop Grumman Corporation (NGC) property and also addresses that portion of contaminated groundwater that has migrated downgradient of both properties into the surrounding community. The United States Environmental Protection Agency (USEPA) Region II previously issued a Record of Decision in September 2000 for that portion of the groundwater contaminant plume that lies beneath and downgradient of property owned by Occidental Chemical since this facility is presently designated as a National Priorities List (NPL) site.

NYSDEC's Groundwater ROD discusses regional groundwater beneath the Navy and NGC properties plus the downgradient, commingled portion as a single entity or operable unit. The Navy's ROD, however, will describe those components of NYSDEC's Groundwater ROD that will be implemented by the Department of Navy. For the purposes of the Navy's Groundwater ROD, groundwater has been subdivided into an on-site and off-site component. The Navy's selected remedy for ON-SITE GROUNDWATER includes the following:

1. An **institutional control** consisting of the placement of a restriction in the deed of transfer to the County of Nassau, New York prohibiting extraction of groundwater from within the boundaries of the 105-acre or Plant 20 parcels located at the Navy's former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage facility. In order to aid in the compliance with the deed restriction, the Navy has completed the abandonment of the seven (7) deep production wells formerly located on the 105-acre parcel. The production wells were used for the extraction of groundwater as non-contact cooling water to support operations conducted by NGC during a time when Northrop Grumman leased the 105-acres from the Navy. If a future occupant of the Navy's 105-acre parcel wishes to pursue groundwater extraction, language will be included in the appropriate deed(s) of transfer requiring prior Navy notification and securing written permission from the Nassau County Department of Health and/or NYSDEC.

Further, the selected remedy for ON-SITE GROUNDWATER is also based on the recognition that an existing groundwater extraction and treatment system, known as the Onsite Containment (ONCT) System, continues to contain and remediate VOC-contaminated groundwater emanating from the Navy's property. The ONCT system was constructed, and is currently being operated on an annual basis, by the Northrop Grumman Corporation and was installed as a component of NYSDEC's Regional Groundwater ROD. The Navy recognizes that continued operation of the ONCT system is paramount to ensuring that the Navy's selected remedy of ON-SITE GROUNDWATER remains protective of human health and the environment. In the event that the ONCT system fails to continue to operate, the Navy also recognizes that it's ON-SITE GROUNDWATER remedy would no longer be protective of human health or the environment. In this case the Navy will re-evaluate the protectiveness of the selected remedy for ON-SITE GROUNDWATER and implement all requisite measures as determined by the Navy in consultation with NYSDEC, NYSDOH, and the Nassau County Department of Health to ensure the continued protection of human health and the environment.

As stated above, NYSDEC's selected remedy for groundwater included a number of response measures that were categorized into a Groundwater Remedial Program and a Public Water Supply Protection Program. The components of these two programs for which the Department of Navy has agreed to implement are all considered to be located off of Navy property and are, therefore, being considered as OFF-SITE GROUNDWATER issues. The Navy's selected remedy for OFF-SITE GROUNDWATER includes the following:

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The Navy recognizes the importance of continued provision of potable water to those communities/populations served by water supply wells that are, or that may become, impacted by site-related contamination. To this end, the NYSDEC Groundwater ROD required that a public water supply protection program be implemented. The components of this program for which the Department of Navy will implement include:

- installation of Vertical Profile Borings (VPBs) to gather water quality and lithologic data that will be used in the regional groundwater computer model to aid in the placement of outpost monitoring wells;

- development of a Public Water Supply Well Contingency Plan that uses data gathered during the VPB installation program and the regional groundwater computer model to identify the locations of the outpost monitoring wells and to also assign "trigger values" to each outpost well in order to determine if treatment or other comparable alternative measure will be required for other public water supply wellfields located downgradient of the VOC-contaminant plume. If triggered, this will alert the Navy to begin discussions with the appropriate water district regarding various treatment alternatives;

- installation of the outpost monitoring wells in areas upgradient of potentially affected water supply wellfields as outlined in the Public Water Supply Well Contingency Plan;

- public water supply wellhead treatment or comparable alternative measures, as necessary, for wellfields that become affected in the future.

It should be noted that another component of the Public Water Supply Protection Program was the treatment of wellfields 4, 5, and 6 associated with the Bethpage Water District (BWD). Wells at these Plants had either been, or would likely be, adversely impacted by VOC-contaminated groundwater emanating from Navy and NGC properties prior to issuance of NYSDEC's Groundwater ROD in 2001. Due to the immediate threat to public health, the Navy, in June 1996, supplied funding to BWD for the construction and 30-year operation of an air stripping treatment system installed on the BWD Plant 5 facility. This action was considered to be an interim action that was part of the Navy's Operable Unit 1 Soils ROD issued by the Navy in July 1995. In the mid-1990's, NGC took similar action to protect the water supplies at BWD Plants 4 and 6.

SECTION 2: SITE LOCATION AND DESCRIPTION

NWIRP Bethapge is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City. The Navy's property totaled approximately 109.5 acres and was formerly a Government-Owned Contractor-Operated (GOCO) facility that was operated by the Northrop Grumman Corporation (NGC) until September 1998. As shown on Figure 1, NWIRP Bethpage is bordered on the north, west, and south by property owned, or formerly owned, by NGC that covered approximately 605 acres, and, on the east, by a residential neighborhood.

NWIRP Bethpage is currently listed by NYSDEC as an "inactive hazardous waste site" (#1-30-003B) as is the Northrop Grumman Corporation (#1-30-003A) and the Hooker/RUCO site (#1-30-004) located less than 1/2 mile west of the NWIRP Bethpage.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

NWIRP Bethpage was established in 1933. Since its inception, the primary mission for the facility has been the research, prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft.

The facilities at NWIRP Bethpage include four plants (No. 3, 5, and 20, used for assembly and prototype testing; and No. 10, which contains a group of quality control laboratories), two warehouse complexes, a salvage storage area, water recharge basins, an industrial wastewater treatment plant, and several smaller support buildings.

The following is a discussion of the waste handling practices at the three identified disposal areas at the NWIRP facility (see Figure 2 for area locations):

Area 1 - Former Drum Marshaling Area

From the early 1950's to 1978, drums containing liquid wastes were stored on a cinder covered area over a cesspool leach field. This leach field may have been used to discharge process wastewater. In 1978, the drum storage area was moved a few yards to the south to a 100- by 100-foot concrete pad. This pad did not have a cover or berms around it. In 1982, the drum storage area was moved to Area 3.

Various solvents were stored at Area 1. Cadmium and cyanide wastes were also stored in this area from the early 1950's through 1974. Approximately 200 to 300 drums were stored at these locations at any given time. Reportedly, all drums of waste which were stored at these areas were taken offsite by a private contractor for treatment and disposal.

Area 2 - Recharge Basin Area

Prior to 1984, some Plant 3 production-line rinse waters were discharged in the three on-site recharge basins. These waters were directly exposed to chemicals used in the industrial processes (rinsing of manufactured parts). Only non-contact cooling water has been discharged into these basins since 1984. The source of this non-contact cooling water has been on-site production wells.

On at least one occasion (1956), hexavalent chromium was detected in the water in the recharge basins at concentrations in excess of allowable limits. This matter was discovered and handled by the Nassau County Department of Health.

Adjacent to and west of the recharge basins are the former sludge drying beds. Sludge from the Plant 2 Industrial Waste Treatment Plant (part of the Grumman Site as described above) was dewatered in these beds before being disposed of off-site.

Area 3 - Salvage Storage Area

The NWIRP salvage storage area is located to the west of Area 2. This area has been used for the storage of fixtures, tools, and metallic wastes such as aluminum and titanium scraps, since the early 1950's.

Located within the salvage storage area was a 100 by 100-foot area that was used for the storage of drummed waste. This 100 by 100-foot area was reportedly covered with coal ash cinders. Halogenated and non-halogenated waste solvents were stored in this area from the early 1950's through 1969. The exact location of this drum storage area is not known. Since 1982, drums have been stored in a covered area with a concrete pad and berms.

3.2: Remedial History

An Initial Assessment Study was conducted at the NWIRP-Bethpage site in 1986. Based upon the results of this study, it was concluded that three areas at the site posed a threat to human health or the environment.

A description of the NWIRP sites is presented in Section 3.1. In March 1993, NYSDEC listed the NWIRP as a separate Class 2 Registry Site, distinct from the Northrop Grumman Site.

An RI/FS was conducted at the site from August 1991 through July 1995. The purpose of the RI was to determine the nature and extent of the contamination that was found during the Initial Assessment Study. The NWIRP ROD called for addressing soils contamination at the three areas of concern. The NWIRP remedies called for the excavation and removal of specific areas of PCB and solvent contamination and the reduction of soils to be excavated by the implementation of a soil vapor extraction system in conjunction with shallow groundwater remediation through air sparging.

3.3: Enforcement History

The United States Navy has undertaken their environmental studies pursuant to the Navy's Installation Restoration Program. The State of New York provides oversight of the work conducted by the Navy pursuant to a Memorandum of Understanding between the State and the Department of Defense.

Resource Conservation and Recovery Act

The Navy's property is also under a Resource Conservation and Recovery Act (RCRA) program that is regulated under 6 NYCRR Part 373. This is New York State's permitting process for facilities that are designated as a large quantity generator of hazardous waste and ultimately the closure process for active facilities that store, generate, and treat hazardous wastes over a certain quantity as defined under this regulation. The RCRA program as promulgated under NYSDEC regulations is authorized by the USEPA to issue RCRA permits.

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 the presence of hazardous waste, the Navy has conducted a basewide remedial investigation and feasibility study (RI/FS).

4.1: Summary of the Remedial Investigation and Feasibility Study

The purpose of the RI was to define the nature and extent of any soil and groundwater contamination resulting from previous activities at the Site. The RI was conducted in two phases. The first phase was conducted

between February 1991 and October 1991 and the second phase between August 1992 and September 1993. Two reports were prepared entitled "Final Remedial Investigation Report NWIRP, May 1992," and "Phase 2 Remedial Investigation Report, NWIRP, October 1993," that described the field activities and findings of the RIs in detail.

The following environmental investigation techniques were used in order to achieve the goals for the RIs:

- Soil gas surveys were conducted in various locations throughout the site in order to locate potential areas which could be sources of groundwater contamination.
- Soil samples were collected in various locations throughout the site to confirm the results of the soil gas surveys and to identify source areas that could not initially be located using soil gas techniques.
- Groundwater samples were collected from monitoring wells that were installed as part of the two Remedial Investigations and by other organizations (such as the United States Geological Survey).

After completion of the Remedial Investigation, a Feasibility Study (FS) was developed. The objectives of this study were to take the information gathered during both phases of the RI and develop remedial action objectives and goals for soils and, to a limited extent groundwater, that would minimize and/or prevent risks to human health and the environment while complying with ARARs.

A Proposed Remedial Action Plant (PRAP) was prepared for soils and a Record of Decision for soils, designated as Operable Unit (OU) 1, was issued by the Navy in July 1995. As mentioned earlier, the Navy is currently implementing the various components of the OU 1 Soils ROD.

4.1.1: Site Geology and Hydrogeology

The sites are underlain by five geologic/hydrogeologic formations (descending from ground surface):

- Pleistocene deposits (Upper Glacial Aquifer) consisting of various sands and gravels intermixed with discontinuous low permeability clay lenses, approximately 100 feet thick
- Magothy Formation (Magothy Aquifer) consisting of various sands and gravels varying in thickness interlaced with low permeabililty confining layers,
- Raritan Clay Formation
- Lloyd Sand Formation (Lloyd Aquifer)
- Bedrock

The Upper Glacial Formation (commonly referred to as glacial deposits) forms the surface deposits across the entire NWIRP. The glacial deposits beneath the site consist of coarse sands and gravels. These deposits are generally about 30 to 45 feet thick; local variations in thickness are common due to the irregular and undulating interface of the glacial deposits with the underlying Magothy Formation. The interface between the two formations was defined in the field as the horizon where gravel becomes very rare to absent, and finer sands, silts, and clays predominate. The generally coarse nature of both formations near their interface, however, may make this differentiation either difficult or rather subjective.

The results of the drilling program at the facility appear to confirm the regional observation that there are no singular, extensive clay units beneath the NWIRP. Clay units encountered at any particular location do not persist along strike or in either direction of dip. The stratigraphic section at and below subsurface depths of about 100 feet may be considered "clay-prone" because the number of individual clay units significantly increases below this depth, but none of these clays are laterally persistent.

The Upper Glacial Formation and the Magothy Formation comprise the aquifer of concern at the NWIRP. Regionally, these formations are generally considered to form a common, interconnected aquifer as the coarse nature of each unit near their interface and the lack of any regionally confirming clay unit allow for the unrestricted flow of groundwater between these two formations.

Although the water table beneath the NWIRP occurs below the glacial deposits, these deposits are hydrogeologically important because their high permeability allows for the rapid recharge of precipitation to the underlying Magothy Formation. In addition, the large quantities of groundwater withdrawn daily from the Magothy passes back through part of the glacial deposits via the recharge basins to the Magothy Formation. The Magothy aquifer is the major source of public water in Nassau County. The most productive water-bearing zones are the discontinuous lenses of sand and gravel that occur within the generally siltier matrix. The major water-bearing zone is the base gravel.

The Magothy aquifer is commonly regarded to function as an unconfined aquifer at shallow depths and a confined aquifer at deeper depths. Drilling at Bethpage has revealed that clay zones beneath the facility are common but laterally discontinuous. No confining clay units of facility-wide extent were encountered.

The groundwater beneath the NWIRP dominantly flows to the southwest and, to a lesser extent, top the south. The flow is greatly influenced by groundwater mounding that occurs at the recharge basins, and by the withdrawal of water at numerous facility wells. The wells have the potential to significantly change the local flow pattern. These wells were operated on an irregular basis and in various combinations. Consequently, their influence on the local flow at any time was difficult to predict.

The horizontal hydraulic gradient varies throughout the facility due to the recharge basins and the facility wells. The average gradient calculated across the facility is 5.3 feet/mile, which is significantly lower than the published regional gradient of 10 feet/mile. The average linear velocity of the groundwater at the water table is estimated to range from 0.2 feet/day to 0.9 feet/day, which is significantly less that the previously estimate of 50 to 70 feet/day. The facility occupies an area of recharge. Vertical hydraulic gradients are downward, but are very low, and this agrees with previously published regional data.

4.1.2: Regional Groundwater Study

Around the same time as the Navy was conducting it's basewide investigation of soils and groundwater, NGC was conducting similar investigations on it's property. Due to the commingling of Navy groundwater with NGC groundwater and the subsequent migration of that commingled contaminant plume to the south, an approach was taken to combine the analytical data gathered by both agencies and investigate groundwater on a regional basis. To determine whether the groundwater was contaminated at levels of concern, the analytical data collected from both the Navy and NGC RI efforts were compared to environmental Standards, Criteria, and Guidance values (SCGs). Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, it was determined that the groundwater required remediation.

The information gathered from the onsite and offsite groundwater contamination associated with NGC and NWIRP Bethpage was used to screen alternatives in a combined Navy-NGC Regional Groundwater Feasibility Study. The results of the FS have estimated that the groundwater plume extends over an area of more than 2,000 acres and to a depth of approximately 700 feet. Due to the magnitude of this contamination and the multiple sources of the contamination, a regional remedy for addressing the groundwater contamination was pursued.

4.1.3: Nature of Contamination

As described in the RI report, numerous soil, soil gas, groundwater and sediment samples were collected at the site to characterize the nature and extent of contamination. The main categories of contaminants which exceed their SCGs are inorganics (metals), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs).

The groundwater contaminants are chlorinated VOCs which were either used and disposed of at the sites or are breakdown products of these chemicals. These compounds are:

- perchloroethene (PCE)
- trichloroethene (TCE)
- dichloroethenes (DCE)
- vinyl chloride
- 1,1,1-trichloroethane (1,1,1–TCA)

4.1.4: Extent of Groundwater Contamination

By current estimates, the commingled groundwater plume emanating from the Navy and NGC sites totals more than 2,000 acres in area and are over 700 feet deep in places. An estimate of the aerial extent of the plume is presented on Figure 3. Recent groundwater data from the Navy vertical profile borings indicates that the commingled plume has migrated south beyond the Hempstead Turnpike.

On-Site Groundwater Plume

The primary on site source of groundwater contamination was identified with Site 1. Groundwater was found to be contaminated with VOCs at a maximum total concentration of approximately 16,000 ug/l and the associated groundwater plume extended approximately 3,700 feet down gradient of Site 1. A Site 1 source area remediation consisting of air sparging/soil vapor extraction removed approximately 4,500 pounds of VOCs from contaminated soils and shallow groundwater at this site. By April 2002, the maximum concentration of VOCs detected in the shallow groundwater at Site 1 was less than 50 ug/l.

The highest concentration of VOCs detected in the on site groundwater was TCE in monitoring well HN-24I in 1991. At that time, TCE was detected at a concentration of 58,000 ppb. A groundwater investigation in this area in the early 1990s did not identify an extensive plume associated with this area. This well was sampled several times over a 10-year period. During this period, the concentration in the well was noted to decrease steadily. By 2000, the concentration in this well had decreased to less than 500 ug/l. An investigation of potential sources of the contamination upgradient of this area did not identify a significant source for this groundwater contamination. However, VOC contaminated soils in a maintenance area within Plant No. 3 near HN-24I were identified and removed in the late 1990s.

Off-Site Groundwater Plume

To date, the plume(s) emanating from the sites have impacted or threatened three public water supply wellfields operated by the Bethpage Water District. There are treatment systems in place at each of the three impacted or threatened wellfields (see section 4.2). The water that is distributed to the community is tested on a monthly basis to ensure that the drinking water standards promulgated by the NYSDOH are met. In addition, the Bethpage Water District has a policy of providing its consumers with drinking water that contains no detectable concentrations of site-related contaminants. Given the proximity of the contaminants to the Bethpage Water District (BWD) well fields, nine (9) outpost or sentry wells were installed upgradient of the water supplies. These wells have been sampled on a quarterly basis since March 1995. The purpose of this quarterly sampling is to provide the BWD with the data necessary to ensure that the existing treatment systems are adequate to treat the level of contaminants that may impact their public supply wells. The data are also used to make decisions about the need for groundwater remediation.

Based upon a review of the sentry well data, there is an area surrounding monitoring well cluster GM-38 that contains high concentrations, in excess of 1,000 ppb, of site-related contamination. The outpost wells will continue to be monitored to determine the groundwater concentrations of these site-related contaminants.

4.1.5: Development of a Computer Groundwater Model

A groundwater computer model was developed as a tool for developing and evaluating remedial alternatives for addressing the groundwater contamination. The study area that is encompassed in the model is 24.1 square miles in area. The model was constructed in order to simulate groundwater flow throughout the entire thickness of the Upper Glacial and Magothy aquifers. A detailed description of the model is presented in the Northrop Grumman Groundwater Feasibility Study Report, Appendix B, dated October 2000. Copies of this report are on file at the Navy's information repository located at the Bethpage Public Library.

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. Information obtained during the development of the Regional Groundwater RI and FS revealed that wells associated with Plants 4, 5 and 6 of the Bethpage Water District (BWD) had either been, or would likely be, adversely impacted by VOC-contaminated groundwater emanating from Navy and NGC properties. Due to the immediate threat to public health, the Navy, in June 1996, supplied funding to BWD for the construction and 30-year operation of an air

stripping treatment system that was installed on the BWD Plant 5 facility. This interim action was part of the Navy's Operable Unit 1 Soils ROD issued by the Navy in July 1995.

Other IRAs have been implemented over the last several years by NGC for groundwater including the construction and current operation of a pump and treat system designed to capture and contain all groundwater from both NGC and Navy property to eliminate any further migration of VOC-contaminated groundwater. In addition, NGC also took steps to protect the water supplies at BWD Plants 4 and 6.

4.3: Summary of Human Exposure Pathways:

An exposure pathway is the manner by which an individual may come in contact with a contaminant. The five elements of an exposure pathway are; 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Human exposure pathways, relative to this operable unit, known to presently exist or that have historically existed at the site include:

- direct contact with (dermal absorption), ingestion of, and inhalation associated with contaminated groundwater through residential or commercial use.

Human exposures could occur by ingesting or coming into direct contact with untreated, contaminated groundwater pumped from a water supply well. Additionally, inhalation of VOCs could occur if contaminated water is used for cooking, cleaning or bathing. As stated above, several BWD public water supply wells were impacted by contamination from the Site. Water from the affected municipal wells is either no longer used or treated to remove the contaminants prior to distribution to the community. Routine monitoring of the treated water supplies has demonstrated the effectiveness of these treatment systems in mitigating exposures to groundwater contaminants.

There are no known private drinking water wells in use within the contaminated aquifer area. The nearest down gradient private well, a non-contact cooling water well at a hospital, was tested in 1998 and found to be free of site-related contaminants.

In summary, while human exposures to contaminated groundwater may have occurred in the past, there are no known exposures that are presently occurring due to the implementation of appropriate response measures.

4.4: Summary of Environmental Exposure Pathways

There are no surface water bodies or other environmentally sensitive areas within a two-mile radius of the site. Therefore, it was concluded that there is a negligible risk to wildlife in the area from the disposal of hazardous wastes at the sites.

SECTION 5: ENFORCEMENT STATUS

Resource Conservation and Recovery Act

The purpose of this ROD is to set forth the groundwater remedial program for NWIRP Bethpage as set forth in 6 NYCRR Part 375, "Inactive Hazardous Waste Disposal Sites." The site is also regulated under 6 NYCRR Part 373, commonly known as the Resource, Conservation and Recovery Act, (RCRA) program. This is the permitting and ultimately the closure process for active facilities that store, generate, and treat hazardous wastes over a certain quantity as defined under this regulation. The RCRA program as promulgated under NYSDEC regulations is authorized by the USEPA to issue RCRA permits.

NWIRP Bethpage

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 Understanding (MOU) between the State and the Department of Defense. The Department of the Navy entered into a Memorandum of Understanding (MOU) with the NYSDEC in 1993. The MOU brought the NYSDEC into the Department of the Navy's Installation Restoration (IR) program. Upon issuance of the Navy's Record of Decision for Groundwater, NYSDEC will approach the Department of the Navy to implement the selected remedy under a Federal Facility Site Remediation Agreement.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

The primary goals for any remedial program, as stated in the National Contingency Plan (NCP), is that the selected remedy is to be protective of human health and the environment and comply with Applicable and Relevant and Appropriate Requirements (ARARs). At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Eliminate, to the extent practicable, site-related contaminants from the affected public water supplies and to prevent, to the extent practicable, the future contamination of public water supplies through the implementation of the offsite groundwater remediation.
- Eliminate, to the extent practicable, exposures to contaminated groundwater.
- Eliminate, to the extent practicable, off-site migration of contaminated groundwater and, where practicable, to restore the groundwater to pre-disposal conditions.
- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.

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 ARARs and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for Regional Groundwater at both Northrop Grumman and NWIRP Bethpage were identified, screened and evaluated in the Operable Unit 2 (OU2) Report entitled "Groundwater Feasibility Study, Northrop Grumman, Bethpage."

Common elements to all of the Navy's potential remedial alternatives for groundwater include response actions that are currently being implemented by Northrop Grumman. These response actions include the continued operation of the On-Site Containment (ONCT) System, continued monitoring of on-site and off-site permanent monitoring wells on a quarterly basis, and the wellhead treatment for the BWD wells. Since completion of the ONCT system in 1998, the Northrop Grumman Corporation (NGC) has operated the system on an annual basis and has been conducting quarterly sampling of on-site and off-site wells since 1995. As of the date of this ROD, the Navy has no reason to believe that NGC will not continue to implement these

components of the groundwater remedial strategy. In addition and as stated earlier, both the Navy and NGC have completed response actions associated with BWD Plants 4, 5 and 6.

A summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to put the remedy in place, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with other potentially responsible parties for implementation of the remedy.

7.1: Description of Alternatives

As stated previously, the remedial strategy for groundwater was developed by NYSDEC with input from the Navy and NGC. The following potential response actions were developed by NYSDEC during the preparation of the State's Record of Decision for Groundwater and were intended to address contaminated groundwater beneath both NGC-property and NWIRP Bethpage as well as the commingled portion of the contaminant groundwater plume that has migrated downgradient. For the purposes of this ROD, the Navy has adopted the same potential response actions.

As stated throughout this document, this ROD describes those components of the groundwater remedial strategy that will be implemented by the Department of Navy. Each of the alternatives discussed below contains common components that will be implemented by the Navy along with the selected alternative. The Navy's determination that implementation of the selected alternative will be protective of human health and the environment is based on the recognition that Northrop Grumman also continues to implement certain common components of the groundwater remedial strategy as they have since issuance of NYSDEC's ROD in March 2001.

The following Items A through C, are common to Some or All of the Alternatives and are expected to be implemented by Northrop Grumman:

A. On-Site Plume Containment (ONCT), Treatment, and Discharge to On-Site Recharge Basins via the On-going ONCT System (formerly called the ONCT IRM):

Under this component of each Alternative, the existing ONCT System will continue operating. The pumping rate from the ONCT system would continue at the approximate rate of 3,375 gallons per minute. The water would be recharged into the recharge basins located adjacent to Plant 5 and to the southern recharge basins. Costs for this option do not include the already completed design and construction but do include operation and maintenance.

B. Long Term Operation and Maintenance of VOC Removal Systems At Two Off-Site Bethpage Public Water Supply Well Fields (BWD Plants 4 and 6):

A long-term agreement is being renegotiated between the BWD and Northrop Grumman to pay for the operation and maintenance of the treatment systems at BWD well fields 4 and 6. This agreement would be required to be effective for at least 30 years, until the treatment at a public supply well(s) is no longer necessary to meet appropriate performance objectives, or until BWD decides to shut down any given supply well.

The Bethpage Water District has a policy of providing its consumers with drinking water that contains no detectable concentrations of VOC contaminants. As of the date of this ROD, Northrop Grumman through its agreement with the BWD for Plants 4 and 6 have paid for VOC removal treatment that is sufficient to meet this District policy.

C. Long-Term Operation Maintenance and Monitoring (OM&M) That Includes Comprehensive Monitoring of Plume Attenuation, Outpost Groundwater Monitoring and Long-Term Operation and Maintenance of the ONCT System:

A long-term operation, maintenance and monitoring (OM&M) program would be designed and implemented and is included with each Alternative. This OM&M plan includes the installation of at least twenty new monitoring wells and specific vertical profile borings. The OM&M plan includes a specific task for verifying that the NWIRP source area contamination does not pass beyond the ONCT system.

The goals for the long term monitoring program would be to:

- monitor the on-site groundwater plume; and
- monitor the effectiveness of the groundwater remedy.

Samples will be collected on a quarterly, semi-annual or annual basis from a monitoring well network. The specific sampling locations and the specific analyses would be based upon periodic reviews under the ongoing long term OM&M program. In addition, water level data would be collected on a regular basis. These results would be evaluated by means of periodic updating of the computer groundwater model that has been developed (see Section 4.1.3) for this site.

The ongoing ONCT system would require a long-term operation and maintenance plan to be submitted to the Department for review, acceptance and periodic updates. The public supply wellhead treatment systems currently in place will also require an operation and maintenance plan both of which would be for the minimum of the thirty year CERCLA time frame or until the treatment systems are no longer required; whichever is longer.

For Alternatives 1 thru 8, the following items D through H, are common to Some or All of the Alternatives and will be implemented by the Department of Navy:

D. Long Term Operation and Maintenance of VOC Removal Systems At One Off-Site Bethpage Public Water Supply Well Fields (BWD Plant 5):

The Department of the Navy entered into a cash-out agreement with the BWD for the installation, permanent operation and maintenance of a treatment system at BWD Plant 5.

The Bethpage Water District has a policy of providing its consumers with drinking water that contains no detectable concentrations of VOC contaminants. As of the date of this ROD, the Department of the Navy has paid for VOC removal treatment for Plant 5 that is sufficient to meet this District policy.

E. Offsite GM 38 Area Remedy:

This offsite groundwater extraction and treatment remedy would be located in the monitoring well GM38 area. This remedial technology would address elevated concentrations of total volatile organic compounds (TVOCs) in groundwater because deep groundwater at the GM-38 well area has been identified as an off-site "hotspot". This process option would be operated as a mass removal option to prevent further degradation of the aquifer. The modeling data from the OU 2 Groundwater FS indicates 7,000 pounds of the contaminant mass could be removed at this location.

Capital Cost:	$ 4,390,000
Annual O&M Cost:	$ 220,000
Present Worth:	$ 6,673,000

F. Long-Term Operation Maintenance and Monitoring (OM&M) of the GM-38 Remedy:

Installation of vertical profile borings and/or monitoring wells in offsite areas would be included in the outpost monitoring, remedial design, and plume tracking programs. The OM&M vertical profile boring program has

been expanded to cover areas south of Hempstead Turnpike. The goals for this OM&M program would be to monitor the groundwater plume(s) both on-site and off-site, monitor the effectiveness of the groundwater remedy or remedies and determine if wellhead treatment is necessary. Comprehensive monitoring of plume attenuation would also be used with respect to the fate and transport of site contamination. This component would also contain operation and maintenance provisions for all treatment systems.

The goals for the long term monitoring program would be to:

- monitor the GM-38 Area groundwater plume; and
- monitor the effectiveness of the GM-38 Area groundwater remedy.

Samples will be collected on a quarterly, semi-annual or annual basis from a monitoring well network. The specific sampling locations and the specific analyses would be based upon periodic reviews under the ongoing long term OM&M program. In addition, water level data would be collected on a regular basis. These results would be evaluated by means of periodic updating of the computer groundwater model that has been developed (see Section 4.1.3) for this site.

G. Development and Implementation of a Public Water Supply Well Contingency Plan:

Installation of vertical profile borings and/or monitoring wells in offsite areas would be included in the outpost monitoring, remedial design, and plume tracking programs. The vertical profile boring program has been expanded to cover areas south of Hempstead Turnpike. The goals for this OM&M program would be to monitor the groundwater plume(s) both on-site and off-site, monitor the effectiveness of the groundwater remedy or remedies and determine if wellhead treatment is necessary. Comprehensive monitoring of plume attenuation would also be used with respect to the fate and transport of site contamination. This component would also contain operation and maintenance provisions for all treatment systems.

All the alternatives contain a contingency for public water supply wellhead treatment or comparable alternative measures. Outpost monitoring would indicate if VOC concentrations in the groundwater would potentially threaten a public supply well. A wellhead treatment system would be designed and installed or comparable alternative water supply measures would be implemented if outpost monitoring well data indicate that treatment of a public supply well or provision of an alternative water source is necessary to protect public health from exposure to site-related contamination. The above determination would be made by the Navy with consultation by NYSDEC and State and County Health Departments. The determination of appropriate water supply protection measures will be made with input from the affected water district(s).

H. Department of the Navy Implementation of "Non-Detect" Policy for Affected Public Water Supplies:

The State of New York, under its State Superfund Program, must ensure that all remedies selected for the remediation of inactive hazardous waste sites are protective of public health and the environment. With respect to the protection of drinking water supplies, the NYSDOH has promulgated Maximum Contaminant Levels (MCLs) for drinking water contaminants in Part 5 of the State Sanitary Code (10 NYCRR Part 5). For the most part, the respective MCLs for the VOC contaminants associated with the Northrop Grumman and Navy sites are 5 micrograms per liter (ug/L or parts per billion (ppb) for water).

Many Water Districts in the vicinity of the OU 2 regional groundwater contaminant plume have policies of providing their consumers with drinking water that contains no detectable concentrations of VOC contaminants. This is sometimes known as a "zero tolerance policy" with respect to VOCs. The Department of the Navy has agreed to establish a goal for any given wellhead treatment or comparable technology for affected drinking water supplies which will provide water that is non-detect using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l) with respect to VOCs for site related contamination as cited in the 2001 Water Quality Monitoring Requirements for Nassau County Public Water Systems. Additional costs to implement this policy relative to the Alternatives considered in the OU 2 FS, if any, fall within the plus fifty and minus thirty percent of CERCLA cost requirements, and therefore will not significantly change the cost estimates for Alternatives 2 through 8.

Alternative 1: No Further Action, A, B, C and D above: This Alternative is the baseline Alternative to which the other alternatives will be compared. Under this Alternative, no additional remedial actions would be incorporated into the existing on-site groundwater IRM that has been installed and is now operating. This Alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment than that already provided. Under this Alternative, no additional remedial actions would be taken and the existing on-site groundwater IRM which has been installed and is now operating would continue to be operated over the next 30 years.

In order to maintain hydraulic containment of the groundwater plume(s), production well GP-1 has been included in the ONCT pump and treatment system design. The GP 1 water would be treated at the IRM treatment system located to the north of Plant 2 and discharged to recharge basins to the west of Plant 2. The ONCT wells are treated by a separate air stripper. The water would be recharged into the southern recharge basins located adjacent to Plant 1.

Capital Cost:	$ 3,670,000
O&M Cost:	$ 1,480,000
Present Worth:	$26,700,000

Alternative 2: A, B, C, D and E above, and HN-24 Area Treatment: Alternative 2 would add treatment of the HN-24 area on the Navy Plant 3 property. Treatment at the HN-24 area would consist of the use of reactive iron powder injected into the impacted groundwater through a series of injection wells. After injection the reactive iron powder would become immobilized within the soil pore space and begin to react with the contaminants of concern (COCs).

Capital Cost:	$ 4,900,000
O&M Cost:	$ 1,514,000
Present Worth:	$28,200,000

F, G, H

Alternative 3: A, B, C, D and E above: Alternative 3 contains the addition of groundwater extraction and treatment system at the GM-38 area. The purpose of the GM-38 groundwater extraction and treatment system would accelerate off-site contaminant mass removal and to restore the off-site portion of the impacted aquifer in the vicinity of BWD Supply Well fields 4, 5 and 6 to remedial action objectives (RAOs) in a shorter time frame than under Alternative 2. The GM-38 area is located approximately 4,500 feet southeast of the Northrop Grumman south recharge basin area, and is defined by the inferred 1 ppm TVOC contour line drawn around Well GM-38D2. F?

Capital Cost:	$ 8,060,000
O&M Cost:	$ 1,660,700
Present Worth:	$33,600,000

Alternative 4: A, B, C, D and E above, with HN-24 Area Treatment: Alternative 4 is the combination of Alternatives 2 and 3 and is undertaken in an attempt to accelerate on-site contaminant mass removal, and restore groundwater quality in these localized areas to RAOs in a shorter time frame.

Capital Cost:	$ 9,290,000
O&M Cost:	$ 1,048,000
Present Worth:	$35,000,000

Alternative 5: A, B, C, D and E above, and Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers: Alternative 5 would add six new off-site groundwater extraction wells to achieve containment of the full extent of the off-site portion of the TVOC plume. Alternative 5 would provide mass removal from the entire aquifer by the installation of a groundwater extraction and treatment system at the farthest downgradient edge of the plume, to contain the full extent (off-site as well as on-site portions) of the plume. The off-site wells would be installed south of the Northrop Grumman facility and north of Hempste Turnpike.

Under Alternative 5, the six new off-site extraction wells (OFCT-1, OFCT-2, OFCT-3, OFCT-4, OFCT-5, and OFCT-6) would be installed. Each off-site well would require an individual treatment system to remove VOCs from the pumped groundwater. Construction of one central treatment facility, in lieu of six individual systems, would be impractical due to the dense residential development in the area, the substantial distances between proposed off-site extraction well locations, and the large quantity of water to be discharged. It is estimated that the total quantity of water to be pumped from the proposed off-site extraction wells would be 3,635 gpm (equal to 5.2 million gallons per day, or MGD).

Where necessary, monitoring wells would be installed to supplement the existing monitoring well network. The number, location, and depth of wells to be installed will be evaluated during the remedial design phase of the project.

Capital Cost:	$21,390,000
O&M Cost:	$ 2,700,000
Present Worth:	$62,800,000

Alternative 6: A, B, C, D and E above, Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers, and HN-24 Area Treatment: Alternative 6 contains the elements of Alternative 5 as described above, with the addition of treatment at the HN-24 area, as described above in Alternative 3.

Alternative 6 would provide mass removal from the aquifer through groundwater extraction and treatment at the farthest downgradient edge of the plume, to contain the full extent (both off-site as well as on-site portions) of the plume. Furthermore, Alternative 6 would provide localized groundwater treatment of the HN-24 areas.

Capital Cost:	$22,620,000
O&M Cost:	$ 2,700,000
Present Worth:	$64,100,000

Alternative 7: A, B, C, D and E above, Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers: Alternative 7 contains the elements of Alternative 5 as described above, with the addition of treatment at the GM-38 area, as described in Item E and Alternative 3. Under Alternative 7, Well ONCT-6 would be relocated approximately 500 feet to the northwest and at this location serves the dual purpose of being a local extraction well for the GM-38 area and also being part of the off-site containment well system.

Alternative 7 would provide mass removal from the aquifer through groundwater extraction and treatment. Alternative 7 would also provide groundwater pumping at the farthest down gradient edge of the plume to contain the off-site as well as on-site portions of the plume. In addition, Alternative 7 would provide treatment of the GM-38 area.

Capital Cost:	$ 21,860,000
O&M Cost:	$ 2,700,000
Present Worth:	$ 63,300,000

Alternative 8: A, B, C, D and E above, Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers and HN-24 Area Treatment: Alternative 8 is the combination of Alternatives 6 and 7. This Alternative includes all of the remedial process options discussed above.

Capital Cost:	$23,090,000
O&M Cost:	$ 2,706,000
Present Worth:	$64,700,000

7.2 Evaluation of Alternatives

The criteria used to compare potential remedial alternatives are defined in Section 300.430(e) of the National Contingency Plan (NCP). 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 Groundwater Feasibility Study developed by Northrop Grumman. The HN-24 treatment process will be carried through this evaluation of remedial alternatives even though it has now been deemed unnecessary given the substantial drop in the HN-24 area concentrations.

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

1. **Compliance with Applicable and Relevant and Appropriate Requirements (ARARs):** Compliance with ARARs addresses whether or not a remedy will meet the requirements of Federal statutes. A discussion of how the alternatives meet or do not meet ARARs was provided in Section 2.2.3 of Northrop Grumman's Groundwater Feasibility Study. With regards to the requirements of New York State, it has been determined by the Navy that the selected remedy will satisfy all substantive requirements of New York State Environmental Conservation Law (ECL) which are considered to be applicable.

The most significant portion of New York State's ECL are the New York State Water Quality Regulations: Part 5 Drinking Water Standards Title 10, New York Codes Rules and Regulations (10 NYCRR) and NYSDEC Groundwater Standards (6 NYCRR Part 700).

Alternatives 1, 2, 3 and 4 would be compliant with NYSDEC's Water Quality Regulations for the portion of the groundwater plume addressed by each Alternative. Alternatives 5, 6, 7 and 8 would be compliant with NYSDEC's Water Quality Regulations for the entire groundwater plume.

The applicable NYSDEC's Water Quality Regulations for the drinking water are the State's maximum contaminant levels, or MCLs, as specified in Part 5 of the NYS Sanitary Code. These standards are currently being met for treated water at each of the affected public supply well fields in the area. In addition, the Department of the Navy has agreed to a goal for this project, for any given wellhead treatment or comparable alternative implemented due to site-related contamination, to provide water that is non-detect using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l) with respect to VOCs, as cited in the 2001 Water Quality Monitoring Requirements for Nassau County Public Water Systems.

The GM-38 area offsite remedy was added to the feasibility study in order to evaluate the reduction of future contaminant loading to the BWD well fields and any public wellfields downgradient.. The groundwater treatment system(s) would be designed to be compliant with the NYSDEC Part 200 Air Quality Regulations.

The 5 ppb groundwater standard for principle organic contaminants would not be met with respect to full plume interception for alternatives 1 through 4, although natural attenuation should reduce site related contaminant concentrations to below 5 ppb over time.

2. **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.

The NYSDEC's Water Quality Regulations that are contaminant-specific are currently being met with respect to treated water at the municipal water supplies (specifically the BWD). This is being accomplished via VOC-removal treatment systems that are operating at the wellheads. In addition, the Department of the Navy has agreed to a goal for this project, for any given wellhead treatment or comparable alternative implemented due to site-related contamination, to provide water that contains no detectable concentrations of site-related contaminants.

The plume(s) would be contained along the southern boundary of the Grumman site under each Alternative based upon the computer modeling work that was conducted as part of the Feasibility Study. By containing the portion of the plume(s) that are on-site, the future contaminant load to the downgradient public water supplies would be reduced.

It is anticipated that the extraction and treatment programs for the ONCT system that are incorporated into each of the eight remedial alternatives under consideration here would need to be operated for 30 years or more. At that point there would be residual contamination remaining in the aquifers. The amount of remaining contamination, however, would be incrementally less as additional remedies are implemented under the various alternatives. As contaminant mass loading decreases, the relative importance of reliance upon the wellhead controls also diminishes.

Deep groundwater at the GM-38 well area has been identified as an off-site "hotspot" because concentrations of TVOCs exceed 1,000 ppb (equal to 1 ppm) at that location. The main objective of the GM-38 well area remedy would be additional protection of human health by reducing the future elevated mass contaminant load to the down gradient public water supplies. The remedy would also enhance the long-term natural process of aquifer restoration.

There could be incremental potentials for exposure to VOCs in air posed to downwind populations due to emissions from each additional groundwater treatment plant installed under the eight alternatives. Air pollution and monitoring controls would be implemented as necessary to ensure that the air emissions from these treatment facilities are within the criteria set by the regulatory agencies. Additional engineering controls could be used to further reduce the potential of exposure.

There is a potential for exposure to VOCs in air if the vinyl chloride plume(s) is captured in the ONCT extraction wells. The treatment systems for these wells were not designed to treat vinyl chloride and could result in air effluent concentrations of vinyl chloride that exceed state air discharge guidelines. This potential exposure pathway would be minimized by implementing the vinyl chloride contingency plan.

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

3. **Short-term Effectiveness.** The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

There could be short-term impacts to the community if Alternatives 2 through 4 were implemented. The impacts could be dust emissions, VOC emissions and noise during construction activities. Engineering controls would be employed to minimize these impacts.

No short-term impacts to the community or the environment would be expected to occur as the result of implementing Alternative 1. The HN24 area remedy short-term impacts would be negligible as the Navy property is now vacant.

The GM38 area remedy would have slightly higher short-term impacts. This groundwater extraction and treatment system would be located closer to residential areas. Potential impacts would be addressed under the site specific community health and safety plan through emission control technologies.

For Alternatives 5 through 8, the short-term impacts would be much greater than alternatives 1 through 4. The offsite containment (OFCT) system would, in most if not all the locations, be placed on or near residential properties, streets and neighborhoods. In addition, it is envisioned that each OFCT location would require its own treatment system.

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 of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

The sources of the groundwater contamination are being addressed as operable units for the Northrop Grumman-Bethpage Facility, NWIRP-Bethpage, and the RUCO Inactive Hazardous Waste Disposal Sites. The long-term effectiveness of each of the source area remedial actions was addressed in the RODs previously issued for these sites.

The time required to remediate the aquifer system is a function of the quantity and location of groundwater that is pumped and treated. It is projected that it would take more than 30 years to remediate the aquifer system onsite for each of the eight Alternatives. However, the ONCT system would prevent any further migration of onsite contamination into the Bethpage regional aquifer.

The OFCT Containment extraction and treatment system that is incorporated into Alternatives 5 through 8 would likely be operated for 30 years or longer. Based on the groundwater modeling, after 30 years of operation, residual contamination would likely exist onsite at concentrations slightly greater than the current drinking water standards.

The GM 38 area remedy is a hot spot remedy that was evaluated in the FS for 15 years. The long-term effectiveness for this remedy would be to potentially reduce the contamination loading to the BWD public supply wells on a permanent basis. Performance results from the ONCT IRM already demonstrate that TVOC concentrations in groundwater immediately down gradient from the ONCT system are diminishing. The GM 38 area remedy would enhance this permanent restoration of the natural resource.

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

Reduction of toxicity, mobility, and volume for the onsite groundwater contamination would be realized by the ONCT groundwater extraction and treatment system for all eight alternatives. These reductions would be achieved as a result of the extraction (reduction of mobility and volume) and treatment (reduction of toxicity) components which are incorporated into the ONCT system.

The greatest reductions in toxicity, mobility and volume would be realized under Alternatives 5 through 8 with the OFCT system. Alternative 8 has the highest reduction in mobility with the HN 24 area treatment, GM 38 area remedy and the ONCT and OFCT systems. Alternative 1 has the least reduction in toxicity, mobility and volume because it targets the on-site contamination only via the ONCT system.

6. **Implementability.** The technical and administrative feasibility of implementing each Alternative are 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.

The HN 24 remedy of alternatives 2, 4, 6 and 8 would be fairly easy to implement technically and administratively. There are several vendors who could supply the treatment technologies which are incorporated into these alternatives. Alternatives 2, 3 and 4 are readily implementable with respect to the GM38 area remedy that would be located near an existing Nassau County recharge basin in an open space area. However, easements would have to be obtained from the municipal and private parties that own the property. Alternative 1 is already in place and therefore is the most easily implementable.

Alternatives 5, 6, 7 and 8 would be substantially more difficult to implement administratively with respect to the ONCT system. Private property would have to be purchased or accessed and potentially, zoning changes would be required in order to construct the off-site extraction wells and treatment plants. The permit-related

tasks would be difficult to implement. In addition construction of one central treatment facility, in lieu of six individual systems, would be impractical due to the dense residential development in the area, the substantial distances between proposed off-site extraction well locations, and the large quantity of water to be discharged.

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.

8. **Community Acceptance**. Concerns of the community regarding the RI/FS reports, the NYSDEC PRAP and ROD for Groundwater and a Draft version of the Navy's ROD for Groundwater have been evaluated. A "Responsiveness Summary" was prepared by NYSDEC that described public comments received during a Public Meeting sponsored by NYSDEC in December 2000 to discuss their PRAP for Groundwater and the manner in which the NYSDEC would address the concerns raised. In addition, a Responsiveness Summary was prepared by the Navy that also described regulatory and public water supply concerns regarding the Navy's ROD for groundwater and is attached as Appendix A.

In addition, members of the community at large have expressed their concerns about site contamination during various gatherings of NWIRP Bethpage's Restoration Advisory Board (RAB) sponsored by the Department of the Navy. As a result, a number of response actions were included in the NYSDEC ROD that will address community, local official, water district, and public health concerns. These response actions include: the ONCT system, the GM 38 area remedy, the outpost groundwater monitoring program, the public water supply contingency for wellhead treatment or comparable alternative measures, the Northrop Grumman and the Department of the Navy agreement to achieve no detectable concentrations of site contaminants in affected water supply wells, additional groundwater investigation to determine if an Operable Unit 3 is necessary, and the long term OM&M systems. Additionally, NYSDEC modified it's selected remedy to incorporate groundwater remediation measures into a Groundwater Remedial Program whereas response measures related to public water supplies have been incorporated into a Public Water Supply Protection Program.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

The remedial action described in this section represents the second remedial phase or operable unit involving the NWIRP Bethpage site. It addresses on-site contaminated groundwater beneath the Navy's 105-acre parcel and it also addresses contaminated groundwater that has migrated off-site and has commingled with a contaminated groundwater plume located downgradient and beneath property owned by the Northrop Grumman Corporation (NGC). Due to the existence of this commingled plume, NYSDEC issued a Record of Decision for "regional groundwater" that described a remedial strategy to address contaminated groundwater beneath both Navy and NGC property and also addresses that portion of contaminated groundwater that has migrated downgradient of both properties into the surrounding community.

Based upon the results of the RI/FS, supplemental investigative data and the evaluation presented in section 7, the NYSDEC proposed the selection of Alternative 3, as described in detail in this document. NYSDEC's selected remedy, Alternative 3, consisted of the following Groundwater Remedial Program components: the ongoing ONCT system (formerly known as the ONCT IRM), the off-site GM-38 area groundwater extraction and treatment system, a vinyl chloride treatment contingency plan for the ONCT system, long-term groundwater monitoring including monitored natural attenuation, and long-term operation and maintenance of all operating treatment systems onsite and off-site. Additionally, the selected Alternative included the following Public Water Supply Protection Program components: the operation and maintenance of air strippers for BWD well fields 4, 5 and 6, and preparation of a contingency plan for wellhead treatment or comparable alternative measures for public supply wells not currently affected but that may become affected by site-related VOCs in the future. MNA

The Department of Navy concurred with the selection of Alternative 3 by NYSDEC. Their selection was based on the evaluation of each of the eight Alternatives developed for regional groundwater. It was determined that Alternative 3 will meet standards, criteria and guidance for the containment portion of the groundwater plume remedy, prevent exposure to site related contaminants in the groundwater, actively restore a natural resource (sole source aquifer), and prevent further deterioration of down gradient groundwater conditions. Alternative 3 was also chosen based on the fact that it is not economically or technically feasible to contain and treat all the contaminated groundwater that has migrated from the Northrop Grumman and NWIRP sites to groundwater quality standards.

The Department of Navy further concurred with the selection of Alternative 3 by NYSDEC since it incorporated a response action to account for the possibility of site-related contamination impacting additional public water supply wells in the future. It called for the wells to be protected by the implementation of a long term

monitoring program that will include sampling of wells upgradient of the public water supply wells with a contingency to provide wellhead treatment or comparable alternative measures, if necessary.

NYSDEC's selection of Alternative 3 also satisfies the preference to permanently and significantly reduce the toxicity, mobility or volume of VOCs in groundwater by reducing the mass of VOCs in the groundwater by recovering, treating and discharging contaminated groundwater. The remedial goal for attainment of the 5 ppb groundwater standard will be met in the treated aquifer segment, to the extent practicable.

It is understood that part of the remedy that the Navy will be implementing, as discussed in this document, may also address contamination that has not been conclusively attributable to NWIRP Bethpage. In the same manner, not all of the contamination attributable to NWIRP Bethpage will be actively addressed by the selected groundwater remedy. Therefore, the public water supply contingency plan is a necessary component to address the potential of future exposure to site-related VOCs.

The following paragraphs describe those components of NYSDEC's selected remedy that will be implemented by the Department of Navy. For the purposes of the Navy's Groundwater ROD, groundwater has been subdivided into an on-site and off-site component. The Navy's selected remedy for ON-SITE GROUNDWATER includes the following:

1. An **institutional control** consisting of the placement of a restriction in the deed of transfer to the County of Nassau, New York prohibiting extraction of groundwater from within the boundaries of the 105-acre or Plant 20 parcels located at the Navy's former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage facility. In order to aid in the compliance with the deed restriction, the Navy has completed the abandonment of the seven (7) deep production wells formerly located on the 105-acre parcel. The production wells were used for the extraction of groundwater as non-contact cooling water to support operations conducted by NGC during a time when Northrop Grumman leased the 105-acres from the Navy. If a future occupant of the Navy's 105-acre parcel wishes to pursue groundwater extraction, language will be included in the appropriate deed(s) of transfer requiring prior Navy notification and securing written permission from the Nassau County Department of Health and/or NYSDEC.

Further, the selected remedy for ON-SITE GROUNDWATER is also based on the recognition that an existing groundwater extraction and treatment system, known as the Onsite Containment (ONCT) System, continues to contain and remediate VOC-contaminated groundwater emanating from the Navy's property. The ONCT system was constructed, and is currently being operated on an annual basis, by the Northrop Grumman Corporation and is being operated as a component of NYSDEC's Regional Groundwater ROD. The Navy recognizes that continued operation of the ONCT system is paramount to ensuring that the Navy's selected

remedy of ON-SITE GROUNDWATER remains protective of human health and the environment. In the event that the ONCT system fails to continue to operate, the Navy also recognizes that it's ON-SITE GROUNDWATER remedy would no longer be protective of human health or the environment. In this case the Navy will re-evaluate the protectiveness of the selected remedy for ON-SITE GROUNDWATER and implement all requisite measures as determined by the Navy in consultation with NYSDEC, NYSDOH, and the Nassau County Department of Health to ensure the continued protection of human health and the environment.

As stated above, NYSDEC's selected remedy for groundwater included a number of response measures that were categorized into a Groundwater Remedial Program and a Public Water Supply Protection Program. The components of these two programs for which the Department of Navy has agreed to implement are all considered to be located off of Navy property and are, therefore, being considered as OFF-SITE GROUNDWATER issues.

The Navy's selected remedy for OFF-SITE GROUNDWATER includes the following:

Groundwater Remedial Program

- mass contaminant removal through groundwater extraction and treatment in an offsite area near the GM 38 monitoring well cluster shown on Figure 4;
- pre-design investigation to determine the optimal groundwater extraction location(s) in the GM 38 offsite treatment area(s);
- operation and maintenance of the GM 38 area remedy;
- additional groundwater investigation in the vicinity of well GM-75D2 in order to determine whether groundwater contamination in this area represents a significant threat to downgradient public water supply wells.

Public Water Supply Protection Program

The Navy recognizes the importance of continued provision of potable water to those communities/populations served by water supply wells that are, or that may become, impacted by site-related contamination (see Figure 5). To this end, the NYSDEC Groundwater ROD required that a public water supply protection program be implemented. The components of this program for which the Department of Navy will implement include:

- installation of Vertical Profile Borings (VPBs) to gather water quality and lithologic data that will be used in the regional groundwater computer model to aid in the placement of outpost monitoring wells;
- development of a Public Water Supply Well Contingency Plan
- installation of the outpost monitoring wells in areas upgradient of potentially affected water supply wellfields as outlined in the Public Water Supply Well Contingency Plan;
- public water supply wellhead treatment or comparable alternative measures, as necessary, for wellfields that become affected in the future.

It should be noted that another component of the Public Water Supply Protection Program was the treatment of wellfields 4, 5, and 6 associated with the Bethpage Water District (BWD). Wells at these Plants had either been, or would likely be, adversely impacted by VOC-contaminated groundwater emanating from Navy and NGC properties prior to issuance of NYSDEC's Groundwater ROD in 2001. Due to the immediate threat to public health, the Navy, in June 1996, supplied funding to BWD for the construction and 30-year operation of an air stripping treatment system installed on the BWD Plant 5 facility. This action was considered to be an interim action that was part of the Navy's Operable Unit 1 Soils ROD issued by the Navy in July 1995. In the mid-1990's, NGC took similar action to protect the water supplies at BWD Plants 4 and 6.

The detailed elements of the Navy's selected remedy are as follows:

Groundwater Remedial Program

1. Mass removal of VOC contamination from groundwater in the vicinity of the GM-38 Area. Components that will be required to achieve this goal include:

a. A pre-design investigation to determine the optimum location(s) for the GM-38 area groundwater extraction well(s). This pre-design investigation will derive the data necessary to determine the screen zone of the extraction well(s). In addition, the number of extraction wells will be substantiated and the potential need to cluster these wells will be determined.

b. The installation of at least one groundwater extraction well, or comparable remedial technology, at the approximate location of the GM-38 area, with all necessary piping to install the wells and properly run the discharge to the groundwater treatment systems.

c. Utilization of an existing storm water collection and groundwater recharge system(s) for discharge of treated groundwater. If one is not available, then a suitable method of system discharge and groundwater recharge will be developed.

d. The installation of the necessary air stripping systems or comparable remedial technology designed to remove VOCs from all the extracted groundwater to meet the State Pollutant Discharge Elimination System (SPDES) discharge limitations.

2. The installation of air emission controls, if required, to comply with the NYSDEC and any other applicable air regulations.

3. The operation, maintenance and monitoring (OM&M) of the GM-38 area extraction well(s). Monitoring will include the installation and use of upgradient and downgradient groundwater shallow, intermediate, deep and very deep monitoring wells. Analytical testing and monitoring of groundwater elevations will be done on a quarterly basis for the first year and annually thereafter.

4. A specific investigative task will be undertaken that includes, but is not necessarily limited to, installation of additional groundwater monitoring wells, vertical profile borings, and groundwater sampling to determine the extent of contamination in the vicinity of monitoring well GM-75D2 and whether groundwater contamination in this area represents a significant threat to downgradient public water supply wells. This task will be documented in a report and forwarded to the NYSDEC.

Public Water Supply Protection Program

5. Development of a Public Supply Well Contingency Plan that uses data gathered during the VPB installation program and the regional groundwater computer model to identify the locations of the outpost monitoring wells and to also assign "trigger values" to each outpost well in order to determine if treatment or other comparable alternative measure will be required for a potentially impacted public water supply wellfield(s).

6. The installation of outpost monitoring wells as recommended in the Public Supply Well Contingency Plan. A Field Implementation Workplan will be developed and submitted to NYSDEC prior to the installation of any outpost monitoring well detailing drilling techniques and proposed construction details of the outpost well(s).

7. A detection of NWIRP Bethpage site-related contamination in an outpost or long-term groundwater monitoring wells upgradient of a public supply well at concentration greater than the trigger values for that well will cause the Department of the Navy to evaluate the rate of movement of contaminants towards the public supply wells. If VOC concentrations in the outpost well(s) meet or exceed the respective performance objectives, additional confirmatory samples will be collected, as specified in the Public Supply Well Contingency Plan, and the results evaluated by the Navy with consultation from NYSDEC and the State and County Health Departments. If triggered, this will alert the Navy to begin discussions with the appropriate water district regarding various treatment alternatives.

8. The design, construction, operation and maintenance of wellhead treatment system and/or the evaluation of comparable alternative measures, if necessary. If evaluation of the long term groundwater monitoring or the outpost well data indicates that a public supply well has been or is in imminent danger of being impacted by NWIRP site-related contaminants, then wellhead treatment or comparable alternative measure(s) for the impacted public water supply well(s) will be necessary. A treatment system or comparable alternative measure(s) to produce potable water will be designed and constructed. Alternatively, if the Department of Navy and an affected Water District reach a cash settlement, then each settling Water District will be responsible for its respective monitoring and implementation of, as necessary, wellhead treatment, or comparable technology. Operation and maintenance of all public supply well treatment systems, or comparable technology, will be assumed, at a minimum, to operate for the required 30 year time frame as required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). At a minimum, the NYSDOH Part 5 drinking water standards will always be met.

The Department of the Navy has agreed to establish a goal for any given wellhead treatment or comparable technology for affected drinking water supplies which will provide water that is non-detect using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l) with respect to VOCs for site related contamination as cited in the 2001 Water Quality Monitoring Requirements for Nassau County Public Water Systems.

9. The provision of public water to residential or commercial structures that have private drinking water wells determined to be affected or potentially affected by the offsite migration of the NWIRP groundwater plume.

Common Program Elements

10. A long term operation, maintenance and monitoring plan will be prepared that details all of the monitoring requirements and contingency aspects associated with Navy-operated treatment systems.

11. A performance evaluation conducted at least once a year for Navy-operated treatment systems to determine whether the remedial goals and performance objectives of that system(s) have been or can be achieved, and whether treatment should continue.

12. A plan to properly close all monitoring wells associated with the NWIRP Bethpage site at such time that the wells are no longer necessary.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- A repository for documents pertaining to the site was established at the Bethpage Public Library.
- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.
- In October 2000, the NYSDEC sent out a mailing to the public announcing the finalized OU2 feasibility study was available to the public.
- In November 2000, NYSDEC issued a press release and a mailing was sent out to the public, announcing to the addressees the release of the OU2 PRAP.
- In March 2001, a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the NYSDEC PRAP.
- In May 2002, Navy prepared a Public Notice announcing that a 30-day comment period had commenced for the review of the Navy's ROD for groundwater.
- In September 2001 and June 2002, Restoration Advisory Board (RAB) meetings were held with community and Navy representatives whose agenda's included discussions regarding efforts to address regional groundwater contamination.

GLOSSARY OF TERMS

ARAR:	Applicable or Relevant and Appropriate Requirement.
BWD:	Bethpage Water District.
Capital Cost:	Refers to the up front cost of constructing a remedial alternative.
CERCLA:	Comprehensive Environmental Response, and Comprehensive Liability Act
Chromium:	An inorganic element used in various manufacturing processes.
DCE:	Dichloroethene.
ECL:	Environmental Conservation Law.
FS:	Feasibility Study.
GM:	Refers to monitoring wells installed for Northrop Grumman by ARCADIS (formerly Geraghty and Miller).
Groundwater Contours:	Equipotential lines of groundwater elevation above mean sea level.
Glacial:	Refers the Glacial or shallow aquifer associated with Long Island.
GOCO:	Government-Owned, Contractor-Operated facility.
HN:	Refers to monitoring wells installed for the Navy by Tetra Tech NUS (formerly Halliburtan NUS).
IRM:	Initial Remedial Measure.
Magothy:	Refers to the section of the Long Island aquifer below the Glacial and above the Lloyd.
MPS:	The Main Plant Site, or the former Fairchild Republic Aircraft manufacturing facility.
MCLs:	Maximum contaminant levels.
MGD:	Million gallons per day. Refers to daily rate of pumping groundwater.

mg/l	Milligrams per liter. See also ppm.
MNA:	Monitored Natural Attenuation.
NASA:	National Aeronautics and Space Administration
ND:	Non-detect or below the detection limit of the analytical equipment.
NWIRP:	Naval Weapons Industrial Reserve Plant.
NYCRR:	New York State Codes, Rules and Regulations.
NYSDEC:	New York State Department of Environmental Conservation.
NYSDOH:	New York State Department of Health.
OFCT:	Offsite containment system.
ONCT:	Onsite containment system.
OM&M:	Refers to operation, maintenance and monitoring, of remedial alternatives.
OU:	Operable unit. Refers to portion of the remedial program that have been divided into sections.
PCB:	Polychlorinated Biphenyl.
PCE:	Perchloroethylene or tetrachloroethylene. A chlorinated, aliphatic organic solvent
Plume:	Contaminant dispersion in the groundwater.
POTW:	Publicly owned treatment works or sewage treatment plant
ppb:	Part per billion. For water samples also termed micrograms per liter (ug/l) and for soil samples termed micrograms per kilogram (ug/kg).
ppm:	Part per million. For water samples also termed milligrams per liter (mg/l) and for soil samples termed milligrams per kilogram (mg/kg).
ppmv:	Part per million by volume. Used to quantify concentrations of contaminants in air samples.

PRAP: Proposed Remedial Action Plan. This is a document listing the remedy(s) proposed to mitigate the threat of hazardous waste disposal to human health and the environment.

PRP: Potential Responsible Party.

RAOs: Remedial Action Objectives, or the goals established to remedy a site based on findings of the RI (CERCLA).

RCRA: Resource Conservation and Recovery Act.

RI/FS: Remedial Investigation and Feasibility Study.

ROD: Record of Decision.

RUCO: Rubber Corporation of America.

SCGs: Standards, Criteria and guidance.

SVOCs: Semi-volatile organic compound

TAGM: Technical Assistance and Guidance Memorandum. Issued by NYSDEC.

TCA: Trichloroethane. A chlorinated aliphatic organic solvent.

TCLP: Toxicity Characteristic Leaching Procedure. Test used to determine if a waste media contained chemicals at concentrations that would be considered hazardous.

TCE: Trichloroethylene. A chlorinated, aliphatic organic solvent.

TVOC: Total volatile organic compounds.

ug/l: Micrograms per liter. See also ppb.

UIC: Underground Injection Control Program.

UST: Underground Storage Tank.

VCM: Vinyl chloride monomer.

VOC: Volatile Organic Compound