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

10 INDUSTRIAL HIGHWAY, MAIL STOP 82

LESTER, PENNSYLVANIA 19113-2090

JANUARY 2003

APRIL 2003 (REVISION 1)

370348

TABLE OF CONTENTS

SECTION

Declaration Statement – Record of Decision DS-1

1 Summary of the Record of Decision 1

2 Site Location and Description 5

3 Site History 5

3.1 Operational/Disposal History 5

3.2 Remedial History 7

3.3 Enforcement History 7

4 Site Contamination 8

4.1 Summary of Remedial Investigation and Feasibility Study 8

4.2 Interim Remedial Measures 13

4.3 Summary of Human Exposure Pathways 13

4.4 Summary of Environmental Exposure Pathways 14

5 Enforcement Status 14

6 Summary of Remediation Goals 15

7 Summary of the Evaluation of Alternatives 15

7.1 Description of Alternatives 16

7.2 Evaluation of Alternatives 23

8 Summary of the Selected Remedy 28

9 Community Participation 35

GLOSSARY OF TERMS 37

FIGURES

1 Site Location Map

2 105-Acre Parcel Map showing Installation Restoration Sites

3 Aerial Extent of Groundwater Contaminant Plume

4 GM-38 and GM-75D2 Areas

5 Potentially Impacted Water Districts

APPENDIX

A1 Responsiveness Summary - Final ROD dated January 2003

A2 Responsiveness Summary - Draft ROD dated May 2002

B Administrative Record Index

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 Appendix B 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, over the years, has migrated off-site beyond the boundaries of NWIRP Bethpage. In addition, there also exists groundwater contamination from other source areas from neighboring property owned by the Northrop Grumman Corporation (NGC). Due to the existence and proximity of these groundwater contaminant plumes, 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 components of these plumes 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 notification to 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 along with the corresponding long-term maintenance and monitoring program for the ONCT system, 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, or any other area identified as requiring additional groundwater investigation, in order to determine whether groundwater contamination represents a significant threat to downgradient public water supply wells and to further determine if a contaminant mass removal program, similar to the GM-38 Area program, is necessary. These actions will be implemented if a determination has been made by the Navy and NYSDEC that a significant threat to a downgradient public water supply exists.
- continued participation on the Technical Advisory Committee (TAC) that was established by NYSDEC that is comprised, at a minimum, of the involved regulatory Agencies, participating local water districts, and the Northrop Grumman Corporation.

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. To date, the regional groundwater computer model is predicting potential future impacts to the South Farmingdale Water District (SFWD) Wellfield that contains Well 4043 and a separate SFWD Wellfield containing Well 6150, as well as to the New York Water Service (NYWS) Wellfield containing Well 8480. If future modeling efforts suggest that a water supply well may be impacted within some reasonable timeframe and it has been further determined that the projected contaminant flow path will not intercept an existing outpost monitoring well, then additional outpost monitoring well(s) would be designed, installed, and monitored.

- public water supply wellhead treatment or comparable alternative measures, as necessary, for the wellfields that become affected in the future, including but not limited to the wells listed above, from site-related contaminants.
- provision of public water to residential or commercial users that have private drinking water wells determined to be affected or potentially affected by the offsite migration of site-related contaminants.

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. In the event that the treatment systems installed on BWD Plants 4 and 6 are no longer funded, the Navy recognizes that its OFF-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 OFF-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.

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 or the corresponding maintenance and monitoring program associated with the ONCT system, or fails to continue to provide funding for BWD Plants 4 and 6, then the Navy also recognizes that the Navy would have

to re-evaluate the effectiveness of the on-site and off-site remedies and propose changes that would ensure that the remedies 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.

13 APRIL 03
Date

Francis P. Castaldo

FRANCIS P. CASTALDO, CAPT, CEC, USN
Deputy, Shore Station Management
Naval Air Systems Command

RECORD OF DECISION
OPERABLE UNIT 2
Naval Weapons Industrial Reserve Plant
Bethpage, New York
January 2003
April 2003 (Revision 1)

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 groundwater contaminant plumes 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 components of these plumes 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 <u>ON-SITE GROUNDWATER</u> 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 notification to 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, along with the corresponding long-term maintenance and monitoring program for the ONCT system, 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 GM38 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 GM38 area remedy;
- additional groundwater investigation in the vicinity of well GM-75D2, or any other area identified as requiring additional groundwater investigation, in order to determine whether groundwater contamination represents a significant threat to downgradient public water supply wells and to further determine if a contaminant mass removal program, similar to the GM-38 Area program, is necessary. These actions will be implemented if a determination has been made by the Navy and NYSDEC that a significant threat to a downgradient public water supply exists.

- continued participation on the Technical Advisory Committee (TAC) that was established by NYSDEC that is comprised, at a minimum, of the involved regulatory Agencies, participating local water districts, and the Northrop Grumman Corporation.

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. To date, the regional groundwater computer model is predicting potential future impacts to the South Farmingdale Water District (SFWD) Wellfield that contains Well 4043 and a separate SFWD Wellfield containing Well 6150, as well as to the New York Water Service (NYWS) Wellfield containing Well 8480. If future modeling efforts suggest that a water supply well may be impacted within some reasonable timeframe and it has been further determined that the projected contaminant flow path will not intercept an existing outpost monitoring well, then additional outpost monitoring well(s) would be designed, installed, and monitored.
- public water supply wellhead treatment or comparable alternative measures, as necessary, for the wellfields that become affected in the future, including but not limited to the wells listed above, from site-related contaminants.
- 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.

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. In the event that the treatment systems installed on BWD Plants 4 and 6 are no longer funded, the Navy recognizes that its OFF-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 OFF-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.

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):

Site 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 Site 3.

Various solvents were stored at Site 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.

Site 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.

Site 3 - Salvage Storage Area

The NWIRP salvage storage area is located to the west of Site 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 OU-1 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 that 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 permeability 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 confining 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 proximity of Navy contaminated groundwater with NGC contaminated groundwater, 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 the SCGs at the NWIRP site 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 contaminated groundwater plumes 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 contaminated groundwater 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 measure was part of the Navy's Operable Unit 1 Soils ROD issued by the Navy in July 1995.

Other IRMs 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.

A potential human exposure pathway that could be relative to this operable unit is direct contact with (dermal adsorption), 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.
- Eliminate, to the extent practicable, detections of site-related VOC contamination for affected drinking water supplies using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l).

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, NGC has operated the system continuously and has been conducting quarterly sampling of on-site wells since 1995 and both on-site and off-site wells since 1998. 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 downgradient components of both contaminant groundwater plumes. 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 to verify that the system achieves the goals of the system, which are defined as preventing the off-site migration of NGC and NWIRP site-related VOC-impacted groundwater that is located within the boundaries of the sites (*i.e.*, on-site contaminant mass containment).

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 requires a long-term operation and maintenance plan. This plan was developed and submitted to NYSDEC for review.

For Alternatives 1 through 5, the following Items D through I, are common to Some or All of the Alternatives and will be implemented by the Department of Navy:

D. A Deed Restriction Prohibiting the Extraction of Groundwater from beneath NWIRP Bethpage

This item is 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 notification to and securing written permission from the Nassau County Department of Health and/or NYSDEC.

E. 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.

F. 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

G. 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.

H. 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 indicates that a trigger value has been exceeded and that a determination has been made 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 jointly with participation by the Navy, NYSDEC, State and County Health Departments, and the appropriate water district whose well is of concern.

I. 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 5.

Alternative 1: No Further Navy Action with Continuation of A, B, and C 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: Continuation of A, B, and C above with Implementation of D through I 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:	$ 9,290,000
O&M Cost:	$ 1,725,500
Present Worth:	$35,000,000

Alternative 3: Continuation of A, B, and C above with Implementation of D through I 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.

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

Alternative 4: Continuation of A, B, and C above with Implementation of D through I above and Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers: Alternative 4 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 4 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 Hempstead Turnpike.

Under Alternative 4, 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:	$21,860,000
O&M Cost:	$ 3,200,000
Present Worth:	$63,300,000

Alternative 5: Continuation of A, B, and C above with Implementation of D through I above and Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers, and HN-24 Area Treatment: Alternative 5 contains the elements of Alternative 4 as described above, with the addition of treatment at the HN-24 area, as described above in Alternative 2.

Alternative 5 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 5 would provide localized groundwater treatment of the HN-24 areas.

Capital Cost:	$23,090,000
O&M Cost:	$ 3,300,000
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 and 3 would be compliant with NYSDEC's Water Quality Regulations for the portion of the groundwater plume addressed by each Alternative. Alternatives 4 and 5 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.

Item E, the GM-38 area offsite remedy, was included in order to provide mass contaminant removal through groundwater extraction and treatment in an offsite area near the GM-38 monitoring well cluster. The groundwater treatment system 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 3, 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, that 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 5 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 4 and 5, the short-term impacts would be much greater than alternatives 1 through 3. 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 4 and 5 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 GM38 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 GM38 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 4 and 5 with the OFCT system. Alternative 5 has the highest reduction in mobility with the HN 24 area treatment, GM38 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 is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

The HN24 remedy of alternatives 2 and 5 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 and 3 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 easiest to implement.

Alternatives 4 and 5 would be substantially more difficult to implement administratively with respect to the OFCT 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, over the years, has migrated off-site beyond the boundaries of NWIRP Bethpage. In addition, there also exists groundwater contamination from other source areas from neighboring property owned by the Northrop Grumman Corporation (NGC). Due to the existence and proximity of these groundwater contaminant plumes, 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, 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. The Department of Navy concurred with the selection of Alternative 3 by NYSDEC.

Similarly, the Department of Navy has also chose Alternative 3 as described in Section 7 of this document. The selection was based on the evaluation of each of the five alternatives developed to address Navy contaminated groundwater both on-site and for that portion of contaminated groundwater that has migrated from Navy property. 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 downgradient 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 NWIRP site to groundwater quality standards.

Further, Alternative 3 was selected 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.

The 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 the remedy that the Navy will be implementing, as discussed in this document, will not address all of the contamination attributable to NWIRP Bethpage. 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 the 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 notification to 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, along with the corresponding long-term maintenance and monitoring program for the ONCT system, 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, or any other area identified as requiring additional groundwater investigation, in order to determine whether groundwater contamination represents a significant threat to downgradient public water supply wells and to further determine if a contaminant mass removal program, similar to the GM-38 Area program, is necessary. These actions will be implemented if a determination has been made by the Navy and NYSDEC that a significant threat to a downgradient public water supply exists.

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. To date, the regional groundwater computer model is predicting potential future impacts to the South Farmingdale Water District (SFWD) Wellfield that contains Well 4043 and a separate SFWD Wellfield containing Well 6150,

as well as to the New York Water Service (NYWS) Wellfield containing Well 8480. If future modeling efforts suggest that a water supply well may be impacted within some reasonable timeframe and it has been further determined that the projected contaminant flow path will not intercept an existing outpost monitoring well, then additional outpost monitoring well(s) would be designed, installed, and monitored.

- public water supply wellhead treatment or comparable alternative measures, as necessary, for the wellfields that become affected in the future, including but not limited to the wells listed above, from site-related contaminants.
- 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.

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. In the event that the treatment systems installed on BWD Plants 4 and 6 are no longer funded, the Navy recognizes that its OFF-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 OFF-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.

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, or any other area where additional groundwater investigations have been determined to be required, and whether groundwater contamination represents a significant threat to downgradient public water supply wells. The trigger value used to determine if additional groundwater investigations are necessary is a detection of 1 ppm of TVOCs in three consecutive sampling events in any one well. After the area is assessed, a determination will also be made regarding the necessity for implementation of a contaminant mass removal program, similar to the GM-38 Area program. If a determination is made by either the Navy and/or NYSDEC, that a significant threat to a downgradient public water supply exists, then a plan of action will be documented in a report and forwarded to the NYSDEC.

5. Continued participation on the Technical Advisory Committee (TAC) that was established by NYSDEC that is comprised, at a minimum, of the involved regulatory Agencies, participating local water districts, and the Northrop Grumman Corporation.

Public Water Supply Protection Program

6. 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). Assignment of "trigger values" for each of the outpost wells will not be considered final until concurred with by NYSDEC and NYSDOH.

7. 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).

8. A detection of 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. Assignment of "trigger values" for each of the outpost wells will not be considered final until concurred with by NYSDEC and NYSDOH.

9. 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 a 30-year time frame as required by 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.

10. 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

11. 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.

12. 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.

13. A plan to properly close all monitoring wells associated with the NWIRP Bethpage site at such time th at 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, Compensation and 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.

HN: Refers to monitoring wells installed for the Navy by Tetra Tech NUS (formerly Halliburton NUS).

IRM: Interim 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.

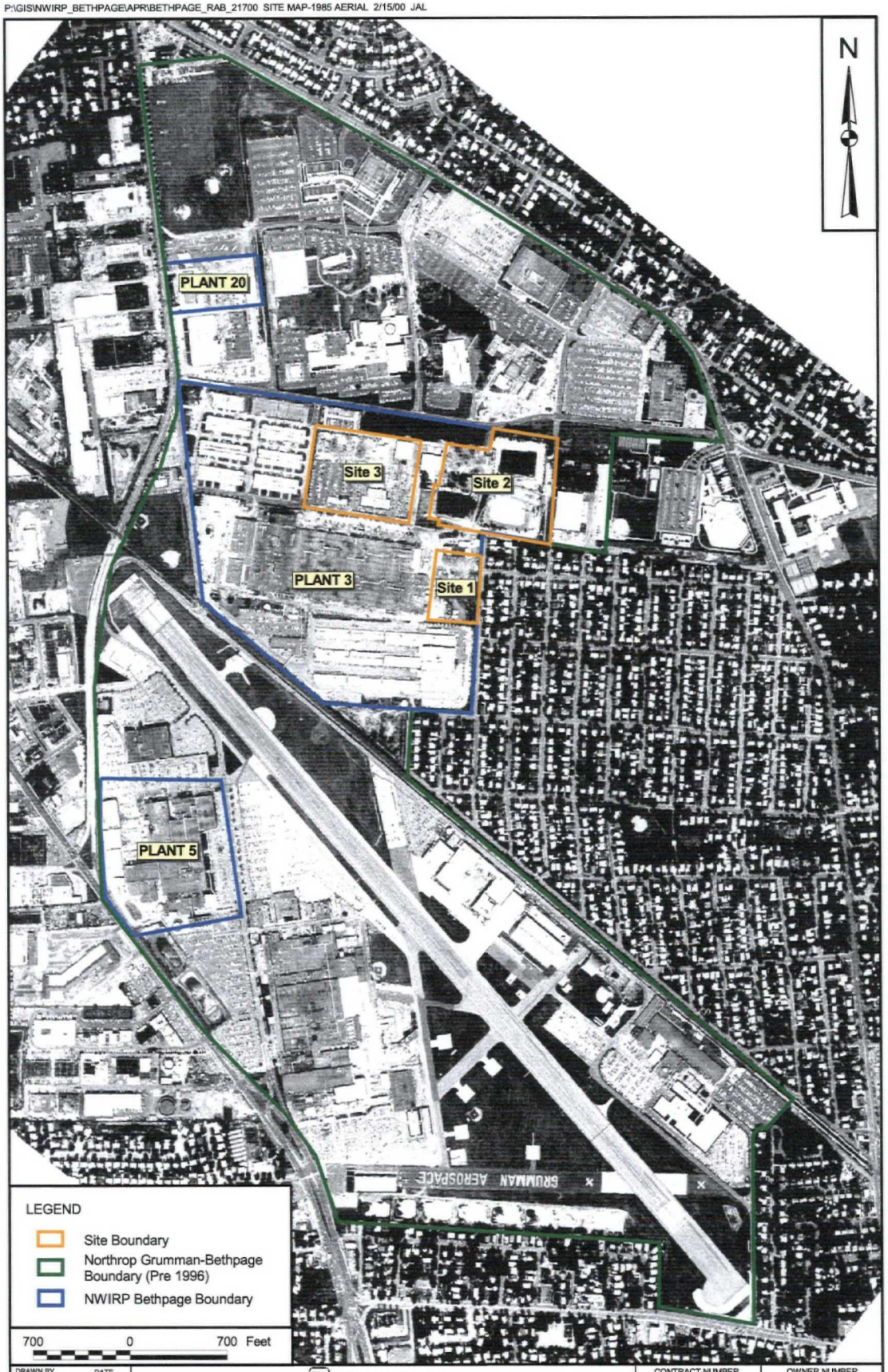
MGD: Million gallons per day. Refers to daily rate of pumping groundwater.

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 has 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.

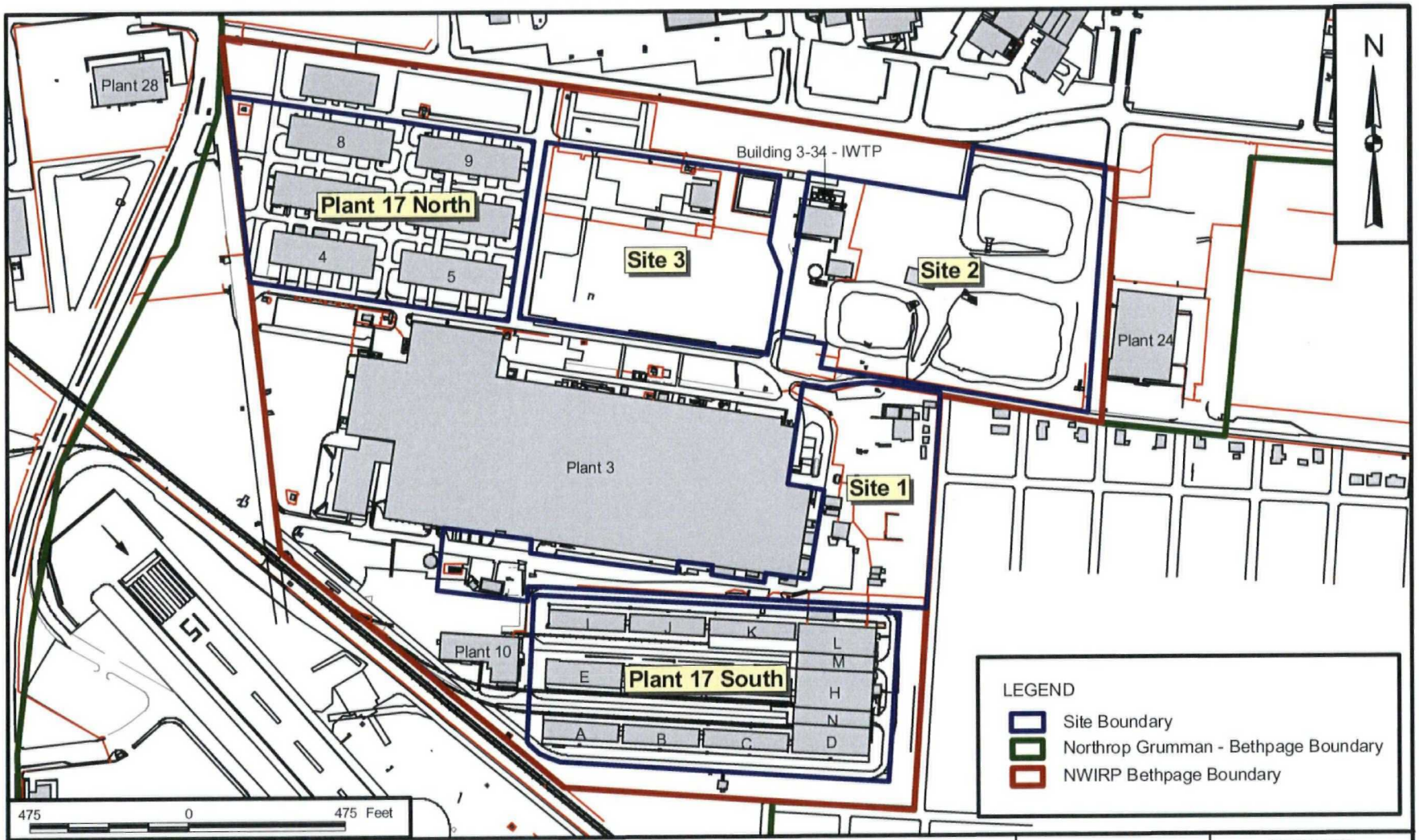
PRAP:	Proposed Remedial Action Plan. This is a document listing the remedy(s) proposed to mitigate the threat of hazardous waste disposal to human health and the environment.
PRP:	Potential Responsible Party.
RAOs:	Remedial Action Objectives, or the goals established to remedy a site based on findings 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

FIGURES

P:\GIS\NWIRP_BETHPAGE\APR\BETHPAGE_RAB_21700 SITE MAP-1985 AERIAL 2/15/00 JAL



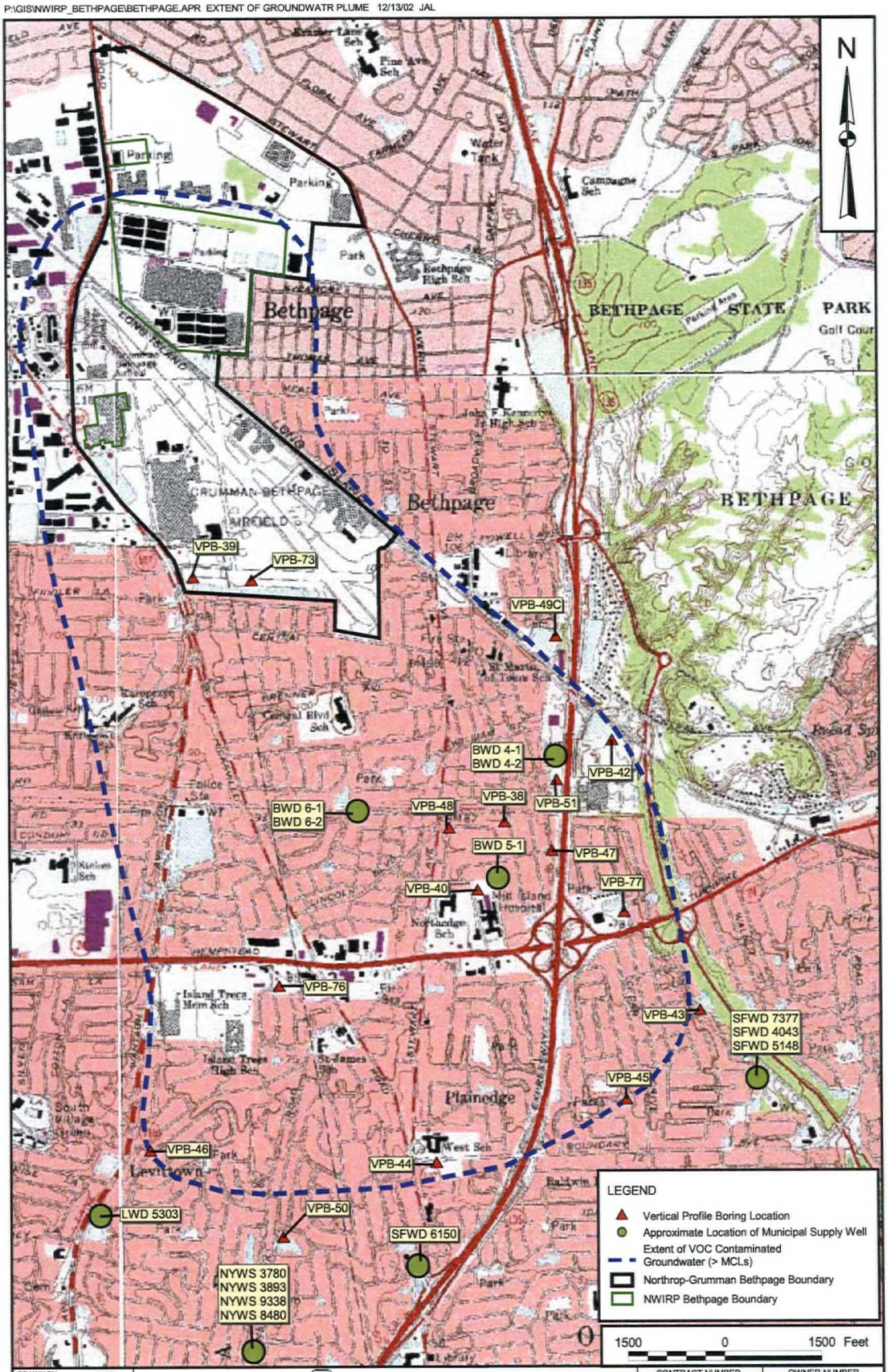
DRAWN BY J. LAMEY DATE 2/8/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER N5174	OWNER NUMBER CTO 208
CHECKED BY DATE	SITE MAP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK	APPROVED BY — DATE —	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 1	REV 0



DRAWN BY J. LAMEY	DATE 9/21/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER — / OWNER NUMBER —
CHECKED BY —	DATE —	105 ACRE PARCEL MAP NWIRP BETHPAGE BETHPAGE, NEW YORK	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2 / REV 0

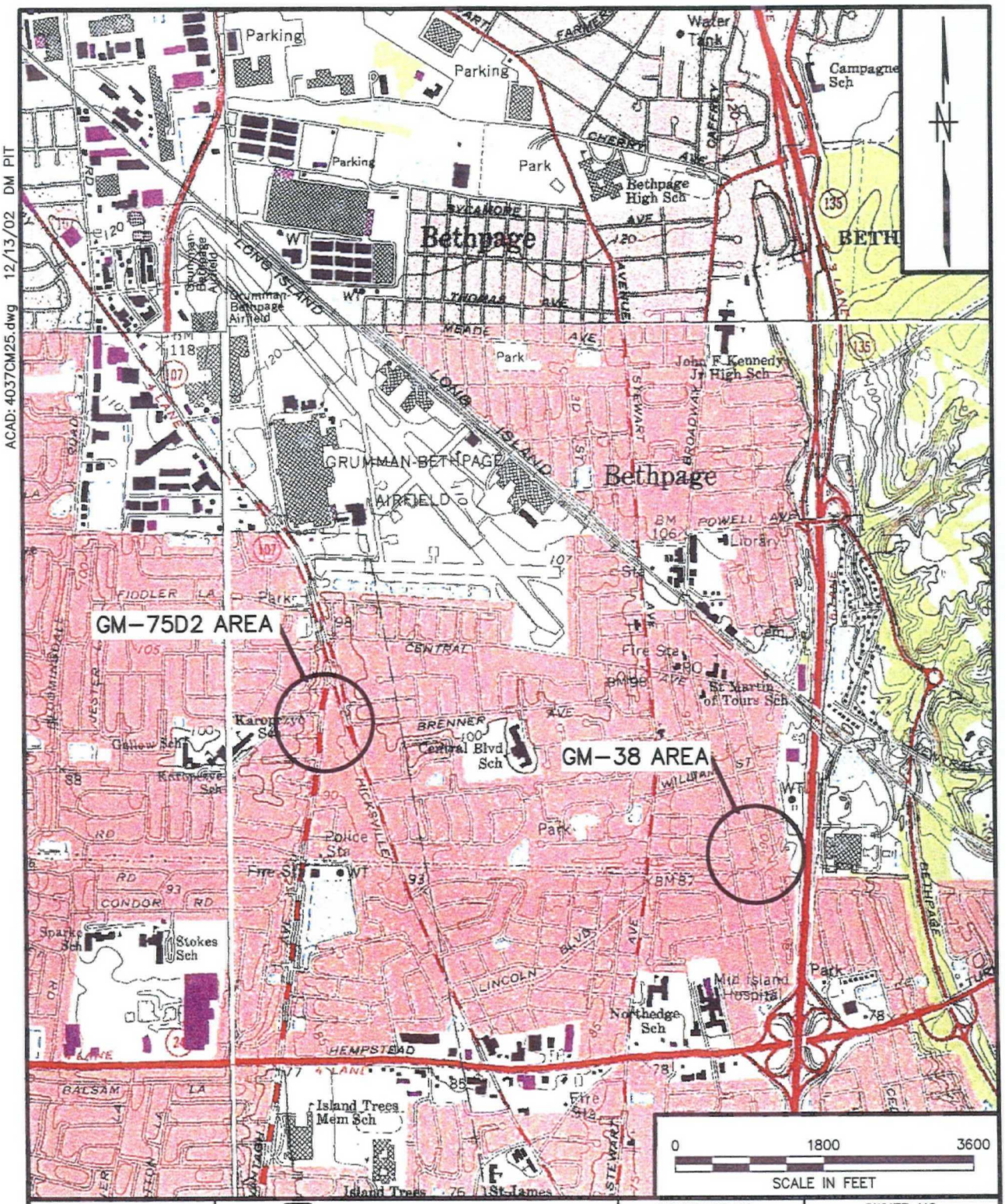
P:\GIS\NWIRP_BETHPAGE\APR\BETHPAGE_RAB_21700.APR 105 ACRE PARCEL MAP 9/21/00 JAL

P:\GIS\NWIRP_BETHPAGE\BETHPAGE.APR EXTENT OF GROUNDWATR PLUME 12/13/02 JAL



DRAWN BY J. LAMEY	DATE 12/13/02	Tetra Tech NUS, Inc.	CONTRACT NUMBER N4037 / OWNER NUMBER —
CHECKED BY —	DATE —	EXTENT OF GROUNDWATER PLUME NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3 / REV 0

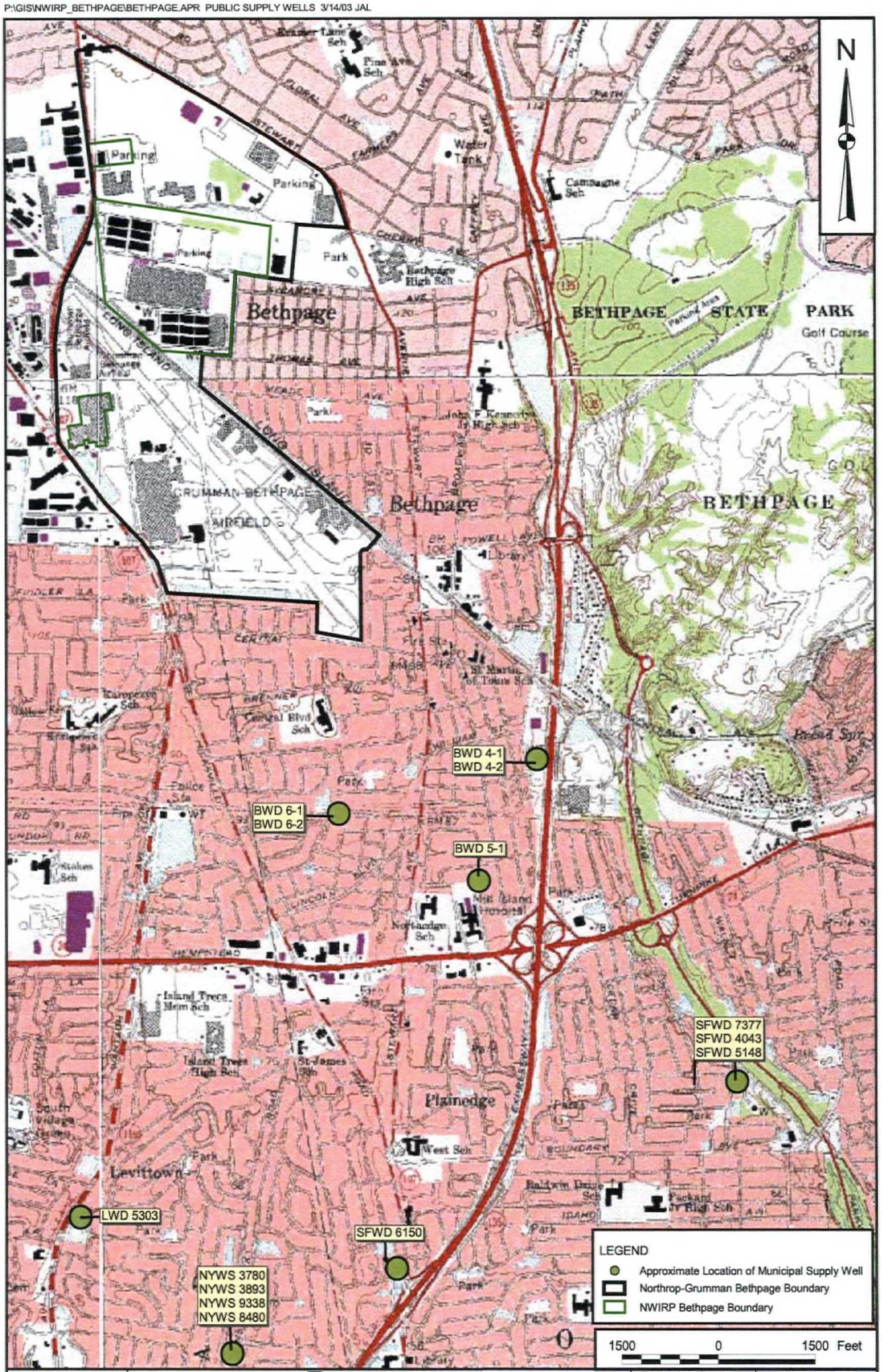
ACAD: 4037CM25.dwg 12/13/02 DM PIT



DRAWN BY DM DATE 10/15/02	Tetra Tech NUS, Inc.	CONTRACT NO. 4037	OWNER NO. ———
CHECKED BY DATE	SITE LOCATION MAP OFFSITE GM-38 AREA REMEDY NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK	APPROVED BY	DATE
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 4	REV. 0

FORM CTO NO. TTNUS A - 0 3 - REV 0 - 12/02 PP

P:\GIS\NWIRP_BETHPAGE\BETHPAGE.APR PUBLIC SUPPLY WELLS 3/14/03 JAL



DRAWN BY J. LAMEY	DATE 12/13/02	Tetra Tech NUS, Inc.	CONTRACT NUMBER N4037 / OWNER NUMBER —
CHECKED BY —	DATE —	LOCATION OF PUBLIC SUPPLY WELLS NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 / REV 0

APPENDIX A1
RESPONSIVENESS SUMMARY REGARDING COMMENTS ON FINAL GROUNDWATER ROD DATED JANUARY 2003

COMMENT RESPONSES FROM ENGINEERING FIELD ACTIVITY, NORTHEAST REGARDING
FINAL NAVY RECORD OF DECISION FOR GROUNDWATER (JANUARY 2003)
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP) BETHPAGE, NEW YORK

Comments from New York State Department of Environmental Conservation (NYSDEC) dated February 6, 2003:

COMMENT 1: Page DS-3, First Paragraph, Page DS-5, Regulatory Acceptance, Last Two Sentences Page 3, First Sentence; Page 32 and 33, Groundwater Remedial Program, Public Water Supply Protection Program and Responsiveness summary First Two comment Responses on Page A-5: The Navy ROD must state that the remedy also fails if the long term operation, maintenance and monitoring program is not being implemented or if treatment for Bethpage Water District Wells 4 and 6 are no longer being funded.

RESPONSE to 1: The following language was inserted into Page DS-3, First Paragraph; Page 3, First Sentence; and on Page 31: "along with the corresponding long-term maintenance and monitoring program for the ONCT system"

The following language was inserted at the end of the last paragraph on Pages DS-4; Page 4; and Page 32: "In the event that the treatment systems installed on BWD Plants 4 and 6 are no longer funded, the Navy recognizes that it's OFF-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 OFF-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."

Appropriate language regarding the above was also included into the Regulatory Acceptance section on Page DS-5.

COMMENT 2: Page DS-4, Page 4 and Page 33, Public Water Supply Protection Program:

a. This section needs to include the Technical Advisory Committee (TAC) Meetings. The TAC meetings will be held at the discretion of the NYSDEC.

b. Add a bullet for the Navy's non-detect goal for this project.

c. Add a bullet that states any private well/residence that has been or will potentially be impacted by Site related contamination will be connected to public water.

d. Last Bullet: Add a statement that if the public wellhead treat contingency program identifies the need for wellhead treatment, the NYSDEC will direct the Navy to implement this program.

RESPONSE TO 2a: The following language was added as a bullet under Groundwater Remedial Program on Pages DS-4, 4 and 33: "continued participation on the Technical Advisory Committee (TAC) that was established by NYSDEC that is comprised, at a minimum, of the involved regulatory Agencies, participating local water districts, and the Northrop Grumman Corporation."

RESPONSE TO 2b: The language regarding the Navy's non-detect goal for this project was previously discussed in Section 8 under the subheading "Detailed elements of the Navy's selected remedy". Item 8 on Page 34 (of the Navy's previous version of this ROD) discusses that non-detect will be the goal of any remedy or comparative alternative that is chosen to protect the public water supplies, if found to be necessary. Section 8 is used to expand upon the details of the elements of the Navy's remedy that were previously shown as bullets. The bullets are used throughout the document so as not to get into too much detail regarding the elements of the remedy and to utilize Section 8 in order to provide those details.

Therefore, since the language requested by NYSDEC is already provided under Section 8, no additional changes to the ROD are necessary.

RESPONSE TO 2c: The appropriate language as suggested in NYSDEC's comment was added to the recommended pages.

RESPONSE TO 2d: The Navy cannot agree to the addition of the recommended language stating that NYSDEC will direct the Navy to implement the wellhead contingency program. Due to the language contained in Executive Order 12580, the Navy has been given CERCLA authority to direct the type of remedial actions that are taken on Navy property or off of Navy property due to an on-site migrating source of contamination. As stated in this document, if trigger values are exceeded, then the Navy has agreed to take action by first consulting with all of the appropriate parties and a collective decision would then be made regarding how best to proceed.

Therefore, no changes to the document will be made regarding this comment.

COMMENT 3: Page DS-3, Page 3 and Page 31 and Page 34, Groundwater Remedial Program, Bullet 4:

a. Add "or any other area identified as requiring such determination."
b. Add "and determine if a contaminant mass removal program as per the GM 38 D2 program is necessary."

RESPONSE TO 3a: The appropriate language as suggested in NYSDEC's comment was added to the recommended pages. Expanded details were also provided under Item 4 on Page 34.

RESPONSE TO 3b: The appropriate language as suggested in NYSDEC's comment was added to the recommended pages. Expanded details were also provided under Item 4 on Page 34.

COMMENT 4: **Page 19, Section G, Last Paragraph, Second to Last Sentence and Page 34, No. 7:** This sentence needs to read: "The above determination would be made by the NYSDEC and State and County Health Departments, in consultation with the Department of the Navy."

RESPONSE TO 4: The Navy can not agree to the addition of the recommended language for the same reason as stated in the Navy's Response to Item 2d above.

COMMENT 5: **Page 20, Section 7: Summary of Alternatives:** Alternative's 2 through 8 must include items F, G and H.

RESPONSE TO 5: Agreed. The oversight has been corrected. Inclusion of the 3 items listed in the above comment has resulted in redundancy between Alternatives 2 and 4, 5 and 7, 6 and 8. Therefore, alternatives 4, 7, and 8 have been deleted and the remaining 5 alternatives renumbered.

COMMENT 6: **Page 31, First Paragraph:** Change the last three sentences to read "implement the remedies selected by the NYSDEC ROD to ensure continued protection of human health and the environment."

RESPONSE TO 6: The Navy can not agree to the addition of the recommended language for the same reason as stated in the Navy's Responses to Items 2d and 4 above. However, it should be noted that by the authority granted to the Navy under Executive Order 12580, the Navy has the same goal of Protection of Human Health and the Environment as NYSDEC.

COMMENT 7: **Page 33. Bullets 5 and 7:** Add "trigger values must be accepted by the NYSDEC and NYSDOH."

RESPONSE TO 7: In this case, the Navy can agree that it will not take any action with regards to the "trigger values" until those values are concurred with by NYSDEC and NYSDOH. The appropriate language as suggested in NYSDEC's comment was added to the appropriate page using the word "concurred" to replace "accepted". The bullets affected are now shown in the revised ROD as numbers 6 and 8 due to a previous addition.

Comments from Environmental Protection Agency, Region II dated February 14, 2003:

COMMENT: Section 6: Summary of the Remediation Goals - Among the goals selected for the site, the Navy does not include the following goal which was included in the March 2001 ROD for Operable Unit 2 - Groundwater prepared by NYSDEC:

> Eliminate, to the maximum extent practicable, the offsite migration of soils contamination entering the groundwater.

The omission should be evaluated and corrected if necessary.

RESPONSE: The remediation or elimination of the offsite migration of soil contamination into groundwater was previously addressed in the Navy's July 1995 Operable Unit 1 Soils ROD. Therefore, the inclusion of this goal into this Operable Unit 2 ROD is not necessary.

COMMENT: Section 7: Summary of the Evaluation of Alternatives - The selected remedy is Alternative 3 and is summarized on Page 21, but omits the components F, G and H as follows:

F. Long-Term Operation, Maintenance and Monitoring (OM&M) of the GM-38 Remedy
G. Development and Implementation of a Public Water Supply Well Contingency Plan
H. Department of the Navy Implementation of "Non-Detect" Policy for Affected Public Water Supplies

The text should be corrected.

RESPONSE: Agreed. The oversight has been corrected. Inclusion of the 3 items listed in the above comment has resulted in redundancy between Alternatives 2 and 4, 5 and 7, 6 and 8. Therefore, alternatives 4, 7, and 8 have been deleted and the remaining 5 alternatives renumbered.

COMMENT: Section 8: Summary of the Selected Remedy - The second paragraph on Page 29 describes the remedy to include long-term groundwater monitoring including monitored natural attenuation. However, the March 2001 ROD for Operable Unit 2 - Groundwater prepared by NYSDEC mentions long term monitoring of the groundwater. This discrepancy should be looked into and corrected if necessary.

RESPONSE: Agreed. The phrase "monitored natural attenuation" should not be included in this paragraph that describes NYSDEC's preferred remedy. The EPA correctly points out that NYSDEC is only requiring long term groundwater monitoring. The above phrase was deleted from this paragraph.

Comments from Dvirka and Bartilucci Consulting Engineers on behalf of the Massapequa Water District dated February 14, 2003:

Primary Concern

1. According to the Declaration Statement (page DS-2), implementation of the selected remedy will be subject to the availability of funds in future fiscal years. This statement is extremely disconcerting and unacceptable. The Navy, as part of the United States Government, is a responsible party for the contamination of a federally designated Sole Source Aquifer, known contamination of two public water supply well fields, which serve approximately 36,000 people, and a documented threat to at least five other public water supply wells, which serve an additional approximately 69,000 people. As being a responsible party, the Navy and the United States Government shall make the financial commitment to ensure that funds will be available to take whatever remediation actions are necessary to protect human health and the environment. Nothing less will be acceptable.

RESPONSE TO 1: The Navy acknowledges the concerns of the Massapequa Water District with regards to insuring that funding is available to protect the public water supplies if action is determined to be necessary. However, due to the language contained in the federal Anti-Deficiency Act, the Navy is not permitted to obligate funds for work that has not been appropriated by Congress. Since the Navy's ER,N funding, which is the source of funding to implement the requirements of this ROD, is an annual Congressional appropriation, the Navy can only commit to funding work in a specific fiscal year.

However, the Navy will include the necessary funding associated with this ROD in future budget requests. In this case, the appropriate funds required to fully implement this ROD have been included in the Navy's funding budget that currently extends out until 2015. Any funding that is thought to be required after 2015 has been included into the 2015 budget. As the Navy has proven in the past with the remediation of Bethpage, every effort is made to acquire sufficient funds each fiscal year to accomplish necessary environmental restoration, and this effort will continue.

Prior Comments from the Massapequa Water District

2. In the response to our comments regarding the May 2002 draft ROD (page A-1 of Appendix A to the ROD), it is stated that the purpose of the vertical profile boring program was to gather data necessary to calibrate the regional groundwater model rather than to delineate the contaminant plume. Since the outpost well locations and depths are being determined based solely on the model results and prior groundwater modeling performed during the Feasibility Study did not accurately delineate the extent of contamination, we have requested on several occasions that additional groundwater sampling be conducted downgradient of the modeled extent of contamination to verify the accuracy of the model. The statement in the ROD that the need for additional vertical profile borings will be evaluated based on water

quality information obtained from the outpost wells and any other investigations that may be conducted in the future does not address our concern regarding the adequacy of the model to determine the locations and depths of outpost monitoring wells.

RESPONSE TO 2: While actual analytical data may be preferred, the Navy, Northrop Grumman and NYSDEC agreed to use a groundwater computer model to help predict groundwater flow and reduce the investigative costs associated with this project, knowing that these savings could be better utilized for actual groundwater remediation. The groundwater model has undergone rigorous calibration; and the PRP group, with NYSDEC concurrence, will use this tool. To date, data collected verifies that the model is useful in predicting groundwater response. In addition, NYSDEC has not expressed a desire for the Navy or Northrop Grumman to collect additional groundwater data downgradient for the sole purpose of pinpointing the extent of the groundwater plume. The edge of the plume that is being predicted by the model has been sufficient. The Navy has full confidence in the model in that the environmental firm that developed it has many years of experience regarding the hydrogeology of the Long Island area.

Based on the above, the Navy has decided, with NYSDEC concurrence, to utilize the results of the groundwater model to make a prediction as to the most likely location of the outpost monitoring wells. Only, when we actually install the wells, will we know if the model predictions were accurate. If it is found that the model was not accurate, then the Navy will have to re-evaluate the data, including the data collected upon installation of each outpost well, and re-locate the well(s).

3. In the ROD (page A-2 of Appendix A), it is stated "the Navy concurs that the water districts can decide what alternative is best for the district and its customers.. .." This statement should be directly incorporated into the ROD, specifically in items 7 and 8 of the detailed description of the Navy's selected remedy.

RESPONSE TO 3: The appropriate water district(s) will be heavily involved in the treatment decisions associated with their respective wells but will not have unilateral authority regarding the decision. The Navy must protect the interests of the federal government and the federal budget from which funds for remediation will be appropriated. Based on cooperation to date, the Navy expects decisions will be acceptable to all parties.

The following language was added to Page 20 under Item H that describes the Development and Implementation of the Public Water Supply Well Contingency Plan, to better clarify the involvement of all parties as it relates to this issue:

> "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 indicates that a trigger value has been exceeded and that a determination has been made 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 jointly with participation by the Navy, NYSDEC, State and County Health Departments, and the appropriate water district whose well is of concern."

Other Comments Regarding the Record of Decision

4. The ROD assumes that certain activities, including sampling of the planned outpost monitoring wells, will continue to be conducted by the Northrop Grumman Corporation. The ROD should include a commitment by the Navy that these activities will continue, even if the Northrop Grumman Corporation will no longer conduct them, to ensure the continued protection of the downgradient public water supply wells.

RESPONSE TO 4: Agreed. Based on a similar comment submitted by NYSDEC, the Navy has expanded those activities that, if failed to continue, would constitute that the Navy's Off-Site Remedy is no longer protective of human health and the environment.

5. According to the ROD, to date, three public water supply well fields operated by the Bethpage Water District have been impacted or threatened by the off-site groundwater contaminant plume. However, according to information presented at the October 2002 Technical Advisory Committee meeting, groundwater modeling shows that three South Farmingdale Water District public water supply wells and two New York Water Service public water supply wells will impacted by site-related contamination in as little as four years. This information should be incorporated into the ROD.

RESPONSE TO 5: Text was inserted into the various sections that discusses the Public Water Supply Well Protection Program, that references the models predicted impacts to the SFWD Wellfield that contains Well 4043 and a separate SFWD Wellfield containing Well 6150, as well as the NYWS Wellfield containing Well 8480.

6. Alternatives 5,6, 7 and 8 all include off-site plume containment, treatment and discharge to off-site storm sewers, and describe installation of extraction wells north of Hempstead Turnpike to "provide mass removal from the entire aquifer.. .at the farthest downgradient edge of the plume.. . ." While it is recognized that the alternatives were developed as part of the 2000 Feasibility Study Report for the site, the ROD should incorporate the results of the recent vertical profile boring program which showed that the extent of the contaminant plume is currently well south of Hempstead Turnpike.

RESPONSE TO 6: The Navy agrees with this comment. The last sentence of the first paragraph under Alternative 4 has been modified to state that the wells that would need to be installed to capture the entire

groundwater contaminant plume would have to be installed to the south of the Hempstead Turnpike.

7. As listed, Alternatives 5 and 6 include Item E (Off-site GM-38 Area Remedy). However, since the descriptions for these alternatives do not make reference to the GM-38 Area, it appears that these two alternatives should only include Items A through D.

RESPONSE TO 7: Due to comments made by NYSDEC, the Navy has revised the description of alternatives. The result was redundancy between Alternatives 2 and 4, 5 and 7, 6 and 8. Therefore, alternatives 4, 7, and 8 have been deleted and the remaining 5 alternatives renumbered.

8. Figure 3 should be modified so that the extent of the groundwater plume can be clearly identified, even on a photocopied page.

RESPONSE TO 8: Comment noted. A revised Figure 3 was inserted.

9. Pages 5 and 6 of the ROD identify the former disposal areas as "Area 1," "Area 2" and "Area 3." These areas are described as "Site 1," " Site 2" and "Site 3" on Figure 2 and on page 11. Identification of the area should be consistent.

RESPONSE TO 9: References made to the former disposal areas will be revised on pages 5 and 6 to match the term "Site" used on Figure 2.

10. Attachment A (list of documents in the Administrative Record) was not provided.

RESPONSE TO 10: The Administrative Record index will be included as Appendix B in the Final version.

11. We note several apparent typographical errors within the ROD, as described below:

a. The second sentence of the third paragraph of page 9 should read "confining clay unit" rather than "confirming clay unit."
b. The first sentence of the first full paragraph of page 13 should read "IRMs" rather than "IRAs." If "IRAs" is correct, then the acronym should be defined. Also, the definition of IRM on page 12 (Interim Remedial Measure) is different from the definition in the Glossary of Terms (Initial Remedial Measure).
c. Since the last paragraph on page 27 describes Alternatives 5 through 8, which include off-site extraction and treatment systems, the first sentence should refer to the "OFCT" system rather than the "ONCT" system.

RESPONSES TO 11a, b and c: All typographical errors discussed in the comments above have been changed as recommended.

Comments from Northrop Grumman Corporation dated February 14, 2003:

General Comment

NGC believes that the Navy ROD improperly seeks to institutionalize the current status quo for the remedial activities being undertaken by the Navy and NGC. NGC is willing to maintain this status quo only until it can be modified, and we have been actively seeking to modify the present suite of activities to be more consistent with the historical allocation of responsibilities between the Navy and other Government-Owned, Contractor-Operated (GOCO) facility operators. We believe this is essential to provide for a more equitable treatment of NGC, ensure a more appropriate allocation of costs over the long term and preserve our competitiveness in the marketplace. With the exception of the Navy-imposed "institutional control" for onsite groundwater (which consists of a deed restriction prohibiting the extraction of groundwater from within the boundaries of the Naval Weapons Industrial Reserve Plant (NWIRP) - Bethpage facility), the Navy ROD should be revised to acknowledge its joint and several responsibility for all the requirements and remedial measures mandated in the March 2001 ROD for Operable Unit 2 (OU-2) Groundwater issued by the New York State Department of Environmental Conservation (NYSDEC) for the NWIRP - Bethpage and Northrop Grumman - Bethpage sites (hereinafter referred to as the NYSDEC ROD).

To that end, NGC offers legal comments below, followed by specific technical comments on various sections of the ROD.

Legal Comments

The Navy is Subject to New York State Law

Congress has waived "sovereign immunity" and thus the Navy (as well as NGC), is subject to the New York State Environmental Conservation Law (ECL) and the regulations promulgated thereunder which govern the remedial activities proscribed by the NYSDEC ROD for OU-2.

> "[S]tate laws concerning removal and remedial action, including state laws regarding enforcement (emphasis supplied) shall apply to removal and remedial action at facilities owned or operated by a Department agency, agency, or instrumentality of the United States . . . when such facilities are not included on the National Priority List." CERCLA § 120(a)(4), U.S.C. § 9620(a)(4).

The NWIRP, the NGC facilities and the environmental conditions which are the subject of both the NYSDEC and the Navy RODs are not listed on the NPL, and thus, clearly fall within the ambit of CERCLA's waiver of sovereign immunity. Section 120(a)(1) does not provide that governmental entities such as the Navy are exempt from liability.

Rather, it provides that the federal government, in this case the Navy, is liable in the same manner and to the same extent as any non-governmental entity. CERCLA § 120(a)(4) unambiguously provides that the waiver broadly applies to state laws pertaining to enforcement, and is not limited to state law clean up standards or ARARS.

In the instant case, Article 27, Title 13 of the ECL and the regulations promulgated thereunder at 6 NYCRR Part 375 establishes New York's enforcement mechanism for implementing the remediation of OU-2, as well as New York's clean up goals, objectives and methodologies. Importantly, New York's regulations, which establish the basis for the NYSDEC's ROD, track its federal counterpart and incorporate by reference the National Contingency Plan. *See* 6 NYCRR § 375-1.10. Consequently, the Navy is subject to the ECL § 27-1313 and the regulations promulgated at 6 NYCRR § 375-1.3(u) which establish the Navy's strict, joint, and several liability for the entire OU-2 remedy as prescribed by the NYSDEC ROD. This does not allow the *de facto* allocation of responsibility as proposed in the Navy ROD.

Specifically, the Navy is not entitled to "accept" certain obligations and delegate others. In an attempt to escape liability, the Navy relies on *United States Department of Energy v. Ohio* in the responsiveness summary of the Navy ROD. That case pertains to RCRA and CWA only, and the ambiguous language of those statutes[1] is dissimilar to the express language contained in CERCLA § 120(a)(4). Thus, under the <u>unambiguous</u> provisions of CERCLA, state laws concerning removal and remedial action, including laws regarding enforcement, <u>do</u> apply at Federal facilities not on the NPL. Moreover, in light of CERCLA's broad remedial goals, the interpretation that the

---

[1] The citizen suit provision of the CWA reads:

> Any citizen may commence a civil action on his own behalf-- (1) against any person (including the United States ...) who is alleged to be in violation of (A) an effluent standard or limitation under this chapter or (B) an order issued by the Administrator or a State with respect to such a standard or limitation....
>
> The district courts shall have jurisdiction ... to enforce an effluent standard or limitation, or such order ... as the case may be, and to apply any appropriate civil penalties under [33 U.S.C. § 1319(d)].
>
> CWA § 505(a), 33 U.S.C. § 1365(a).

The RCRA provision reads:

> (a) In general . . . . [a]ny person may commence a civil action on his own behalf—
> (1)(A) against any person (including . . . the United States . . .) who is alleged to be in violation of any permit, standard, regulation, condition, requirement, prohibition, or order which has become effective pursuant to this chapter . . . or (B) against any person, including the United States . . . who has contributed or who is contributing to the past or present handling, storage, treatment, transportation, or disposal of any solid or hazardous waste which may present an imminent and substantial endangerment to health or the environment . . . . The district court shall have jurisdiction . . . to enforce the permit, standard, regulation, requirement, prohibition, or order, referred to in paragraph (1)(A), to restrain any person . . . and to apply any appropriate civil penalties under [42 U.S.C. §§ 6928(a) and (g)].
> RCRA § 7002, 42 U.S.C. § 6972.

Navy seeks to apply in these circumstances would lead to irreconcilable and inconsistent results and remedies. To avoid such inconsistent results and remedies, as in this instance, Congress expressly gave state law precedence.

RESPONSE: The current and prevailing appellate court opinion is that CERCLA 120(a)(4) does not satisfy the threshold test required by the United States Supreme Court to be a clear and unambiguous (see, Department of Energy v Ohio, 503 U.S. 607 (1992) waiver of Sovereign immunity that showing a clear congressional intent to require federal agencies to comply with non-substantive state requirements (see, Hancock v. Train (426 US 167 (1978). In particular, the United States Court of Appeals (1st. Circuit), addressed the scope of CERCLA 120(a)(4) in a case questioning whether a non-substantive state requirement of the imposition of fines can be enforced against the Department of the Navy. That court held, "We therefore conclude that Department of Energy requires us to hold that CERCLA section 120, like RCRA section 6961, does not provide an adequately clear waiver of sovereign immunity from civil penalties sought by Maine." Maine v. Navy 973 F.2d 1007 (1st. Circ., 1992). In response to Hancock v. Train and Maine v. Navy, Congress amended the Clean Water Act and RCRA respectively to broaden the scope of the waivers and to include state and local procedural requirements within the language of the provision. No such language was added nor presently exists in CERCLA 120(a)4. Accordingly, as required by CERCLA, all state substantive requirements which are Applicable, Relevant and Appropriate have been satisfied.

The Navy's Position is Contrary to Navy Policy

Moreover, to suggest that CERCLA Section 120 is "ambiguous" or otherwise fails to enable the State of New York to compel complete Department of Defense (DOD) action at Bethpage is a dramatic departure from Navy's own Environmental and Natural Resources Program Manual (OPNAVINST 5090.1B) ("Navy Policy Manual").

Chapter 15 of the Navy Policy Manual pertains to the very Installation Restoration Program at issue here and "non-government owned sites that have been contaminated by the disposal of Navy-generated waste and other [hazardous substances] for which the Navy is a potentially responsible party." (Emphasis added.) Of note, Section 15-2.6 (State laws) reaffirms that, "under CERCLA Section 120(a)(4), State laws concerning removal, remedial action, and enforcement apply to Federal facilities not listed on the National Priorities List (NPL)." Indeed, "Navy policy is to comply with all State laws which are consistent with CERCLA, SARA and the NCP." Section 15-5.29. In addition, "Navy actions to fulfill its CERCLA responsibilities shall be consistent with its contractual requirements with the GOCO contractor." Section 15-5.28 (emphasis added). Section 15-5.17 of the Navy Policy Manual confirms that "[a]lthough neither a ROD nor an IAG [interagency agreement] is required under CERCLA at non-NPL sites[e.g., Bethpage], State remediation laws may contain requirements for decision documentation. Where such requirements apply, the cognizant NAVFACENGCOM activity shall write a decision document for submittal to

the installation that satisfies State law." Navy Policy Manual Section 15-5.17 (emphasis added).

RESPONSE: See Response to Legal Comment above regarding the satisfaction of the substantive requirements of State Law.

The Navy's Position is a Material Deviation from the Prior Course of Dealing

NGC has also found that the NWIRP-specific ROD conflicts with not only New York State law and published Navy policy, but also pre-existing facility contracts and the prior course of dealing.

In the face of a comprehensive March 2001 NYSDEC ROD for groundwater, the Navy purports to "accept" almost two years later only certain aspects of the Bethpage groundwater remedy mandated by the NYSDEC ROD and relegate other substantive aspects of the NYSDEC ROD to its contractor (NGC) over NGC's objection. According to the Navy, the purpose of its considerably narrower and competing Navy ROD is purportedly to authorize DOD funding for those limited tasks that "Navy feels" are "acceptable" for it in regard to implementation of the OU-2 remedy.

Promptly after the issuance of the NYSDEC ROD in March 2001, NGC attempted without success to enter into an "Environmental Matters Agreement" with the Navy to allocate voluntarily responsibility under OU-2. Where the Government has failed to fund 100% cleanup, the Navy and other DOD departments have occasionally entered into such agreements with contractors at a number of contaminated industrial reserve plants. The Navy terminated those discussions with NGC over one year ago and now seeks to impose its own allocation formula under the veil of a "Navy ROD."

The Navy ROD is plainly calculated to impose what Navy admits is an incomplete solution for OU-2 over the objections of both NYSDEC and NGC. Navy concedes that, when it could not delegate responsibility for OU-2 to NGC in the face of contractual guarantees to the contrary, Navy first approached NYSDEC to enter into a Federal Facilities Site Remediation Agreement to bind DOD to only certain aspects of OU-2: "That is why the Navy approached NYSDEC to enter into a Federal Facilities Site Remediation Agreement (FFSRA) with the Department of the Navy that binds the Navy to accept responsibility for certain portions of groundwater remedy." Navy Comments at A-11.

Thus, in the absence of an Environmental Matters Agreement, the Navy ROD evidently became its third option to delegate OU-2's obligations and impose a Navy-sponsored allocation formula, regardless of controlling state and federal law, and its own contractual obligations to its contractor.

The history of the NGC facility compels a contrary conclusion. For example, since the 1930s, production at the adjoining and highly integrated Navy- and NGC-owned parcels has related almost exclusively (98%) to DOD requirements, DOD production and DOD product

specifications. Thus, the environmental degradation attributable to 98% DOD production is not susceptible to the arbitrary allocation formula imposed by Navy in its ROD.

Moreover, the Navy assumes erroneously that the activities and operations on the Navy parcels and NGC parcels were unrelated and independent, which is more accurately the case with the activities at the Occidental Petroleum/RUCO site under EPA jurisdiction. To the contrary, the activities at Bethpage that led to historical releases to groundwater were in direct support of DOD programs and in compliance with DOD specifications and oversight. Further, the Navy ROD ignores the applicable Bethpage facility use and production contracts that plainly allocate responsibility for damages arising from DOD-related production activities to the Navy, regardless of whether part or all the DOD work occurred on a specific Navy/NGC parcel or within a specific Navy/NGC building. Over the six decades of DOD production at Bethpage, the ownership of various parcels and production buildings has changed back and forth between DOD and NGC or its predecessor. Accordingly, the Navy's approach to limit its responsibility in the manner set forth in its narrow and self-serving ROD is both arbitrary and capricious.

It is noteworthy that all costs pertaining to OU-1 (soils) and the interim OU-2 groundwater measures undertaken at NWIRP and on the adjoining NGC parcels, including all downgradient off-site locations, have been assumed directly or indirectly by Navy, as required by applicable contracts, federal regulations and New York State Law. This interim allocation for OU-2 is far more consistent with applicable law and DOD practices at hundreds of other former industrial reserve plants and military installations. The Navy ROD departs from its practices over the last 10 years at Bethpage and Calverton and is remarkably silent on Navy's obligations under its own Bethpage contracts to assume the cost of cleanup of OU-2. Navy simply states that in the event its former GOCO contractor fails to perform certain key tasks necessary to implement the NYSDEC ROD, NYSDEC may exercise its option to revisit the Navy ROD every 5 years.

At Bethpage, the Navy represents to NYSDEC that a competing ROD that selects certain more favorable portions of a pre-existing state ROD (and unilaterally allocates substantive obligations to other parties) is "required" in order to obtain DOD funding. Navy's own policy manual instructs otherwise. The Navy's own practices at Bethpage, Calverton and other GOCO facilities also instruct otherwise.

In light of the foregoing, it is clear the Navy ROD is legally defective and has no purpose other than to limit NYSDEC's enforcement options, override controlling state law and mitigate controlling facility contracts in order to achieve an outcome favored by the Navy.

RESPONSE: Navy asserts that its CERCLA authority prevails as to Navy decision-making at this non-NPL site as described in the response to items above. Resolution of financial responsibility for contamination from operations conducted by Northrop Grumman has been remanded to the Navy Litigation Office for resolution. Navy intends to go ahead with

remedies as described in this ROD in order to protect human health and the environment and to transfer property to Nassau County as authorized by federal law while matters of financial responsibility are being resolved. The Navy recognizes the efforts made on the part of NGC to enter into an Environmental Matters Agreement and notes NGC's objection to the course of action chosen by the Navy.

Technical Comments

1. The description of the "commingled plume" should be revised to include that portion of the plume that is off-site, downgradient of the NWIRP and Northrop Grumman sites. See Page DS-2 (1st paragraph).

RESPONSE TO 1: The phrase, "Over the years, a portion of this Navy/NGC commingled plume has migrated further downgradient and beyond the property boundaries of both the Navy and NGC." was incorporated.

2. The ON-SITE GROUNDWATER remedy should be revised to include the NYSDEC ROD-required ONCT System Hydraulic Effectiveness Evaluation, including any follow-up activities required by the NYSDEC. See Pages DS-3 (1st full paragraph); 3 (1st paragraph); 17 (Section C, 1st paragraph); 18; and 31 (top of page).

RESPONSE TO 2: The components of this ROD in combination with actions being taken by other parties, including the identified evaluation, provide a remedy that is protective of human health and the environment. If necessary actions taken by others, including the suggested evaluation, fail to be implemented, then the Navy's ROD would no longer be protective and the ROD would have to be amended.

3. The description of the GM-38 Area remedy should be revised to include the following components. See Pages DS-3 (Groundwater Remedial Program Section); 3 (Groundwater Remedial Program Section); 18 (Section E); 31 (Groundwater Remedial Program Section); and 32 (Groundwater Remedial Program Section).

   a. Remedial design of GM-38 remedy.
   b. Construction of GM-38 remedy.
   c. Monitoring of GM-38 remedy (consistent with Page 18, Section E of Navy ROD).

RESPONSE TO 3: Agreed. The recommended changes on the suggested pages have been made with regards to the description of the GM-38 remedy.

4. The Groundwater Remedial Program Section should be revised to include the recognition of responsibility for implementing any investigation, RD/RA, OMM, or other activity required by the NYSDEC. See Pages DS-3 (Groundwater Remedial Program Section); 3 (Groundwater Remedial Program Section); 31 (Groundwater Remedial Program Section); and 33 (Groundwater Remedial Program Section).

RESPONSE TO 4: The following phrase was added to the appropriate bullets that describe the Groundwater Remedial Program, "The trigger value used to determine if additional groundwater investigations are

necessary is a detection of 1 ppm of TVOCs in three consecutive sampling events in any one well. After the area is assessed, a determination will also be made regarding the necessity for implementation of a contaminant mass removal program, similar to the GM-38 Area program."

5. The phrase "by the commingled plume from the NWIRP and Northrop Grumman sites" should be added to the end of the last bullet on Pages DS-4; 32 (top of page - last bullet); and 34 (Item No.9).

RESPONSE TO 5: This exact phrase was not added as recommended. The phrase was slightly modified to read, "from site-related contaminants." and added to the recommended pages.

6. Monitoring of Outpost Wells should be added to the 3rd bullet on Pages DS-4; 4; and 33 (Item No. 6). Furthermore, the goal of the vertical profile boring program stated under the Public Water Supply Protection Program heading should be revised to indicate that the goal was to collect depth-specific lithologic and groundwater samples to establish a vertical profile of the geology and groundwater quality at each investigation location in support of groundwater modeling efforts, not to delineate the extent of the plume.

RESPONSE TO 6: The Navy does not agree to the addition of this item in the Navy's ROD. Currently, and over the last couple of years, NGC has been tasking their environmental contractor with the quarterly sampling and analysis of groundwater monitoring wells located downgradient of NGC property in accordance with OM&M activities associated with the ONCT system. Collection of this data is used to describe groundwater flow conditions and groundwater quality observed on a quarterly basis. Based on discussions with NGC and their environmental consultant, it is the Navy's understanding that the sampling and analysis of the outpost monitoring wells will be included into the quarterly efforts associated with OM&M of the ONCT system since the data collected from the outpost wells could also be used to describe groundwater flow conditions and groundwater quality (see Item C in Section 7.1).

7. Change the phrase "NWIRP ROD" to "OU-1 NWIRP ROD", on Page 7 (1st full paragraph).

RESPONSE TO 7: Agreed. The recommended change has been made.

8. Insert the phrase "at the NWIRP site" after the phrase "SCGs" on Page 10 (last paragraph).

RESPONSE TO 8: Agreed. The recommended change has been made.

9. Change the phrase "IRAs" to "IRMs", on Page 13 (1st full paragraph).

RESPONSE TO 9: Agreed. The recommended change has been made.

10. Delete the phrase "known to presently exist or that have historically existed at the site" from the 2nd paragraph under Section 4.3 on Page 13. NGC is not aware of any human exposures that exist, either historically or currently.

RESPONSE TO 10: Agreed. The following phrase has been substituted, "A potential human exposure pathway that could be relative to this operable unit is direct contact with (dermal adsorption), ingestion of, and inhalation associated with contaminated groundwater through residential or commercial use."

11. Add the NYSDEC ROD-required Non-Detect Performance Standard for affected public supply wells to the list of goals on Page 15 (2nd paragraph).

RESPONSE TO 11: Agreed. The following phrase has been added, "Eliminate, to the extent practicable, detections of site-related VOC contamination for affected drinking water supplies using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l)."

12. The 3rd sentence in the last paragraph on Page 15 should be revised to say "Since completion of the ONCT system in 1998, NGC has operated the system continuously and has been conducting quarterly sampling of on-site wells since 1995 and both on-site and off-site wells since 1998."

RESPONSE TO 12: The recommended change has been added to the text.

13. Delete the 2nd sentence in the 1st paragraph on Page 18. The public supply wells that are presently equipped with wellhead treatment systems are operated and maintained by the water districts. Therefore, the preparation and implementation of the associated operation and maintenance plan would be the responsibility of the respective water district, not Northrop Grumman.

RESPONSE TO 13: Agreed. This statement has been deleted. The remaining text was also changed to present tense to reflect that an O&M plan associated with the ONCT system has been prepared and submitted to NYSDEC for review.

14. The text for Page 18, Section E and Page 19, Section G do not match the titles given for these sections. These sections should be revised, as follows: Section E should include the components of the GM-38 Area remedy discussed herein as Specific Comment No. 3; Section G should include preparation of the Water Supply Contingency Plan, including trigger values, installation of VPBs and outpost wells, and outpost monitoring.

RESPONSE TO 14: The texts within these two items were updated to reflect more of the components of each task as suggested with the exception of the inclusion of outpost monitoring under Item G for the reasons stated in the Navy's response to Comment 6.

15. The 4th paragraph on page 24 should be deleted and replaced with the wording provided by the NYSDEC on Page 4 (2nd bullet) of the NYSDEC ROD.

RESPONSE TO 15: The recommended text was included as suggested.

16. Add language to address implementation of any NYSDEC-required follow-up (including Pre-Design investigation, RD/RA, OMM, etc.) to the GM-75D2 investigation.

RESPONSE TO 16: The follow-up taskings were added with language that also states that these actions will be implemented if a determination has been made that a significant threat to a downgradient public water supply exists. Further language was added to state that the determination of a significant threat will be made by the Navy and NYSDEC. This change was made to the 75D2 bullet on all pages where the Groundwater Remedial Program was described.

17. Figure 3 should be revised to better illustrate the extent of the VOC plume. The plume extent is not apparent in the figure supplied.

RESPONSE TO 17: Agreed. Figure 3 has been modified.

18. The statement made on Page 17, Item C, 1st paragraph, second sentence is incorrect, as the OMM Plan does not include a specific task to verify the NWIRP contamination does not pass beyond the ONCT system. As referred to in Specific Comment No. 2, herein, the ROD requires that a hydraulic effectiveness evaluation of the ONCT system be performed to verify that the system achieves the goals of the system, which are defined as preventing the off-site migration of NGC and NWIRP site-related VOC-impacted groundwater that is located within the boundaries of the sites (*i.e.*, on-site contaminant mass containment). Further, this ROD requirement is not limited to the NWIRP site contaminants.

RESPONSE TO 18: The clarification to the language was made.

Comments from Holzmacher, McLendon & Murrell, P.C. (H2M Group) on behalf of the South Farmingdale Water District and New York Water Service dated February 14, 2003:

- Pages DS-3 and 3 - We believe that the data in the vicinity of Well 75D2 already demonstrates the need for extraction and treatment and request that the Navy implement a remedy to minimize any further migration of this concentrated VOC plume to the south. Consideration should be given to pumping the extracted water back to the Grumman-Navy site where additional treatment facilities could be constructed adjacent to the on-site treatment system (ONCT).

RESPONSE: The data collected from Well 75D2 has been incorporated into the groundwater computer model and the output of the model has indicated that collection and treatment of contamination from this area will not change the predicted impacts to the downgradient public supply wells. Therefore, the Navy does not agree that the installation of the suggested system is necessary. Rather the Navy will utilize available resources on other priorities of the groundwater remedy.

- Pages DS-3 and 3 - We are reiterating our comments that we previously provided on the proposed groundwater remedial program at GM-38. The proposed program should include a collection of extraction wells that optimizes the effectiveness of the remedial action in removing contaminants in the GM-38 area and reduces the potential impact of the contaminant plume on downgradient water supply wells. While the modeling results presented at the June 26, 2002 and October 22, 2002 TAC meetings suggested little difference to the downgradient wells regardless of whether two or three extraction wells were installed, it is our opinion that this conclusion is biased due to the proposed location and minimal pumping rate of the third extraction well and the slow rate of groundwater travel in the deeper Magothy aquifer. It is our opinion that if extraction well(s) at more significant pumping rates (1000 gpm +) were installed further south (on Hempstead Turnpike, in the vicinity of Mid-Island Hospital) coupled with looking at a longer period of time (in excess of 30 years), the benefit of adding additional extraction well(s) would be more significant to downgradient water suppliers. The proposed GM-38 area is upgradient of SFWD's largest well field (plant 1) where the SFWD has three of its eleven wells. Consequently, we are recommending that additional extraction wells with adequate pumping capacity (1000 gpm +) be added in the vicinity of Mid-Island Hospital to minimize the size and concentration of the contaminant plume traveling south of Hempstead Turnpike beyond the proposed capture zone for GM-38.

RESPONSE: ARCADIS is currently running a model simulation based on the recommendation provided in the comment above to determine if there are any readily apparent benefits of implementing this scenario.

- Pages DS-4 and 19 - As part of the Public Water Supply Well Contingency Plan, consideration should be given to modifying the

wording such that if either the outpost monitoring well data OR the ongoing modeling indicates that a water supply well will be impacted within five years or less, that the Navy will commence negotiations with the affected water supplier. This will minimize the possibility of contamination bypassing the outpost monitoring well and subsequently impacting the water supply well thereby putting the water supplier at risk with insufficient time to design and construct treatment facilities or implement an alternative measure.

RESPONSE: Navy intends to use both means to determine if a potential problem exists, but will rely on actual groundwater data as confirmation before committing to the installation of a multi-million dollar treatment system or other comparative alternative. However, the comment made above is valid, therefore, the Navy has included the following language to all bullets that describe the installation of Outpost Monitoring Wells:

> "If future modeling efforts suggest that a water supply well may be impacted within some reasonable timeframe and it has been further determined that the projected contaminant flow path will not intercept an existing outpost monitoring well, then additional outpost monitoring well(s) would be designed, installed, and monitored."

- Page 19 - Section G - second paragraph and 34 - Article 7 - last line: In addition to the Navy, NYSDEC and the Health Department, the affected Water Districts must also be a participant in any discussion relative of the evaluation of outpost monitoring well data and the need to implement an appropriate remedy.

RESPONSE: Agreed. This comment was previously addressed in the Navy's response to Dvirka & Bartilucci's Comment 3. Specifically, the following language was added to Page 20 under Item H, "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 indicates that *a* trigger value has been exceeded and that a determination has been made 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 jointly with participation by the Navy, NYSDEC, State and County Health Departments, and the appropriate water district whose well is of concern."

- Figures 3 and 5 - Please correct the location of the wells at Plant site 1. Wells N-4043, N-5148 and N-7377 are on the same Plant site (1) and well N-4042 no longer exists.

RESPONSE: Changes to the well locations have been made.

- Figure 3 - Based on the latest data, this figure does not appear to accurately and clearly show the extent of VOC contaminated groundwater (>MCLs).

RESPONSE: Figure 3 has been revised to better reflect the extent of the groundwater contaminant plume. However, no change in the outline was made since the figure provides an accurate representation of the extent of the groundwater contaminant plume.

Comments from Holzmacher, McLendon & Murrell, P.C. (H2M Group) on behalf of the Bethpage Water District dated February 14, 2003:

- Pages DS-3 and 3 - As the District has already been on record, the groundwater data for the plume in the area of GM-75D2 already demonstrates that remediation at this location is warranted and required. We request that the Navy concur that remediation at this location will minimize further migration of the contamination plume to the south. Since past data has already shown high levels of contamination, additional investigation at this point will only prolong the plume migration. With the location of this site near to the on-site treatment system, extraction wells piped back to the on-site treatment system for groundwater remediation should be considered. As a note, we suggest that a figure indicating the location of the GM-75D2 area be provided as part of the ROD.

RESPONSE: The data collected from Well 75D2 has been incorporated into the groundwater computer model and the output of the model has indicated that collection and treatment of contamination from this area will not change the predicted impacts to the downgradient public supply wells. Therefore, the Navy does not agree that the installation of the suggested system is necessary. Rather the Navy will utilize available resources on other priorities of the groundwater remedy.

The Navy will, however, revise Figure 4 to include the location of the 75D2 Area.

- Pages DS-3 and 3 - In our letter of December 2,2002, which commented on the information provided at the October 22, 2002 Technical Advisory Committee (TAC) meeting, we reiterate our comments related to the design parameters of the GM-38 area remediation. Without reiterating all the details included in the December 2nd letter, we are still very concerned about the basis of design for the treatment system and question its effectiveness for fully accomplishing its intent of groundwater remediation. Since we are in disagreement with the preliminary design of the extraction wells in number, location and capacity, we recommend that the Navy hold open the final design of the GM-38 remediation system so that discussion and comment on the technical approach can be agreed upon by the District to maximize the groundwater clean up in the area.

RESPONSE: All design assumptions and any design-related calculations will be part of the Implementation Plan for the GM-38 remedy that will be developed and submitted by the Navy's Remedial Action Contractor (RAC), Foster Wheeler Environmental Corporation. A draft version of this document will be made available to the members of the Technical Advisory Committee for review.

- DS-5 - Under "Regulatory Acceptance," the ROD states "However, the only components of the 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 the 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 tie 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." This statement implies that the Navy will be responsible should Northrop Grumman fail to continue to operate the ONCT. The statement does not make the Navy responsible for monitoring of the permanent groundwater well network and continued payments to the Bethpage Water District for the Plants 4 and 6 treatment systems should Northrop Grumman fail to do so. The Navy should be responsible for these two items as well, and we recommend that the ROD be revised accordingly.

RESPONSE: Agreed. Based on a similar comment submitted by NYSDEC, the Navy has expanded those activities that, if failed to continue, would constitute that the Navy's Off-Site Remedy is no longer protective of human health and the environment.

The following language was inserted into Page DS-3, First Paragraph; Page 3, First Sentence; and on Page 31: "along with the corresponding long-term maintenance and monitoring program for the ONCT system"

In addition, the following language was inserted at the end of the last paragraph on Pages DS-4; Page 4; and Page 32: "In the event that the treatment systems installed on BWD Plants 4 and 6 are no longer funded, the Navy recognizes that it's OFF-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 OFF-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."

- Figure 3 - This figure intends to delineate the extent of groundwater contamination above the MCL. The figure is very unclear, and the delineation line cannot be seen. We recommend that the figure be revised so that the necessary information can be more easily seen.

RESPONSE: Figure 3 has been modified.

APPENDIX A2
RESPONSIVENESS SUMMARY REGARDING COMMENTS ON DRAFT GROUNDWATER ROD DATED MAY 2002

COMMENT RESPONSES FROM ENGINEERING FIELD ACTIVITY, NORTHEAST REGARDING
DRAFT NAVY RECORD OF DECISION FOR GROUNDWATER (MAY 2002)
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP) BETHPAGE, NEW YORK

Comments from Dvirka and Bartilucci Consulting Engineers on behalf of the Massapequa Water District dated June 5, 2002:

COMMENT: The ROD appears to imply that data collected from the Vertical Profile Boring Program, and groundwater modeling based on the data, will determine the location of the outpost wells and the vertical placement of the well screens. Based on the information contained in the report "Southern area Vertical Profile Bring Installation Summary Report" and "GM-38 Area Vertical Profile Boring Installation Summary Report", the downgradient and lateral extent of the contaminant plume originating from NWIRP/Northrop Grumman Corporation Facility has not been defined and, therefore, existing data, as well as model input data to predict migration of the plume in the future and the threat to public water supply wells, is not sufficient to locate the early warning wells and screen depths. As a result, as previously stated in our letter to the New York State Department of Environmental Conservation (NYSDEC, Mr. Steven Scharf), dated April 25, 2002, additional vertical profile borings need to be constructed south, east and west of the previous borings to determine the extent of the plume and the current threat to the public water supply wells, as well as to provide accurate input data/leading edge of plume information to the groundwater model for calibration purposes. This will provide the data and model results that will allow the appropriate placement of the outpost monitoring wells for protection of the potentially impacted water supply wells.

RESPONSE: The goal of the Navy's Vertical Profile Boring Program was never to delineate the full extent of the off-site contaminant plume. Rather, it was to gather lithological and water quality data in order to calibrate the regional computer model which was to be used in combination with the vertical profile boring data, regional lithology mapping, groundwater hydraulic measurements, precipitation infiltration, and effects from other water users in the area, to determine effective outpost monitoring well locations. This process was described at the October 22, 2002 TAC meeting.

In addition, and as requested at the October 22, 2002 TAC meeting, ARCADIS has supplied the Draft Regional Modeling Report to the members of the TAC committee for their information and review.

Also discussed at the last TAC meeting was the fact that as additional water quality information is gathered from the outpost wells and any other investigations that may be conducted in the future, this information would be fed into the regional groundwater model in order to re-evaluate movement of the VOC-contaminant plume. During these future evaluations of the site, the need for additional vertical profile borings to the south will then be re-evaluated.

COMMENT: The ROD states that the remedial action will consist (in addition to the outpost wells) well head treatment or comparable alternative measures, as necessary, for public water supply wells that become affected in the future. However, the ROD does not define "comparable alternative measures", which it should in order for the water districts to know if the comparable measures are appropriate for their potential needs. Such comparable measure should include, but not be limited to, relocation of water supply wells to new well fields or transmission of water from unaffected wells.

In addition, the ROD appears to imply that the remedial action will consist of (up front) payment to an "appropriate (also requires definition) water district to compensate for capital and O&M expenditures that would be limited to the installation of well head treatment. Again, the affected water district should decide what alternative is best for the district and its customers, whether it be well head treatment, well relocation, water transmission, etc., and that whatever the affected district chooses, it should receive full payment for capital and O&M expenditures. Also, the payment for O&M expenditures should not be limited to 30 years.

RESPONSE: The Navy concurs that the water districts can decide what alternative is best for the district and it's customers including relocation of water supply wells. "Comparative alternative measures" was mainly referring to treatment alternatives, such as liquid phase granular activated carbon adsorption that could be a more timely and less costly alternative than air stripping. Although the Navy does not preclude re-siting of a new well field as a "comparable alternative measure", the Navy feels that, based on the industrial history and geology of the area, that it is unlikely that a new well field could be successfully developed and maintained in the long term without similar impacts from contaminant plumes and also believes that obtaining the necessary permits from NYSDEC would be difficult.

Comments from ARCADIS G&M on behalf of the Northrop Grumman Corporation dated June 21, 2002:

COMMENT: While the selected remedy presented in the Navy's draft ROD appears to be generally consistent with the requirements of the OU2 ROD, dated March 29, 2001, which was issued by the New York State Department of Environmental Conservation (NYSDEC) for the Northrop Grumman and NWIRP Bethpage facilities, certain of the essential elements required in the NYSDEC ROD were omitted. For this reason, the draft ROD must be revised to include the following items:

1. Conduct the ONCT Hydraulic Effectiveness Investigation to assess the performance/effectiveness of the on-site pump and treat system.
2. Conduct any required pre-design investigation, and/or remedial design/remedial actions necessary for the off-site GM-75D2 area.

RESPONSE: The Navy agrees. Since the time that this draft ROD was issued, the Navy has agreed to conduct the fieldwork necessary to gather data to support the development of an ONCT Hydraulic Effectiveness Report. Bear in mind, that Northrop Grumman agreed to write this report based on the analytical data collected by the Navy.

The Navy also agreed to conduct the necessary fieldwork related to the further delineation of the GM-75D2 area. As stated at the TAC Meeting held on October 22, 2002, the Navy will budget for this effort but will prioritize it accordingly after installation of the GM-38 remedy and installation of the Outpost Monitoring Wells and will also be based upon the availability of future Navy funds.

COMMENT: As you are aware, under New York State law, both Northrop Grumman and the U.S. Navy are obligated to carry out all the work specified in the NYSDEC ROD.

RESPONSE: The Navy has agreed, in principle, to the components of the NYSDEC ROD for Operable Unit 2. However, the Federal government is not legally bound to the NYSDEC ROD. It is for this reason, that the Navy had to issue it's own ROD for groundwater in accordance with the President's Executive Order 12580 that delegates the President's CERLCA authority down to the various branches of the armed forces including the Department of Navy.

COMMENT: Furthermore, the goal of the vertical profile boring program stated under the Public Water Supply Protection Program heading should be revised to indicate that the goal was to collect depth specific lithologic and groundwater samples to establish a vertical profile of the geology and groundwater quality at each location investigation in support of groundwater modeling efforts, NOT to delineate the extent of the plume.

Also under the Public Water Supply Protection Program heading, Item 4, the following should be added to the end of the first sentence "by the commingled plume from the Navy and Northrop Grumman Sites."

RESPONSE: The language will be revised as suggested.

COMMENT: Also under the Public Water Supply Protection Program heading, Item 4, the following should be added to the end of the first sentence "by the commingled plume from the Navy and Northrop Grumman Sites." Additionally, the paragraph before the "Declaration" section of the Draft ROD should be revised to broaden the language to include both on-site and off-site issues, particularly the GM-38 remedy, the GM-75D2 area, public supply well measure, or any other currently undiscovered site-related issue. This paragraph should also be revised to extend the timeframe from the period ". . . during the implementation of the selected remedy . . ." to a period that extends through site closure.

RESPONSE: The language will be revised as suggested.

Comments from Holzmacher, McLendon & Murrell, P.C. (H2M Group) on behalf of the South Farmingdale Water District dated July 8, 2002:

COMMENT: In reviewing the Navy issued draft ROD and the NYSDEC issued (March 2001) ROD, we are concerned relative to a number of changes in the previously "negotiated" wording. We have highlighted some of these concerns below:

Groundwater Remedial Program

The proposed groundwater remedial program should include a collection of extraction wells that optimizes that effectiveness of the remedial action in removing contaminants in the GM-38 area AND reduces the potential impact of the contaminant plume on downgradient water supply wells. The modeling results verbally presented at the June 26, 2002 TAC meeting indicated little difference to the downgradient wells regardless of whether two or three extraction wells were installed. Our concern is that this conclusion is somewhat biased due to the proposed location of the third extraction well and the slow rate of groundwater travel in the deeper Magothy aquifer. It is our speculation that if a third extraction well were to be installed further south (on Hempstead Turnpike, in the vicinity of Mid-Island Hospital), and if we were looking out a longer period of time (> 30 years), the benefit of adding the third extraction well would be more significant to downgradient water suppliers.

RESPONSE: The GM-38 Area remedial system is being designed to intercept the majority of the contamination in this area, such that at the end of operation, the quality of the remaining groundwater in the area will be similar to or less than the remainder of the off site plume. By meeting this objective, potential impacts to down gradient water receptors will be minimized. The third extraction well was evaluated in the model in an attempt to minimize the VOC loading to Bethpage Water District Wells. Based on the proximity of the contaminated groundwater to these wells at this time, minimal benefit would be realized by the addition of a third extraction well and the option was not carried any further.

Based on the Vertical Profile Boring Program, there is relatively little mass of VOCs in the area of the Mid-Island Hospital. Even though TCE was detected in one sample interval at a concentration of 320 ug/l, additional detections of VOCs in the boring were sporadic and at much lower concentrations. The next highest VOC concentration detected in this boring was 28 ug/l.

Public Water Supply Protection Program

COMMENT: Sections 9, 10, 11 and 12 (pages 30-31) of the Public water Supply Protection Program in the NYSDEC issued ROD includes the appropriate language that was previously discussed and agreed to by the affected parties. The proposed language in the Navy issued draft ROD differs from that which was previously agreed to and is not

acceptable to the SFWD and NYWS. We request that the Navy issued ROD reflect the previously agreed language. Some examples are:

RESPONSE: The Navy's ROD parallels but is not identical to the NYSDEC ROD. The Navy's ROD only identifies the actions that will be taken by the Navy. The Navy ROD does not identify nor will take responsibility for actions that will be taken by other parties.

COMMENT: The Navy issued ROD does not address the frequency of sampling and the sampling/analytical costs for the outpost monitoring wells and water supply wells determined to be potentially impacted or impacted by the plume.

RESPONSE: Sampling and analysis of outpost monitoring wells and water supply wells is being conducted by Northrop Grumman, and therefore is not part of the Navy ROD.

COMMENT: It was our understanding that any site contaminant at a concentration of 1 ppb or higher identified in a sample taken from an outpost monitoring well, once confirmed by a second sample, would trigger action on the part of the NYSDEC, the PRPs and water district relative to the implementation of a wellhead treatment system or a comparable alternative measure, as selected by the water supplier. The Navy issued draft ROD indicates the development of trigger values for each well using groundwater modeling data to aid [in] the determination for the earliest possible date to initiate discussions with the water supplier to address the issue of wellhead treatment.

RESPONSE: The Navy's approach utilizes a rigid technical determination of a value that is protective of the water districts and, as such, will develop a technically defensible value for each of the outpost monitoring wells. This approach was presented to the members of the TAC in a presentation given by ARCADIS on October 22, 2002. To date, no adverse comments have been received by any member of the TAC regarding that presentation.

COMMENT: The Navy issued ROD is not based on the water supplier determining whether a well impacted by the Grumman/Navy groundwater plume should be treated or whether the water supplier should implement an alternative action to treatment.

RESPONSE: The water suppliers can implement any alternative action that they choose for impacted water supplies, providing that they continue to operate the effected well.

COMMENT: The Navy issued ROD is also silent on the frequency of conducting treatment system performance evaluation and whether the remedial goals have been met.

RESPONSE: The Navy agrees that the issues mentioned in the comment above are an essential part of the remedy. However, it has been the Navy's experience that it is often difficult to come to an agreement with any regulatory agency regarding frequency of sampling and whether the remedial goals have been met up front in the ROD. It is for this

reason that these items are often discussed as part of an Operations, Maintenance, and Monitoring (OM&M) Report that often accompanies a remedial action workplan. This way, disagreement regarding sampling frequency and exit strategies does not preclude the construction of the remedy itself. Often times, quarterly sampling is the standard when a new remedy is first initiated and then based on the data collected, modifications to the sampling frequency and exit strategies can be discussed.

Time Period for Treatment

COMMENT: When the Grumman onsite treatment system and the Navy's selected remedy at GM-38 are both operating as designed, they will certainly decrease the concentration of contaminants down-gradient of these two sites. However, due to the extent of contamination and the rate of groundwater travel in the deeper aquifers, these two treatment systems alone are not going to eliminate the potential impact on the SFWD and NYWS well fields from this plume. The time frame before these well fields are impacted will vary from plant site to plant site and the time frame during which the well will be impacted will also vary. Consequently, it is premature to determine whether the time frame considered as required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) should be for a minimum of 30 years.

RESPONSE: A 30 year time period is being used at this time primarily to evaluate activities that need to be conducted in the near term (e.g. 5 to 10 years). Over time, as the plume migrates, contaminants attenuate, and additional data becomes available, additional actions may be determined to be required that extend beyond 30 years. Also, since computer modeling is being used to such a significant extent to predict the future movement of the contaminant plume, using timeframes in excess of 30 years makes the conclusions of the model less reliable.

Comments from Holzmacher, McLendon & Murrell, P.C. (H2M Group) on behalf of the Bethpage Water District dated July 10, 2002:

COMMENT: This office is writing to you on behalf of the Bethpage Water District regarding the Navy's draft Record of Decision [ROD] for Operable Unit 2 [OU2]. I do not understand the need for a separate ROD for the Navy on the very same OU2, since it will no doubt cause conflict and confusion with the earlier [March 29, 2001] DEC ROD for OU2. Therefore, it is my suggestion that the Navy simply incorporate the identical language that was developed by the DEC. The DEC's ROD also provides specificity that is lacking in the Navy ROD.

RESPONSE: The Navy's ROD can only address those activities that will be conducted by the Navy. As a result, activities being conducted by Northrop Grumman cannot be included in the Navy ROD.

COMMENT: I offer the following comments on specific items of note in the proposed Navy ROD.

With respect to the Groundwater Remedial Program, the Bethpage Water District is fully aware that a number of the action items outlined are already well underway but it is important to restate our objective that the Navy [and Northrop Grumman] maximize their extraction volume at the location 38D. This should be done not only to protect the long-term interests of the Bethpage Water District with respect to plant nos. 4 and 5, but also to benefit the Water Districts south of Bethpage. As outlined in Arcadis-G&M's modeling presentation at our TAC meeting of June 26, the off-site extraction wells will provide a major long-term benefit to the environment. Of particular interest to the Water District is the option that includes the three extraction wells, since this approach can maximize contaminant removal from the groundwater system. The District also wants to restate its desire that the program be pushed forward as quickly as possible for it seems that every time we see a schedule, the schedule is extended.

RESPONSE: The remedy, as established, meets the objectives as listed in the comment. Of note is that the current proposed remedy identifies two recovery wells operating at combined flow rate 1100 gpm. This extraction rate is higher than the previously submitted two well-combined 900 gpm rate, but is less than the three well - combined 1200 gpm rate.

Note that the three well option was not selected because it did not provide any significant additional reductions of VOC impacts to the Bethpage Water District.

COMMENT: Although it is outside of Bethpage, the District notes that at least one of the South Farmingdale Water District well fields is likely to be impacted in only a few years based upon the recent modeling results. For this well field, the Public Water Supply Contingency Program should move directly into treatment plant design and installation. Here the issue is not one of "contingency" plans but necessary and immediate "action". The experience of Bethpage speaks quite directly to this point. The implementation of treatment in anticipation of impact is a decision of the water supplier. Decision making here is a matter of their sole responsibility and prerogative.

RESPONSE: Comment noted.

COMMENT: The cost recovery period for operation and maintenance at an affected well field is stated in the Navy ROD to be limited to 30 years. It should be clear that the clock should start when the remedy is first implemented. For example, if treatment were installed in 15 years because that is when it is needed, then the 30-year clock for O&M cost recovery would still govern.

RESPONSE: The Navy agrees and will revise the language in the ROD accordingly.

Comments from New York State Department of Environmental Conservation (NYSDEC) dated July 10, 2002:

GENERAL COMMENTS:

COMMENT 1: There was no Proposed Plan issued by the Navy. A Proposed Plan is a prerequisite for a ROD in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as detailed in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and as required by New York Environmental Conservation Law (ECL) Title 6 New York Codes Rules and Regulations (NYCRR) Part 375.

RESPONSE: The Navy agrees that a Proposed Plan is a prerequisite for a Record of Decision (ROD). However, the Navy believes that a Proposed Plan for the remediation of groundwater has already been developed and that CERCLA, the NCP, and New York law have all been satisfied. Although the Navy was not the author of the Proposed Plan for Groundwater, the Navy did participate in its development by reviewing, commenting and concurring with the contents of the NYSDEC Proposed Plan. Since the Navy is not proposing to add, delete, or otherwise change the various components of the groundwater remedial strategy, the Navy feels that developing a Navy Proposed Plan would be redundant.

The main point here is that the Navy must develop it's own Record of Decision to document any remedial actions that are to be taken to address contamination that exists on Navy-owned property or that emanated from Navy-owned property but has migrated beyond property boundaries. The Navy can not appropriate funding to implement a remedial strategy if a Navy ROD is not developed. In this instance, the Navy's ROD for Groundwater is being developed so that congressional funding can be appropriated for those components of NYSDEC's ROD for which the Department of Navy will be implementing.

Another important factor of the Navy's ROD for Groundwater is the recognition of the existence of another remedial system that has been implemented by another party. With this component already in place and being operated by the other party, it is not necessary for the Navy to include this component in it's ROD. However, the Navy recognizes that its continued operation 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 it's system, then the Navy also recognizes that the Navy's remedy would no longer be protective of human health or the environment. In this case, the NYSDEC would have every legal right to inform the Navy of this failure and begin discussions with the Navy to have this failure corrected.

COMMENT 2: The NCP and the ECL require that any proposed action be screened for protection of human health and the environment, short term effectiveness, long term effectiveness, reduction of toxicity, mobility and volume, feasibility, and community acceptance. This has not been done.

RESPONSE: See the first paragraph of the Navy's response to Comment 1 above. The Navy did participate in the development of NYSDEC's Proposed Plan by reviewing, commenting and concurring with the contents of the document including the screening of the various criteria items. The Navy is not proposing any changes to the components of NYSDEC's remedial strategy therefore, a re-screening of the proposed actions that will be implemented by the Navy alternatives with regards to the various criteria items listed above would be redundant.

COMMENT 3: The Department of the Navy reviewed the NYSDEC PRAP and ROD for the OU 2 Groundwater remedy for the Northrop Grumman and the NWIRP sites, commented on these documents and subsequently concurred with the NYSDEC OU2 ROD. The Navy originally proposed an individual ROD for the NWIRP Bethpage groundwater but instead agreed to the NYSDEC Groundwater OU 2 ROD. Therefore, any ROD issued by the Navy for the NWIRP Plant site alone, should not be entitled, or referred to as the OU 2 Groundwater ROD since that nomenclature would create confusion by having two definitions for the term OU2.

RESPONSE: The term "Operable Unit 2" is defined as the groundwater media that exists beneath and downgradient of property owned by Northrop Grumman, Department of Navy, and Occidental Chemical. The term "Operable Unit 2" is NOT defined by the components of the remedial strategy for groundwater chosen to protect human health and the environment. The Navy does not feel that there would be any confusion created by use of the term "OU 2 Groundwater" in it's Record of Decision. Rather, it is fairly clear that the Navy's ROD is merely stating which of the various components of the groundwater remedial strategy that the Department of Navy has chosen to implement.

COMMENT 4: Overall, the language in both the Groundwater Remedial Program and the Public Water Supply Protection Program are not consistent with the language from the NYSDEC's OU2 Groundwater ROD. One way to ensure State acceptance is to copy verbatim language from the NYSDEC's ROD
into the Navy's ROD (see also Table 1).

RESPONSE: The Navy will amend it's ROD to include verbatim language from NYSDEC's ROD for those components of the groundwater remedial strategy that the Department of Navy will be implementing.

COMMENT 5: The Navy's ROD only "recognizes" the existing groundwater extraction and treatment system downgradient of the NWIRP site. This is inconsistent with the NYSDEC's OU 2 ROD, which specifies that the contamination attributable to the Northrop Grumman and NWIRP sites will be actively addressed by the on-site Containment system. (See also legal comment Roman Numeral I (3)(A)).

RESPONSE: See the third paragraph of the Navy's response to Comment 1 above. In addition to the Navy's recognition of the existence of the downgradient groundwater extraction and treatment system is the Navy's recognition that the Navy's ROD would no longer be protective of human health and the environment if the extraction and treatment system fails to continue to operate.

COMMENT 6: In order for the Navy ROD to be consistent with New York State ECL, this ROD must be consistent with the NYSDEC Operable Unit 2 ROD; which it is not (see also Table 1).

RESPONSE: As discussed above, the Navy will modify it's ROD for groundwater to more closely match the language contained in NYSDEC's ROD for those components of NYSDEC's remedial groundwater strategy that the Navy will be implementing.

DETAILED COMMENTS:

Declaration for the Record for Decision

1. Statement of Basis and Purpose: The ROD issued by the Navy in the State of New York must state that the Navy ROD will comply with New York State Environmental Conservation Law (ECL). Also refer to Roman Numeral II, Legal Comments. Also, the reference to the NYSDEC ROD must specify the exact title (i.e. Operable Unit 2 Groundwater Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites, Nassau County Site Numbers 1-30-003A&B).

RESPONSE: The Navy ROD will be amended to state that the ROD issued by the Navy in the State of New York will satisfy all substantive requirements of New York State Environmental Conservation Law (ECL) which are considered to be applicable.

The Navy's ROD will also be amended to specify the exact title of the NYSDEC ROD for Groundwater when referenced.

2. Institutional Controls: The groundwater beneath the NWIRP Site can be "extracted" with permission from the Nassau County Department of Health and/or the NYSDEC with an appropriate technology to treat groundwater to applicable standards. The text must be changed accordingly.

RESPONSE: Agreed.

3. Page 2, Paragraph 2 & 3: Each potentially responsible party (PM') is jointly and severally liable for the scope of the remedial work. The NYSDEC cannot accept one parties official decision document that unilaterally allocates the responsibility to implement the NYSDEC's OU 2 Groundwater ROD.

RESPONSE: The Navy understands and respects the position of NYSDEC with regards to this issue. However, the Navy can not go on the record stating that the Navy will address ALL components of the groundwater remedial strategy when other parties are also responsible for implementation of some of the components. The Navy understands that if the PRPs could have come to some type of written agreement regarding the allocation of responsibility for implementation of the groundwater remedial strategy, that there would be no objection to the Navy writing a ROD for the Navy's portion of the liability.

The Navy has tried on several occasions to enter into a formal cost sharing agreement with Northrop Grumman regarding allocation of responsibility to implement certain aspects of NYSDEC's groundwater ROD. However, to date, the parties can not agree on what is fair and equitable with regards to the sharing of costs to implement the groundwater remedy and it seems unlikely that this disparity will be resolved in a timeframe that is acceptable to NYSDEC. That is why the Navy approached NYSDEC to enter into a Federal Facility Site Remediation Agreement (FFSRA) with the Department of Navy that binds the Navy to accept responsibility for certain portions of groundwater remedy. It is the Navy's intention to modify this Record of Decision so that it more closely agrees with the contents of the latest version of the FFSRA as discussed at a meeting held between NYSDEC and Navy Offices of Counsel on September 24, 2002.

4. Groundwater Remedial Program (GRP), Public Water Supple Protection Program (PWSP) and Elements Common To Both Programs

A. Table 1 (enclosed with this letter) summarizes the difference between the NYSDEC's ROD and the Navy's draft ROD for the GRP and PWSP program.
B. The On-site Containment System must be included in the Groundwater Remedial Program.
C. The differences listed in Table 1 for the GRP and the PWSP must be resolved before the NYSDEC can concur with this ROD.
D. Long term groundwater monitoring is missing from the GRP program.
E. The "Elements Common To Both Programs" section is completely missing from the Navy ROD.
F. PWSP program item 3 in the Navy ROD is not a "remedial action" and would be better described as a monitoring activity.
G. PWSP program item 4 in the Navy ROD should be not termed a remedial action, but rather an engineering control.
H. Item 4 of the Navy ROD should state "this action will be sufficient to cover capital costs and long term operation and maintenance expenditures that would be required to install, operate and maintain the wellhead treatment or comparable alternative." The remaining sentences should be deleted.
I. The final sentence on page 3 of the Navy ROD should continue "...the Navy will re-evaluate the protectiveness of the selected remedy and implement all requisite measures as determined by the NYSDEC and the NYSDOH in consultation with

the Nassau County Department of Health and the affected water districts."

RESPONSE TO 4A: The Navy is in receipt of Table 1 prepared by NYSDEC and will make appropriate changes to the Navy's ROD.

RESPONSE TO 4B: The Navy does not understand NYSDEC's continued objection of withholding the inclusion of the On-Site Containment System from the Navy's ROD since NYSDEC concurred with a similar approach used by U.S. EPA Region II in it's ROD for Occidental Chemical's Operable Unit 3 issued in September 2000. In that document, several actions were mandated by the U.S. EPA that required implementation by Occidental Chemical with the recognition that another parties off-site remedy, that was currently in place, would address the VOC-contaminated groundwater emanating from property owned by Occidental Chemical.

The Navy's approach is similar. As a matter of fact, the language included in the Navy's ROD comes from the last paragraph on Page 2 that continues onto Page 3 of the Declaration for the Record of Decision prepared by the U.S. EPA for Occidental Chemical's OU 3. On Page 1 of that Declaration under Statement of Basis and Purpose is the statement that the New York State Department of Environmental Conservation concurred with this approach and a letter of concurrence was issued.

As stated in previous responses, the Navy is taking responsibility for all components of NYSDEC's groundwater remedial strategy with the exception of the On-Site Containment System and associated Groundwater and Hydraulic Monitoring Program, with the recognition that these two components must continue to be implemented for the Navy's remedy to continue to be protective of human health and the environment. If continuation of these components fails in the future, then NYSDEC has the legal recourse to inform the Navy that it's remedy is no longer protective of human health and the environment and the Navy will then address the issue.

RESPONSE TO 4C: The Navy will address the differences listed in Table 1 with regards to the GRP and the PWSP to the maximum extent possible with the hope that NYSDEC finds the changes acceptable. However, it must be pointed out that due to the Navy's authority to implement CERCLA response actions for contamination on or emanating from Navy property, as mandated as part of the President's Executive Order 12580, the Navy seeks the concurrence of the State but does not require it in order to implement remedial actions.

RESPONSE TO 4D: See the Navy's response to Item 4B above.

RESPONSE TO 4E: Navy agrees. A section that discusses OM&M plans, performance evaluations and a monitoring well close-out plan, as they relate to the GM-38 remedy, will be added to the Navy's ROD.

RESPONSE TO 4F: Navy agrees. This item will be moved as suggested.

RESPONSE TO 4G: This change will be made as suggested.

RESPONSE TO 4H: These changes will be made as suggested.

RESPONSE TO 4I: Due to the Navy's authority to act as lead agency, as mandated as part of the President's Executive Order 12580, it is the Navy that re-evaluates the protectiveness of a selected remedy and it is the main purpose for conducting five-year reviews. This does not mean that the Navy's determination will be made without consultation from NYSDEC, NYSDOH, Nassau County DOH, or the affected water districts.

5. Closing Declaration: The NYSDEC ROD requires annual review, not five year reviews specified in the Navy ROD.

RESPONSE: Comment noted.

CERCLA, as amended by SARA of 1986, requires that remedial actions resulting in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years regardless of a site's NPL status. Similar to the Navy's response to Item 4C above, the President's CERCLA authority, including the policy on five-year reviews, has been handed down to various federal agencies including the Department of Navy. This five-year review is a status of a remedies ability to continue to be protective of human health and the environment on a five year basis.

However, the above does not preclude the development of annual operating, maintenance, or monitoring reports which, in most cases, are used as the basis for development of the five-year review report.

The statement in the closing declaration is simply stating that review of the components of the remedy will be required every five years as established by CERCLA. The Navy will be developing an Operations, Maintenance, and Monitoring (OM&M) Report that will outline the frequency of sampling to ensure that the components of the remedy that are installed are operating as designed and will also recommend a timeframe for issuing a report documenting those findings.

LEGAL COMMENTS:

COMMENT I: The Navy **is** subject to federal law just as much as the Environmental Protection Agency See CERCLA & 120(a), which provides, in pertinent part,

> (1) Each department, agency, and instrumentality of the United States (including the executive, legislative, and judicial branches of government) shall be subject to, and comply with, this chapter in the same manner and to the same extent, both procedurally and substantively, as an nongovernmental entity ....

(2) All guidelines, rules, regulations, and criteria which are . . . applicable to remedial actions at such facilities shall also be applicable to facilities which are owned or operated by a department, agency, or instrumentality of the United States in the same manner and to the extent as such guidelines, rules, regulations, and criteria are applicable to other facilities. No department, agency, or instrumentality of the United States may adopt or utilize any such guidelines, rules, regulations, or criteria which are inconsistent with the guidelines, rules, regulations, and criteria established by the Administrator under this chapter.

See also CERCLA 3 120(f), which provides:

The Administrator and each department, agency, or instrumentality responsible for compliance with this section shall afford to relevant State and local officials the opportunity to participate in the planning and selection of the remedial action, including but not limited to the review of all applicable data as it becomes available and the development of studies, reports, and action plans. In the case of State officials, the opportunity to participate shall be provided in accordance with section (121) of this title.

And see also CERCLA & 121(f), which provides:

(3)(A) This paragraph shall apply to remedial actions at facilities owned or operated by a department, agency, or instrumentality of the United States. At least 30 days prior to the publication of the President's final remedial action plan, if the President proposes to select a remedial action that does not attain a legally applicable or relevent and appropriate standard requirement, criteria, or limitation, under the authority of subsection (d)(4) of this section, the President shall provide an opportunity for the State to concur or not concur in such selection. If the State concurs, or does not act within 30 days, the remedial action may proceed.

If the State does not concur in such selection as provided in subparagraph (A), and desires to have the remedial action conform to such standard, requirement, criteria, or limitation, the State may maintain an action as follows:

(i) If the President has notified the State of selection of such a remedial action, the State may bring an action within 30 days of such notification for the sole purpose of determining whether the finding of the President is supported by substantial evidence. Such action shall be brought in the United States district court for the district in which the facility is located.

(ii) If the State establishes, on the administrative record, that the President's finding is not supported by substantial evidence, the remedial action shall be modified to conform to such standard, requirement, criteria, or limitation.

(iii) If the State fails to establish that the President's finding was not supported by substantial evidence and if the State pays, within 60 days of judgment, the additional costs attributable to meeting such standard, requirement, criteria, or limitation, the remedial action shall be selected to meet such standard, requirement, criteria, or limitation. If the State fails to pay within 60 days, the remedial action selected by the President shall proceed through completion.

Nothing in this section precludes, and the court shall not enjoin, the federal agency from taking any remedial action unrelated to or not inconsistent with such standard, requirement, criteria, or limitation.

It is fundamental that a remedial action must attain ARARs, unless attainment is waived. However, in the instant matter, the draft Record Of Decision simply recites, "The selected remedy . . . complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action **to the extent practicable** [emphasis added]". The statute requires that the Record of Decision must clearly state, either that the selected remedy will attain ARARs, or that the selected remedy will not attain some ARAR and that attainment has been waived on the ground of technical impracticability which is a proper ground for waiver per CERCLA & 121 (d)(4)(C). The draft Record of Decision in the instant matter does neither. The significance of this omission is that CERCLA & 121 (f)(3), quoted supra, requires that the federal agency give notice of its intent to select a remedy that does not attain ARARs so that the State has an opportunity to address it.

RESPONSE TO I: The Final ROD has been amended to include a discussion of the ARARs and how they were attained.

COMMENT II: The Navy is subject to State law just as much as a private-sector person. See CERCLA & 120(a), which provides, in pertinent part:

State laws concerning removal and remedial action, including State laws regarding enforcement, shall apply to removal and remedial action at facilities owned or operated by a department, agency, or instrumentality of the United States . . . when such facilities are not included on the National Priorities List. The preceding sentence shall not apply to the extent that a State law would apply any standard or requirement to such facilities which is more stringent than the standards and requirements applicable to facilities which are not owned or operated by any such department, agency, or instrumentality.

This paragraph has been construed to mean exactly what it seems to mean, that the United States has waived its sovereign immunity with the result that a federal agency is subject to State CERCLA-like law to the same extent as a private-sector person. *See: United States vs. Commonwealth of Pennsylvania, Department of Natural Resources, 778*

F.Supp. 1328,34 ERC 1779, _ ELR (Middle Dist. Pennsylvania 1991); *Crowley Marine Services Inc. vs. Fednav Ltd.*, 915 F.Supp. 218, 42 ERC 1045.26 ELR 21105 (Eastern Dist. Washington 1995)

RESPONSE TO II: The current and prevailing appellate court opinion is that CERCLA 120(a)(4) does not satisfy the threshold test required by the United States Supreme Court to be a clear and unambiguous (see, Department of Energy v Ohio, 503 U.S. 607 (1992) waiver of Sovereign immunity that showing a clear congressional intent to require federal agencies to comply with non-substantive state requirements (see, Hancock v. Train (426 US 167 (1978). In particular, the United States Court of Appeals (1st. Circuit), addressed the scope of CERCLA 120(a)(4) in a case questioning whether a non-substantive state requirement of the imposition of fines can be enforced against the Department of the Navy. That court held, "We therefore conclude that Department of Energy requires us to hold that CERCLA section 120, like RCRA section 6961, does not provide an adequately clear waiver of sovereign immunity from civil penalties sought by Maine." Maine v. Navy 973 F.2d 1007 (1st. Circ., 1992). In response to Hancock v. Train and Maine v. Navy, Congress amended the Clean Water Act and RCRA respectively to broaden the scope of the waivers and to include state and local procedural requirements within the language of the provision. No such language was added nor presently exists in CERCLA 120(a)4. Accordingly, as required by CERCLA, all state substantive requirements which are Applicable, Relevant and Appropriate have been satisfied.

APPENDIX B
ADMINISTRATIVE RECORD

APPENDIX B
ADMINISTRATIVE RECORD INDEX
FOR
NWIRP BETHPAGE, NEW YORK

REPORTS

1. "Initial Assessment Study", Naval Environmental, Energy, and Support Activity, December 1986
2. "Final Remedial Investigation Quality Assurance Plan", Halliburton NUS, August 1991
3. "Final Remedial Investigation Site and Data Management Plan", Halliburton NUS, August 1991
4. "Final Health and Safety Plan", Halliburton NUS, August 1991
5. "Final Remedial Investigation Workplan", Halliburton NUS, August 1991
6. "Final Hazard Ranking System Preliminary Scoring and Site Inspection Report Form", Halliburton NUS, February 1992
7. "Final Remedial Investigation Report - Volumes I, II, III, and IV", Halliburton NUS, May 1992
8. "Final Phase 2 RI Workplan Addendum", Halliburton NUS, November 1992
9. "Final EPA Region II Federal Facility SI Review Documentation Package", Malcolm Pirnie, Inc., September 1992, Updated August 1993
10. "Phase 2 Remedial Investigation Report - Volumes I and II", Halliburton NUS, October 1993
11. "Feasibility Study Report - Volumes I and II", Halliburton NUS, March 1994
12. "Record of Decision, Naval Weapons Industrial Reserve Plant Bethpage, New York, Sites 1, 2, and 3", Northern Division Naval Facilities Engineering Command and New York State Department of Environmental Conservation, May 1995.
13. "Phase 1 Environmental Baseline Survey, NWIRP Bethpage, New York", CF Braun Engineering Corporation, January 1998.
14. "Work Plan, Construction of a Soil Vapor Extraction/Air Sparing System, Naval Weapons Industrial Reserve Plant Bethpage, NY", Foster Wheeler Environmental Corporation, January 1998.

REPORTS (CONTINUED)

15. "On-Site Monitoring Well Installation Summary Report, NWIRP Bethpage, New York", Tetra Tech NUS, October 2000.
16. "Groundwater Feasibility Study, Grumman Aerospace-Bethpage, NY Site #130003A and Naval Weapons Industrial Reserve Plant Bethpage, NY, NY Site #130003B" Arcadis Geraghty & Miller,, October 2000.
17. "Vertical Profile Borings VPB-38, -76, -77 Summary Report, NWIRP Bethpage, New York", Tetra Tech NUS, November 2000.
18. "Record of Decision, Operable Unit 2 Groundwater, Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites, Nassau County, Site Numbers 1-30-003A", New York State Department of Environmental Conservation, March 2001.
19. "2001 Annual Groundwater Monitoring Report, Operable Unit 2, Northrop Grumman Corporation, Bethpage, New York", Arcadis, June 2001.
20. "GM-38 Vertical Profile Boring Installation Summary Report, NWIRP Bethpage, New York", Tetra Tech NUS, May 2002.
21. "Southern Area Vertical Profile Boring Installation Summary Report, NWIRP Bethpage, New York", Tetra Tech NUS, February 2002.
22. "Off-Site Monitoring Well Installation Summary Report, NWIRP Bethpage, New York", Tetra Tech NUS, April 2002.
23. "Phase II Environmental Baseline Survey, NWIRP Bethpage, New York", Tetra Tech NUS, May 2002.
24. "GM-39 and GM-73 Vertical Profile Boring and Monitoring Wells Installation Summary Report, NWIRP Bethpage, New York", Tetra Tech NUS, November 2002.
25. "Second Quarter 2002 Groundwater Monitoring Report, Operable Unit 2, Northrop Grumman Corporation, Bethpage, New York", Arcadis, January 2003.

CORRESPONDENCE REGARDING IR PROGRAM

1. Letter to A. Karas (EPA Region II) from S. Eikenberry (NEESA), Distribution of IAS to EPA, April 1988
2. Letter to Commanding Officer (NAVAIRSYSCOM) from R.P. Dillman (CO NorthDiv), IR Program at Bethpage, June 1989

CORRESPONDENCE REGARDING IR PROGRAM (CONTINUED)

3. Letter to Abe Kern (DPRO) from Bob Wing (EPA Region II), Comments on IAS, December 1989
4. Letter to Helen Shannon (EPA Region II) from Tom Sheckels (NorthDiv), IR Program at Bethpage,
   January 1990
5. Letter to Tom Sheckels (NorthDiv) from V. Pitruzzello (EPA Region II), Information required for NWIRP Bethpage, June 1991
6. Letter to John Barnes (NYSDEC) from Tom Sheckels (NorthDiv), Submission of Draft RI Workplan,
   July 1991
7. Letter to Helen Shannon (EPA Region II) from Tom Sheckels (NorthDiv), Submission of Draft RI Workplan,
   July 1991
8. Letter to Frank Klanchar (Navy RPM) from John Barnes (NYSDEC), Comments on Draft RI Workplan, August 1991
9. Letter to Helen Shannon (EPA Region II) from Tom Sheckels (NorthDiv), Interim Response to EPA,
   August 1991
10. Letter to Technical Review Committee from Frank Klanchar (Navy RPM), Submission of Final RI Workplan, September 1991
11. Letter to John Barnes (NYSDEC) from Frank Klanchar (Navy RPM), Addendum to RI Workplan,
    October 1991
12. Letter to Technical Review Committee from Frank Klanchar (Navy RPM), Submission of Draft RI Report, March 1992
13. Letter to Technical Review Committee from Frank Klanchar (Navy RPM), Submission of Addendum to Draft RI Report, March 1992
14. Letter to Frank Klanchar (Navy RPM) from John Barnes (NYSDEC), Comments on Draft RI Report,
    April 1992
15. Letter to Frank Klanchar (Navy RPM) from John Molloy (Bethpage Water District), Comments on Draft RI Report, April 1992

CORRESPONDENCE REGARDING IR PROGRAM (CONTINUED)

16. Letter to Frank Klanchar (Navy RPM) from Carlo San Giovanni (Geraghty & Miller), Comments on Draft RI Report, April 1992
17. Letter to Dave Brayack (HNUS) from Frank Klanchar (Navy RPM), Submission of Navy Review Comments on Draft RI, May 1992
18. Letter to Technical Review Committee from Frank Klanchar (Navy RPM), Submission of Final RI Report,
    May 1992
19. Letter to John Barnes (NYSDEC) from Frank Klanchar (Navy RPM), Intention to Perform Phase 2 RI,
    May 1992
20. Letter to Frank Klanchar (Navy RPM) from Dave Brayack (HNUS), RI-Derived Residue Management,
    June 1992
21. Letter to John Barnes (NYSDEC) from Lloyd Wilson (NYSDOH), Off-Site Soil Sampling, July 1992
22. Letter to Technical Review Committee from Frank Klanchar (Navy RPM), Submission of Draft Phase 2 RI Workplan Addendum, October 1992
23. Letter to Frank Klanchar (Navy RPM) from John Barnes (NYSDEC), Comments on Draft Phase 2 Workplan Addendum, November 1992
24. Letter to Frank Klanchar (Navy RPM) from Carlo San Giovanni (Geraghty & Miller), Comments on Draft Phase 2 Workplan Addendum, November 1992
25. Letter to Dave Brayack (HNUS) from Frank Klanchar (Navy RPM), Submission of Comments on Draft Phase 2 RI Workplan Addendum, November 1992
26. Letter to Technical Review Committee from Frank Klanchar (Navy RPM), Submission of Final Phase 2 RI Workplan Addendum, November 1992
27. Letter to James Colter (Navy RPM) from Dave Brayack (HNUS), Pump Test Results, January 1993
28. Letter to James Colter (Navy RPM) from Dave Brayack (HNUS), Plant 3 Soil Gas Survey Results,
    March 1993
29. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), Comments regarding Draft Feasibility Study ARAR's, April 1993

CORRESPONDENCE REGARDING IR PROGRAM (CONTINUED)

30. Letter to James Colter (Navy RPM) from Mary Logan (EPA Region II), Comments regarding Draft Feasibility Study ARAR's, May 1993
31. Letter to Technical Review Committee from James Colter (Navy RPM), Submission of Draft Phase 2 RI Report, July 1993
32. Letter to John Barnes (NYSDEC) from James Shafer (NorthDiv), Results of Interim Action to isolate PCB Hot Spot, July 1993
33. Letter to James Colter (Navy RPM) from Mary Logan (EPA Region II), Comments regarding Draft Phase 2 RI Report, August 1993
34. Letter to James Colter (Navy RPM) from Carlo San Giovanni (Geraghty & Miller), Comments regarding Draft Phase 2 RI Report, August 1993
35. Various Phone Conversation Records to James Colter (Navy RPM) from TRC Members, Comments regarding Draft Phase 2 RI Report, August through September 1993
36. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), Comments regarding Draft Phase 2 RI Report, September 1993
37. Fax Transmission to James Colter (Navy RPM) from Carol Stein (EPA Region II), Comments regarding Draft Phase 2 RI Report, September 1993
38. Letter to James Colter (Navy RPM) from John Molloy (Bethpage Water District), Comments regarding Draft Phase 2 RI Report, September 1993
39. Letter to John Barnes (NYSDEC) from Lloyd Wilson (NYSDOH), Comments regarding Draft Phase 2 RI Report, September 1993
40. Letter to James Colter (Navy RPM) from Steven Silvers (Nassau County DOH), Comments on Draft FS, September 1993
41. Letter to Dave Brayack (HNUS) from James Colter (Navy RPM), Submission of Comments on Draft Phase 2 RI Report, October 1993
42. Letter to Technical Review Committee from James Colter (Navy RPM), Submission of Final Phase 2 RI Report, October 1993
43. Letter to James Colter (Navy RPM) from Carlo San Giovanni (Geraghty & Miller), Comments regarding Draft FS Report, October 1993
44. Various Phone Conversation Records to James Colter (Navy RPM) from TRC Members, Comments regarding Draft FS Report, October 1993
45. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), Comments regarding Draft FS Report, October 1993

CORRESPONDENCE REGARDING IR PROGRAM (CONTINUED)

46. Letter to James Colter (Navy RPM) from Dave Brayack (HNUS), Update on RI-Derived Residue Management, October 1993
47. Fax Transmission to James Colter (Navy RPM) from Carol Stein (EPA Region II), Comments regarding Draft FS Report, December 1993
48. Various Fax Transmissions to TRC Members from James Colter (Navy RPM), Draft Responses to Comments on Draft FS Report, January 1994
49. Letter to James Colter (Navy RPM) from Andrew Bellina (EPA Region II), Responses to EPA Comments on Draft FS Report, March 1994
50. Letter to Technical Review Committee from James Colter (Navy RPM), Submission of Final FS Report, March 1994
51. Letter to Dale Carpenter (EPA Region II) from John Barnes (NYSDEC), Recharge Basins, May 1994
52. Letter to James Colter (Navy RPM) from Anthony Sabino (Attorney, Bethpage Water District), Interim Action to protect BWD Plant #5, September 1994
53. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), Announcement of October 7 Meeting to Discuss Regional Groundwater, September 1994
54. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), Minutes of October 7 Meeting to Discuss Regional Groundwater, October 1994
55. Letter to Steve Scharf (NYSDEC) from William Gilday (NYSDOH), Acceptance of Groundwater Feasibility Study, September 2000.
56. Letter to John Cofman (Northrop Grumman Corporation) from Steve Scharf (NYSDEC), Acceptance of Groundwater Feasibility Study, October, 2000.
57. Letter to David Stern (Arcadis) from Steven Scharf (NYSDEC), Comments on Vertical Profile Boring Program, April 2002.

COMMUNITY RELATIONS

1. "Community Relations Plan", Halliburton NUS, August 1992
2. "Installation Restoration Fact Sheet", Department of Navy, April 1992
3. "Installation Restoration Fact Sheet", Department of Navy, October 1992
4. "Installation Restoration Fact Sheet", Department of Navy, November 1992
5. "Installation Restoration Fact Sheet", Department of Navy, February 1993
6. "Installation Restoration Fact Sheet", Department of Navy, September 1993

7. Letter to Technical Review Committee from James Colter (Navy RPM), Submission of Draft PRAP, May 1994
8. Letter to James Colter (Navy RPM) from Laurie Lutzker (Nassau County DOH), Comments on Draft Prap, June 1994
9. Phone Conversation Record to James Colter (Navy RPM) from Bob Booth (NAVAIRSYSCOM), Comments on Draft PRAP, June 1994
10. Phone Conversation Record to James Colter (Navy RPM) from Carlo San Giovanni (Geraghty & Miller), Comments on Draft PRAP, July 1994
11. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), Comments on Draft PRAP, July 1994
12. Letter to James Colter (Navy RPM) from Andrew Ballina (EPA Region II), Comments on Draft PRAP, July 1994
13. Comment Responses on Draft PRAP, Department of Navy, October 1994
14. Letter to Technical Review Committee from James Colter (Navy RPM), Submission of Final PRAP, October 1994
15. "Public Meeting Invitation and Fact Sheet", Department of Navy and NYSDEC, October 1994
16. "Final Proposed Remedial Action Plan", Department of Navy and NYSDEC, November 1994
17. "Transcript from Public Meeting", MGM Court Reporting, November 1994
18. Letter to John Barnes (NYSDEC) from Mrs. Marilyn Humphrey (Resident), November 1994
19. Letter to John Barnes (NYSDEC) from David Nydick (Superintendent of Schools, Bethpage), November 1994
20. Letter to James Colter (Navy RPM) from John Barnes (NYSDEC), December 1994
21. Letter to James Colter (Navy RPM) from Dr. Alan F. Weston (Occidental Chemical Corp.) December 1994
22. Letter to James Colter (Navy RPM) from Anthony J. Sabino (Attorney for Bethpage Water District), December 1994

COMMUNITY RELATIONS (CONTINUED)

23. Letter to James Colter (Navy RPM) from Andrew Bellina (EPA Region II), January 1995
24. Letter from John Barnes (NYSDEC) to Mr. Richard Pfaender (Town Hall), January 1995
25. Letter from John Barnes (NYSDEC) to Mr. Alan Phillips (Assistant Superintendent, Bethpage Schools), January 1995.
26. Letter from Judithanne Hare to Community Members, Announcement for the start of a Restoration Advisory Board (RAB) at NWIRP Bethpage, April 1999.
27. Restoration Advisory Board Fact Sheet, NWIRP Bethpage, April 1999.
28. Letter from Judithanne Hare to Residents, Announcement of September 1999 RAB Meeting, September 1999.
29. Letter from James Colter (Navy RPM) to RAB Members, Announcement of Technical Subcommittee and RAB Meetings in February 2000, Transmittal of September 1999 RAB Meeting Minutes and transcript, January 2000.
30. Letter from James Colter (Navy RPM) to RAB Members, Announcement of March 2001 RAB Meeting, Transmittal of October 2000 RAB Meeting Minutes, March 2001.
31. Letter from James Colter (Navy RPM) to RAB Members, Announcement of September 2001 RAB Meeting, Distribution of March 2001 RAB Meeting Minutes and transcript, September 2001.
32. Letter from James Colter (Navy RPM) to RAB Members, Announcement of June 2002 RAB Meeting, Distribution of September 2001 RAB Meeting Minutes and transcript, June 2002.
33. Letter from James Colter (Navy RPM) to RAB Members, Announcement of January 2003 RAB Meeting, December 2002.

TECHNICAL REVIEW COMMITTEE ACTIVITIES

1. Letter to Kim Mann (NYSDOH) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991
2. Letter to John Barnes (NYSDEC) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991

3. Letter to Helen Shannon (EPA Region II) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991
4. Letter to Marty Simonson (DPRO) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991
5. Letter to John Ohlmann (Grumman Aerospace) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991
6. Letter to John Molloy (Bethpage Water District) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991
7. Letter to Joseph Schecter (Nassau County DOH) from Judith Hare (NAVAIRSYSCOM), TRC Invitation, October 1991
8. Letter to TRC Members from Frank Klanchar (Navy RPM), Announcement of TRC Meeting #1, March 1992
9. Letter to TRC Members from Frank Klanchar (Navy RPM), Minutes from TRC Meeting #1, May 1992
10. Letter to TRC Members from Frank Klanchar (Navy RPM), Minutes from TRC Meeting #2, August 1992
11. Letter to TRC Members from Frank Klanchar (Navy RPM), Announcement of TRC Meeting #3, October 1992
12. Letter to TRC Members from Frank Klanchar (Navy RPM), Minutes from TRC Meeting #3, December 1992
13. Letter to TRC Members from Tom Sheckels (NorthDiv), Rescheduling of TRC Meeting #4, February 1993
14. Letter to TRC Members from Tom Sheckels (NorthDiv), Minutes from TRC Meeting #4, April 1993
15. Letter to TRC Members from James Shafer (NorthDiv), Cancellation of TRC Meeting #5, July 1993
16. Letter to TRC Members from James Shafer (NorthDiv), Announcement of TRC Meeting #5, September 1993
17. Letter to TRC Members from James Colter (Navy RPM), Minutes from TRC Meeting #5, October 1993
18. Letter to TRC Members from James Colter (Navy RPM), Offsite Soil Test Results, May 1995.

19. Letter to John Ohlmann (Northrop Grumman), Alan Weston (Occidental), and James Colter (Navy RPM) from John Barnes (NYSDEC), Announcement of September 1997 Technical Committee Meeting, August 1997.
20. Letter to Technical Committee Members from John Barnes (NYSDEC), Minutes from September 1997 Meeting, September 1997.
21. Letter from Steven Scharf (NYSDEC) to TAC Members, Minutes from TAC Meeting #1, October 2001.
22. Letter from Steven Scharf (NYSDEC) to TAC Members, Announcement of TAC Meeting #2, December 2001.