Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Operable Unit 2 Groundwater
Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites
Nassau County
Site Numbers 1-30-003A & B

March 2001

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* ERIN M. CROTTY, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Operable Unit 2 Groundwater
Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites
Inactive Hazardous Waste Disposal Sites
Town of Oyster Bay, Nassau County, New York
Site Nos. 1-30-003A & B

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Northrop Grumman and the Naval Weapons Industrial Reserve Plant Class 2 Inactive Hazardous Waste Disposal Sites Operable Unit 2 regional groundwater contaminant plume. This plan was chosen in accordance with the New York State Environmental Conservation Law. The remedy selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Northrop Grumman and the Naval Weapons Industrial Reserve Plant Class 2 inactive hazardous waste disposal sites and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Northrop Grumman and the Naval Weapons Industrial Reserve Plant (NWIRP) Class 2 Inactive Hazardous Waste Disposal Sites and the criteria identified for evaluation of alternatives, the NYSDEC has selected Alternative 3. The selected remedy includes a number of response measures which have been categorized into a Groundwater Remedial Program and a Public Water Supply Protection Program.

Groundwater Remedial Program

The selected remedy includes a groundwater remedial program to address the regional groundwater contaminant plume associated with the Northrop Grumman and NWIRP sites. The components of this program are as follows:

- continued operation of the on-site containment (ONCT) groundwater extraction and treatment system (formerly known as an Interim Remedial Measure) at Northrop Grumman's southern property line;

- an evaluation of the ONCT system to confirm that it is performing effectively;

- mass contaminant removal through groundwater extraction and treatment in an offsite area near the GM 38 monitoring well cluster;

- predesign investigation to determine the optimal groundwater extraction location(s) in the GM 38 offsite treatment area(s);

- long term operation and maintenance of all operating systems, including the ONCT (or former IRM) system and the GM 38 area remedy;

- additional groundwater investigation to better define the groundwater contaminant plume and to determine whether additional groundwater remediation is required under this ROD, under an amended OU2 ROD, and/or if an Operable Unit 3 Groundwater RI/FS is warranted;

- long term monitoring of the groundwater including a comprehensive monitoring of plume attenuation;

- the formation of a technical advisory committee (TAC) as deemed necessary by the NYSDEC, to be comprised at a minimum, of the involved Agencies, participating local water districts, Northrop Grumman and the Department of the Navy. The main purpose is to review and provide input on all materials relating to the implementation of the Northrop Grumman and NWIRP OU2 Groundwater remedy.

Public Water Supply Protection Program

The ROD recognizes the importance of continued provision of potable water to those communities/populations served by water supply wells that are or that become impacted by site-related contamination. To this end, the ROD requires that a public water supply protection program be implemented. The components of this program are as follows:

- continued public water supply wellhead treatment to meet appropriate drinking water quality performance objectives at wellfields already affected by the groundwater contaminant plume for as long as these affected wellfields are used as community water supply sources;

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

- long term monitoring of the groundwater contaminant plume including outpost monitoring wells upgradient of potentially affected water supply wells.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

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

_____ _____

Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites
Town of Oyster Bay, Nassau County
Site Nos. 1-30-003A & B
March 2001

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC) in consultation with 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 Northrop Grumman Bethpage Plant and the Naval Weapons Industrial Reserve Plant-Bethpage (NWIRP), both class 2, inactive hazardous waste disposal sites. In particular, this ROD addresses Operable Unit 2 (OU2), the regional groundwater contaminant plume associated with these sites. As more fully described in Sections 3 and 4 of this document, plant wastes 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 bi-phenyls (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 down gradient of Northrop Grumman, NWIRP and the Grumman-Steel Los Plant 2 facilities. Contaminated groundwater originating from the Grumman-Steel Los Plant 2 Site, formerly part of the Northrop Grumman site, now a Class 4 site, is included within the scope of the Northrop Grumman and NWIRP OU2 groundwater remedial action and long-term management plan.

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;

In order to restore the Northrop Grumman and Naval Weapons Industrial Reserve Plant Site inactive hazardous waste disposal sites to pre-disposal conditions to the extent feasible and authorized by law, but at a minimum to eliminate or mitigate the significant threats to the public health and/or the environment that the hazardous waste disposed at the site has caused, the following remedy was selected:

Groundwater Remedial Program

- continued operation of the on-site containment (ONCT) groundwater extraction and treatment system (formerly known as an Interim Remedial Measure (IRM)) at Northrop Grumman's southern property line;

- an evaluation of the ONCT system to confirm that it is performing effectively;

- mass contaminant removal through groundwater extraction and treatment in an offsite area near the GM 38 monitoring well cluster;

- predesign investigation to determine the optimal groundwater extraction location(s) in the GM 38 offsite treatment area(s);

- long term operation and maintenance of all operating systems, including the ONCT (or former IRM) and the GM 38 area remedy;

- additional groundwater investigation to better define the groundwater contaminant plume and to determine whether additional groundwater remediation is required under this ROD, under an amended OU2 ROD, and/or if an Operable Unit 3 Groundwater RI/FS is warranted;

- long term monitoring of the groundwater including a comprehensive monitoring of plume attenuation;

- the formation of a technical advisory committee (TAC) as deemed necessary by the NYSDEC, to be comprised at a minimum, of the involved Agencies, participating local water districts, Northrop Grumman and the Department of the Navy. The main purpose is to review and provide input on all materials relating to the implementation of the Northrop Grumman and NWIRP OU2 Groundwater remedy.

Public Water Supply Protection Program

- continued public water supply wellhead treatment to meet appropriate drinking water quality performance objectives at wellfields already affected by the groundwater contaminant plume for as long as these affected wellfields are used as community water supply sources;

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

- long term monitoring of the groundwater contaminant plume including outpost monitoring wells upgradient of potentially affected water supply wells.

During the course of the OU2 remedial investigation certain actions, known as Interim Remedial Measures (IRMs), were undertaken by Northrop Grumman and/or the Department of the Navy in response to the threats identified above. An IRM is conducted at a site when a source of contamination or exposure

pathway can be effectively addressed before completion of the RI/FS. A major groundwater IRM undertaken at this site was installation of the onsite containment, or ONCT System, at Northrop Grumman's southern property line. This IRM is described in more detail in Section 4.

Additional response measures taken during the course of the OU2 investigation include installation of wellhead treatment systems at the Bethpage Water District (BWD) Wellfields 4, 5 and 6. This response measure is described in more detail in Section 4.

The selected remedy, discussed in detail in Section 8 of this document, is intended to attain the goals selected for this site in Section 6 of this Record of Decision (ROD), in conformity with applicable standards, criteria, and guidance (SCGs).

SECTION 2: SITE LOCATION AND DESCRIPTION

The Northrop Grumman and NWIRP inactive hazardous waste disposal sites are located in east-central Nassau County, Long Island (see Figures 1 and 2).

The entire Northrop Grumman site was initially more than 600 acres in area, but has been reduced in size through previous remedial activities and confirmatory sampling events. The portions of the former Northrop Grumman site that remain listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites include the southern recharge basins, the NWIRP and the Grumman-Steel Los Plant 2 site (formerly the Grumman Plant 2 facility). The southern recharge basins and the Grumman-Steel Los Plant 2 facility currently total about 35 acres in size. The NWIRP site is approximately 105 acres in size. There are numerous groundwater industrial supply wells and recharge basins at these sites.

The RUCO Polymer site, site No. 1-30-004, (see figure 4) is located to the northwest of the Northrop Grumman Site and west-northwest of the NWIRP. There are other industrial and commercial facilities in the area along with several residential communities. There are several public supply wells within a two-mile radius of the sites.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

Northrop Grumman Site No. 1-30-003A

The Grumman Aerospace Corporation was established in the early 1930s at the present site in Bethpage. Several naval aircraft were developed and manufactured at the site. Other activities at the site included the manufacturing of naval amphibious craft and the manufacturing of various satellites, etc. for the National Aeronautics and Space Administration (NASA).

From 1943 to 949, Grumman disposed of chromic acid wastes directly on the ground or in open seepage basins. In 1949, a chromic acid treatment system was put on-line at Plant 2. In addition to the chromic acid treatment system located at Plant 2, systems for treating phenols, oils, and other organic compounds, and for recovering silver were also used at Plant 2. Since the early 1950s, some of the wastes generated by Grumman were taken to the NWIRP property for treatment or storage before being taken off site by private haulers. These wastes included common organic solvents consisting of chlorinated hydrocarbons. There were several locations on the Grumman site where wastes were stored, treated, or disposed of. Trichloroethene (TCE) was stored in an above ground tank along the northeastern corner of Plant 2. A release of TCE from this tank (or the associated piping system) occurred and was discovered during the Grumman Remedial Investigation.

NWIRP Site No. 1-30-003B:

The NWIRP was established in 1933. The NWIRP is known as a government owned, contractor operated (GOCO) facility. 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 the NWIRP 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 3 or area locations):

Area 1 - Former Drum Marshaling Area

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

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

Area 2 - Recharge Basin Area

Prior to 1984, some Plant 3 production-line rinse waters were discharged in the three on-site recharge basins. These waters were directly exposed to chemicals used in the industrial processes (rinsing of

manufactured parts). Only non-contact cooling water has been discharged into these basins since 1984. The source of this non-contact cooling water has been on-site production wells.

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

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

Area 3 - Salvage Storage Area

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

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

Grumman-Steel Los Plant 2, Site No. 1-30-003C (Groundwater Contamination):

In 1994, the Grumman Aerospace Corporation was purchased by the Northrop Corporation and became known as the Northrop Grumman Corporation. In December 1996, Northrop Grumman sold Plant 2 and the surrounding land to the Steel Los III Corporation (Steel Los). Steel Los refurbished the Plant 2 complex and now leases the former Plant 2 as commercial real estate.

The Plant 2 facility, listed as site No. 1-30-003C on the New York State Registry of Inactive Hazardous Waste Sites, was originally part of Site 1-30-003A, the Northrop Grumman Site. Now known as the Grumman Steel Los site, this site was addressed by the Operable Unit One (OU1) soils remedy for the Northrop Grumman Site. The OU1 ROD deferred groundwater contamination issues to this OU2 groundwater remedy. The Grumman Steel Los Site is now a class 4 site, and long term monitoring will be required, in part due to residual cadmium and chromium contamination beneath the site. A deed restriction for the property has been filed to minimize the potential for exposure to residual contamination and to minimize the potential for groundwater leaching of residual contaminants.

OXY Hooker Ruco, Site No. 1-30-004 (Not the Subject of this ROD):

The RUCO Polymer site (see figure 4) was originally the Rubber Corporation of America. The Hooker Chemical Corporation (now the Occidental Chemical Corporation, also known as OCC or OXY)

purchased the Rubber Corporation of America (RUCO) in 1965. The RUCO plant was sold to the employees in 1982. The site is now a subsidiary of the Sybron Corporation under the name RUCO Chemical Corporation (RUCO Site). OXY has retained the environmental liability for the past disposal practices.

Between 1956 and 1975, industrial process wastewater and storm water runoff from the facility was discharged to six (6) on-site recharge basins or sumps. This wastewater contained chlorinated hydrocarbons including PCE, TCE and vinyl chloride monomer (VCM), as well as other organic and inorganic wastes. These waste waters have contributed to the contamination of the Bethpage regional aquifer upgradient and beneath the Northrop Grumman, NWIRP and Grumman-Steel Los facilities. The OXY Hooker Ruco Site is listed on the National Priorities List (NPL) of the United States Environmental Protection Agency (USEPA). A separate remedial program is being carried out for the Ruco site under the oversight of the USEPA. Therefore, the Ruco site is not a direct focus of this ROD except inasmuch as it may affect the effectiveness of groundwater remedies (see for example Item D in Section 7.1).

3.2: Remedial History

Northrop Grumman and Grumman Steel Los Plant 2:

Grumman was reportedly notified in December 1947 that a sample collected from Well No. 3 of the Central Park Water District (predecessor of the Bethpage Water District) contained chromium at a concentration of 1.4 parts per million (ppm). As a result, the District's well No.s 1, 2 and 3, located on Jackson Avenue near the train station, were permanently closed. Eventually Grumman Aerospace reimbursed the District for these wells. Grumman installed a chromic acid treatment system for its Plant 2 waste waters. This system went on-line in 1949.

Odor and taste problems were discovered in water pumped from some of Grumman's on-site production wells in 1973. Several investigations into the source(s) of this problem were conducted from 1973 through the early 1980's. It was ultimately determined that these problems were due to chlorinated hydrocarbons in the groundwater.

The Northrop Grumman site was added to the New York State Department of Environmental Conservation's Registry of Inactive Hazardous Waste Disposal Sites in New York State (Registry) in 1983. At the time, the NWIRP-Bethpage site was considered part of the Northrop Grumman site. The site was initially listed as a Class 2a site because there was insufficient data to assign it a classification set forth in the Environmental Conservation Law (ECL).

Based on a subsequent review of existing data, the Grumman site was reclassified to a Class 2 site by the NYSDEC in December 1987. A Class 2 site is a site which poses a significant threat to human health and/or the environment, and for which action is required.

Northrop Grumman conducted a remedial investigation (RI) on site between October 1989 and September 1994. As a result of this investigation, two source areas were identified. The NYSDEC also divided the remedial programs at the Northrop Grumman Site and the NWIRP site into two operable units; site soils and the regional groundwater. An operable unit is designated to represent a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from contamination at a site.

The purpose of the Feasibility Studies on the Northrop Grumman and NWIRP sites was to develop and evaluate remedial alternatives for remediating the soils contamination defined during the RI(s). A Record of Decision (ROD) for operable unit one (OU1) for the Northrop Grumman site was issued in March 1995 and for the NWIRP site in July 1995.

A soil vapor extraction system was installed adjacent to a former storage tank that was used to store trichloroethene (TCE) at Plant 2. This system was shut down for a short period of time and was used to remediate a small area of contamination (perchloroethene or PCE) at Plant 15. The Plant 15 source area has been adequately remediated. The adequacy of the Plant 2 remediation will be determined after confirmatory sampling.

In addition to the hazardous waste remediation program, the parts and parcels of the former Grumman Aerospace facility have been regulated under the Resource, Conservation and Recovery Act, (RCRA), or active facility permitting program. Under the RCRA program, other remedial measures (sometimes called corrective actions), have been implemented by the NYSDECs RCRA program (also discussed in section 4) and under the USEPA's underground injection control (UIC) program.

Contaminated soil and dry well sediments, at known or potential source areas (such as various Northrop Grumman and NWIRP facilities), have been or are being addressed under OU 1 and/or appropriate RCRA and UIC closure programs.

Certain specific areas of the former Plant 2, or Steel Los property, have elevated levels of chromium and cadmium. The Steel Los Corporation opted to remove only the hazardous waste levels of contamination and then restrict access to the remainder of the soils with contamination above NYSDEC soil cleanup objectives. These areas are well below ground surface and have been deed restricted. The restriction requires maintenance of a cap or cover system at the site and special measures prior to and during ground intrusive activities. These provisions are intended to minimize the potential for leaching of residual contaminants and to minimize the potential for exposure to subsurface contaminants, respectively. The Steel Los property has been reclassified to a class 4, which means the remedial actions are in place and proper long term operation, maintenance and monitoring is required. Cadmium and chromium are included as analytes in the long term hydro-geologic monitoring plan.

NWIRP

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 Northrop Grumman and 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. The NWIRP site was excluded from the 1990 Northrop Grumman RI/FS Order on Consent and therefore, a separate investigation was required.

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

OXY Hooker RUCO

The RUCO Site is broken into three operable units. OU 1 addresses site soils and adjacent groundwater, OU 2 addresses soils associated with a particular recharge basin, and OU 3 addresses the offsite migration of groundwater contaminated with VOCs including vinyl chloride and tentatively identified compounds, or TICs, that generally fall into the category of semi-volatile organic compounds (SVOCs). The USEPA issued a Record of Decision for the offsite groundwater contamination, or Operable Unit 3 (OU3) in September 2000. The USEPA OU 3 ROD remedy includes enhanced natural attenuation and long term monitoring of a concentrated groundwater contaminant plume known as "the vinyl chloride subplume" that is immediately northwest of the Northrop Grumman site. The USEPA OU 3 ROD remedy recognizes the importance of preventing the vinyl chloride subplume from adversely affecting the performance and regulatory compliance of Northrop Grumman's groundwater remedial systems and requires that RUCO will take necessary steps to protect the Northrop Grumman groundwater treatment system.

3.3: Enforcement History

Grumman

Grumman entered into a Consent Order with the NYSDEC on October 25, 1990 in which Grumman agreed to conduct a RI/FS at the Northrop Grumman site.

NWIRP

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

Resource Conservation and Recovery Act

The purpose of this ROD is to set forth the groundwater remedial program and the public water supply protection program for the Northrop Grumman and NWIRP Sites as set forth in 6 NYCRR Part 375, "Inactive Hazardous Waste Disposal Sites." These two sites are 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.

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 Northrop Grumman Corporation and the Navy have conducted two area-wide remedial investigation and feasibility studies (RI/FS's) and a smaller focused RI/FS on the Navy property.

The RCRA program is addressing the contaminated soils beneath the Northrop Grumman and NWIRP buildings. In addition, both Grumman and the Navy are working towards completing the remediation of large capacity underground fuel oil tanks that historically leaked. All the tanks have been removed and residual contaminants in these areas are being remediated under the NYSDEC Division of Environmental Remediation Underground Storage Tanks (UST) program.

4.1: Summary of the Remedial Investigation

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. For the Northrop Grumman property, a report entitled "Remedial Investigation Report, Grumman Aerospace Corporation, Bethpage, New York, May 1994," has been prepared. For the NWIRP, two reports entitled "Final Remedial Investigation Report NWIRP, May 1992," and "Phase 2 Remedial Investigation Report, NWIRP, October 1993," describe the field activities and findings of the RIs in detail.

The first two FSs were for soils remedies covered under OU 1 RODs with the Navy and Northrop Grumman. The Focused RI/FS, being conducted by Northrop Grumman, is still ongoing for the two remaining PCB contaminated dry wells at the NWIRP. An additional FS, which is the subject of this PRAP, was prepared for offsite groundwater issues.

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

- Soil gas surveys were conducted in various locations throughout the site in order to locate potential areas which could be sources of groundwater contamination.

- Soil samples were collected in various locations throughout the site to confirm the results of the soil gas surveys and to identify source areas that could not initially be located using the soil gas survey technique.

- 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).

To determine whether the groundwater is contaminated at levels of concern, the RI analytical data were compared to environmental Standards, Criteria, and Guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the Northrop Grumman and NWIRP Sites are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part 5 of the New York State Sanitary Code. Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, the groundwater requires remediation. The RI results are summarized below. More complete information can be found in the RI Report on file in the document repositories.

Chemical concentrations are reported in parts per billion (ppb) or parts per million (ppm). For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1: Site Geology and Hydrogeology

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

- Pleistocene deposits (Upper Glacial Aquifer) consisting of various sands and gravels intermixed with discontinuous low permeability clay lenses, approximately 100 feet thick

- Magothy Formation (Magothy Aquifer) consisting of various sands and gravels varying in thickness interlaced with low permeabililty confining layers,

- Raritan Clay Formation

- Lloyd Sand Formation (Lloyd Aquifer)

- Bedrock

The Upper Glacial, Magothy and Lloyd aquifers are all important formations for the purposes of this ROD. Groundwater from the Upper Glacial aquifer in this area eventually percolates to the Magothy aquifer. The Magothy Aquifer is the aquifer that is utilized the most as a source of drinking water.

4.1.2: Regional Groundwater Study

The investigation of onsite and offsite groundwater contamination associated with the Northrop Grumman and NWIRP Sites is referred to as the regional groundwater study. The information gathered was used to screen alternatives in the Operable Unit 2 (OU 2) Groundwater Feasibility Study. The groundwater plume is estimated to extend 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 required. The process of developing a regional remedy began in October 1994 and originally included Northrop Grumman, the NWIRP and the RUCO Sites. Subsequently, in September 1998, the involved Agencies determined that the RUCO Site would be most appropriately addressed separately under the USEPA's RI/FS program for that site.

4.1.3: Nature of Contamination

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

A summary of the groundwater analytical data generated during the RIs is presented in Table 1. Summaries of the soils analytical data are presented in the RODs for onsite soils that are referenced in Section 3.2. It is recognized that residual soil contaminants such as chromium and cadmium beneath the Plant 2 property could serve as a source of groundwater contamination in the future. Although this ROD addresses groundwater contaminants, this relationship between soils and groundwater is recognized throughout the ROD.

The sites are located in an area of deep aquifer recharge. Precipitation that percolates through the soil and enters the aquifer system travels vertically down through the aquifers thus replenishing the water that is pumped for potable uses. Pollutants in the unsaturated soils and upper reaches of the aquifer system also migrate downward with infiltrating water.

The primary 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

Inorganic analytes (metals), specifically arsenic, cadmium and chromium were detected in groundwater samples that were collected at the sites. The arsenic, cadmium, and chromium were detected at

concentrations greater than the corresponding standards, though only in a small number of on-site monitoring wells.

4.1.4: Extent of Contamination

Groundwater

By current estimates, the groundwater plumes emanating from the two sites total more than 2,000 acres in area and are over 700 feet deep in places. An estimate of the areal extent of the plume, based on 1993 groundwater data, is presented on Figure 5. Recent groundwater Data from the Navy vertical profile borings indicates that Northrop Grumman contamination has migrated southward beyond the Hempstead Turnpike.

On-Site Groundwater Plume

The highest concentrations of VOCs in groundwater were detected in samples collected from on-site wells. The most contaminated on-site well was the intermediate depth well of the HN-24 well cluster (see Figure 6), located on the southwest corner of the Navy property, in which TCE was detected at a concentration of 58,000 ppb (the drinking water standard is 5 ppb). An attempt to isolate the source of this contamination was unsuccessful. Concentrations greater than 1,000 ppb have been detected in some of Grumman's and the Navy's production wells. Consistently high concentrations of VOCs have been detected in Grumman production well GP-1 for some time, and a treatment system has been installed to treat the water that is pumped from that well (see Section 4.2).

Off-Site Groundwater Plume

To date, the plume(s) emanating from the sites have impacted or threaten three public water supply wellfields operated by the Bethpage Water District (see Figure 5). There are treatment systems in place at each of these 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.

Soil

The Northrop Grumman and NWIRP OU1 RODs dealt with soil contamination outside the areas of the site buildings at the Northrop Grumman and NWIRP sites. Contaminated soils beneath the site buildings are being addressed by the RCRA program, or active facilities permitting program. This is being accomplished by sampling, excavation and offsite disposal of contaminated soils.

Sediments

Sediments in some of the onsite recharge basins contained elevated levels of inorganics. All sediments that were removed from the recharge basins were characterized and sent offsite for disposal. The closure of the onsite storm drains was through the USEPA underground injection control (UIC) program.

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 (see Figure 8). 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 document repositories listed on Page 2 of this document.

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. Two major groundwater response actions, the ONCT IRM and the provision of wellhead treatment for impacted public supply wells, have been implemented over the past seven years and have been incorporated into the selected remedy for these sites.

On-Site Containment IRM

The On-Site Containment (ONCT) IRM was installed by Northrop Grumman. It was realized during the early stages of the feasibility study that one of the components of the final remedy for addressing the groundwater contamination was the containment of the portions of the plume(s) that are still beneath the sites (i.e. - prevent further migration of contaminants off site to the extent practicable). Pumping at the onsite production wells had helped contain much of the contamination onsite. However, as Northrop Grumman and the Navy began closing down their Bethpage operations, many of the on-site production wells were slated to be removed from service. Therefore, it was decided to implement a specific groundwater containment remedy as an Interim Remedial Measure (IRM) in advance of making a decision regarding the final groundwater remedy. This system went on-line in November 1997.

As designed, the ONCT IRM system consists of four extraction wells; one of which was pre-existing (GP-1), and three others that were installed in 1996-97 (see Figure 7). The bulk of the contaminant removal is predicted to occur in wells ONCT-1 and GP-1, with lesser amounts of contaminants extracted from

wells ONCT-2 and ONCT-3. The combined pumping rate for wells GP-1, ONCT-1, ONCT-2, and ONCT-3 is 3,375 gallons per minute.

The groundwater that is pumped from these wells is treated to remove VOC contaminants prior to being recharged back into the aquifer via on-site recharge basins. This combination of pumping, treating and recharge are the factors by which the on-site plumes will be contained ("hydraulic containment"). Eventually, most of the Northrop Grumman production (GP) wells that added additional pumping will be closed and only the ONCT system, consisting of GP-1 and ONCT extraction wells 1, 2 and 3 will be left in place. The closure of most of the production wells was incorporated into the design of the containment system.

Protection of the Bethpage Water District Public Supply Wells

Treatment systems have been installed at the three currently operated and impacted or threatened public supply wellfields operated by the BWD (see also section 4.1.2). The treatment systems at BWD Plants 4, 5 and 6 were installed by the district. Plant 4 and 6 costs were reimbursed by Grumman. The treatment system at BWD Plant 5 was reimbursed by the U.S. Navy as specified in the May 1995 OU 1 ROD for the NWIRP-Bethpage site.

4.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks can be found in Section 5 of the RI report entitled, "Contaminant Fate and Transport."

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

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

- direct contact with (dermal absorption), ingestion of, and inhalation of vapor from contaminated onsite groundwater; and

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

Human exposures could occur by ingesting or coming into direct contact with untreated, contaminated groundwater pumped from a water supply well. Additionally, inhalation of VOCs could occur if contaminated water is used for cooking, cleaning or bathing. 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 preventing 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.

It should be noted that exposures to contaminated soil, dry well sediments, and groundwater at known or potential source areas (such as various Northrop Grumman and NWIRP facilities) have been or are being addressed under OU1 and/or appropriate RCA and UIC closure programs.

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 sites. 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

Grumman entered into a Consent Order with the NYSDEC on October 25, 1990 in which Grumman agreed to conduct a RI/FS at the Northrop Grumman site.

Resource Conservation and Recovery Act

The purpose of this ROD is to set forth the groundwater remedial program for the Northrop Grumman and NWIRP Sites as set forth in 6 NYCRR Part 375, "Inactive Hazardous Waste Disposal Sites." These two sites are 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.

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. The NYSDEC and the Northrop Grumman Corporation (Grumman Aerospace) entered into a Consent Order on October 25, 1990. The Order obligated Northrop Grumman to implement an RI/FS.

NWIRP

The United States Navy has undertaken their environmental studies pursuant to the Navy's Installation Restoration Program. The State of New York provided oversight of the work conducted by the Navy pursuant to a Memorandum of 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 Record of Decision for Operable Unit 2 (OU2) the NYSDEC will approach the Northrop Grumman Corporation and the Department of the Navy to implement the selected remedy under an Order on Consent and a Federal Facility Site Remediation Agreement respectively.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. 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, the offsite migration of soils contamination entering the groundwater.

- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, Alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Northrop Grumman and the NWIRP sites were identified, screened and evaluated in the Operable Unit 2 (OU2) Report entitled "Groundwater Feasibility Study, Northrop Grumman, Bethpage."

The On Site Containment System (ONCT) and the wellhead treatment for the BWD Wells are response actions that have already been implemented and that will be incorporated into the selected remedy for this

site. All of the alternatives contained in the OU2 Groundwater ROD include the continued operation, maintenance and monitoring (OM&M) of the ONCT system and the BWD wellhead treatment.

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 responsible parties for implementation of the remedy.

7.1: Description of Alternatives

The following potential response actions are intended to address contaminated groundwater associated with the site and to protect affected or potentially affected public water supply systems.
For Alternatives 1 thru 8, the following Items A through F, are included in Some or All of the Alternatives:

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 (See Figure 9) 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 Three Off-Site Bethpage Public Water Supply Well Fields:
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 or until the treatment at a public supply well(s) is no longer necessary to meet appropriate remedial goals, or until BWD decides to shut down any given supply well. 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 wellfield 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, Northrop Grumman through its agreement with the BWD for Plants 4 and 6 and the Department of the Navy for Plant 5 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 with a Public Water Supply Protection Contingency, and Long-Term Operation and Maintenance of All Operating Treatment Systems On-site.

A long-term operation, maintenance and monitoring (OM&M) program would be designed and implemented and is included with each Alternative. This OM&M plan includes the installation of at least twenty new monitoring wells and specific vertical profile borings. The OM&M plan includes a specific task for verifying the Grumman Steel Los Plant 2 and the NWIRP source area contamination does not pass beyond the ONCT system.

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 groundwater plume(s) both on-site and off-site; 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 (approximately 20 - 40 wells). 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.

All the alternatives contain a contingency for public water supply wellhead treatment or comparable alternative measures. The treatment or alternative measures will be sufficient to meet the appropriate remedial goals for this project (see item F below). 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, as determined by the NYSDEC and State and County Health Departments, indicate that treatment of a public supply well or provision of an alternative water source is necessary to protect public health from exposure to site-related contamination. The determination of appropriate water supply protection measures will be made with input from the affected water district(s).

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

D. Vinyl Chloride Contingency Plan

The feasibility study does not include specific treatment for vinyl chloride. The RUCO site is upgradient of the Northrop Grumman Site and historically upgradient of the NWIRP Site due to large scale pumping by Northrop Grumman. The RUCO site discharged vinyl chloride, other chlorinated solvents and other organic compounds directly into the aquifer through on-site recharge basins. The USEPA has selected a remedy for the RUCO site vinyl chloride subplume. The existing ONCT system was not designed to treat vinyl chloride, a VOC that requires unique methods of treatment to meet stringent air discharge limits. Thus, the NYSDEC directed Northrop Grumman to develop a continency treatment plan. The USEPA OU 3 ROD remedy includes enhanced natural attenuation and long term monitoring of the vinyl chloride subplume. The USEPA OU 3 ROD remedy recognizes the importance of preventing the vinyl chloride subplume from adversely affecting the performance and regulatory compliance of Northrop Grumman's groundwater remedial systems. Vinyl chloride was recently detected in Northrop production well GP-3, suggesting continued migration of the vinyl chloride subplume. Northrop Grumman has notified the USEPA and OXY that the vinyl chloride treatment contingency plan must now be invoked.

E. Offsite GM 38 Area Remedy:

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

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

F. Northrop Grumman and the 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. Northrop Grumman and the Department of the Navy have agreed to establish a goal for any given wellhead treatment or comparable alternative measures for affected drinking water supplies which will provide water that is

non-detect using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l) with respect to VOCs for site related contamination as cited in the 2001 Water Quality Monitoring Requirements for Nassau County Public Water Systems. Additional costs to implement this policy relative to the Alternatives considered in the OU 2 FS, if any, fall within the plus fifty and minus thirty percent of CERCLA cost requirements, and therefore will not significantly change the cost estimates for Alternatives 2 through 8.

The Bethpage Water District has a policy that only non-detect water be provided with their treatment system. As of the date of this ROD, Northrop Grumman through its agreement with the Bethpage Water District has reimbursed the District for Plants 4 and 6 and the Department of the Navy has reimbursed BWD for Plant 5 with such treatment technology. It is anticipated that Northrop Grumman and the Department of the Navy will enter into future agreements to implement this policy, as detailed in bullet 9 of section 8 of this ROD, with all water districts affected by site-related contamination.

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

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

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

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

Capital Cost:	$ 4,390,000
O&M Cost:	$ 1,506,000
Present Worth:	$ 28,830,000

Alternative 3: A, B, C, D, E and F 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:	$	1,700,500
Present Worth:	$	33,600,000

Alternative 4: A, B, C, D, E and F above, with HN-24 Area Treatment:

Alternative 4 is the combination of Alternatives 2 and 3. Alternative 4, is undertaken in an attempt to accelerate on-site contaminant mass removal, and restore groundwater quality in these localized areas to RAOs in a shorter time frame than under Alternative 1.

Capital Cost:	$	9,290,000
O&M Cost:	$	1,725,500
Present Worth:	$	35,000,000

Alternative 5: A, B, C, D and F above, and Off-Site Plume Containment, Treatment, and Discharge to Off-Site Storm Sewers:

Alternative 5 would add six new off-site groundwater extraction wells to achieve containment of the full extent of the off-site portion of the TVOC plume. Alternative 5 would provide mass removal from the entire aquifer by the installation of a groundwater extraction and treatment system at the farthest downgradient edge of the plume, to contain the full extent (off-site as well as on-site portions) of the plume. The off-site wells would be installed south of the Northrop Grumman facility and north of Hempstead Turnpike (see Figure 7).

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

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

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

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

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

Capital Cost: $ 22,620,000
O&M Cost: $ 3,080,000
Present Worth: $ 64,100,000

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

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

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

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

Capital Cost: $ 23,090,000
O&M Cost: $ 3,300,000
Present Worth: $ 64,700,000

7.2 Evaluation of Alternatives

The criteria used to compare potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided, followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study. 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 New York State Standards, Criteria, and Guidance (SCGs).** Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

The most significant SCGs for this ROD 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). Air Quality Regulations (6 NYCRR Part 200 series) are relevant to the air discharges from each groundwater treatment system.

Alternatives 1, 2, 3 and 4 would be compliant with SCGs for the portion of the groundwater plume addressed by each Alternative. Alternatives 5, 6, 7 and 8 would be compliant with SCGs for the entire groundwater plume.

The applicable SCGs 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, Northrop Grumman and the Department of the Navy have agreed to a goal for this project, for any given wellhead treatment or comparable alternative implemented due to site-related contamination, to provide water that is non-detect using USEPA Method 502.2 to a detection limit of 0.5 micrograms per liter (ug/l) with respect to VOCs, as cited in the 2001 Water Quality Monitoring Requirements for Nassau County Public Water Systems.

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

The air treatment systems for the IRM wells were not designed to treat vinyl chloride and may need to be modified if the vinyl chloride concentrations in the air discharge exceeds state air discharge guidelines. The raw and treated groundwater at the ONCT system, as well as the effluent air stream, would need to be

monitored for vinyl chloride. If necessary, a vinyl chloride treatment component would be incorporated into existing treatment system.

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

2. <u>Protection of Human Health and the Environment</u>. This criterion is an overall evaluation of each Alternative's ability to protect public health and the environment.

The contaminant-specific SCGs 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, Northrop Grumman and the Department of the Navy have agreed to a goal for this project, for any given wellhead treatment or comparable alternative implemented due to site-related contamination, to provide water that contains no detectable concentrations of site-related contaminants.

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

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

Deep groundwater at the GM-38 well area has been identified as an off-site "hotspot" because concentrations of TVOCs exceed 1,000 ppb (equal to 1 ppm) at that location. The main objective of the GM-38 well area remedy would be to reduce mass contaminant load in the aquifer in the vicinity of three public water supply wellfields. Depending upon placement of the extraction well(s) and system performance, this could also result in reduced loading to the public water supply wells. The remedy would also enhance the long-term natural process of aquifer restoration.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Alternatives 5, 6, 7 and 8 would be substantially more difficult to implement administratively with respect to the 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. The costs for each Alternative are presented in Table 2.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is evaluated after public comments on the PRAP have been received.

8. Community Acceptance. Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. A "Responsiveness Summary"has been prepared that describes public comments received and the manner in which the Department will address the concerns raised.

Members of the community at large, particularly in the BWD, have expressed their concerns about site contamination during the Remedial Advisory Board (RAB) meetings sponsored by the Department of the Navy, at the December 13, 2000 PRAP public meeting and in writing during the public comment period. A number of response actions included in this ROD will address community, local official, water district, and public health concerns. These include: the ONCT system, the GM38 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. It is noteworthy that the PRAP proposal for granular activated carbon (GAC) polishing at affected public water supply wells has been replaced by a contingency for wellhead treatment or comparable alternative measures, with recognition of Northrop Grumman's and the Department of the Navy's stated agreement to use "non-detect" levels as the design goal for the provision of such treatment or measures. Additionally, the selected remedy has been modified 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

Based upon the results of the RI/FS, supplemental investigative data, the evaluation presented in section 7 and the reasons presented below, the NYSDEC is proposing selecting Alternative 3, as described in

detail in this ROD. The selected remedy, Alternative 3, consists of the following Groundwater Remedial Program components: the ongoing ONCT system (formerly known as the IRM), the off-site GM-38 area groundwater extraction and treatment system, a vinyl chloride treatment contingency plan for the ONCT system, long-term groundwater monitoring including monitored natural attenuation, and long-term operation and maintenance of all operating treatment systems onsite and off-site. Additionally, the selected Alternative includes 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 selection of Alternative 3 is based on the evaluation of each of the eight Alternatives developed for this site. It was determined that Alternative 3 will meet standards, criteria and guidance for the containment portion of the groundwater plume remedy, prevent exposure to site related contaminants in the groundwater, actively restore a natural resource (sole source aquifer), and prevent further deterioration of down gradient groundwater conditions. Alternative 3 was also chosen based on the fact that it is not economically or technically feasible to contain and treat all the contaminated groundwater that has migrated from the Northrop Grumman and NWIRP sites to groundwater quality standards.

There is a possibility of site-related contamination impacting additional public water supply wells. These wells will be protected by a long term monitoring program that includes sampling of wells upgradient of the public water supply wells and by a contingency to provide wellhead treatment or comparable alternative measures, if necessary.

The preference to permanently and significantly reduce the toxicity, mobility or volume of VOCs in groundwater is satisfied by the selected remedy since it will reduce the mass of VOCs in the groundwater by recovering, treating and discharging groundwater contaminated by the Northrop Grumman and NWIRP sites plume(s). The remedial goal for attainment of the 5 ppb groundwater standard will be met in the treated aquifer segment, to the extent practicable.

Part of the remedy may address contamination that has not been conclusively attributable to Northrop Grumman and/or the NWIRP. In the same manner, not all of the contamination attributable to Northrop Grumman and the NWIRP will be actively addressed by the selected groundwater remedy. Therefore, the public water supply contingency plan will be necessary to address the potential of future exposure to site-related VOCs.

As more data become available, other PRPs may be identified (for example, the RUCO Site). The USEPA has concluded the RI/FS process for the RUCO OU 3 project and has selected a groundwater remedy for the RUCO Site that will address the additional VOC loading, including vinyl chloride, to the Bethpage regional aquifer.

The estimated present worth cost to implement the remedy proposed in this ROD is $33,600,000. The cost to construct the remedy is estimated to be $8,060,000 and the estimated average annual operation and maintenance cost for 30 years is $1,660,700.

The elements of the selected remedy are as follows:

Groundwater Remedial Program

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

   Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program, including comprehensive monitoring of plume attenuation will be instituted. This monitoring will evaluate the effectiveness of the ONCT groundwater extraction and treatment system, monitor the levels of select inorganics (e.g., chromium and cadmium) and volatile organic compound (VOC) contaminants in the groundwater upgradient and downgradient of the ONCT system, monitor the effectiveness of the offsite component of this remedy and the wellhead treatment systems, and better define and track the offsite groundwater contaminant plume. This combined monitoring effort will allow the effectiveness of this remedy to be monitored and will be a component of the operation, maintenance and monitoring (OM&M) program for the site.

2. Continued operation of the Onsite Containment (ONCT) IRM groundwater extraction system to address the onsite TVOC groundwater contamination emanating from the former and current onsite source areas. This system must be sufficient to intercept the width and depth of the entire TVOC plume migrating from the Northrop Grumman Site.

3. A study to confirm the hydrogeologic effectiveness of the onsite containment (ONCT) system. This will, if necessary, include, but not necessarily be limited to, the installation of any required monitoring wells, piezometric measurements, a groundwater modeling effort and a hydrogeologic report, independent of any quarterly monitoring report on the ONCT system predesign study findings.

4. a. A predesign investigation to determine the optimum location(s) for the GM38 area groundwater extraction well(s). This predesign 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 GM38 area, depicted on Figure 7 and as detailed in the Northrop Grumman OU2 FS, with all necessary piping to install the wells and properly run the discharge to the groundwater treatment systems.

c. Utilization an existing storm water collection and groundwater recharge system 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.

5. The installation of air emission controls, if required, to comply with the NYSDEC air regulations.

6. The long-term operation, maintenance and monitoring (OM&M) of the ONCT and 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. Testing will be done, at a minimum, on a quarterly basis unless otherwise approved by the NYSDEC, to verify the system performance. Additionally, monitoring of groundwater elevations will be done, initially on a quarterly basis (unless otherwise approved by the NYSDEC) to determine the groundwater capture zone in different seasons, and annually thereafter.

7. A specific investigative task will include current work and potentially include, but is not necessarily limited to, installation of additional groundwater monitoring wells, vertical profile borings (VPBs), and groundwater sampling to determine if there are any other areas of elevated groundwater contamination that warrant additional remediation under OU2 and/or creation of an Operable Unit 3. This task, which includes the recent and ongoing installation of VPBs, will be documented in a report to the NYSDEC. The NYSDEC will then, based on the report, make a final determination.

8. The formation of a technical advisory committee (TAC) as deemed necessary by the NYSDEC, to be comprised at a minimum, of the involved Agencies, participating local water districts, Northrop Grumman and the Department of the Navy. The main purpose is to review and provide input on all materials relating to the implementation of the Northrop Grumman and NWIRP OU2 Groundwater Remedial Program and Public Water Supply Protection Program.

Public Water Supply Protection Program

9. The installation and/or quarterly monitoring for VOCs of outpost monitoring wells installed with respect to potentially affected public and private water supply wells, including BWD well fields 4, 5 and 6. The remedial design will evaluate and determine the best locations for any additional outpost wells required for this program. Outpost monitoring wells will be sampled quarterly.

10. A public water supply contingency plan for the design, construction, operation and maintenance of wellhead treatment systems 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 Northrop Grumman/NWIRP site-related contaminants, then wellhead treatment or comparable alternative measure(s) for the impacted public water supply well(s) will be necessary. This determination will be made by NYSDEC, NYSDOH, and the Nassau County Department of Health in conjunction with the potentially impacted water district. The treatment system or comparable alternative measure(s) to produce potable water will be designed and constructed with input from the affected water district. Alternatively, if Northrop Grumman/NWIRP reaches a cash settlement with an affected Water District, then each settling District will be responsible for its respective monitoring and implementation of, as necessary, wellhead treatment, or comparable alternative measures. Operation and maintenance of all public supply well treatment systems, or comparable alternative measures, will be assumed, at a minimum, to operate for the required 30 year time frame as required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). At a minimum, the NYSDOH Part 5 drinking water standards will always be met.

Northrop Grumman and the Department of the Navy have 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.

11. a. Any repeated detection of 1 ppb or more of Northrop Grumman/NWIRP Site-related contamination in the outpost or long term groundwater monitoring wells upgradient of a public supply well will "trigger" Northrop Grumman or the Department of the Navy to notify the NYSDEC and the potentially impacted water district and to evaluate the rate of movement of the Northrop Grumman/NWIRP contaminants towards the public supply wells.

    b. If VOC concentrations in the outpost well(s) approach or exceed a predetermined, outpost well-specific action level, a minimum of one and a maximum of three confirmatory samples will be collected within 30 days and the results evaluated by the NYSDEC and the State and County Health Departments with input from the affected water district(s). If the NYSDEC's and the Health Departments' evaluation indicates that treatment is necessary, the design and construction phase of the water treatment system(s) or comparable alternative measure will begin.

12. The BWD public supply wells and any other supply wells determined to be impacted or potentially impacted based on the long term OM&M, would be sampled on a monthly basis for total volatile organic compounds.

13. 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 Northrop Grumman and NWIRP groundwater plume(s).

Elements Common to Both Programs

14. A long term operation, maintenance and monitoring plan will be prepared that details all of the specific operation and maintenance of the ONCT and the GM 38 area systems and all the monitoring requirements and contingency aspects of this project.

15. A performance evaluation conducted at least once a year to determine whether the remedial goals and performance objectives of all systems have been or can be achieved, and whether the monitoring should continue.

16. A plan to properly close all monitoring wells associated with the Northrop Grumman and NWIRP sites at such time that the wells are no longer necessary.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

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

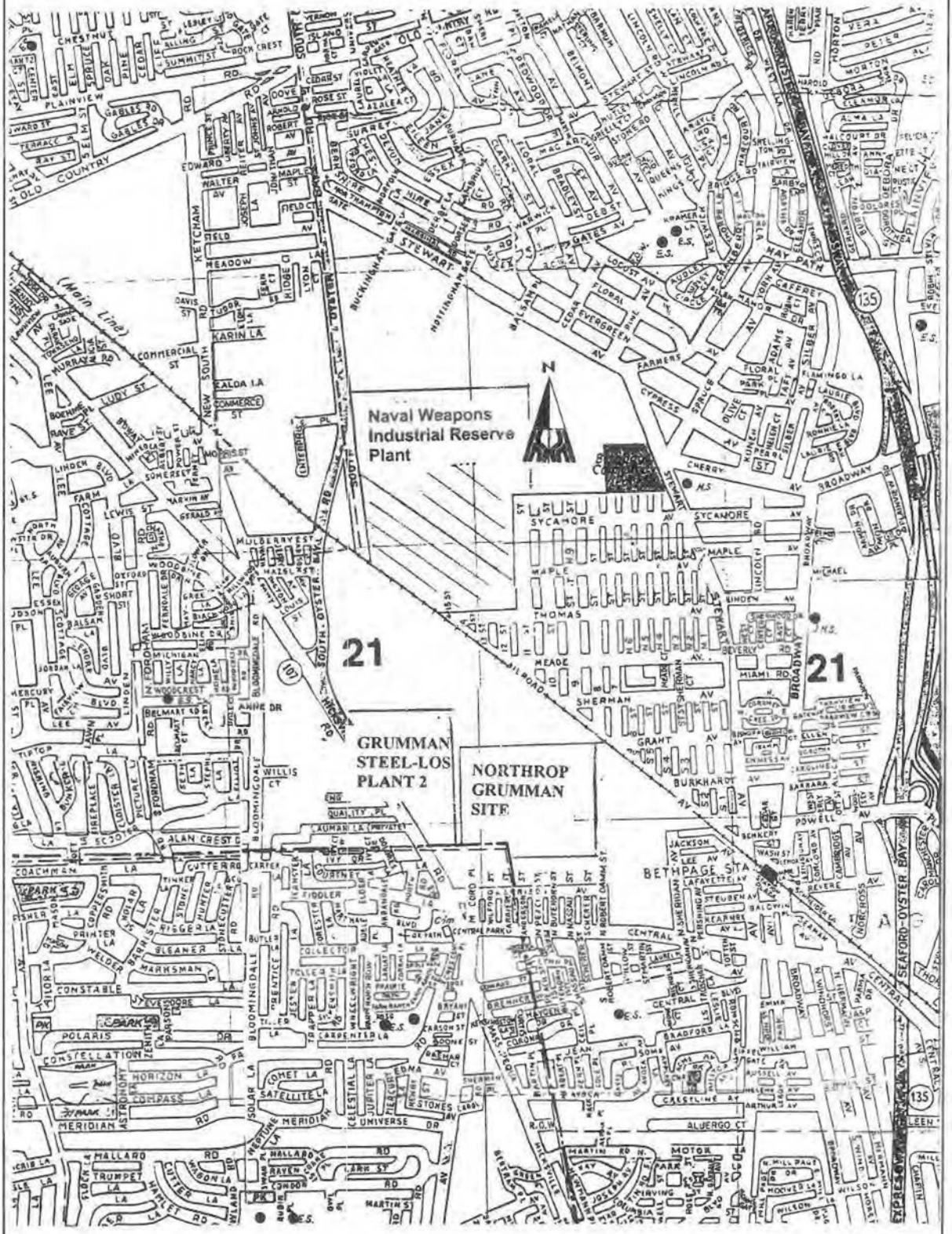
- A repository for documents pertaining to the site was established.

- 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 the public. NYSDEC also announcing the finalized OU2 feasibility study was available to the public.

- In November 2000, issued a press release and a mailing was sent out to the public, announcing the to address ed 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 PRAP.



Northrop Grumman

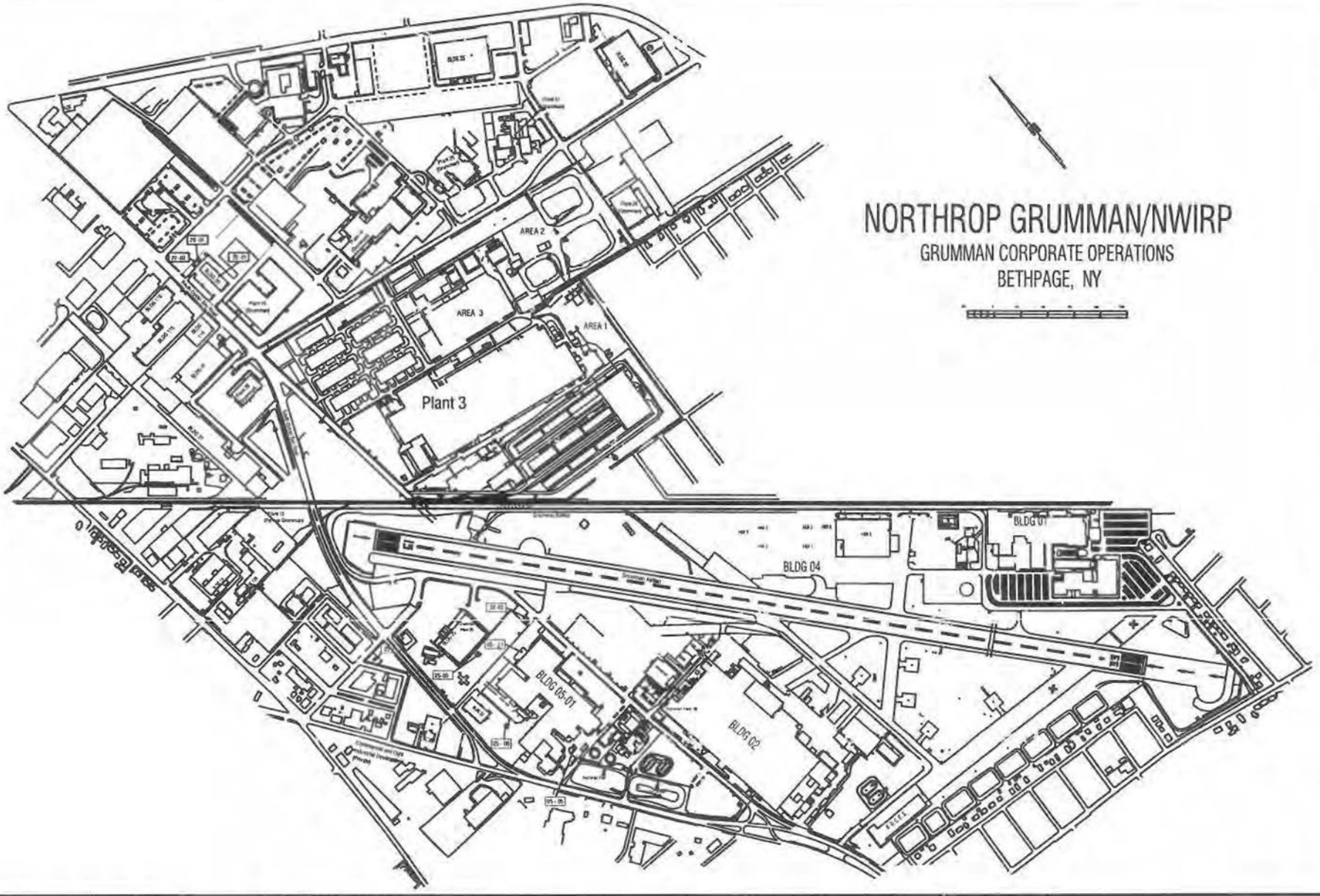
Figure 1– Area Location Map

DIVISION OF ENVIRONMENTAL REMEDIATION

REVISED:
DATE: 03/21/00

DRAWING:

Town of Oyster Bay, Site No.s 1-30-003A, B and C

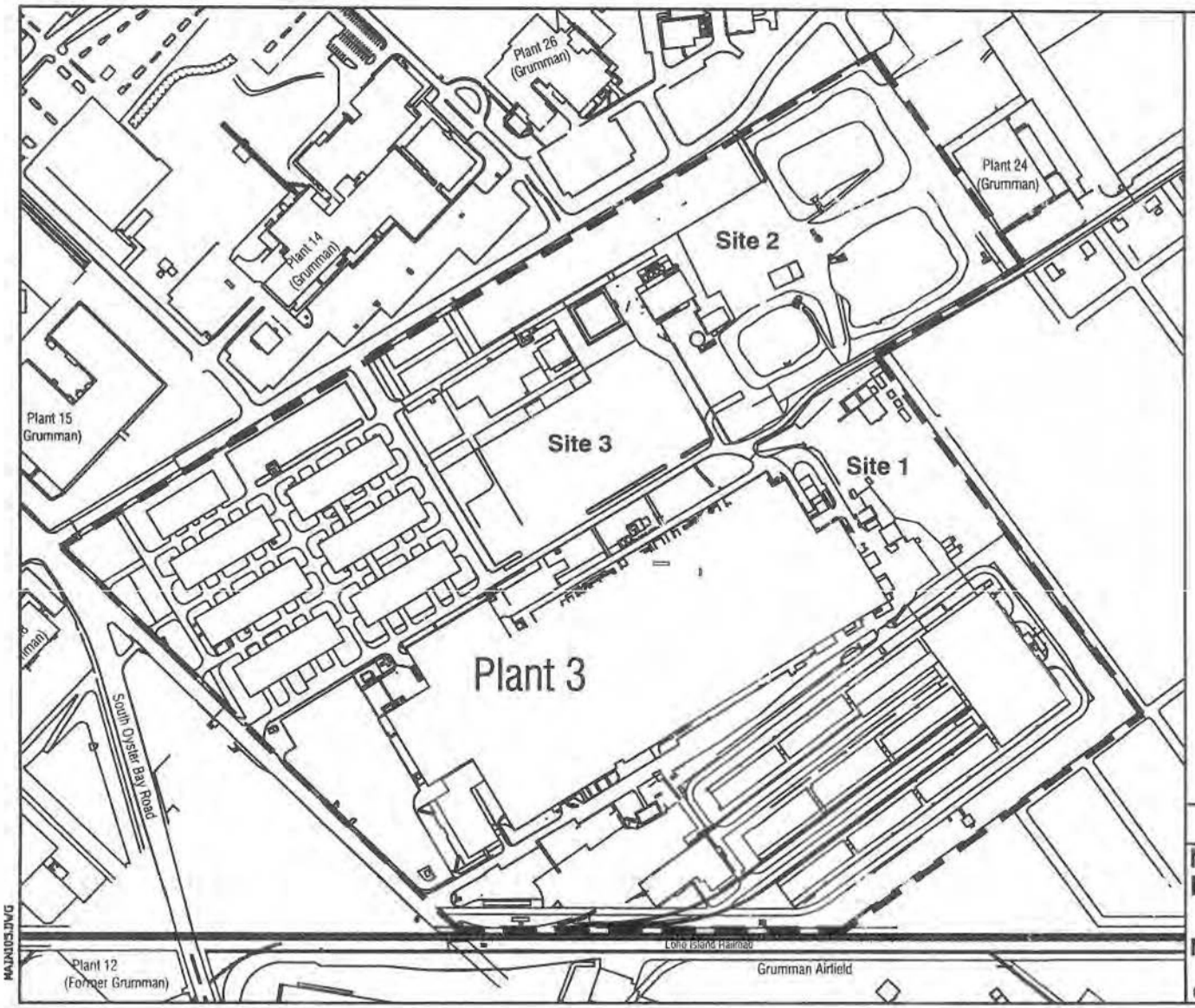


NORTHROP GRUMMAN/NWIRP SITE
BETHPAGE, NASSAU COUNTY, NEW YORK

GENERAL SITE LOCATION

FIGURE 2

Figure 3



Legend

Navy 105 Acre Parcel Boundary

N

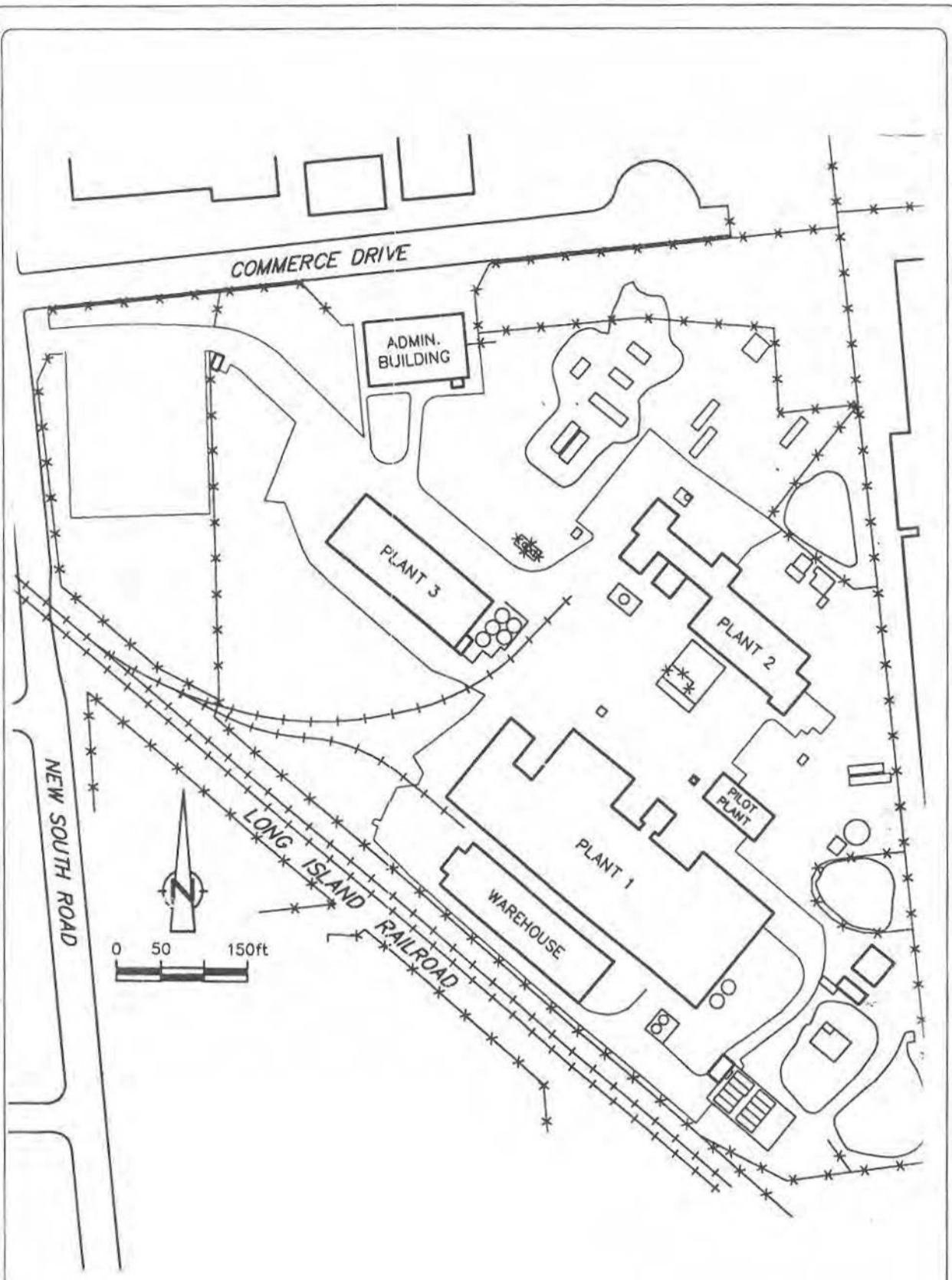
0 100 200 300 400

SCALE IN FEET

April, 2000	From TetraTech NUS Base Map Modified by: Steven M. Scharf, P.E.

Naval Weapons Industrial Reserve Plant
NWIRP Bethpage
(NWIRP.DWG)
For Estimating Purposes Only, Not To Scale

MAINXIOS.DWG



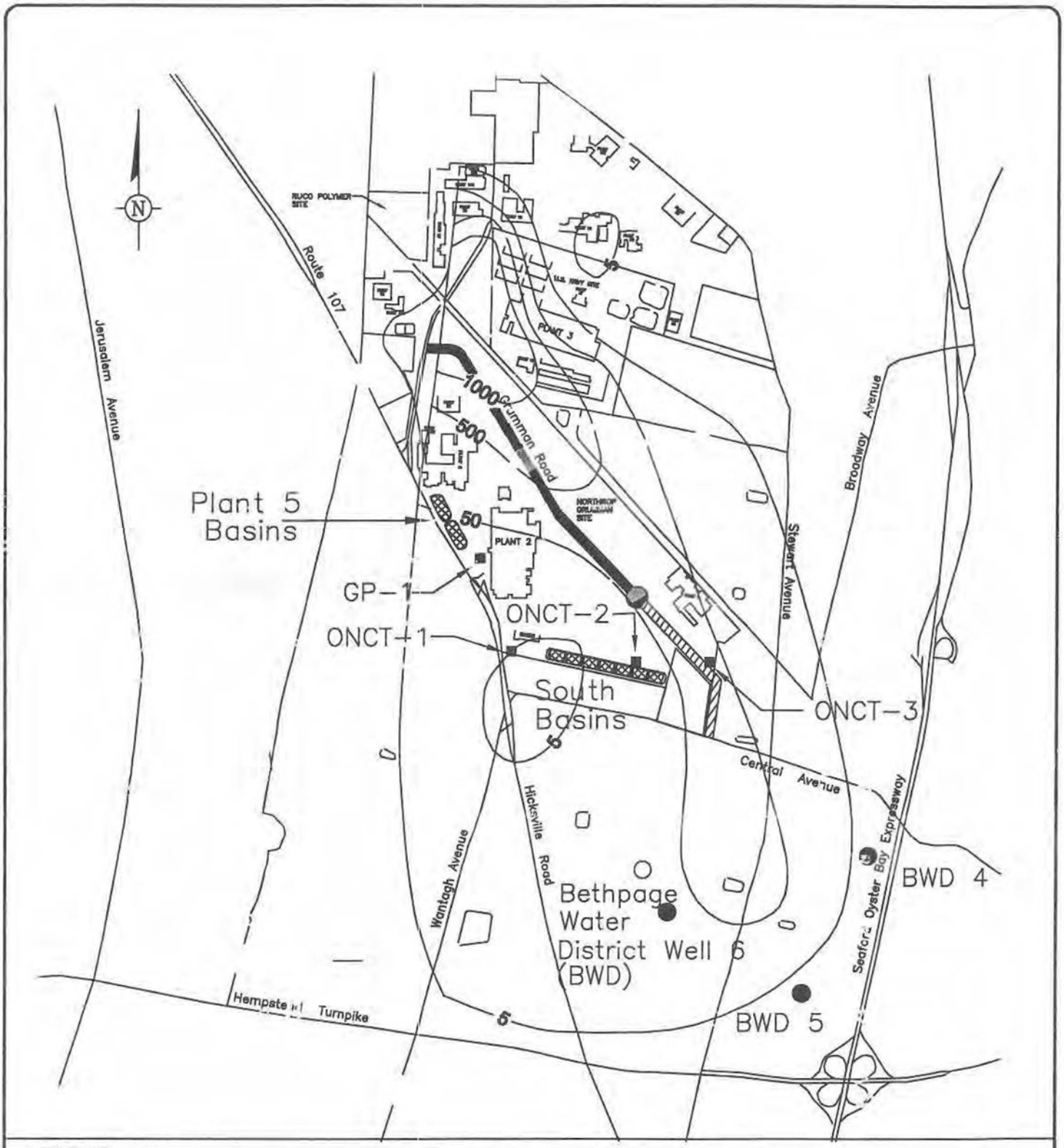
OXY Hooker Ruco Site
Figure 4

DIVISION OF ENVIRONMENTAL REMEDIATION

REVISED:
DATE: 04/25/00

DRAWING:

Town of Oyster Bay, Site No.s 1-30-004



LEGEND:

ONCT-1 ■ WELL LOCATION AND DESIGNATION

5 REPRESENTS THE LEADING EDGE OF THE VOLATILE ORGANIC COMPOUNDS IN PARTS PER BILLION BASED ON 1993 DATA

— — REPRESENTS MODIFIED WESTERN EXTENT OF TVOC PLUME AS REQUESTED BY NYSDEC BASED UPON HISTORIC DISCHARGE OF NON-CONTACT COOLING WATER TO PLANT 12 BASINS

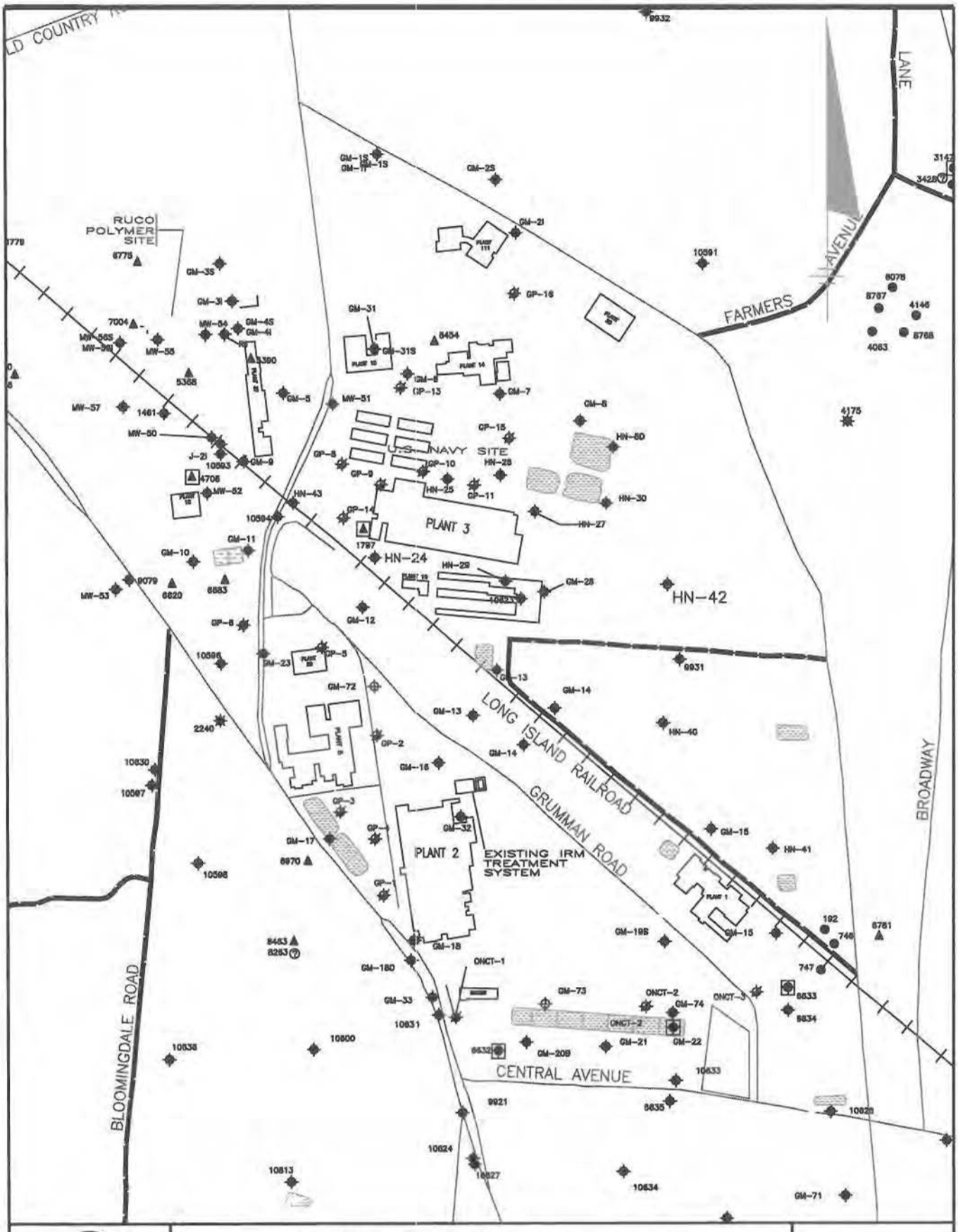
– – – APPROXIMATE WESTERN EXTENT OF TVOC PLUME

0 2000 FT

Modified by:
Steven M. Scharf, P.E.
From Original Map prepared
Arcadis Geraghty and Miller

INITIAL CONTOURED CONCENTRATIONS OF TOTAL VOLATILE ORGANIC COMPOUNDS IN MODEL LAYER 4

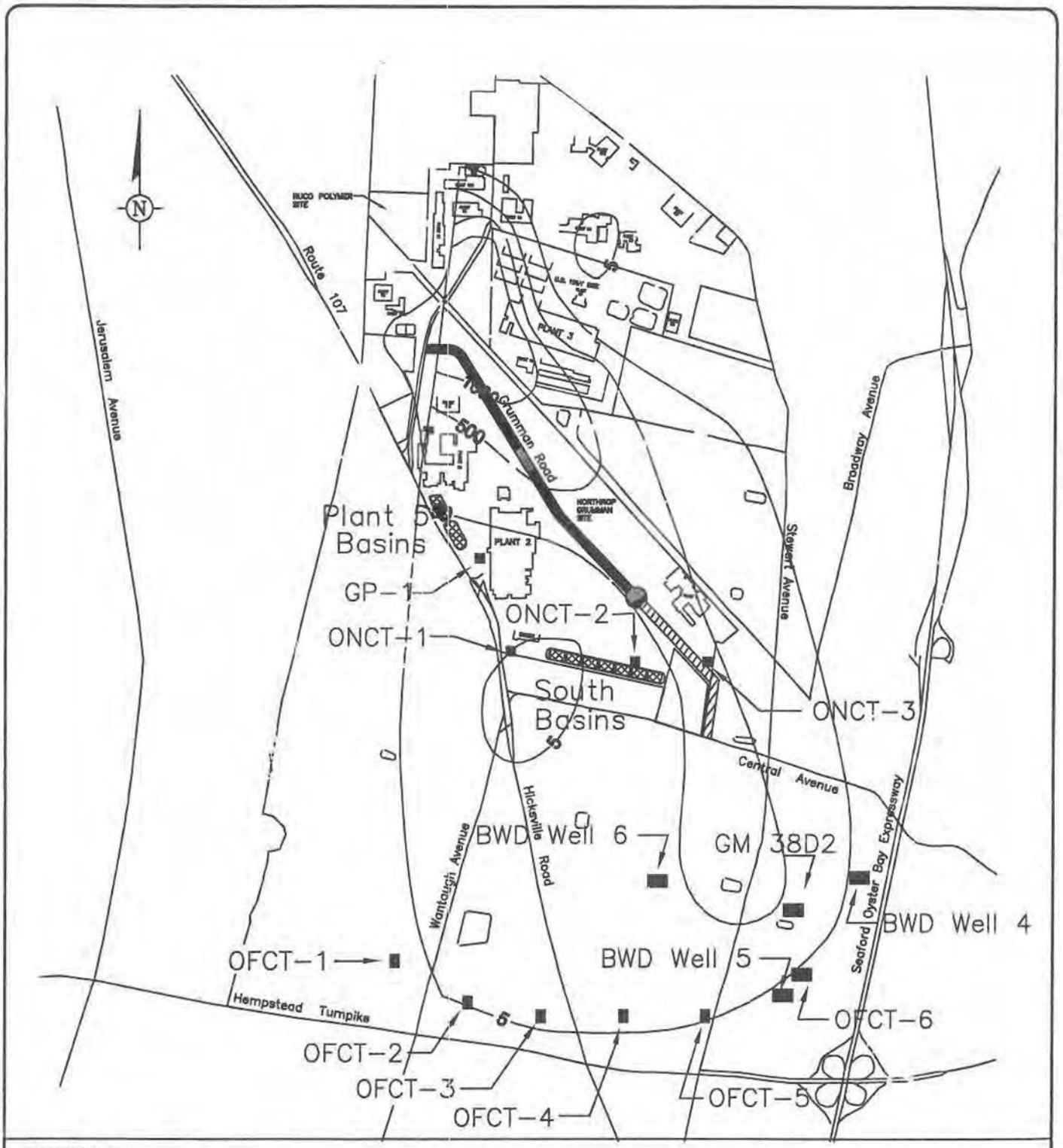
Figure 5



NORTHROP GRUMMAN/ NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

SITE MONITORING WELL LOCATIONS

FIGURE 6



LEGEND:

OFCT-1 ■ WELL LOCATION AND DESIGNATION

5 LINE OF EQUAL TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATION IN PARTS PER BILLION

– – – APPROXIMATE WESTERN EXTENT OF TVOC PLUME

– – REPRESENTS MODIFIED WESTERN EXTENT OF TVOC PLUME AS REQUESTED BY NYSDEC BASED UPON HISTORIC DISCHARGE OF NON-CONTACT COOLING WATER TO PLANT 12 BASINS

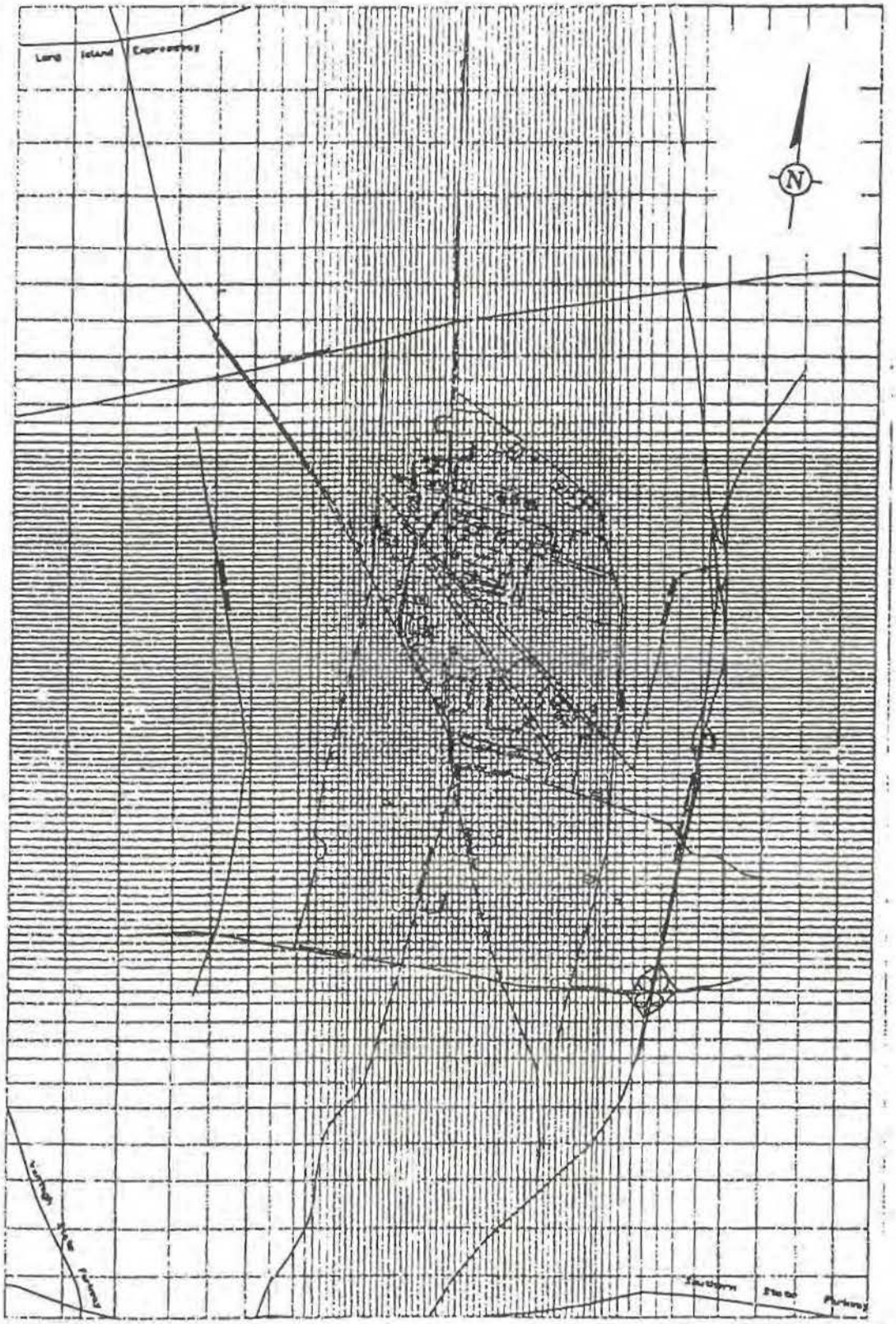
figure7.dwg

0 2000 FT

Modified by:
Steven M. Scharf, P.E.
From Original Map prepared
Arcadis Geraghty and Miller

NORTHROP GRUMMAN FEASIBILITY STUDY
VARIOUS EXTRACTION WELL LOCATIONS

Figure 7



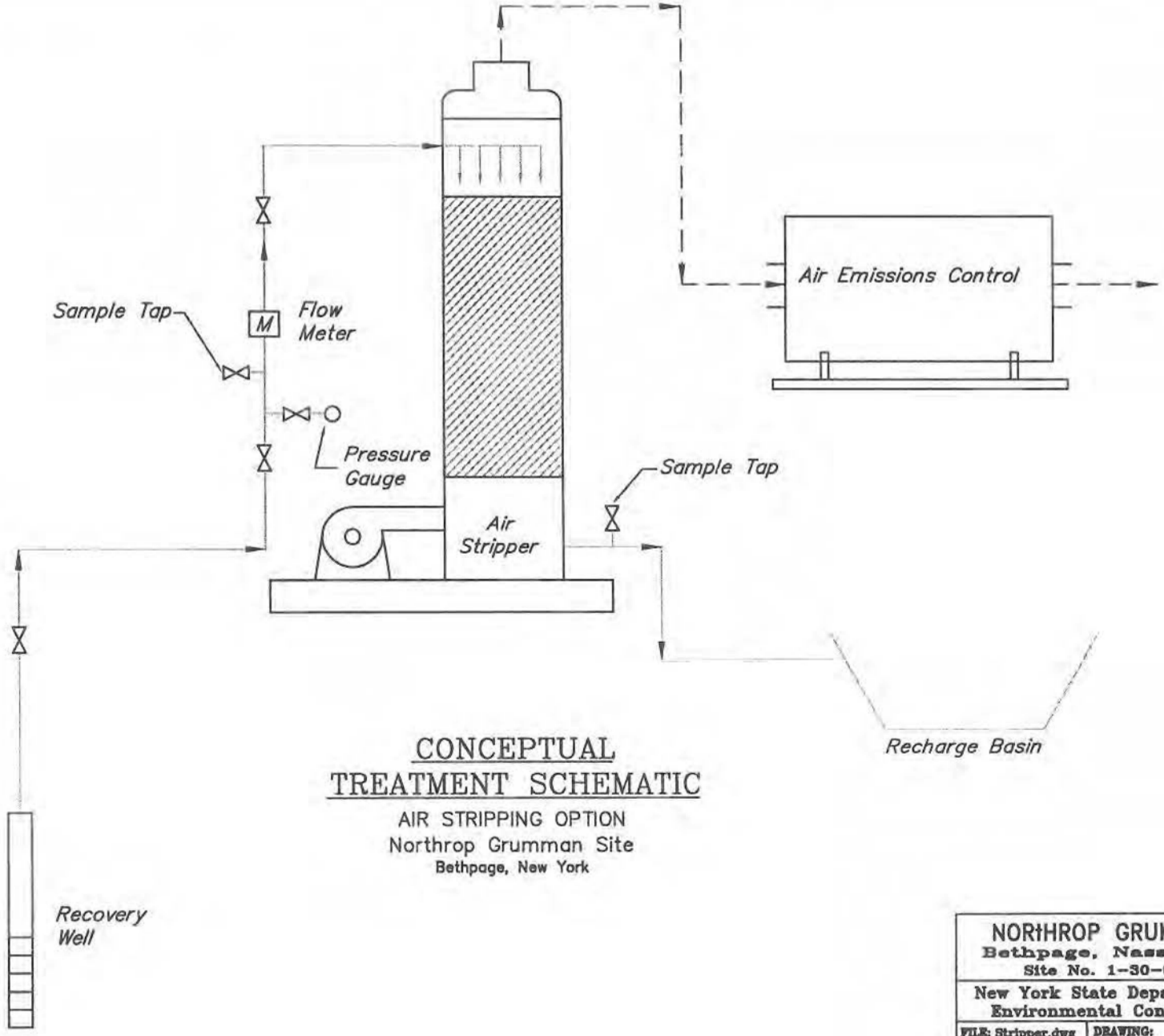
Groundwater Model Grid
Figure 8

DIVISION OF ENVIRONMENTAL REMEDIATION

REVISED:
DATE: 08/22/00

DRAWING:

Northrop Grumman Site



CONCEPTUAL TREATMENT SCHEMATIC

AIR STRIPPING OPTION

Northrop Grumman Site

Bethpage, New York

NORTHROP GRUMMAN SITE
Bethpage, Nassau County
Site No. 1-30-003A, B, C

New York State Department of Environmental Conservation

FILE: Stripper.dwg | DRAWING: Base Map

GROUNDWATER REMEDIATION SCHEMATIC VIEW

DATE: 04/26/00 | FIGURE 9

Table 1
Nature and Extent of Contamination

MEDIUM	CATEGORY	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs	SCGs (ppb)
Groundwater (On-Site Monitoring and production Wells)	Volatile Organic Compounds (VOCs)	Perchloroethene	ND-3,600	39/121	5
		Trichloroethene	ND-58,000	55/121	5
		1,1-Dichloroethene	0.38-620	11/121	5
		1,2-Dichloroethene	ND-3,850	21/121	5
		Vinyl Chloride	ND-6,400	11/121	2
		1,1-Dichloroethane	ND-880	8/121	5
		1,1,1-Trichloroethane	ND-10,000	21/121	5
Groundwater (On-Site Monitoring and production Wells)	Inorganic Analytes (Metals)	arsenic	ND(1)-68	7/82	25
		barium	ND(2)-164	0/82	1,000
		cadmium	ND(1)-130	3/82	10
		chromium	ND(1)-160	4/82	50
		lead	ND(1)-7.2	0/82	25
		mercury	ND(0.2)-1.2	0/82	2
		selenium	ND(1)-4	0/82	10
		silver	ND(1)-6	0/82	50
Groundwater Outpost Monitoring Wells for the BWD September 1997		Perchloroethene	ND(0.5)-10	1/9	5
		Trichloroethene	ND(1)-1,300	5/9	5
		1,1-Dichloroethene	ND(0.5)-5.1	1/9	5
		1,2-Dichlorethene	ND(0.5)-1	0/9	5
		Vinyl Chloride	ND(0.5)-1	0/9	2
		1,1-Dichloroethane	ND(0.5)-12	1/9	5
		1,1,1-Trichloroethane	ND(.5)-7	1/9	5

MEDIUM	CATEGORY	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs/Background	SCG/ Bkgd. (ppb)
Groundwater Long Term Monitoring Data 1997-Present		Trichloroethene	ND-15,000	25/106	5
		Tetrachloroethene	ND-44	11/106	5
		1,1-Dichloroethene	ND–39	3/106	5
		1,2-Dichlorethene	ND-6	3/106	5
		Vinyl Chloride	ND-2,000	3/106	2
		1,1-Dichloroethane	ND-10	3/106	5

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
1. Alternative 1:	$3,670,000	$1,480,000	$26,700,000
2. Alternative 2:	$4,390,000	$1,480,000	$28,200,000
3. Alternative 3:	$8,060,000	$1,700,500	$33,600,000
4. Alternative 4:	$9,290,000	$1,725,400	$35,000,000
5. Alternative 5:	$21,390,000	$2,980,000	$62,800,000
6. Alternative 6:	$22,620,000	$3,080,000	$64,100,000
7. Alternative 7:	$21,860,000	$3,200,000	$63,300,000
8. Alternative 8:	$23,090,000	$3,300,000	$64,700,000

GLOSSARY OF TERMS

ARAR: Applicable or relevant and appropriate requirement.

BWD: Bethpage Water District.

Capital Cost: Refers to the up front cost of constructing a remedial Alternative.

CERCLA: Comprehensive Environmental Response, and Comprehensive Liability Act (USEPA).

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 Geraghty and Miller.

Groundwater Contours: Equipotential lines of groundwater elevation above mean sea level.

Glacial: Refers the Glacial or shallow aquifer associated with Long Island.

GOCO: Government owned, contractor operated facility.

HN: Refers to monitoring wells installed for the Navy by Halliburtan NUS.

IRM: Initial Remedial Measure.

Magothy: Refers to the section of the Long Island aquifer below the Glacial and above the Lloyd.

MPS: The Main Plant Site, or the former Fairchild Republic Aircraft manufacturing facility**.**

MCLs: Maximum contaminant levels.

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

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.

O,M&M: Refers to operation, maintenance and monitoring, of remedial alternatives.

OU: Operable unit. Refers to portions of the remedial program divided into sections.

PCB: Poly-chlorinated Bi-phenyl.

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 volume, used for 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 an Feasibility Study.

ROD: Record of Decision.

RUCO: Rubber Corporation of America.

SCGs: Standards, Criteria and guidance.

SVOCs: Semi-volatile organic compounds. Semivolatile Compounds- compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds. Also, organic compounds with boiling points above 150 degrees Celsius.

TAGM: Technical Assistance and Guidance Memorandum. These guidance documents are used by the NYSDEC.

TCA: (Trichloroethane) A chlorinated aliphatic organic solvent.

TCLP: Toxicity Characteristic Leaching Procedure, is one test used to determine if hazardous waste is present.

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. Amenable to identification by gas chromatography analysis. Also, an organic compound that is readily vaporizable at a relatively low temperature.

APPENDIX A

Responsiveness Summary

Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites
Record of Decision
Town of Oyster Bay, Nassau County
Site Nos. 1-30-003A & B

The Proposed Remedial Action Plan (PRAP) for the Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites (NWIRP), was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on October 24, 2000. This Plan outlined the preferred remedy proposed for the remediation of contaminated groundwater associated with these two sites and for the protection of nearby public water supplies. The preferred remedy was based, for the most part, on the results of the Operable Unit 2 (OU2) Remedial Investigation/Feasibility Study (RI/FS) for the Northrop Grumman and the Naval Weapons Industrial Reserve Plant Class 2 inactive hazardous waste disposal sites. Based upon the criteria identified for evaluation of alternatives, comments received during the PRAP public comment period, recent supplemental investigative data from areas downgradient of the sites, and several discussions with affected and potentially affected water districts, the NYSDEC has selected Alternative 3 of the Operable Unit 2 Groundwater Feasibility Study, with some modification. The modifications, based primarily on comments received from the public and water districts, are noted in Section 7.2.8 ("Community Acceptance") of the Record of Decision (ROD). The modifications and other comments, where applicable, have been incorporated into the ROD. The selected remedy includes a number of response measures which have now been categorized into a Groundwater Remedial Program and a Public Water Supply Protection Program.

The components of the remedy are as follows:

Groundwater Remedial Program

The selected remedy includes a groundwater remedial program to address the regional groundwater contaminant plume associated with the Northrop Grumman and NWIRP sites. The components of this program are as follows:

- continued operation of the on-site containment (ONCT) groundwater extraction and treatment system (formerly known as an Interim Remedial Measure) at Northrop Grumman's southern property line;

- an evaluation of the ONCT system to confirm that it is performing effectively;

- mass contaminant removal through groundwater extraction and treatment in an offsite area near the GM 38 monitoring well cluster;

- predesign investigation to determine the optimal groundwater extraction location(s) in the GM 38 offsite treatment area(s);

- long term operation and maintenance of all operating systems, including the ONCT (or former IRM) system and the GM 38 area remedy;

- additional groundwater investigation to better define the groundwater contaminant plume and to determine whether an Operable Unit 3 Groundwater RI/FS is warranted;

- long term monitoring of the groundwater including a comprehensive monitoring of plume attenuation; and

- the formation of a technical advisory committee (TAC) as deemed necessary by the NYSDEC, to be comprised at a minimum, of the involved Agencies, participating local water districts, Northrop Grumman and the Department of the Navy. The main purpose is to review and provide input on all materials relating to the implementation of the Northrop Grumman and NWIRP OU2 Groundwater remedy.

Public Water Supply Protection Program

The ROD recognizes the importance of continued provision of potable water to those communities/populations served by water supply wells that are or that become impacted by site-related contamination. To this end, the ROD requires that a public water supply protection program be implemented. The components of this program are as follows:

- continued public water supply wellhead treatment to meet appropriate drinking water quality performance objectives at wellfields already affected by the groundwater contaminant plume for as long as these affected wellfields are used as community water supply sources;

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

- long term monitoring of the groundwater contaminant plume including outpost monitoring wells upgradient of potentially affected water supply wells.

The release of the PRAP was announced via a public notice to the mailing list, informing the public of the PRAP's availability.

A public availability/poster session featuring a walk-through presentation of the RI/FS (upon which the PRAP was based) with representatives of government, Northrop Grumman, and the Navy, was held on December 8, 2000. A public meeting was held on December 13, 2000 which included an overview of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. Written comments were received from Water Districts south of the Northrop Grumman Site, from Northrop Grumman Corporation, from the U.S. Department of the Navy, and from the OXY Corporation. Two letters and one telephone inquiry from individual citizens of the community were also received.

The public comment period for the PRAP ended on **February 5, 2001**. This Responsiveness Summary responds to all questions and comments raised at the December 13, 2001 public meeting and to the written comments received.

The following are the comments received at the public meeting, with the NYSDEC/NYSDOH responses:

Question No. 1:

a. The groundwater problem took place in the mid 70s, is that not correct?

b. Why did it take the time from the mid 70s, to date, to come up with an answer that was already answered in 1992, but the Board of Health did nothing for the people?

c. How could they have taken care of it if they only picked it up in the mid-70s, which it took at least 15 years for it to be detected, and it's still now ongoing, and this is 2000?

Response No. 1: It is not known when groundwater contamination with volatile organic compounds (VOCs) first occurred at the Grumman Aerospace and Naval Weapons Industrial Reserve Plant (NWIRP) sites. It is correct that VOC contamination problems with some of the groundwater production wells on the Grumman and NWIRP properties were first identified in the 1970s. Northrop Grumman (former Grumman Aerospace) and the Navy had identified groundwater problems within their site. In response, Northrop Grumman added treatment to their non-contact cooling water discharges. Initially, this was in the form of aeration basins. As the problem was evaluated in more detail, Northrop Grumman and the Navy eventually added air strippers to the treatment system.

With respect to the Nassau County Department of Health ("Board of Health"), starting in about 1977, a systematic program was implemented in conjunction with the New York State Department of Health (NYSDOH) to test all public water supply wells in Nassau County for the type of contaminants associated with the Northrop Grumman and NWIRP sites. The first downgradient public supply well discovered to be impacted by VOC contaminants in the groundwater was one of the two wells at Bethpage Water District (BWD) Plant 6. When Plant 6 began to show trace levels of contaminants, BWD took the well offline. BWD subsequently paid for VOC removal treatment at Plant 6 that was sufficient to decrease the contaminant levels to non-detectable concentrations in treated water. Only then was the well put back on line. The BWD was later reimbursed by Northrop Grumman for installation of the treatment system, operational expenses of the treatment system, and a subsequent upgrade of the system. A similar scenario and sequence of events occurred at BWD's Plant 4. More recently, the Department of the Navy paid for VOC removal treatment at BWD's Plant 5 after groundwater modeling suggested that the Plant 5 wellfield might eventually be impacted by VOC contamination.

The Nassau County Department of Health (NCDOH) continued to monitor public water supply wells for VOC contamination during the 1980s, and NYSDOH promulgated a requirement for quarterly VOC monitoring beginning in 1989 along with maximum contaminant levels (MCLs) for VOCs in drinking water (10 NYCRR Part 5). NCDOH requires monthly monitoring for VOCs in public supply wells, such as those at BWD Plants 4, 5, and 6, that are affected by VOC contamination.

Question No. 2: There's 400 superfund sites on Long Island, and each one of those superfund sites has the same chemicals and compounds that only the Navy is and was allowed to use, as only 50 companies in all of United States, including Alaska and Hawaii, could use this chemical. Isn't that the reason why the Lloyd Aquifer is now polluted?

Response No. 2: It's not clear what chemicals are being referred to in the question. The chemicals at the Northrop Grumman and NWIRP sites are volatile organic chemicals, such as trichloroethylene (TCE). These chemicals are fairly common in industry and commerce, are used throughout the country, and are not limited to just 50 companies. Under a federal program called the Installation Restoration (IR) Program, the Navy and other Defense Department branches are required to identify the contamination at their facilities and address it.

Long Island groundwater is a sole source aquifer for drinking water. Therefore, over the course of time, as the agencies became aware of groundwater contamination, it became a priority to identify the hazardous waste sites that exist. These sites are then characterized and, as required, remediated. If these sources are affecting the groundwater, we also address the groundwater contamination.

Question No. 3: The Constitution clearly states if the Navy or the Army or any one of those agencies did cause any kind of contamination they must correct the problem and pay compensation to each of the families or home owners that have loss, whatever the loss may be.

Response No. 3: The Department of the Navy, along with Northrop Grumman, has stepped in to correct the problems associated with these sites under NYSDEC and NYSDOH review and approval. Several corrective measures have been implemented, including the treatment systems added to the Bethpage Water District wells, the ongoing onsite containment (ONCT) system and the source removals completed at the plant sites. Both the Department of the Navy and Northrop Grumman have verbally committed to implement the remed(ies) detailed in the Proposed Plan.

With respect to the Department of the Navy compensating families and/or homeowners for any losses they have incurred, that issue is beyond the scope of this project. It is noteworthy, however, that offsite sampling of residential yards in the area did not indicate significant offsite impacts via aerial transport/deposition of contaminants. With respect to contaminated groundwater, the route of potential exposure would be through the water supply. Because of VOC monitoring and regulatory involvement, the Water Districts were able to detect the contaminants in the water supply wells and implement appropriate controls in a timely manner.

Question No. 4: Regarding the chemicals that were found in the water and in the soil, why doesn't the PRAP have the specific breakdown of the chemicals that were found, the material safety data sheets (MSDS) associated with them, and the permissible exposure levels that OSHA has set on these chemicals. Grumman and the Navy should provide these as they are not exempt from the Right-to-Know requirements.

Response No. 4: The chemicals found at the site are listed in Table 1in the PRAP; which lists the concentration ranges of chemicals for the environmental sample results. For a more detailed evaluation of the site, information can be found in the remedial investigation and additional sampling reports on file in the document repository located in the Bethpage Community Library on Powell Avenue. With respect to the MSDS sheets, NYSDEC does not normally require that these be included in document repositories; some responsible parties provide these, others don't. These would be

available to workers at the facility where in use. Between 1980 and 1986, under the New York State Right-to-Know Law employers were required to provide information on workplace exposures to employees. After this time, OSHA required the provision of similar information under the federal Hazard Communication Standard. Under these rules, employers were required to inform employees of any hazardous materials they were potentially exposed to in the performance of their job as well as potential health effects, appropriate protective equipment, and spill remediation methods.

Material Safety Data Sheets (MSDSs) for chemical products are available from the manufacturers of the respective chemicals. With respect to health effects information on common chemicals, interested readers may access toxicological profile reports at the following website: www.atsdr.cdc.gov/tfacts.

Regarding the OSHA Permissible Exposure Limits (PELs), these are air levels that pertain to occupational exposures and are not applicable to the subject groundwater investigation.

Question No. 5: Is the chemical data available in one place in the FS Report that's available in the Bethpage Library? Why isn't this very important information more accessible to the homeowners? Shouldn't it be part of a group mailing since it does have the potential to affect all of us?

Response No. 5: All of the information gathered from the groundwater sampling under this project is available at the document repository located in the Bethpage Community Library on Powell Avenue. The reports are too voluminous to supply the thousands of local residences with an independent copy. Under New York State Law, specifically Title 6 NYCRR Part 375, the NYSDEC has to meet specific citizen participation requirements. One of those requirements is to make site information available to the general public at such document repositories. NYSDEC has sent several thousand fact sheets to area residents notifying them about the sites, the environmental issues, the proposed remedial action plan, and directing the interested citizen to the document repositories and/or NYSDEC and NYSDOH toll-free numbers (NYSDEC: 1-800-342-9296; NYSDOH: 1-800-458-1158) for additional information.

Question No. 6: a) Where is the breakdown of the exact chemicals that were found, what are the hazards associated with each and every chemical that has been found, and what were the specific levels that were found in ground soil and groundwater? b) If there is any discharge or contaminated discharge from these air stripping water purification systems, and who is monitoring the air discharge from this, since it's air based, what type of filtration, are there any levels of exposure we should know about regarding the discharge from these units?

Response No. 6:

a) With respect to the breakdown of chemicals and specific levels in various media and the hazards associated with each and every chemical found, please refer to the response to question 5 above.

b) The groundwater that Grumman is extracting for both production purposes and now the onsite containment system is treated on-site with an air stripper. The air discharge from these air strippers, due to the elevated levels of contamination in some of the onsite groundwater at the site, is treated with activated carbon. This removes the volatile organic compounds from the airstream before it is released into the air. The carbon is then periodically steam stripped,

the product is recovered and sent offsite for disposal. Northrop Grumman is required to test the air discharges, among other things, and submit regular monitoring reports to the NYSDEC.

Question No. 7: Is there any monitoring of the discharge that goes through the activated charcoal filters?

Response No. 7: As noted above, Grumman monitors the discharge(s) to evaluate system effectiveness and for compliance with air quality standards.

Question No.8: Shouldn't there be an independent third party monitoring?

Response No. 8: . Grumman has professional engineers working for them in a consulting capacity whom are obligated to submit certified data used for site characterization. The State of New York uses the same types of certified consultants to take environmental samples. Similarly, Grumman must use analytical laboratories that are certified under NYSDOH's Environmental Laboratory Approval Program (ELAP).

Question No.9: Most hazardous waste situations do require the hiring of an dependent third party monitor, and that's true with lead abatements and asbestos abatements.

Response No. 9: Northrop Grumman is monitored by professional staff at the NYSDEC, the NYSDOH and various officials from Nassau County. These agencies periodically take independent samples to check the reliability of (Northrop Grumman's) samples. The labs used to analyze the samples are are required to produce quality assurance (QA) reports on the accuracy and precision of their analytical equipment. Additionally, NYSDEC often requires that independent laboratories review all the data, reports, and QA programs of the analytical laboratory.

Question No. 10: So if a bad report does come back, and let's say your engineers do detect a higher than normal level, or possible contamination level, are we to get a phone call? That's what I'm looking for, a little more freedom of information here and a free flow of information and having it more accessible to the homeowners; it's the 25,000 other people that couldn't make it here tonight.

Response No. 10: Potential routes of exposure from site-related contamination have been evaluated and the State has not found any ongoing exposures to the site-related contamination. If significant exposures are discovered, programs and requirements do exist to notify affected individuals. The water that the local water districts provide to consumers meets the NYSDOH drinking water quality standards. With respect to drinking water, consumers do have to be notified about the quality of their water whether or not there is an exposure. Customers receive an annual water supply statement, called a Consumer Confidence Report, which summarizes the water quality. Any violation of the State's drinking water regulations pertaining to maximum contaminant levels would require prompt notification through radio and the printed media.

Question No. 11: Is there an upcoming website that's going to be available for the residents of Bethpage, or someplace where this information is more accessible?

Response No. 11: Forming a website is feasible since the consultants for Northrop Grumman and the Navy have most data in tabular form and/or on disks from different sources. Establishing a website is not required, but it is something that can be further considered.

Question No. 12: What I would like to know, one question is has the chromium been speciated?

Response No. 12: Specific groundwater samples that were taken as part of the remedial investigation were analyzed for the varying states of chromium. This information is available in the remedial investigation report(s) for the two sites at the document repository.

Question No. 13: My main concern is the offsite contamination, the tremendous area of contamination, and what is being done. I heard tonight about wells on Central Avenue, but it is my understanding, from having read quite a bit on the site, that this contamination is falling south of Hempstead Turnpike. That's quite an area. What is being done in that area, anything?

Response No. 13: As groundwater in the Upper Glacial and Magothy aquifers moves towards those areas south of Hempstead Turnpike, the concentrations drop off dramatically compared to what they are in onsite groundwater. The FS evaluated full containment of all of the groundwater contamination associated with the site, but found that it was technically infeasible. Although NYSDEC's goal is to restore the site to pre-disposal conditions to the extent feasible and authorized by law, this goal is very difficult to achieve. The Navy is conducting additional investigation south of the Hempstead Turnpike to better determine the extent of contamination in that area and to place outpost monitoring wells upgradient of potentially affected water supply wells.

Question No. 14: Could you give me, for instance, what I'm trying to get for some of the people here, rather than say 3,000 feet wide, could you tell me like there's an area of contamination from Wantagh Avenue to past the high school? Could you tell me where the plume exists?

Response No. 14: The contaminant plume is roughly bounded by Cherry Avenue to the North, the Oyster Bay Expressway to the East, New South Road and Massapequa-Hicksville Road /Route 107 to the West, and some point South of the Hempstead Turnpike. It was already known that the projected edge of the groundwater plume was approaching Hempstead Turnpike from the information detailed in remedial investigation reports. Therefore, the NYSDEC directed Northrop Grumman and the Navy to install a number of off-site monitoring wells to begin looking further down gradient, south of Hempstead Turnpike.

The Navy took the lead on this portion of the project and began with the installation of groundwater profiles. They went to areas thought to be the end of the plume. However, this current data generated by the Navy indicated contamination has gone beyond Hempstead Turnpike. In response to this, the Navy agreed to install additional borings to delineate the leading edge and locate outpost monitoring wells before the Record of Decision is signed.

In terms of contaminant mass, approximately 75 percent of volatile organic contamination is still underneath the two sites. The volatile organic concentrations down gradient are, for the most part, an order of magnitude lower, with the exception of the highly elevated concentrations around monitoring well GM-38-D2.

Question No. 15: How about cadmium and chromium?

Response No. 15: Chromium, and to a less extent cadmium and arsenic, in groundwater is limited to specific areas beneath the Northrop Grumman and Navy Sites. These contaminants will be tested for under the long term Hydrogeologic Monitoring Plan.

Question No. 16: It does not exist off-site at all?

Response No. 16: Only in a few shallow groundwater wells in the area near Plant 2. The concentrations were only slightly above groundwater standards.

Question No. 17: You mentioned that Grumman had (to) have long-term operation, and, you know, oversight monitoring and maintenance. What exactly does that mean?

Response No. 17: As part of the remedy implementation, groundwater recovery systems are being operated by Northrop Grumman to contain the plume on the site. There are four wells pumping close to 4,000 gallons a minute to an air stripper and an air treatment system. Groundwater will have to be monitored to a) confirm the containment system is working, b) track the leading edges of the plume and c) indicate whether any municipal well will be impacted. An approved plan must be established that will cover these items and all the other aspects of the long term operation, maintenance and monitoring required for the remedial systems at these two sites.

Question No. 18: Would you let us know exactly what "long-term" means, does it mean somebody is going to come there once a year, etc?

Response No. 18: Long-term, under the CERCLA process, is a thirty year time frame. Thirty years is used to estimate the cost, In all likelihood, in 30 years those on-site containment wells will still be necessary based on the time rate of travel of contamination present at his site.

Question No. 19: How deep is the plume?

Response No. 19: It varies in different parts of the study area. Not all groundwater data points are on a continuous plane. In some areas the affected groundwater is as deep as six hundred feet. Also the volatile organic contamination, mainly trichloroethylene, is heavier than water. These volatile organic compounds therefore tend to sink in the aquifer as they move down gradient. However at lower concentrations it has some degree of solubility, so it moves slower than the groundwater, and tends to sink as it moves.

Question No. 20: Which is where our wells are?

Response No. 20: Some of the municipal wells are screened at some of the similar depths the site related contamination. This explains the need for the wellhead treatment contingency plan, to make ensure that a treatment system will be put in place before any there are any affects on any of the municipal wells.

Question No. 21: I bought a house in Levittown 17 years ago, I guess before this whole thing became a festering problem or people heard about it. I live two blocks away from the BOCES school that you mentioned, a half a mile or 11 blocks away from the Grumman and Navy facility, and naturally I'm concerned about what I have been ingesting in one way or another during the past 17 years. Just as an example, I love to grow vegetables and fruit trees on my property, and I thought I was doing a great job of keeping myself free of contaminants, and the question is what have I been absorbing through my produce as a result of this?

Response No. 21: The volatile organic compounds associated with this site tend to sink in the aquifer as they move down gradient. Therefore, this is not a route of potential exposure. Local residential areas next to and near the Grumman Site were tested for any surficial soil impacts by the NYSDOH and found that there were none.

Question No. 22: My basic question is, when I bought the house nobody told me that there was any problem. Now if I want to sell my house, how does that affect what I am going to be able to sell it for, and naturally I will have to explain to buyers that there is a problem.

Response No. 22: Technically speaking, there is no defect in your property. The plume, for the sake of argument, may be passing in the groundwater, beneath your house. However, there's no exposure pathway for you to come in contact with the dissolved contamination that's more than fifty feet below in the groundwater.

Question No. 23: The gentleman who spoke before mentioned, for example, BOCES school. Now, I can throw a baseball from my house and land it in the BOCES school yard, and I know water doesn't really adhere to county lines or state lines or any kind of lines that are drawn by planners, water just flows. So that it's hard for me to agree that I have no contamination on my property, unless a test is made. And so I wonder whether the town, the county, somebody, could arrange that, before a sale is made, or when it's contemplated, that a test is made of the property and an affidavit issued that it is or is not contaminated that the homeowner has to give to the potential buyer. I think that would be fair.

Response No. 23 : There is no reason to do that, with respect to your particular site. The areas around the facility that were thought to have the potential to be impacted, for instance, from a surface deposition of contaminants, were tested and there was no problem found. The area where you live is too far from the plant site itself to have any surface contamination from operations at the facility, and there's absolutely no way for your property to be contaminated by groundwater 100 or 200 or 400 feet below, it's just not possible.

Question No. 24: How come you're not talking about the Levittown water and you're only talking about Bethpage? Because Levittown is like right there, too.

Response No. 24: The Bethpage Water District is foremost in the plan because they already have treatment in place that was made a requirement of this project and that was paid for by Grumman and the Navy. The groundwater in the far eastern parts of Levittown is also down gradient of the site. However, one of the integral parts of this project is the long-term monitoring and wellhead treatment contingency program. This program also covers outpost monitoring for any down gradient municipal supply well(s) that might be affected in the future. This program wants to make sure that

any municipal well that might be affected will have treatment in place before the contamination reaches the supply wells. In addition, all the water supplies in Nassau County are sampled on a routine basis.

Question No. 25: But Levittown hasn't been treated at all yet is what you're saying?

Response No. 25: The Town of Hempstead municipal supply wells located in Levittown have not been impacted by site related contamination.

Question No. 26: You (NYSDOH) were saying statistics on adults, how many adults get cancer in their life. How about kids under 18; do you have any statistics on that? And you should have some statistics about our area. Because I could tell you, we have a very small school district, I can tell you five kids off the top of my head right now being treated, and that's a scary thought. We have a very small school district, under 16 years old. So that's what my concern is.

Response No. 26: All the cancers have to be reported To the NYSDOH regardless of age. Statistics are available on a county-wide, and in some cases, a zip code basis. The NYSDOH has recently published cancer maps for New York State. This information and these maps are accessible at the NYSDOH website: /www.health.state.ny.us. Individuals may also call the NYSDOH toll free number (1-800-458 -1158 ext. 27950) to inquire about local area cancer incidence investigations.

Question No. 27: And how do we get those (maps)?

Response No. 27: They're on the web, they are at www.health.state.ny.us. At the toll free number, enter extension 27950, and you can ask about specific studies, local area, small area studies where there's unusual disease patterns where the NYSDOH has looked into those areas.

Question No. 28: And so our area in Levittown has not even been addressed to try to decontaminate yet. So we're long-term?

Response No. 28: The onsite groundwater contamination is being addressed with the containment systems. Groundwater wells are now being monitored quarterly. The municipal wells are also sampled on a regular basis to insure that the wells have not been impacted. Groundwater is approximately 50 to 60 feet below the ground surface in the area adjacent to the two facilities. The groundwater contamination flows downgradient and gets deeper as it migrates from the Sites and does not move upward towards the residences.

The width of the plume is going to be studied further and action will be taken accordingly, but right now Levittown wells have not had any contamination detected.

Question No. 29: The NYSDOH just said that Levittown is not affected, as the plume is not moving in that direction. I assume you're talking about the vinyl chloride plume is that correct?

Response No. 29: What's being discussed are the flow components of the Northrop Grumman-Navy groundwater contaminant plume. The vinyl chloride plume is associated with the OXY Hooker Ruco site, which is under the United States Environmental Protection Agency (USEPA) control.

Question No. 30: If the contaminants go down to 800 feet, isn't it true that the Lloyd's Aquifer, which extends from Queens to Montauk, is being contaminated with these chemicals?

Response No. 30: It is possible that, at some point in the future, the Lloyd Aquifer in this area might be impacted. However, even the most recent vertical profiles to 800 feet show no contamination. There are also various layers and lenses of clays that tend to isolate parts of the aquifer from other parts of the aquifer. Further, at that depth there is a Raritan clay unit which prohibits the transfer of contaminants into the Lloyd Aquifer.

Question No. 31: Isn't the Lloyd's Aquifer one contiguous aquifer which extends from Queens to Montauk?

Response No. 31: The Lloyd Aquifer does not exist in the eastern part of Long Island. The groundwater direction in the area of the site, and on Long Island in general, are north and south in the Upper Glacial, Magothy and the Lloyd Aquifer. There's no east-west flow component in the aquifer system.

Question No. 32: This transparency, which is your own figure 4.2 (Hooker RUCO OU3 RI Report), which shows the Lloyd's Aquifer extending from one area to the other.

Response No. 32: The figure you have shows the north-south hydro geologic cross-section from the Long Island Sound south to the Atlantic Ocean.

Question No. 33: And you are saying that contaminants have gone down to the Lloyd's Aquifer in some areas that have been tested; is that correct?

Response No. 34: What the testing to date has indicated is that contamination has not penetrated the Raritan clay in this area. In addition, given the known flow patterns of site related contamination and the fact that the Lloyd Aquifer is a confined aquifer, site related contamination from the Northrop Grumman site is not expected to impact the Lloyd.

Question No. 35: All of Long Island is contaminated, contaminated by Grumman and the Navy.

Response No. 35: That's absolutely untrue.

Question No. 36: Is the only chemical being addressed presently the vinyl chloride, which is being addressed by the biosparging which you've been proposing in the newspaper, etc.?

Response No. 36:. Much more than VCM, or vinyl chloride, is being addressed here. The RUCO polymers facility discharged pure vinyl chloride in the recharge basins from the late '50s to the early '70s. It was mixed in with their other wastewater discharges out to their recharge basins located on-site. And that's in the location of the RUCO Polymers

Site; to the north-northwest. What was read in the newspaper about the RUCO Site is what the USEPA is doing to remediate that site.

Most of the RUCO contamination has migrated off-site from the RUCO facility onto the Navy and the Grumman property. During their high period of production, the groundwater wells on the Grumman property drew groundwater over to the east, so it commingled the plume. The proposed plan being referred to was issued by the EPA. This proposed plan subsequently became a Record of Decision and covers the off-site groundwater component of the Ruco facility. The USEPA ROD selected biosparging. This technology enhances the bacterial break down the vinyl chloride found in the groundwater on the Northrop Grumman and Navy Sites. In addition, the offsite migration of contamination from RUCO will be addressed by the Northrop Grumman ONCT system.

Question No. 37: So you're containing them, but you're not getting rid of them, the other chemicals. Would you let me just mention some of them. Trichloroethylene, tetrachloroethylene, dichloroethylene, dichloroethene, trichloroethene, dichloroethelene, hydrocarbons, polychlorinated biphenyls and semi-volatile organic compounds. These are all listed in your own report as contaminants which are in the water, they all cause cancer. Why is not more than containment being done?

Response No. 37: The word "containment" is being used to describe the fact that no more of those chemicals are being allowed to migrate off site in the groundwater regime. They are being removed from the groundwater, treated through a stripper system, and the vapor phase of that stripper is being further treated with activated carbon so that none of those chemicals are being discharged to the environment. Some of the other contaminants mentioned were only a problem at the source areas on site, and have been addressed through the various soils remediation programs.

Question No. 38: I'd like to know-- well, actually, what I wanted to get to before, throughout the program before, 50 parts per billion was considered the risk, the permissible exposure level back 25 years ago, and since then the number has been moved down to five parts per billion. How do we know in five more years it's not going to be down to one part per billion, and exactly how many different toxic chemicals are we talking about the water being contaminated with? I hear so many numbers being thrown around tonight, and everybody likes that catchall VOCs, which seems kind of harmless, but how many different chemicals are we talking about in the water?

Response No. 38: As far as the offsite groundwater plume, the main concern is tetrachloroethylene, trichloroethylene, dichloroethylene (cis and trans) and vinyl chloride. These compounds are very similar and are outlined in the table in the PRAP. Standards are always under review, and there is no guarantee that they will not go lower in the future. Certainly it's always a possibility. The current technology has resulted in the current standard of 5 micrograms per liter or 5 parts per billion for those VOC's present at the site.

Question No. 39: Again, if it is only 5 that are in the drinking water, then why hasn't the information on these five chemicals been provided in more detailed form, including, while the level might be below the 5 parts per billion, is it 4, 4-1/2?Any one of the five different chemicals that you say are in the water (supply)?

Response No. 39: The water supply is continually monitored and is non-detect. That information comes from the water suppliers, and can be made available to you as a consumer.

Question No. 40: You're saying there's only approximately five chemicals that are contaminating the water supply within this plume area?

Response No. 40: We're dealing primarily with TCE, or trichloroethylene. There are lesser concentrations of some related contaminants, dichlorethenes, ethanes and perchloroethene.

Question No. 41: How far exactly has this plume moved since you began tracking it back in the '70s, and to date, and how much further is it expected to move before you actually enact some of these plans that you're talking about?

Response No. 41: Figure 5 of the Proposed Plan shows the approximate extent of the plume from 1993 data. This does not detail all the all the groundwater concentrations vertically, much of which is non-detect, but basically the horizontal extent. Recent vertical profile sampling from the Navy has shown that the leading edge of the plume is now past Hempstead Turnpike. The Navy has submitted a new work plan to add additional profile borings to locate the edge of the plume.

Through the use of IRM's, much of the proposed remedy is already in place. The Navy has also agreed to begin the predesign work for the monitoring well GM38 D2 groundwater extraction remedy. Once the Record of Decision is signed, the wellhead treatment contingency plan will be put into effect. In the meantime, if groundwater monitoring indicates that a municipal water supply well is threatened, the NYSDEC will still require Northrop Grumman and the Navy to install treatment.

Question No. 42: Is it moving a mile a year, 500 yards a year?

Response No. 42: The shallow groundwater is moving at about a foot and a half a day. However, most of the contamination is deeper and this part of the aquifer is moving at approximately .25 feet per day.

Question No. 43: Actually I asked about the contaminated area, and is it spreading beyond this (Northrop Grumman Site)?

Response No. 43: Yes. There is a portion of the groundwater pume that has moved beyond the ONCT system.

Question No. 44: Can you guarantee that it's not spreading, and are these wells and test wells being moved out accordingly with the rate of movement (groundwater).

Response No.44: The Navy has agreed to begin installing these wells even before we get a Record of Decision that will require installation of outpost monitoring wells to track the plume. They're submitting a work plan to install wells further down gradient beyond the current edge of the plume. The proposed remedy will require treatment of contaminated groundwater at the site boundary, treatment of the elevated concentrations of groundwater in the GM 38 D2 monitoring well location, and natural attenuation. The progress of natural attenuation will be verified through a comprehensive monitoring plan.

Question No. 45: That's just our neighboring communities will have to worry?

Response No. 45: We have to monitor groundwater, outpost and municipal wells and make sure, up gradient to the supply wells, they won't be affected, and that's what all the different monitoring programs are involved in. The pathways of exposure are being monitored and people are not being exposed to the site related contamination in the groundwater.

Question No. 46: I want to show the public what the water line divide is on my slide. Right in the center, you see the highest point of the line that runs right from the top down into the bottom lower green. That's called the water line divide. That's approximately, supposedly, according to the record, a mile and a quarter away from the study site. Now, the study site, which we're talking about right now, is a place where there are chemicals, as the Board of Health just acknowledged that. It is correct in saying that there were other chemicals in there, approximately 113. Now, we'll go one step further. Being one mile and one quarter away from the waterline divide, which is the replenishing system for all of Long Island's Lloyd's Aquifer, is now being, as they say, polluted due to the fact that the heavy compounds, as they start to move, they lay and they lay flat, they start to move out. And as they drive outward in a circular area, as it rains, these contaminants run down into the waterline divide, there is nothing to stop it, as this gentleman over here says, there is a wall.

Response No. 46: The deep groundwater recharge area being referred to is about a mile and one half north of the site. Beneath and down gradient of the Northrop Grumman Site, The groundwater moves, by orders of magnitude, horizontally. However, the main contaminants of concern do tend to sink in the aquifer as they move out horizontally from the site. In addition, due to the numerous production wells used by Northrop Grumman, contamination was drawn down deeper before moving offsite.

Question No. 47: My question is why, number one, didn't the Board of Health, in 1992, put out an advisory to pregnant women and women who get breast cancer, when they had the complete study, and that study was dropped, put into the hands of the people, you people, when it clearly stated 100 percent that there were eleven chemicals that causes cancer, and each cancer, these cancer-causing elements, which has been proven in laboratory rodents, okay, was never given to the general public to go buy bottled water. But bottled water can't help; can it, sir, because they take showers. And when you take a shower, your skin opens up, and you know what, when your skin opens up, all those chemicals go inside of you, because your pores are now opened up, that's why you say breast cancer; a woman stands in front of a shower with their breasts first.

Response No. 47: Both the New York State Department of Health and the Nassau County Department of Health have been closely monitoring the situation whereby public water supplies could potentially have been impacted by groundwater contamination. The State and the County require routine monitoring to ensure that contaminants are detected and appropriate action taken promptly. If groundwater contamination has been determined to potentially impact a public water supply well, then the respective water district typically initiates their own response, most notably taking the well offline, so that people are not exposed to any contamination. The NYSDOH has promulgated maximum contaminant levels for drinking water in 10 NYCRR Part 5. These levels are based on conservative assumptions and consideration of exposures via ingestion, contact and inhalation. Thus, exposures related to cooking, showering and bathing are reflected in the standards. The standards also reflect available toxicologic data for the contaminants with respect to potential carcinogenicity (i.e. cancer causing) and non-carcinogenic (e.g. systemic) health effects. The standards also reflect consideration of differences, if any, with respect to gender, race and age.

Question No. 48: The question is why was it not reported to the people on Long Island that there were chemicals inside this water that causes cancer for each and every one of the people on Long Island.

Response No. 48: To the extent that any water supply on Long Island has chemicals in it, those results are routinely available to the public. Individuals can request copies of these results from their respective water district. This information is also provided to consumers by the water districts on a routine basis.

Question No. 49: Long-term is equivalent, then, equivalent to walking into a situation and getting one good hit of anything; long-term exposure, and it takes long-term exposure to show and prove; doesn't it, sir? The question is if you're taking these chemicals, these contaminants and you're wearing them by going into the shower and it gets into your system, does it not take long term to get into your system before you get sick?

Response No. 49: The maximum contaminant levels referred to above are based upon the assumption of long term exposure to the chemical(s) in question. This is usually seventy years for an adult. Shorter durations, as in the case of childhood exposure, are also reflected in the drinking water standards.

Question No. 50: Do you know how many times water companies have told everyone that there is a problem, please boil your water? You know when you boil that water it makes those chemicals more intense, they cannot come out?

Response No. 50: Boiling the water has nothing to do with chemical contamination. When a pipe breaks, or a water main needs repair it may temporarily impair what is known as the break point chlorination. Break point chlorination is the ability of the water district to provide potable water that is free of water borne diseases. Therefore, the water supplier requests people to boil water to attenuate any pathogens until breakpoint chlorination can be re-established.

Question No. 51: The question I have is, has Northrop Grumman and/or the Navy fully disclosed any and all contamination, storage of chemicals that they are aware of and sent it to the DEC?

Response No. 51: There are the two different programs administered by the NYSDEC which regulates to the use and storage of chemicals and the clean-up of those chemicals if they happen to get into the environment. The program that regulate the use and storage of those chemicals under is called the Resource, Conservation and Recovery Act or RCRA program. That program has evaluated this Grumman facility and the Navy facility with respect to the buildings where the chemicals are used. All of the various chemical use areas have been investigated and, as of now, closed.

In addition, under the New York State Superfund program areas of soil contamination have been identified and remediated. Northrop Grumman and/or the Department of the Navy have identified areas where chemicals were used and all areas have been cleaned up properly.

Question No. 52: The only other question I would have then is why, as recently as three months ago, the new construction that's going on in those sites that have been sold, etc. have there been discoveries of in excess of 200 fifty-five gallon drums of contaminated materials and toxic waste that one of Grumman's representatives show up at the site, they show up with paperwork indicating, oh, yes, there's 200 buried over here and there's a sewage treatment plant that was abandoned, buried over there. If full disclosure was given, then why haven't those chemicals been removed out of

the ground, which are now still seeping into the ground water? Not only drums. There were numerous sites, numerous different area locations. On the Grumman's property, or what was owned by the Grumman or part of the Grumman property.

Response No. 52: The NYSDEC is not aware of that occurring. But if Northrop Grumman uncovered any drums during any construction activities, they would have notified this Department. Any contractors for any of the new property owners would do the same.

Question No. 53: I'm talking about construction that is underway right now on sites that were sold by Grumman to individuals, that as they excavate they are bringing up contaminants.

Response No. 53: Again, the NYSDEC is not aware of any sites that were sold to individuals that are encountering drums as excavation occurs. Before Northrop Grumman sold any of the property (ies), they did their own environmental assessments to determine what was there, and if there was anything that was there, to address the problem. Some properties were sold with the understanding that if any work was required, the new owner fully understood the terms of the property transfer and agreed to assume the remedial work that would be required.

In addition, when Northrop Grumman knew there was a groundwater contamination problem, they wanted to know where this groundwater contamination was coming from. They did source area investigations all across the property,. thousands of soil samples have been collected from the Northrop Grumman and the Navy parcels. If contaminated areas were found, they were addressed. When these areas were cleaned up, then endpoint samples were taken to ensure that the soil had been completely cleaned up.

Question No. 54: The Lloyd Aquifer, you did say that it was contaminated. I was led to believe by members of the EPA that if the Lloyd Aquifer is contaminated, there is no remediation, that's it. We cannot remediate the Lloyd Aquifer. If that's the case, all of our water is doomed.

Response No. 54: An important aspect of this project is acquiring an understanding about the hydro geology of Long Island. What you state is not the case. In certain places in Nassau County it is believed that there is contamination in the Lloyd Aquifer. However, where the Lloyd does exist in the area of these sites, there is a very thick clay unit, known as the Raritan clay separating the Lloyd form the Magothy. This would, for the most part, prevent the contaminant plume from migrating to the Lloyd Aquifer.

Question No. 54: Well, is it true that--can it be remediated? Let me ask that question.

Response No. 55: Anything can be re remediated. If the contamination does reach the Lloyd Aquifer, it usually is in very, very minute quantities , because of confining material, makes it difficult for contaminants to migrate through.

The Lloyd Aquifer is what's known as a confined aquifer, there is an aquitard or aquiclude, which is another name for clay, over the top of the Lloyd Aquifer which pretty well protects it from above. It is true that it does get recharged from water above at a very, very slow rate; in the order of 4,000 years for the water to get down into the Lloyd

Aquifer. By contrast, the Glacial Aquifer is young. It takes a matter of decades, that water comes down and runs to the Sound or to the Atlantic.

Question No. 56: We know that the Magothy has been contaminated, that we know from other sites that I've worked on. But I have been told time and time again is that the Lloyd Aquifer has not been contaminated, and if it ever is contaminated, we're in trouble. Where, in fact, one man said we're doomed, and that scares the hell out of me, so I'm going to check this out.

Response No. 56: The statement about the Lloyd being contaminated has to do with certain wells in Nassau County here and there that are showing extremely minute traces, and the likelihood is that those traces of contamination have come from the well itself in its penetration down through all those layers. Since the casing itself is not always a perfect seal, sometimes the well will draw contaminants down along the casing.

There are no drinking water wells in the Lloyd Aquifer in the area of the sites, so even if it did become contaminated, that's not where the drinking water is coming water from. There are only a few wells on the south shore and a few on the north shore that get their water from the Lloyd.

Bethpage has made it a policy not to supply water to their customers that has any detectable contamination of VOCs. With respect to Levittown, no contamination has reached the Levittown wells yet.

Question No. 57: Why are there no PCBs listed in the water? There's no pesticides listed in the water. Why is it in your own Federal Report it states that?

Response No. 57: PCBs, or polychlorinated biphenyls, are highly insoluble compounds. The remedial investigation did not find PCB contamination from site soils was impacting offsite groundwater. With respect to pesticides, these compounds were eliminated as site related contamination. However, groundwater for Nassau County is monitored on a County-wide basis for pesticide contamination.

Question No. 58: The statement that I would like to have for the record is I do not agree with the phase that's being proposed. I do not feel the public has been given sufficient time to review a compilation of approximately 25 years worth of records and testing when it was just brought to our attention that they were available for review last week, and in order to comment intelligently, we've only had approximately seven days to review those documents, which, at the Bethpage Public Library, are kept in the basement in numerous, numerous boxes, which I viewed.

Response No. 58: Unfortunately, there is a lot of historic material associated with the Northrop Grumman and NWIRP sites. Most of this material has been on file for several years or more. This OU2 proposed remedial action plan (PRAP) was first released in October 2000. At that time, many people first became aware of this project. As part of the Navy Remedial Advisory Board meeting in October, the NYSDEC issued a 4,000 piece community mailing and a notice was published in Newsday. A press release was issued in November 2000 to get the local media to publish the information available at the Bethpage library. The NYSDEC makes the best attempt possible to get the word out about the PRAP and other site related documents. However, doing a mailing to the entire communities of Bethpage, Levittown and Hicksville is beyond the scope of this project.

Question No. 59: I believe that the situation is a little out of control and there's an easy way to fix the situation, and it would be the intake of everybody's home water system, a computerized water system. You guys want to take 15 or 30 years to fix and repair it, it can be repaired one, two, three, cheaper and at a lesser cost by doing this. It costs us a lot of money to have filtering systems put in, aerators, air strippers put in, that the public has to pay for, that they are now using to say that it is going to clean the water of the chemicals.

Response No. 59: There is no need to place an activated carbon filter on every individual residence. The water supply is sampled at the source to ensure that it meets drinking water standards. It is much easier and more cost effective to analyze water from several wellhead points than from several thousand plus individual homes. Additionally, the presence of thousands of government provided homeowner filters would necessitate an ambitious bacteriological monitoring plan to control the risk associated with the unregulated filters. If an individual resident wants to add a carbon filter to their residence system, then that is their personal choice.

Question No. 60: I'm a water commissioner with the Massapequa Water District. We just, in brief, this morning for the first time, although my fellow Commissioner, Frank Flood, and I have served on the Nassau County Department of Public Works and are thoroughly familiar with the plume, we at the Massapequa Water District do not agree with any kind of wellhead treatment. We agree that the plume can be confined to the site which it's on; we believe that you should recover the plume and flow that are now probably down near Jerusalem Avenue and close to our northwest wellfield. We've gone through a similar problem with the Liberty site, and our position is clear on this.

And we also believe that there hasn't been enough modeling or testing done. We think that you must take your model to another extent, as we discussed this morning. And we also want you to know that in the 1980s, I am old enough to remember that, we had to clean up the Purex site, which was very similar to this site. We did the on-site confinement, we did not allow the plume to migrate to Hempstead Turnpike, we recovered the plume, the cost in those days was 30 million.

Response No. 60: Based on the extent of the Northrop Grumman contamination, full plume containment is not a feasible option. This is even more evident given the recent vertical profile data received by the NYSDEC from the Department of the Navy and referred to in your Statement.

The remedial investigation for the Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites began almost 10 years ago. Since then, numerous samples have been taken of the site soils and groundwater for the full range of analytes. This information was compiled into a number of independent groundwater models and have been run more than once by Northrop Grumman, the Navy and the Occidental Chemical Corporation (as former owners of the RUCO site). Even without including the 2000 vertical profile data, it is clear that full plume containment wold be too extensive in nature, and is just not feasible.

With respect to wellhead treatment, there are approximately 48 treatment systems for VOC removal for 72 public water supply wells that have been contaminated with VOCs. This technology is widely available and is used as appropriate at the locations to ensure that human health is protected by preventing human exposures to potentially harmful chemicals.

Written Comments Received by the NYSDEC

This section responds to the following letters that were received by the NYSDEC from technical and legal representatives of water districts located in the vicinity and downgradient of the Northrop Grumman and the Naval Weapons Industrial Reserve Plant (NWIRP) Sites, from the Northrop Grumman Corporation, from the Department of the Navy, and from OXY Glenn Springs Holdings, Inc.:

1. A letter dated November 3, 2000 was received from Anthony Sabino, Attorney and Board member of the Bethpage Water District.

2. A letter dated January 11, 2001 was received from Gary Loesch, P.E. of the H2M Group, representing The South Farmingdale Water District and the New York Water Service.

3. A letter dated January 16, 2001 was received from William Carmen, Attorney for the South Farmingdale Water District.

4. A letter dated January 17, 2001 from Frank Flood, Jr., John Caruso and Vincent Guardino, Commissioners for the Massapequa Water District.

5. A letter dated January 19, 2001 received from John Molloy, P.E. of the H2M Group, representing the Bethpage Water District.

6. A letter dated January 19, 2001 was received from Steve Whyte of the OXY Glenn Springs Holdings Inc.

7. A letter dated January 29, 2001 was received from John H. Young of the Northrop Grumman Corporation.

8. A letter dated January 31, 2001 was received from Frank Flood, Jr., John Caruso and Vincent Guardino, Commissioners for the Massapequa Water District.

9. A letter dated February 2, 2001 was received from Arcadis Geraghty and Miller, Inc., on behalf of the Northrop Grumman Corporation.

10. A letter dated February 2, 2001 was received from James Colter, for the Department of the Navy, Naval Facilities Engineering Command, Northern Division.

11. A letter dated February 5, 2001 received from Arnold Palleschi, Commissioner, Town of Hempstead Water District.

As many of the comments and the questions raised in the above referenced comment letters have a common theme, responses have been grouped by category.

General Responses

One of the cornerstones of the operable unit 2 (OU2) groundwater selected remedy is the comprehensive groundwater monitoring program. This includes outpost monitoring for public water supply wells, monitoring of the onsite containment (ONCT) system, overall groundwater quality monitoring for comprehensive evaluation of plume attenuation and the performance monitoring of the treatment system of the GM 38 area groundwater remediation. Along with the outpost monitoring is a public water supply contingency consisting of addition of wellhead treatment systems or comparable technology, or other comparable alternative measures, for impacted public water supply wells.

There were a number of concerns raised by the water districts affected or potentially affected by the groundwater contamination. Foremost, any costs associated with implementation of the selected remedy will be borne by the potential responsible parties. Also, public water supply wells are never considered part of any groundwater remediation strategy. When appropriate treatment is necessary for continued operation, that operation is strictly for the purposes of providing potable water to the public, and not part of any groundwater remediation strategy. This has been clarified in the ROD by separating those measures addressing public water supply issues from those measures addressing groundwater remediation.

Historically, public water supplies affected by volatile organic compound (VOC) contamination have been protected by the provision of wellhead treatment for VOC removal at the impacted wells. This treatment has consisted of packed tower aeration (also known as "air stripping"), granular activated carbon (GAC) filtration or, in select cases, some combination of both. In the subject ROD, comparable technology and alternative measures have been added to the public water supply contingency to address the concerns of the local water districts that they are able to select the most appropriate course of action for affected wells in their district. This will provide the affected water districts with the option of, within the limits of reasonable cost, designing and constructing a comparable technology or selecting an alternative measure, including well replacement or relocation, to produce potable water. The measure selected will be sufficient to reflect the policies of the districts that all water provided to their customers contain no detectable levels of VOC contaminants.

There were concerns raised regarding an adequate time to review technical materials related to and including the PRAP. In order to address this, the public comment period was extended from December 22, 2000 to February 5, 2001. Concerns were also raised by the water districts about not being copied on all test results and pumpage data generated by Northrop Grumman and the Navy. The NYSDEC will ensure that the interested water districts are given copies of pertinent materials. With respect to prompt access to relevant information and corresponding input to decisions made, a number of the potentially affected water districts have requested the formation of a Technical Advisory Committee (TAC). NYSDEC has, therefore, reconvened a previous TAC (most recently dormant) for these sites, expanding its members to include potentially affected water districts south of the Hempstead Turnpike.

Most Water Districts wanted greater involvement in decisions made with respect to groundwater remedial decisions and public water supply protection. The ROD includes water district input as a factor in such decisions. Additionally, the re-constitution of the TAC will provide a forum for such input on an ongoing basis.

Specific Responses

I. Remedial Investigation and Feasibility Study.

Comments were raised during the public meeting and in writing questioning the completeness of the remedial investigation (RI) with respect to the regional groundwater. In responding to these questions, the following site history is presented. The RI for the Northrop Grumman and NWIRP Sites dates back to 1990 when the RI/FS order on consent was first signed with what was then Grumman Aerospace and a memorandum of understanding (MOU) was entered into between the NYSDEC and the Department of the Navy.

A number of groundwater monitoring wells, at varying depths, both onsite and down-gradient offsite were installed during the RI to supplement previously installed monitoring wells. Several monitoring wells had been installed earlier by Nassau County and the U.S. Geological Survey (USGS) during investigations of VOC contamination in the aquifer near Bethpage. In addition, over the course of time, several discrete quarterly groundwater monitoring programs, that also included rounds of well installations, were initiated to monitor specific portions of groundwater related to interim remedial measures (IRMs) being conducted at the sites. Numerous analytical data results and geologic cross sections, combined with groundwater modeling efforts from Northrop Grumman, the Department of the Navy and the Occidental Chemical Corporation (OXY) for the nearby Hooker RUCO site, were used to estimate the lateral and vertical extent of the groundwater contamination. This information was used to identify Interim Remedial Measures (IRMs) for site soils and groundwater. This information was also used to assemble, screen and evaluate remedial alternatives in the Northrop Grumman "Regional Groundwater Feasibility Study" (RGWFS)

After the execution of the 1995 OU 1 Soils Records of Decision for the Northrop Grumman and Navy Sites, the NYSDEC and the USEPA attempted to produce one RGWFS Report concerning the Northrop Grumman Corporation, the Department of the Navy and OXY (Hooker RUCO Site) co-mingled regional VOC contaminant groundwater plume. Ultimately, it was determined that separate groundwater feasibility studies would facilitate conclusion of the RI/FS process for these sites.

The offsite portion of the Northrop Grumman plume was always seen as extensive, based on the RI data. The RI also identified an offsite location, known as the GM 38 monitoring well area, that contained significantly elevated concentrations of site-related groundwater contaminants.

Recent vertical, hydrogeological profile borings completed by the Department of the Navy, indicated that the leading edge of contaminated groundwater is beyond those areas originally identified and/or projected during the RI/FS process. The latest groundwater data generated by the vertical profile borings shows the extent of the plume is beyond Hempstead Turnpike in the deeper parts of the Magothy aquifer. Therefore, a rigorous vertical profiling program has been initiated, with each boring being installed to the Raritan Clay (approximately 750 to 800 feet below ground surface), to define the limits of the groundwater contaminant plume.

The groundwater profiling data indicates offsite contaminant concentrations much less than the range of the concentrations found in the GM 38 monitoring well area. The OU2 groundwater remedy does not include full plume containment due to the technical infeasibility of implementing such a program in the extensive and diffuse offsite plume. This is based on the sheer width, depth, and overall area of the plume and on comparison of this plume information with

ONCT extraction system data and data from other sites on Long Island where groundwater extraction and treatment is being implemented. In addition, the area is densely developed and finding the necessary locations to implement total plume containment would be difficult at best and, more likely, infeasible to implement.

As part of the selection of this remedy, the NYSDEC will implement specific tasks, covered in more detail in the following sections, to ensure that the selected remedy is protective of human health and the environment.

II. Interim Remedial Measures

a. Onsite Containment (ONCT) System: The groundwater IRM, or ONCT system, has been designed to intercept contaminated groundwater at the downgradient edge of the Grumman/Navy property, thereby preventing continued offsite migration of site-related contaminants. As part of the startup of the ONCT system, Northrop Grumman began to routinely sample a number of groundwater wells in the area to monitor the ONCT effectiveness. Analytical results generated by this program indicated the ONCT system is achieving it's primary goals. Subsequently, the NYSDEC directed Northrop Grumman to assemble an overall hydrogeologic monitoring plan to cover all the various quarterly sampling events and install additional wells necessary to complete this task.

As part of the implementation of the final remedy for this site, Northrop Grumman will be required to do a comprehensive evaluation of the ONCT system to demonstrate that it is effective in containing the plume from the site, or whether any modifications are necessary to ensure hydraulic containment onsite. Northrop Grumman has acknowledged that there were some initial start up issues with down time that unavoidably occurs with mechanical equipment. At one point, the new owners of Plant 2 inadvertently severed the fiber optic control cables during construction activities. The ONCT system must be operated to the satisfaction of the NYSDEC. Accordingly it is expected that, as time progresses, the ONCT system will approach 100 percent operating time.

b. Treatment for the Bethpage Water District Wells: Treatment systems for VOC removal at BWD Plants 4, 5 and 6 were installed either before or during the RI/FS phase of this project. Therefore, in order to document this wellhead treatment as being included in this remedy, these systems are being termed IRMs with respect to their design, construction and initial operation and ongoing maintenance. The outpost monitoring wells for these Plants are already in place and operation, maintenance and monitoring will be covered for the duration of these systems. Public water supply wells are not a part of groundwater remediation, they are being treated solely because they have been impacted by the site.

III. Record of Decision (ROD): The ROD presents the selected remedy for the Northrop Grumman and NWIRP site. However, given the complexity of this site, there is a contingency to create an Operable Unit 3 (OU 3) in the event that the groundwater evaluation conducted as part of this ROD indicates further remediation is required. Additional groundwater remediation may also be carried out under the OU2 ROD. An updated groundwater model will be run to select additional locations that need outpost monitoring wells using data gathered during the implementation of the OM&M plan and the vertical profile borings.

Once the ROD is executed, the NYSDEC will approach Northrop Grumman to enter into an order on consent, and approach the Department of the Navy to enter into a consent order or memorandum of understanding to implement the

selected remedy. A remedial action work plan will be prepared listing all the work that needs to be done, including a project schedule. The NYSDEC has already directed Grumman and the Navy to finalize and implement the hydrogeologic monitoring plan and the installation of the outpost monitoring wells. The vertical profile borings are a subpart of this hydro-geologic plan which, in turn, is part of the overall operation, maintenance and monitoring program.

A. Operation, Maintenance and Monitoring (OM&M) Plan: Part of the final remedy will include an operation maintenance and monitoring (OM&M) plan. Monitoring requirements for any and all the water districts will be covered as part of the monitoring requirements of this project. This Plan will include the following subcategories:

1. Onsite Containment System: The monitoring requirements for the ONCT system have been included in the hydrogeologic monitoring plan. Northrop Grumman will also undertake a specific task of evaluating the performance of the ONCT system to ensure that hydraulic containment of the site is being achieved.

2. Hydrogeologic Monitoring Plan: Plume tracking will be made a requirement of the Hydrogeologic monitoring program. This will more accurately monitor the fate and transport of the groundwater contamination not specifically addressed by active remediation through comprehensive monitoring of plume attenuation. Another requirement of the ROD is periodically re-run the groundwater model with all of the updated information. This information will be evaluated along with other aspects of the long term monitoring program.

This plan also includes the existing outpost monitoring wells for the BWD, specific groundwater monitoring for inorganic contamination and performance monitoring of the ONCT system. The Plan will include additional outpost monitoring wells as these are installed. The hydrogeologic monitoring plan has already been approved and is being implemented by Northrop Grumman. It is a living document that can be modified as current information directs.

3. Vinyl Chloride Contingency Plan: Vinyl chloride is a volatile organic compound (VOC) that has a vapor pressure higher than trichloroethylene (TCE) or perchlorethylene (PCE). Using current air stripper technology, vinyl chloride can be safely removed from groundwater. Vinyl chloride is related to the OXY Hooker RUCO site and has not been found anywhere downgradient of Northrop Grumman property. The vinyl chloride has been identified in the upgradient portions of the Northrop Grumman and Navy Sites. Recent sampling of Northrop Grumman production well 3 (GP-3) indicates that vinyl chloride is now approaching the ONCT system and that additional air emissions treatment will soon be required. The subject ROD includes a contingency for this treatment and the US EPA ROD for the RUCO site contains a similar provision.

4. Public Water Supply Contingency for Wellhead Treatment or Comparable Alternative Measures: The public water supply contingency for wellhead treatment or comparable alternative measures, as detailed in the selected remedy section of the ROD, will be implemented if outpost monitoring indicates treatment, or a comparable alternative, is necessary. The selected remedy section of the ROD addresses the process for implementing the wellhead treatment.

The Department of the Navy is currently implementing a vertical profile boring program to locate adequate outpost monitoring well locations and to close any data gaps from the RI. This work is being done now to better delineate the leading edge of the Northrop Grumman and Navy contamination plume and to find appropriate locations for outpost wells. This will give ample time to identify if any given public supply well is in danger of being affected.

As part of any treatment system, to address the concerns of local water districts, Northrop Grumman and the Department of the Navy have agreed to establish as a goal for this remedy, to the extent practicable, for any given wellhead treatment, or comparable technology, to provide water that is non-detect for site related contamination for the affected drinking water supplies, to the current analytical standards of non-detect as of the date of this ROD. This is of paramount importance to all of the water districts involved with this project. This also replaces the PRAP carbon polishing contingency since having the goal of attaining non-detect with wellhead treatment or comparable technology replaces the need for specifically requiring this technology.

The option of "comparable alternative measures" addresses the concern of replacing an existing supply well with a new well at a different location, or providing some other means to maintain a suitable potable water supply. If, at the time treatment is deemed necessary at a public supply well, a justification can be made to replace a well rather than add treatment to an existing well. Then a new well location will fall under "comparable alternative measure." This justification would include feasibility and comparable cost.

Offsite Groundwater Treatment Additional to the GM 38 Monitoring Well Area: The predesign investigation work and the offsite long term monitoring may identify areas that have similar contaminant concentrations that were found at the GM 38 area. If such information comes to light, the NYSDEC will evaluate this information and determine if treatment is required in a similar manner as the GM 38 area remedy.

Remedial Design: The Navy has undertaken a geo-technical program of installing vertical profile borings in the Bethpage, Levittown, Farmingdale and Massapequa areas. Profile borings include the collection of groundwater samples for VOC analysis at discrete intervals from the shallow groundwater all the way to the Raritan Clay. The information obtained from this fieldwork is part of the long term monitoring and plume tracking, outpost monitoring for the public water supply contingency program and the remedial design for operable unit 2.

The Navy borings will verify the hydrogeology and those areas that are contaminant free. For the purposes of the public water supply contingency program, the borings will locate the proper place for installing outpost monitoring wells. An additional task of the Navy program is to initiate the predesign study necessary to implement the GM 38 area remedy. All the other aspects of remedial design are based on contingency plans. If any part of the long term OM&M identifies the need to implement a remedial design program, then such a program will be implemented.

Miscellaneous Water District Comments

A number of water districts suggested that full containment of the groundwater contaminant plume should be the preferred remedy or, at a minimum, interception of contamination before it impacts downgradient public supply wells. Based on the extent of the Northrop Grumman contamination, full plume containment is not a technically feasible nor cost effective option. This option was evaluated in detail in the OU 2 FS. The option of full containment has since been rendered less feasible given the recent vertical profile data received by the NYSDEC from the Department of the Navy. The above assessment notwithstanding, the ROD does contain a provision for additional "hot spot" remediation of localized areas if the data indicate such action is warranted. The use of groundwater extraction wells to "intercept" contaminant plumes upgradient of public supply wells, where feasible, could be considered during the evaluation of comparable alternative measures under the public water supply contingency program.

Some water districts asked that metals, particularly chromium, be included in groundwater tests. One district also asked for radiologic testing. Inorganic constituents will be included as analytes for samples from select monitoring wells under the long-term Hydrogeologic Monitoring Plan; radiologic parameters will be considered. The districts are encouraged to comment on the locations and numbers of such samples via future TAC reviews.
One water district requested that public water connections be provided if private wells that are used for potable water are discovered. Although no such wells are known to exist, this provision has been included in the ROD.

Miscellaneous Northrop Grumman Comments

Northrop Grumman submitted some additional comments that are not addressed above.

Grumman opposes the specification of "trigger values" within the ROD, favoring the development of these in subsequent work plans and contingency plans. The ROD retains one "trigger value," that of the 1 ppb repeated detection in the outpost monitoring wells to begin the process of groundwater modeling and projected impacts specific to the threatened well. This "trigger" is also expected to begin the process of evaluating wellhead treatment options and comparable alternative measures for the threatened supply well(s). Practically speaking, the modeling will be ongoing up to that point and minimal revisions/reruns would be likely. The commencement of alternatives evaluation is considered to be a prudent step at such time. It is noted that outpost well-specific action levels are expected to be developed within work plans and contingency plans with input from the TAC and potentially affected water districts.

Grumman generally opposed the use of language in the PRAP that suggested redundant engineering controls offered additional protection of public health. Some of this language had been part of the PRAP discussion on the carbon polishing option for affected public supply wells. The carbon polishing option has been deleted from the ROD along with the disputed language. This option was removed in favor of Northrop Grumman's and the Navy's stated agreement to use "non-detect" as the design goal for treatment systems installed at affected wellheads. One section of the PRAP had suggested that the GM-38 well area remedy offered additional protection of public health by decreasing the contaminant mass that would pass through public supply wells, even though such wells had VOC removal treatment. The statement hinged on the concept that the magnitude of exposure would be less in the event of system (treatment and monitoring) failure if lower VOC concentrations were present in the source water. The language has been changed in the ROD to simply state that the GM-38 well area remedy may result in reduced loading to nearby public water supply wells.

Responses to Written Comments from Citizens

Written Comment Letter Re: Cancer and Occupational Exposure

Two written comment letters/submittals were received from individual citizens. One expressed concern about a relative who was a former employee at Grumman and was subsequently diagnosed with cancer of the kidney. The writer suggested that the cancer may have resulted from occupational exposure to VOCs at Grumman. The writer also implied that Grumman showed negligence in allowing employees to be exposed to VOCs in water used at the site and to VOC vapors in the plant.

At this time, the causes of kidney cancer are not well understood. Although scientists do not know exactly why kidney cancer develops, they have learned that some things, called risk factors, increase a person's chance of getting this disease. For kidney cancer, these risk factors are believed to include smoking, use of the pain-killing drug phenacetin (no longer available in the United States), historic exposure to thorium dioxide via diagnostic X-rays, long-term kidney dialysis, and being overweight. With regard to occupational risk factors, some studies suggest above-average rates of kidney cancer among coke oven and insulation/asbestos workers. Other studies show that workers in the rubber, leather, petroleum, dye, textile, and plastics industries have an increased risk of at least one type of kidney cancer.

Unfortunately, cancer is a very common disease. One in two men and one in three women will be diagnosed with cancer at some time during their lives. Cancer is a group of more than 100 different types of cancer, each with different risk factors. Tumors originating in different organs (sites) are considered to be different diseases because of variation in cause, type of abnormal cells, course of the disease, prognosis and treatment. Cancers develop in people of all ages but most often in the middle-aged and the elderly. The number of cancer cases has risen dramatically over the past 40 years, but much of this increase reflects the increase in the population, especially in older age groups. Cancers of the prostate, lung, and colon are the most common among adult men. Breast, lung, and colon cancer are the most common among adult women. Kidney cancer affects men about twice as often as women, although doctors could seldom explain why one woman might get it while another wouldn't. Most people who get kidney cancer are between the ages of 50 and 70.

As noted above, the exact causes of kidney cancer are not yet known. Adult kidney cancers are more common in urban, industrialized areas. While exposure to chemicals on the job may have had an effect on the inquirer's relative, it cannot be conclusively pinpointed as the source of cancer, from information NYSDOH has at this time.

With respect to contaminated groundwater at the site, VOCs were detected in production wells used for non-potable purposes. Consequently, workers did not drink water from these contaminated wells. Potable water at the facilities is provided by the Bethpage Water District. Whether or not workers were exposed to contaminated water in the past via incidental contact during plant processes is unknown. Generally, such incidental exposures, if any, tend to be less significant than other occupational exposures, particularly those from actual use of the chemicals in question. With respect to these occupational exposures, regulatory requirements to minimize workplace exposures have increased as knowledge of the potential for adverse health effects has increased. Most prominent in this regard was Congress' enactment of the Occupational Safety and Health Act and the subsequent formation of the Occupational Safety and Health Administration (OSHA). Many such work exposures are regulated by OSHA.

Between 1980 and 1986, under the New York State Right-to-Know Law employers were required to provide information on workplace exposures to employees. After this time, OSHA required the provision of similar information under the federal Hazard Communication Standard. Under these rules, employers were required to inform employees of any hazardous materials they were potentially exposed to in the performance of their job as well as potential health effects, appropriate protective equipment, and spill remediation methods. Enforcement of the Right-to-Know Law was the responsibility of the New York State Department of Labor and enforcement of the Hazard Communication Standard is the responsibility of OSHA. Individuals with concerns about past or present exposures to VOCs at Grumman Aerospace or NWIRP may contact the NYSDOH Center for Environmental Health at 1-800-458-1158 to discuss their concerns.

Written Comment Package from Mr. Joseph Sadowski and Dr. Rebecca Carley:

The referenced package contains comments that cover a number of different subjects. For the most part, this comment letter is a copy of the one submitted to the USEPA on the OXY Hooker RUCO Site and some of the material contained does not pertain to the Northrop Grumman and TWIRP Operable Unit 2 PAP. Therefore, some statements and questions made in the 35 page comment letter and 57 pages of attachments are not part of this responsiveness summary. The OXY Hooker RUCO Site Operable Unit 3 "Offsite Groundwater Remedy Record of Decision" and Responsiveness Summary, dated September 29, 2001, can be viewed at the USEPA document repository for this site at the following location:

Hicksville Public Library
169 Jerusalem Avenue
Hicksville, New York

Many of the responses to comments contained in Mr. Sadowski's package can be found in the above responsiveness summary from the public meeting. Health related subjects concerning exposure and toxicity of site related chemicals have been responded to by the NYSDOH.

A major concern raised by Mr. Sadowski is the sites' location in relation to the Long Island groundwater divide. The groundwater divide is at least 1.5 miles to the north of the Site. The general groundwater flow in the area of the Northrop Grumman and TWIRP is south from the groundwater divide. During the years that Grumman was in operation, pumping from its production wells exerted an influence on the groundwater inducing a localized east/west component of flow only in the study area. During the various investigations, a series of monitoring wells have been placed around the two sites. Measurements from those wells confirm that the direction of ground water flow in the area is to the south-southeast. This has been reinforced now that Northrop Grumman has reduced, to a large degree, the total amount of water pumped. Water entering the ground at the Northrop Grumman and NWIRP sites moves downward until it reaches the water table, then migrates in a south-southeasterly direction. The groundwater movement as depicted in the FS report has been reviewed by EPA, NYSDEC, and the United States Geological Survey (USGS). All reviewers have concluded that the interpretation of the groundwater flow depicted in the FS Report is valid.

A number of questions were raised regarding the Lloyd aquifer. This has been addressed in the main body of the responsiveness summary from the public meeting. However, the deepest monitoring wells at the Northrop Grumman and NWIRP sites are completed in the Magothy Aquifer. The Magothy Aquifer is separated from the Lloyd Aquifer by an extensive layer of clay (the Raritan Confining Unit). The are no wells in the study area that have entered the Lloyd Aquifer. Therefore, contamination cannot enter the Lloyd by traveling down well casings. The Magothy Aquifer extends deeper than 600 ft. in the area of the Site where the contaminants are at their deepest. Below the Magothy lies a layer of low permeability material known as the Raritan Confining Unit that averages 175 ft thick that would act as a barrier to prevent contaminants from moving from the Magothy to the Lloyd.

A number of the Sadowski/Carley comments referenced the hydrogeologic groundwater model used in the FS and the output figures from these model runs. The comments also referenced Figure H.2.8 from the OXY RUCO OU3 Groundwater FS. The concern stated in the comment letter is that Northrop Grumman, NWIRP and OXY Hooker RUCO contamination is affecting the Hicksville water supply wells, including Plant 9. The lines on the figure represent

hydraulic head for a subsurface "layer" of the study area. Groundwater flows perpendicular to the lines of equal head from the higher numbers to the lower. These equipotential lines indicate the groundwater flows to the south. The regional figure shows the influence of pumping wells, including the Hicksville wells. Figure H.2.8 indicates that the groundwater influence of the Hicksville wells does not extend to any of the three hazardous waste sites noted above. In addition, the study area depicted on this figure includes an area much larger than the area impacted by the sites. By simply locating the Hicksville wellfield on the same figure as the OXY Hooker RUCO, Northrop Grumman and NWIRP sites does not imply that these sites are impacting the Hicksville Plant 9 wellfield, which they are not.

The water provided to residents of Hicksville meets NYSDOH drinking water standards, is tested on a routine basis, and is free of site-related contaminants. Gases are not being released from groundwater into the soils, nor are gases migrating into private residences and places of business. The groundwater table in this area is at least 50 feet below the ground surface. Additionally, the VOCs in question tend to migrate deeper in groundwater with distance from the site.

Sadowski/Carley made a number of statements regarding cancer. As noted above (see the previous response to written comments), cancer is a fairly common diagnosis. There are many different types of cancer and many different risk factors associated with cancer. The relationship of cancer incidence to environmental factors, such as chemical exposure, is the subject of ongoing scientific inquiry. NYSDOH has been involved with cancer surveillance activities in New York State for many years. More recently, NYSDOH has been involved with cancer mapping and incidence investigation activities. Information about these activities is available on the Department's website: w.w.w.health.state.ny.us.

Telephone Inquiry Re: Drinking Water Quality

One telephone inquiry was received by NYSDOH during the PRAP public comment period. A resident in the Bethpage Water District expressed concern that her drinking water was being contaminated by the Grumman and Navy facilities. Water provided to consumers within the Bethpage Water District is monitored routinely and is in compliance with the New York State drinking water regulations specified in 10 NYCRR Part 5. Additionally, the water supplied to consumers meets the more stringent policy established by the District of "non-detectable" concentrations of volatile organic contaminants. The monitoring frequency for these contaminants is also more stringent (than the State requirement) per the local Bethpage Water District policy.

APPENDIX B: ADMINISTRATIVE RECORD FOR OPERABLE UNIT 2
NORTHROP GRUMMAN AND NAVAL WEAPONS INDUSTRIAL RESERVE PLANT

Documents that are part of Operable Unit 2 (OU 2) Administrative Record that have been placed the Grumman Aerospace Operable Unit 1 (OU 1) Administrative Record:

1. Interim Remedial Measure, Pilot Test Report, Grumman Aerospace Corporation, prepared by Geraghty and Miller, Inc., January 1994.

2. Remedial Investigation Report, Grumman Aerospace Corporation, Bethpage, New York, prepared by Geraghty and Miller, Inc., September 1994, Volume I.

3. Remedial Investigation Report, Grumman Aerospace Corporation, Bethpage, New York, prepared by Geraghty and Miller, Inc., September 1994, Volume II.

4. Remedial Investigation Report, Grumman Aerospace, Bethpage, New York, prepared by Geraghty and Miller, Inc., September 1994, Volume III.

5. Remedial Investigation Report, Volume 1, Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, May 1992

6. Remedial Investigation Report, Volume 2, Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, May 1992

7. Remedial Investigation Report, Volume 3, Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, May 1992

8. Remedial Investigation Report, Volume 4, Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, May 1992

9. Phase 2 Remedial Investigation Report, Volume , Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, May 1992

10. Phase 2 Remedial Investigation Report, Volume , Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, May 1992

11. Feasibility Study Report, Volume 1, Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, March 1994

12. Feasibility Study Report, Volume 2, Final, Naval Weapons Industrial Reserve Plant, Bethpage, New York, prepared by Halliburton NUS Environmental Corporation, March 1994

Documents that are part of this Administrative Record:

Grumman Aerospace OU1 Record of Decision March 1995

Naval Weapons Industrial Reserve Plant OU1 Record of decision, March 1995

New York State Site Registry Delisting Petition, Headquarters Complex, Bethpage, N.Y. March 1995.

Technical Specifications, Groundwater IRM, Grumman Aerospace Corporation, March 1996.

Soil Vapor Extraction, Operation and Maintenance, May, 1996.

Supplemental Phase II Environmental Assessment, Eagles Nest Site, 500 Central Ave, Bethpage, August 1996

Phase II Site Assessment, North Runway- Parcel L2, Northrop Grumman- March 1997.

Northrop Grumman Onsite Containment System (Interim Remedial Measure) Final Design Documents, 1997

IRM VPGAC System, Source Testing, Northrop Grumman Corporation, February, 1998.

Groundwater Feasibility Study, Grumman Aerospace Corporation, October 2000.

Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites Operable Unit 2 Groundwater Proposed Remedial Action Plan, October, 2000.

Correspondence file from the beginning to March 2001.

Naval Weapons Industrial Reserve Plant Vertical Profile Borings report, January 2001 TTNUS

Baseline Sampling Report and Quarterly Sampling Reports for the ONCT system through March 2001.

Comment Letters in the PRAP Referenced in Appendix A.

Comments On The OU 2 PRAP- Submitted by Joseph Sadowski and Rebecca Carley January 20, 2000.