Between 2000 and 2014, the Navy installed over 40 borings and over 60 groundwater monitoring wells/ outpost wells. The location of the existing borings and wells for OU2 is shown in the figure inside. Additionally, NG has installed its own borings and monitoring wells that also provide data to the Navy's program.

A Long Term Monitoring program is ongoing to better map the groundwater plumes and to determine effectiveness of remedial measures implemented to date. NG monitors 88 wells (including wells installed by NG), which are sampled quarterly, semiannually or annually by NG, and reported on a quarterly and annual basis by NG.

The Navy recognizes the importance of continued protection of potable water to those communities/ populations served by water supply wells that are, or that may become, impacted by site-related contamination. To date, the Navy has worked with three water districts to install and operate well head treatment on seven water supply wells to ensure protection of public health.

The Navy is continuing to investigate the extent of VOC-contaminated groundwater including areas near the ***Bethpage Water District (BWD)*** Plant 6, ***New York American Water (NYAW)***, and ***South Farmingdale Water District (SFWD)*** Plant 6. The Navy will use these results to determine if additional study is needed farther to the south. Additionally, the Navy and USGS are conducting computer modeling to assist in the investigation.

OU2 ROD EVALUATION

In response to community concerns, the Navy assembled a Technical Team of independent groundwater experts to conduct an Optimization Evaluation of the Bethpage groundwater plume remedy. The goal of the team was to provide an evaluation of the groundwater remedy for both the OU2 groundwater contamination from the NG Bethpage and NWIRP properties, as well as the impacts on OU2 from the NG groundwater plume emanating from the Bethpage Community Park (OU3) and identify potential steps to optimize containment and cleanup efforts.

Based on the Technical Team Report findings, the Navy has concluded that complete plume containment and treatment is not technologically feasible to prevent all potential impacts to local water districts, but did identify actions to improve the reliability of the remedy and reduce potential future impacts. The Navy then further evaluated potential remedial alternatives in the 2012 Alternatives Evaluation Report. This report evaluated a range of options from continuation of the existing OU2 ROD to attempts to fully contain all groundwater flow. Based on this report, the Navy recommended Alternative 2A and is proceeding with the implementation of this alternative. Alternative 2A consists of the following:

- Continued implementation of the OU2 ROD
- Sustained operation of strategically located existing groundwater extraction wells equipped with VOC treatment to reduce migration of VOC-contaminated groundwater
- Improved plume delineation and early warning of impending impacts to water supplies

Onsite Containment System

The Onsite Containment System captures contaminated groundwater at the south and southwest edges of the former NG property to limit additional movement of contaminated groundwater off-site. The system is operated and monitored by NG with reports provided on a quarterly and annual basis. This includes a detailed analysis of pump volumes, amount of VOCs removed by the system, and an effectiveness evaluation. Recent VOC data from BWD Plant 6-2, indicates that some VOC contamination may be bypassing the containment system. In response, the Navy is reviewing hydraulic and analytical monitoring data and computer modeling predictions and installing additional borings/wells to determine the source and magnitude of the VOCs and the potential for optimizing containment.

PUBLIC INVOLVEMENT

The Navy hosts Restoration Advisory Board (RAB) meetings twice a year for NWIRP Bethpage. The RAB meetings began in 1999. The RAB is a forum for exchange of information between the Navy and the local community on the NWIRP Bethpage ERP activities. The RAB includes community members, water districts, Navy representatives, and representatives from NYSDEC, NYSDOH and NCDOH. The NWIRP Bethpage RAB meetings are open to the public.

FOR MORE INFORMATION

Copies of all official environmental program documents are available for review at an information repository: Bethpage Public Library, 47 Powell Avenue, Bethpage, NY 11714, (516) 931-3907.
Additional information on the NWIRP Bethpage ERP is available online at **http://go.usa.gov/DyXF**
For more information on the NWIRP Bethpage ERP, please contact: Public Affairs Officer, NAVFAC Mid-Atlantic, 9342 Virginia Ave, Norfolk VA 23511-3095 or thomas.kreidel@navy.mil.

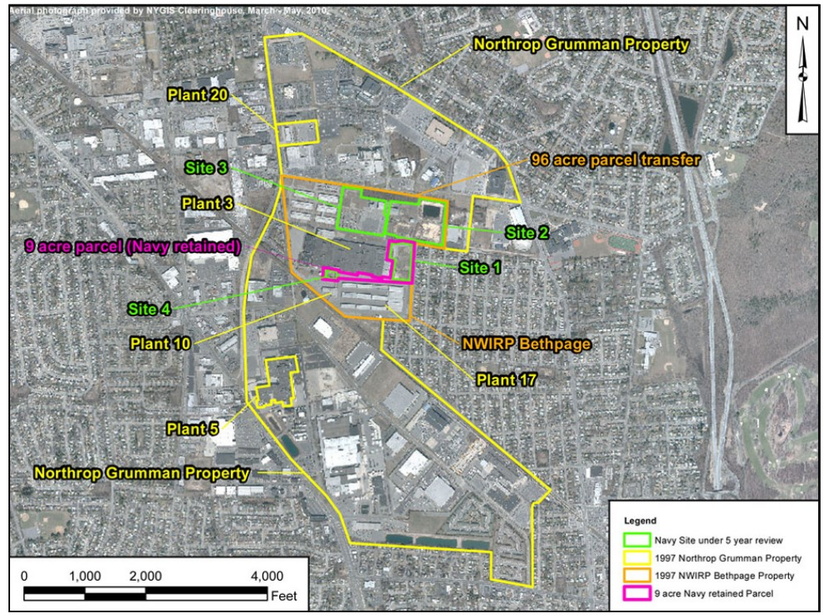
Naval Weapons Industrial Reserve Plant Bethpage (Former Grumman Plant)

OU2 Groundwater
Navy Environmental Restoration Program

OU2 Groundwater Fact Sheet March 2015

INTRODUCTION

Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage was a 109-acre government-owned, contractor-operated facility under the jurisdiction of the Naval Air Systems Command (NAVAIR) and its predecessor commands. It was operated ***by Northrop Grumman (NG)*** and its predecessors, including Grumman Aircraft Engineering Corporation ([Grumman] and its successor Northrop Grumman [NG]) from 1942 until manufacturing operations ceased in 1996. The NWIRP's primary mission was the research prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft.



In 1998, NG returned the NWIRP Bethpage land to Department of the Navy (Navy) control. By February 2008, the Navy transferred most of the property to Nassau County for economic redevelopment. The Navy retained a 9-acre portion to complete environmental investigation and cleanup activities under the Navy's ***Environmental Restoration Program (ERP)***.

The Navy's ERP conducts its environmental cleanup work for the former NWIRP under the ***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)***, the Resource Conservation and Recovery Act, and the Defense Environmental Restoration Program. The Navy is the lead agency for the CERCLA cleanup. The ***New York State Department of Environmental Conservation (NYSDEC)***, with assistance from the ***New York State Department of Health (NYSDOH)***, is the lead state agency providing regulatory support for the Navy. In addition, the ***United States Geological Survey (USGS)*** contributes technical support on groundwater issues.

The NWIRP Bethpage ERP includes four sites on the former NWIRP property and corresponding groundwater contamination, some of which has moved off Navy property. This fact sheet provides the history and status of the ERP activities for the groundwater contamination referred to as ***Operable Unit 2 (OU2)***. The history and status of ERP activities at the remaining four NWIRP Bethpage sites is provided in a separate Fact Sheet.

OU2 GROUNDWATER

Volatile Organic Compounds (VOCs) are a group of chemicals that evaporate easily into the air. The VOCs in the groundwater result from the historic storage and/ or disposal practices resulting from NG's operation of facilities at the former NWIRP and adjacent former NG-owned properties. Over the last several decades, VOC

-contaminated groundwater that originated from these facilities has moved off-property to the south and generally downward as a result of natural and pumping induced groundwater flow. The Navy estimates the VOC contamination covers over 3,000 acres, but it is not distributed evenly throughout the area. Instead of a single, contiguous plume, there are multiple widely dispersed plumes or "fingers", meaning VOCs are present in the groundwater at different concentrations and different depths in different areas of OU2.

Shallow Plume—VOCs are located in the groundwater between approximately 50 and 300 feet deep. The VOCs include a mixture ***of trichloroethylene (TCE)***; ***perchloroethylene (PCE)***; ***1,1-dichloroethene (DCE)***; ***1,1,1-trichloroethane (TCA)*** and ***1,1-dichloroethane (DCA)***, which are generally found at concentrations of 0.5 to 10 parts per billion (ppb) for each contaminant. The safe drinking water limit for each of these chemicals in drinking water is listed in Table 1.

Deep Eastern Plume—VOCs are located in the deep groundwater (deeper than 300 feet) east of the former NWIRP Bethpage, starting in the area of Bethpage Community Park, and continuing south of Hempstead Turnpike. This plume contains a mixture of TCE, PCE, DCE, TCA, and DCA with concentrations ranging between 5 to 10,000 ppb.

GM-38 Area Hotspot Groundwater—VOCs are located in relatively deep groundwater (220 to 500 feet) approximately 8,500 feet southeast of the former NWIRP Bethpage, starting in the eastern portion of the NWIRP and/or NG properties, and continuing south of Hempstead Turnpike. The hotspot originally encompassed an area of approximately 38 acres and contained a mixture of TCE, PCE, DCE, TCA, and DCA with concentrations ranging between 100 to 2,000 ppb. Groundwater from this hotspot is being treated by the GM-38 Area Treatment System and concentrations are decreasing.

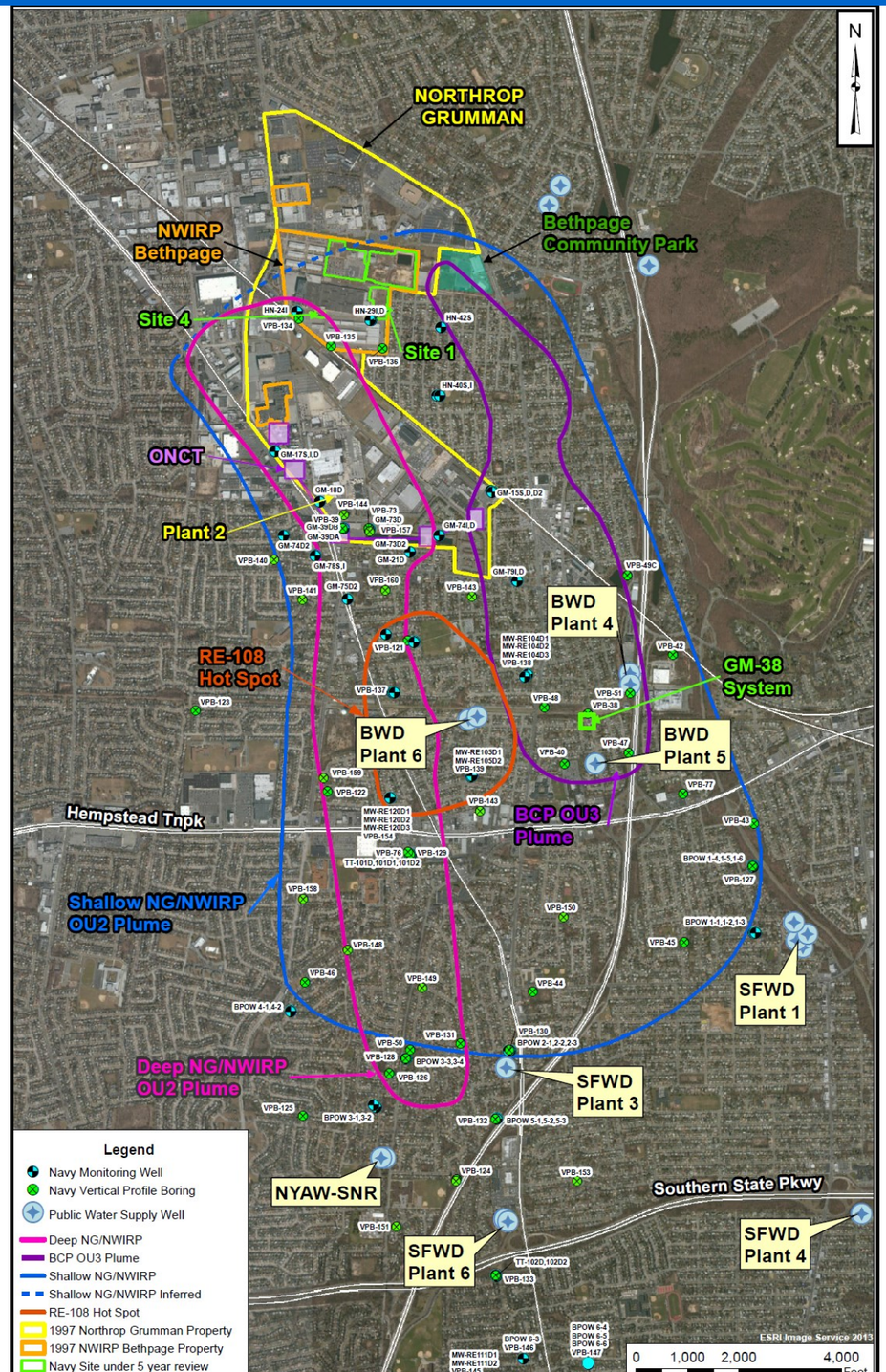
RE-108 Area Hotspot Groundwater—The areal and vertical extents of the hot spot are being determined by an ongoing field investigation and is currently estimated to be approximately 200 acres at a depth of 575 to 750 feet below ground surface. This plume is predominately TCE, with lower concentrations of other VOCs. VOC concentrations range between 1,000 to 4,200 ppb.

Deep Western Plume— VOCs are located in the deep groundwater (deeper than 300 feet) southwest of NWIRP Bethpage, starting in the western portion of the NWIRP and NG properties and the Hooker Ruco Superfund Sites and continues south of Hempstead Turnpike. This plume is predominately TCE, with lower concentrations of other VOCs. VOC concentrations range between 50 to 1,200 ppb.

Table 1: Safe Drinking Water Act Maximum Contaminant Limit (MCL)

	TCE	PCE	DCE	TCA	DCA
MCL	5 ppb	5 ppb	5 ppb	5 ppb	5 ppb

Because of the size, depth, and variable distribution of VOCs, mapping, management, and cleanup the groundwater are very challenging. Additionally, because of the history of commercial and industrial activity in the area, other sources, including the Bethpage Community Park OU3 Site, the Hooker Ruco Superfund Site, Bethpage Landfill Site, and potentially dry cleaners and gasoline stations, are likely or potentially contributing contamination to OU2.



NAVY 2003 RECORD OF DECISION

In April 2003, the Navy, with concurrence from NYSDEC, issued its ROD under CERCLA for the OU2 groundwater cleanup. The selected remedy included:

- Institutional Controls to restrict groundwater use at the former NWIRP
- Groundwater Remedial Program to treat off-property hotspot groundwater
- Public Water Supply Protection Program to protect the drinking water supply

Institutional Controls: For the former NWIRP property transferred outside federal ownership, the Navy's ROD requires that future property transfer documents include notice of on-property groundwater contamination and legal restrictions in the deed limiting the use of groundwater. These notifications and restrictions were also imposed on lease arrangements.

Groundwater Remedial Program - GM-38 Hot Spot Area Treatment System: In 2009, the Navy started operation of a groundwater treatment system at the GM-38 hotspot, which is approximately 8,500 feet south, southeast of NWIRP Bethpage. The hotspot location is down gradient of NWIRP, meaning groundwater flows from the NG/NWIRP facilities to the hotspot area. Based on previous groundwater investigations, the hot spot was originally estimated to encompass approximately 38 acres, located at variable depths between 220 to 500 feet deep. The remediation system works by pulling water from the ground with two recovery wells and then treating the water to remove VOCs down to drinking water standards before it is discharged back to a local basin. The VOCs are removed by air stripping, which involves passing air through the contaminated water to help the VOCs evaporate faster, and then the groundwater is passed through carbon filters to remove any remaining residual VOCs. After treating the water, the air and chemical vapors are also collected and passed through a carbon filter to remove the VOCs before being vented outside. Extensive water and air monitoring is conducted to ensure compliance with regulations. In addition, samples are collected from monitoring wells in the area to determine the systems effectiveness. Through December 2014, approximately 2.4 billion gallons of groundwater containing 8,000 pounds of VOCs were extracted and treated. Currently, a capture zone analysis is being performed by the Navy to ensure the system is drawing the groundwater for treatment from the hotspot location as designed and not from other portions of the groundwater.

Public Water Supply Protection Program: This program consists of an ongoing groundwater investigation and wellhead treatment as needed. The groundwater investigation includes installation of vertical profile borings, monitoring wells, and outpost wells. A vertical profile boring is a 12-inch diameter hole drilled into the ground. At select depths, the drilling is stopped and a device is lowered to collect a sample of the water to identify areas of contamination. The borings extend to depths up to 1,000 feet deep, and approximately 36 groundwater samples are collected per boring and analyzed for VOCs. The process for drilling and sampling takes 4 to 8 weeks to complete for each boring. Monitoring wells are installed to track the plume movement including changes in concentrations. Outpost wells are monitoring wells that are installed in select locations to provide early warning of groundwater contamination which might be moving toward public water supply wells.