

The Limitations of Wellhead Treatment Bethpage and Massapequa, Long Island, New York

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The Northrop-Grumman facility in Bethpage, Long Island, New York illustrates some of the challenges that may emerge when wellhead treatment is a primary component of a groundwater remedy. In 2010 the Massapequa Water District sought federal intervention in the state-regulated cleanup when data indicated that a groundwater plume was likely to impact its drinking-water supply aquifers within the next few years.

The Northrop-Grumman facility consists of 635 acres, including a 105-acre government-owned, contractor-operated Naval Weapons Industrial Reserve Plant. Established during World War II, it contained manufacturing plants, laboratory and test facilities, and an airfield. Northrop-Grumman has reduced operations and sold off most of the facility. Much of the property has been redeveloped. However, along with the Navy, the Defense contractor remains a responsible party.

Chlorinate volatile organic compounds, such as tetrachloroethylene (PCE), trichloroethylene (TCE), and their breakdown products are found in a 3.5-mile-plus long, 2000-acre groundwater plume. Groundwater from the Upper Glacial Aquifer, approximately 100-feet thick, percolates down to the Magothy Aquifer, considered a sole-source aquifer for much of Long Island. Below 700 feet lies the apparently uncontaminated Lloyd Aquifer, but its use is restricted by both history and statute for use by coastal communities.



Contamination was originally discovered in 1976, and in 1986 the Nassau County Health Department launched an investigation of this plume, as well as an upgradient plume, in conjunction with the U.S. Geologic Survey. In the early 1990s Grumman signed a consent order with the New York Department of Environmental Conservation (DEC) and began interim remedial measures. In 1995 DEC issued an on-site (Operable Unit 1) Record of Decision (ROD), specifying soil vapor extraction/air sparging to remove volatile organic compounds (VOCs) from soils, excavation of other soil contaminants, and wellhead treatment at one of the Bethpage Water District's production wells. In addition, in 1998 Grumman started up the On-Site Containment System, a network of groundwater extraction wells, as an interim remedial measure.

In 2001 DEC issued a Record of Decision for Operable Unit 2, the principal off-site plume. In addition to contingency treatment at hot-spots where identified, the ROD provided for wellhead treatment at impacted public water supply wells, boundary monitoring of the plume, and the contingency for additional wellhead treatment should other wells be affected. The Navy signed essentially the same ROD in 2003. The responsible parties were held responsible for paying for wellhead treatment, even though it was not technically considered part of the groundwater remedy.



Local water districts, including Massapequa—beyond the plume's leading edge—called for full containment of the groundwater contaminant plume as the preferred remedy or, "at a minimum, interception of contamination before it impacts downgradient public supply wells." In selecting wellhead treatment, DEC explained, "Based on the extent of the Northrop Grumman contamination, full plume containment is not a technically feasible nor cost-effective option."¹

¹ Division of Environmental Remediation, New York State Department of Environmental Conservation, "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, p. 63.

In September 2009 the Massapequa Water District began a public campaign for federal intercession. In 2010, petitions and e-mails from local residents led U.S. Senator Charles Schumer to organize a meeting among regulatory and water agencies, the responsible parties, and others. U.S. EPA is currently considering the District's call for additional plume remediation. In April 2011 the U.S. Geological Survey found that the Navy's groundwater contamination flow model was not reliable and appropriate for use to address the plume's impact on downgradient water-supply wells.²

The Massapequa District reports that the plume's continuing spread is triggering new expenditures by the Bethpage Water District to be able to treat higher VOC concentrations, and that two other water purveyors, the South Farmingdale Water District and private Aqua of New York are negotiating to have the Navy and Grumman finance wellhead treatment as the plume enters their source areas.³

The Massapequa District has taken a strong position:

For every day that passes, the plume moves closer to our vital drinking water wells. Therefore we strongly urge our elected officials to compel federal and state regulatory agencies to perform their regulatory duties that are specific to health issues, by remediating the groundwater contamination as opposed to the state's position of requiring wellhead treatment by the local water supply agencies.⁴

The District calculates that the cost of permanent wellhead treatment for its own wells would be \$128 million, and it estimates that the cost of plume remediation, based on escalated cost of the rejected 2001 alternative, would be about \$91 million.

Furthermore, the District argues that groundwater remediation is the best way to protect public health. It notes that EPA is considering establishing more protective drinking water standards for the principal contaminants, PCE and TCE, and states, "The lowering of the MCLs [Maximum Contaminant Levels] will result in far higher wellhead treatment costs."⁵ While the application of drinking water standards to groundwater is subject to variability in the remedy selection process, they are absolute requirements for wellhead treatment and retail water delivery.

On the other hand, New York State DEC still has confidence in the selected

² U.S. Senator Charles Schumer, Letter to Secretary of the Navy Ray Mabus, U.S. EPA Administrator Lisa Jackson, and New York DEC Commissioner Joseph Martens, April 7, 2011, p. 1.

³ "Massapequa Water District Case in Opposition to NTSDEC Navy ROD OU-2," February 2011, p. 1-3.

⁴ "Massapequa Water District," p. 1-4.

⁵ "Massapequa Water District," p. 1-7.

remedy, despite its regulatory preference for remediation over pathway interruption. It notes that even with the groundwater remediation strategy recommended by the MWD, wellhead treatment would remain necessary for wells in or near the plume. Thus, it estimates the cost of the remediation option is higher than the wellhead treatment alternative. Explaining that this is a densely populated, developed area, DEC officials doubt that there is a suitable location to place a treatment system of the magnitude required. It also is concerned about the disposition of large quantities of extracted, treated water.

In June 2011, a Navy-sponsored independent Technical Team issued an Optimization Review of the Bethpage plumes. It agreed that the existing groundwater flow model suffers from limitations, some of which are technical and some of which are inherent, and it called for the development of a dynamic conceptual site model, as well as improved monitoring. It rejected additional remediation of source areas due to technical challenges, such as matrix diffusion, and its finding that it would “have no effect on plume migration at the leading edge of the plume...”⁶

The Technical Team conducted a “hand calculation,” estimating that the plume could reach the Massapequa supply wells in 10 to 40 years—longer than that suggested by the Massapequa District. But it left the remedy for further study:

The Technical Team recommends an evaluation be conducted of the technical and economic feasibility of a containment and treatment system, in conjunction with existing public water supply wells, at the current leading edge of the plume to prevent further plume expansion and impacts to currently non-affected public water supply wells. The technical feasibility and cost of this containment system should be evaluated in relation to other alternatives, such as eventual installation of treatment plants in down-gradient (currently non-impacted) public water supply wells. The possibility of leveraging existing public water supply wells (e.g., Aqua New York and South Farmingdale Water District Plants 3 and 1) by operating them at full capacity year-round could be discussed with the water districts. Lower pumping rates in winter months may be one reason why the plume has evaded greater capture by the supply wells so far.⁷

It is too soon to tell how the dispute over the proper remediation strategy at the Navy/Northrop-Grumman plume in Bethpage will be resolved. Regardless of which strategy prevails, this case illustrates the pitfalls of wellhead treatment where migration is significant enough to threaten additional water supplies.

⁶ Technical Team for Optimization of the Bethpage Plume Remedy, “Remedy Optimization Team Report for the Bethpage Groundwater Plume Remedy,” Naval Facilities Engineering Command Mid-Atlantic, June 15, 2011, p. 8.

⁷ Technical Team for Optimization, p. 12.