Remedy Optimization & Validation of Bethpage OU-2, Site 1

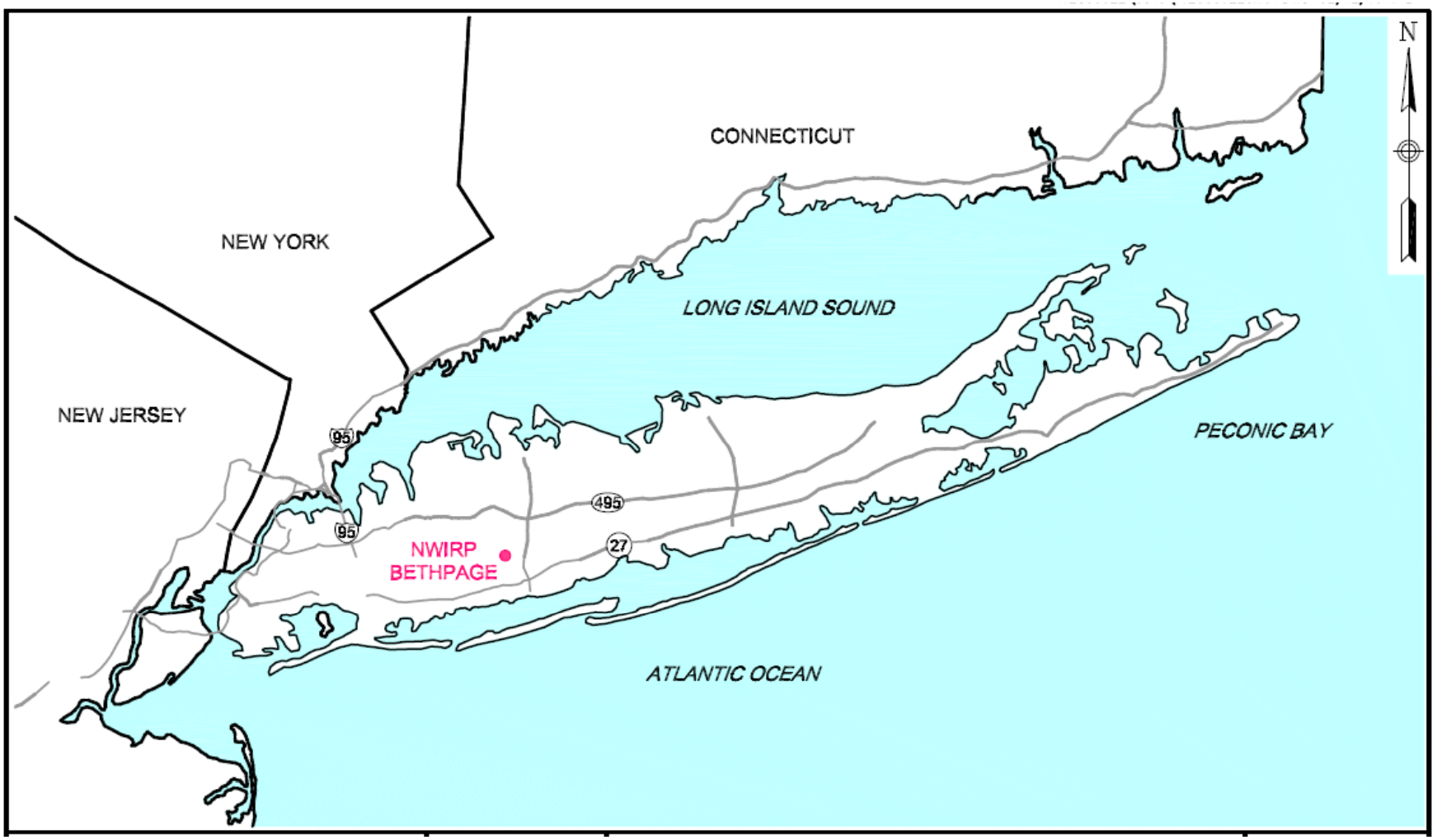
Site & Remedy Presentation, January 2011

Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York

Presentation Outline

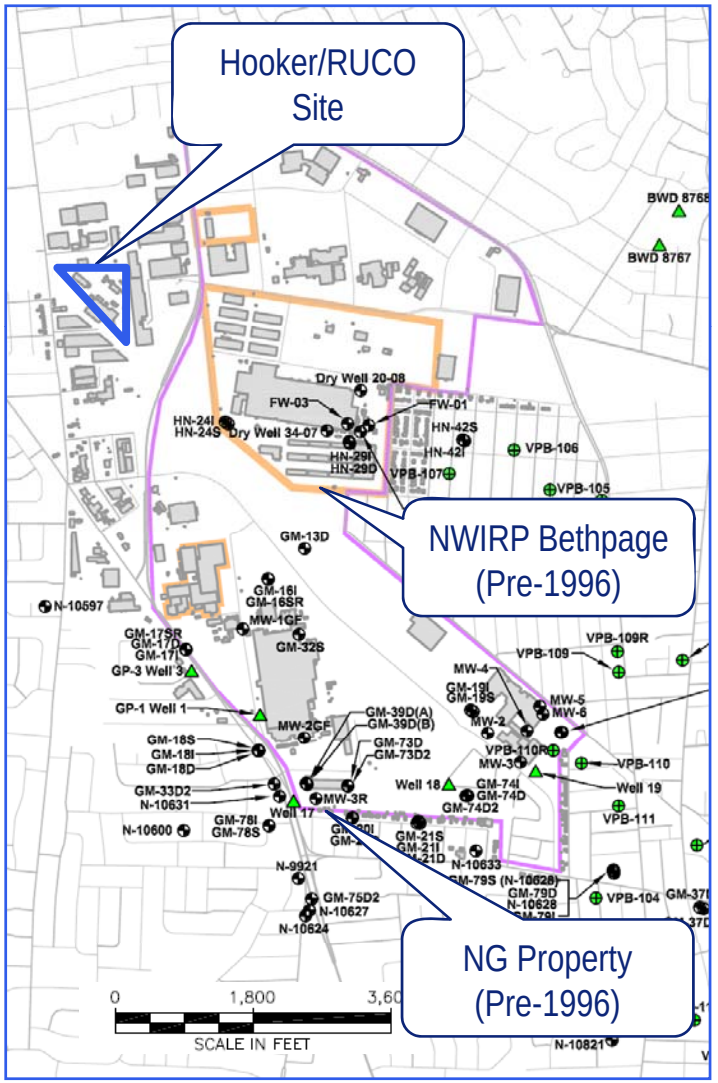
- Site Overview
- Regulatory Status
- Pre-ROD Groundwater Activities
- Navy OU2 Remedy (2003)
- Post-ROD Groundwater Activities
- OU2 Groundwater Summary (2010)
- Reference Documents/Share Point Site

Site Overview - Location



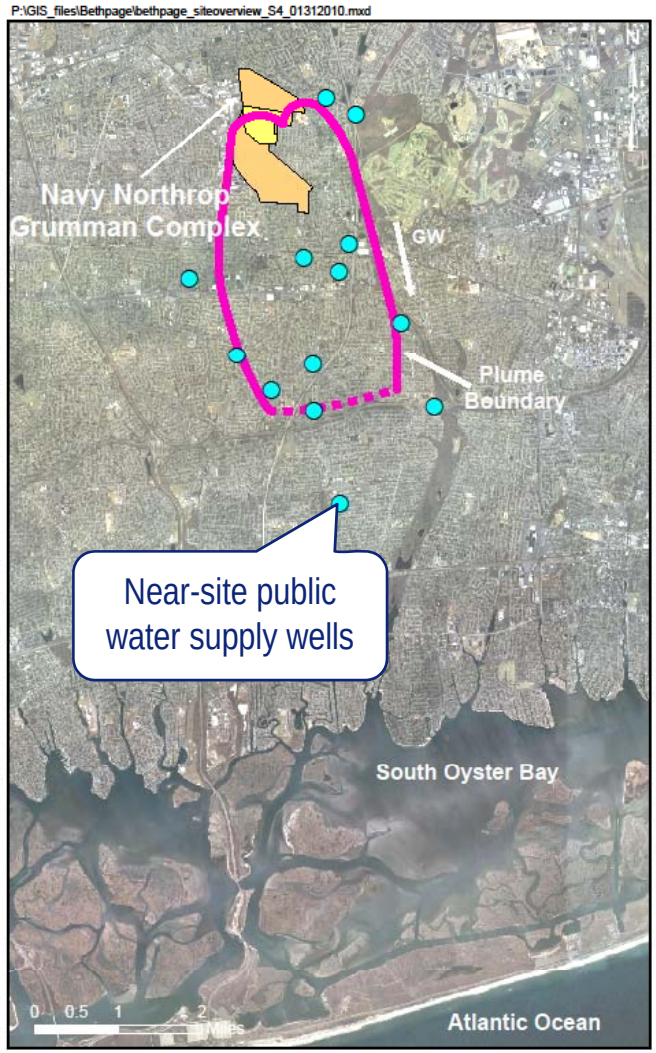
Site Overview - History

- Navy had 109.5 acres
  - –Currently 9 acres
- Northrop Grumman (NG) had approximately 500 acres
- NG operated complex from 1942 to 1997
- Co-mingled groundwater plume - Navy, NG, and an EPA Superfund Site (Hooker/RUCO)



Site Overview

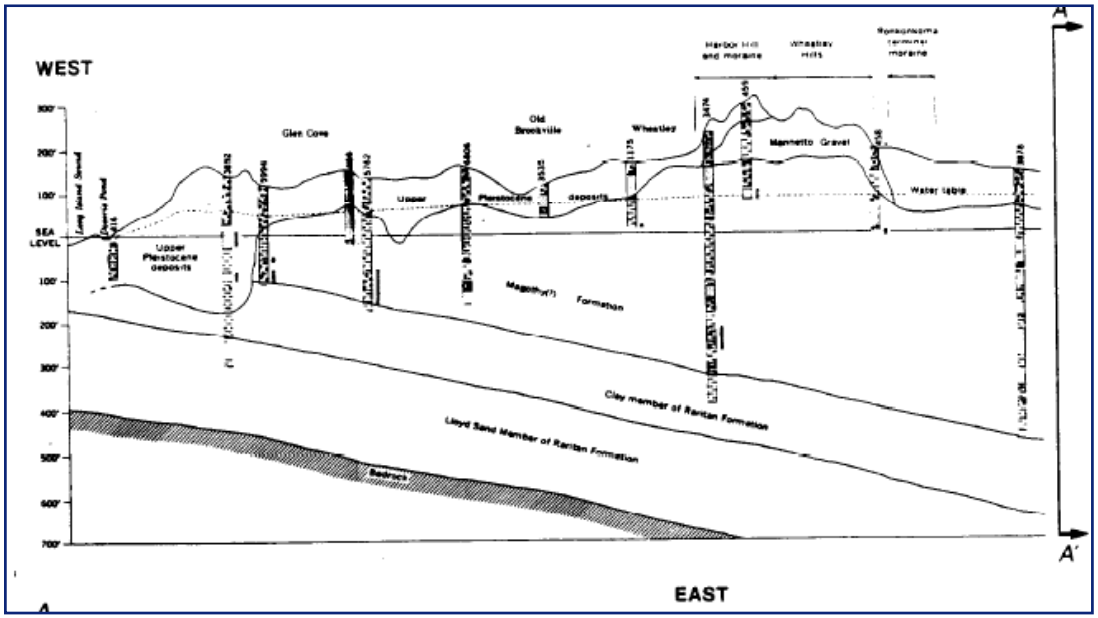
- Dense residential/commercial development
- Multiple water supply well fields down gradient of site
- Groundwater flows south - southeast toward Bay/Atlantic Ocean - 7 miles
- Not all depth intervals are impacted by contamination
- Well fields influence plume migration, horizontally and vertically



Site Overview - Geology

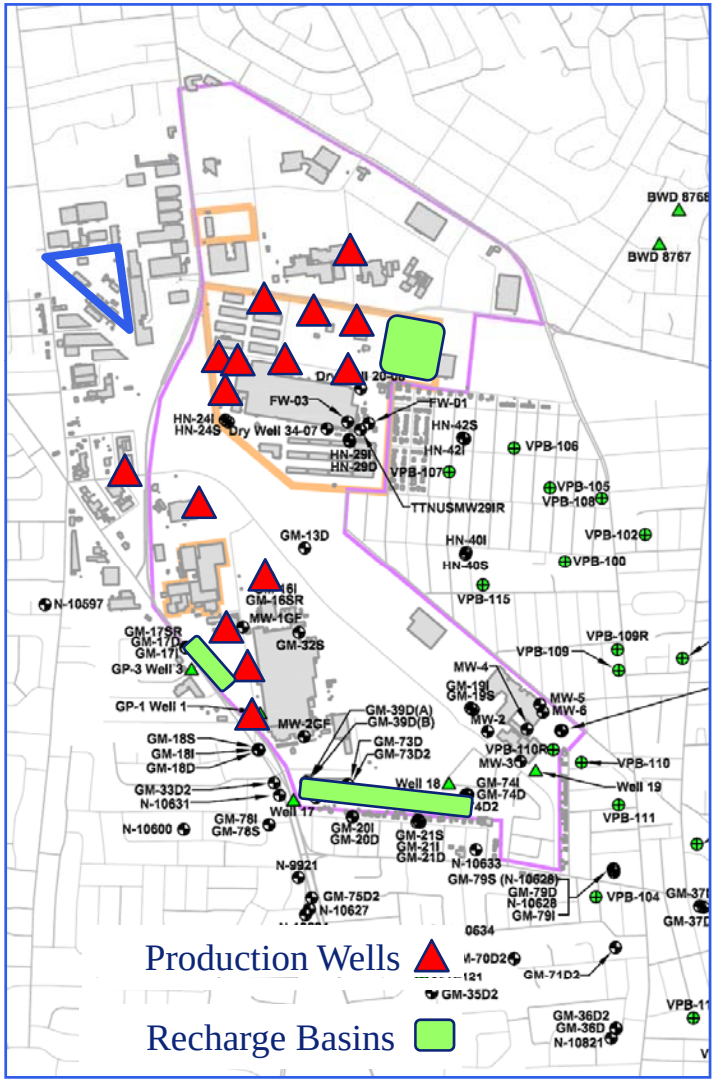
- Coarse-grained sands and gravels
  - –Groundwater migrates to the south

- Upper Glacial Aquifer - 0 to ~70 feet
- Magothy Aquifer - 70 to ~ 700/800 feet
- Raritan Clay Unit - 700/800 to ~1000 feet
- Lloyd Aquifer >1000 feet



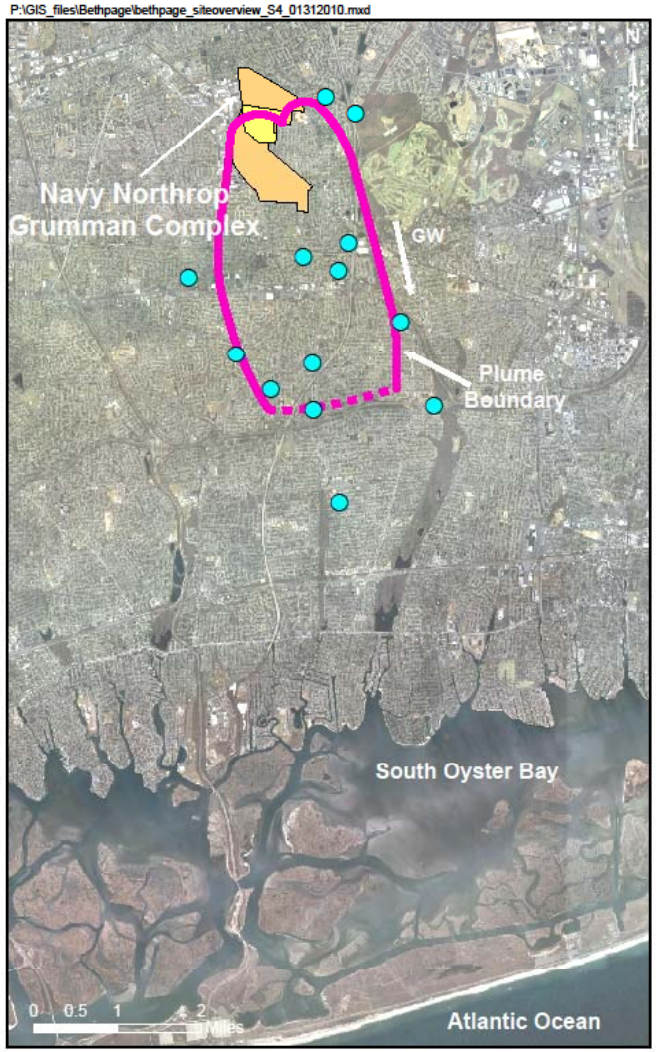
Site Overview - Onsite Grumman Production Wells/Recharge Basis

- Sources on Navy/NG properties resulted in the release of chlorinated VOCs to groundwater
- 15 Onsite Grumman Production Wells (GP or PW) resulted in contaminant flow to the southwest and deep (300 to 500 feet), high pumping rates
  - –Aug 1992: 10.7 MGD
  - –Feb 1992: 3.8 MGD
- Sources on Hooker/RUCO released VOCs, which then flowed southeast and were intercepted by Navy/NG Production Wells



Site Overview - Onsite Grumman Production Wells/Recharge Basis

- Production Well water was used for non-contact cooling and discharged to surface recharge basins along east, south, and southwest borders of property
  - –Most production wells operated from 1940s to mid-1990s.
  - –SPDES Permit allowed 50 µg/L of TCE, until early 1990s



Site Overview

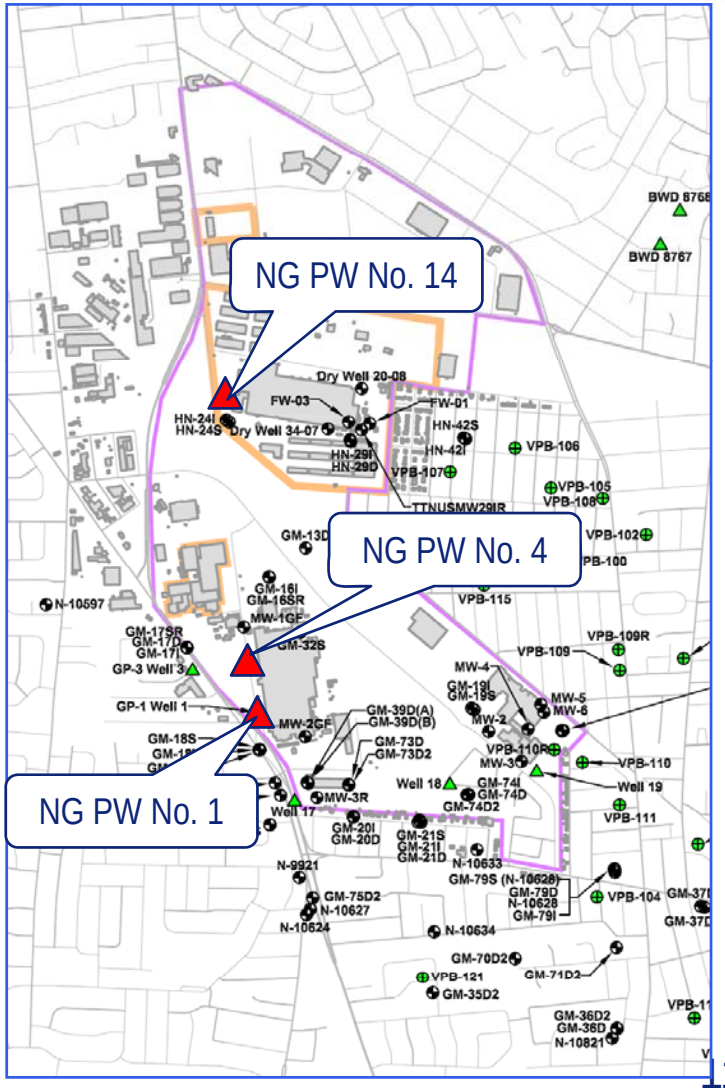
- Questions

Regulatory Status

- Navy operates under CERCLA authority, not an USEPA NPL Site.
- Facility is listed as a State Superfund Site
- Facility has a RCRA permit - current requirements are corrective actions only

Pre-ROD Groundwater Activities

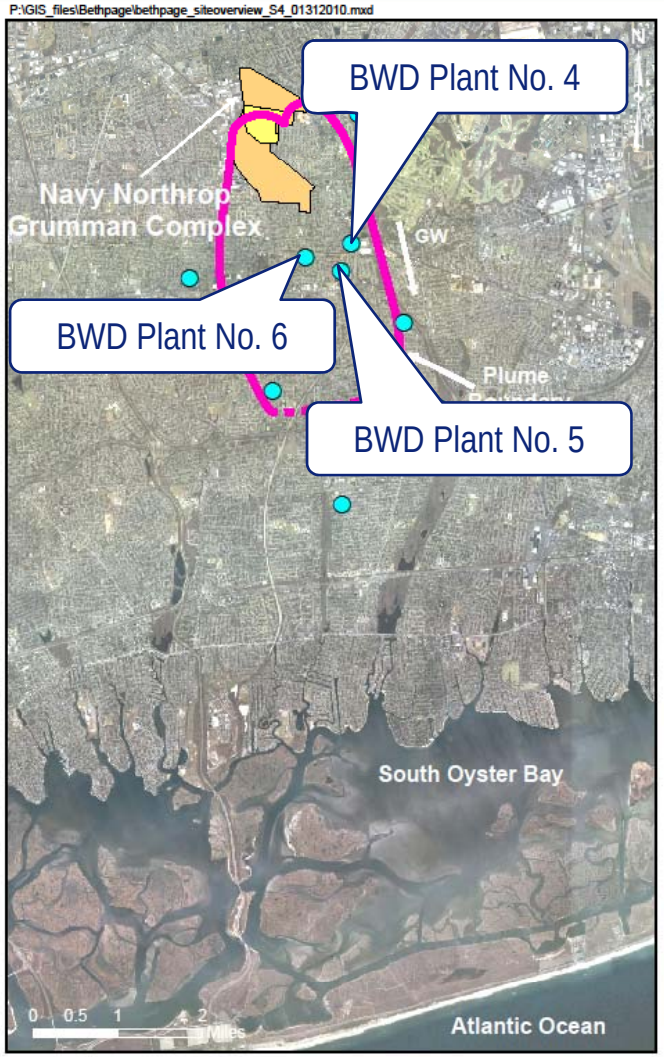
- 1970 NG water supply data:
  - NG PW No. 1: 2 ppm TCE (1976)
  - NG PW No. 4: 25 ppm of TCE (1976)
  - NG PW No. 14: 0.5 ppm of TCE, 0.071 ppm of VC (1978)
- 1980s - USGS groundwater investigations



Pre-ROD Groundwater Activities

- 1989/90- BWD Plant Nos. 4 and 6 Impacted by VOCs
- Treatment systems installed in 1990 and 1995

Well	Location	Screen Depth (feet)	Sample Date	Maximum Concentration (ug/l)			
				TCE	PCE	TCA	NO_3
4-1 (10)	Plant #4-Sophia St	540-603	1992	1.2	ND	ND	2.8
			1991	ND	ND	ND	1.3
			1990	2.6	ND	ND	2.7
4-2 (11)	Plant #4-Sophia St	556-606	1992	0.5	ND	ND	2.3
			1991	ND	ND	ND	2.7
			1990	ND	ND	ND	0.8
5-1	Plant #5-Broadway	675-735	1992	ND	ND	ND	ND
			1991	ND	ND	ND	0.4
			1990	ND	0.6	ND	0.2
6-1	Plant #6-Park La.	321-381	1992	240	9.9	3.3	ND
			1991	200	ND	5.3	5.0
6-2	Plant #6-Park La.	710-770	1992	ND	ND	ND	5.0
			1991	ND	ND	ND	0.6
			1990	ND	ND	ND	1.5

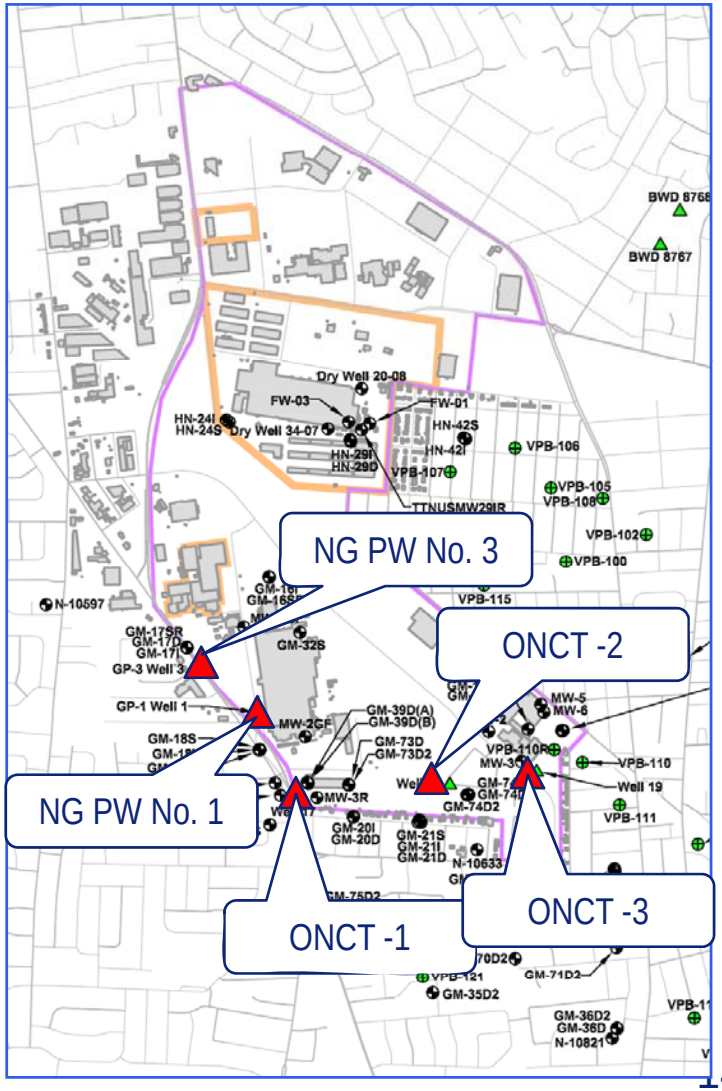


Pre-ROD Groundwater Activities

- 1992 - NG Remedial Investigation - Investigations focused on NG property and near down gradient groundwater, with NG groundwater model
- 1993 - Navy Phase 2 Remedial Investigation - Investigations focused on Navy property and near down gradient (NG property), with Navy groundwater model
- Late 1990s - Contamination extends beyond extent of groundwater models, Navy/NG proceed with a combined model by NG
- 1996/1997 - Treatment installed on BWD Plant 5 (via OU 1 ROD)
- 1996, NG ends majority of onsite activities, onsite groundwater extraction is significantly reduced

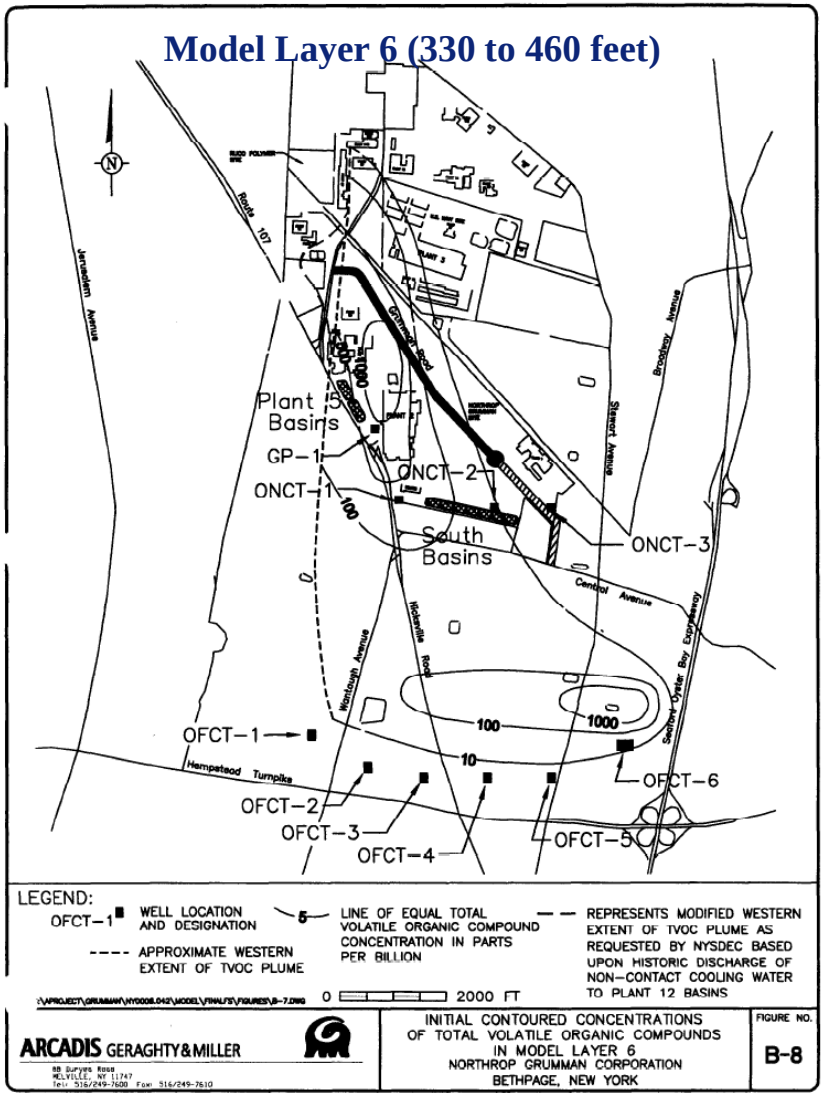
Pre-ROD Groundwater Activities

- 1998 - NG starts operation of Onsite Containment System (ONCT)
- 2009 - Mass removal - 5.4 MGD & 6.4 tons per year



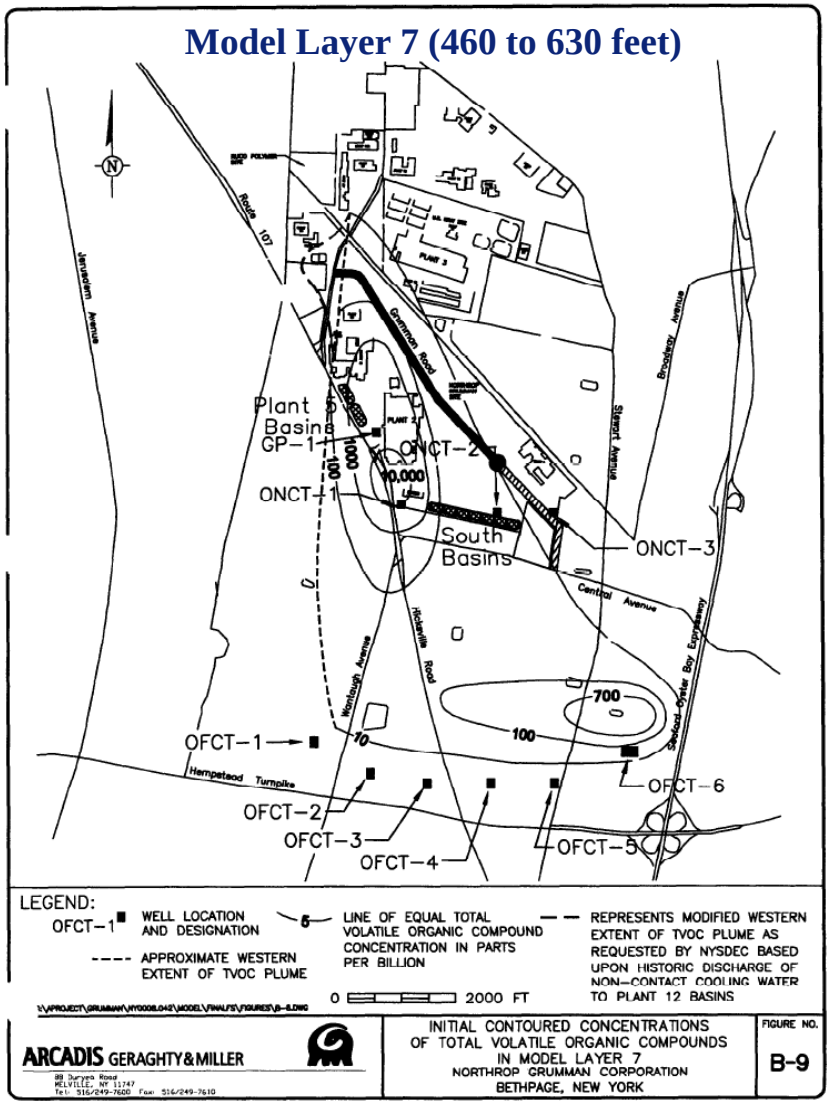
Pre-ROD Groundwater Activities

- 2000 - OU 2 Groundwater FS evaluated several options, including onsite containment (ONCT) and offsite containment (OFCT) extraction wells
- Area north of OFCT-6 becomes GM-38 Area



Pre-ROD Groundwater Activities

- Plume is limited to area north of Hempstead Turnpike
- Majority of contamination is located on NG property, near western boundary



Pre-ROD Groundwater Activities

- Questions

Navy OU2 ROD (April 2003)

- Onsite groundwater use restrictions and abandonment of onsite Grumman Production Wells (completed late 1990s)
- Operation of onsite groundwater containment system (1998 to current)
- Mass removal at the GM-38 Area:
  - –Investigations, design, and construction- 2001 to 2009
  - –Operation 2009 to current
- Groundwater investigation at GM-75D2 (late 2001):
  - –2002 to 2008 - monitoring well data trend evaluation
  - –Downgradient vertical profile borings - 2008 to current

Navy OU2 ROD (April 2003)

- Technical Assistance Committee (ongoing)
- Public Water Supply Contingency Plan (2003)
- Outpost Monitoring Wells (2003/2004, monitoring continuing)
- Wellhead Protection
  - –SFWD construction - 2010
  - –ANY design - 2010, construction 2011

Navy OU2 ROD (April 2003)

- Questions

Post-ROD Groundwater Activities

- 2000 to 2004 - Navy/NG continues installation of vertical profile borings (VPBs) and monitoring wells
  - –2000 to 2002 - VPBs identify groundwater contamination south of Hempstead Turnpike, some samples are contaminated
  - –2000 to 2001 - Additional monitoring wells installed on and near NG property to allow evaluation of ONCT capture zone
  - –2002 - Identify GM-75 Area as a Hotspot (becomes western deep plume)
- 2006 to 2008 - Navy prepares Work Plan for GM-75 Area Investigation, by 2005, GM-75D2 VOCs are less than 400 µg/L, focus of investigation shifts down gradient

Post-ROD Groundwater Activities

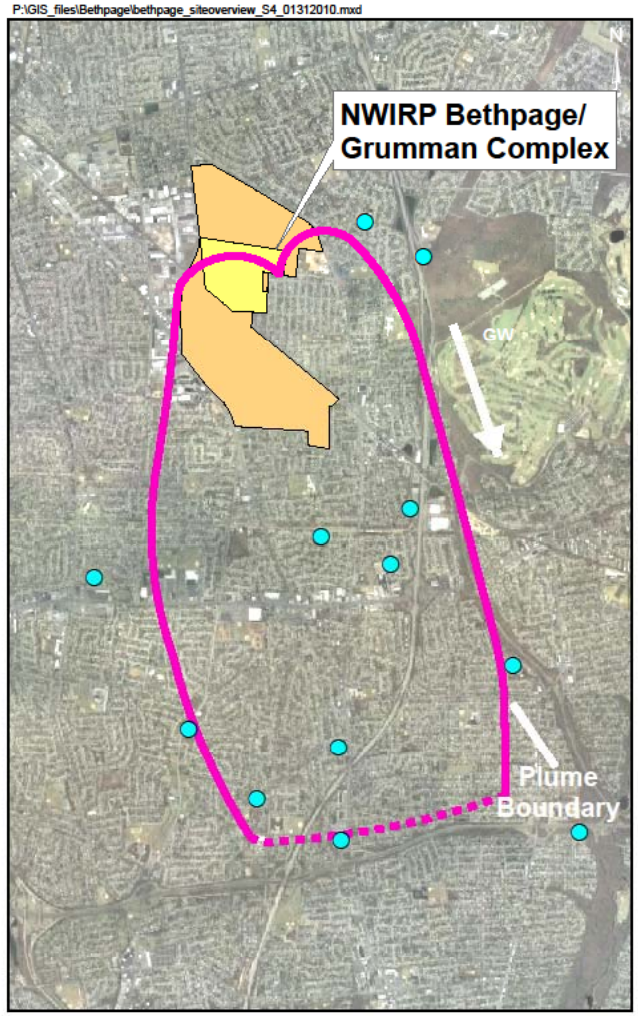
- 2006 to 2009 - NG conducts OU3 Groundwater Investigation, identifies eastern plume,
- 2009 - Installation of hydraulic containment for OU3 Site
- 2008 to current - Navy installs VPBs to better define extent of western deep plume and placement of outpost wells

Post-ROD Groundwater Activities

- Questions

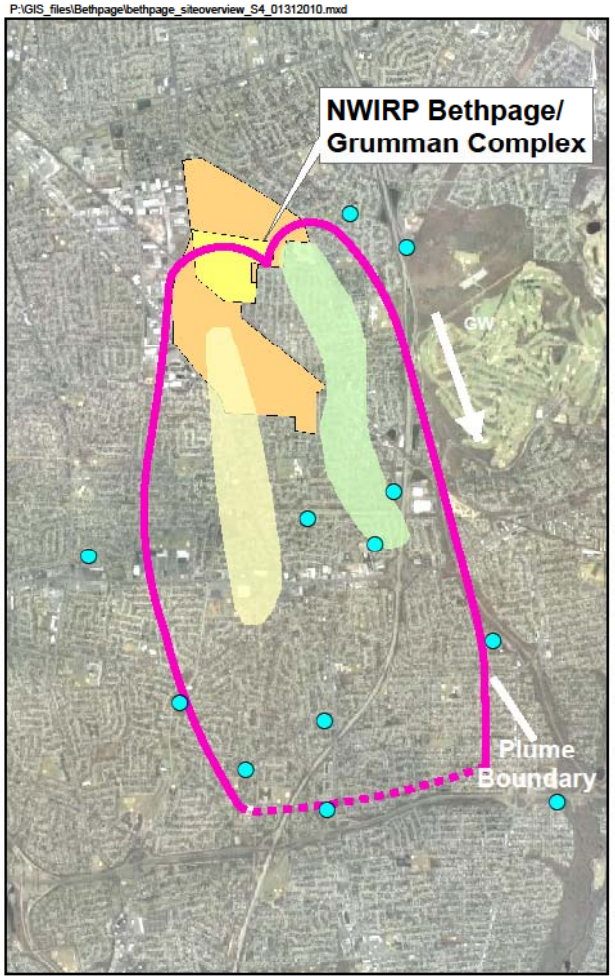
OU2 Groundwater Summary (2010)

- Offsite Groundwater Plume:
  - TCE (90%), PCE, and others
  - 3000+ acres, 1 mile by 3.5+ miles
  - Plume is 150 to 750 feet deep
  - Not all depths affected



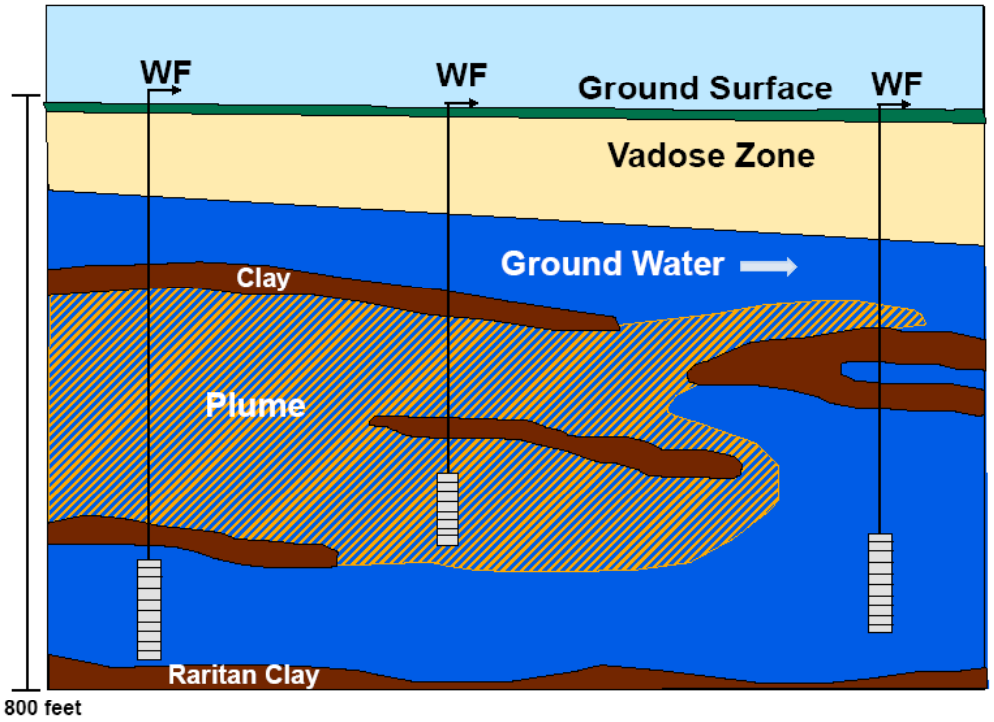
OU2 Groundwater Summary (2010)

- Three general VOC plumes:
  - -Shallow, 150 to 300 feet, 1 to 50 µg/L
  - -Eastern Deep, 300 to 600+ feet, > 500 µg/L
  - -Western Deep, 300 to 750 feet, >100 µg/L
  - -Other sources present



OU2 Groundwater Summary (2010)

- Complex hydrogeology
  - –Discontinuous clay units
  - –First true confining unit 800 feet
  - –Modeling uncertainty
  - –Minimal VOC attenuation



WF : Well Fields – either potable or production

OU2 Groundwater Summary (2010)

- Contamination is deep – 150 to 750 feet, plume thicknesses are variable - not contaminated at all depths
- Monitoring can be challenging,
  - In downgradient area, one monitoring well cluster per 100 acres
  - Lack of physical access
  - Access agreements between Navy and Town/County
- High volume potable water supply well fields (1.3 to 6 MGD) can affect migration locally

OU 2 Offsite Groundwater Contamination

- Access Issues
  - –Dense residential areas – work in residential side-yard or surface water recharge basins
  - –Big rigs, 840 feet borings, 1 to 3 months per location

OU2 Groundwater Summary (2010)

- Questions

Reference Documents/Share Point

- Navy - Initial Assessment Study - 1986 - History of NWIRP Bethpage, geology/hydrogeology
- Navy - Remedial Investigation - 1992 (Phase 1) - Investigations focused on Navy property sources and soils
- NG - Remedial Investigation - 1992 (Phase 1) - Investigations focused on NG property and downgradient groundwater
- Navy - Phase 2 Remedial Investigation - 1993 - Investigations focused on Navy property and near downgradient, includes Navy modeling efforts - downgradient boundary - BWD wells
- NG - Phase II Remedial Investigation - 1996 - Investigations of onsite and offsite groundwater continued, includes NG modeling
- NG - Groundwater Feasibility Study - 2000 - Evaluated onsite and offsite groundwater containment options, includes NG modeling
- NYSDEC - 2001 - OU2 Record of Decision - Identifies both Navy and NG
- Navy - 2003 - OU2 Record of Decision - Identifies Navy actions
- Navy - 2003 - Public Water Supply Contingency Plan
- Navy - 2003 - ONCT Effectiveness Report, evaluates effectiveness of capture system
- NG - 2009 - OU3 Remedial Investigation, identifies sources and off site migration of groundwater contamination
- NG - 1998 to present - Quarterly and Annual Reports, presents groundwater results for monitoring wells and ONCT system operation

NWIRP Bethpage

Questions ?