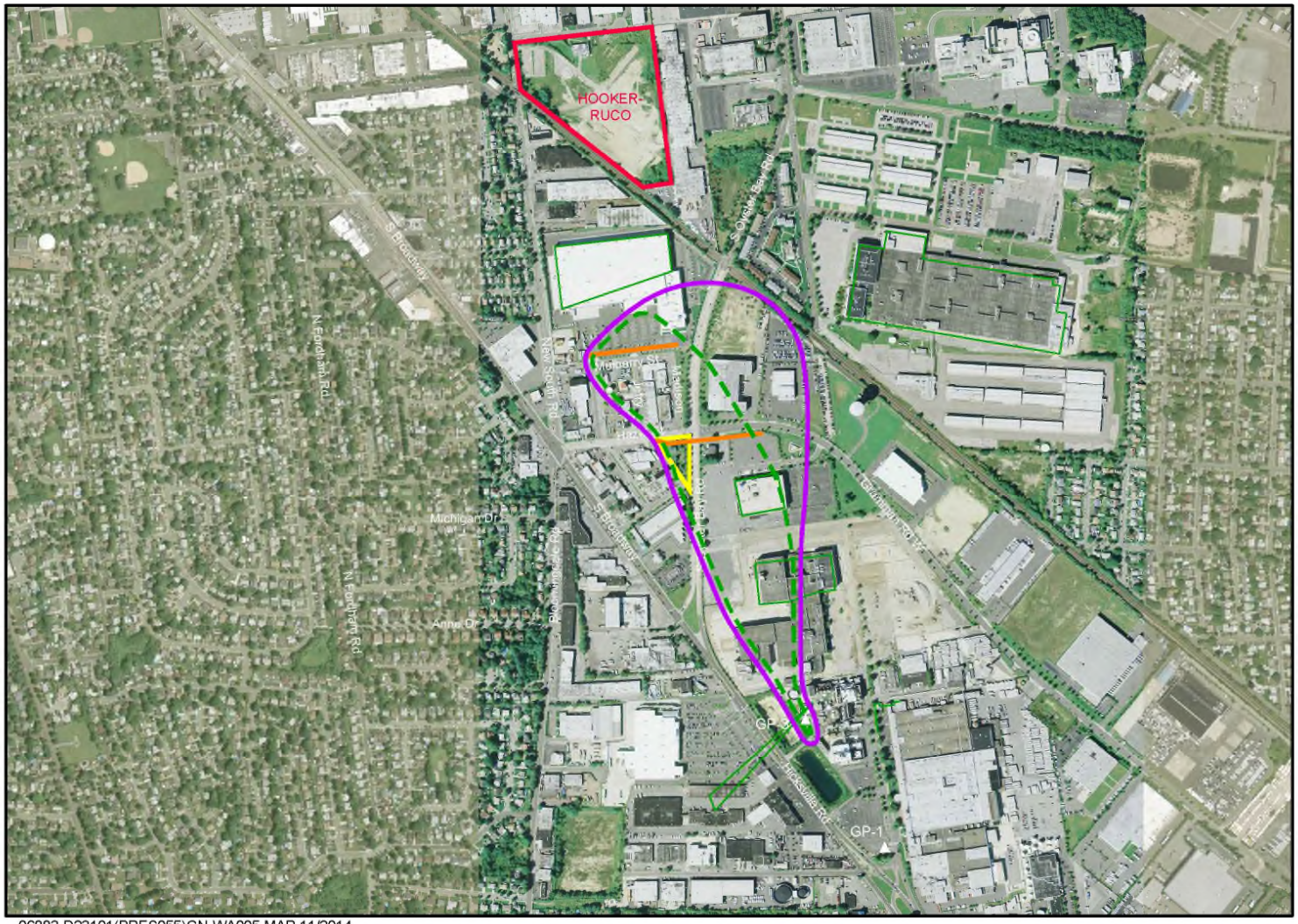
Hooker/Ruco Superfund Site
Hicksville, New York

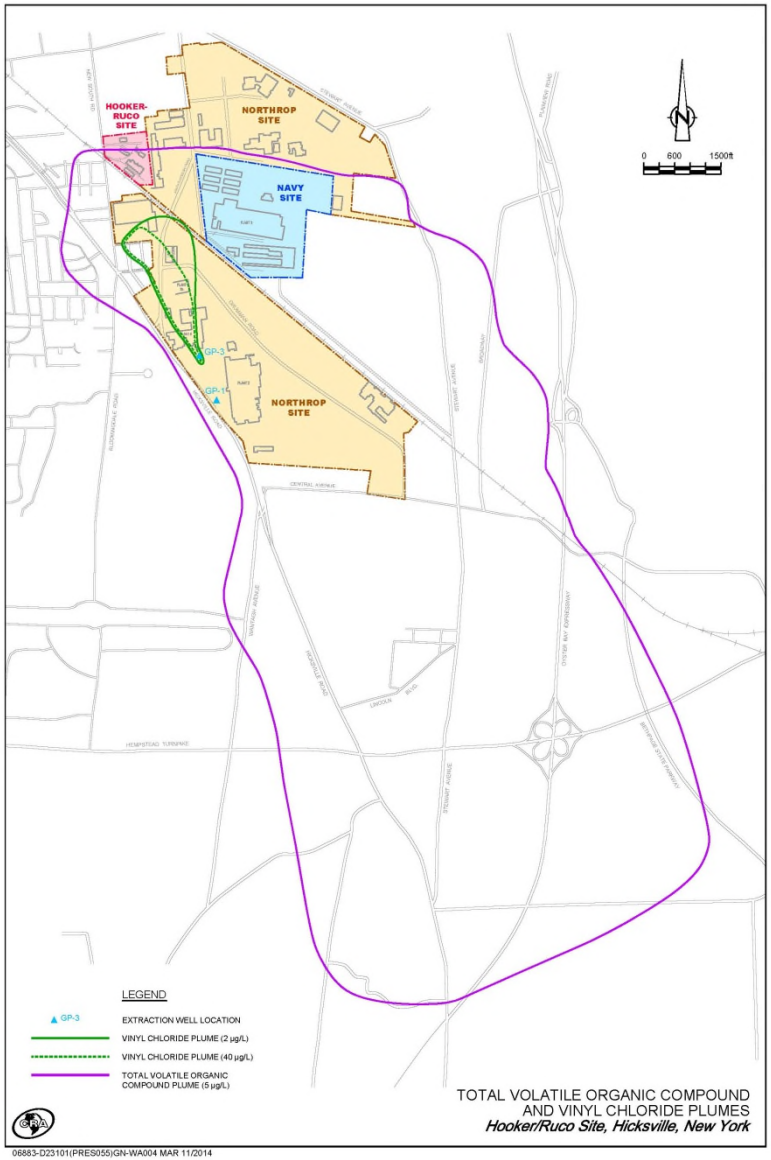
Status Update
April 10, 2014

CONESTOGA-ROVERS & ASSOCIATES



06883-D23101(PRES055)GN-WA005 MAR 11/2014

Where is the Vinyl Chloride?



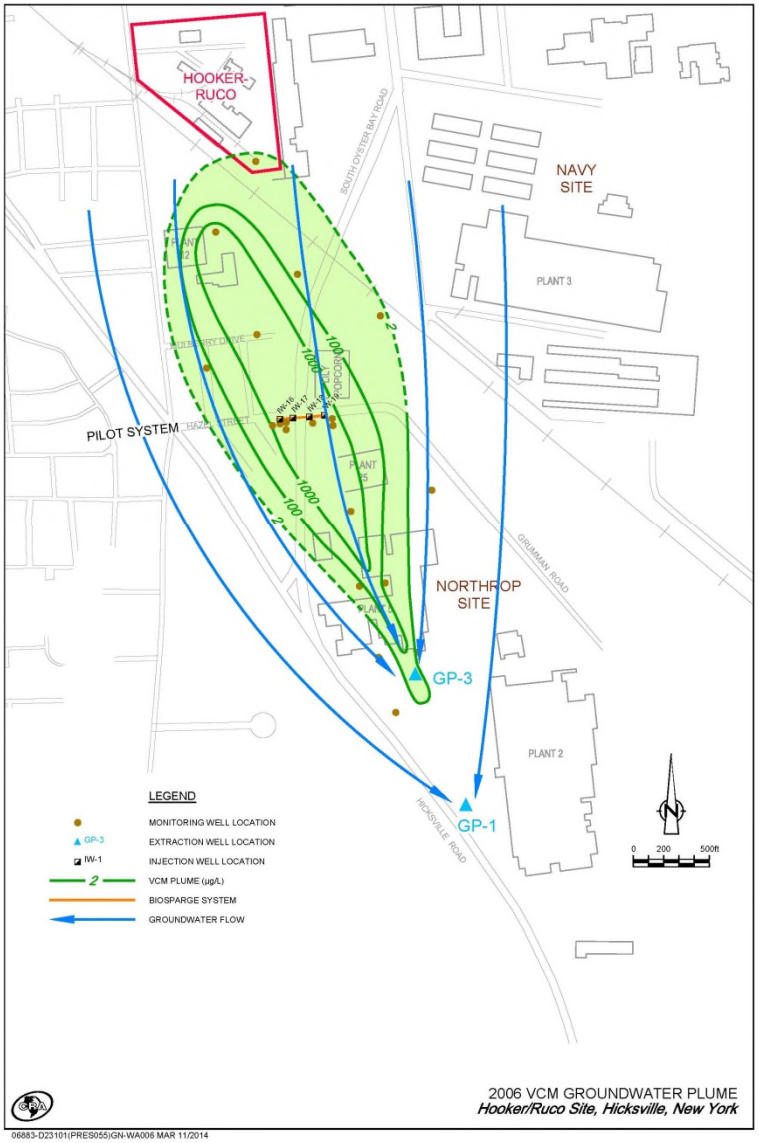
Brief Groundwater Remediation History

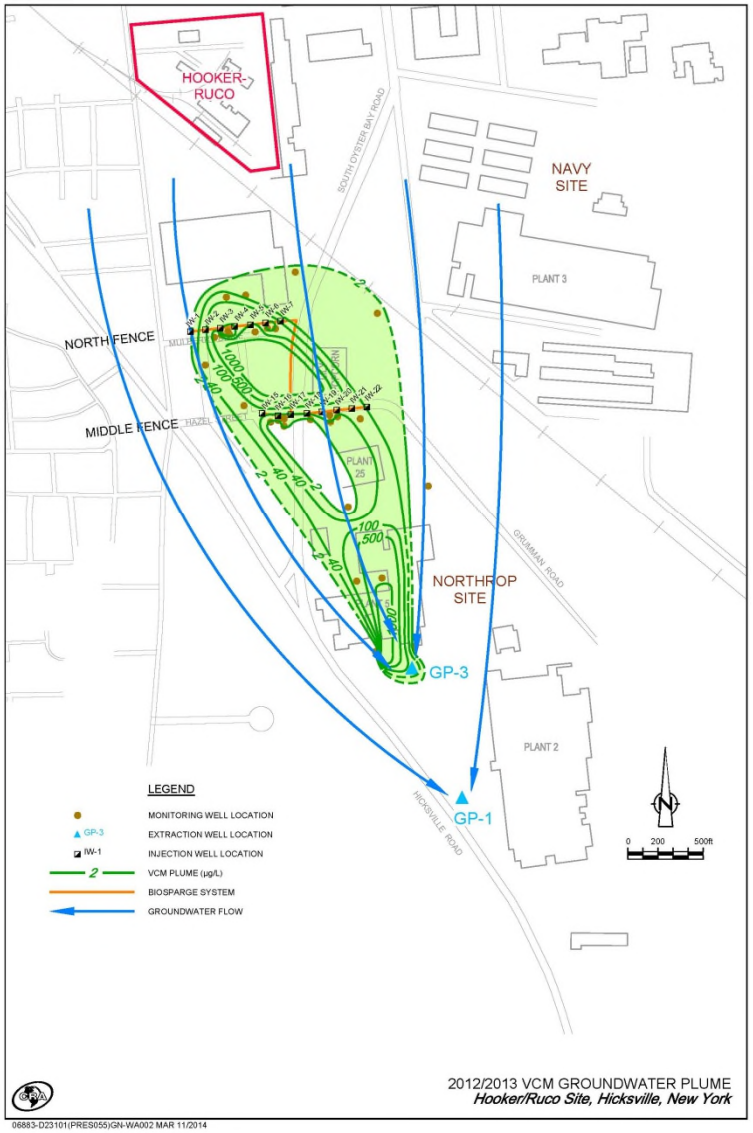
- Construction and Start-Up of Pilot (Experimental) System – 2006
- Pilot System Operation – 2006 through Present
- EPA accepts demonstration of system effectiveness and approves expansion to full scale - January 2010
- Construction of Remainder of Full Scale System – 2012
- Full Scale Treatment System Operation - 2012 through Present

Groundwater Remediation

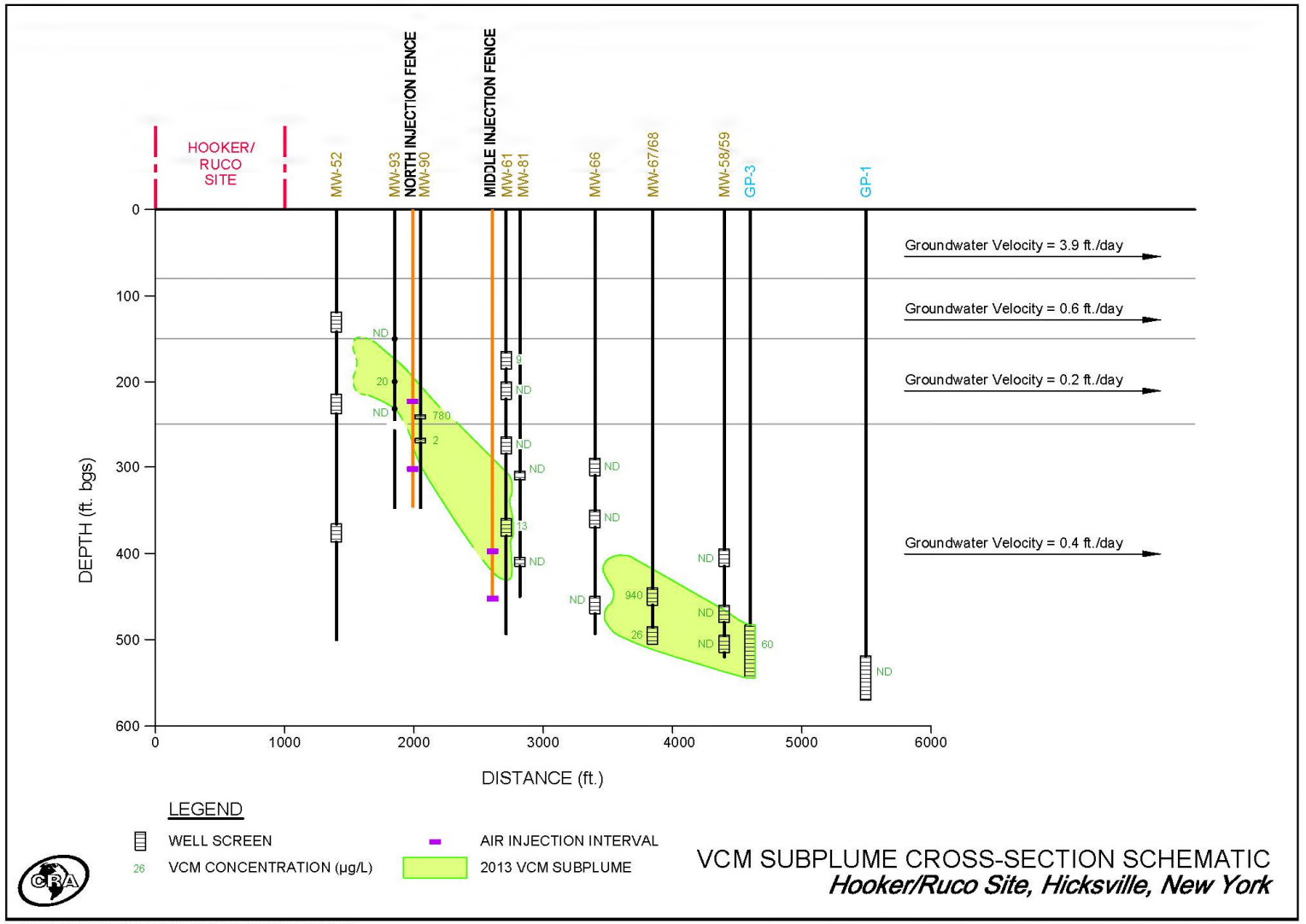
- EPA Approved Remedy
  - Air Injection (Biosparge) into and around the Vinyl Chloride Impacted Groundwater
    - Increases dissolved oxygen, that speeds the biological breakdown of the Vinyl Chloride.
    - Vinyl Chloride then degrades/breaks down to water, carbon dioxide, chloride, and other harmless byproducts.
  - Measure of Effectiveness
    - Increased levels of dissolved oxygen
    - Reduced concentrations of Vinyl Chloride

Then and Now


HOOKER-RUCO
NAVY SITE
PLANT 3
PLANT 25
PLANT 2
NORTHROP SITE
PILOT SYSTEM
GP-3
GP-1
SOUTH OYSTER BAY ROAD
GRUMMAN ROAD
HICKSVILLE ROAD
LEGEND
MONITORING WELL LOCATION
EXTRACTION WELL LOCATION
INJECTION WELL LOCATION
VCM PLUME (µg/L)
BIOSPARGE SYSTEM
GROUNDWATER FLOW
0 200 500ft
2006 VCM GROUNDWATER PLUME
Hooker/Ruco Site, Hicksville, New York
06883-D23101(PRES055)GN-WA006 MAR 11/2014


HOOKER-RUCO
NAVY SITE
PLANT 3
PLANT 25
PLANT 2
NORTH FENCE
MIDDLE FENCE
NORTHROP SITE
GP-3
GP-1
SOUTH OYSTER BAY ROAD
GRUMMAN ROAD
HICKSVILLE ROAD
LEGEND
MONITORING WELL LOCATION
EXTRACTION WELL LOCATION
INJECTION WELL LOCATION
VCM PLUME (µg/L)
BIOSPARGE SYSTEM
GROUNDWATER FLOW
0 200 500ft
2012/2013 VCM GROUNDWATER PLUME
Hooker/Ruco Site, Hicksville, New York
06883-D23101(PRES055)GN-WA002 MAR 11/2014

Cross Sectional View



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Current Status

- Full Scale System has been operating since October 2012
  - System is working as designed
  - Results have been as expected
    - Oxygen concentrations have increased
    - Vinyl Chloride concentrations have decreased
  - The Vinyl Chloride plume is shrinking
  - Operation and Monitoring will continue

Summary of OM&M Activities

Technical Advisory Committee Meeting
Operable Unit 2
Northrop Grumman Systems Corporation, Bethpage, New York
April 10, 2014

NORTHROP GRUMMAN

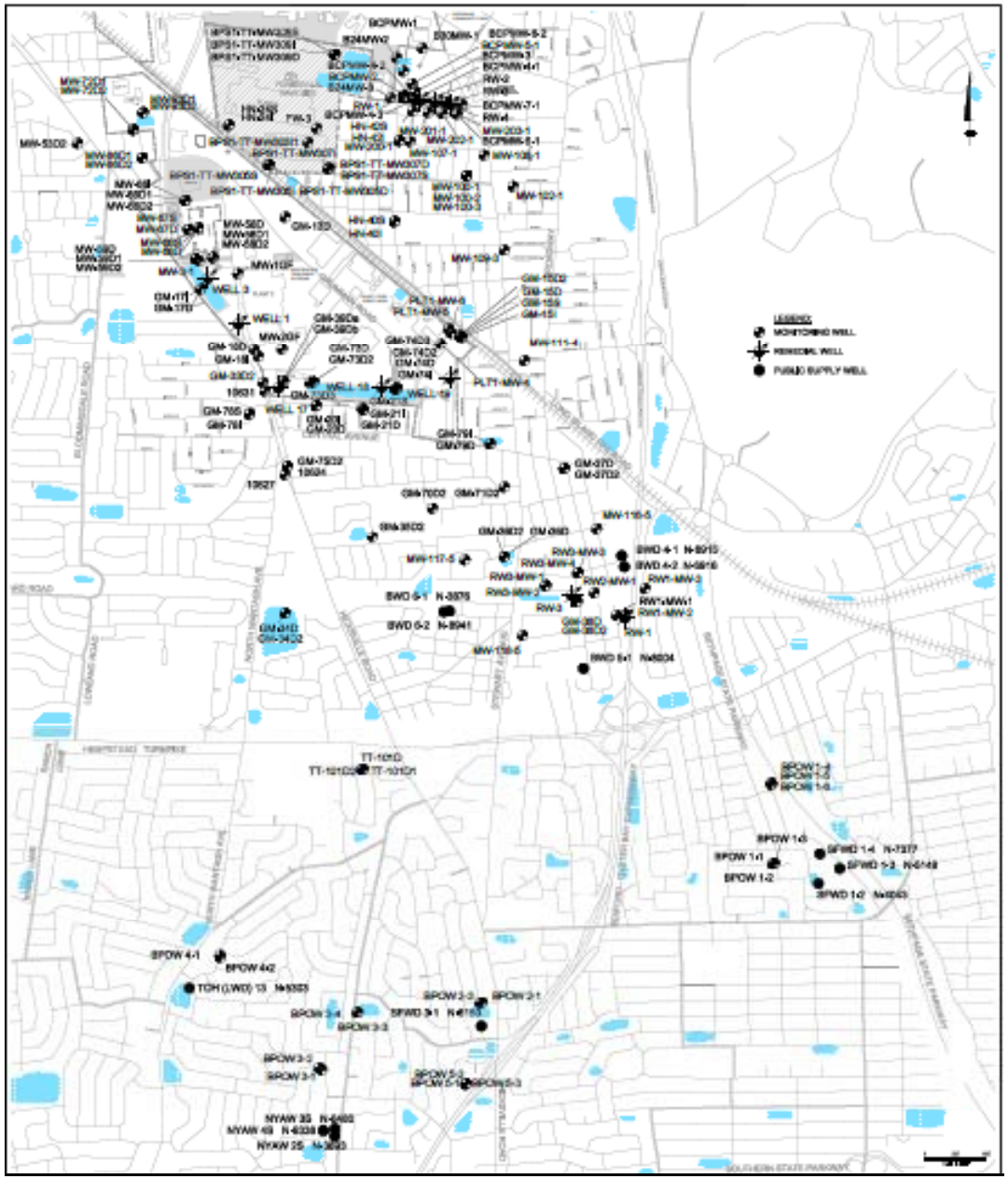
ARCADIS

Agenda Topics

- Comprehensive Groundwater Sampling
- Long-Term ONCT System Operation and Monitoring
- Reports in Progress
- Q&A

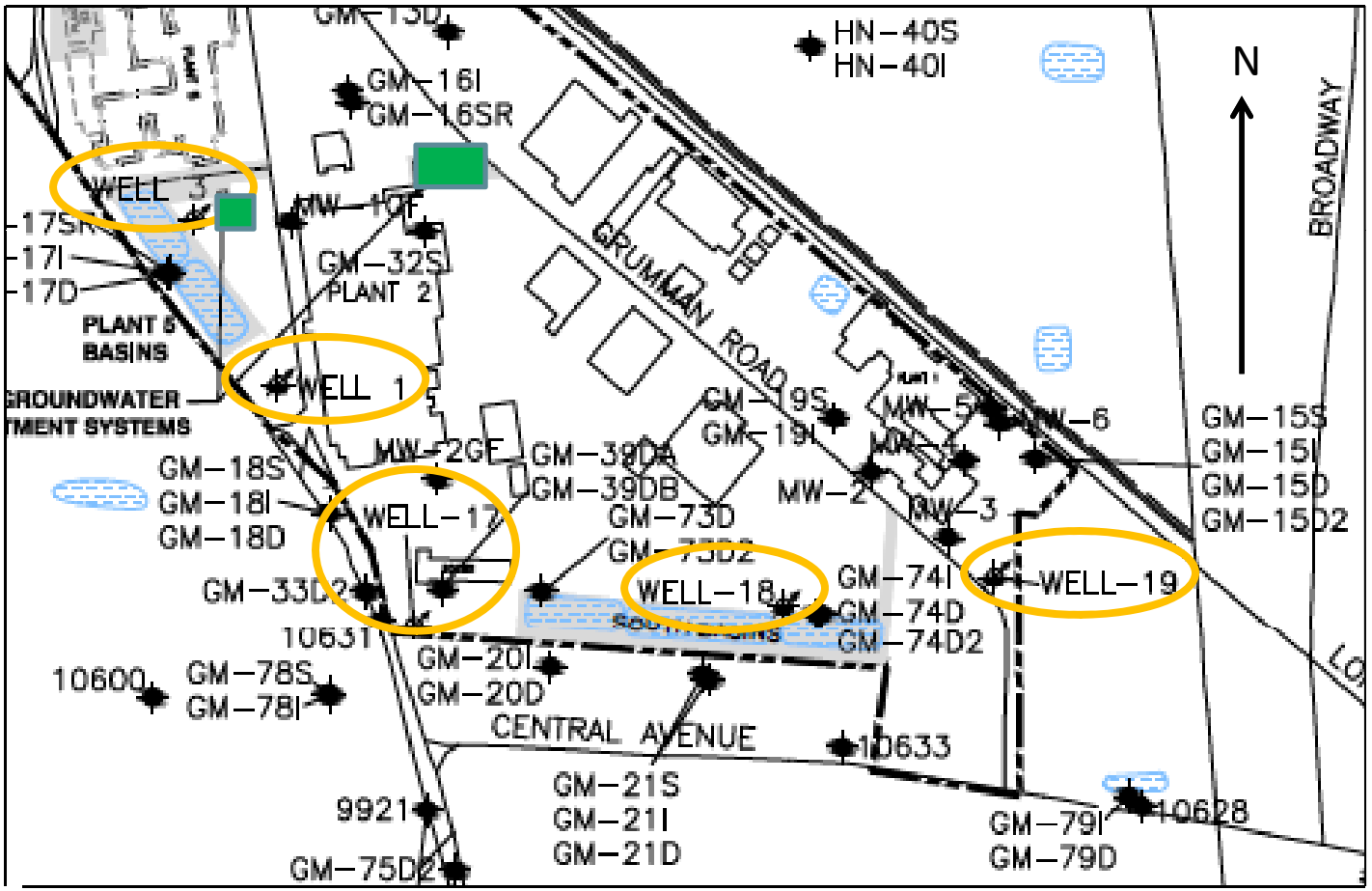
Comprehensive Groundwater Sampling

- Performed from April to June 2013
- Total of 152 Wells Owned by Northrop Grumman, Navy and OCC/RUCO
- Total of eight water district well-fields (Bethpage, South Farmingdale, Town of Hempstead/Levittown, and New York American Water)
- Sampling Zones: Shallow, Intermediate, Deep, Deep2, and Deep3.
- Analytes: VOCs; subset also for Cd/Cr
- October 2013 - Tabulated results to NYSDEC
- April 2014 - NYSDEC request for report of results



Comprehensive Groundwater Sampling Locations

Long Term ONCT System Operation and Monitoring

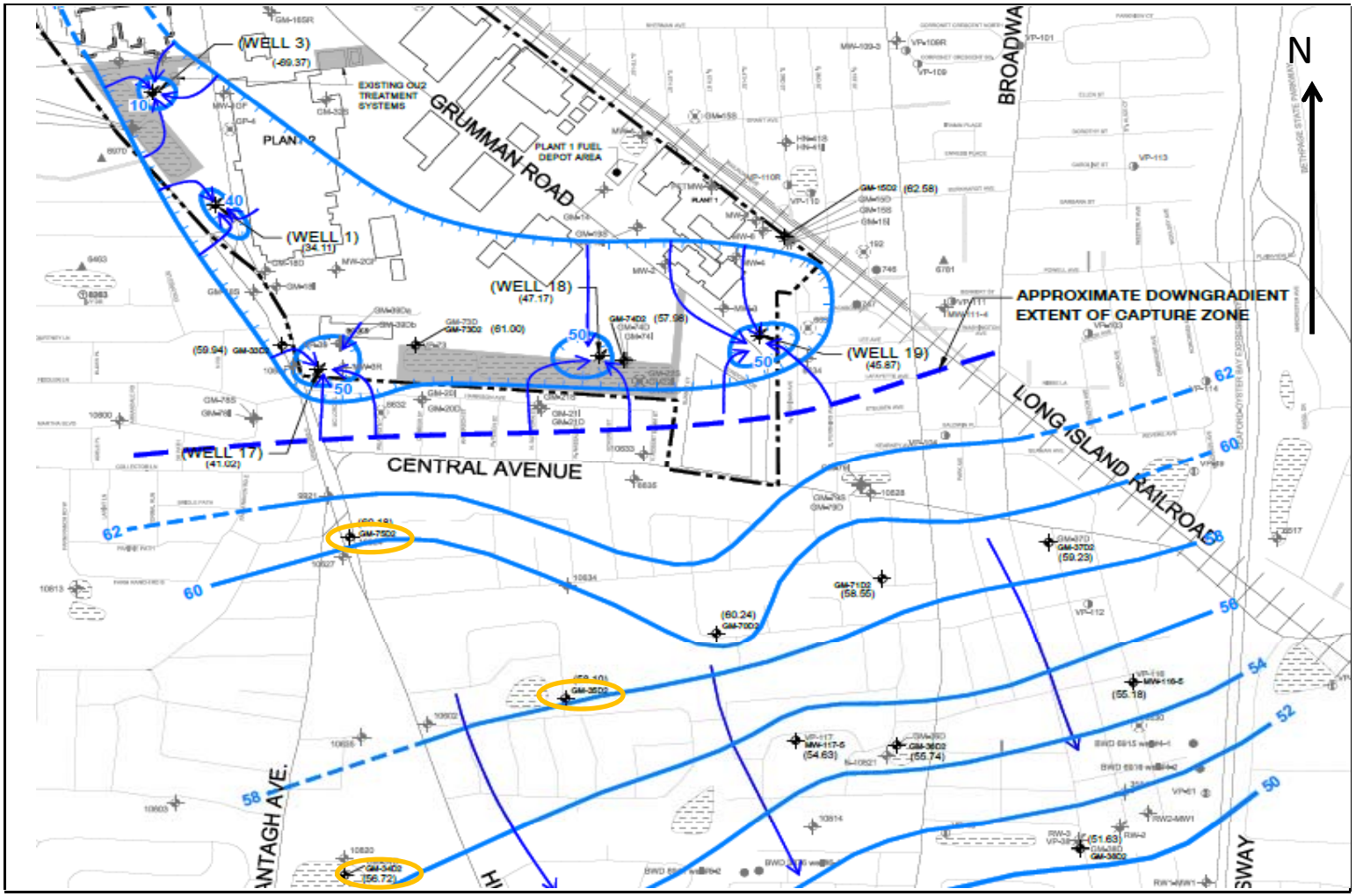


ONCT System Performance Year 2012

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, Fourth Quarter 2012, Year 2012, and Period of Record, Northrop Grumman Systems Corporation, Bethpage, New York. [1]

Identification	Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Annual Flow Volumes (MG)			VOC Concentrations (ug/L)		VOC Mass Removed (lbs) [7]		
	Design [2]	Average [3,4]	Design [2]	Actual [3,4]	% of Design	Design [2]	Actual [3,4]	% of Design	TCE [5]	TVOC [5,6]	Quarterly	Annual	Cumulative
Influent Groundwater													
Well 1 [10]	800	812	112.9	112.3	99%	419.3	338.7	81%	410	478	449	1,318	34,841
Well 3 [11]	700	715	98.8	98.9	100%	366.9	354.0	96%	1,500	1,666	1,348	5,203	78,938
Well 17 [12]	1,000	1,060	141.1	130.1	92%	524.2	507.6	97%	230	280	298	1,131	48,848
Well 18 [12]	600	630	84.7	80.8	95%	314.5	317.6	101%	66	90	60	231	5,304
Well 19 [12]	700	709	98.8	91.0	92%	366.9	359.0	98%	180	217	161	646	5,811
Total	3,800	3,926	536	513	96%	1,992	1,877	94%	--	--	2,316	8,529	173,742
Effluent Groundwater [8]													
Calpine	100 - 400	160	--	21.4	--	--	118.2	--	--	--	--	--	--
OXY Biosparge	14 - 54	3.7	--	0.5	--	--	1.0	--	--	--	--	--	--
West Recharge Basins	1,112 - 1,455	977	--	137.9	--	--	384.3	--	--	1.06	--	--	--
South Recharge Basins [12]	2,231	2,504	314.8	353.3	112%	1,169.4	1,373.4	117%	--	0.44	--	--	--
Total	--	3,645	--	513	--	--	1,877	--	--	--	--	--	--
Treatment Efficiencies [9]													
Tower 96 System Efficiency:	99.9%												
Tower 102 System Efficiency:	>99.9%												

ONCT System Capture Zone – Year 2012



TVOC Trends in Key Monitoring Wells

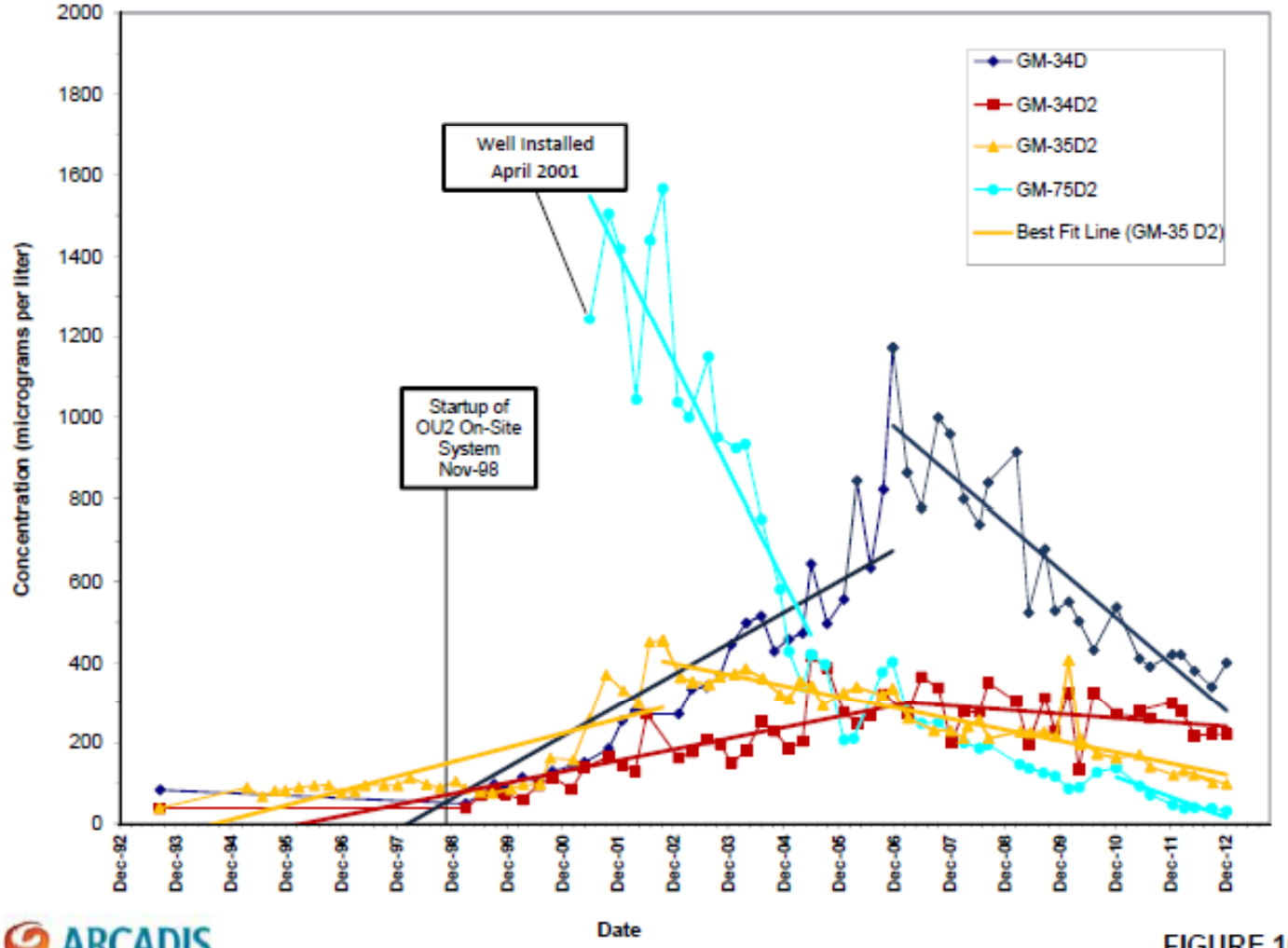


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FIGURE 10

Reports in Progress

- Phase 2 ONCT System Hydraulic Effectiveness Data Report
- ONCT System Periodic Review Report – Year 2013
- Report of Results of Comprehensive Groundwater Sampling

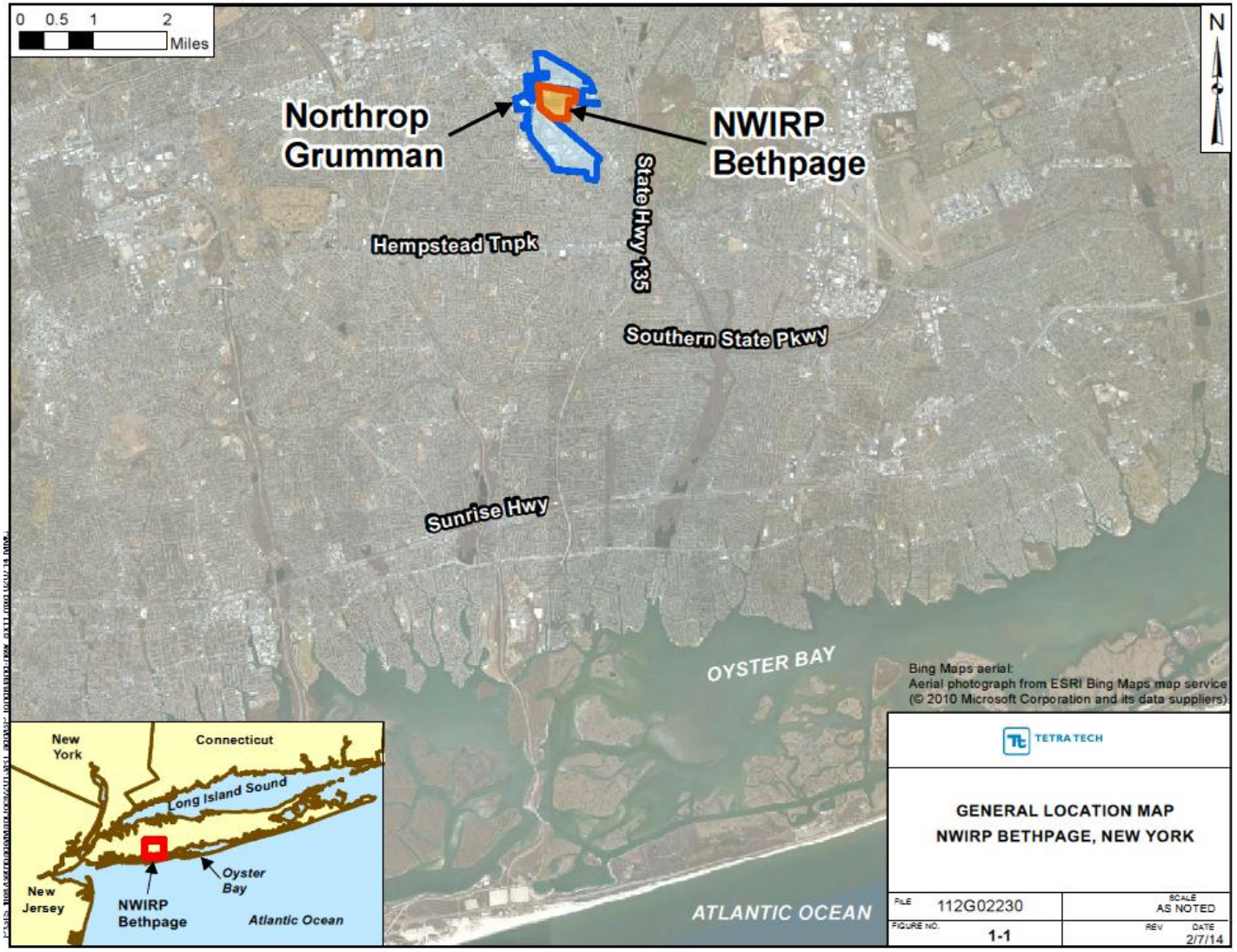
Questions?

GM-38 GROUNDWATER TREATMENT PLANT OPERATION AND CAPTURE ZONE EVALUATION APRIL 2014 TECHNICAL ADVISORY COMMITTEE (TAC)

NWIRP BETHPAGE
LONG ISLAND, NEW YORK

04/10/2014

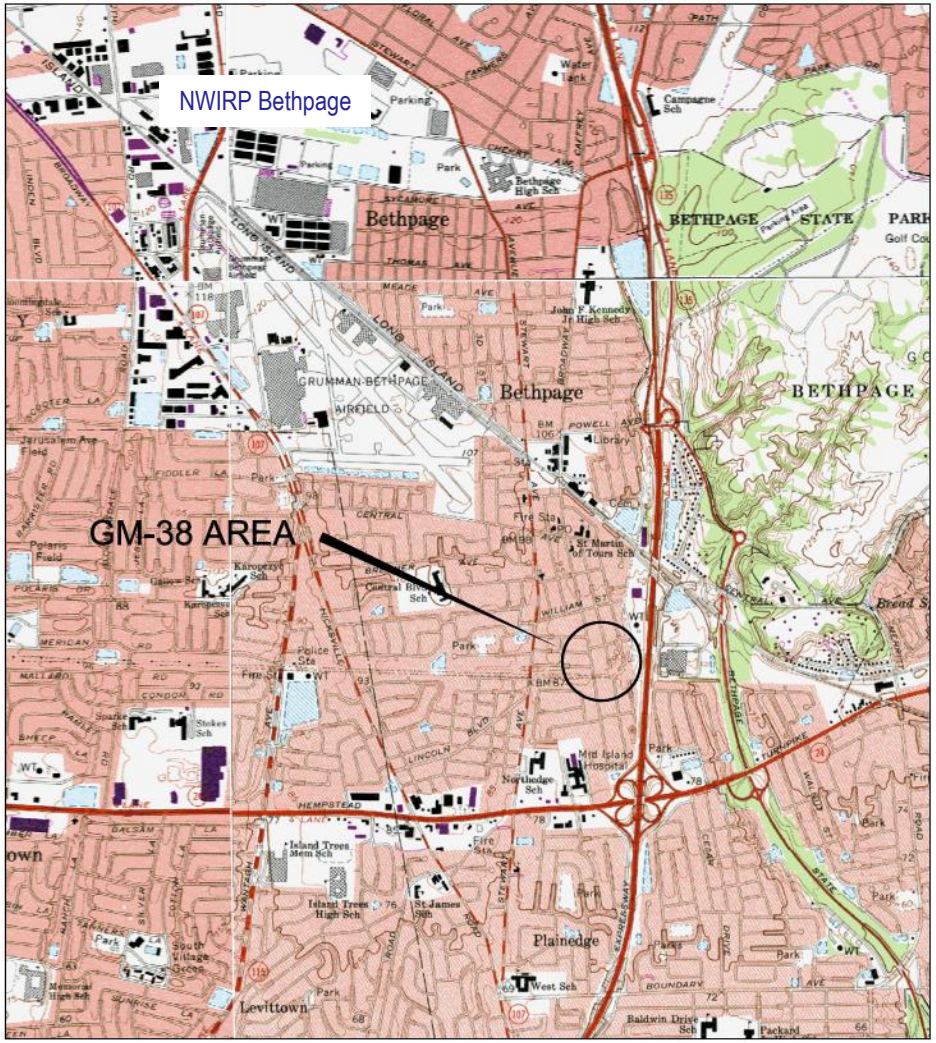
Introduction



Introduction

GM-38 Groundwater Treatment System

- Objective
- Construction and Operation
- Capture Zone Evaluation
- Path Forward



Objective

From the Operable Unit 2 Record of Decision (April 2003):

- "The main objective of the GM-38 well area remedy would be additional protection of human health by reducing the future elevated mass contaminant load to the down gradient public water supplies. The remedy would also enhance the long-term natural process of aquifer restoration."

Construction and Operation

- GM-38 Treatment System consists of the following components:
  - –Two groundwater recovery wells RW-1 and RW-3
  - –Equalization Tank
  - –Air Stripping Tower
  - –Liquid Phase Granular Activated Carbon Polishing
  - –Discharge to a Recharge Basin
  - –Vapor Phase Treatment using Granular Activated Carbon and Permanganate-Based Resin

Operation

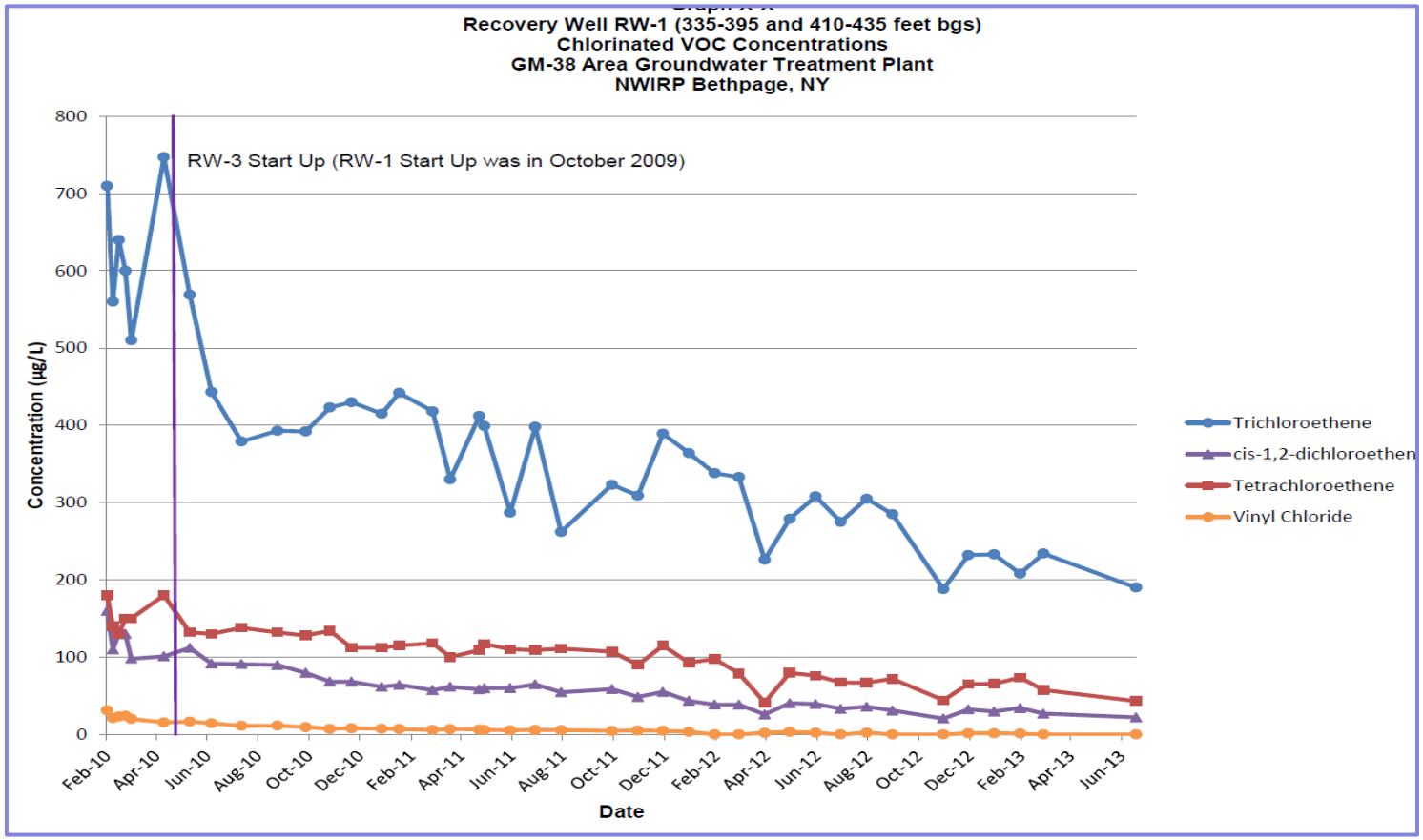

MW-116-5
VPB-42
GM-36D
GM-36D2
BWD 4-1
BWD 4-2
Recharge Basin
GM-38D2
GM-38D
VPB-51
Treatment Plant
GM-38RW03
GM-38 RW2-MW2
VPB-48
GM-38RW02
VPB-38
Recovery Well RW03
GM-38RW01
GM-38 RW1-MW1
Miller Rd
MW-118-5
Recovery Well RW01
VPB-47
VPB-40
BWD 5-1

Operation

- Since Startup, System has treated:
  - 2 Billion gallons of water (2.2 times the Hotspot Volume), and
  - 7,500 pounds of volatile organics
- Monthly compliance sampling of water and air – Consistently achieves requirements
- Quarterly to bi-annual sampling of groundwater monitoring wells
  - December 2013
  - March 2014
  - September 2014
- Two month shutdown in October 2013 for maintenance:
  - Replace duct work
  - Carbon Change outs – liquid and vapor phase
- Normal runtime is 95% - power outages and schedule maintenance

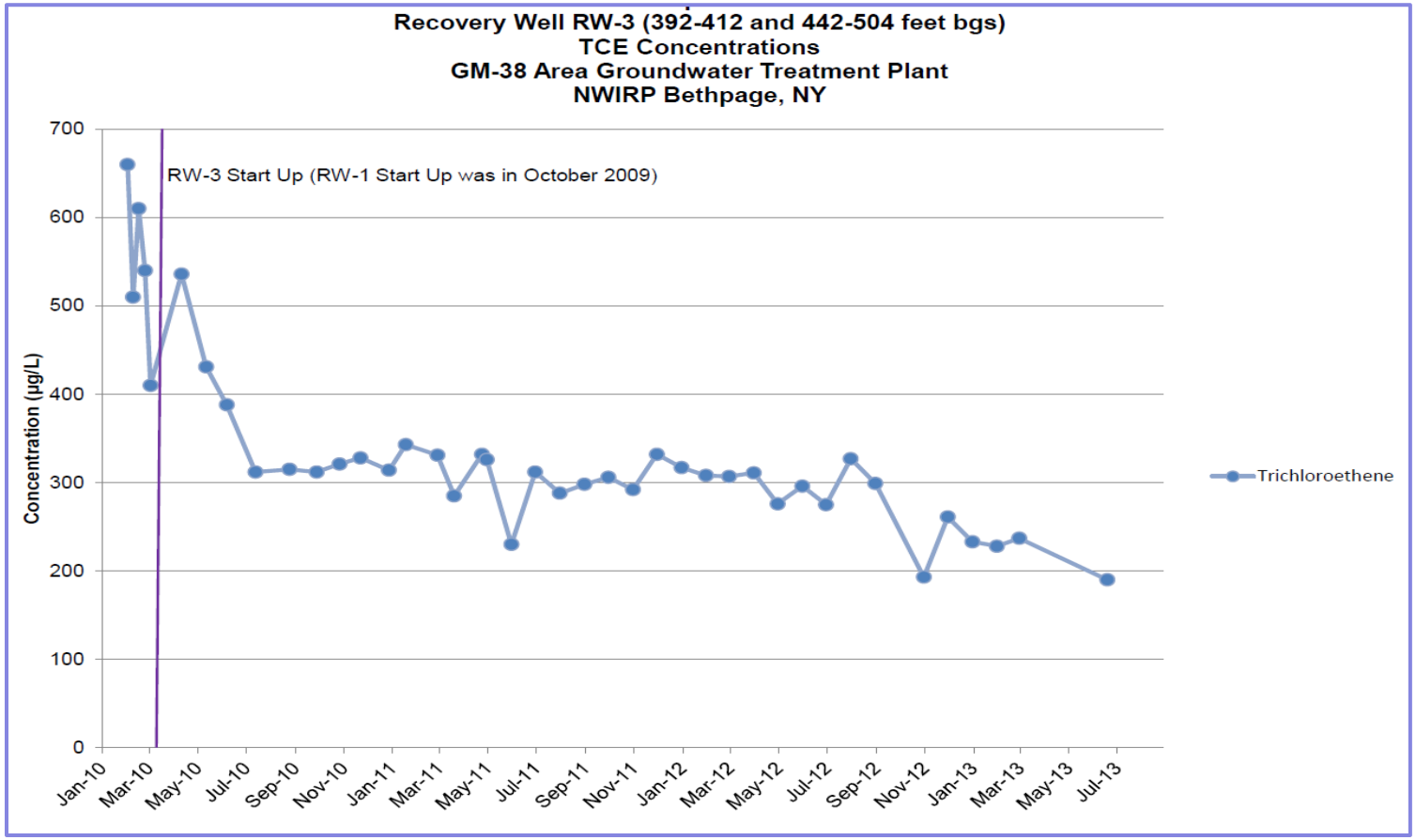
Operation – Recovery Well RW01

- Well extracts from upper and middle portion of Hotspot – less than 435 feet
- 75% Reduction in volatile organics since startup

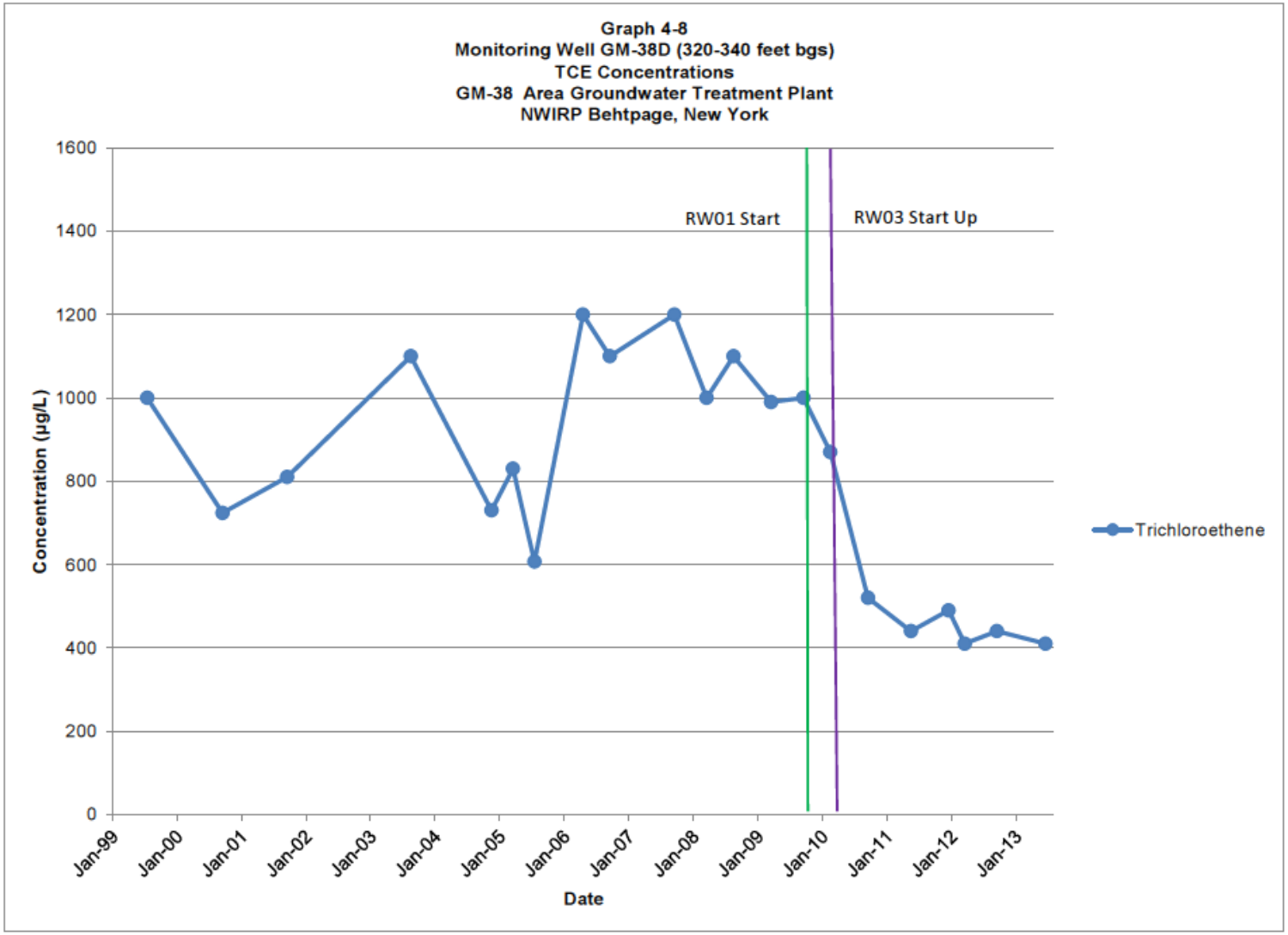


Operation – Recovery Well RW03

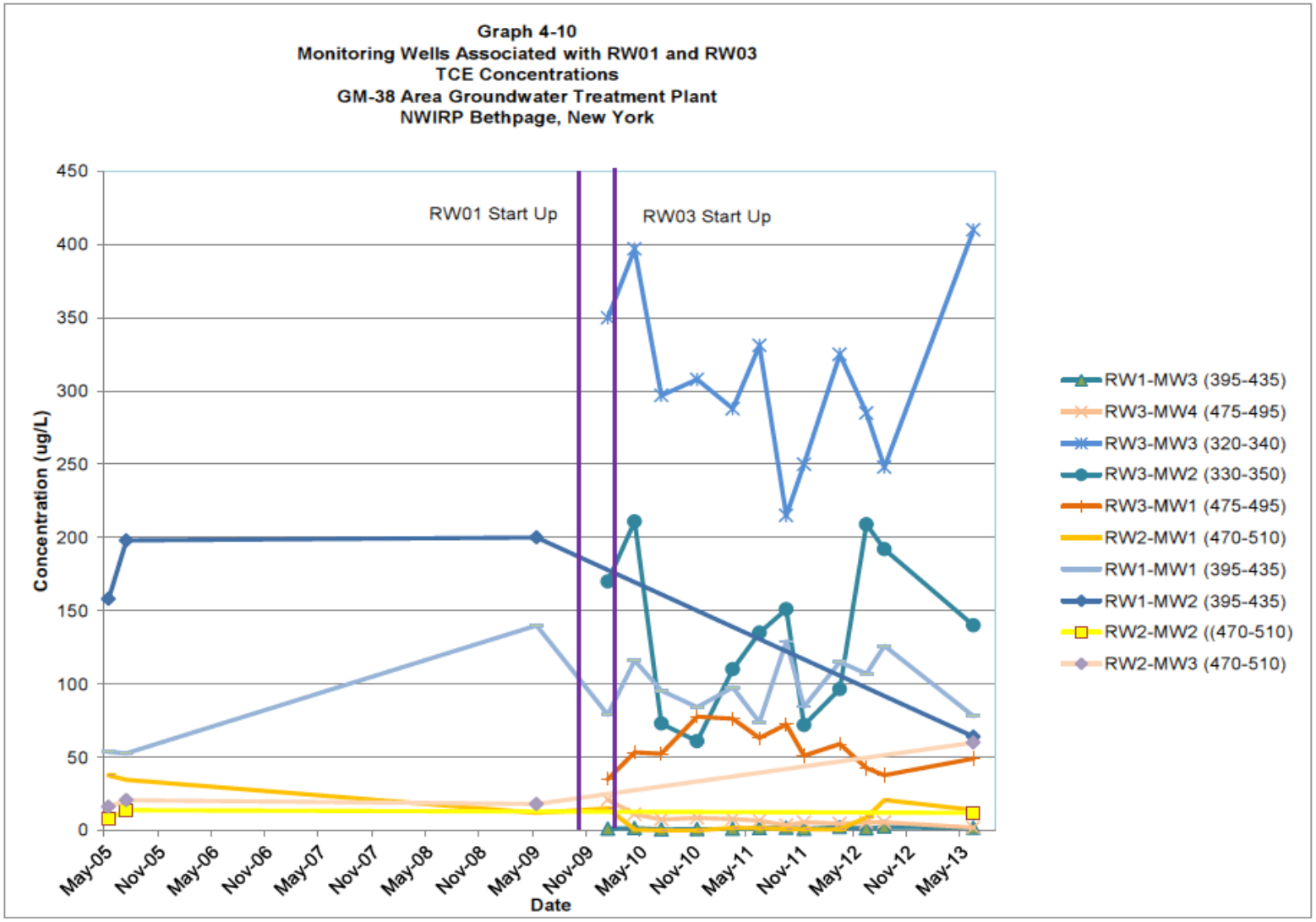
- Well extracts from middle and lower portion of Hotspot – 392 to 504 feet
- 75% Reduction in Trichloroethene (TCE) since startup



Monitoring Well Results



Monitoring Well Results



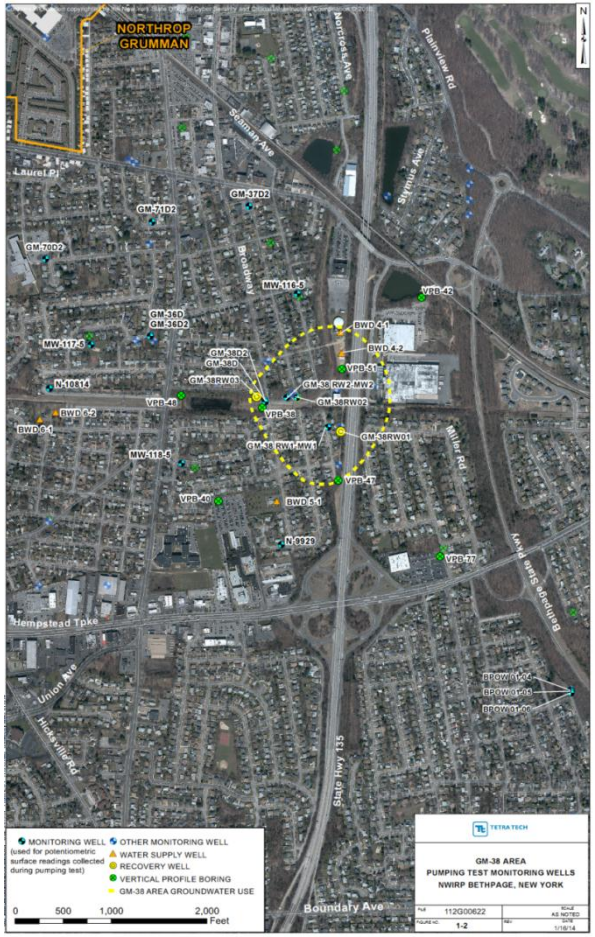
Monitoring Well Results Summary

- Deeper groundwater (greater than 450 feet)
  - –TCE concentrations were originally greater 1,200 micrograms per liter (µg/L) (GM-38D2)
  - –TCE concentrations are currently less than 50 µg/L

- Shallower groundwater (320 to 435 feet)
  - –TCE concentrations decrease shortly after startup of the GM-38 System
  - –TCE concentrations have remained relatively steady since startup (GM-38D2)
  - –Sustained concentration in up-gradient wells suggest continuing source of volatile organics to the north

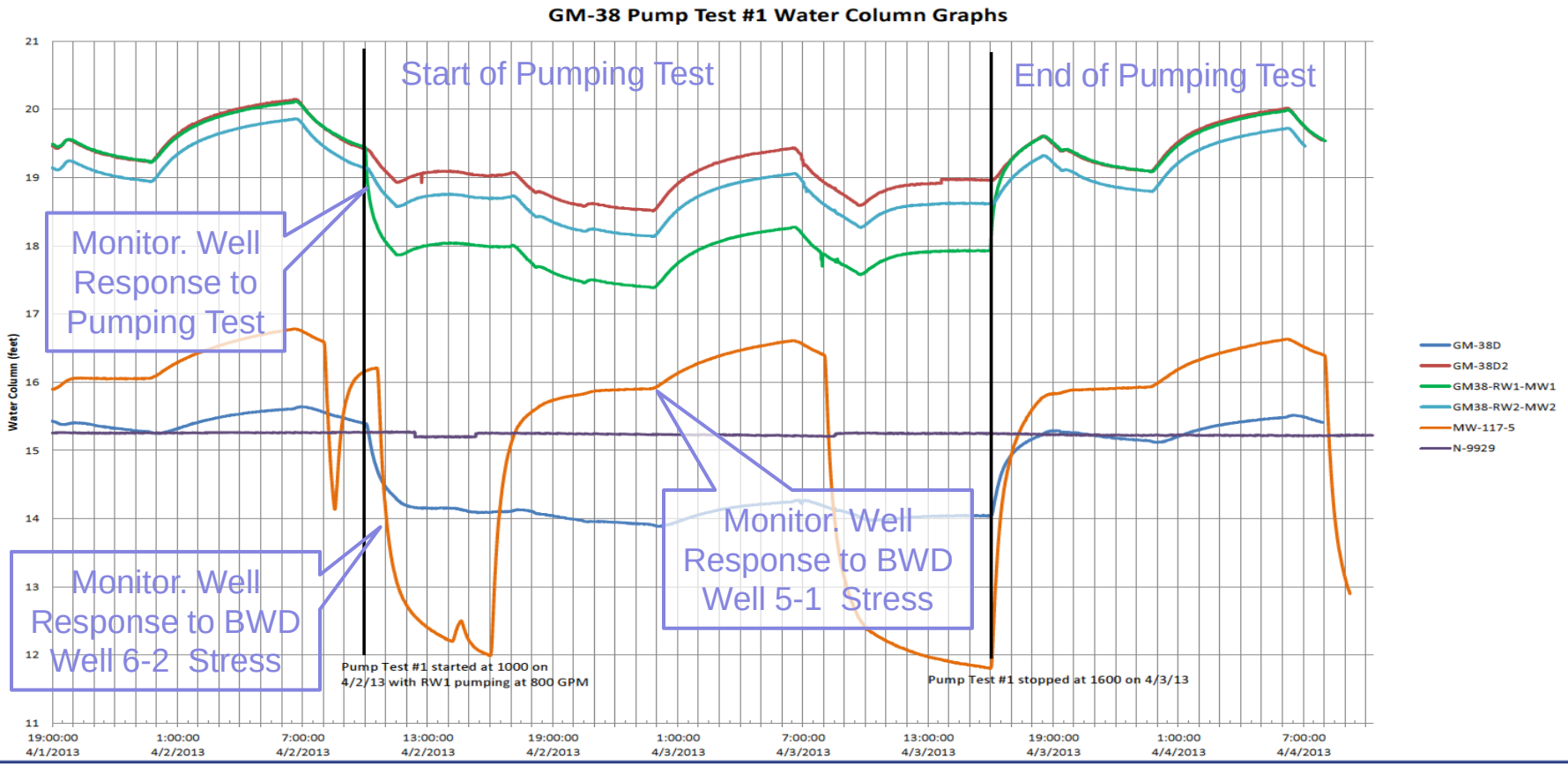
Capture Zone Analysis

- Objective is to evaluate whether the system is capturing the hotspot groundwater as designed
- Conducted four pumping tests at the GM-38 Area in April 2013 – coordinated with Bethpage Water District (BWD)
- Monitored 18 wells with screen depths of 50 to 757 feet below ground surface
- Water levels were recorded over a two-week period
- United States Geological Survey (USGS) is supporting evaluation – and recently issued it own evaluation report
- Also, a year-long area-wide evaluation is ongoing



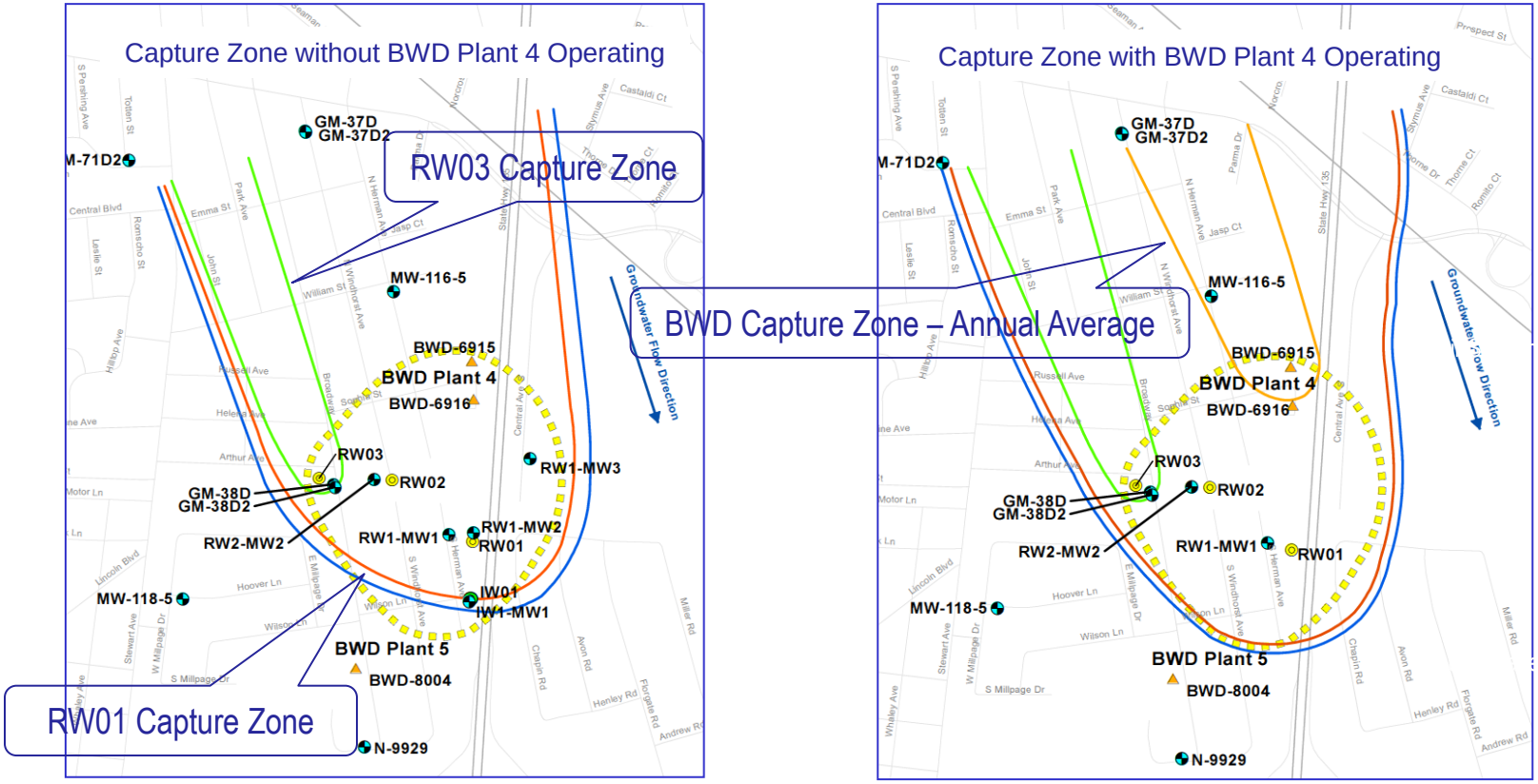
Capture Zone Analysis

- Example of Water Level Readings
- Recovery Well RW01 running at 800 gallons per minute (420 million gallons per year)
- Note response of some wells to BWD Wells 5-1 and 6-2



Capture Zone Analysis

- Evaluation indicates 95 to 100 percent capture of GM-38 Area Groundwater
- Southwest piece of hotspot and capture zone (Without BWP Plant 4 Operating) is within range of accuracy of hotspot delineation and capture calculations



Conclusions and Path Forward

- RW01 provides the vast majority of mass removal
  - Central location, high pumping rate, and screen depth is better matched to GM-38 Area Groundwater
  - Continue operation, but discuss future operation with New York State Department of Environmental Conservation
- RW03 is not optimally located
  - Located near northwest corner of GM-38 Area Groundwater
  - Shallow screen zone is redundant with RW01 and deeper screen zone is no longer located within significant organic mass
  - Discontinue operation
- Navy to consider investigation of shallower groundwater quality north of the GM-38 Area to identify source of continuing organics