



Mr. Steven Scharf, P.E.
New York State Department of Environmental Conservation (NYSDEC)
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Subject:

Results of First Quarter 2013 Groundwater Monitoring,
Operable Unit 2, Northrop Grumman Systems Corporation and Naval Weapons
Industrial Reserve Plant (NWIRP) Sites, Bethpage, New York.
(NYSDEC Site #s 1-30-003A and B)

Dear Mr. Scharf:

On behalf of Northrop Grumman Systems Corporation (Northrop Grumman),
ARCADIS is providing the NYSDEC with the validated results of Operable Unit 2
(OU2) groundwater monitoring, performed in accordance with the approved
groundwater monitoring plan (ARCADIS G&M, Inc. 2006) and the Public Water
Supply Contingency Plan (PWSCP) (ARCADIS G&M, Inc. 2003), plus additional
wells installed by the Navy that Northrop Grumman agreed to monitor on a voluntary
basis. Table 1 provides OU2 remedial system performance operational data and
water balance. Tables 2 and 3 provide the validated analytical results of monitoring
for this period. Figure 1 shows the site plan with well locations.

Please contact us if you have any questions or comments.

Sincerely,

ARCADIS of New York, Inc.

David E. Stern
Senior Hydrogeologist

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Project Manager

Enclosures

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ENVIRONMENT

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NY001496.0312.GWMI4

Imagine the result

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Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, First Quarter 2013, Northrop Grumman Systems Corporation, Bethpage, New York. ⁽¹⁾

Identification	Flow Rates (gpm)		Quarterly Flow Volumes (MG)			VOC Concentrations (ug/L)		VOC Mass Removed (lbs) ⁽⁷⁾
	Design ⁽²⁾	Average ^(3,4)	Design ⁽²⁾	Actual ^(3,4)	% of Design	TCE ⁽⁵⁾	TVOC ^(5,6)	Quarterly
<u>Influent Groundwater</u>								
Well 1	800	804	96.8	93.4	96%	360	424	331
Well 3	700	710	84.7	82.5	97%	1,400	1,550	1,046
Well 17	1,000	981	121.0	117.4	97%	210	254	244
Well 18	600	627	72.6	75.1	103%	60	82	51
Well 19	700	728	84.7	86.2	102%	190	226	160
Total	3,800	3,850	460	455	99%	--	--	1,832
<u>Effluent Groundwater</u> ⁽⁸⁾								
Calpine	100 - 400	40	--	5.0	--	--	--	--
OXY Biosparge ⁽¹⁰⁾	2 - 42	4.1	--	0.5	--	--	--	--
West Recharge Basins	1,112 - 1,455	978	--	118.3	--	--	0.63	--
South Recharge Basins ⁽¹¹⁾	2,231	2,735	269.9	330.8	123%	--	0.94	--
Total	--	3,757	--	455	--	--	--	--
<u>Treatment Efficiencies</u> ⁽⁹⁾								
Tower 96 System Efficiency:	99.9%							
Tower 102 System Efficiency:	99.6%							

see footnotes on last page

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, First Quarter 2013, Northrop Grumman Systems Corporation, Bethpage, New York. ⁽¹⁾

Notes:

- (1) Quarterly reporting period: January 07, 2013 through April 01, 2013
- (2) "Design" flow rates were determined for the five remedial wells and for the South Recharge Basins based on computer modeling (ARCADIS G&M, Inc. 2003c, modified in April 2005). Flow rates for Calpine, OXY Biosparge and West Recharge Basins are typical flow rates and are provided for reader information. "Design" flow volumes represent the volume of water that should be pumped/discharged during the reporting period and is calculated by multiplying the design rate by the reporting period duration.
- (3) "Average" flow rates for the remedial wells represent the average actual pumping rates when the pumps are operational and do not take into account the time that a well is not operational. During this reporting period, the remedial wells operated for the following percentage of the time: Well 1 (96%), Well 3 (96%), Well 17 (99%), Well 18 (99%), and Well 19 (98%). "Actual" volumes are determined via totalizing flow meters.
- (4) "Average" flow rates for the system discharges represent the average flow rate during the entire reporting period and are determined by dividing the total flow during the reporting period by the reporting period duration. The Calpine, OXY Biosparge, and South Recharge Basins flow volumes are determined via totalizing flow meters. The West Recharge Basin flow is calculated by subtracting the cumulative flow to the other discharges from the total influent flow. Actual flow to the recharge basins are greater than shown because storm water combines with the plant effluents prior to discharge to the recharge basins.
- (5) The TCE and TVOC concentrations for the remedial wells are from the quarterly sampling event performed during this reporting period (Table 2).
- (6) The TVOC concentration for the two sets of recharge basins are their respective average monthly SPDES concentration for the current quarter.
- (7) TVOC mass removed for the reporting period is calculated by multiplying the TVOC concentration from the quarterly sampling event and the quantity of water pumped during the reporting period.
- (8) There are five discharges for the effluent groundwater: South Recharge Basins, West Recharge Basins, Calpine, OXY Biosparge system, and minor losses (pipe loss, irrigation use). Treated water is continuously discharged to the south and west recharge basins, and is available "on-demand" to both the Calpine Power Plant (Calpine) for use as make-up water, and the biosparge remediation system operated by Occidental Chemical (OXY Biosparge).
- (9) Treatment System Efficiencies are calculated by dividing the difference between the influent and effluent TVOC concentrations by the influent TVOC concentration.
- (10) The flow rate and volume for OXY Biosparge were estimated based on the average pumping rate calculated from data from April 2007 through March 2012.
- (11) The discharge flow rate and flow volume to the South Recharge Basins (T102 weir overflow) were estimated throughout the duration of this reporting period due to the need for re-calibration of the ultrasonic level indicator associated with the water level over the weir. Estimated values were calculated using historic data associated with the total clear well water elevation and weir overflow rates.

Acronyms:

--	Not Available or Not Applicable	lbs	pounds
TVOC	Total Volatile Organic Compounds	MG	Million Gallons
gpm	gallons per minute	ug/L	micrograms per liter
SPDES	State Pollutant Discharge Elimination System	OU2	Operable Unit 2
NG	Northrop Grumman Systems Corporation	NYSDEC	New York State Department of Environmental Conservation
TCE	Trichloroethene	VPGAC	Vapor Phase Granular Activated Carbon



Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater Remedial Wells, First Quarter 2013, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: WELL 1	WELL 3	96 EFFLUENT	WELL 17	WELL 18	WELL 19	102 EFFLUENT
	Sample ID: WELL 1	WELL 3	96 EFFLUENT	WELL 17	WELL 18	WELL 19	102 EFFLUENT
	Date: 2/18/2013	2/18/2013	2/18/2013	2/18/2013	2/18/2013	2/18/2013	2/19/2013
1,1,1-Trichloroethane	< 13	< 50	< 5	0.6 J	0.91 J	0.52 J	< 5
1,1,1,2-Tetrachloroethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
1,1,2-Trichloroethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
1,1-Dichloroethane	0.55 J	< 50	< 5	1.2 J	0.97 J	0.98 J	< 5
1,1-Dichloroethene	2 J	8.6 J	< 5	2.4 J	3 J	1.7 J	< 5
1,2-Dichloroethane	< 13	< 50	< 5	< 10	< 5	0.56 J	< 5
1,2-Dichloropropane	5.5 J	< 50	< 5	< 10	< 5	< 5	< 5
2-Butanone (MEK)	< 130	< 500	< 50	< 100	< 50	< 50	< 50
2-Hexanone (MBK)	< 130	< 500	< 50	< 100	< 50	< 50	< 50
4-methyl-2-pentanone (MIK)	< 130	< 500	< 50	< 100	< 50	< 50	< 50
Acetone	< 130	< 500	< 50	< 100	< 50	< 50	< 50
Benzene	< 1.8	< 7	< 0.7	< 1.4	< 0.7	< 0.7	< 0.7
Bromodichloromethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Bromoform	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Bromomethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Carbon Disulfide	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Carbon tetrachloride	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Chlorobenzene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Chloroethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Chloroform	< 13	< 50	< 5	< 10	0.21 J	0.52 J	< 5
Chloromethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
cis-1,2-dichloroethene	4.6 J	9.7 J	< 5	4.5 J	2.1 J	24	< 5
cis-1,3-dichloropropene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Dibromochloromethane	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Ethylbenzene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Methylene Chloride	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Styrene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Tetrachloroethene	49	53	< 5	31	13	6.2	< 5
Toluene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
trans-1,2-dichloroethene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
trans-1,3-dichloropropene	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Trichloroethylene	360	1400	1.2 J	210	60	190	0.78 J
Trichlorotrifluoroethane (Freon 113)	2.8 J	6.8 J	< 5	4.2 J	1.3 J	0.85 J	< 5
Vinyl Chloride	< 5	72	< 2	< 4	< 2	< 2	< 2
Xylene-o	< 13	< 50	< 5	< 10	< 5	< 5	< 5
Xylenes - m,p	< 13	< 50	< 5	< 10	< 5	< 5	< 5
TVOC	420	1600	1.2	220	81	230	0.76

Note: Results rounded to two significant figures.

Bold Constituent detected
 VOCs Volatile Organic Compounds
 ug/L Micrograms per liter
 J Constituent value is estimated

Table 3. Concentrations of Site-Related Volatile Organic Compounds Detected in Outpost Wells, First Quarter 2013, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: BPOW 1-1	BPOW 1-2	BPOW 1-3	BPOW 1-4	BPOW 1-5	BPOW 1-6	BPOW 2-1	BPOW 2-3	BPOW 3-1	BPOW 3-2	BPOW 3-3
	Sample ID: BPOW 1-1	BPOW 1-2	BPOW 1-3	BPOW 1-4	BPOW 1-5	BPOW 1-6	BPOW 2-1	BPOW 2-3	BPOW 3-1	BPOW 3-2	BPOW 3-3
	Date: 2/6/2013	2/6/2013	2/7/2013	2/15/2013	2/15/2013	2/14/2013	2/8/2013	2/20/2013	2/7/2013	2/8/2013	2/20/2013
1,1,1-Trichloroethane	< 0.5	0.46 J	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene	< 0.5	0.46 J	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorotrifluoroethane (Freon 113)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	0.88	0.63	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.48 J	< 0.5	< 0.5	< 0.5
Total Site-Related VOCs ⁽¹⁾ :	0.88⁽³⁾	1.5⁽³⁾	0	0	0	0	0	0.48	0	0	0
TVOC Trigger Value ⁽²⁾:	0.6	0.6	0.6	NE	NE	NE	NE	NE	1.5	1.5	NE

See last page for notes and abbreviations.

Table 3. Concentrations of Site-Related Volatile Organic Compounds Detected in Outpost Wells, First Quarter 2013, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well:	BPOW 3-4	BPOW 4-1	BPOW 4-2
	Sample ID:	BPOW 3-4	BPOW 4-1	BPOW 4-2
	Date:	2/19/2013	2/11/2013	2/12/2013
1,1,1-Trichloroethane		< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane		< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane		0.47 J	< 0.5	< 0.5
1,1-Dichloroethane		< 0.5	< 0.5	< 0.5
1,1-Dichloroethene		< 0.5	0.26 J	< 0.5
1,2-Dichloroethane		< 0.5	< 0.5	< 0.5
Carbon tetrachloride		1	< 0.5	< 0.5
Chlorobenzene		< 0.5	< 0.5	< 0.5
Chloroform		1.2	< 0.5	< 0.5
cis-1,2-dichloroethene		0.72	< 0.5	< 0.5
Trichlorotrifluoroethane (Freon 113)		0.24 J	2.7	1.1
Tetrachloroethene		< 0.5	< 0.5	< 0.5
trans-1,2-dichloroethene		< 0.5	< 0.5	< 0.5
Trichloroethylene		57 D	< 0.5	< 0.5
Total Site-Related VOCs ⁽¹⁾ :		60.63	2.96 ⁽⁴⁾	1.1
TVOC Trigger Value ⁽²⁾:		NE	1.5	1.5

Note: Outpost wells OW2-2 was not sampled by Northrop Grumman this round, due to significant drawdown during purging indicating possible well fouling. Wells BPOW1-4, BPOW1-5, BPOW1-6, BPOW3-3, and BPOW3-4 are currently monitored by Northrop Grumman on a voluntary basis. The screen intervals for these wells were selected by the Navy based on data obtained from vertical profile borings VP-127 (BPOW-1 cluster) and VP-128 (BPOW-3 cluster).

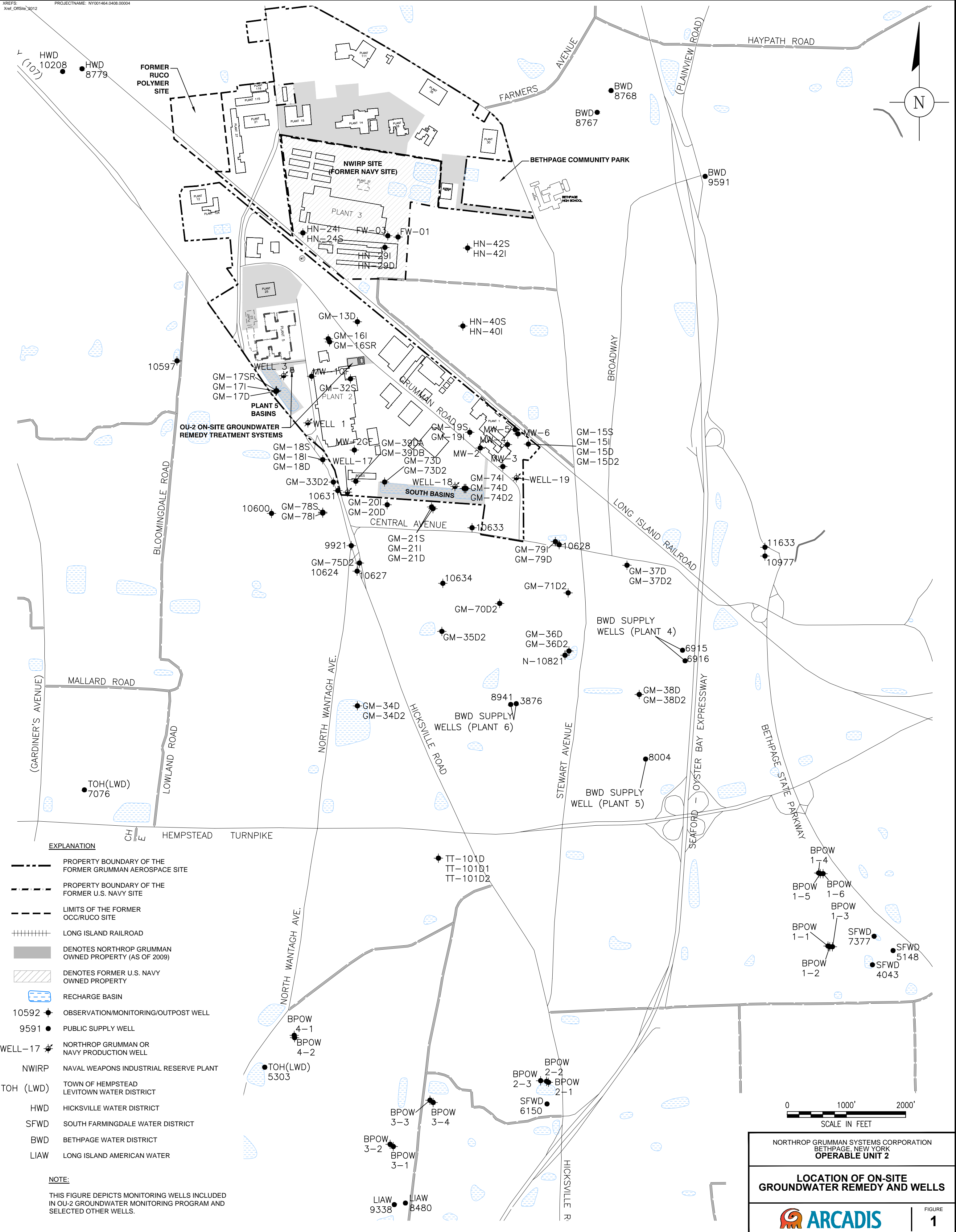
⁽¹⁾ Site-related VOCs were established for the wells identified above in the Public Water Supply Contingency Plan (PWSCP) (ARCADIS G&M, Inc. 2003).

⁽²⁾ TVOC Trigger Values were established for Wells BPOW1-1, BPOW1-2, BPOW1-3, BPOW3-1, BPOW3-2, BPOW4-1, and BPOW4-2 in the PWSCP (ARCADIS G&M, Inc. 2003).

⁽³⁾ The TVOC Trigger Value for Cluster 1 was initially exceeded on April 23, 2004; confirmatory sampling and reporting was conducted as per the PWSCP (ARCADIS G&M, Inc. 2003).

⁽⁴⁾ The TVOC Trigger Value for BPOW 4-1 was initially exceeded on March 1, 2012; confirmatory sampling and reporting was conducted as per the PWSCP (ARCADIS G&M, Inc. 2003).

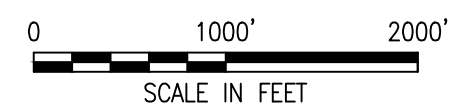
Bold Constituent detected
 TVOC Total Volatile Organic Compounds
 NE Trigger Value Not Established
 J Value is estimated



EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER U.S. NAVY SITE
- LIMITS OF THE FORMER OCC/RUCO SITE
- +++++ LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2009)
- ▨ DENOTES FORMER U.S. NAVY OWNED PROPERTY
- RECHARGE BASIN
- 10592 ● OBSERVATION/MONITORING/OUTPOST WELL
- 9591 ● PUBLIC SUPPLY WELL
- WELL-17 ● NORTHROP GRUMMAN OR NAVY PRODUCTION WELL
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
- TOH (LWD) TOWN OF HEMPSTEAD LEVITOWN WATER DISTRICT
- HWD HICKSVILLE WATER DISTRICT
- SFWD SOUTH FARMINGDALE WATER DISTRICT
- BWD BETHPAGE WATER DISTRICT
- LIAW LONG ISLAND AMERICAN WATER

NOTE:
THIS FIGURE DEPICTS MONITORING WELLS INCLUDED IN OU-2 GROUNDWATER MONITORING PROGRAM AND SELECTED OTHER WELLS.



NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

**LOCATION OF ON-SITE
GROUNDWATER REMEDIY AND WELLS**

ARCADIS

FIGURE
1