ARCADIS of New York, Inc.
Two Huntington Quadrangle
Suite 1S10
Melville
New York 11747
Tel 631 249 7600
Fax 631 249 7610
www.arcadis-us.com

ENVIRONMENT

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 2014 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)

Date:
May 20, 2014

Contact:
David Stern

Phone:
631.391.5284

Email:
david.stern@arcadis-us.com

Our ref:
NY001496.0314.GWMI4

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 of New York, Inc. 2012) 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 summarizes OU2 remedial system performance operational data and water balance. Table 2 provides the validated analytical results of remedial wells for this period. Table 3 provides the validated analytical results of the outpost wells 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

Enclosures

Copies:
Ed Hannon – Northrop Grumman
Fred Weber – Northrop Grumman
Walter Parish – NYSDEC Region 1
Bill Spitz - NYSDEC Region 1
Steven Karpinski – New York State Department of Health
Michael Alarcon – Nassau County Department of Health
Joseph DeFranco – Nassau County Department of Health
Lora Fly – NAVFAC Midlant Environmental
David Brayack – TetraTech NUS, Inc.
Roger Smith – Glenn Springs Holdings, Inc.
Kevin Lumpe – Steel Equities
Thomas Taccone – USEPA
Robert Alvey – USEPA
Matthew Russo – Town of Oyster Bay
Stan Carey – Massapequa Water District
Matthew Snyder – New York American Water
Charles Prucha – South Farmingdale Water District
John Reinhardt – Town of Hempstead Water District
Michael Boufis – Bethpage Water District
Anthony J. Sabino Esq. – Bethpage Water District
Lois Lovisolo – Bethpage Public Library (Public Repository)
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Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, First Quarter 2014, Northrop Grumman Systems Corporation, Bethpage, New York. [1]

Identification	Quarterly Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Quarterly 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
Influent Groundwater								
Well 1 [11]	800	772	104.8	91.1	87%	400	460	350
Well 3R [12]	700	727	91.7	86.7	95%	98	190	135
Well 17	1,000	1,097	131.0	133.6	102%	190	240	262
Well 18	600	669	78.6	82.4	105%	55	75	51
Well 19 [13]	700	786	91.7	59.7	65%	180	210	103
Total	3,800	4,051	498	454	91%	--	--	901
Effluent Groundwater [8]								
Calpine	100 - 400	95	--	12.3	--	--	--	--
OXY Biosparge [10]	2 - 42	3.8	--	0.5	--	--	--	--
West Recharge Basins	1,112 - 1,455	1,455	--	190.6	--	--	<0.5	--
South Recharge Basins	2,231	1,909	292.4	250.1	86%	--	0.63	--
Total	--	3,463	--	454	--	--	--	--

Treatment Efficiencies [9]

Tower 96 System Efficiency:	99.9%
Tower 102 System Efficiency:	>99.9%

See footnotes on last page

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, First Quarter 2014, Northrop Grumman Systems Corporation, Bethpage, New York. (1)

Notes:

(1) Quarterly reporting period: January 07, 2014 through April 08, 2014

(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 (90%), Well 3R (91%), Well 17 (93%), Well 18 (94%), and Well 19 (58%). "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 concentration.

(10) The flow rate and volume for OXY Biosparge (Occidental Chemical) were estimated based on the average pumping rate calculated from data from April 2007 through March 2012.

(11) At various times in the 1st Quarter of 2014, the totalizing flowmeter at Well 1 was malfunctioning. For the times when the flowmeter was malfunctioning, the total flow was calculated by taking the difference in the Tower 96 Influent and the Well 3R totalizing flowmeter between weekly readings. When the flowmeter was functioning, the total flow was calculated by taking the difference between weekly readings.

(12) Well 3R was brought online in December 2013 to replace Well 3 due to decreasing specific capacity of Well 3 indicative of imminent well failure.

(13) Well 19 sample was not collected during 1st Quarter as Well 19 was shut down from February 11 to March 12, 2014 due to the installation of a new submersible pump and appurtenances. Concentration value from 4th Quarter of 2013 was used to estimate TVOC mass removed for the current period.

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, First Quarter 2014, Northrop Grumman Systems Corporation, Bethpage, New York. (1)

Acronyms:

--	Not Available or Not Applicable	gpm	gallons per minute	SPDES	State Pollutant Discharge Elimination System
TVOC	Total Volatile Organic Compounds	TCE	Trichloroethene	NG	Northrop Grumman Systems Corporation
ug/L	micrograms per liter	lbs	pounds	NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2	MG	Million Gallons	VPGAC	Vapor Phase Granular Activated Carbon
<0.5	Compound not detected above its laboratory quantification limit.				

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Table 2. Concentrations of Volatile Organic Compounds in Groundwater Remedial Wells,
First Quarter 2014, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (units in µg/L)	Well: / Sample ID: / Date:	WELL 1 / WELL 1 / 2/24/2014	WELL 3R / WELL 3R / 2/24/2014	96 EFFLUENT / 96 EFFLUENT / 2/24/2014	WELL 17 / WELL 17 / 2/24/2014	WELL 17 / WELL 17 (REP) / 2/24/2014	WELL 18 / WELL 18 / 2/24/2014	102 EFFLUENT / 102 EFFLUENT / 2/24/2014
1,1,1-Trichloroethane		< 13	**0.45 J**	< 5.0	**0.51 J**	**0.51 J**	**0.69 J**	< 5.0
1,1,2,2-Tetrachloroethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
1,1,2-Trichloroethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
1,1-Dichloroethane		**0.68 J**	**0.87 J**	< 5.0	**1.0 J**	**1.2 J**	**0.93 J**	< 5.0
1,1-Dichloroethene		**2.0 J**	**2.4 J**	< 5.0	**2.4 J**	**2.8 J**	**3.2 J**	< 5.0
1,2-Dichloroethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
1,2-Dichloropropane		**5.5 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
2-Butanone (MEK)		< 130	< 50	< 50	< 50	< 50	< 50 J	< 50
2-Hexanone (MBK)		< 130	< 50	< 50	< 50	< 50	< 50 J	< 50
4-methyl-2-pentanone (MIK)		< 130	< 50	< 50	< 50	< 50	< 50 J	< 50
Acetone		< 130	< 50	< 50	< 50	< 50	< 50 J	< 50
Benzene		< 1.8	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70 J	< 0.70
Bromodichloromethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Bromoform		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Bromomethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Carbon Disulfide		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Carbon tetrachloride		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Chlorobenzene		< 13	**0.35 J**	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Chloroethane		< 13	**1.4 J**	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Chloroform		< 13	< 5.0	< 5.0	**0.33 J**	**0.41 J**	**0.25 J**	< 5.0
Chloromethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
cis-1,2-dichloroethene		**4.2 J**	**7.3**	< 5.0	**4.2 J**	**4.5 J**	**1.9 J**	< 5.0
cis-1,3-dichloropropene		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Dibromochloromethane		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Ethylbenzene		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Methylene Chloride		**1.0 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Styrene		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Tetrachloroethene		**39**	**38**	< 5.0	**32**	**34**	**12 J**	< 5.0
Toluene		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
trans-1,2-dichloroethene		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
trans-1,3-dichloropropene		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Trichloroethylene		**400**	**98**	**0.39 J**	**190**	**190 D**	**55 J**	< 5.0
Trichlorotrifluoroethane (Freon 113)		**2.7 J**	**3.0 J**	< 5.0	**4.6 J**	**4.3 J**	**1.2 J**	< 5.0
Vinyl Chloride		< 5.0	**38**	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0
Xylene-o		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
Xylenes - m,p		< 13	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
	TVOC (1)	**460**	**190**	**0.39**	**240**	**240**	**75**	0

Notes:

(1) Results rounded to two significant figures.

(2) Well 19 sample was not collected during 1st Quarter 2014 as Well 19 was offline from February 11 to March 12, 2014 due to pump replacement activities.

Acronyms\Key:

Bold	Constituent detected
VOCs	Volatile Organic Compounds
µg/L	Micrograms per liter
J	Constituent value is estimated
D	Concentration is based on a diluted sample analysis
REP	Field replicate
<5.0	Compound not detected above its laboratory quanitfication limit.

Table 3. Concentrations of Site-Related Volatile Organic Compounds in Outpost Wells, First Quarter 2014, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in µg/L)	Well: / Sample ID: / Date:	BPOW 1-1 / BPOW 1-1 / 2/11/2014	BPOW 1-2 / BPOW 1-2 / 2/11/2014	BPOW 1-3 / BPOW 1-3 / 2/12/2014	BPOW 1-4 [1] / BPOW 1-4 / 2/26/2014	BPOW 1-5[1] / BPOW 1-5 / 2/26/2014	BPOW 1-6[1] / BPOW 1-6 / 2/27/2014	BPOW 2-1 / BPOW 2-1 / 2/14/2014	BPOW 2-2 / BPOW 2-2 / 2/18/2014	BPOW 2-3 / BPOW 2-3 / 2/12/2014	BPOW 3-1 / BPOW 3-1 / 2/19/2014
1,1,1-Trichloroethane		< 0.5	< 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
1,1,2-Trichloroethane		< 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
1,1-Dichloroethene		< 0.5	< 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
Carbon tetrachloride		< 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
Chloroform		< 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
Trichlorotrifluoroethane (Freon 113)		< 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
trans-1,2-dichloroethene		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene		**0.9**	**0.55**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Site-Related VOCs [2] :		**0.90[3]**	**0.55[3]**	0	0	0	0	0	0	0	0
TVOC Trigger Value [4]:		**0.6**	**0.6**	**0.6**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**1.5**

See last page for notes and abbreviations.

Table 3. Concentrations of Site-Related Volatile Organic Compounds in Outpost Wells, First Quarter 2014, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

	Well:	BPOW 3-2	BPOW 3-3[1]	REP022514	BPOW 3-4[1]
CONSTITUENT	**Sample ID:**	BPOW 3-2	BPOW 3-3	BPOW 3-3	BPOW 3-4
(Units in µg/L)	**Date:**	2/19/2014	2/25/2014	2/25/2014	2/25/2014
1,1,1-Trichloroethane		< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane		< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane		< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane		< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene		< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane		< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride		< 0.5	< 0.5	< 0.5	**0.61**
Chlorobenzene		< 0.5	< 0.5	< 0.5	< 0.5
Chloroform		< 0.5	< 0.5	< 0.5	**1.1**
cis-1,2-dichloroethene		< 0.5	< 0.5	< 0.5	**0.73**
Trichlorotrifluoroethane (Freon 113)		< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene		< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-dichloroethene		< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene		< 0.5	< 0.5	< 0.5	**46D**
Total Site-Related VOCs [2] :		0	0	0	**49**
TVOC Trigger Value [4]:		**1.5**	**NE**	**NE**	**NE**

Note:

Samples analyzed for site related VOCs per the PWSCP (ARCADIS G&M, Inc. 2003) using USEPA Method 524.2

(1) Wells BPOW1-4, BPOW1-5, BPOW1-6, BPOW3-3, and BPOW3-4 are currently monitoreed 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).

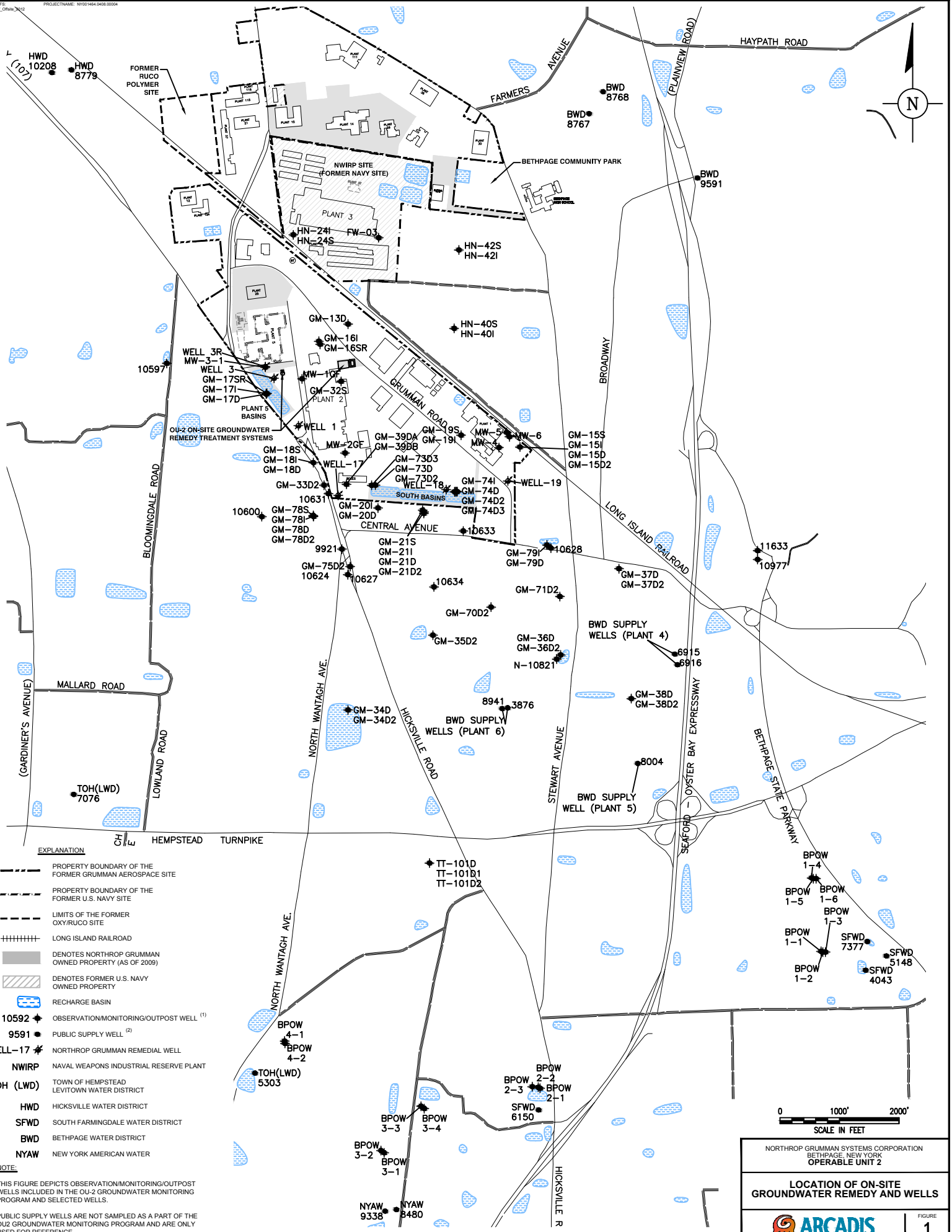
(2) Site-related VOCs were established for the wells identified above in the Public Water Supply Contingency Plan (PWSCP) (ARCADIS G&M, Inc. 2003).

(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) 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). Established trigger values have been previously exceeded and no longer apply as the goal of PWSCP has been met. Wells BPOW 4-1 and BPOW 4-2 were not sampled this round due to ongoing NAVY well re-construction activites.

Results rounded to two significant figures.

Bold Bold value indicates constituent detected.
D Secondary Dilution.
NE Not Established
TVOC Total Volatile Organic Compounds
USEPA United States Environmental Protection Agency
VOC Volatile Organic Compounds
µg/L micrograms per liter
<0.5 Compound not detected above its laboratory quantification limit.



EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER U.S. NAVY SITE
- LIMITS OF THE FORMER OXY/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 (1)
- 9591 PUBLIC SUPPLY WELL (2)
- WELL-17 NORTHROP GRUMMAN REMEDIAL 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
- NYAW NEW YORK AMERICAN WATER

NOTE:

(1) THIS FIGURE DEPICTS OBSERVATION/MONITORING/OUTPOST WELLS INCLUDED IN THE OU-2 GROUNDWATER MONITORING PROGRAM AND SELECTED WELLS.

(2) PUBLIC SUPPLY WELLS ARE NOT SAMPLED AS A PART OF THE OU2 GROUNDWATER MONITORING PROGRAM AND ARE ONLY USED FOR REFERENCE.

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

LOCATION OF ON-SITE GROUNDWATER REMEDY AND WELLS

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FIGURE 1