ARCADIS
Infrastructure, environment, buildings

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

ENVIRONMENT

Subject:
Results of First Quarter 2011 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:
June 30, 2011

Contact:
David Stern

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Our ref:
NY001496.0311.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 G&M, Inc. 2006) and the Public Water Supply Contingency Plan (PWSCP) (ARCADIS G&M, Inc. 2003). 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

Carlo San Giovanni
Project Manager

Enclosures

Copies:
John Cofman – Northrop Grumman
Kent Smith – Northrop Grumman
Ed Hannon – Northrop Grumman
Carol Henry, EMAGIN
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.
Jeffrey Kogut – Glenn Springs Holdings, Inc.
Kevin Lumpe – Steel Equities
Thomas Taccone – USEPA
Matthew Russo – Town of Oyster Bay
Anthony J. Sabino
Frank Flood – Massapequa Water District
Matthew Snyder – Aqua New York
William Bier – South Farmingdale Water District
John Reinhardt – Town of Hempstead Water District
Michael Boufis – 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 2011, Northrop Grumman Systems Corporation, Bethpage, New York.

Identification	Design Pumping/ Recharge Rate [a] (gpm)	Current Actual Average Pumping/Recharge Rate [b] (gpm)	Design Total Pumpage/Recharge (MG)	Current Actual Total Pumpage/Recharge (MG)	Current Percent of Design Pumpage/ Recharge	Current TCE Concentration (ug/L)	Current TVOC Concentration [c] (ug/L)	1st Quarter 2011 VOC Mass Removed [d] (lbs)
Remedial Wells		**Groundwater Removed from Aquifer**						
Well 1	800	801	96.8	15.7	16%	540	623	81
Well 3	700	622	84.7	46.9	55%	2,300	2,614	1,021
Well 17	1,000	1,006	121.0	118.0	98%	240	284	279
Well 18	600	678	72.6	75.5	104%	81	104	65
Well 19	700	767	84.7	90.9	107%	180	211	160
Rounded Totals:	**3,800**	**3,874**	**460**	**347**	**75%**	**--**	**--**	**1,606**
Recharge Basins [a]		**Treated Water Recharged to Aquifer**						
West Recharge Basins	0	1,400	0	59.3	--	--	--	--
South Recharge Basins	2,231	2,345	269.9	283.7	105%	--	--	--
Rounded Totals:	**2,231**	**3,745**	**270**	**343**	**--**	**--**	**--**	**--**
Treated Water Sent to Calpine								
Calpine Demand	100-400	22	12 - 48	2.7	--	--	--	--
Treatment Efficiencies		**Average SPDES Outfall TVOC Concentrations First Quarter 2011 (ug/L) [f]**						
Tower 96 System Efficiency [e] :		**>99.9%**	--	**<0.5**	--	--	--	--
Tower 102 System Efficiency [e] :		**>99.9%**	--	**<0.5**	--	--	--	--

see footnotes on last page

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, First Quarter 2011, Northrop Grumman Systems Corporation, Bethpage, New York.

(a) - Design remedial well pumping rates based on computer modeling (ARCADIS G& M, Inc. 2003c). Acceptable design recharge rates based on computer modeling (ARCADIS G&M, Inc. 2004b). Design pumping and recharge rates were modified in April, 2005. Recharge includes remedial well pumpage (minus Calpine demand, Oxy biosparge system demand, incidental irrigation use, and pipe loss), plus incidental runoff from precipitation. Current average recharge rates have been determined using the entire 84-day span of time for the South Recharge Basin as opposed to current average pumping rates, which account for varying amounts of downtime, as indicated below. The current average recharge rates for the West Recharge Basins have been determined by using the average current percent of design for Wells 1 and 3. Well 1 not operational due to maintenance during part of this period. Tower 96 air stripper was not operational from mid-February to mid-March due to repairs, which accounts for lower than normal up-time for Wells 1 and 3.

(b) - OU2 wells were operational during the First Quarter 2011, at the following percentages: Well-1 (16.2%), Well-3 (62.3%); Well-17 (97%), Well-18 (92%), and Well-19 (98%). The Actual Average Pumping Rates and rate of treated water sent to Calpine are for when the wells are pumping.

(c) - The TVOC concentration for each well was calculated based on First Quarter 2011 groundwater monitoring data (Table 2).

(d) - TVOC mass removed is based on the TVOC data given above and the following formula:

(TVOC concentration in ug/L) X (gallons pumped) X (3.785 L/gal) X (1 x 10^{-6} g/ug) X (2.2 x 10^{-3} lb/g)

(e) Air Stripping Efficiency calculated from values above using the following formula:

$$1 - \left[\left(\frac{\text{Average SPDES TVOC Concentration at Outfall}}{\frac{[(\text{TVOC}_{\text{Well 1}} \times Q_{\text{Well 1}}) + (\text{TVOC}_{\text{Well 3}} \times Q_{\text{Well 3}}) \text{ etc...}]}{(Q_{\text{Well 1}} + Q_{\text{Well 3}} \text{ etc..})}} \right) \right]$$

-When non-detectable levels of VOCs are found in the effluent, a value of zero is used to estimate the efficiency of the air stripper.

(f) -Towers 102 and 96 outfalls are identified as Outfalls 005 and 006, respectively (commonly known as the South Recharge Basins and Plant 5 Recharge Basins, respectively). Complete SPDES reporting provided to NYSDEC by NGC under separate cover.

(g) - Well 1 was off line during the First Quarter sampling event, Fourth Quarter 2010 TCE and TVOC concentrations were used for the current time period.

--	Not Available or Not Applicable	lb/g	pounds per kilogram
TCE	Trichloroethelyene	lbs	pounds
TVOC	Total Volatile Organic Compounds	MG	million gallons
g/ug	grams per microgram	ug/L	micrograms per liter
gpm	gallons per minute	OU2	Operable Unit 2
L/gal	Liters per gallon	Q	pumping rate

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Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater Remedial Wells,
First Quarter 2011, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	WELL 3 / WELL 3 / 2/14/2011	96 EFFLUENT / T96 EFF. / 2/14/2011	WELL 17 / WELL 17 / 2/14/2011	WELL 18 / WELL 18 / 2/14/2011	WELL 19 / WELL 19 / 2/14/2011	WELL 19 (REP) / REP 021411 / 2/14/2011	102 EFFLUENT / T102 EFF. / 2/14/2011
1,1,1-Trichloroethane		< 100	< 5	< 10	**1.2 J**	**0.62 J**	**0.74 J**	< 5
1,1,2,2-Tetrachloroethane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
1,1-Dichloroethane		< 100	< 5	**1.1 J**	**1.1 J**	**0.91 J**	**0.91 J**	< 5
1,1-Dichloroethene		**14 J**	< 5	**2.9 J**	**4.2 J**	**1.6 J**	**1.7 J**	< 5
1,2-Dichloroethane		< 100	< 5	< 10	< 5	**0.65 J**	**0.59 J**	< 5
1,2-Dichloropropane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
2-Butanone		< 1000	< 50	< 100	< 50	< 50	< 50	< 50
2-Hexanone		< 1000	< 50	< 100	< 50	< 50	< 50	< 50
4-methyl-2-pentanone		< 1000	< 50	< 100	< 50	< 50	< 50	< 50
Acetone		< 1000	< 50	< 100	< 50	< 50	< 50	< 50
Benzene		< 14	< 0.7	< 1.4	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Bromoform		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Bromomethane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Carbon Disulfide		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Carbon tetrachloride		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Chlorobenzene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 100	< 5	< 10	**0.42 J**	**0.43 J**	**0.4 J**	< 5
Chloroethane		**8.4 J**	< 5	< 10	< 5	< 5	< 5	< 5
Chloroform		< 100	< 5	< 10	< 5	**0.59 J**	**0.63 J**	< 5
Chloromethane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene		**13 J**	< 5	**3.9 J**	**1.5 J**	**18**	**18**	< 5
cis-1,3-dichloropropene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Dibromochloromethane		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Ethylbenzene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Methylene Chloride		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Styrene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Tetrachloroethene		**69 J**	< 5	**29**	**13**	**6.9**	**7.7**	< 5
Toluene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Trichloroethylene		**2300**	< 5	**240**	**81**	**180 D**	**200**	< 5
Trichlorotrifluoroethane (Freon 113)		**9.6 J**	< 5	**6.6 J**	**1.5 J**	**0.93 J**	**0.91 J**	< 5
Vinyl Chloride		**200**	< 2	< 4	< 2	< 2	< 2	< 2
Xylene-o		< 100	< 5	< 10	< 5	< 5	< 5	< 5
Xylenes - m,p		< 100	< 5	< 10	< 5	< 5	< 5	< 5
	Total VOCs	**2614**	0	**284**	**104**	**211**	**232**	0

Note: Well 1 was not operational due to maintenance during this sampling event.

Bold Constituent detected

VOCs Volatile Organic Compounds
ug/L Micrograms per liter
J Constituent value is estimated
REP Replicate Sample

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Table 3. Concentrations of Site-Related Volatile Organic Compounds Detected in Outpost Wells, First Quarter 2011, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

	Well:	BPOW 1-1 [3]	BPOW 1-2 [3]	REP BPOW 1-2 [3]	BPOW 1-3 [3]	BPOW 2-1	BPOW 2-2	BPOW 3-1	BPOW 3-2	BPOW 4-1	BPOW 4-2
CONSTITUENT	**Sample ID:**	BPOW 1-1	BPOW 1-2	REP02082011	BPOW 1-3	BPOW 2-1	BPOW 2-2	BPOW 3-1	BPOW 3-2	BPOW 4-1	BPOW 4-2
(Units in ug/L)	**Date:**	2/9/2011	2/8/2011	2/8/2011	2/9/2011	2/10/2011	2/10/2011	2/11/2011	2/11/2011	2/15/2011	2/14/2011
1,1,1-Trichloroethane		**0.36 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
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	**0.71**	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**0.36 J**	< 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	**0.93**	**0.28 J**
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
Trichloroethene		**1.1**	< 0.5	< 0.5	< 0.5	< 0.5	**0.85**	< 0.5	< 0.5	< 0.5	< 0.5
Total Site-Related VOCs [1] :		**1.46**	0	0	0	0	**1.92**	0	0	**0.93**	**0.28**
TVOC Trigger Value [2] :		**0.6**	**0.6**	**0.6**	**0.6**	**NE**	**NE**	**1.5**	**1.5**	**1.5**	**1.5**

Note:

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

(2) TVOC Trigger Values were established 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).

(5) Benzene and Methyl tert-butyl ether (MTBE), which are not site-related VOCs, were detected in Outpost Well OW 2-1 on 3/7/07 at 130 ug/L and 10 ug/L, respectively.

NE Not established

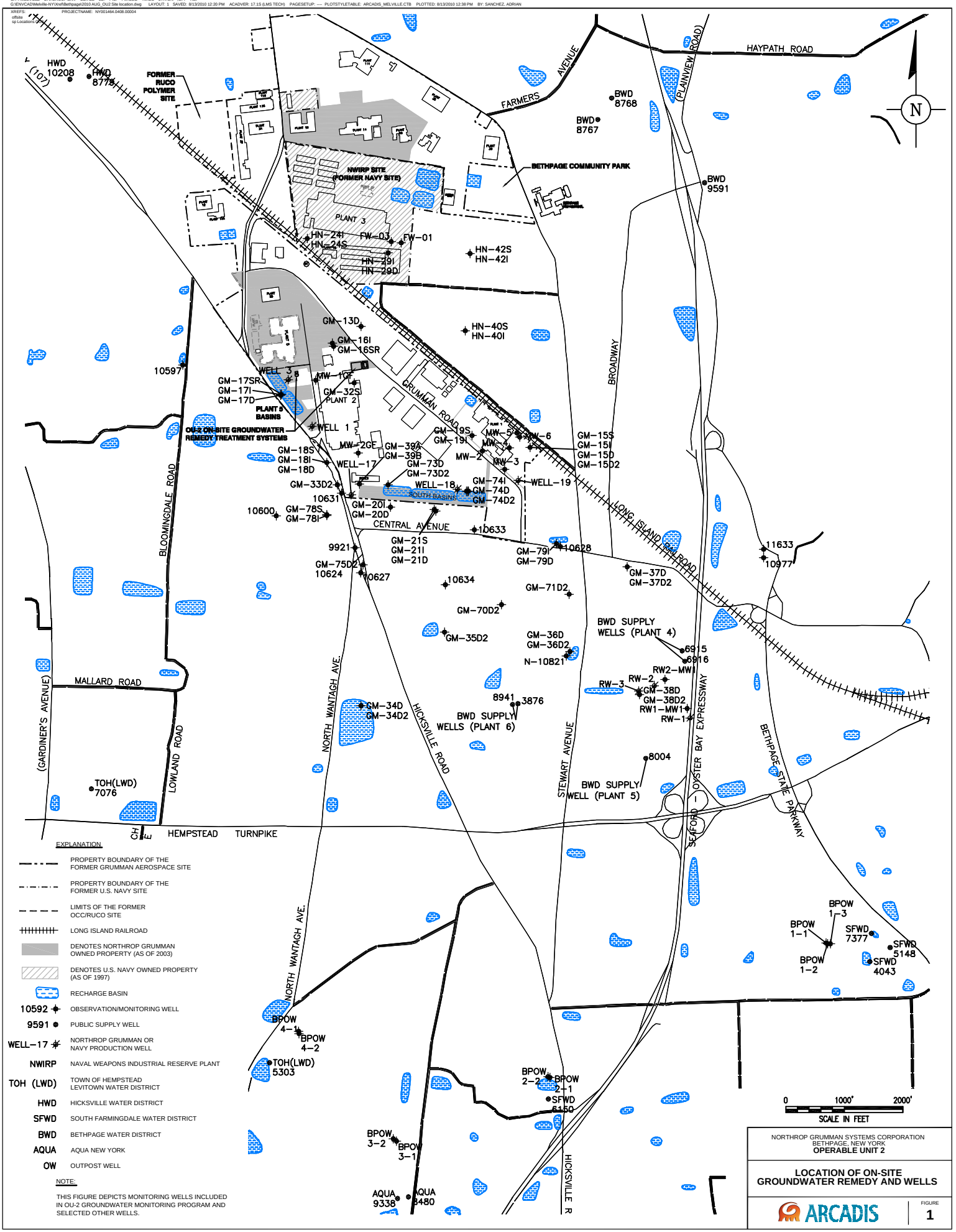
ug/L Micrograms per liter

Bold Constituent detected

TVOC Total Volatile Organic Compounds

J Constituent value is estimated

REP Replicate sample



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 2003)
- DENOTES U.S. NAVY OWNED PROPERTY (AS OF 1997)
- RECHARGE BASIN
- 10592 OBSERVATION/MONITORING 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
- AQUA AQUA NEW YORK
- OW OUTPOST WELL

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 REMEDY AND WELLS

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FIGURE 1