ARCADIS

Infrastructure, environment, facilities

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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

Subject:
Results of Second Quarter 2009 Groundwater Monitoring,
Operable Unit 2, Northrop Grumman Systems Corporation (Northrop Grumman) and Naval Weapons Industrial Reserve Plant (NWIRP) Sites, Bethpage, New York.
(NYSDEC Site #s 1-30-003A and B)

ENVIRONMENT

Dear Mr. Scharf:

Date:
September 11, 2009

Contact:
David E. Stern

Phone:
(631) 391-5284

Email:
David.stern@arcadis-us.com

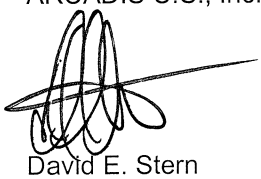
Our ref:
NY001492.0409.00004

On behalf of Northrop Grumman Systems Corporation (Northrop Grumman), ARCADIS is providing the New York State Department of Environmental Conservation (NYSDEC) with the validated results of 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) for the Second Quarter of 2009 for Operable Unit 2 (OU2). Table 1 provides OU2 remedial system performance operational data and water balance. Tables 2 and 3 provide the 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 U.S., Inc.



David E. Stern
Senior Hydrogeologist

Enclosures

Copies:
See Attached Distribution List

Copies:
John Cofman – Northrop Grumman
Kent Smith – Northrop Grumman
Walter Parish – NYSDEC Region 1
Bill Spitz, NYSDEC Region 1
Jacqueline Nealon – 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.
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Table 1. Summary of Operational Data and Water Balance for the On-Site Portion of the OU2 Groundwater Remedy, Second Quarter 2009, Operable Unit 2, 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)	2nd Quarter 2009 Estimated VOC Mass Removed [d] (lbs)
Remedial Wells			**Groundwater Removed from Aquifer**					
Well 1	800	844	97.9	103.3	106%	370	488	420
Well 3	700	705	85.7	86.3	101%	2,700	3,022	2,172
Well 17	1,000	1,112	122.4	133.4	109%	230	272	302
Well 18	600	674	73.4	80.9	110%	100	126	85
Well 19	700	750	85.7	89.0	104%	190	225.0	167
Rounded Totals:	**3,800**	**4,085**	**465**	**493**	**106%**	**--**	**--**	**3,146**
Recharge Basins [a]			**Treated Water Recharged to Aquifer**					
West Recharge Basins	0	1,184	0	144.9	--	--	--	--
South Recharge Basins	2,231	2,619	273.1	320.6	117%	--	--	--
Rounded Totals:	**2,231**	**3,803**	**273**	**465.5**	**171%**	**--**	**--**	**--**
Treated Water Sent to Calpine								
Calpine Demand	100-400	276	14-56	33.8	--	--	--	--

Treatment Efficiencies		**Average SPDES Outfall TVOC Concentrations (ug/L) [f]**
Tower 96 System Efficiency [e]:	**99.9%**	**1.5**
Tower 102 System Efficiency [e]:	**>99.9%**	**0**

see footnotes on last page

Table 1. Summary of Operational Data and Water Balance for the On-Site Portion of the OU2 Groundwater Remedy, Second Quarter 2009, Operable Unit 2, 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, and pipe loss), plus incidental runoff from precipitation. Current average recharge rates have been determined using the entire 98-day span of time as opposed to current average pumping rates, which account for varying amounts of downtime, as indicated below.

b) - OU2 wells were operational during the Second Quarter 2009, at the following percentages: Well-1 (>99.9%), Well-3 (>99.9%); Well-17 (98%), Well-18 (98%), and Well-19 (97%). 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 Second Quarter 2009 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 and in Table 2 using the following formula:

$$1 - \left[\left(\frac{\text{Average SPDES TVOC Concentration at Outfall}}{\frac{[(TVOC_{Well\ 1} \times Q_{Well\ 1}) + (TVOC_{Well\ 2} \times Q_{Well\ 2}) \text{ etc...}]}{(Q_{Well\ 1} + Q_{Well\ 2} \text{ etc..})}} \right) \right]$$

-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.

--	Not Available or Not Applicable	lb/g	pounds per gram
TVOC	Total Volatile Organic Compounds	lbs	pounds
g/ug	grams per microgram	MG	Million Gallons
gpm	gallons per minute	ug/L	micrograms per liter
L/gal	Liters per gallon	OU2	Operable Unit 2
SPDES	State Pollutant Discharge Elimination System	Q	Pumping Rate
NGC	Northrop Grumman Corporation	NYSDEC	New York State Department of Environmental Conservation

Table 2. Concentrations of Volatile Organic Compounds Detected in Monitoring Wells and Groundwater Remedial Wells, Second Quarter 2009, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	GM-20I / GM-20I / 5/22/2009	GM-20D / GM-20D / 5/22/2009	GM-21I / GM-21I / 5/17/2009	GM-21D / GM-21D / 5/17/2009	GM-33D2 / GM-33D2 / 5/18/2009	GM-34D / GM-34D / 5/15/2009
Chloromethane		< 5	< 5	< 5	< 5	< 5	< 13
Bromomethane		< 5	< 5	< 5	< 5	< 5	< 13
Vinyl Chloride		< 2	< 2	< 2	< 2	< 2	< 5
Chloroethane		< 5	< 5	< 5	< 5	< 5	< 13
Methylene Chloride		< 5	< 5	< 5	< 5	< 5	< 13
Acetone		< 50	< 50	< 50	< 50	< 50	< 130
Carbon Disulfide		< 5	< 5	< 5	< 5	< 5	< 13
1,1-Dichloroethene		< 5	< 5	< 5	< 5	< 5	**9.4 J**
1,1-Dichloroethane		< 5	< 5	< 5	< 5	< 5	**0.98 J**
cis-1,2-dichloroethene		< 5	< 5	< 5	< 5	**0.83 J**	**8.3 J**
trans-1,2-dichloroethene		< 5	< 5	< 5	< 5	< 5	< 13
Chloroform		< 5	< 5	< 5	< 5	< 5	< 13
1,2-Dichloroethane		< 5	< 5	< 5	< 5	< 5	< 13
2-Butanone		< 50	< 50	< 50	< 50	< 50	< 130
1,1,1-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 13
Carbon tetrachloride		< 5	< 5	< 5	< 5	< 5	< 13
Bromodichloromethane		< 5	< 5	< 5	< 5	< 5	< 13
1,2-Dichloropropane		< 5	< 5	< 5	< 5	< 5	< 13
cis-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 13
Trichloroethylene		< 5	< 5	< 5	**0.74 J**	**50**	**490 D**
1,1,2-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 13
Benzene		< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 1.8
trans-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 13
Bromoform		< 5	< 5	< 5	< 5	< 5	< 13
4-methyl-2-pentanone		< 50	< 50	< 50	< 50	< 50	< 130
2-Hexanone		< 50	< 50	< 50	< 50	< 50	< 130
Tetrachloroethene		< 5	< 5	< 5	< 5	**13**	**5.3 J**
1,1,2,2-Tetrachloroethane		< 5	< 5	< 5	< 5	< 5	< 13
Toluene		< 5	< 5	< 5	< 5	< 5	< 13
Chlorobenzene		< 5	< 5	< 5	< 5	< 5	< 13
Ethylbenzene		< 5	< 5	< 5	< 5	< 5	< 13
Styrene		< 5	< 5	< 5	< 5	< 5	< 13
Trichlorotrifluoroethane (Freon 113)		< 5	< 5	< 5	< 5	**29**	**8.8 J**
Xylene-o		< 5	< 5	< 5	< 5	< 5	< 13
Xylenes - m,p		< 5	< 5	< 5	< 5	< 5	< 13
	Total VOCs	0	0	0	**0.74**	**92.83**	**523.68**

Notes and Abbreviations

Bold	Constituent detected
VOCs	Volatile Organic Compounds
ug/L	Micrograms per liter
J	Constituent value is estimated
D	Constituent identified at a secondary dilution

Table 2. Concentrations of Volatile Organic Compounds Detected in Monitoring Wells and Groundwater Remedial Wells, Second Quarter 2009, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	GM-34D2 / GM-34D2 / 5/15/2009	GM-35D2 / GM-35D2 / 5/26/2009	GM-75D2 / GM-75D2 / 5/18/2009	GM-79I / GM-79I / 5/14/2009	GM-79D / GM-79D / 5/14/2009	WELL 1 / WELL 1 / 5/18/2009
Chloromethane		< 5	< 10	< 5	< 5	< 5	< 13
Bromomethane		< 5	< 10	< 5	< 5	< 5	< 13
Vinyl Chloride		**0.42 J**	< 4	< 2	< 2	< 2	< 5
Chloroethane		< 5	< 10	< 5	< 5	< 5	< 13
Methylene Chloride		< 5	< 10	< 5	< 5	< 5	< 13
Acetone		< 50 B	< 100	< 50 B	< 50	< 50	< 130
Carbon Disulfide		< 5	< 10	< 5	< 5	< 5	< 13
1,1-Dichloroethene		**2 J**	**0.78 J**	**1.3 J**	< 5	**0.36 J**	**3 J**
1,1-Dichloroethane		**0.47 J**	< 10	< 5	< 5	< 5	**1.1 J**
cis-1,2-dichloroethene		**11**	**1.9 J**	**0.35 J**	< 5	**0.4 J**	**5.4 J**
trans-1,2-dichloroethene		< 5	< 10	< 5	< 5	< 5	< 13
Chloroform		< 5	< 10	< 5	< 5	< 5	< 13
1,2-Dichloroethane		< 5	< 10	< 5	< 5	< 5	< 13
2-Butanone		< 50	< 100	< 50	< 50	< 50	< 130
1,1,1-Trichloroethane		< 5	< 10	< 5	< 5	< 5	**0.9 J**
Carbon tetrachloride		< 5	< 10	< 5	< 5	< 5	< 13
Bromodichloromethane		< 5	< 10	< 5	< 5	< 5	< 13
1,2-Dichloropropane		< 5	< 10	< 5	< 5	< 5	**4.3 J**
cis-1,3-dichloropropene		< 5	< 10	< 5	< 5	< 5	< 13
Trichloroethylene		**170**	**210**	**130**	< 5	**37**	**370**
1,1,2-Trichloroethane		< 5	< 10	< 5	< 5	< 5	< 13
Benzene		< 0.7	< 1.4	< 0.7	< 0.7	< 0.7	< 1.8
trans-1,3-dichloropropene		< 5	< 10	< 5	< 5	< 5	< 13
Bromoform		< 5	< 10	< 5	< 5	< 5	< 13
4-methyl-2-pentanone		< 50	< 100	< 50	< 50	< 50	< 130
2-Hexanone		< 50	< 100	< 50	< 50	< 50	< 130
Tetrachloroethene		**6.8**	**7.8 J**	**3.7 J**	< 5	**0.81 J**	**99**
1,1,2,2-Tetrachloroethane		< 5	< 10	< 5	< 5	< 5	< 13
Toluene		< 5	< 10	< 5	< 5	< 5	< 13
Chlorobenzene		< 5	< 10	< 5	< 5	< 5	< 13
Ethylbenzene		< 5	< 10	< 5	< 5	< 5	< 13
Styrene		< 5	< 10	< 5	< 5	< 5	< 13
Trichlorotrifluoroethane (Freon 113)		**2.3 J**	**4.3 J**	**1.1 J**	< 5	**0.62 J**	**4.7 J**
Xylene-o		< 5	< 10	< 5	< 5	< 5	< 13
Xylenes - m,p		**0.33 J**	< 10	< 5	< 5	< 5	< 13
	Total VOCs	**193.88**	**224.78**	**136.45**	0	**39.19**	**488.4**

Notes and Abbreviations

Bold	Constituent detected
VOCs	Volatile Organic Compounds
ug/L	Micrograms per liter
J	Constituent value is estimated
D	Constituent identified at a secondary dilution

Table 2. Concentrations of Volatile Organic Compounds Detected in Monitoring Wells and Groundwater Remedial Wells, Second Quarter 2009, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	WELL 3 / WELL 3 / 5/18/2009	96 EFFLUENT / 96 EFFLUENT / 5/18/2009	WELL 17 / WELL 17 / 5/18/2009	WELL 18 / WELL 18 / 5/18/2009	WELL 19 / WELL 19 / 5/18/2009	102 EFFLUENT / 102 EFFLUENT / 5/18/2009
Chloromethane		< 100	< 5	< 10	< 5	< 5	< 5
Bromomethane		< 100	< 5	< 10	< 5	< 5	< 5
Vinyl Chloride		**210**	< 2	< 4	< 2	< 2	< 2
Chloroethane		< 100	< 5	< 10	< 5	< 5	< 5
Methylene Chloride		< 100	< 5	< 10	< 5	< 5	< 5
Acetone		< 1000	< 50	**2.8 J**	**1.4 J**	< 50	< 50
Carbon Disulfide		< 100	< 5	< 10	< 5	< 5	< 5
1,1-Dichloroethene		**14 J**	< 5	**2.5 J**	**5**	**1.6 J**	< 5
1,1-Dichloroethane		< 100	< 5	**0.94 J**	**1.3 J**	**1 J**	< 5
cis-1,2-dichloroethene		**16 J**	< 5	**3.8 J**	**1.9 J**	**21**	< 5
trans-1,2-dichloroethene		< 100	< 5	< 10	< 5	< 5	< 5
Chloroform		< 100	< 5	< 10	**0.31 J**	**0.78 J**	< 5
1,2-Dichloroethane		< 100	< 5	< 10	< 5	**0.71 J**	< 5
2-Butanone		< 1000	< 50	< 100	< 50	< 50	< 50
1,1,1-Trichloroethane		< 100	< 5	< 10	**1.6 J**	**0.73 J**	< 5
Carbon tetrachloride		< 100	< 5	< 10	< 5	< 5	< 5
Bromodichloromethane		< 100	< 5	< 10	< 5	< 5	< 5
1,2-Dichloropropane		< 100	< 5	< 10	< 5	< 5	< 5
cis-1,3-dichloropropene		< 100	< 5	< 10	< 5	< 5	< 5
Trichloroethylene		**2700**	**1.2 J**	**230**	**100**	**190 D**	**0.5 J**
1,1,2-Trichloroethane		< 100	< 5	< 10	< 5	< 5	< 5
Benzene		< 14	< 0.7	< 1.4	< 0.7	< 0.7	< 0.7
trans-1,3-dichloropropene		< 100	< 5	< 10	< 5	< 5	< 5
Bromoform		< 100	< 5	< 10	< 5	< 5	< 5
4-methyl-2-pentanone		< 1000	< 50	< 100	< 50	< 50	< 50
2-Hexanone		< 1000	< 50	< 100	< 50	< 50	< 50
Tetrachloroethene		**71 J**	< 5	**24**	**12**	**8.2**	< 5
1,1,2,2-Tetrachloroethane		< 100	< 5	< 10	< 5	< 5	< 5
Toluene		< 100	< 5	< 10	< 5	< 5	< 5
Chlorobenzene		< 100	< 5	< 10	< 5	< 5	< 5
Ethylbenzene		< 100	< 5	< 10	< 5	< 5	< 5
Styrene		< 100	< 5	< 10	< 5	< 5	< 5
Trichlorotrifluoroethane (Freon 113)		**11 J**	< 5	**8.2 J**	**1.7 J**	**0.91 J**	< 5
Xylene-o		< 100	< 5	< 10	< 5	< 5	< 5
Xylenes - m,p		< 100	< 5	< 10	< 5	< 5	< 5
	Total VOCs	**3022**	**1.2**	**272.24**	**125.57**	**225.34**	**0.5**

Notes and Abbreviations

Bold	Constituent detected
VOCs	Volatile Organic Compounds
ug/L	Micrograms per liter
J	Constituent value is estimated
D	Constituent identified at a secondary dilution

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Table 3. Concentrations of Site-Related Volatile Organic Compounds Detected in Outpost Wells, Second Quarter 2009, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

	Well:	BPOW 1-1 [3]	BPOW 1-2	BPOW 1-3 [3]	BPOW 3-1	BPOW 3-2	BPOW 4-1	BPOW 4-2
CONSTITUENT	**Sample ID:**	BPOW 1-1	BPOW 1-2	BPOW 1-3	BPOW 3-1	BPOW 3-2	BPOW 4-1	BPOW 4-2
(Units in ug/L)	**Date:**	5/19/2009	5/19/2009	5/19/2009	5/20/2009	5/20/2009	5/21/2009	5/21/2009
1,1,1-Trichlroethane		**1.8**	< 0.5 U	**2**	< 0.5 U	< 0.5 U	< 5 U	< 5 U
1,1,2,2-Tetrachlroethane		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
1,1,2-Trichloroethane		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
1,1-Dichloroethane		**0.61**	< 0.5 U	**0.87**	< 0.5 U	< 0.5 U	< 5 U	< 5 U
1,1-Dichloroethene		**1**	< 0.5 U	**1.5**	< 0.5 U	< 0.5 U	< 5 U	< 5 U
1,2-Dichloroethane		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Carbon Tetrachloride		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Chlorobenzene		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Chloroform		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
cis-1,2-Dichloroethene		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Trichlorotrifluoroethane (Freon 113)		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Tetrachloroethene		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
trans-1,2-Dichloroethene		< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Trichloroethene		**1.4**	< 0.5 U	**0.76**	< 0.5 U	< 0.5 U	< 5 U	< 5 U
Total Site-Related VOCs [1] :		**4.81**	0	**5.13**	0	0	0	0
TVOC Trigger Value [2]:		**0.6**	**0.6**	**0.6**	**1.5**	**1.5**	**1.5**	**1.5**

Note: Outpost wells OW2-1 and OW2-2 were not sampled by Northrop Grumman this round, due to ongoing NYSDEC investigation of non-site related VOCs (benzene and methyl tertiary butyl ether) detected in these wells.

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

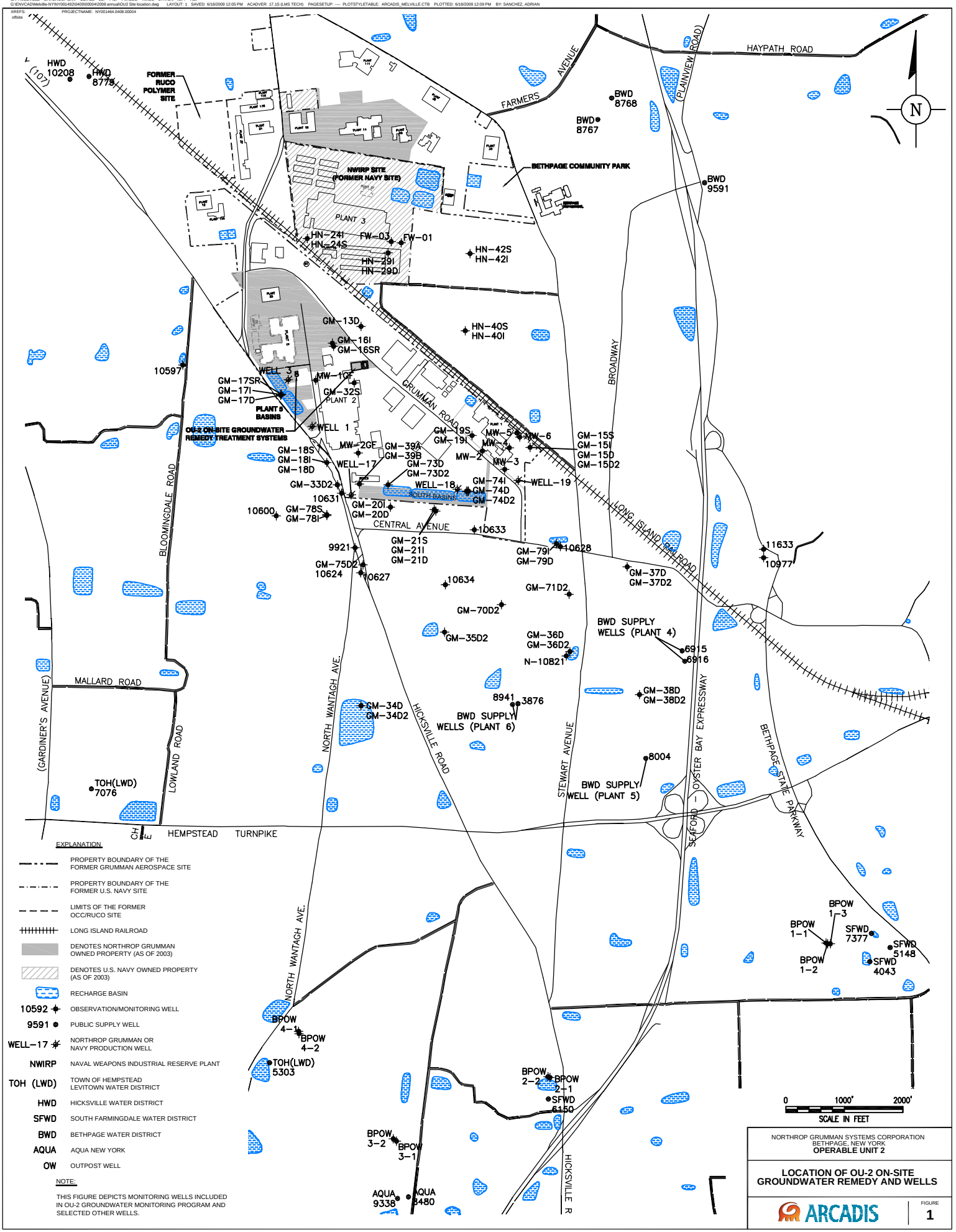
(2) TVOC Trigger Values were established in the PWSCP (ARCADIS G&M, Inc. 2003).

(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).

ug/L Micrograms per liter

Bold Constituent detected

TVOC Total Volatile Organic Compounds



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 2003)
- 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 OU-2 ON-SITE GROUNDWATER REMEDY AND WELLS

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FIGURE 1