ARCADIS
Infrastructure, environment, buildings

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

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 Second 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:
August 12, 2011

Contact:
David Stern

Phone:
631-391-5284

Email:
david.stern@arcadis-us.cc

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 through 4 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
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
Anthony J. Sabino Esq. – Bethpage Water District
Lois Lovisolo – Bethpage Public Library (Public Repository)
File

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, Second 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)	2nd Quarter 2011 Estimated VOC Mass Removed [d] (lbs)
Remedial Wells			**Groundwater Removed from Aquifer**					
Well 1	800	812	112.9	114.0	101%	390	471	447
Well 3	700	704	98.8	98.6	100%	2,100	2,378	1,954
Well 17	1,000	959	141.1	129.9	92%	250	294	318
Well 18	600	584	84.7	80.8	95%	77	100	67
Well 19	700	787	98.8	110.0	111%	190	222	195
Rounded Totals:	**3,800**	**3,846**	**536**	**533**	**99%**	**--**	**--**	**2,981**
Recharge Basins [a,g]			**Treated Water Recharged to Aquifer**					
West Recharge Basins	0	--	0	--	--	--	--	--
South Recharge Basins	2,231	2,935	314.8	414.2	132%	--	--	--
Rounded Totals:	**2,231**	**2,935**	**315**	**414**	**--**	**--**	**--**	**--**
Treated Water Sent to Calpine [g]								
Calpine Demand	100-400	--	12 - 48	--	--	--	--	--
Treatment Efficiencies			**Average SPDES Outfall TVOC Concentrations (ug/L) [f]**					
Tower 96 System Efficiency [e] :		**>99.9%**	--	**<0.5**	--	--	--	--
Tower 102 System Efficiency [e] :		**99.7%**	--	**0.7**	--	--	--	--

see footnotes on last page

Table 1. Operational Summary for the On-Site Portion of the Operable Unit 2 Groundwater Remedy, Second 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 98-day span of time for the Recharge Basins 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 2011, at the following percentages: Well-1 (99.5%), Well-3 (99.2%); Well-17 (96%), Well-18 (98%), and Well-19 (99%). 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 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) - Current Actual Average and Total Pumpage/Recharge values for Calpine Demand nor the West Basin recharge for this period due to the fact that totalizer values for Calpine consumption were not available for the period of June to July 11, 2011. The West Basin recharge is calculated as by minusing the recharge to the South Basins and the Calpine/Occidental demand from the total water pumped by the OU2 Remedial Wells The Second Quarter 2011 Actual Average and Total Pumpage/Recharge to the West Basins and Calpine will be noted in the Third Quarter 2011 Report.

--	Not Available or Not Applicable	lb/kg	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
NGC	Northrop Grumman Corporation	SPDES	State Pollutant Discharge Elimination System
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 2011, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	FW-03 FW-03 5/5/2011	GM-13D GM-13D 5/31/2011	GM-15S GM-15S 5/6/2011	GM-15I GM-15I 5/13/2011	GM-15D GM-15D 5/6/2011	GM-15D2 GM-15D2 5/6/2011	GM-17I GM-17I 5/11/2011
1,1,1-Trichloroethane		**0.53 J**	**3.2 J**	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane		< 5	**5.6 J**	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene		< 5	**12**	< 5	< 5	< 5	**1.1 J**	< 5
1,2-Dichloroethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
2-Butanone		< 50	< 100	< 50	< 50	< 50	< 50	< 50
2-Hexanone		< 50	< 100	< 50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone		< 50	< 100	< 50	< 50	< 50	< 50	< 50
Acetone		< 50	< 100	< 50	< 50	< 50	< 50	< 50
Benzene		< 0.7	< 1.4	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Bromoform		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Bromomethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Carbon Disulfide		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Chlorobenzene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 5	**2.4 J**	< 5	< 5	< 5	**1 J**	< 5
Chloroethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Chloroform		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Chloromethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene		**0.58 J**	**21**	**0.32 J**	< 5	< 5	**0.31 J**	< 5
cis-1,3-dichloropropene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Ethylbenzene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Methylene Chloride		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Styrene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene		**56**	**200**	< 5	< 5	**0.35 J**	**7.8**	< 5
Toluene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Trichloroethylene		**3.1 J**	**87**	**5 J**	**5.4**	**0.6 J**	**11**	< 5
Trichlorotrifluoroethane (Freon 113)		< 5	**2.9 J**	< 5	< 5	< 5	**0.99 J**	< 5
Vinyl Chloride		< 2	< 4	< 2	< 2	< 2	< 2	< 2
Xylene-o		< 5	< 10	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p		< 5	< 10	< 5	< 5	< 5	< 5	< 5
	Total VOCs	**60**	**330**	**5.3**	**5.4**	**1.0**	**22**	0

Note: Results rounded to two significant figures.

Bold Constituent detected

VOCs Volatile Organic Compounds

ug/L Micrograms per liter

J Constituent value is estimated

REP Replicate Sample

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

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	GM-17D GM-17D 5/11/2011	GM-18I GM-18I 5/31/2011	GM-18D GM-18D 5/11/2011	GM-18D GM-18D (REP) 5/11/2011	GM-20I GM-20I 5/31/2011	GM-20D GM-20D 5/31/2011	GM-21S GM-21S 5/12/2011	GM-21I GM-21I 6/1/2011
1,1,1-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone		**1.6 J**	< 50	< 50	< 50	< 50	< 50	< 50	< 50
2-Hexanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Acetone		< 50 B	**1.1 J**	< 50	< 50	< 50	< 50	< 50 B	< 50
Benzene		< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon Disulfide		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methylene Chloride		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Toluene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene		**0.54 J**	**0.45 J**	**1.7 J**	**1.7 J**	< 5	< 5	< 5	< 5
Trichlorotrifluoroethane (Freon 113)		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Xylene-o		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
	Total VOCs	**2.1**	**1.6**	**1.7**	**1.7**	0	0	0	0

Note: Results rounded to two significant figures.

Bold Constituent detected

VOCs Volatile Organic Compounds

ug/L Micrograms per liter

J Constituent value is estimated

REP Replicate Sample

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

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	GM-21D GM-21D 5/12/2011	GM-33D2 GM-33D2 5/18/2011	GM-34D GM-34D 5/16/2011	GM-34D2 GM-34D2 5/16/2011	GM-35D2 GM-35D2 5/17/2011	GM-38D GM-38D 5/21/2011	GM-38 D GM-38D (REP) 5/21/2011	GM-38D2 GM-38D2 5/21/2011
1,1,1-Trichloroethane		< 5	< 5	< 13	< 10	< 5	**1.7 J**	**0.44 J**	**0.41 J**
1,1,2,2-Tetrachloroethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
1,1,2-Trichloroethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
1,1-Dichloroethane		< 5	< 5	**1.1 J**	< 10	< 5	**2.6 J**	**1.6 J**	**1.8 J**
1,1-Dichloroethene		< 5	< 5	**5.1 J**	**1.6 J**	**0.69 J**	**3.4 J**	**0.54 J**	**0.52 J**
1,2-Dichloroethane		< 5	< 5	< 13	< 10	< 5	**1.7 J**	< 5	< 5
1,2-Dichloropropane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
2-Butanone		< 50	< 50	< 130	< 100	< 50	< 130	< 50	< 50
2-Hexanone		< 50	< 50	< 130	< 100	< 50	< 130	< 50	< 50
4-methyl-2-pentanone		< 50	< 50	< 130	< 100	< 50	< 130	< 50	< 50
Acetone		< 50	< 50	< 130	< 100	< 50	< 130	**0.8 J**	< 50
Benzene		< 0.7	< 0.7	< 1.8	< 1.4	< 0.7	< 1.8	< 0.7	< 0.7
Bromodichloromethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Bromoform		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Bromomethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Carbon Disulfide		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Carbon tetrachloride		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Chlorobenzene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 5	< 5	< 13	**0.72 J**	**0.85 J**	< 13	< 5	< 5
Chloroethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Chloroform		< 5	< 5	< 13	< 10	< 5	< 13	**0.43 J**	**0.45 J**
Chloromethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
cis-1,2-dichloroethene		< 5	**0.38 J**	**6.9 J**	**5.2 J**	**1.3 J**	**1.3 J**	**0.37 J**	**0.36 J**
cis-1,3-dichloropropene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Dibromochloromethane		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Ethylbenzene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Methylene Chloride		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Styrene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Tetrachloroethene		< 5	**7**	**5.7 J**	**11**	**8.7**	**13**	< 5	< 5
Toluene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
trans-1,2-dichloroethene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
trans-1,3-dichloropropene		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Trichloroethylene		**0.55 J**	**48**	**380**	**260**	**150**	**440**	**48**	**42**
Trichlorotrifluoroethane (Freon 113)		< 5	**17**	**7.1 J**	**2.6 J**	**3.3 J**	**2 J**	**0.46 J**	**0.44 J**
Vinyl Chloride		< 2	< 2	< 5	< 4	< 2	< 5	< 2	< 2
Xylene-o		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
Xylenes - m,p		< 5	< 5	< 13	< 10	< 5	< 13	< 5	< 5
	Total VOCs	**0.55**	**72**	**410**	**280**	**170**	**470**	**53**	**46**

Note: Results rounded to two significant figures.

Bold Constituent detected

VOCs Volatile Organic Compounds

ug/L Micrograms per liter

J Constituent value is estimated

REP Replicate Sample

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

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	GM-39D$_A$ GM-39D$_A$ 5/9/2011	GM-39D$_B$ GM-39D$_B$ 5/9/2011	GM-73D GM-73D 5/4/2011	GM-73D2 GM-73D2 5/4/2011	GM-73D2 GM-73D2 (REP) 5/4/2011	GM-74I GM-74I 5/4/2011	GM-74D GM-74D 5/4/2011	GM-74D2 GM-74D2 5/4/2011
1,1,1-Trichloroethane		< 5	< 5	< 5	**0.58 J**	**0.49 J**	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane		< 5	< 5	< 5	**0.99 J**	**0.94 J**	< 5	< 5	**0.52 J**
1,1-Dichloroethene		< 5	< 5	< 5	**2.1 J**	**1.8 J**	< 5	< 5	**0.76 J**
1,2-Dichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
2-Hexanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Acetone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Benzene		< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon Disulfide		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 5	< 5	< 5	< 5	**0.33 J**	< 5	< 5	**0.77 J**
Chloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene		< 5	**0.38 J**	**0.35 J**	**1 J**	**0.87 J**	< 5	< 5	< 5
cis-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methylene Chloride		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene		< 5	**0.89 J**	< 5	**2 J**	**2.1 J**	< 5	**0.43 J**	**6.7**
Toluene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene		**1.2 J**	**94**	**58**	**110**	**120**	< 5	**1.8 J**	**8.8**
Trichlorotrifluoroethane (Freon 113)		< 5	**0.37 J**	< 5	**0.52 J**	**0.47 J**	< 5	< 5	**0.95 J**
Vinyl Chloride		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Xylene-o		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
	Total VOCs	**1.2**	**96**	**59**	**120**	**130**	0	**2.0**	**19**

Note: Results rounded to two significant figures.

Bold Constituent detected

VOCs Volatile Organic Compounds

ug/L Micrograms per liter

J Constituent value is estimated

REP Replicate Sample

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

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	GM-75D2 GM-75D2 5/18/2011	GM-78S GM-78S 5/5/2011	GM-78I GM-78I 5/5/2011	GM-79I GM-79I 5/3/2011	GM-79D GM-79D 5/3/2011	HN-24I HN-24I 5/17/2011	HN-40S HN-40S 5/3/2011	HN-40I HN-40I 5/3/2011
1,1,1-Trichloroethane		< 5	< 5	< 5	< 5	< 5	**3.9 J**	< 5	**0.37 J**
1,1,2,2-Tetrachloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane		< 5	< 5	< 5	< 5	< 5	**0.44 J**	< 5	< 5
1,1-Dichloroethane		< 5	< 5	< 5	< 5	< 5	**4.1 J**	< 5	< 5
1,1-Dichloroethene		**1 J**	< 5	< 5	< 5	< 5	**24**	< 5	< 5
1,2-Dichloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
2-Hexanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Acetone		< 50	< 50	< 50	< 50	< 50	< 50	< 50	**1.3 J**
Benzene		< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon Disulfide		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride		< 5	< 5	< 5	< 5	< 5	**0.79 J**	< 5	< 5
Chlorobenzene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform		< 5	< 5	< 5	< 5	< 5	**4.3 J**	< 5	**0.63 J**
Chloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene		**0.37 J**	< 5	< 5	< 5	< 5	**1.3 J**	< 5	< 5
cis-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 5	< 5	< 5	< 5	< 5	**2.6 J**	< 5	< 5
Ethylbenzene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methylene Chloride		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene		**2.8 J**	< 5	< 5	**0.62 J**	< 5	**75**	< 5	**0.64 J**
Toluene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene		**87**	< 5	< 5	**28**	< 5	**35**	< 5	**2.3 J**
Trichlorotrifluoroethane (Freon 113)		**1.3 J**	< 5	< 5	**0.43 J**	< 5	**2.1 J**	< 5	< 5
Vinyl Chloride		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Xylene-o		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
	Total VOCs	**93**	0	0	**29**	0	**150**	0	**5.0**

Note: Results rounded to two significant figures.

Bold Constituent detected

VOCs Volatile Organic Compounds

ug/L Micrograms per liter

J Constituent value is estimated

REP Replicate Sample

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

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	HN-42S / HN-42S / 5/2/2011	HN-42I / HN-42I / 5/2/2011	N-10624 / N-10624 / 5/27/2011	N-10627 / N-10627 / 5/18/2011	N-10631 / N-10631 / 5/18/2011	WELL 1 / WELL 1 / 5/9/2011	WELL 3 / WELL 3 / 5/9/2011	WELL 3 / WELL 3 (REP) / 5/9/2011
1,1,1-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 13	**2.5 J**	< 50
1,1,2,2-Tetrachloroethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
1,1,2-Trichloroethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
1,1-Dichloroethane		< 5	< 5	< 5	< 5	< 5	**0.83 J**	**2.5 J**	< 50
1,1-Dichloroethene		< 5	< 5	< 5	< 5	< 5	**2.5 J**	**10 J**	**11 J**
1,2-Dichloroethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
1,2-Dichloropropane		< 5	< 5	< 5	< 5	< 5	**5.2 J**	< 25	< 50
2-Butanone		< 50	< 50	< 50	< 50	< 50	< 130	< 250	< 500
2-Hexanone		< 50	< 50	< 50	< 50	< 50	< 130	< 250	< 500
4-methyl-2-pentanone		< 50	< 50	< 50	< 50	< 50	< 130	< 250	< 500
Acetone		**1.3 J**	**0.84 J**	< 50 B	**0.88 J**	**0.82 J**	< 130 B	< 250	< 500
Benzene		< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 1.8	< 3.5	< 7
Bromodichloromethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Bromoform		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Bromomethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Carbon Disulfide		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Carbon tetrachloride		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Chlorobenzene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Chlorodifluoromethane (Freon 22)		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Chloroethane		< 5	< 5	< 5	< 5	< 5	< 13	**4.6 J**	**7 J**
Chloroform		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Chloromethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
cis-1,2-dichloroethene		**0.36 J**	**3.4 J**	< 5	< 5	< 5	**3.6 J**	**11 J**	**12 J**
cis-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Dibromochloromethane		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Dichlorodifluoromethane (Freon 12)		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Ethylbenzene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Methylene Chloride		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Styrene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Tetrachloroethene		< 5	< 5	< 5	< 5	< 5	**65**	**69**	**72**
Toluene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
trans-1,2-dichloroethene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
trans-1,3-dichloropropene		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Trichloroethylene		**0.79 J**	**8.1**	< 5	**0.67 J**	**0.59 J**	**390**	**2100 D**	**2100 D**
Trichlorotrifluoroethane (Freon 113)		< 5	< 5	< 5	< 5	< 5	**4.2 J**	**8.8 J**	**12 J**
Vinyl Chloride		< 2	< 2	< 2	< 2	< 2	< 5	**170**	**180**
Xylene-o		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
Xylenes - m,p		< 5	< 5	< 5	< 5	< 5	< 13	< 25	< 50
	Total VOCs	**3.0**	**12**	0	**2.0**	**1.0**	**470**	**2400**	**2400**

Note: Results rounded to two significant figures.

Bold Constituent detected

VOCs Volatile Organic Compounds

ug/L Micrograms per liter

J Constituent value is estimated

REP Replicate Sample

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

CONSTITUENT (Units in ug/L)	Well: / Sample ID: / Date:	96 EFFLUENT 96 EFFLUENT 5/9/2011	WELL 17 WELL 17 5/9/2011	WELL 18 WELL 18 5/9/2011	WELL 19 WELL 19 5/9/2011	102 EFFLUENT 102 EFFLUENT 5/9/2011
1,1,1-Trichloroethane		< 5	**0.74 J**	**1.2 J**	**0.68 J**	< 5
1,1,2,2-Tetrachloroethane		< 5	< 10	< 5	< 5	< 5
1,1,2-Trichloroethane		< 5	< 10	< 5	< 5	< 5
1,1-Dichloroethane		< 5	**1.2 J**	**1.2 J**	**0.88 J**	< 5
1,1-Dichloroethene		< 5	**2.7 J**	**4.3 J**	**1.6 J**	< 5
1,2-Dichloroethane		< 5	< 10	< 5	**0.64 J**	< 5
1,2-Dichloropropane		< 5	< 10	< 5	< 5	< 5
2-Butanone		< 50	< 100	< 50	< 50	< 50
2-Hexanone		< 50	< 100	< 50	< 50	< 50
4-methyl-2-pentanone		< 50	< 100	< 50	< 50	< 50
Acetone		< 50	< 100 B	< 50	< 50	< 50 B
Benzene		< 0.7	< 1.4	< 0.7	< 0.7	< 0.7
Bromodichloromethane		< 5	< 10	< 5	< 5	< 5
Bromoform		< 5	< 10	< 5	< 5	< 5
Bromomethane		< 5	< 10	< 5	< 5	< 5
Carbon Disulfide		< 5	< 10	< 5	< 5	< 5
Carbon tetrachloride		< 5	< 10	< 5	< 5	< 5
Chlorobenzene		< 5	< 10	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)		< 5	< 10	**0.61 J**	**0.65 J**	< 5
Chloroethane		< 5	< 10	< 5	< 5	< 5
Chloroform		< 5	< 10	< 5	**0.65 J**	< 5
Chloromethane		< 5	< 10	< 5	< 5	< 5
cis-1,2-dichloroethene		< 5	**3.8 J**	**1.7 J**	**19**	< 5
cis-1,3-dichloropropene		< 5	< 10	< 5	< 5	< 5
Dibromochloromethane		< 5	< 10	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)		< 5	< 10	< 5	< 5	< 5
Ethylbenzene		< 5	< 10	< 5	< 5	< 5
Methylene Chloride		< 5	< 10	< 5	< 5	< 5
Styrene		< 5	< 10	< 5	< 5	< 5
Tetrachloroethene		< 5	**30**	**12**	**7**	< 5
Toluene		< 5	< 10	< 5	< 5	< 5
trans-1,2-dichloroethene		< 5	< 10	< 5	< 5	< 5
trans-1,3-dichloropropene		< 5	< 10	< 5	< 5	< 5
Trichloroethylene		**0.43 J**	**250**	**77**	**190 D**	< 5
Trichlorotrifluoroethane (Freon 113)		< 5	**5.7 J**	**1.5 J**	**0.83 J**	< 5
Vinyl Chloride		< 2	< 4	< 2	< 2	< 2
Xylene-o		< 5	< 10	< 5	< 5	< 5
Xylenes - m,p		< 5	< 10	< 5	< 5	< 5
	Total VOCs	**0.43**	**290**	**100**	**220**	0

Note: Results rounded to two significant figures.

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

Table 3. Concentrations of Metals in Monitoring Wells,
Second Quarter 2011, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in mg/L)	Well: / Sample ID: / Date:	GM-15S GM-15S 5/6/2011	GM-78I GM-78I 5/5/2011	GM-78S GM-78S 5/5/2011	MW-01GF MW-01GF 5/27/2011	MW-02GF MW-02GF 5/27/2011	MW-02GF MW-02GF (REP 5/27/2011	N-10631 N-10631 5/18/2011	PT1 MW-4 PT1 MW-4 5/13/2011	PT1 MW-5 PT1 MW-5 5/13/2011	PT1 MW-6 PT1 MW-6 5/13/2011
Cadmium		--	< 5	< 5	< 5	< 5	< 5	**5.8**	--	--	--
Cadmium (Dissolved)		--	< 5	< 5	< 5	< 5	--	< 5	--	--	--
Chromium		**616**	< 10	< 10	< 10	**184**	**183**	**20**	< 10	**460**	**170**
Chromium (Dissolved)		--	< 10	< 10	< 10	**183**	--	**14**	--	--	--

Bold Constituent detected
mg/L Milligrams per liter
-- Not analyzed
REP Replicate Sample

ARCADIS

Table 4. Concentrations of Site-Related Volatile Organic Compounds Detected in Outpost Wells, Second Quarter 2011, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

	Well:	BPOW 1-1 [3]	BPOW 1-2 [3]	BPOW 1-3 [3]	BPOW 2-1 [4]	BPOW 2-2	BPOW 3-1	REP 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 2-1	BPOW 2-2	BPOW 3-1	BPOW 3-1	BPOW 3-2	BPOW 4-1	BPOW 4-2
(Units in ug/L)	**Date:**	5/23/2011	5/23/2011	6/13/2011	6/14/2011	5/26/2011	5/24/2011	5/24/2011	5/24/2011	5/26/2011	5/25/2011
1,1,1-Trichloroethane		**0.54**	**0.29 J**	< 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	**0.65**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene		**0.28 J**	**0.22 J**	< 0.5	< 0.5	**0.29 J**	< 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	**0.8**	**0.62**
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		**1.2**	**0.25 J**	< 0.5	< 0.5	**0.71**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Site-Related VOCs [1] :		**2.0**	**0.76**	0	0	**1.7**	0	0	0	**0.80**	**0.62**
TVOC Trigger Value [2] :		**0.60**	**0.60**	**0.60**	**NE**	**NE**	**1.5**	**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). Results adjusted to two signficant figures

(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).

(4) Benzene, which is not a site-related VOC, was detected in Outpost Well OW 2-1 at 0.21 ug/L.

NE Not established

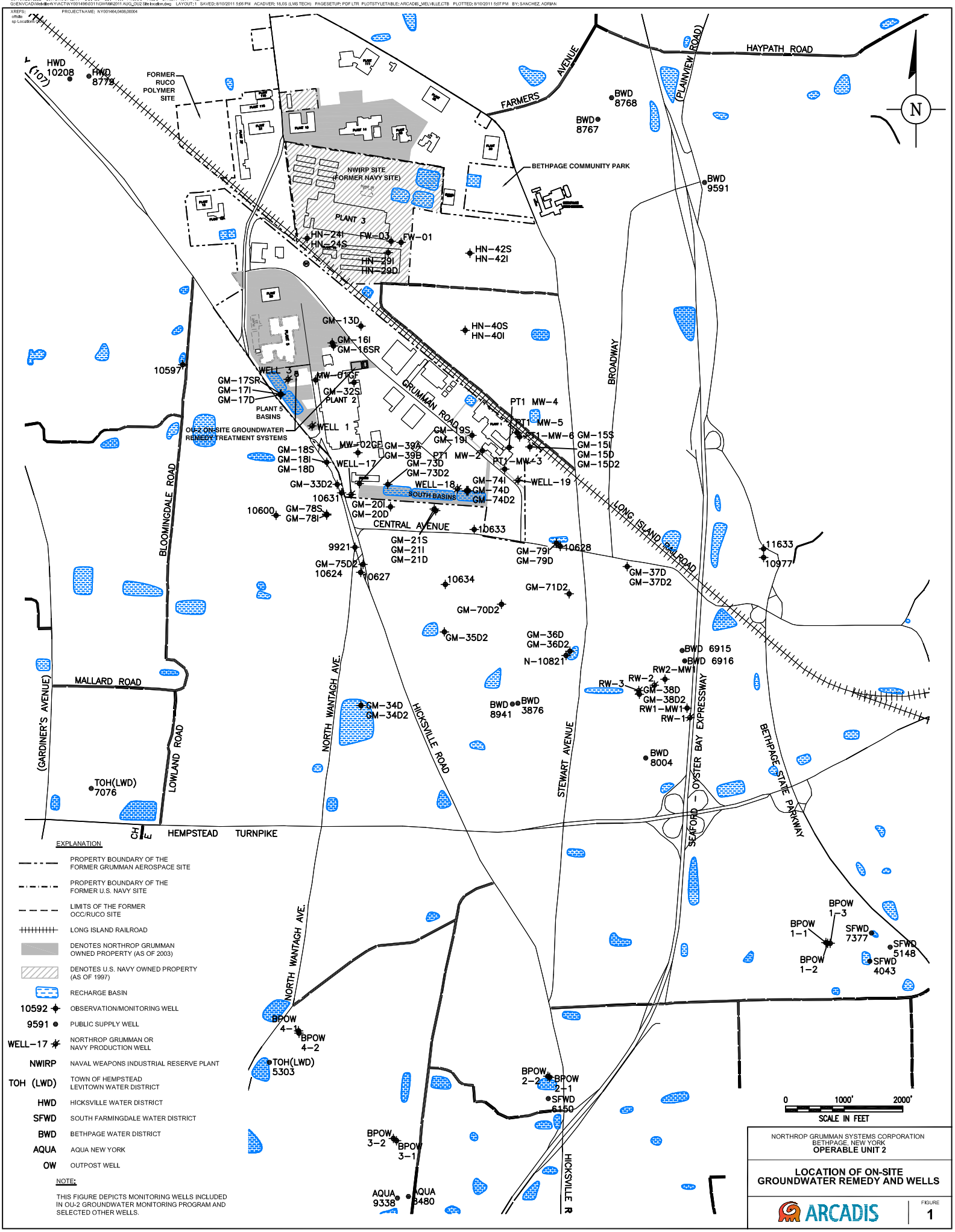
ug/L Micrograms per liter

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

ARCADIS

FIGURE 1