ARCADIS Design & Consultancy for natural and built assets

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Subject:
Third Quarter 2018 Progress Report
Northrop Grumman Systems Corporation
Operable Unit 2, NYSDEC Site ID # 1-30-003A,
Bethpage, New York

ENVIRONMENT

Date:
October 10, 2018

Contact:
David E. Stern
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Our ref:
NY001496.22TM.LARA5

Dear Jason:

In accordance with Appendix "A", Section XIII of Administrative Order on Consent (AOC) Index # W1-118-14-12, this letter reports Operable Unit 2 (OU2) activities performed by Northrop Grumman Systems Corporation (Northrop Grumman) during the Third Quarter of 2018 (July through September 2018). Activities planned for Fourth Quarter of 2018 (October through December 2018) are also described.

This progress report provides data that have been received as final and/or validated from the current period that are not included in other routine reporting for OU2 (e.g., quarterly reports as specified in the Groundwater Monitoring Plan).

As this is an ongoing remediation project, Northrop Grumman has transitioned the frequency of these progress reports from monthly to quarterly. Therefore, the next report will be submitted following the close of December 2018.

OU2 ACTIVITIES CONDUCTED DURING THIRD QUARTER 2018

OU2 On-Site Containment (ONCT) System

- Continued Operation, Maintenance, and Monitoring (OM&M) of the OU2 ONCT system, including performance of maintenance of South Basins (westernmost) and West Basins (southernmost)
- Significant shutdown instances this period are summarized below. In each instance the system was fully restored following shutdown.
    - Tower 96, of the ONCT System, was shut down from July 12, 2018 through August 1, 2018 due to failure of supplemental blower shaft bearings.
    - Tower 96, of the ONCT System, was shut down for approximately one workday in August due to electrical work and a duct leak repair.
    - Tower 96, of the ONCT system, was shut down for approximately three working days in August to accommodate planned maintenance activities (a supplemental blower fan replacement, SCADA alarm adjustments, and removal of the temporary air stripper blower).
    - Tower 102, of the ONCT System, was shut down for approximately two workdays in September 2018 to accommodate planned air duct replacement.
    - Tower 102, of the ONCT System, was shut down for part of a day in September 2018 to accommodate planned duct work testing.
- Completed Third Quarter 2018 ONCT system sampling
- Data not routinely reported are provided for the current period as follows:
    - Analytical data associated with Tower 96 Effluent and monthly sampling of ONCT Tower 96 system Remedial Wells 1 and 3R are provided in Table 1. Locations of wells are shown on Figure 1.

Regional Groundwater Monitoring & Outpost Well Monitoring

- Completed supplemental (quarterly) VOC sampling at Monitoring Wells GM-21D2, GM-33D2, GM-75D2 and GM-20D located just south of the ONCT remedial wells to monitor ONCT system hydraulic effectiveness following 2017 ONCT South Basins maintenance activities
- Completed Third Quarter 2018 routine OU2 groundwater monitoring activities (sampled former outpost wells BPOW 2-1, BPOW 2-2 and BPOW 2-3)

- Completed single event sampling for PFAS and 1,4-dioxane at select monitoring well locations, using temporary PFC-compatible sampling equipment in accordance with the work plan approved by NYSDEC (correspondence dated June 8, 2018).
- Data not routinely reported are provided for the current period as follows:
    - Analytical data associated with the sampling of Monitoring Wells GM-21D2, GM-20D, GM-33D2 and GM-75D2 are provided in Table 1. Locations of wells are shown on Figure 1.
    - Analytical data associated with the discharge sample for compliance with local POTW are also provided in Table 1.
- Prepared and submitted Second Quarter 2018 sampling event data (Form 1 packages) to NYSDEC

Northrop Grumman Cooperation with Navy

- Coordinated with Navy and completed Third Quarter 2018 sampling of additional outpost wells
- Prepared and submitted Second Quarter 2018 sampling event data for Navy owned wells (Form 1 packages) to Navy for distribution

Other

- Prepared and submitted the Second Quarter 2018 AOC quarterly progress report
- Prepared and submitted the Second Quarter 2018 OU2 Operation, Maintenance, and Monitoring Report

OU2 ACTIVITIES SCHEDULED FOR FOURTH QUARTER 2018

OU2 On-Site Containment (ONCT) System

- Continue OM&M of OU2 ONCT system, including preparation for and performance of maintenance of South Basins (centermost) in fourth quarter, dependent on weather

Regional Groundwater Monitoring & Outpost Well Monitoring

- Conduct Fourth Quarter 2018 sampling from wells in Northrop Grumman's routine monitoring program (BPOW2 well cluster)
- Continue supplemental (quarterly) VOC sampling at Monitoring Wells GM-21D2, GM-33D2, GM-75D2 and GM-20D

Northrop Grumman Cooperation with Navy

- Conduct Fourth Quarter 2018 sampling from additional outpost wells and plume monitoring wells

Other

- Prepare and submit the Third Quarter 2018 AOC quarterly progress report on October 10, 2018
- Prepare and submit the Third Quarter 2018 OU2 Operation, Maintenance, and Monitoring Report on November 29, 2018

Sincerely,

Arcadis of New York, Inc.

David E. Stern
Senior Hydrogeologist/Associate Project Manager

Enclosures

Copies:
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Steven Scharf – NYSDEC
Donald Hesler, NYSDEC
Andrew Guglielmi, NYSDEC
Edward J. Hannon, Northrop Grumman
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Lora Fly, NAVFAC Mid-Atlantic Environmental
Bethpage Public Library – Public Repository
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Mike Wolfert, Arcadis
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TABLES

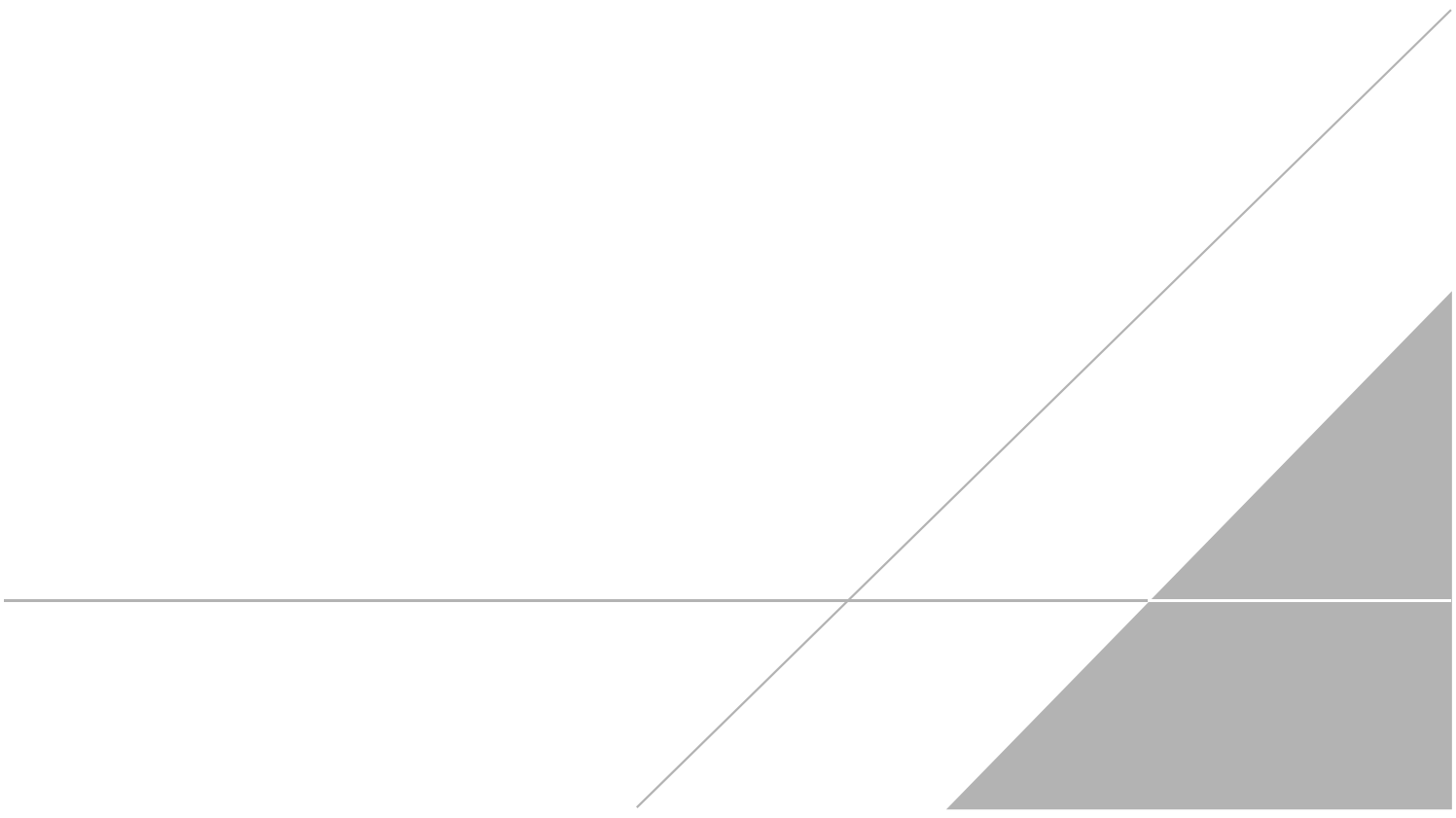


Table 1.
Concentrations of Volatile Organic Compounds
Operable Unit 2, Northrop Grumman Systems Corporation
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Constituents (units in µg/L)	Location ID: / Sample ID: / Date:	WELL 1 / WELL 1_20180615 / 6/15/2018	WELL 3R / WELL 3R_20180615 / 6/15/2018	96 EFFLUENT T96 EFFLUENT (GW)_20180615 / 6/15/2018	QAQC / TB-061518-SC-1 / 6/15/2018	WELL 1 / WELL 1_20180711 / 7/11/2018	WELL 3R / WELL 3R_20180711 / 7/11/2018	96 EFFLUENT T96 EFFLUENT (GW)_20180711 / 7/11/2018	QAQC / TB-071118-JJC-1 / 7/11/2018	GM-20D / GM-20D_20180828 / 8/28/2018	GM-20D / REP082818AD1 / 8/28/2018	QAQC / TB082818AD1 / 8/28/2018	GM-75D2 / GM-75D2_20180829 / 8/29/2018
Volatile Organic Compounds [1]													
1,1,1-Trichloroethane		**0.29 J**	**0.59**	< 0.50	< 0.50	< 0.50	**0.73**	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane		**3.6**	**3.3**	< 0.50	< 0.50	**3.7**	**3.5**	< 0.50	< 0.50	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane		**0.67 J**	**1.3**	< 1.0	< 1.0	**0.73 J**	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene		**2.4**	**3.7**	< 0.50	< 0.50	**2.4**	**4.0**	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane		**4.1**	< 1.0	< 1.0	< 1.0	**4.5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
CFC-11		--	--	--	--	--	--	--	--	--	--	--	--
CFC-12		--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform		**0.40 J**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene		**5.0**	**3.5**	< 0.50	< 0.50	**5.4**	**4.0**	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methyl-tert-butylether		--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene		**18.9**	**27.4**	< 0.50	< 0.50	**19.0**	**29.5**	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
Toluene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene		**540**	**305**	< 0.50	< 0.50	**546**	**307**	< 0.50	< 0.50	**0.93 J**	**0.97 J**	< 1.0	**21.6**
Vinyl chloride		< 0.50	**2.0**	< 0.50	< 0.50	< 0.50	**1.9**	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [3]		**580**	**350**	0	0	**580**	**350**	0	0	**0.93**	**0.97**	0	**22**

Notes and Abbreviations on last page.

Table 1.
Concentrations of Volatile Organic Compounds
Operable Unit 2, Northrop Grumman Systems Corporation
Bethpage, New York

Constituents (units in µg/L)	Location ID: / Sample ID: / Date:	QAQC TB082018AD1 8/29/2018	QAQC FB082018AD1 8/29/2018	GM-21D2 GM-21D2_20180830 8/30/2018	GM-33D2 GM-33D2_20180830 8/30/2018	QAQC FB083018DC1 8/30/2018	QAQC TB083018DC1 8/30/2018	DISCHARGE [2] DISCHARGE-083018 8/30/2018
Volatile Organic Compounds [1]								
1,1,1-Trichloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane		< 5.0	< 5.0	< 5.0	**2.0 J**	< 5.0	< 5.0	< 2.0
1,1,2-Trichloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)		< 10	< 10	< 10	< 10	< 10	< 10	< 5.0
4-Methyl-2-Pentanone		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone		< 10	< 10	< 10	< 10	< 10	< 10	< 5.0
Benzene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Bromodichloromethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Carbon Disulfide		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Carbon Tetrachloride		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
CFC-11		--	--	--	--	--	--	< 2.0
CFC-12		--	--	--	--	--	--	< 2.0
Chlorobenzene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Ethylbenzene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methyl-tert-butylether		--	--	--	--	--	--	< 1.0
o-Xylene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
Tetrachloroethene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene		< 1.0	< 1.0	**8.4**	**10**	< 1.0	< 1.0	**2.5**
Vinyl chloride		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[3]		0	0	**8.4**	**12**	0	0	**2.5**

Notes and Abbreviations on last page.

Table 1.
Concentrations of Volatile Organic Compounds
Operable Unit 2, Northrop Grumman Systems Corporation
Bethpage, New York

Notes and Abbreviations:

(1) Sample analysis by VOC Method 8260C unless otherwise noted.

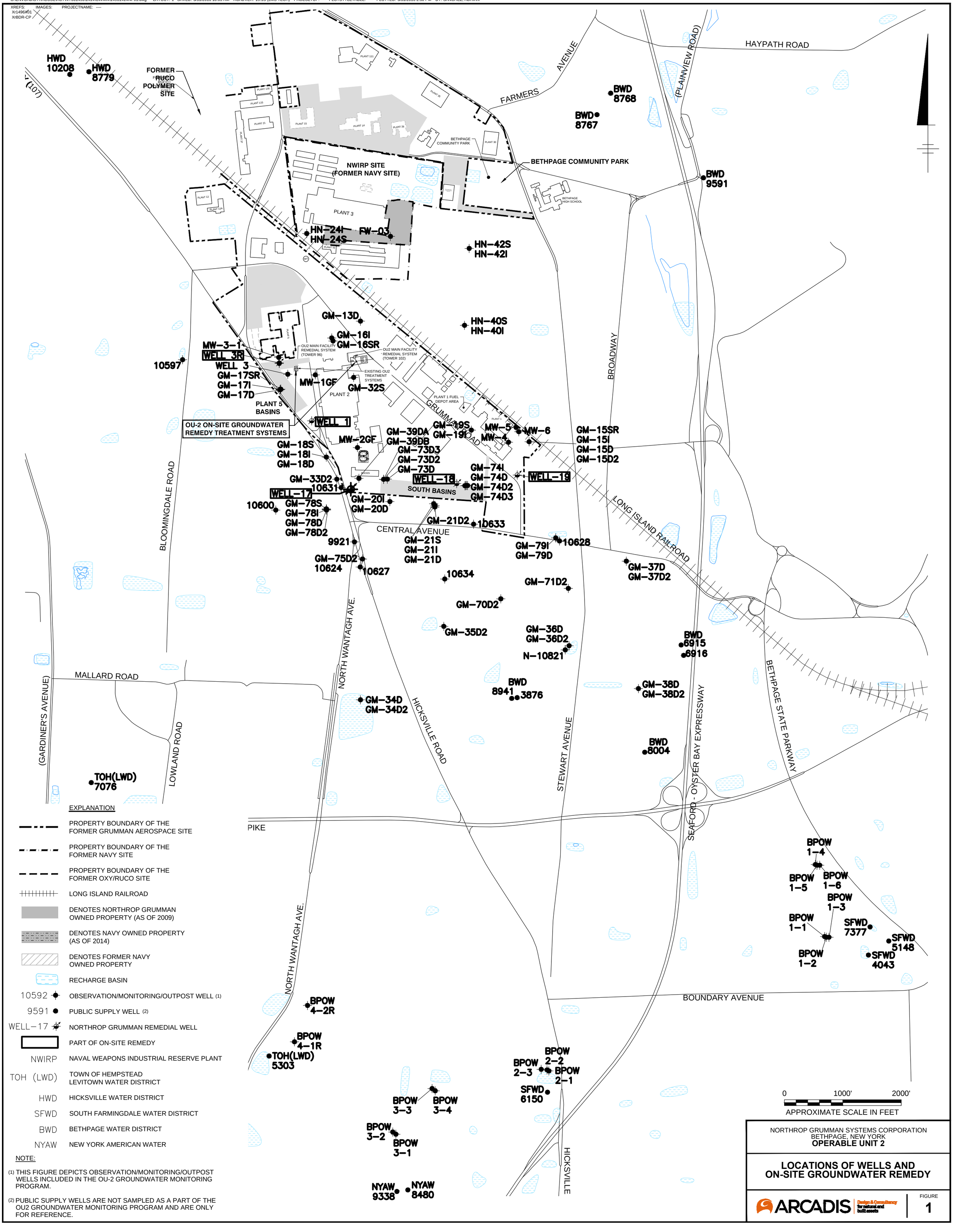
'(2) Sample analysis by VOC Method 624.

(3) Results rounded to two significant figures.

Results validated following protocols specified in OU2 Groundwater Monitoring Plan (ARCADIS 2016), or as received as final from the laboratory as of the end of the AOC reporting period.

--	Not Analyzed
4.2	Bold value indicates a detection
µg/L	Micrograms per liter
<1.0	Constituent not detected above its laboratory quantification limit.
OU2	Operable Unit 2
VOC	Volatile Organic Compound
QAQC	Quality Assurance/Quality Control sample
TB	Trip Blank
REP	Blind duplicate sample
FB	Field Blank
J	Value is estimated concentration

FIGURES



EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- PROPERTY BOUNDARY OF THE FORMER OXY/RUCO SITE
- LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2009)
- DENOTES NAVY OWNED PROPERTY (AS OF 2014)
- DENOTES FORMER NAVY OWNED PROPERTY
- RECHARGE BASIN
- 10592 OBSERVATION/MONITORING/OUTPOST WELL (1)
- 9591 PUBLIC SUPPLY WELL (2)
- WELL-17 NORTHROP GRUMMAN REMEDIAL WELL
- PART OF ON-SITE REMEDY
- 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.

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

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

LOCATIONS OF WELLS AND ON-SITE GROUNDWATER REMEDY

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FIGURE 1