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Subject:

2020 First Quarter Operation Maintenance and Monitoring Report,
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)

ENVIRONMENT

Date:
May 29, 2020

Contact:
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Our ref:
30038454.RPTI4
30038457.NAVI4

Dear Jason:

On behalf of Northrop Grumman Systems Corporation (Northrop Grumman), Arcadis is providing the NYSDEC with the 2020 First Quarter Operation Maintenance and Monitoring Report (Report). This Report was prepared to document the operation, maintenance, and monitoring (OM&M) activities conducted for the on-site portion of the Operable Unit 2 (OU2) groundwater remedy and the results of ongoing volatile organic compound (VOC) and inorganic monitoring in groundwater to meet the remedial objectives set forth in the March 2001 OU2 Record of Decision (ROD).

Table 1 summarizes OU2 remedial system performance operational data, total mass removal, and water balance. Tables 2 and 3 provide the analytical results for remedial system water and vapor samples for this period, respectively. Tables 4A and 4B provide the air modeling inputs and outputs and resulting analyses, based on quarterly vapor samples collected from the Tower 96 and Tower 102 systems, respectively, for this period. Tables 5A and 5B provides a summary of percent mass emittance of TCE from first quarter 2019 through first quarter 2020. Table 6 provides the validated analytical results of groundwater monitoring for this period. Figures 1 through 3 show the Locations of Wells and Onsite


Mr. Jason Pelton
May 29, 2020

Groundwater Remedy, ONCT Groundwater Extraction and Treatment System Site Plan, and the ONCT Groundwater Extraction and Treatment System Schematic, respectively.

Please contact us if you have any questions or comments.

Sincerely,

Arcadis of New York, Inc.



Christopher Engler, P.E. 069748
Engineer of Record

Copies:

Ed Hannon – Northrop Grumman
Walter Parish – NYSDEC Region 1
Donald Hesler – NYSDEC
Steven Scharf – NYSDEC
James Sullivan – New York State Department of Health
John Lovejoy - NCDOH
Brian S. Murray – NAVFAC Midlant Environmental
David Brayack – TetraTech NUS, Inc.
Paul Bluestein – Glenn Springs Holdings, Inc.
Manfred Bohms – Steel Equities
Mike Negrelli – USEPA
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Carol Stein - USEPA
Matthew Russo – Town of Oyster Bay
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TABLES



Table 1
Operational Summary for the Treatment System,
First Quarter 2020⁽¹⁾ Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

	Quarterly Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Quarterly VOC Concentrations (µg/L)		VOC Mass Removed (lbs)	
	Design ⁽²⁾	Average ^(3,4)	Design ⁽²⁾	Actual ^(3,4)	% of Design	TCE ⁽⁵⁾	TVOC ^(5,6)	Quarterly	Cumulative
Influent Groundwater									
Well 1 ⁽⁷⁾	800	807	104.8	105.6	101%	629	660	582	50,490
Well 3R ⁽⁷⁾	700	753	91.7	77.5	85%	204	250	162	92,453
Well 17 ⁽⁷⁾	1,000	1,100	131.0	143.0	109%	117	140	167	54,265
Well 18 ⁽⁷⁾	600	1,003	78.6	130.4	166%	34	55	60	6,868
Well 19 ⁽⁷⁾	700	506	91.7	65.8	72%	95	120	66	9,010
Total ⁽⁸⁾	3,800	4,169	498	522	105%	--	--	1,037	213,086
Effluent Groundwater ⁽⁹⁾									
Calpine	100 - 400	62	--	8.1	--	--	--	--	--
OXY Biosparge ⁽¹⁰⁾	2 - 42	0	--	0	--	--	--	--	--
West Recharge Basins	1,112 - 1,455	1,216	--	159.4	--	--	0.0	--	--
South Recharge Basins ⁽¹⁰⁾	2,231	2,708	292.4	354.8	121%	--	1.2	--	--
Total ⁽¹¹⁾	--	3,986	--	522	--	--	--	--	--
Additional Flow to South Recharge Basins									
Storm Water Runoff Contributing to South Recharge Basins Flow Volume ⁽¹¹⁾	--	--	--	15.6	--	--	--	--	--
Total Flow Volume to South Recharge Basins ^(10,11,12)	--	--	292	370	127%	--	--	--	--
Treatment Efficiencies ⁽¹³⁾									
Tower 96 System:	>99.9%								
Tower 102 System:	>99.9%								

See Notes and Abbreviations on last page.

Table 1
Operational Summary for the Treatment System,
First Quarter 2020⁽¹⁾ Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

- (1) Quarterly reporting period: January 01, 2020 through March 31, 2020.
 - (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 Power Plant (Calpine), Occidental Chemical (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 is expected to 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 quarterly reporting period, the remedial wells operated for the following percentages of the time: Well 1 (99.9%), Well 3R (78.5%), Well 17 (99.2%), Well 18 (99.2%), and Well 19 (99.2%). "Actual" flow volumes are determined via totalized values computed by SCADA using the instantaneous flow rates transmitted from local 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. For this quarter, due to a malfunctioning weir flow meter for the T102 system, the quarterly flow rates to the south and west recharge basins (SRB and WRB, respectively) were calculated using the remedial well flow rates and additional information and assumptions on flow distribution as follows. Only Tower 96 was pumping water into the distribution line for Calpine usage and T102 system steam condenser; given the relief valves on the distribution line had been set so that balance of water goes to the WRB. The resulting effluent water directed to the WRB was therefore calculated as the total remedial well water flow to Tower 96 minus Calpine usage and minus the Tower 102 steam condenser usage (119 gpm/15.6 MG). Furthermore, the Tower 102 system used approximately 119 gpm of water from the distribution line for the T102 system steam condenser and added approximately 15.6 MG of additional discharge to the Tower 102 system. The resulting effluent water directed to the SRB was therefore calculated as the total remedial well water flow to Tower 102 plus Tower 102 steam condenser usage.
 - (5) The TCE and TVOC concentrations are from the quarterly sampling events performed during this reporting period on March 26, 2020.
 - (6) The TVOC concentration for the two sets of recharge basins are their respective average monthly SPDES concentrations for the current quarter.
 - (7) Well 3R was shut down from February 6, 2020 to February 25, 2020 due to Well 3R pump failure and subsequent replacement. Tower 102 was shutdown overnight between March 1, 2020 and March 2, 2020 due to skid PLC electronics failure and subsequent repair by Lexington Technology.
 - (8) Total pumpage/recharge rates are accurate to ±15% based on expected or typical precision/accuracy factors for the gauges and meters.
 - (9) There are four possible discharges for the effluent groundwater: South Recharge Basins, West Recharge Basins, Calpine, and the OXY Biosparge system. Treated water is continuously discharged to the south and west recharge basins during routine operation, and is available "on-demand" to both Calpine for use as make-up water, and the OXY Biosparge remediation system.
 - (10) Occidental Chemical has not reported any water usage for the OXY Biosparge system since May 2016.
 - (11) Storm Water Runoff Volume is calculated by multiplying the adjusted tributary area and NOAA precipitation data for the reporting periods. The tributary area is adjusted by the runoff coefficient to exclude the infiltration volume from the total rainfall volume. The tributary area, runoff coefficient, and adjusted tributary area are from Dvirka and Bartilucci Consulting Engineers' Storm Water Permit Evaluation Report (January, 28, 2010). The NOAA precipitation data are calculated as a sum of NOAA daily precipitation data for the reporting period. NOAA precipitation data are retrieved from Station GHCND:USW00054787 - FARMINGDALE REPUBLIC AIRPORT, NY US for January, February and March 2020.
 - (12) Total Flow Volume to South Recharge Basins is estimated as a sum of flow volumes contributed from the Effluent Groundwater to South Recharge Basins and from Storm Water Runoff to South Recharge Basins.
 - (13) Treatment System Efficiencies are calculated by dividing the difference between the remedial well flow weighted influent and effluent TVOC concentrations by the remedial well flow weighted influent concentration.
- Not Applicable
- µg/L micrograms per liter
gpm gallons per minute
lbs pounds
MG million gallons
NOAA National Oceanic and Atmospheric Administration
SCADA Supervisory Controls and Data Acquisition
SPDES State Pollution Discharge Elimination System
TCE trichloroethene
TVOC total volatile organic compounds
VOC volatile organic compounds

Table 2
Concentrations of Constituents in Remedial Wells and
Treatment System Effluents
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents ⁽¹⁾ (units in µg/L)	CAS#	Location ID: Sample ID: Sample Date:	WELL 1 WELL 1 3/26/2020	WELL 3R WELL 3R 3/26/2020	96 EFFLUENT 96 EFFLUENT 3/26/2020
<u>Volatile Organic Compounds (VOCs)⁽²⁾</u>					
1,1,1-Trichloroethane	00071-55-6		< 0.50	0.55	< 0.50
1,1,2,2-Tetrachloroethane	00079-34-5		< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	00079-00-5		< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	00075-34-3		0.82 J	1.5	< 1.0
1,1-Dichloroethene	00075-35-4		2.4	3.9	< 0.50
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		4.3	< 1.0	< 1.0
2-Butanone (MEK)	00078-93-3		< 10	< 10	< 10
2-Hexanone (MBK)	00591-78-6		< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone (MIK)	00108-10-1		< 5.0	< 5.0	< 5.0
Acetone	00067-64-1		< 10	< 10	< 10
Benzene	00071-43-2		< 0.50	< 0.50	< 0.50
Bromodichloromethane	00075-27-4		< 1.0	< 1.0	< 1.0
Bromoform	00075-25-2		< 1.0	< 1.0	< 1.0
Bromomethane	00074-83-9		< 2.0	< 2.0	< 2.0
Carbon Disulfide	00075-15-0		< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	00056-23-5		< 1.0	< 1.0	< 1.0
Chlorobenzene	00108-90-7		< 1.0	< 1.0	< 1.0
Chloroethane	00075-00-3		< 1.0	< 1.0	< 1.0
Chloroform	00067-66-3		0.54 B	< 0.50	< 0.50
Chloromethane	00074-87-3		< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		5.7	3.6	< 0.50
cis-1,3-Dichloropropene	10061-01-5		< 1.0	< 1.0	< 1.0
Dibromochloromethane	00124-48-1		< 1.0	< 1.0	< 1.0
Ethylbenzene	00100-41-4		< 1.0	< 1.0	< 1.0
Dichloromethane	00075-09-2		< 0.50	< 0.50	< 0.50
Styrene	00100-42-5		< 1.0	< 1.0	< 1.0
Tetrachloroethene	00127-18-4		17	30.1	< 0.50
Toluene	00108-88-3		< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	00156-60-5		< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	10061-02-6		< 1.0	< 1.0	< 1.0
Trichloroethylene	00079-01-6		629	204	0.33
Trichlorotrifluoroethane (Freon 113)	00076-13-1		3.3	2.3	< 0.50
Vinyl Chloride	00075-01-4		< 0.50	1.5	< 0.50
Xylene-o	00095-47-6		< 1.0	< 1.0	< 1.0
Xylene-m,p	179601-23-1		< 1.0	< 1.0	< 1.0
Total VOCs⁽³⁾			660	250	0.33
1,4-Dioxane⁽²⁾			8.7	14	9.7

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and
Treatment System Effluents
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents ⁽¹⁾ (units in µg/L)	CAS#	Location ID:	WELL 17	WELL 18	WELL 19
		Sample ID:	WELL 17	WELL 18	WELL 19
		Sample Date:	3/26/2020	3/26/2020	3/26/2020
<u>Volatile Organic Compounds (VOCs)⁽²⁾</u>					
1,1,1-Trichloroethane	00071-55-6		< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	00079-34-5		< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	00079-00-5		< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	00075-34-3		0.72 J	1.4	0.65 J
1,1-Dichloroethene	00075-35-4		1.2	2.4	0.94
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		0.59 J	< 1.0	< 1.0
2-Butanone (MEK)	00078-93-3		< 10	< 10	< 10
2-Hexanone (MBK)	00591-78-6		< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone (MIK)	00108-10-1		< 5.0	< 5.0	< 5.0
Acetone	00067-64-1		< 10	< 10	< 10
Benzene	00071-43-2		< 0.50	< 0.50	< 0.50
Bromodichloromethane	00075-27-4		< 1.0	< 1.0	< 1.0
Bromoform	00075-25-2		< 1.0	< 1.0	< 1.0
Bromomethane	00074-83-9		< 2.0	< 2.0	< 2.0
Carbon Disulfide	00075-15-0		< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	00056-23-5		< 1.0	< 1.0	< 1.0
Chlorobenzene	00108-90-7		< 1.0	< 1.0	< 1.0
Chloroethane	00075-00-3		< 1.0	< 1.0	< 1.0
Chloroform	00067-66-3		< 0.50	< 0.50	0.38
Chloromethane	00074-87-3		< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		2.3	2.6	13.0
cis-1,3-Dichloropropene	10061-01-5		< 1.0	< 1.0	< 1.0
Dibromochloromethane	00124-48-1		< 1.0	< 1.0	< 1.0
Ethylbenzene	00100-41-4		< 1.0	< 1.0	< 1.0
Dichloromethane	00075-09-2		< 0.50	< 0.50	< 0.50
Styrene	00100-42-5		< 1.0	< 1.0	< 1.0
Tetrachloroethene	00127-18-4		14.5	13.8	5.6
Toluene	00108-88-3		< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	00156-60-5		< 0.50	< 0.50	0.42
trans-1,3-Dichloropropene	10061-02-6		< 1.0	< 1.0	< 1.0
Trichloroethylene	00079-01-6		117	33.9	94.5
Trichlorotrifluoroethane (Freon 113)	00076-13-1		2.1	0.91	1.0
Vinyl Chloride	00075-01-4		< 0.50	< 0.50	< 0.50
Xylene-o	00095-47-6		< 1.0	< 1.0	< 1.0
Xylene-m,p	179601-23-1		< 1.0	< 1.0	< 1.0
Total VOCs⁽³⁾			140	55	120
1,4-Dioxane⁽²⁾			7.8	5.5	4.6

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and
Treatment System Effluents
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents ⁽¹⁾ (units in µg/L)	CAS#	Location ID: Sample ID: Sample Date:	WELL 19 REP-032620-RSA-1 3/26/2020	102 EFFLUENT 102 EFFLUENT 3/26/2020
<u>Volatile Organic Compounds (VOCs)⁽²⁾</u>				
1,1,1-Trichloroethane	00071-55-6		< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	00079-34-5		< 1.0	< 1.0
1,1,2-Trichloroethane	00079-00-5		< 1.0	< 1.0
1,1-Dichloroethane	00075-34-3		0.61 J	< 1.0
1,1-Dichloroethene	00075-35-4		1.1	< 0.50
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		< 1.0	< 1.0
2-Butanone (MEK)	00078-93-3		< 10	< 10
2-Hexanone (MBK)	00591-78-6		< 5.0	< 5.0
4-Methyl-2-Pentanone (MIK)	00108-10-1		< 5.0	< 5.0
Acetone	00067-64-1		< 10	< 10
Benzene	00071-43-2		< 0.50	< 0.50
Bromodichloromethane	00075-27-4		< 1.0	< 1.0
Bromoform	00075-25-2		< 1.0	< 1.0
Bromomethane	00074-83-9		< 2.0	< 2.0
Carbon Disulfide	00075-15-0		< 2.0	< 2.0
Carbon Tetrachloride	00056-23-5		< 1.0	< 1.0
Chlorobenzene	00108-90-7		< 1.0	< 1.0
Chloroethane	00075-00-3		< 1.0	< 1.0
Chloroform	00067-66-3		< 0.50	< 0.50
Chloromethane	00074-87-3		< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		13.5	< 0.50
cis-1,3-Dichloropropene	10061-01-5		< 1.0	< 1.0
Dibromochloromethane	00124-48-1		< 1.0	< 1.0
Ethylbenzene	00100-41-4		< 1.0	< 1.0
Dichloromethane	00075-09-2		< 0.50	< 0.50
Styrene	00100-42-5		< 1.0	< 1.0
Tetrachloroethene	00127-18-4		5.5	< 0.50
Toluene	00108-88-3		< 1.0	< 1.0
trans-1,2-Dichloroethene	00156-60-5		< 0.50	< 0.50
trans-1,3-Dichloropropene	10061-02-6		< 1.0	< 1.0
Trichloroethylene	00079-01-6		92.7	< 0.50
Trichlorotrifluoroethane (Freon 113)	00076-13-1		0.91	< 0.50
Vinyl Chloride	00075-01-4		< 0.50	< 0.50
Xylene-o	00095-47-6		< 1.0	< 1.0
Xylene-m,p	179601-23-1		< 1.0	< 1.0
Total VOCs⁽³⁾			110	0
1,4-Dioxane⁽²⁾			4.6	6.7

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and Treatment System Effluents
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

- (1) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).
 - (2) VOC samples analyzed using USEPA Method 8260C. 1,4-dioxane samples analyzed using USEPA Method 8270D-SIM.
 - (3) Total VOC results rounded to two significant figures.
- 2.6** Bold value indicates a detection
< 1.0 Compound is not detected above its laboratory quantification limit
µg/L micrograms per liter
B Analyte found in associated method blank
J Constituent value is estimated
OU2 Operable Unit 2
REP Blind Replicate Sample
USEPA United States Environmental Protection Agency
VOC Volatile Organic Compound

Table 3A
Vapor Sample Analytical Results
Tower 96 Treatment System
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents (Units in $\mu\text{g}/\text{m}^3$)	Location ID: Sample ID:	96 INFLUENT T96 INFLUENT (AA)	96 MID-EFFLUENT T96 MIDTRAIN (AA)	96 EFFLUENT T96 EFFLUENT (AA)
	CAS #	3/26/2020 ⁽³⁾	3/26/2020 ⁽³⁾	3/26/2020
Volatile Organic Compounds (VOCs)⁽¹⁾	CAS #			
1,1,1-Trichloroethane	00071-55-6	24	6	1.8
1,1,2,2-Tetrachloroethane	00079-34-5	< 0.69	< 0.69	< 0.69
1,1,2-Trichloroethane	00079-00-5	3.4	< 0.55	< 0.55
1,1-Dichloroethane	00075-34-3	57.5	30	33
1,1-Dichloroethene	00075-35-4	138	88.8	95.6
1,2-Dichloroethane	00107-06-2	3	0.97	1.6
1,2-Dichloropropane	00078-87-5	120	21	< 0.92
Benzene	00071-43-2	2.2	0.58 J	5.4
Bromodichloromethane	00075-27-4	< 0.67	< 0.67	< 0.67
Bromoform	00075-25-2	< 0.41	< 0.41	< 0.41
Bromomethane	00074-83-9	< 0.78	< 0.78	< 0.78
Carbon Disulfide	00075-15-0	< 0.62	< 0.62	< 0.62
Carbon Tetrachloride	00056-23-5	4	0.88	0.42
Chlorobenzene	00108-90-7	1.8	< 0.92	< 0.92
Chloroethane	00075-00-3	4	2.9	3.4
Chloroform	00067-66-3	23	2.2	14
Chloromethane	00074-87-3	1.3	1.2	1.1
cis-1,2-Dichloroethene	00156-59-2	173	128	144
cis-1,3-Dichloropropene	10061-01-5	< 0.91	< 0.91	< 0.91
Dibromochloromethane	00124-48-1	< 0.85	< 0.85	< 0.85
Ethylbenzene	00100-41-4	< 0.87	< 0.87	< 0.87
Dichloromethane	00075-09-2	0.87	0.87	0.94
Styrene	00100-42-5	< 0.85	< 0.85	< 0.85
Tetrachloroethene	00127-18-4	882	130	1.7
Toluene	00108-88-3	0.60 J	0.53 J	46.7
trans-1,2-Dichloroethene	00156-60-5	2.8	1.5	1.7
trans-1,3-Dichloropropene	10061-02-6	< 0.91	< 0.91	< 0.91
Trichloroethylene	00079-01-6	9240	3130	296
Trichlorotrifluoroethane (Freon 113)	00076-13-1	171	65	52
Vinyl Chloride	00075-01-4	26.8	21	25
Xylene-o	00095-47-6	1.7	< 0.87	< 0.87
Xylene-m,p	179601-23-1	3.4	< 0.87	< 0.87
Total VOCs⁽²⁾		10,884	3,633	724

Notes and abbreviations on last page.

**Table 3A
Vapor Sample Analytical Results,
Tower 96 Treatment System,
First Quarter 2020, Operable Unit 2,
Northrop Grumman Systems Corporation
Bethpage, New York**

Notes and Abbreviations:

- (1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
- (2) Total VOCs represents the sum of individual concentrations of compounds detected rounded to the nearest whole number.

24	Bold value indicates a detection
< 0.69	Compound is not detected above its laboratory quantification limit.
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
J	Compound detected below its reporting limit; value is estimated.
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 3B
Vapor Sample Analytical Results
Tower 102 Treatment System
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituents (Units in µg/m³)	Location ID:	102 INFLUENT	102 EFFLUENT
	Sample ID:	T102 INFLUENT (AA)	T102 EFFLUENT (AA)
		3/26/2020	3/26/2020
Volatile Organic Compounds (VOCs)⁽¹⁾	CAS #		
1,1,1-Trichloroethane	00071-55-6	13	2.1
1,1,2,2-Tetrachloroethane	00079-34-5	< 0.69	< 0.69
1,1,2-Trichloroethane	00079-00-5	2.1	< 0.55
1,1-Dichloroethane	00075-34-3	48.2	52.6
1,1-Dichloroethene	00075-35-4	81.3	102
1,2-Dichloroethane	00107-06-2	4.9	< 0.81
1,2-Dichloropropane	00078-87-5	16	< 0.92
Benzene	00071-43-2	1.2	< 0.64
Bromodichloromethane	00075-27-4	< 0.67	< 0.67
Bromoform	00075-25-2	< 0.41	< 0.41
Bromomethane	00074-83-9	< 0.78	< 0.78
Carbon Disulfide	00075-15-0	< 0.62	< 0.62
Carbon Tetrachloride	00056-23-5	5.1	0.82
Chlorobenzene	00108-90-7	< 0.92	< 0.92
Chloroethane	00075-00-3	< 0.53	< 0.53
Chloroform	00067-66-3	14	9.3
Chloromethane	00074-87-3	0.85	0.83
cis-1,2 Dichloroethene	00156-59-2	293	103
cis-1,3-Dichloropropene	10061-01-5	< 0.91	< 0.91
Dibromochloromethane	00124-48-1	< 0.85	< 0.85
Ethylbenzene	00100-41-4	< 0.87	< 0.87
Dichloromethane	00075-09-2	0.63 J	2.4
Styrene	00100-42-5	< 0.85	< 0.85
Tetrachloroethene	00127-18-4	469	0.44
Toluene	00108-88-3	< 0.75	< 0.75
trans-1,2-Dichloroethene	00156-60-5	3.3	1.7
trans-1,3-Dichloropropene	10061-02-6	< 0.91	< 0.91
Trichloroethylene	00079-01-6	3,340	8.1
Trichlorotrifluoroethane (Freon 113)	00076-13-1	64	78.2
Vinyl Chloride	00075-01-4	0.25	0.25
Xylene-o	00095-47-6	0.74 J	0.42 J
Xylene-m,p	179601-23-1	1.7	1.0
Total VOCs⁽²⁾		4,358	363

Notes and abbreviations on last page.

Table 3B
Vapor Sample Analytical Results
Tower 102 Treatment System,
First Quarter 2020, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

- (1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
- (2) Total VOCs represents the sum of individual concentrations of compounds detected rounded to the nearest whole number.

2.4	bold value indicates a detection
< 0.67	Compound is not detected above its laboratory quantification limit.
µg/m ³	micrograms per cubic meter
J	Compound detected below its reporting limit; value is estimated.
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 4A
Summary of AERMOD Air Quality Impact Analysis
Tower 96 Treatment System,
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituent	CAS#	T96 Effluent (ug/m ³)	Emission Rate ⁽¹⁾			Scaled Impact - Hourly ⁽²⁾	Scaled Impact - Annual ⁽²⁾	SGC ⁽³⁾	AGC ⁽³⁾	%SGC	% AGC
		3/26/2020	lb/yr	lb/hr	g/s	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)		
1,1,1 - Trichloroethane	00071-55-6	1.8	0.29	3.28E-05	4.13E-06	6.12E-04	1.79E-05	9,000	5000	0.00%	0.00%
1,1 - Dichloroethane	00075-34-3	33	5.27	6.01E-04	7.57E-05	1.12E-02	3.29E-04	--	0.63	--	0.05%
1,2 - Dichloroethane	00107-06-2	1.6	0.26	2.91E-05	3.67E-06	5.44E-04	1.60E-05	--	0.04	--	0.04%
1,1 - Dichloroethene	00075-35-4	95.6	15.25	1.74E-03	2.19E-04	3.25E-02	9.53E-04	--	200	--	0.00%
Tetrachloroethene	00127-18-4	1.7	0.27	3.10E-05	3.90E-06	5.78E-04	1.70E-05	300	4.0	0.00%	0.00%
Trichloroethene ⁽⁴⁾	00079-01-6	296	47	5.39E-03	6.79E-04	1.01E-01	2.95E-03	20	0.20	0.50%	1.48%
Vinyl Chloride ⁽⁴⁾	00075-01-4	25	3.99	4.55E-04	5.74E-05	8.49E-03	2.49E-04	180,000	0.11	0.00%	0.23%
cis 1,2-Dichloroethene	00156-59-2	144	22.98	2.62E-03	3.30E-04	4.89E-02	1.44E-03	--	63	--	0.00%
trans 1,2-Dichloroethene	00156-60-5	1.7	0.27	3.10E-05	3.90E-06	5.78E-04	1.70E-05	--	63	--	0.00%
Benzene ⁽⁴⁾	00071-43-2	5.4	0.86	9.84E-05	1.24E-05	1.83E-03	5.38E-05	1,300	0.13	0.00%	0.04%
Toluene	00108-88-3	46.7	7.45	8.51E-04	1.07E-04	1.59E-02	4.66E-04	37,000	5000	0.00%	0.00%
Carbon Tetrachloride	00056-23-5	0.42	0.07	7.58E-06	9.55E-07	1.41E-04	4.15E-06	1900	0.17	0.00%	0.00%
Chloroethane	00075-00-3	3.4	0.54	6.19E-05	7.80E-06	1.16E-03	3.39E-05	--	10000	--	0.00%
Chloroform	00067-66-3	14	2.23	2.55E-04	3.21E-05	4.76E-03	1.40E-04	150	14.70	0.00%	0.00%
Chloromethane	00074-87-3	1.1	0.18	2.00E-05	2.52E-06	3.74E-04	1.10E-05	22,000	90	0.00%	0.00%
Dichloromethane	00075-09-2	0.94	0.15	1.71E-05	2.16E-06	3.19E-04	9.37E-06	14,000	60	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	00075-69-4	73.04	11.55	1.32E-03	1.66E-04	2.46E-02	7.22E-04	9000	5000		0.00%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	52	8.30	9.47E-04	1.19E-04	1.77E-02	5.19E-04	960,000	180000	0.00%	0.00%

Notes and Abbreviations on next page

Table 4A
Summary of AERMOD Air Quality Impact Analysis
Tower 96 Treatment System,
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

- (1) Emission rate calculated based on effluent concentration and a stack air flow rate of 4,830 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 3/26/20. Effluent temperature used in the model was 92°F from direct read in-line gauge.

$$\text{Trichloroethene (lb/hr)} = (720 \text{ ug/m}^3) \times (4,756 \text{ ft}^3/\text{min}) \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min/hr}) \times (0.000001 \text{ g/1 ug}) \times (0.0022 \text{ lb/g})$$

$$\text{lb/yr} = \text{lb/hr} \times 8,760 \text{ hrs/yr}$$

$$\text{g/s} = \text{lb/hr} \times 1 \text{ hr}/3,600 \text{ sec} \times 453.59 \text{ g/1 lb}$$
- (2) Ambient impact based on AERMOD modeling using normalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Farmingdale, NY) for the years 2011 through 2015, and a stack which is 55 feet high and 20 inches in diameter. The maximum impact from all the years was used for the calculations.

$$\text{Scaled hourly impact (ug/m}^3) = \text{AERMOD predicted hourly ambient impact at 1 g/s (ug/m}^3)/[\text{g/s}] \times \text{Actual emission rate (g/s)}$$

$$\text{Scaled annual impact (ug/m}^3) = \text{AERMOD predicted annual ambient impact at 1 g/s (ug/m}^3)/[\text{g/s}] \times \text{Actual emission rate (g/s)}$$

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([ug/m ³]/[g/s])	Annual ([ug/m ³]/[g/s])
148.05	4.35

- (3) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
- (4) Vinyl Chloride, Trichloroethene, and Benzene potential emission rates are less than 0.1 lb/hr and therefore below the trigger emissions for degree of air cleaning requirement (6 CRR-NY 212-2.3).

AGC	Annual Guideline Concentration	0.61	bold value indicates a detection
CAS #	Chemical Abstracts Service Registry Number	--	
CRR-NY	New York Codes, Rules and Regulations	acfm	actual cubic feet per minute
DAR-1	Division of Air Resources-1	ug/m ³	micrograms per cubic meter
NYSDEC	New York State Department of Environmental Conservation	g/s	grams per second
SGC	Short-term Guideline Concentration	lb/yr	pounds per year
		lb/hr	pounds per hour

Table 4B
Summary of AERMOD Air Quality Impact Analysis
Tower 102 Treatment System,
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Constituent	CAS#	T102 Effluent (ug/m ³)	Emission Rate ⁽¹⁾			Scaled Impact - Hourly ⁽²⁾ (ug/m ³)	Scaled Impact - Annual ⁽²⁾ (ug/m ³)	SGC ⁽³⁾ (ug/m ³)	AGC ⁽³⁾ (ug/m ³)	%SGC	% AGC
		3/26/2020	lb/yr	lb/hr	g/s						
1,1,1 - Trichloroethane	00071-55-6	2.1	0.54	6.17E-05	7.77E-06	2.71E-03	1.78E-05	9,000	5,000	0.00%	0.00%
1,1 - Dichloroethane	00075-34-3	52.6	13.53	1.54E-03	1.95E-04	6.79E-02	4.45E-04	--	0.63	--	0.07%
1,1 - Dichloroethene	00075-35-4	102	26.23	2.99E-03	3.77E-04	1.32E-01	8.62E-04	--	200	--	0.00%
Tetrachloroethene	00127-18-4	0.44	0.11	1.29E-05	1.63E-06	5.68E-04	3.72E-06	300	4	0.00%	0.00%
Trichloroethene ⁽⁴⁾	00079-01-6	8.1	2.08	2.38E-04	3.00E-05	1.05E-02	6.85E-05	20	0.20	0.05%	0.03%
Vinyl Chloride ⁽⁴⁾	00075-01-4	0.25	0.06	7.34E-06	9.25E-07	3.23E-04	2.11E-06	180,000	0.11	0.00%	0.00%
cis-1,2-Dichloroethene	00156-59-2	103	26.49	3.02E-03	3.81E-04	1.33E-01	8.71E-04	--	63	--	0.00%
trans-1,2-Dichloroethene	00156-60-5	1.70	0.44	4.99E-05	6.29E-06	2.19E-03	1.44E-05	--	63	--	0.00%
Total Xylene	00095-47-6	1.42	0.37	4.17E-05	5.25E-06	1.83E-03	1.20E-05	37000	5000	0.00%	0.00%
Xylene-O	00095-47-6	0.42	0.11	1.23E-05	1.55E-06	5.42E-04	3.55E-06	22000	100	0.00%	0.00%
Xylenes - m,p	00095-47-6	1.0	0.26	2.94E-05	3.70E-06	1.29E-03	8.45E-06	22,000	100	0.00%	0.00%
Chlorodifluoromethane (Freon 22)	00075-45-6	10.7	2.75	3.14E-04	3.96E-05	1.38E-02	9.04E-05	--	50000		0.00%
Chloroform	00067-66-3	9.3	2.39	2.73E-04	3.44E-05	1.20E-02	7.86E-05	150	14.7	0.01%	0.00%
Chloromethane	00074-87-3	0.83	0.21	2.44E-05	3.07E-06	1.07E-03	7.02E-06	22,000	90	0.00%	0.00%
Dichloromethane	00075-09-2	2.4	0.62	7.05E-05	8.88E-06	3.10E-03	2.03E-05	14,000	60	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	00075-69-4	10.7	2.75	3.14E-04	3.96E-05	1.38E-02	9.04E-05	9000	5000		0.00%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	78.2	20.11	2.30E-03	2.89E-04	1.01E-01	6.61E-04	960,000	180,000	0.00%	0.00%

Notes and Abbreviations on next page

Table 4B
Summary of AERMOD Air Quality Impact Analysis
Tower 102 Treatment System,
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York

Notes and Abbreviations:

- (1) Emission rate calculated based on effluent concentration and a stack air flow rate of 7,785 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 3/26/2020. Effluent temperature used in the model was 80°F from direct read in-line gauge.
 Trichloroethene (lb/hr) = (21 ug/m³) x (7,832 ft³/min) x (1 m³/35 ft³) x (60 min/hr) x (0.000001 g/1 ug) x (0.0022 lb/g)
 lb/yr = lb/hr x 8,760 hrs/yr
 g/s = lb/hr x 1 hr/3,600 sec x 453.59 g/1 lb
- (2) Ambient impact based on AERMOD modeling using normalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Farmingdale, NY) for the years 2011 through 2015, and a stack which is 69.52 feet high and 24 inches in diameter. The maximum impact from all the years was used for the calculations.
 Scaled hourly impact (ug/m³) = AERMOD predicted hourly ambient impact at 1 g/s ([ug/m³]/[g/s]) x Actual emission rate (g/s)
 Scaled annual impact (ug/m³) = AERMOD predicted annual ambient impact at 1 g/s ([ug/m³]/[g/s]) x Actual emission rate (g/s)

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([ug/m ³]/[g/s])	Annual ([ug/m ³]/[g/s])
348.85	2.29

- (3) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
 (4) Vinyl Chloride and Trichloroethene potential emission rates are less than 0.1 lb/hr and therefore below the trigger emissions for degree of air cleaning requirement (6 CRR-NY 212-2.3).

AGC	Annual Guideline Concentration	2.1	bold value indicates a detection
CAS #	Chemical Abstracts Service Registry Number	--	None Specified
CRR-NY	New York Codes, Rules and Regulations	µg/m ³	micrograms per cubic meter
DAR-1	Division of Air Resources-1	acfm	actual cubic feet per minute
NYSDEC	New York State Department of Environmental Conservation	g/s	grams per second
SGC	Short-term Guideline Concentration	lb/yr	pounds per year
		lb/hr	pounds per hour

Table 5A
Summary of TCE Mass Removal,
Tower 96 Treatment System,
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York⁽¹⁾

Date	TCE Concentration ($\mu\text{g}/\text{m}^3$)				TCE Mass Emission ⁽²⁾	Percent of Allowable TCE Emissions ⁽³⁾
	T96 INFLUENT	T96 MIDTRAIN	T96 SUP MIDTRAIN	T96 EFFLUENT	(lbs)	12 Month Rolling Average ⁽⁷⁾
02/13/19	17,989	4,696	NS	1596	37.6 ⁽⁴⁾	25.4%
06/13/19	24,449	2,627	NS	3871	179	54.2%
10/03/19 ^(5,6)	21,977	306	NS	107	2.8	48.0%
12/23/19	13,400	2,990	NS	79	2.8	42.7%
03/26/20	9,240	3,130	NS	296	12.1	26.8%

Notes and Abbreviations:

- (1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
- (2) TCE Mass Emission calculated based on the exhaust air flow rate on the day of sampling and the period of time since the preceding day of sampling.

$$\text{TCE (lb)} = \text{TCE Concentration } [\mu\text{g}/\text{m}^3] \times \text{Days} \times \text{Flow Rate } [\text{ft}^3/\text{min}] \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min}/\text{hr}) \times (24 \text{ hr}/\text{day}) \times (0.000001 \text{ g}/1 \text{ ug}) \times (0.0022 \text{ lb}/\text{g})$$
- (3) Percent of allowable TCE emissions to date is a time-weighted annual rolling average based on the 500 lb/year emission limit specified in the CRR-NY 212-2.2 Table 2. High Toxicity Air Contaminant List, revised April 1, 2017.
- (4) TCE Mass Emission value of 7 lbs reported for the First Quarter was an incorrect typographical error and has been corrected to 37.6 lbs. The 12 month rolling average was accurate during the entire period.
- (5) Carbon changeout for Tower 96 supplemental beds was completed on September 20, 2019.
- (6) Third Quarter 2019 Vapor Sampling was conducted for both systems on October 3, 2019, after T96 system was brought back on-line after a condensate pump replacement.
- (7) Data and footnotes provided outside of the First Quarter 2020 reporting period are included for 12 Month Rolling Average calculations.

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
lbs	pounds
CRR-NY	Codes, Rules and Regulations of the State of New York
ELAP	Environmental Laboratory Approval Program
NS	Not Sampled
NYSDOH	New York State Department of Health
SUP	Supplemental
TCE	Trichloroethylene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 5B
Summary of TCE Mass Removal,
Tower 102 Treatment System,
First Quarter 2020 Reporting Period, Operable Unit 2,
Northrop Grumman Systems Corporation,
Bethpage, New York⁽¹⁾

Date	TCE Concentration ($\mu\text{g}/\text{m}^3$)		TCE Mass Emission ⁽²⁾	Percent of Allowable TCE Emissions ⁽³⁾
	T102 INFLUENT	T102 EFFLUENT	(lbs)	12 Month Rolling Average ⁽⁵⁾
02/13/19	2,230	16	0.8	0.5%
06/13/19	1,990	34	2.9	1.0%
10/03/19 ⁽⁴⁾	1,670	17	1.3	1.2%
12/27/19	3,400	35	2.1	1.3%
03/26/20	3,340	8	0.5	1.2%

Notes and Abbreviations:

- (1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
- (2) TCE Mass Emission calculated based on the exhaust air flow rate on the day of sampling and the period of time since the preceding sampling day.

$$\text{TCE (lb)} = \text{TCE Concentration } [\mu\text{g}/\text{m}^3] \times \text{Days} \times \text{Flow Rate } [\text{ft}^3/\text{min}] \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min}/\text{hr}) \times (24 \text{ hr}/\text{day}) \times (0.000001 \text{ g}/1 \text{ ug}) \times (0.0022 \text{ lb}/\text{g})$$
- (3) Percent of allowable TCE emissions to date is a time-weighted annual rolling average based on the 500 lb/year emission limit specified in the CRR-NY 212-2.2 Table 2. High Toxicity Air Contaminant List, revised April 1, 2017.
- (4) Third Quarter 2019 Vapor Sampling was conducted for both systems on October 3, 2019, after T96 system was brought back on-line after a condensate pump replacement.
- (5) Data and footnotes provided outside of the First Quarter 2020 reporting period are included for 12 Month Rolling Average calculations.

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
lbs	pounds
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
T102	Tower 102
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 6
Concentrations of Volatile Organic Compounds
and 1,4-Dioxane in Monitoring Wells
First Quarter 2020, Operable Unit 2,
Northrop Grumman System Corporation,
Bethpage, New York

CONSTITUENT Units (ug/L)	Location ID: Sample ID: Date:	BPOW 2-1 ⁽¹⁾ BPOW 2-1 3/17/2020	BPOW 2-2 ⁽¹⁾ BPOW 2-2 3/17/2020	BPOW 2-3 ⁽¹⁾ BPOW 2-3 3/17/2020	GM-21D2 GM-21D2 3/18/2020
<u>Volatile Organic Compounds (VOCs)</u> ^(2,3)					
1,1,1-Trichloroethane		< 0.50	< 0.50	< 0.50	< 1.0
1,1,2,2-Tetrachloroethane		< 0.50	< 0.50	< 0.50	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)		< 1.0	< 1.0	< 1.0	< 5.0
1,1,2-Trichloroethane		< 0.50	< 0.50	< 0.50	< 1.0
1,1-Dichloroethane		< 0.50	< 0.50	< 0.50	< 1.0
1,1-Dichloroethene		< 0.50	< 0.50	< 0.50	< 1.0
1,2-Dichloroethane		< 0.50	< 0.50	< 0.50	< 1.0
1,2-Dichloropropane		< 0.50	< 0.50	< 0.50	< 1.0
2-Butanone (MEK)		< 5.0	< 5.0	< 5.0	< 10
2-Hexanone		< 2.0	< 2.0	< 2.0	< 5.0
4-methyl-2-pentanone (MIK)		< 2.0	< 2.0	< 2.0	< 5.0
Acetone		< 5.0	< 5.0	< 5.0	< 10
Benzene		< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane		< 0.50	< 0.50	< 0.50	< 1.0
Bromoform		< 0.50	< 0.50	< 0.50	< 1.0
Bromomethane		< 0.50	< 0.50	< 0.50	< 2.0J
Carbon Disulfide		< 0.50	< 0.50	< 0.50	< 2.0
Carbon tetrachloride		< 0.50	< 0.50	< 0.50	< 1.0
Chlorobenzene		< 0.50	< 0.50	< 0.50	< 1.0
Chloroethane		< 0.50	< 0.50	< 0.50	< 1.0
Chloroform		< 0.50	< 0.50	< 0.50	< 1.0
Chloromethane		< 0.50	< 0.50	< 0.50	< 1.0
cis-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 1.0
cis-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 1.0
Dibromochloromethane		< 0.50	< 0.50	< 0.50	< 2.0
Ethylbenzene		< 0.50	< 0.50	< 0.50	< 1.0
Methylene Chloride		< 0.50	< 0.50	< 0.50	< 1.0
Styrene		< 0.50	< 0.50	< 0.50	< 1.0
Tetrachloroethene		< 0.50	< 0.50	< 0.50	< 1.0
Toluene		< 0.50	< 0.50	< 0.50	< 1.0
trans-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 1.0
trans-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 1.0
Trichloroethylene		< 0.50	< 0.50	< 0.50	6.2
Vinyl Chloride		< 0.50	< 0.50	< 0.50	< 1.0
Xylene-o		< 0.50	< 0.50	< 0.50	< 1.0
Xylenes - m,p		< 0.50	< 0.50	< 0.50	< 1.0
Total VOCs		0.0	0.0	0.0	6.2
1,4-Dioxane ^(2,3)		0.771	0.524	2.87	7.4

See last page for Notes and Abbreviations.

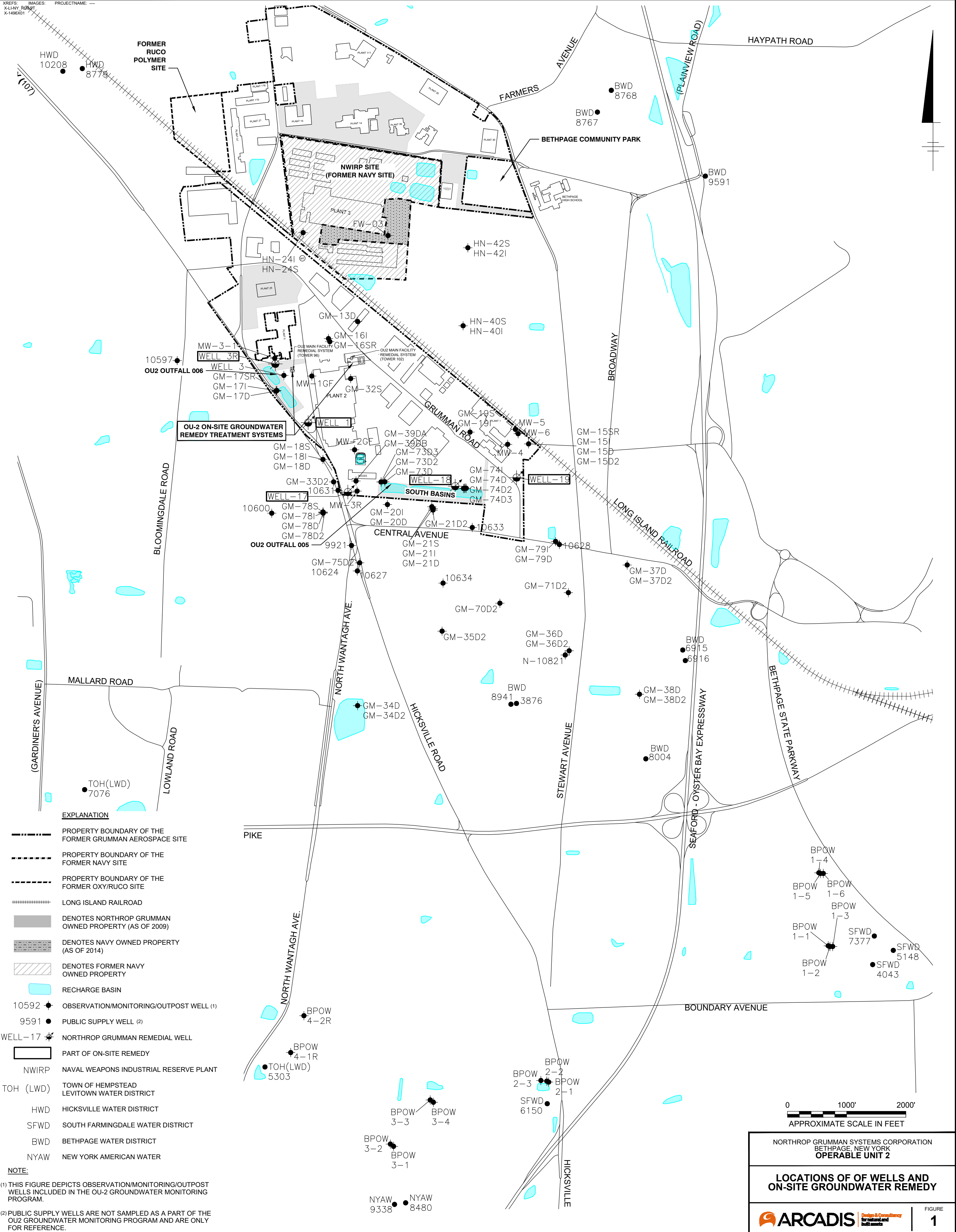
Table 6
Concentrations of Volatile Organic Compounds
and 1,4-Dioxane in Monitoring Wells
First Quarter 2020, Operable Unit 2,
Northrop Grumman System Corporation,
Bethpage, New York

Notes and Abbreviations:

- (1) These outpost wells have been repurposed for use as plume monitoring wells per the June 2015 Groundwater Monitoring Plan Addendum (ARCADIS of New York, Inc., 2015) as conditionally approved by the NYSDEC (August 25, 2015). Therefore, TVOC trigger levels that may have been previously established are no longer shown
 - (2) BPOW samples were analyzed for VOCs using USEPA Method 524.2; and analyzed for 1,4-Dioxane using USEPA Method 522. GM-21D2 sample was analyzed for VOCs by USEPA Method 8260C and analyzed for 1,4-Dioxane using USEPA Method 8270D SIM.
 - (3) Results for the program are validated at 20% frequency, per protocols specified in the OU2 Groundwater Monitoring Plan (Arcadis 2016).
- 0.771** Bold value indicates a detection
 VOC Volatile Organic Compound
 µg/L micrograms per liter
 J Compound detected below its reporting limit; value is estimated
 <0.5 Compound not detected above its laboratory quantification limit

FIGURES

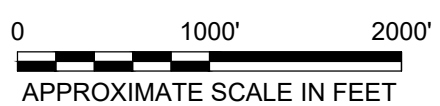




EXPLANATION

- 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.



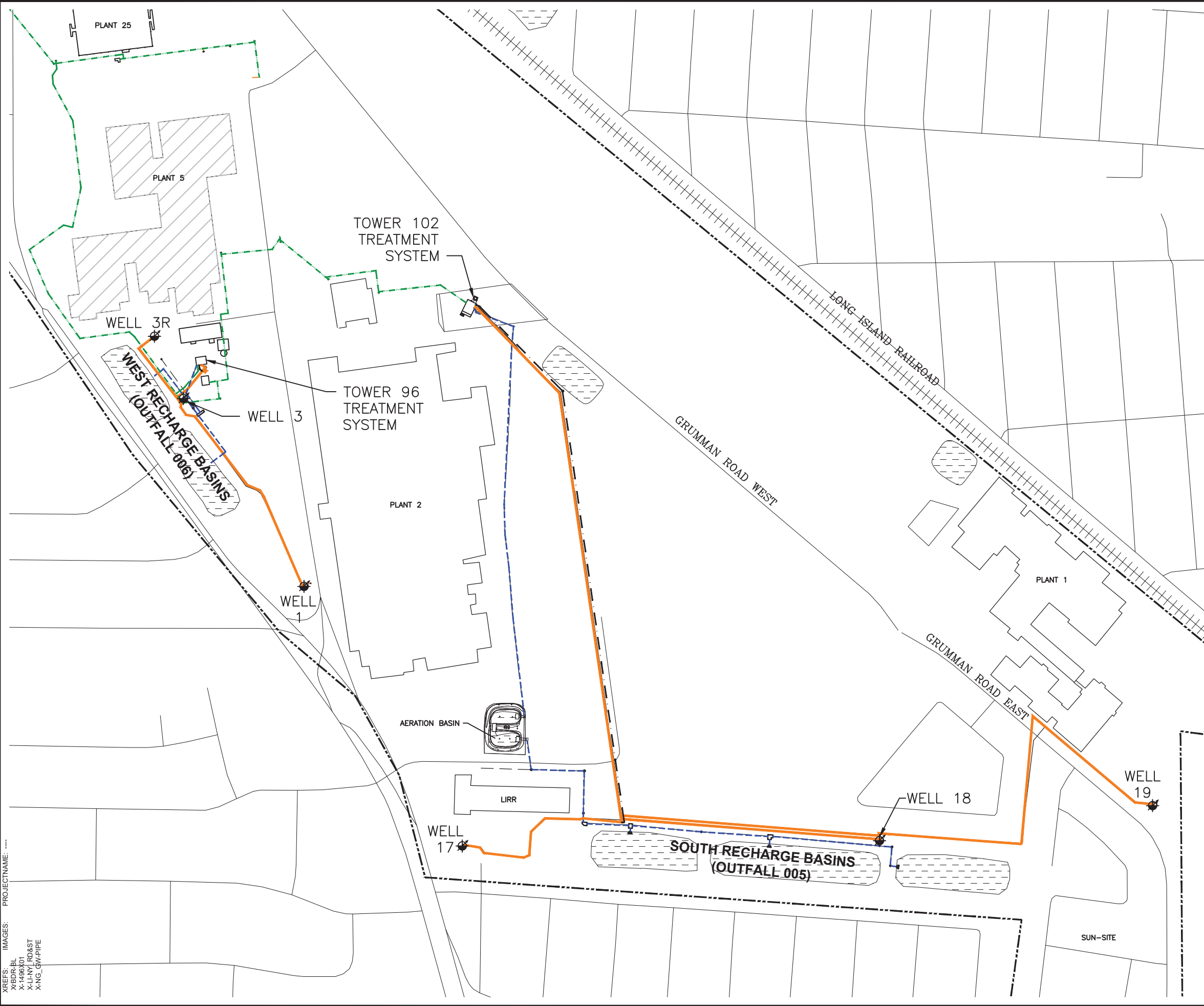
NORTHROP GRUMMAN SYSTEMS CORPORATION
 BETHPAGE, NEW YORK
OPERABLE UNIT 2

**LOCATIONS OF OF WELLS AND
 ON-SITE GROUNDWATER REMEDY**

ARCADIS Design & Consultancy
for natural and
built assets

FIGURE
1

CITY: SYRACUSE, NY; DIV: GROUNDWATER; DR: A. SANCHEZ; LD: A.S.; PC: (G); PM: (R); TH: (G); LVR: (G); ON: (C); OF: (R); REF: C:\BIM\OnSite\ARCADIS\BIM_360\Docs\NORTHROP GRUMMAN\OU2 ONCT\OU2\PROGRAM\2019\OU2\DWG\GNDW\CONCT\GNET\SITEPLAN.dwg; LAYOUT: 2; SAVER: 3/6/2019 10:42 AM; ACADVER: 20.08; ACADTCL: LISP; PLOT: 3/6/2019 10:54 AM; BY: SANCHEZ, ADRIAN



LEGEND:

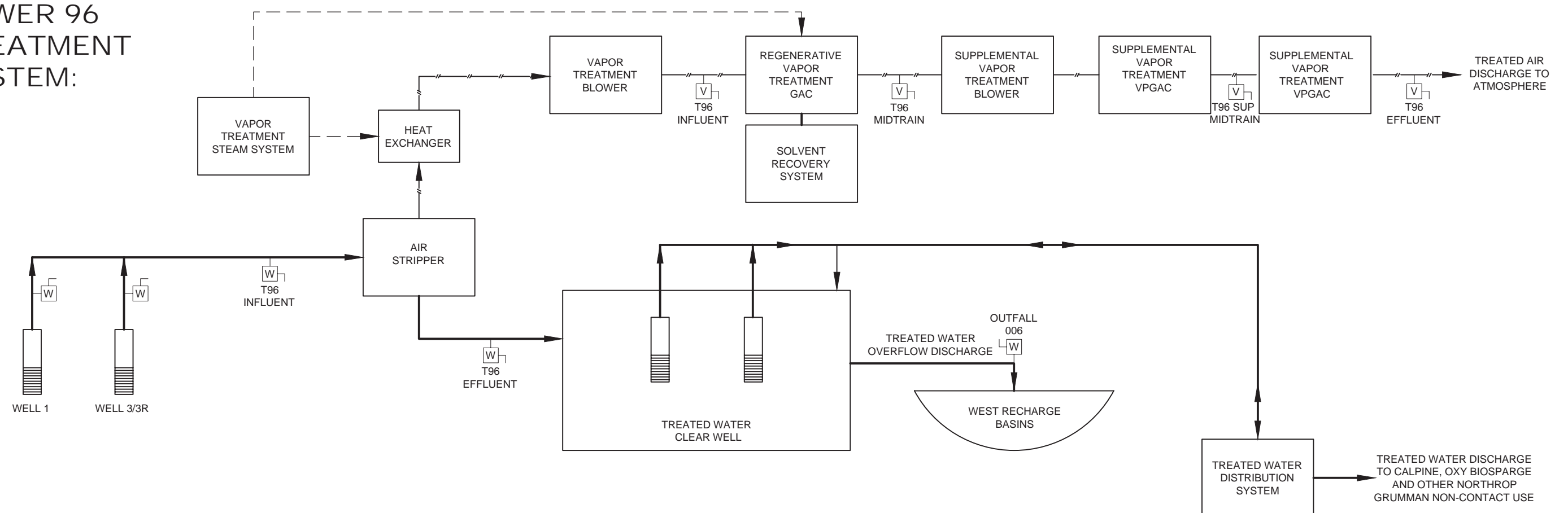
- FORMER NORTHROP GRUMMAN PROPERTY LINE
- INFLUENT LINE
- BYPASS
- STORM DRAIN (EFFLUENT)
- NON POTABLE WATER DISTRIBUTION LINE (EFFLUENT)
- +++++ RAILROAD TRACKS
- x-x-x- FENCE
- WELL 18 REMEDIAL WELL
- BASIN
- ONCT ON-SITE CONTAMINANT

NOTES:

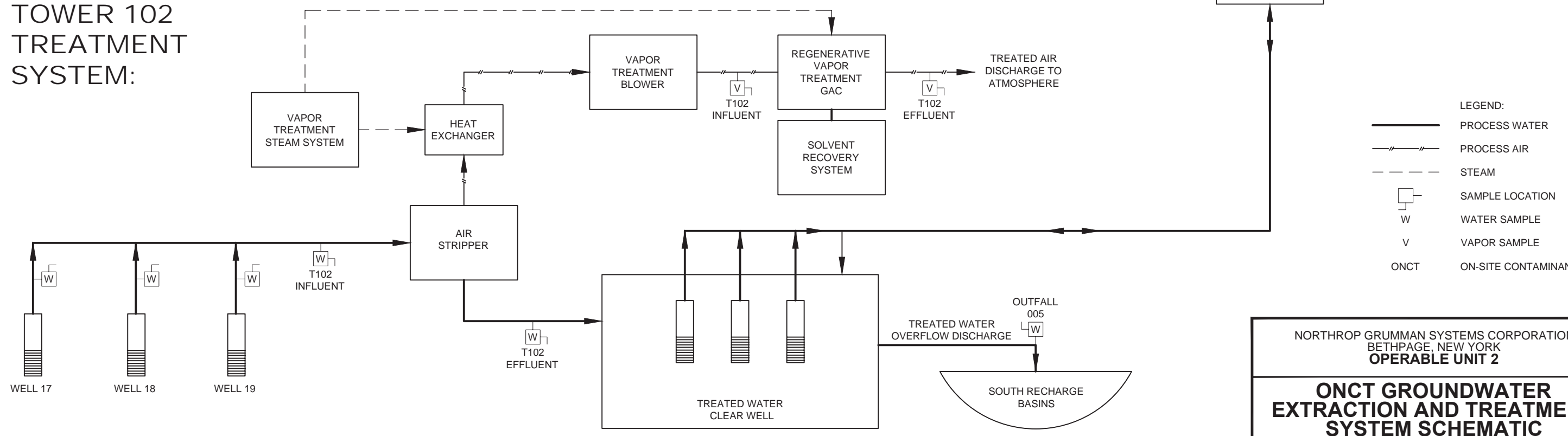
DRAWING IS NOT TO BE USED FOR DESIGN PURPOSES. LAYOUT OF PIPING IS FOR REPRESENTATION ONLY (LOCATIONS ARE APPROXIMATE).

NORTHROP GRUMMAN SYSTEMS CORPORATION BETHPAGE, NEW YORK OPERABLE UNIT 2	
ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN	
	FIGURE 2

TOWER 96 TREATMENT SYSTEM:



TOWER 102 TREATMENT SYSTEM:



LEGEND:

- PROCESS WATER
- PROCESS AIR
- STEAM
- SAMPLE LOCATION
- WATER SAMPLE
- VAPOR SAMPLE
- ON-SITE CONTAMINANT

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 2

**ONCT GROUNDWATER
EXTRACTION AND TREATMENT
SYSTEM SCHEMATIC**

ARCADIS Design & Consultancy
for natural and built assets

FIGURE
3

CITY: SYRACUSE, NY DIV: GROUPE NV DB: A. SANCHEZ LD: ALS PIC: (Regd) TM: (Opt) LYR: (Opt) ON: -OFF- REF: (PATRICIA RICHE PDF CHANGES SUP BED TEXT and extra VSP-10.26.17)
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 XREFS: IMAGES: PROJECTNAME: ...
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