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Subject:

2020 Third Quarter Operation Maintenance and Monitoring Report,  
Operable Unit 2, Northrop Grumman and Naval Weapons Industrial Reserve  
Plant (NWIRP) Sites, Bethpage, New York.  
(NYSDEC Site #'s 1-30-003A and B)

ENVIRONMENT

Date:  
November 30, 2020

Dear Jason:

On behalf of Northrop Grumman, Arcadis is providing the NYSDEC with the 2020 Third 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) and associated December 2019 Amended Record of Decision (AROD).

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Our ref:  
30062516.RPTI4  
30059249.NAVI4

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 provide a summary of percent mass emittance of TCE from vapor sampling completed during the Third Quarter 2019 through the Third Quarter 2020. Table 6 provides validated analytical results associated with groundwater monitoring efforts completed during this period. Figures 1 through 3 show the Locations of Wells and On-site Groundwater Remedy; ONCT Groundwater Extraction and Treatment System


Mr. Jason Pelton  
November 30, 2020

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  
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Donald Hesler – NYSDEC  
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Carol Stein – USEPA  
Matthew Russo – Town of Oyster Bay  
Stan Carey – Massapequa Water District  
Richard Kern – New York American Water  
Frank Koch – South Farmingdale Water District  
John Reinhardt – Town of Hempstead Water District  
Michael Boufis – Bethpage Water District  
Bethpage Public Library  
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# TABLES



**Table 1**  
**Operational Summary for the Treatment System,**  
**Third Quarter 2020<sup>(1)</sup> Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

	Quarterly Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Quarterly VOC Concentrations (µg/L)		VOC Mass Removed (lbs)	
	Model Design <sup>(2)</sup>	Operational Average <sup>(3,4)</sup>	Design <sup>(2)</sup>	Actual <sup>(3,4)</sup>	% of Design	TCE <sup>(5)</sup>	TVOC <sup>(5,6)</sup>	Quarterly	Cumulative
<b>Influent Groundwater</b>									
Well 1 <sup>(7)</sup>	800	818	106.0	107.9	102%	578	605	546	51,460
Well 3R <sup>(7)</sup>	700	806	92.7	106.3	115%	198	243	216	92,837
Well 17 <sup>(7)</sup>	1,000	1,103	132.5	142.1	107%	115	135	160	54,590
Well 18 <sup>(7)</sup>	600	1,011	79.5	130.0	164%	31	51	55	6,981
Well 19 <sup>(7)</sup>	700	508	92.7	65.9	71%	83	101	56	9,132
<b>Total <sup>(8)</sup></b>	<b>3,800</b>	<b>4,246</b>	<b>503</b>	<b>552</b>	<b>110%</b>	<b>--</b>	<b>--</b>	<b>1,033</b>	<b>215,000</b>
<b>Effluent Groundwater <sup>(9)</sup></b>									
Calpine	100 - 400	432	--	56.6	--	--	--	--	--
OXY Biosparge <sup>(10)</sup>	2 - 42	0	--	0	--	--	--	--	--
West Recharge Basins	1,112 - 1,455	1,070	--	141.8	--	--	0.3	--	--
South Recharge Basins <sup>(10)</sup>	2,231	2,671	295.6	353.8	120%	--	1.5	--	--
<b>Total <sup>(11)</sup></b>	<b>--</b>	<b>4,173</b>	<b>--</b>	<b>552</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>Additional Flow to South Recharge Basins</b>									
Storm Water Runoff Contributing to South Recharge Basins Flow Volume <sup>(11)</sup>	--	--	--	23.7	--	--	--	--	--
<b>Total Flow Volume to South Recharge Basins <sup>(10,11,12)</sup></b>	<b>--</b>	<b>--</b>	<b>296</b>	<b>378</b>	<b>128%</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>Treatment Efficiencies <sup>(13)</sup></b>									
Tower 96 System:	>99.9%								
Tower 102 System:	>99.9%								

See Notes and Abbreviations on last page.

**Notes and Abbreviations:**

- (1) Quarterly reporting period: July 01, 2020 through September 30, 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 Basin flow rates 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) "Actual" 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 quarter: Well 1 (99.5%), Well 3R (99.5%), Well 17 (97.3%), Well 18 (97%), and Well 19 (97.9%). "Actual" flow volumes are determined via totalized values computed by SCADA using the instantaneous flow rates transmitted from local flow meters.
  - (4) "Actual" flow rates for the system discharges represent the average flow rate during the entire reporting period and are determined by dividing the total flow recorded during the reporting period by the reporting period duration.
  - (5) The TCE and TVOC concentrations are from the quarterly sampling events performed during this reporting period on August 19, 2020 and August 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) Tower 102 was shutdown for maintenance for 25 hours from July 27, 2020 at 8:30 AM to July 28, 2020 at 9:30 am to repair RVPGAC bed effluent valves.
  - (8) Total pumpage/recharge rates are accurate to ±15% based on available information and 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. For this quarter, the quarterly flow rates to the south and west recharge basins (SRB and WRB, respectively) were calculated using the remedial well flow rates and available additional information and assumptions regarding flow distribution, as follows: the Tower 96 system (Remdial Wells 1 and 3R) discharges effluent water to the WRB, less Calpine usage and less 119 gpm of Tower 102 steam condenser usage (15.8 MG); the Tower 102 system (Remedial Wells 17 through 19), including the Tower 102 steam condenser usage (15.8 MG), discharges effluent water to the SRB.
  - (10) Oxy 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 July, August and September 2020.
  - (12) Total Flow Volume to South Recharge Basins is estimated as a sum of flow volumes contributed by the effluent groundwater to South Recharge Basins and from storm water runoff to South Recharge Basins. Third Quarter 2020 calculated South Recharge Basin flow volumes is within historical operating volumes.
  - (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**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

Constituents <sup>(1)</sup> (units in µg/L)	CAS#	Location ID:	WELL 1	WELL 3R	96 EFFLUENT
		Sample ID:	WELL 1	WELL 3R	96 EFFLUENT
		Sample Date:	8/19/2020	8/19/2020	8/19/2020
<b>Volatile Organic Compounds (VOCs)<sup>(2)</sup></b>					
1,1,1-Trichloroethane	00071-55-6		< 0.50	<b>0.58</b>	< 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		<b>0.68 J</b>	<b>1.6</b>	< 1.0
1,1-Dichloroethene	00075-35-4		<b>2.4</b>	<b>4.2</b>	< 0.50
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		<b>3.7</b>	< 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	<b>0.38 J</b>	< 0.50
Chloromethane	00074-87-3		< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		<b>4.9</b>	<b>3.9</b>	< 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		<b>13.4</b>	<b>29.9</b>	< 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		<b>578</b>	<b>198</b>	< 0.50
Trichlorotrifluoroethane (Freon 113)	00076-13-1		<b>1.9</b>	<b>2.4</b>	< 0.50
Vinyl Chloride	00075-01-4		< 0.50	<b>2.2</b>	< 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
<b>Total VOCs<sup>(3)</sup></b>			<b>605</b>	<b>243</b>	<b>ND</b>
<b>1,4-Dioxane<sup>(2)</sup></b>			<b>5.7</b>	<b>7.6</b>	<b>6.9</b>

Notes and abbreviations on last page.

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

Constituents <sup>(1)</sup> (units in µg/L)	CAS#	Location ID: Sample ID: Sample Date:	WELL 17 WELL 17 8/26/2020	WELL 18 WELL 18 8/26/2020	WELL 19 WELL 19 8/26/2020	WELL 19 REP-082620-JS-1 8/26/2020	102 EFFLUENT 102 EFFLUENT 8/26/2020
<b>Volatile Organic Compounds (VOCs)<sup>(2)</sup></b>							
1,1,1-Trichloroethane	00071-55-6		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	00079-34-5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	00079-00-5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	00075-34-3		<b>0.61 J</b>	<b>1.2</b>	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	00075-35-4		<b>1.1</b>	<b>2.6</b>	<b>1.2</b>	<b>1</b>	< 0.50
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		<b>0.66 J</b>	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	00078-93-3		< 10	< 10	< 10	< 10	< 10
2-Hexanone (MBK)	00591-78-6		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone (MIK)	00108-10-1		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	00067-64-1		< 10	< 10	< 10	< 10	< 10
Benzene	00071-43-2		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	00075-27-4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	00075-25-2		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	00074-83-9		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	00075-15-0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	00056-23-5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	00108-90-7		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	00075-00-3		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	00067-66-3		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	00074-87-3		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		<b>1.9</b>	<b>2.6</b>	<b>11.8</b>	<b>12</b>	< 0.50
cis-1,3-Dichloropropene	10061-01-5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	00124-48-1		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	00100-41-4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	00075-09-2		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	00100-42-5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	00127-18-4		<b>13.5</b>	<b>13.3</b>	<b>5</b>	<b>5.4</b>	< 0.50
Toluene	00108-88-3		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	00156-60-5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	10061-02-6		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	00079-01-6		<b>115</b>	<b>30.8</b>	<b>83.3</b>	<b>85.8</b>	< 0.50
Trichlorotrifluoroethane (Freon 113)	00076-13-1		<b>2</b>	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride	00075-01-4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	00095-47-6		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	179601-23-1		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
<b>Total VOCs<sup>(3)</sup></b>			<b>135</b>	<b>50.5</b>	<b>101</b>	<b>104</b>	<b>ND</b>
<b>1,4-Dioxane<sup>(2)</sup></b>			<b>5.7</b>	<b>4.2</b>	<b>3.4</b>	<b>3.5</b>	<b>4.5</b>

Notes and abbreviations on last page.

**Table 2**  
**Concentrations of Constituents in Remedial Wells and**  
**Treatment System Effluents**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**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) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.
- 1.4** Bold value indicates a detection
- < 1.0 Compound is not detected above its laboratory quantification limit
- µg/L micrograms per liter
- ND Not detected
- 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**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

Constituents (Units in µg/m <sup>3</sup> )	Location ID: Sample ID:	96 INFLUENT T96 INFLUENT (AA)	96 MID-EFFLUENT T96 MIDTRAIN (AA)	96 EFFLUENT T96 EFFLUENT (AA)
		8/19/2020	8/19/2020	8/19/2020
<b><u>Volatile Organic Compounds (VOCs)<sup>(1)</sup></u></b>	<b>CAS #</b>			
1,1,1-Trichloroethane	00071-55-6	< 22	< 11	< 4.4
1,1,2,2-Tetrachloroethane	00079-34-5	< 27	< 14	< 5.5
1,1,2-Trichloroethane	00079-00-5	< 22	< 11	< 4.4
1,1-Dichloroethane	00075-34-3	<b>19 J</b>	<b>17</b>	<b>27</b>
1,1-Dichloroethene	00075-35-4	<b>56.3</b>	<b>49.6</b>	<b>77.3</b>
1,2-Dichloroethane	00107-06-2	< 32	< 16	< 6.5
1,2-Dichloropropane	00078-87-5	<b>27 J</b>	<b>27</b>	<b>8.3</b>
Benzene	00071-43-2	< 26	< 13	< 5.1
Bromodichloromethane	00075-27-4	< 27	< 13	< 5.4
Bromoform	00075-25-2	< 17	< 8.3	< 3.3
Bromomethane	00074-83-9	< 31	< 16	< 6.2
Carbon Disulfide	00075-15-0	< 25	< 12	< 5.0
Carbon Tetrachloride	00056-23-5	< 10	< 5.0	< 2.0
Chlorobenzene	00108-90-7	< 37	< 18	< 7.4
Chloroethane	00075-00-3	< 21	< 11	< 4.2
Chloroform	00067-66-3	< 39	< 20	<b>8.3</b>
Chloromethane	00074-87-3	< 17	< 8.3	<b>2.3 J</b>
cis-1,2-Dichloroethene	00156-59-2	<b>71.4</b>	<b>67</b>	<b>105</b>
cis-1,3-Dichloropropene	10061-01-5	< 36	< 18	< 7.3
Dibromochloromethane	00124-48-1	< 34	< 17	< 6.8
Ethylbenzene	00100-41-4	< 35	< 17	< 6.9
Dichloromethane	00075-09-2	< 28	< 14	< 5.6
Styrene	00100-42-5	< 34	< 17	< 6.8
Tetrachloroethene	00127-18-4	<b>377</b>	<b>310</b>	< 2.2
Toluene	00108-88-3	< 30	< 15	<b>22</b>
trans-1,2-Dichloroethene	00156-60-5	< 32	< 16	< 6.3
trans-1,3-Dichloropropene	10061-02-6	< 36	< 18	< 7.3
Trichloroethylene	00079-01-6	<b>7,310</b>	<b>4,180</b>	<b>1,550</b>
Trichlorotrifluoroethane (Freon 113)	00076-13-1	<b>41</b>	<b>38</b>	<b>17</b>
Vinyl Chloride	00075-01-4	<b>15</b>	<b>13</b>	<b>12</b>
Xylene-o	00095-47-6	< 35	< 17	< 6.9
Xylene-m,p	179601-23-1	< 35	< 17	< 6.9
<b>Total VOCs <sup>(2)</sup></b>		<b>7,917</b>	<b>4,702</b>	<b>1,829</b>

Notes and abbreviations on last page.

**Table 3A**  
**Vapor Sample Analytical Results**  
**Tower 96 Treatment System**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**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) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.

<b>27</b>	Bold value indicates a detection
< 0.69	Compound is not detected above its laboratory quantification limit
µg/m <sup>3</sup>	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**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

Constituents <sup>(3)</sup> (Units in µg/m <sup>3</sup> )	Location ID:	102 INFLUENT	102 EFFLUENT
	Sample ID:	T102 INFLUENT (AA)	T102 EFFLUENT (AA)
		8/26/2020	8/26/2020
<b>Volatile Organic Compounds (VOCs)<sup>(1)</sup></b>	<b>CAS #</b>		
1,1,1-Trichloroethane	00071-55-6	<b>11</b>	<b>9.3</b>
1,1,2,2-Tetrachloroethane	00079-34-5	< 14	< 0.69
1,1,2-Trichloroethane	00079-00-5	< 11	< 0.55
1,1-Dichloroethane	00075-34-3	<b>30</b>	<b>92.3</b>
1,1-Dichloroethene	00075-35-4	<b>53.5</b>	<b>144</b>
1,2-Dichloroethane	00107-06-2	< 16	<b>3.7</b>
1,2-Dichloropropane	00078-87-5	<b>11 J</b>	<b>0.51 J</b>
2-Butanone (MEK)	00078-93-3	< 12	<b>11</b>
Acetone	00067-64-1	< 9.5	<b>18</b>
Benzene	00071-43-2	< 13	< 0.64
Bromodichloromethane	00075-27-4	< 13	< 0.67
Bromoform	00075-25-2	< 8.3	< 0.41
Bromomethane	00074-83-9	< 16	< 0.78
Carbon Disulfide	00075-15-0	< 12	< 0.62
Carbon Tetrachloride	00056-23-5	< 5.0	<b>3.8</b>
CFC-11	00075-69-4	< 11	<b>11</b>
Chlorobenzene	00108-90-7	< 18	< 0.92
Chloroethane	00075-00-3	< 11	< 0.53
Chloroform	00067-66-3	< 20	<b>24</b>
Chloromethane	00074-87-3	< 8.3	<b>0.91</b>
cis-1,2 Dichloroethene	00156-59-2	<b>215</b>	<b>262</b>
cis-1,3-Dichloropropene	10061-01-5	< 18	< 0.91
Dibromochloromethane	00124-48-1	< 17	< 0.85
Ethylbenzene	00100-41-4	< 17	< 0.87
Dichloromethane	00075-09-2	< 14	<b>0.87</b>
Styrene	00100-42-5	< 17	< 0.85
Tetrachloroethene	00127-18-4	<b>426</b>	<b>2.8</b>
Toluene	00108-88-3	< 15	< 0.75
trans-1,2-Dichloroethene	00156-60-5	< 16	<b>5.6</b>
trans-1,3-Dichloropropene	10061-02-6	< 18	< 0.91
Trichloroethylene	00079-01-6	<b>3,910</b>	<b>105</b>
Trichlorotrifluoroethane (Freon 113)	00076-13-1	<b>38</b>	<b>120</b>
Vinyl Chloride	00075-01-4	< 2.0	<b>0.31</b>
Xylene-o	00095-47-6	< 17	< 0.87
Xylene-m,p	179601-23-1	< 17	< 0.87
<b>Total VOCs <sup>(2)</sup></b>		<b>4,695</b>	<b>815</b>

Notes and abbreviations on last page.

**Table 3B**  
**Vapor Sample Analytical Results**  
**Tower 102 Treatment System**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**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) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.
- (3) 2-Butanone (MEK), Acetone and CFC-11 were inadvertently reported by the analytical laboratory outside the limits of the routine list of analytes. It should be noted that acetone and 2-butanone (MEK) are common laboratory contaminants. Comparison of these compounds to applicable SGCs/AGCs is provided on Table 4B.

<b>2.4</b>	Bold value indicates a detection
< 0.67	Compound is not detected above its laboratory quantification limit
µg/m <sup>3</sup>	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,**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman Systems Corporation,**  
**Bethpage, New York**

Constituent	CAS#	T96 Effluent (ug/m <sup>3</sup> )	Emission Rate <sup>(1)</sup>			Scaled Impact - Hourly <sup>(2)</sup>	Scaled Impact - Annual <sup>(2)</sup>	SGC <sup>(3)</sup> (ug/m <sup>3</sup> )	AGC <sup>(3)</sup> (ug/m <sup>3</sup> )	%SGC	% AGC
		8/19/2020	lb/yr	lb/hr	g/s	(ug/m <sup>3</sup> )	(ug/m <sup>3</sup> )				
1,1 - Dichloroethane	00075-34-3	<b>27</b>	4.25	4.85E-04	6.11E-05	9.05E-03	2.65E-04	--	0.63	--	0.04%
1,1 - Dichloroethene	00075-35-4	<b>77.3</b>	12.16	1.39E-03	1.75E-04	2.59E-02	7.60E-04	--	200	--	0.00%
Trichloroethene <sup>(4)</sup>	00079-01-6	<b>1,550</b>	244	2.78E-02	3.51E-03	5.19E-01	1.52E-02	20	0.20	2.60%	7.62%
Vinyl Chloride <sup>(4)</sup>	00075-01-4	<b>12</b>	1.89	2.16E-04	2.72E-05	4.02E-03	1.18E-04	180,000	0.11	0.00%	0.11%
cis 1,2-Dichloroethene	00156-59-2	<b>105</b>	16.52	1.89E-03	2.38E-04	3.52E-02	1.03E-03	--	63	--	0.00%
Toluene	00108-88-3	<b>22</b>	3.46	3.95E-04	4.98E-05	7.37E-03	2.16E-04	37,000	5,000	0.00%	0.00%
1,2-Dichloropropane	00078-87-5	<b>8.3</b>	1.31	1.49E-04	1.88E-05	2.78E-03	8.16E-05	--	4.00	--	0.00%
Chloroform	00067-66-3	<b>8.3</b>	1.31	1.49E-04	1.88E-05	2.78E-03	8.16E-05	150	14.70	0.00%	0.00%
Chloromethane	00074-87-3	<b>2.3 J</b>	0.36	4.13E-05	5.20E-06	7.71E-04	2.26E-05	22,000	90	0.00%	0.00%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	<b>17</b>	2.67	3.05E-04	3.85E-05	5.70E-03	1.67E-04	960,000	180,000	0.00%	0.00%

Notes and Abbreviations on next page

**Table 4A**  
**Summary of AERMOD Air Quality Impact Analysis**  
**Tower 96 Treatment System,**  
**Third 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 4,762 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 8/19/20. Effluent temperature used in the model was 92°F from direct read in-line gauge.  
 $\text{Trichloroethene (lb/hr)} = (720 \text{ ug/m}^3) \times (4,762 \text{ ft}^3/\text{min}) \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min/hr}) \times (0.000001 \text{ g/1 ug}) \times (0.0022 \text{ lb/g})$   
 $\text{lb/yr} = \text{lb/hr} \times 8,760 \text{ hrs/yr}$   
 $\text{g/s} = \text{lb/hr} \times 1 \text{ hr}/3,600 \text{ sec} \times 453.59 \text{ g/1 lb}$
- (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 <sup>3</sup> ]/[g/s])	Annual ([ug/m <sup>3</sup> ]/[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	<b>27</b>	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	µg/m <sup>3</sup>	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,**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman Systems Corporation,**  
**Bethpage, New York**

Constituent	CAS#	T102 Effluent (ug/m <sup>3</sup> )	Emission Rate <sup>(1)</sup>			Scaled Impact - Hourly <sup>(2)</sup> (ug/m <sup>3</sup> )	Scaled Impact - Annual <sup>(2)</sup> (ug/m <sup>3</sup> )	SGC <sup>(3)</sup> (ug/m <sup>3</sup> )	AGC <sup>(3)</sup> (ug/m <sup>3</sup> )	%SGC	% AGC
		8/26/2020	lb/yr	lb/hr	g/s						
1,1,1 - Trichloroethane	00071-55-6	<b>9.3</b>	2.37	2.70E-04	3.41E-05	1.19E-02	7.78E-05	9,000	5,000	0.00%	0.00%
1,1 - Dichloroethane	00075-34-3	<b>92.3</b>	23.51	2.68E-03	3.38E-04	1.18E-01	7.73E-04	--	0.63	--	0.12%
1,1 - Dichloroethene	00075-35-4	<b>144</b>	36.68	4.19E-03	5.28E-04	1.84E-01	1.21E-03	--	200	--	0.00%
Tetrachloroethene	00127-18-4	<b>2.8</b>	0.71	8.14E-05	1.03E-05	3.58E-03	2.34E-05	300	4	0.00%	0.00%
Trichloroethene <sup>(4)</sup>	00079-01-6	<b>105</b>	26.74	3.05E-03	3.85E-04	1.34E-01	8.79E-04	20	0.20	0.67%	0.44%
Vinyl Chloride <sup>(4)</sup>	00075-01-4	<b>0.31</b>	0.08	9.01E-06	1.14E-06	3.96E-04	2.59E-06	180,000	0.11	0.00%	0.00%
cis-1,2-Dichloroethene	00156-59-2	<b>262</b>	66.73	7.62E-03	9.60E-04	3.35E-01	2.19E-03	--	63	--	0.00%
trans-1,2-Dichloroethene	00156-60-5	<b>5.6</b>	1.43	1.63E-04	2.05E-05	7.16E-03	4.69E-05	--	63	--	0.00%
1,2-Dichloroethane	00107-06-2	<b>3.7</b>	0.94	1.08E-04	1.36E-05	4.73E-03	3.10E-05	37,000	5,000	0.00%	0.00%
1,2-Dichloropropane	00078-87-5	<b>0.51 J</b>	0.13	1.48E-05	1.87E-06	6.52E-04	4.27E-06	37,000	5,000	0.00%	0.00%
2-Butanone (MEK)	00078-93-3	<b>11</b>	2.80	3.20E-04	4.03E-05	1.41E-02	9.21E-05	22,000	100		0.00%
Acetone	00067-64-1	<b>18</b>	4.58	5.23E-04	6.59E-05	2.30E-02	1.51E-04	22,000	100	0.00%	0.00%
Carbon Tetrachloride	00056-23-5	<b>3.8</b>	0.97	1.10E-04	1.39E-05	4.86E-03	3.18E-05	1,900	0.17	0.00%	0.02%
Chloroform	00067-66-3	<b>24</b>	6.11	6.98E-04	8.79E-05	3.07E-02	2.01E-04	150	14.7	0.02%	0.00%
Chloromethane	00074-87-3	<b>0.91</b>	0.23	2.65E-05	3.33E-06	1.16E-03	7.62E-06	22,000	90	0.00%	0.00%
Dichloromethane	00075-09-2	<b>0.87</b>	0.22	2.53E-05	3.19E-06	1.11E-03	7.28E-06	14,000	60	0.00%	0.00%
CFC-11	00075-69-4	<b>11</b>	2.80	3.20E-04	4.03E-05	1.41E-02	9.21E-05	--	1,000	--	0.00%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	<b>120</b>	30.56	3.49E-03	4.40E-04	1.53E-01	1.00E-03	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,**  
**Third 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 7,709 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 8/26/2020. Effluent temperature used in the model was 80°F from direct read in-line gauge.

$$\text{Trichloroethene (lb/hr)} = (21 \text{ ug/m}^3) \times (7,709 \text{ ft}^3/\text{min}) \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min/hr}) \times (0.000001 \text{ g/1 ug}) \times (0.0022 \text{ lb/g})$$

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

$$\text{g/s} = \text{lb/hr} \times 1 \text{ hr/3,600 sec} \times 453.59 \text{ g/1 lb}$$

(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 69.52 feet high and 24 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 <sup>3</sup> )/[g/s])	Annual ((ug/m <sup>3</sup> )/[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	<b>9.3</b>	bold value indicates a detection
CAS #	Chemical Abstracts Service Registry Number	--	None Specified
CRR-NY	New York Codes, Rules and Regulations	µg/m <sup>3</sup>	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,**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York<sup>(1)</sup>**

Date	TCE Concentration ( $\mu\text{g}/\text{m}^3$ )			TCE Mass Emission <sup>(2)</sup>	Percent of Allowable TCE Emissions <sup>(3)</sup>
	T96 INFLUENT	T96 MIDTRAIN	T96 EFFLUENT <sup>(6)</sup>	(lbs)	12 Month Rolling Average <sup>(7)</sup>
10/03/19 <sup>(4,5)</sup>	21,977	306	57	2.8	48.0%
12/23/19	13,400	2,990	79	2.8	42.7%
03/26/20	9,240	3,130	296	12.1	26.8%
05/13/20 <sup>(8)</sup>	5,640	2,350	4,330	89.7	21.6%
8/19/2020 <sup>(9)</sup>	7,310	4,180	1,550	65.0	34.2%

**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 elapsed since the day of the preceding sampling event.  

$$\text{TCE (lb)} = \text{TCE Concentration } [\mu\text{g}/\text{m}^3] \times \text{Days} \times \text{Flow Rate } [\text{ft}^3/\text{min}] \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min}/\text{hr}) \times (24 \text{ hr}/\text{day}) \times (0.000001 \text{ g}/1 \text{ ug}) \times (0.0022 \text{ lb}/\text{g})$$
- (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) Carbon changeout for Tower 96 supplemental beds was completed on September 20, 2019.
- (5) 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.
- (6) T96 Effluent concentrations for 6/13/19 and 10/3/19 were revised slightly due to typographical error in previous reporting. Typographical error did not impact 12 Month Rolling Average calculations.
- (7) Data and footnotes provided outside of the Third Quarter 2020 reporting period are included for 12 Month Rolling Average calculations.
- (8) The elevated Second Quarter 2020 effluent vapor-phase contaminant concentrations, compared to prior quarterly sample events were attributed to a malfunctioning steam actuator valve noted at the regenerative vapor-phase granular activated carbon vessels (RVPGAC), which allowed regenerative steam and condensate to partially commingle with system vapor-phase effluent. It should be noted that no SGC or AGC air emission exceedance was associated with this sampling event, and the steam actuator valve was repaired.
- (9) T96 Supplemental Mid Train treatment (T96 SUP MID TRAIN) was not sampled Third Quarter 2020 or for prior 2020 quarters and has been removed from the Mass Removal table.

$\mu\text{g}/\text{m}^3$	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,**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York<sup>(1)</sup>**

Date	TCE Concentration ( $\mu\text{g}/\text{m}^3$ )		TCE Mass Emission <sup>(2)</sup>	Percent of Allowable TCE Emissions <sup>(3)</sup>
	T102 INFLUENT	T102 EFFLUENT	(lbs)	12 Month Rolling Average <sup>(5)</sup>
10/03/19 <sup>(4)</sup>	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%
05/13/20	2,130	17	0.6	1.0%
08/26/20	3,910	105	7.6	2.2%

**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 elapsed since the day of the preceding sampling event.  
  

$$\text{TCE (lb)} = \text{TCE Concentration } [\mu\text{g}/\text{m}^3] \times \text{Days} \times \text{Flow Rate } [\text{ft}^3/\text{min}] \times (1 \text{ m}^3/35 \text{ ft}^3) \times (60 \text{ min}/\text{hr}) \times (24 \text{ hr}/\text{day}) \times (0.000001 \text{ g}/1 \text{ ug}) \times (0.0022 \text{ lb}/\text{g})$$
- (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 Third 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**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

CONSTITUENT Units (ug/L)	Location ID: Sample ID:	BPOW 2-1 <sup>(1)</sup> BPOW 2-1	BPOW 2-2 <sup>(1)</sup> BPOW 2-2	BPOW 2-3 <sup>(1)</sup> BPOW 2-3	BPOW 2-3 <sup>(1)</sup> REP083120PQ1
	Date:	8/25/2020	8/31/2020	8/31/2020	8/31/2020
<b><u>Volatile Organic Compounds (VOCs) <sup>(2,3)</sup></u></b>					
1,1,1-Trichloroethane		< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane		< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)		< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane		< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane		< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane		< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane		< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (MEK)		< 5.0	< 5.0	< 5.0	< 5.0
2-Hexanone		< 2.0	< 2.0	< 2.0	< 2.0
4-methyl-2-pentanone (MIK)		< 2.0	< 2.0	< 2.0	< 2.0
Acetone		< 5.0	< 5.0	< 5.0	< 5.0
Benzene		< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane		< 0.50	< 0.50	< 0.50	< 0.50
Bromoform		< 0.50	< 0.50	< 0.50	< 0.50
Bromomethane		< 0.50	< 0.50	< 0.50	< 0.50
Carbon Disulfide		< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride		< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene		< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane		< 0.50	< 0.50	< 0.50	< 0.50
Chloroform		< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane		< 0.50	< 0.50	< 0.50	< 0.50
cis-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane		< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene		< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride		< 0.50	< 0.50	< 0.50	< 0.50
Styrene		< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene		< 0.50	< 0.50	< 0.50	< 0.50
Toluene		< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethylene		< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride		< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o		< 0.50	< 0.50	< 0.50	< 0.50
Xylenes - m,p		< 0.50	< 0.50	< 0.50	< 0.50
<b>Total VOCs <sup>(4)</sup></b>		ND	ND	ND	ND
<b>1,4-Dioxane <sup>(2,3)</sup></b>		<b>1.05 J</b>	<b>0.618 J</b>	<b>2.65</b>	<b>2.9</b>

See last page for Notes and Abbreviations.

**Table 6**  
**Concentrations of Volatile Organic Compounds**  
**and 1,4-Dioxane in Monitoring Wells**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

CONSTITUENT	Location ID: Sample ID:	GM-21D2 GM-21D2	GM-21D2 REP090120SV1
Units (ug/L)	Date:	9/1/2020	9/1/2020
<b><u>Volatile Organic Compounds (VOCs)</u></b> <sup>(2,3)</sup>			
1,1,1-Trichloroethane		< 1.0	< 1.0
1,1,2,2-Tetrachloroethane		< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)		< 5.0	< 5.0
1,1,2-Trichloroethane		< 1.0	< 1.0
1,1-Dichloroethane		< 1.0	< 1.0
1,1-Dichloroethene		< 1.0	< 1.0
1,2-Dichloroethane		< 1.0	< 1.0
1,2-Dichloropropane		< 1.0	< 1.0
2-Butanone (MEK)		< 10	< 10
2-Hexanone		< 5.0	< 5.0
4-methyl-2-pentanone (MIK)		< 5.0	< 5.0
Acetone		< 10	< 10
Benzene		< 0.50	< 0.50
Bromodichloromethane		< 1.0	< 1.0
Bromoform		< 1.0	< 1.0
Bromomethane		< 2.0J	< 2.0J
Carbon Disulfide		< 2.0	< 2.0
Carbon tetrachloride		< 1.0	< 1.0
Chlorobenzene		< 1.0	< 1.0
Chloroethane		< 1.0	< 1.0
Chloroform		< 1.0	< 1.0
Chloromethane		< 1.0	< 1.0
cis-1,2-dichloroethene		< 1.0	< 1.0
cis-1,3-dichloropropene		< 1.0	< 1.0
Dibromochloromethane		< 2.0	< 2.0
Ethylbenzene		< 1.0	< 1.0
Methylene Chloride		< 1.0	< 1.0
Styrene		< 1.0	< 1.0
Tetrachloroethene		1	< 1.0
Toluene		< 1.0	< 1.0
trans-1,2-dichloroethene		< 1.0	< 1.0
trans-1,3-dichloropropene		< 1.0	< 1.0
Trichloroethylene		6	6.1
Vinyl Chloride		< 1.0	< 1.0
Xylene-o		< 1.0	< 1.0
Xylenes - m,p		< 1.0	< 1.0
<b>Total VOCs</b> <sup>(4)</sup>		<b>7</b>	<b>6.1</b>
<b>1,4-Dioxane</b> <sup>(2,3)</sup>		<b>4.8</b>	<b>5</b>

See last page for Notes and Abbreviations.

**Table 6**  
**Concentrations of Volatile Organic Compounds**  
**and 1,4-Dioxane in Monitoring Wells**  
**Third Quarter 2020 Reporting Period, Operable Unit 2,**  
**Northrop Grumman**  
**Bethpage, New York**

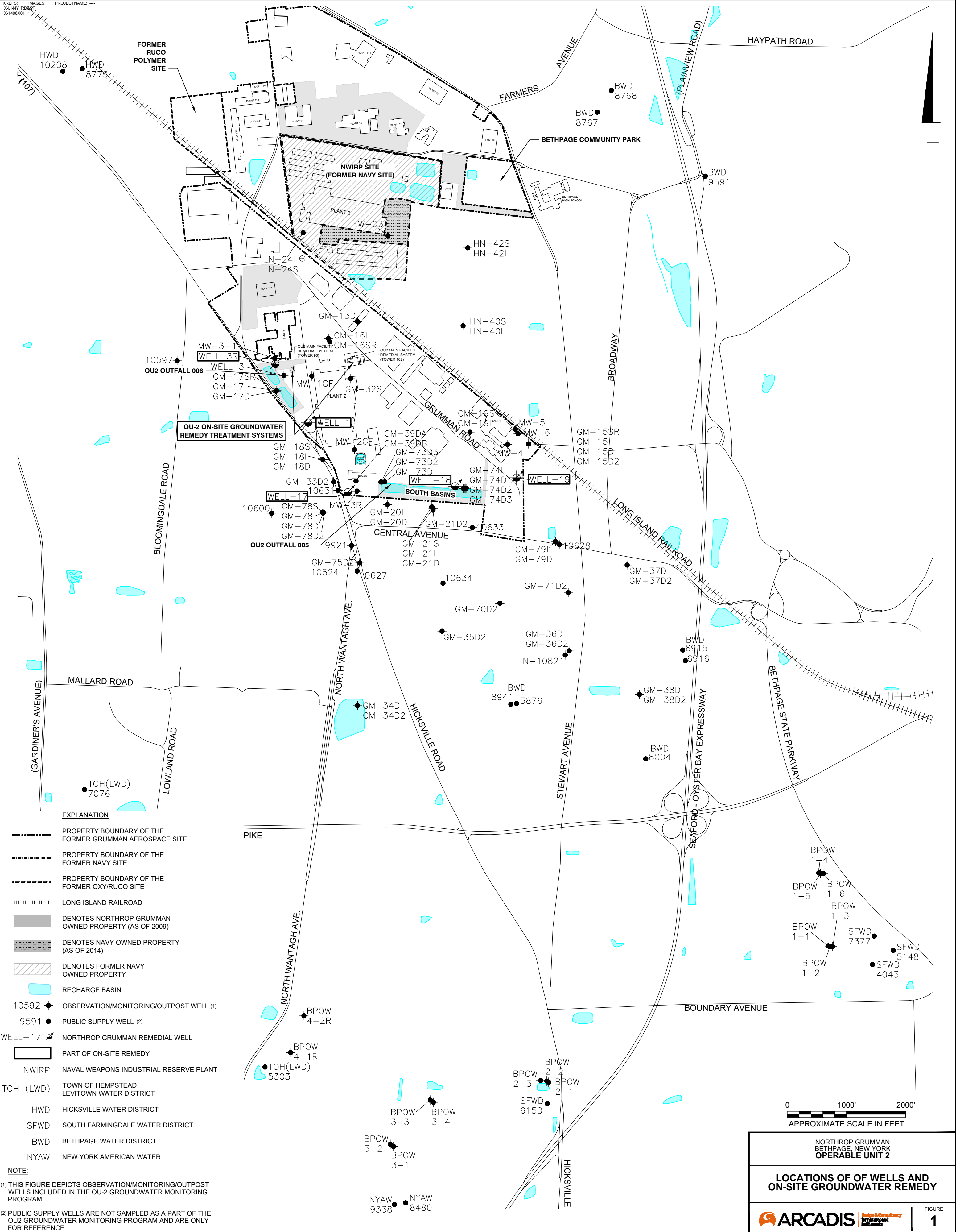
**Notes and Abbreviations:**

- (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 1,4-dioxane using USEPA Method 522. GM-21D2 sample was analyzed for VOCs by USEPA Method 8260C and 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).
- (4) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.

<b>6.1</b>	Bold value indicates a detection
VOC	Volatile Organic Compound
ND	Not detected
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
REP	Blind Duplicate Sample

# FIGURES

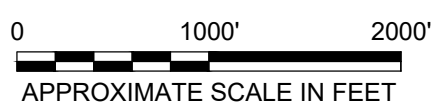




**EXPLANATION**

- 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.



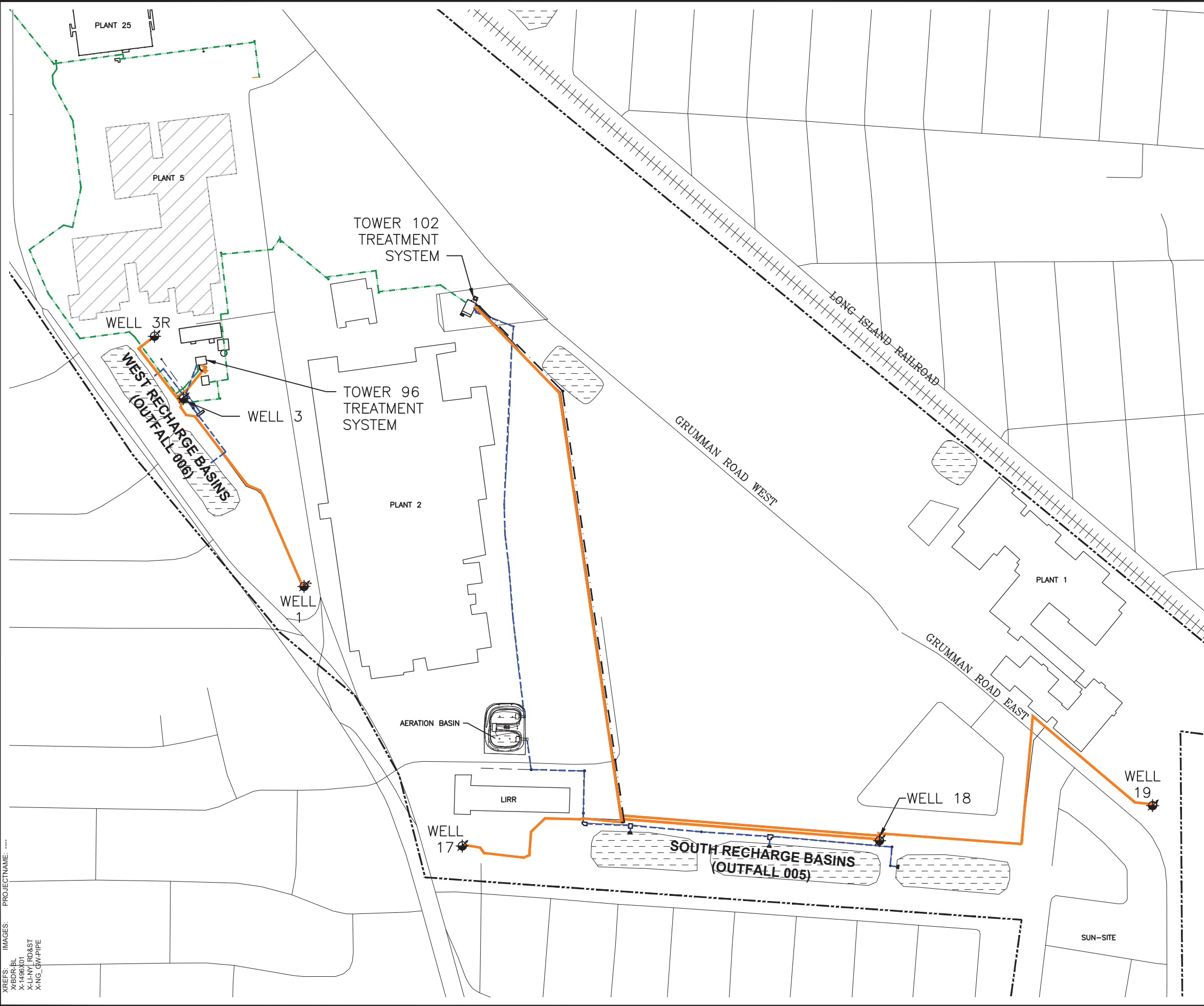
NORTHROP GRUMMAN  
 BETHPAGE, NEW YORK  
**OPERABLE UNIT 2**

**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.L.S.; PC: (G); PM: (R); TH: (G); L: (V); (G); (N); (O); (F); (R); (E);  
 C:\BIM\OnSite - ARCADIS\BIM 360 Docs\NORTHROP GRUMMAN\OU2 ONCT\OU2\PROGRAM\201901\DWG\CONDUCT\GWT\OU2\SITEPLAN.dwg; LAYOUT: 2; SAVER: 3/6/2019 10:42 AM; ACADVER: 20.05; (LMS TECH); PAGES: 1; PLOTSTYLE TABLE: ---; PLOT SETUP: ---; PLOTTED: 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

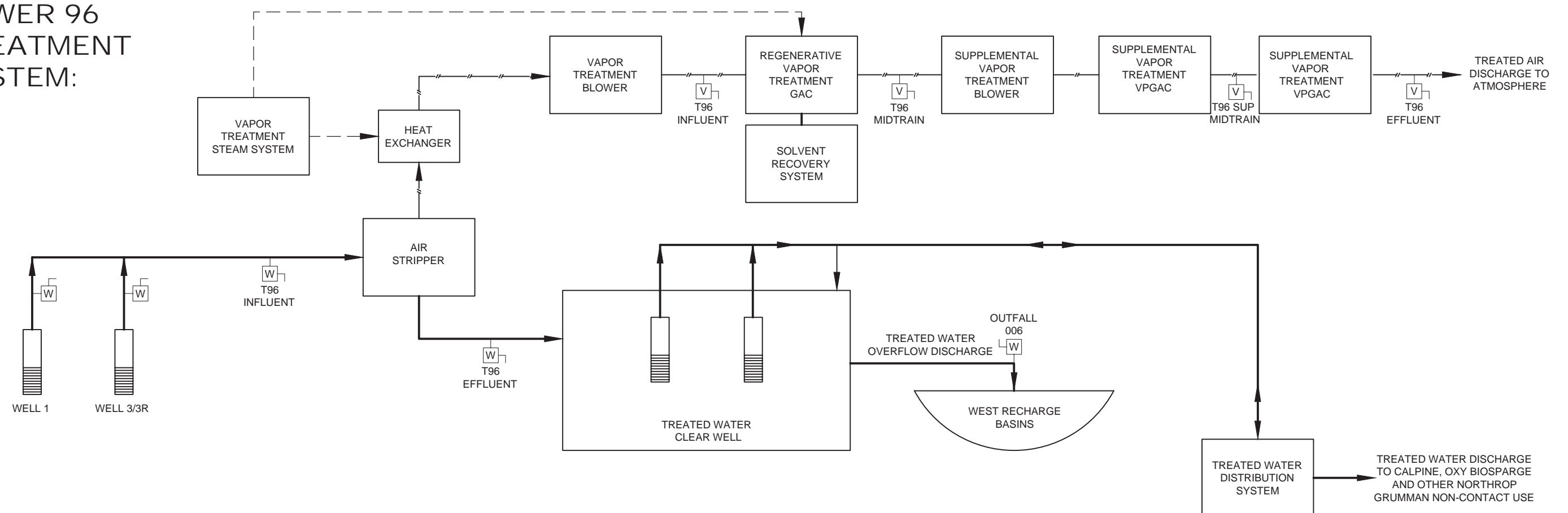
**NOTES:**

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

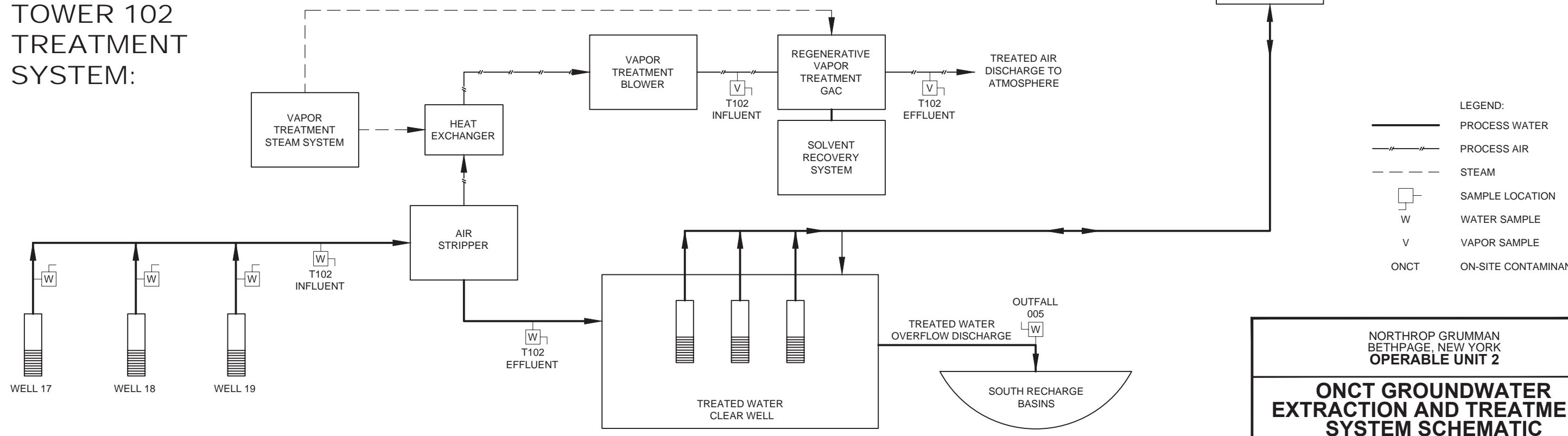
NORTHROP GRUMMAN BETHPAGE, NEW YORK <b>OPERABLE UNIT 2</b>	
<b>ONCT GROUNDWATER          EXTRACTION AND TREATMENT          SYSTEM SITE PLAN</b>	
	FIGURE <b>2</b>



# TOWER 96 TREATMENT SYSTEM:



# TOWER 102 TREATMENT SYSTEM:



- LEGEND:
- PROCESS WATER
  - - - PROCESS AIR
  - - - - STEAM
  - W SAMPLE LOCATION
  - W WATER SAMPLE
  - V VAPOR SAMPLE
  - ONCT ON-SITE CONTAMINANT

NORTHROP GRUMMAN  
BETHPAGE, NEW YORK  
**OPERABLE UNIT 2**

**ONCT GROUNDWATER  
EXTRACTION AND TREATMENT  
SYSTEM SCHEMATIC**

**ARCADIS** Design & Consultancy  
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built assets

FIGURE  
**3**

CITY: SYRACUSE, NY DIV: GROUP ENV 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: