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Date: November 29, 2021
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Subject: 2021 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)

Dear Jason:

On behalf of Northrop Grumman, Arcadis is providing the NYSDEC with the Third Quarter 2021 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).

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, respectively, for this period. 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 Fourth Quarter 2020 through the Third Quarter 2021. 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 Site Plan, and the ONCT Groundwater Extraction and Treatment System Schematic, respectively.

Jason Pelton
NYSDEC
November 29, 2021

Please contact us if you have any questions or comments.

Sincerely,
Arcadis of New York, Inc.

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Enclosures

Tables

Table 1
Operational Summary for the Treatment System
Third Quarter 2021[1] 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)	
	Current Model Design [2]	Current Operational Flow [3,4]	Design [2]	Actual [3,4]	% of Design[14]	TCE [5]	TVOC [5,6]	Quarterly	Cumulative
Influent Groundwater[7]									
Well 1	800	769	106	82	77%	833	870	596	53,697
Well 3R	700	607	93	66	71%	187	254	140	93,507
Well 17	1,000	1,010	132	134	102%	168	197	221	55,330
Well 18	800	1,009	106	132	125%	39.7	70.8	78	7,214
Well 19	500	510	66	67	102%	97.9	124.9	70	9,386
Total [8]	**3,800**	**3,905**	**503**	**481**	**96%**	**--**	**--**	**1,105**	**219,134**
Effluent Groundwater [9]									
Calpine	100 - 400	443	--	59	--	--	--	--	--
OXY Biosparge [10]	2 - 42	0	--	0	--	--	--	--	--
West Recharge Basins	1,112 - 1,455	675	--	89	--	--	0.63	--	--
South Recharge Basins	2,231	2,520	296	334	113%	--	ND	--	--
Total	**--**	**3,638**	**--**	**482**	**--**				
Additional Flow to South Recharge Basins									
Storm Water Runoff Contributing to South Recharge Basins Flow Volume [11]	--	--	--	35	--	--	--	--	--
Total Flow Volume to South Recharge Basins [10,11,12]			**296**	**369**	**125%**				

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
Third Quarter 2021[(1)] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) "Curent Model Design" flow rates were determined for the five remedial wells and for the South Recharge Basin based on computer modeling (ARCADIS G&M, Inc. 2002, updated in 2021). 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. Actual flow volumes are colleted from the monthly SPDES reports, which are calculated using the SCADA instantaneous flow rates transmitted from local flow meters.

(4) “Actual” flow rates for the system discharges represent the average flow rate during the 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 18, 2021.

(6) The TVOC concentration for the two sets of recharge basins are their respective average monthly Outfall SPDES concentrations for the current quarter.

(7) The Tower 96 System shut down on 7/12/21 due to failure of the inner bearings and a warped shaft on the external blower. The system was restarted on 7/28/21 to test a temporary blower installed at the stripper tower inlet, with Wells 1 and 3R pumping at reduced flow rates. By 7/29/21, the system was stabilized and continuously operating at a reduced total flow rate of approximately 900 gpm. The Tower 96 System was shut down on 8/24/21 through 8/25/21 to install new bearings and a new, balanced shaft at the exterior blower. The temporary blower was also removed, and the system was placed back into routine operating configuration at a total flow rate of approximately 1,600 gpm. Well 18 of the Tower 102 System was shut down on 8/25/21 to allow for the removal of an obstruction in the stilling tube that was preventing the collection of depth-to-water measurements.

(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 provided by Northrop Grumman 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 2021.

(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 2021 calculated South Recharge Basin flow volume is within historical operating range.

(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.

(14) Given the downtime outined above and associated repair efforts, the actual quaterly flow volumes for Well 1 and Well 3R are slightly less than design quaterly flow volumes and the actual quarterly flow volume for Well 18 is higher than design quarterly flow volumes this reporting period.

-- 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 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman,
Bethpage, New York

Constituents[2] (Units in µg/L)	CAS#	Location ID: Sample ID: Sample Date:	WELL 1 WELL 1 8/18/2021	WELL 3R WELL 3R 8/18/2021
Volatile Organic Compounds (VOCs)[3]				
1,1,1-Trichloroethane	00071-55-6		**0.24 J**	**0.65**
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		**1.1**	**2.0**
1,1-Dichloroethene	00075-35-4		**2.3**	**5.2**
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		**3.7**	< 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		**0.64**	**0.44 J**
Chloromethane	00074-87-3		< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		**7.1**	**4.3**
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		**18.2**	**49.5**
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		**833**	**187**
Trichlorotrifluoroethane (Freon 113)	00076-13-1		**3.8**	**2.5**
Vinyl Chloride	00075-01-4		< 0.50	**2.3**
Xylene-o	00095-47-6		< 1.0	< 1.0
Xylene-m,p	179601-23-1		< 1.0	< 1.0
Total VOCs[4]			**870**	**254**
1,4-Dioxane[3]			**7.5**	**12**

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and Treatment System Effluents
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman,
Bethpage, New York

Constituents[2] (Units in µg/L)	CAS#	Location ID: Sample ID: Sample Date:	96 EFFLUENT 96 EFFLUENT 8/18/2021	WELL 17 WELL 17 8/18/2021	WELL 18 WELL 18 8/18/2021
Volatile Organic Compounds (VOCs)[3]					
1,1,1-Trichloroethane	00071-55-6		< 0.50	< 0.50	**0.35 J**
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		< 1.0	**0.85 J**	**1.9**
1,1-Dichloroethene	00075-35-4		< 0.50	**1.6**	**3.8**
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		< 1.0	**1.1**	< 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	< 0.50
Chloromethane	00074-87-3		< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		< 0.50	**3.1**	**3.4**
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		< 0.50	**19.6**	**20.5**
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		**0.63**	**168**	**39.7**
Trichlorotrifluoroethane (Freon 113)	00076-13-1		< 0.50	**2.7**	**1.2**
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[4]			**0.63**	**197**	**70.9**
1,4-Dioxane[3]			**8**	**8.4**	**4.8**

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and Treatment System Effluents
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman,
Bethpage, New York

Constituents[2] (Units in µg/L)	CAS#	Location ID: Sample ID: Sample Date:	WELL 19 WELL 19 8/18/2021	WELL 19 REP-081821-TG-1 8/18/2021	102 EFFLUENT 102 EFFLUENT 8/18/2021
Volatile Organic Compounds (VOCs)[3]					
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		**0.69 J**	**0.68 J**	< 1.0
1,1-Dichloroethene	00075-35-4		**1.6**	**1.6**	< 0.50
1,2-Dichloroethane	00107-06-2		< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	00078-87-5		< 1.0	< 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		**0.38 J**	**0.35 J**	< 0.50
Chloromethane	00074-87-3		< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	00156-59-2		**15.4**	**14.8**	< 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		**7.7**	**7.5**	< 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		**97.9**	**96.5**	< 0.50
Trichlorotrifluoroethane (Freon 113)	00076-13-1		**1.2**	**1.3**	< 0.50
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[4]			**124.9**	**122.7**	ND
1,4-Dioxane[3]			**3.8**	**3.1**	**4.6**

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and Treatment System Effluents
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

(3) VOC samples analyzed using USEPA Method 8260C. 1,4-Dioxane samples analyzed using USEPA Method 8270D-SIM.

(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.

1.1	Bold value indicates a detection
< 1.0	Compound is not detected above its laboratory quantification limit
µg/L	micrograms per liter
ND	Not detected
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 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents (units in µg/m^3)	Location ID: Sample ID: Sample Date:	96 INFLUENT T96 INFLUENT (AA) 8/31/2021	96 MID-EFFLUENT T96 MIDTRAIN (AA) 8/31/2021	96 EFFLUENT T96 EFFLUENT (AA) 8/31/2021
Volatile Organic Compounds (VOCs)[2]	**CAS #**			
1,1,1-Trichloroethane	00071-55-6	< 22	< 22	< 6.5
1,1,2,2-Tetrachloroethane	00079-34-5	< 27	< 27	< 8.2
1,1,2-Trichloroethane	00079-00-5	< 22	< 22	< 6.5
1,1-Dichloroethane	00075-34-3	**40**	**37**	**12**
1,1-Dichloroethene	00075-35-4	**122**	**111**	**95.9**
1,2-Dichloroethane	00107-06-2	< 32	< 32	< 9.7
1,2-Dichloropropane	00078-87-5	**67.5**	**57.3**	**23**
Benzene	00071-43-2	< 26	< 26	**1.9 J**
Bromodichloromethane	00075-27-4	< 27	< 27	< 8.0
Bromoform	00075-25-2	< 17	< 17	< 5.1
Bromomethane	00074-83-9	< 31	< 31	< 9.3
Carbon Disulfide	00075-15-0	< 25	< 25	< 7.5
Carbon Tetrachloride	00056-23-5	< 10	< 10	< 3.1
Chlorobenzene	00108-90-7	< 37	< 37	< 11
Chloroethane	00075-00-3	< 21	< 21	**2.5 J**
Chloroform	00067-66-3	< 39	< 39	**3.0 J**
Chloromethane	00074-87-3	< 17	< 17	**1.7 J**
cis-1,2-Dichloroethene	00156-59-2	**180**	**173**	**36**
cis-1,3-Dichloropropene	10061-01-5	< 36	< 36	< 11
Dibromochloromethane	00124-48-1	< 34	< 34	< 10
Ethylbenzene	00100-41-4	< 35	< 35	< 10
Dichloromethane	00075-09-2	< 28	< 28	**19**
Styrene	00100-42-5	< 34	< 34	< 10
Tetrachloroethene	00127-18-4	**1,240**	**895**	**3.1 J**
Toluene	00108-88-3	< 30	< 30	**362**
trans-1,2-Dichloroethene	00156-60-5	< 32	< 32	< 9.5
trans-1,3-Dichloropropene	10061-02-6	< 36	< 36	< 11
Trichloroethylene	00079-01-6	**18,100**	**14,800**	**5,250**
Trichlorotrifluoroethane (Freon 113)	00076-13-1	**107**	**104**	**14**
Vinyl Chloride	00075-01-4	**29.1**	**28.4**	**28.6**
Xylene-o	00095-47-6	< 35	< 35	< 10
Xylene-m,p	179601-23-1	< 35	< 35	< 10
Total VOCs [3,4]		**19,886**	**16,206**	**5,853**

Notes and abbreviations on last page.

Table 3A
Vapor Sample Analytical Results,
Tower 96 Treatment System,
Third Quarter 2021(1) Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) 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.

(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.

(4) Based on the above vapor-phase influent, mid-fluent, and effluent contaminant concentrations, Northrop Grumman inspected the RVPGAC components and identified no malfunctions/issues. In addition, to ensure compliance with all vapor-phase effluent requirements, the GAC contained in the supplemental beds was changed-out on October 13, 2021. Vapor-phase contaminant concentrations, specifically effluent concentrations, will be closely monitored during upcoming sample rounds.

40	Bold value indicates a detection
< 0.22	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 3B
Vapor Sample Analytical Results
Tower 102 Treatment System
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constitents (units in µg/m3)	Location ID: Sample ID: Sample Date:	102 INFLENT T102 INFLENT (AA) 8/18/2021	102 EFFLENT T102 EFFLENT (AA) 8/18/2021
Volatile Organic Componds (VOCs)(2)	**CAS #**		
1,1,1-Trichloroethane	00071-55-6	< 11	**4.6**
1,1,2,2-Tetrachloroethane	00079-34-5	< 14	< 0.55
1,1,2-Trichloroethane	00079-00-5	< 11	< 0.44
1,1-Dichloroethane	00075-34-3	**29**	**30**
1,1-Dichloroethene	00075-35-4	**50.7**	**57.1**
1,2-Dichloroethane	00107-06-2	< 16	**2.1**
1,2-Dichloropropane	00078-87-5	**11 J**	**1.2**
Benzene	00071-43-2	< 13	< 0.51
Bromodichloromethane	00075-27-4	< 13	< 0.54
Bromoform	00075-25-2	< 8.3	< 0.33
Bromomethane	00074-83-9	< 16	< 0.62
Carbon Dislfide	00075-15-0	< 12	< 0.50
Carbon Tetrachloride	00056-23-5	**5.2**	**2.6**
Chlorobenzene	00108-90-7	< 18	< 0.74
Chloroethane	00075-00-3	< 11	< 0.42
Chloroform	00067-66-3	< 20	**8.3**
Chloromethane	00074-87-3	< 8.3	**0.81**
cis-1,2 Dichloroethene	00156-59-2	**124**	**125**
cis-1,3-Dichloropropene	10061-01-5	< 18	< 0.73
Dibromochloromethane	00124-48-1	< 17	< 0.68
Ethylbenzene	00100-41-4	< 17	< 0.69
Dichloromethane	00075-09-2	< 14	**1.4**
Styrene	00100-42-5	< 17	< 0.68
Tetrachloroethene	00127-18-4	**403**	**1.5**
Toluene	00108-88-3	< 15	**0.49 J**
trans-1,2-Dichloroethene	00156-60-5	< 16	**1.5**
trans-1,3-Dichloropropene	10061-02-6	< 18	< 0.73
Trichloroethylene	00079-01-6	**2,720**	**288**
Trichlorotrifloroethane (Freon 113)	00076-13-1	**43**	**44**
Vinyl Chloride	00075-01-4	< 2.0	**0.26**
Xylene-o	00095-47-6	< 17	< 0.69
Xylene-m,p	179601-23-1	< 17	**0.52 J**
Total VOCs [3]		**3,386**	**569**

Notes and abbreviations on last page.

Table 3B
Vapor Sample Analytical Results
Tower 102 Treatment System
Third Quarter 2021(1) Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) 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.

(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.

43	Bold value indicates a detection
< 11	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
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents[7]	CAS#	T96 Effluent (ug/m^3)	Emission Rate[2]			Scaled Impact - Hourly [3] (ug/m^3)	Scaled Impact - Annual [3] (ug/m^3)	SGC [4] (ug/m^3)	AGC[4] (ug/m^3)	%SGC	% AGC
		8/31/2021	lb/yr	lb/hr	g/s						
1,1 - Dichloroethane	00075-34-3	**12**	1.95	2.23E-04	2.81E-05	4.16E-03	1.22E-04	--	6.3E-01	--	0.02%
1,1 - Dichloroethene	00075-35-4	**95.9**	15.62	1.78E-03	2.25E-04	3.33E-02	9.76E-04	--	200.0	--	0.00%
1,2-Dichloropropane	00078-87-5	**23**	3.75	4.28E-04	5.39E-05	7.98E-03	2.34E-04	--	4.0	--	0.01%
Benzene[5]	00071-43-2	**1.9 J**	0.31	3.53E-05	4.45E-06	6.59E-04	1.93E-05	27	1.3E-01	0.00%	0.01%
Chloroethane	00075-00-3	**2.5 J**	0.41	4.65E-05	5.86E-06	8.67E-04	2.54E-05	--	10,000.0	--	0.00%
Chloroform	00067-66-3	**3.0 J**	0.49	5.58E-05	7.03E-06	1.04E-03	3.05E-05	150	14.7	0.00%	0.00%
Chloromethane	00074-87-3	**1.7 J**	0.28	3.16E-05	3.98E-06	5.90E-04	1.73E-05	22,000	90.0	0.00%	0.00%
cis-1,2-Dichloroethene	00156-59-2	**36**	5.86	6.69E-04	8.43E-05	1.25E-02	3.66E-04	--	63.0	--	0.00%
Dichloromethane	00075-09-2	**19**	3.09	3.53E-04	4.45E-05	6.59E-03	1.93E-04	14,000	46.0	0.00%	0.00%
Tetrachloroethene	00127-18-4	**3.1 J**	0.50	5.76E-05	7.26E-06	1.08E-03	3.16E-05	300	3.8	0.00%	0.00%
Toluene	00108-88-3	**362**	58.96	6.73E-03	8.48E-04	1.26E-01	3.68E-03	37,000	5,000.0	0.00%	0.00%
Trichloroethene[5,6]	00079-01-6	**5,250**	855.12	9.76E-02	1.23E-02	1.82E+00	5.34E-02	20	2.1E-01	9.10%	25.45%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	**14**	2.28	2.60E-04	3.28E-05	4.86E-03	1.43E-04	960,000	180,000.0	0.00%	0.00%
Vinyl Chloride[5]	00075-01-4	**28.6**	4.66	5.32E-04	6.70E-05	9.92E-03	2.91E-04	180,000	1.1E-01	0.00%	0.26%

See Notes and Abbreviations on last page.

Table 4A
Summary of AERMOD Air Quality Impact Analysis
Tower 96 Treatment System
Third Quarter 2021(1) Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) Emission rate calculated based on effluent concentration and a stack air flow rate of 4,930 acfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 8/31/2021. Effluent temperature used in the model was 92°F from direct read in-line gauge.
Trichloroethene (lb/hr) = (Trichloroethene ug/m3) x (4,930 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

(3) 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.
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])
148.05	4.35

(4) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised February 12, 2021.

(5) Vinyl chloride 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). TCE potential emissions are above the trigger limit and require a 12 month rolling average of annual emission to be maintained (see Table 5A) to demonstrate compliance with the 6 CRR-NY 212-2.2 500 lb/year requirement.

(6) Based on the above vapor-phase effluent contaminant concentrations, Northrop Grumman inspected the RVPGAC components and identified no malfunctions/issues. In addition, to ensure compliance with all vapor-phase effluent requirements, the GAC contained in the supplemental beds was changed-out on October 13, 2021. Vapor-phase effluent contaminant concentrations will be closely monitored during upcoming sample rounds.

(7) Emission rate calculations are performed only for constituents detected in the collected sample.

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

Table 4B
Summary of AERMOD Air Quality Impact Analysis
Tower 102 Treatment System
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents (6)	CAS#	T102 Effluent (ug/m^3)	Emission Rate[2]			Scaled Impact - Hourly [3] (ug/m^3)	Scaled Impact - Annual [3] (ug/m^3)	SGC [4] (ug/m^3)	AGC[4] (ug/m^3)	%SGC	% AGC
		8/18/2021	lb/yr	lb/hr	g/s						
1,1,1 - Trichloroethane	00071-55-6	**4.6**	1.17	1.34E-04	1.69E-05	5.88E-03	3.85E-05	9,000	5,000.0	0.00%	0.00%
1,1-Dichloroethane	00075-34-3	**30**	7.65	8.73E-04	1.10E-04	3.84E-02	2.51E-04	--	6.3E-01	--	0.04%
1,1-Dichloroethene	00075-35-4	**57.1**	14.56	1.66E-03	2.09E-04	7.30E-02	4.78E-04	--	200.0	--	0.00%
1,2 - Dichloroethane	00107-06-2	**2.1**	0.54	6.11E-05	7.70E-06	2.69E-03	1.76E-05	--	3.8E-02	--	0.05%
1,2-Dichloropropane	00078-87-5	**1.2**	0.31	3.49E-05	4.40E-06	1.54E-03	1.01E-05	--	4.0	--	0.00%
Carbon Tetrachloride	00056-23-5	**2.6**	0.66	7.57E-05	9.53E-06	3.33E-03	2.18E-05	1,900	1.7E-01	0.00%	0.01%
Chloroform	00067-66-3	**8.3**	2.12	2.42E-04	3.04E-05	1.06E-02	6.95E-05	150	14.7	0.01%	0.00%
Chloromethane	00074-87-3	**0.81**	0.21	2.36E-05	2.97E-06	1.04E-03	6.79E-06	22,000	90.0	0.00%	0.00%
cis-1,2-Dichloroethene	00156-59-2	**125**	31.87	3.64E-03	4.58E-04	1.60E-01	1.05E-03	--	63.0	--	0.00%
Dichloromethane	00075-09-2	**1.4**	0.36	4.07E-05	5.13E-06	1.79E-03	1.17E-05	14,000	46.0	0.00%	0.00%
Tetrachloroethene	00127-18-4	**1.5**	0.38	4.37E-05	5.50E-06	1.92E-03	1.26E-05	300	4.0	0.00%	0.00%
Toluene	00108-88-3	**0.49 J**	0.12	1.43E-05	1.80E-06	6.27E-04	4.11E-06	37,000	5,000.0	0.00%	0.00%
trans-1,2-Dichloroethene	00156-60-5	**1.5**	0.38	4.37E-05	5.50E-06	1.92E-03	1.26E-05	--	63.0	--	0.00%
Trichloroethene[5]	00079-01-6	**288**	73.42	8.38E-03	1.06E-03	3.68E-01	2.41E-03	20	2.0E-01	1.84%	1.21%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	**44**	11.22	1.28E-03	1.61E-04	5.63E-02	3.69E-04	960,000	180,000.0	0.00%	0.00%
Vinyl Chloride[5]	00075-01-4	**0.26**	0.07	7.57E-06	9.53E-07	3.33E-04	2.18E-06	180,000	1.1E-01	0.00%	0.00%
Xylenes - M,P	01330-20-7	**0.52 J**	0.13	1.51E-05	1.91E-06	6.65E-04	4.36E-06	22,000	100.0	0.00%	0.00%

See Notes and Abbreviations on last page.

Table 4B
Summary of AERMOD Air Quality Impact Analysis
Tower 102 Treatment System
Third Quarter 2021(1) Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) Emission rate calculated based on effluent concentration and a stack air flow rate of 7,717 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on 8/18/2021.
Effluent temperature used in the model was 80°F from direct read in-line gauge.
Trichloroethene (lb/hr) = (Trichloroethene ug/m3) x (7,717 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

(3) 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

(4) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised February 12, 2021.

(5) Benzene potential emission rate is less than 0.1 lb/hr and therefore below the trigger emissions for degree of air cleaning requirement (6 CRR-NY 212-2.3). TCE potential emissions are above the trigger limit and require a 12 month rolling average of annual emission to be maintained (see Table 5B) to demonstrate compliance with the 6 CRR-NY 212-2.2 500 lb/year requirement.

(6) Emission rate calculations are performed only for constituents detected in the collected sample.

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

Table 5A
Summary of TCE Mass Removal
Tower 96 Treatment System
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	TCE Concentration (µg/m^3)[2]			TCE Mass Emission[3]	Percent of Allowable TCE Emissions[4]
	T96 INFLUENT	T96 MIDTRAIN	T96 EFFLUENT [6]	lbs/quarter	12 Month Rolling Average
11/17/2020	19,300 [5]	2,190	5,040	196.4	72.9%
3/16/2021	13,500	5,320	34	1.8	70.8%
5/13/2021	12,419	1,550	1,000	24.6	57.6%
8/31/2021	18,100 [5]	14,800	5,250	256.0	90.5%

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) 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.

(3) 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.
TCE (lb) = TCE Concentration [µg/m3] x Days x Flow Rate [ft3/min] x (1 m3/35 ft3) x (60 min/hr) x (24 hr/day) x (0.000001 g/1 ug) x (0.0022 lb/g)

(4) 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 February 5, 2019.

(5) Given that Q4 2020 and Q3 2021 TCE aqueous-phase influent concentrations are comparable to typical concentration ranges observed over the last two years, it is unclear what caused this elevated vapor-phase concentration. Northrop Grumman inspected the GAC units and determined that they were functional.

(6) Based on vapor-phase effluent contaminant concentrations, GAC within the supplemental GAC beds was replaced on March 3, 2021 and again on October 13, 2021. On both occasions, Northrop Grumman inspected the RVPGAC components and identified no malfunctions/issues. Vapor-phase effluent contaminant concentrations will be closely monitored during upcoming sample rounds.

µg/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
VPGAC	vapor phase granular activated carbon

Table 5B
Summary of TCE Mass Removal
Tower 102 Treatment System
Third Quarter 2021[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	TCE Concentration (µg/m^3)[2]		TCE Mass Emission[3]	Percentage of Allowable TCE Emissions[4]
	T102 INFLUENT	T102 EFFLUENT	lbs/quarter	12 Month Rolling Average
12/8/2020	2,130	1,990 [5]	147.8	31.4%
2/24/2021	2,890	13	0.7	31.4%
5/13/2021	3,258	107	5.7	32.4%
8/18/2021	2,720	288	19.4	34.8%

Notes and Abbreviations:

(1) Quarterly reporting period: July 1, 2021 through September 30, 2021.

(2) 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.

(3) 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.

TCE (lb) = TCE Concentration [µg/m^3] x Days x Flow Rate [ft^3/min] x (1 m^3/35 ft^3) x (60 min/hr) x (24 hr/day) x (0.000001 g/1 ug) x (0.0022 lb/g)

(4) 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 February 5, 2019.

(5) The elevated effluent vapor-phase contaminant concentrations, compared to prior quarterly sample events, are potentially related to a malfunctioning steam actuator valve noted at the regenerative vapor-phase granular activated carbon vessels (RVPGAC), which may have 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 were noted associated with this sampling event, and the steam actuator valve has since been repaired. Arcadis will closely monitor contaminant concentrations during future sampling events.

µg/m^3	Micrograms per cubic meter
lbs	Pounds
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
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 2021[1] Reporting Peroid
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents Units (µg/L)	Location ID: Sample ID: Sample Date:	BPOW 2-1[2] BPOW 2-1 9/9/2021	BPOW 2-2 [2] BPOW 2-2 9/9/2021	BPOW 2-3 [2] BPOW 2-3 9/9/2021	BPOW 2-3 [2] REP090921JDF2 9/9/2021	GM-21D2 GM-21D2 9/10/2021
Volatile Organic Compounds (VOCs) [3,4]						
1,1,1-Trichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
1,1,2-trichloro-1,2,2-trifluroethane (Freon 113)		< 1.0	< 1.0	< 1.0	< 1.0	< 0.50
1,1,2-Trichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
1,1-Dichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
1,1-Dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
1,2-Dichloropropane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
2-Butanone (MEK)		< 5.0	< 5.0	< 5.0	< 5.0	< 10
2-Hexanone		< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
4-methyl-2-pentanone (MIK)		< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
Acetone		< 5.0	< 5.0	< 5.0	< 5.0	< 10
Benzene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Bromoform		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Bromomethane		< 0.50	< 0.50	< 0.50	< 0.50	< 2.0
Carbon Disulfide		< 0.50	< 0.50	< 0.50	< 0.50	< 2.0
Carbon tetrachloride		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Chlorobenzene		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Dibromochloromethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Chloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Chloroform		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
cis-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Methylene Chloride		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Xylenes - m,p		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Xylene-o		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Styrene		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Tetrachloroethene		< 0.50	< 0.50	< 0.50	< 0.50	**0.91**
Toluene		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
trans-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
Trichloroethylene		< 0.50	< 0.50	< 0.50	< 0.50	**4.9**
Vinyl Chloride		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total VOCs [5]		ND	ND	ND	ND	**5.8**
1,4-Dioxane [3,4]		**1.09**	**0.738**	**4.14**	**4.07**	**6.7**

See last page for Notes and Abbreviations.

Table 6
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Monitoring Wells
Third Quarter 2021[(1)] Reporting Peroid
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1)	Quarterly reporting period: July 1, 2021 through September 31, 2021.
(2)	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.
(3)	BPOW samples were analyzed for VOCs using USEPA Method 524.2, and 1,4-dioxane using USEPA Method 522. The GM-21D2 sample was analyzed for VOCs by USEPA Method 8260C and 1,4-dioxane using USEPA Method 8270D SIM.
(4)	Results for the program are validated at 20% frequency, per protocols specified in the OU2 Groundwater Monitoring Plan (Arcadis 2016).
(5)	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.

0.91	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

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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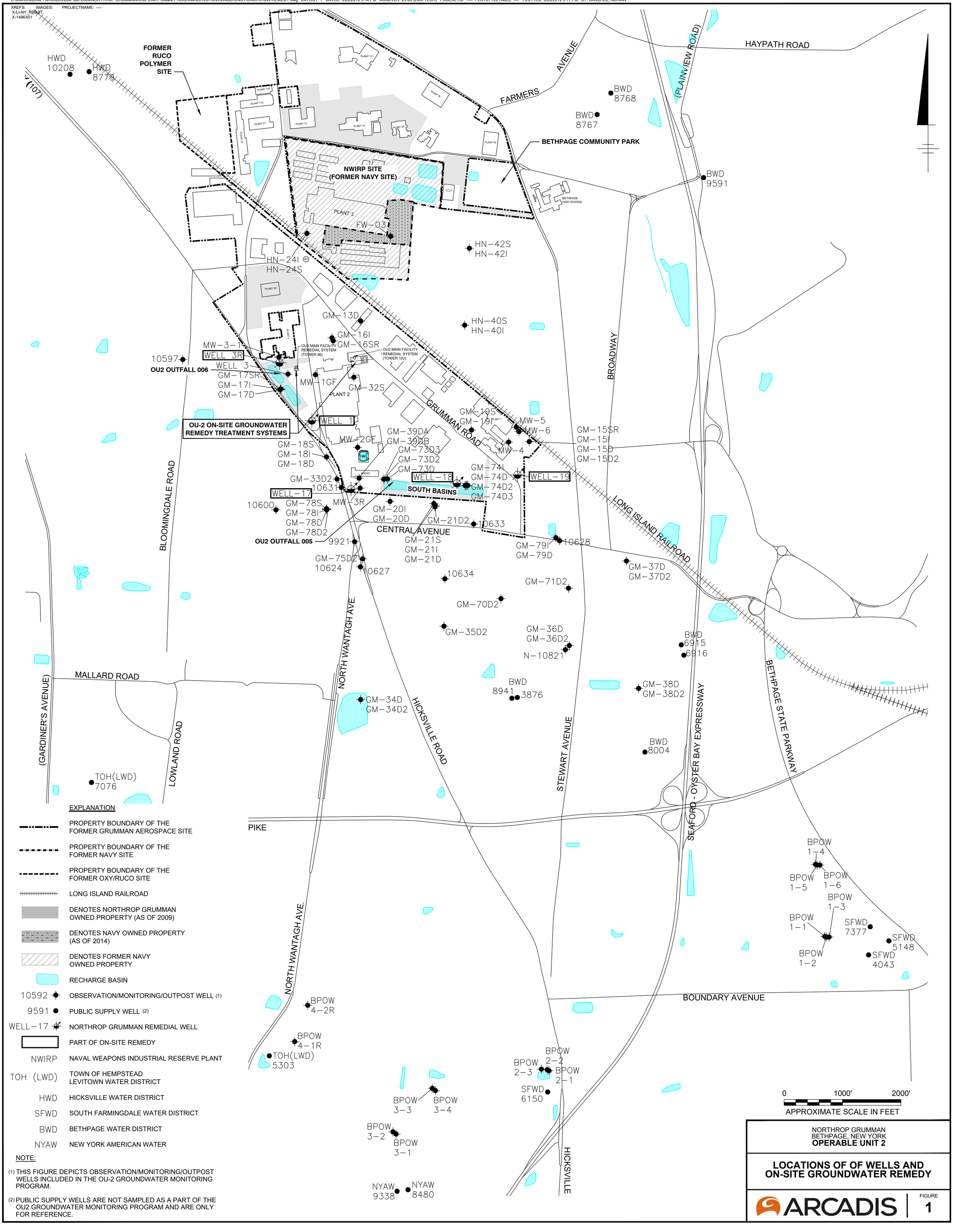

EXPLANATION

- 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

FIGURE 1

PLANT 25

PLANT 23

PLANT 5

(SWM)

TOWER 102
TREATMENT
SYSTEM

WELL 3R

WEST RECHARGE BASINS
(OUTFALL 006)

TOWER 96
TREATMENT
SYSTEM

WELL 3

PLANT 2

LONG ISLAND RAILROAD

GRUMMAN ROAD WEST

PLANT 1

GRUMMAN ROAD EAST

WELL
1

AERATION BASIN

LIRR

WELL
17

SOUTH RECHARGE BASINS
(OUTFALL 005)

WELL 18

WELL
19

SUN-SITE

LEGEND:

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

NOTES:

1. DRAWING IS NOT TO BE USED FOR DESIGN PURPOSES. LAYOUT OF PIPING IS FOR REPRESENTATION ONLY (LOCATIONS ARE APPROXIMATE).
2. THE PIPING REPRESENTED IN THIS DRAWING MAY BE CONSTRUCTED OF CAST IRON PIPE (CIP), DUCTILE IRON PIP (DIP),ASBESTOS CEMENT PIP (ACP) OR TRANSITE, OR A COMBINATION OF THESE PIPE TYPES.

NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN

ARCADIS

FIGURE
2

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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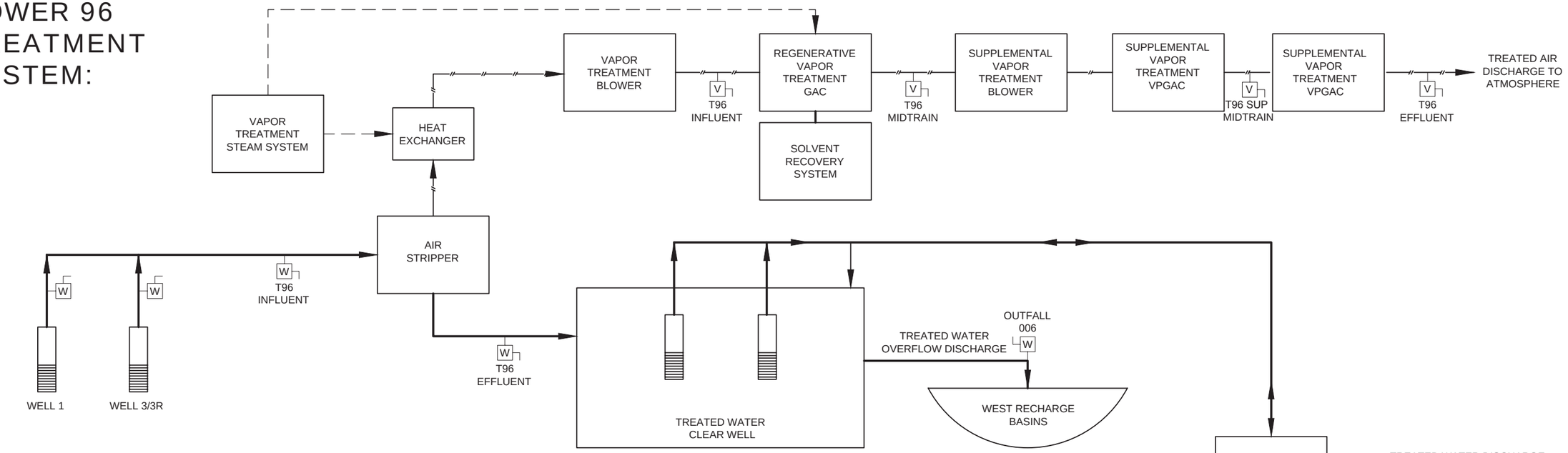
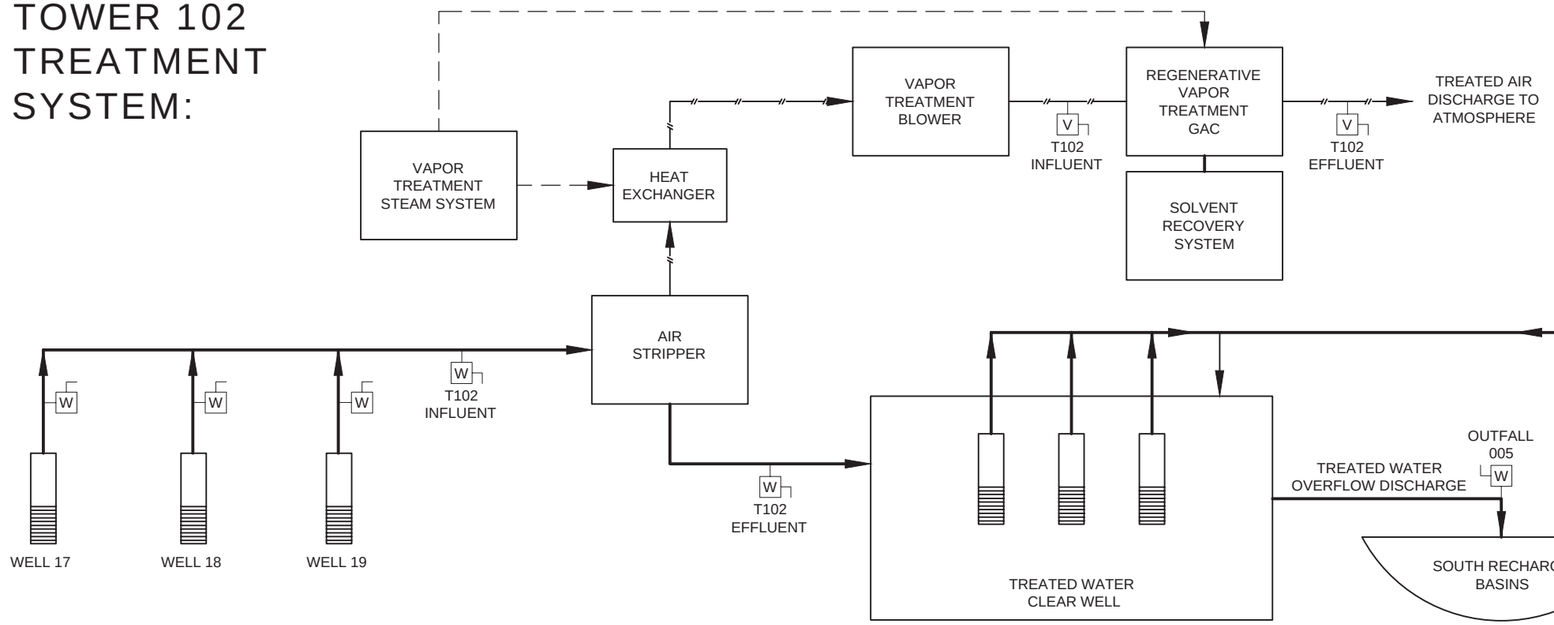
X-1496301
X-LI-NY_RD&ST
X-GW-SYS-PIPE
IMAGES:
PROJECTNAME: ----

TOWER 96 TREATMENT SYSTEM:



TOWER 102 TREATMENT SYSTEM:



LEGEND:

- PROCESS WATER
- PROCESS AIR
- STEAM
- 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

FIGURE 3

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF* (PATRICIA RICHE PDF CHANGES SUP BED TEXT and extra VSP-10.26.17)
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