Mr. Jason Pelton
Project Manager
New York State Department of Environmental Conservation
Remedial Bureau D
625 Broadway
Albany, NY 12233-7015

Arcadis of New York, Inc.
Two Huntington
Quadrangle
Suite 1S10
Melville
New York 11747
Phone: 631 249 7600
Fax: 631 249 7610
www.arcadis.com

Date: May 27, 2021
Our Ref: 30059268
Subject: Results of First Quarter 2021 System Operation and Monitoring, Bethpage Park Soil Gas Containment System (BPSGCS), Operable Unit 3 (OU3; Former Grumman Settling Ponds), Bethpage, New York, NYSDEC Site #1-30-003A.

Dear Jason,

Enclosed is one electronic PDF copy of the 2021 First Quarter results of the OU3 BPSGCS operation and monitoring, performed in accordance with the NYSDEC-approved OU3 Soil Gas IRM OM&M Manual (Arcadis 2016) and the NYSDEC-approved Sampling and Analysis Plan (SAP; Arcadis 2016). As we have transitioned to electronic submittals (via PDF) in line with NYSDEC's paper reduction program, hard copies of the report can be provided on request.

A notable increase in concentrations of cis-1,2-Dichloroethene, Trichloroethylene, and Vinyl Chloride was detected in the March 23rd, 2021 soil gas discharge sample compared to previous quarters (Tables 3 and 5, and Figures 4 through 6). This increase is likely due to the ongoing ISTR system activities on the Bethpage Community Park property. However, the air quality impact analysis (Table 5) shows that none of the detected compounds exceed the SCGs or AGCs specified in NYSDEC DAR-1. Additionally, laboratory analytical results from the Second Quarter sampling event conducted on May 17th, 2021 (not included in the attached tables) indicate a significant decrease in concentrations of cis-1,2-Dichloroethene, Trichloroethylene, and Vinyl Chloride in the soil gas discharge compared to the First Quarter. Cis-1,2-Dichloroethene decreased from 354 ug/m3 in March to 199 ug/m3 in May, Trichloroethylene decreased from 1,550 ug/m3 to 736 ug/m3, and Vinyl Chloride decreased from 28.1 ug/m3 to 5.9 ug/m3. We will continue monitoring this situation during subsequent quarterly monitoring rounds.

If you have any questions, please do not hesitate to contact me.

Sincerely,
Arcadis of New York, Inc.

Christopher Engler, PE New York PE-069748
Vice President

Email: Christopher.Engler@arcadis.com

Mr. Jason Pelton
NYSDEC
May 27, 2021

Direct Line: 315.409.6579

CC. Ed Hannon, Northrop Grumman
Donald Hesler, NYSDEC
Jim Sullivan, NYS Dept. of Health
Donald Irwin, Nassau County Dept. of Health
Robin Putnam, Nassau County Dept. of Health
Richard Castle, Nassau County Dept. of Health
Carlo San Giovanni, Arcadis
Nidal Azzam, USEPA
Carol Stein, USEPA
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Table 1
General System Operating Parameters
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

	DW-7S Parameters			DW-7D Parameters			DW-3S Parameters			DW-3D Parameters			DW-5S Parameters			DW-5D Parameters			DW-6S Parameters			DW-6D Parameters		
	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum
Date	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc
5/20/20	75	-17	-1.34	6.0	-8.0	-0.39	11.0	-5.5	-0.32	11.0	-10.0	-0.48	100	-15.5	-1.60	7.5	-8.0	-1.17	83	-16	-1.69	5.8	-5.2	-1.33
7/29/20	95	-18	-1.7	7.0	-7.0	-0.51	9.0	-5.5	-0.30	8.0	-10.0	-0.38	80	-12.5	-1.23	15	-8.0	-2.04	85	-15	-1.7	6.2	-5.2	-1.38
10/27/20	75	-16	-1.36	5.5	-8.0	-0.40	6.0	-7.5	-0.20	8.0	-9.0	-0.34	74	-12.0	-0.77	13	-7.0	-1.50	69	-13	-1.42	6.2	-5	-1.30
3/23/21	85	-20	-1.56	5.0	-15.0	-0.43	6.0	-5.0	-0.28	15.0	-7.0	-0.49	75	-17.0	-1.51	15	-10.0	-2.93	75	-15	-1.60	8.2	-6	-1.88

Notes, Abbreviations, and Units on last page.

Table 1
General System Operating Parameters
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

	DW-1S Parameters			DW-1D Parameters			DW-4S Parameters			DW-4D Parameters			DW-8S Parameters			DW-9S Parameters			DW-2S Parameters			DW-2D Parameters		
	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum
Date	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc
5/20/20	93	-22	-2.10	5.0	-3.0	-1.70	58	-15.0	-1.24	12.0	-6.5	-0.81	58	-15.5	-1.80	41	-13	-1.60	31	-25	-1.70	41	-25	-2.50
7/29/20	90	-21	-1.90	4.9	-3.0	-1.57	75	-16.0	-1.56	7.0	-6.0	-0.68	67	-18.0	-2.09	26	-12	-1.15	31	-27	-1.90	35	-21	-2.39
10/27/20	66	-18.5	-1.53	5.1	-2.5	-1.53	69[4]	-15.0	-1.46	7.0	-5.6	-0.70	59	-18.0	-1.80	30	-12	-1.33	29	-21	-1.8	37	-21	-2.36
3/23/21	85	-23.5	-2.32	6.1	-3	-1.94	0	-15.0	-0.30	8.0	-6	-0.39	48	-17.0	-1.40	34	-12	-1.41	28	-14	-2.88	43	-28	-1.15

Notes, Abbreviations, and Units on last page.

Table 1
General System Operating Parameters
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

	DW-10S Parameters			DW-11S Parameters			Knock Out Tank Parameters - Vacuum			Condensate Water Collected [1]	Blower Parameters BL-200			Blower Parameters BL-300			Blower Parameters BL-400			Combined Effluent Parameters				
	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Wellhead Vacuum	Influent KO-200	Influent KO-300	Influent KO-400	Influent ST-510	Influent Vacuum	Effluent Pressure	Blower Speed	Influent Vacuum	Effluent Pressure	Blower Speed	Influent Vacuum	Effluent Pressure	Blower Speed	Total Effluent Flow Rate [2]	Total Effluent PID	Heat Exchanger Influent Temp.	Total Effluent Pressure	Heat Exchanger Effluent Temp.
Date	scfm	iwc	iwc	scfm	iwc	iwc	iwc	iwc	iwc	Gallons	iwc	iwc	Hz	iwc	iwc	Hz	iwc	iwc	Hz	scfm	ppmv	°F	iwc	°F
5/14/20	45	-16	-2.10	25	-17	-1.30	-41	NA	NA	395	-44.0	6.0	59	NA	NA	NA	-8	11	60	1674[3]	0.0	110	13.0	100
7/29/20	32	-14	-1.83	30	-25	-2.77	-38	NA	-5.5	0	-38.0	9.0	59	NA	NA	NA	-5	11.5	60	1846	0.0	125	12.0	122
10/27/20	35	-14	-2.06	29	-26	-2.20	NA	-30	NA	100	NA	NA	NA	-35	15	60	-7	12	60	1479	0.1	113	14.0	102
3/23/21	27	-12	-1.50	35	-27	-2.86	NA	-39	NA	180	NA	NA	NA	-43	14	60	17	11	60	1727	1.0	120	12.0	118

Notes, Abbreviations, and Units on last page.

Table 1
General System Operating Parameters
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

Notes, Abbreviations, and Units:

1. Total gallons of water accumulated at storage tank ST-510 per quarter are based on storage tank level and condensate removed as documented in site operator condensate discharge logs.
2. Total effluent air velocity in feet per minute was measured using a hand-held anemometer at the stack effluent location. The total effluent flow rate in scfm was calculated by multiplying the measured air velocity by the pipe area, the ratio of the standard air temperature to the measured air temperature, and the ratio of the measured air pressure to the standard air pressure.
3. Reading estimated due to measuring equipment failure. There were no reported changes in the system operation during the 2nd Quarter 2020, and therefore an average of the past three quarters will be used as representative.
4. Reading estimated due to measuring equipment failure. There were no reported changes in the system operation during the 4th Quarter 2020, and therefore an average of the past three quarters will be used as representative.

DW	Depressurization Well
NA	Not Applicable
NM	Not Measured
°F	degrees Fahrenheit
Hz	Hertz
iwc	inches of water column
scfm	standard cubic feet per minute

Table 2
Summary of Induced Vacuum Readings at Compliance Monitoring Points
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

Well ID:	DW-7S		DW-7D	DW-3S	DW-3D	DW-5S		DW-5D		DW-1S			DW-1D	DW-4D	DW-8S		DW-2S		DW-2D		DW-11S	
MP ID:	VMWC-14A	VMWC-14B	VMWC-14D	VMWC-11B	VMWC-12D	VMWC-15A	VMWC-15B	VMWC-15D	VMWC-15E	VMWC-3A	VMWC-3B	VMWC-3C	VMWC-3D	VMWC-16D	VMWC-16A	VMWC-16B	VMWC-7A	VMWC-7B	VMWC-13D	VMWC-17D	VMWC-18A	VMWC-18B
Date	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc	iwc
05/20/20	-0.08	-0.16	-0.16	-0.15	-0.14	-0.13	-0.12	NM[3]	NA	-0.14	-0.14	-0.14	-0.33	-0.21	-0.14	-0.11	-0.38	-0.42	-0.24	-0.25	-0.09	-0.10
07/29/20	-0.11	-0.20	-0.21	-0.12	-0.13	-0.13	-0.13	NA[3]	-0.15	-0.14	-0.15	-0.15	-0.43	-0.26	-0.19	-0.18	-0.12	-0.13	-0.17	-0.27	-0.10	-0.12
10/27/20	-0.10	-0.16	-0.16	-0.15	-0.12	-0.14	-0.13	NA[3]	-0.12	-0.14	-0.13	-0.16	-0.22	-0.16	-0.16	-0.14	-0.11	-0.14	-0.10	-0.16	-0.10	-0.11
03/23/21	-0.10	-0.19	-0.20	-0.14	-0.13	-0.15	-0.15	NA[3]	-0.11	-0.15	-0.15	-0.16	-0.24	-0.10	-0.10	-0.10	-0.10	-0.10	-0.21	-0.11	-0.11	-0.14
Time Weighted Rolling Average[1]	**-0.10**	**-0.18**	**-0.19**	**-0.14**	**-0.13**	**-0.14**	**-0.14**	**-0.10**	**-0.12**	**-0.14**	**-0.14**	**-0.16**	**-0.29**	**-0.16**	**-0.14**	**-0.13**	**-0.14**	**-0.16**	**-0.18**	**-0.17**	**-0.11**	**-0.12**

Gross Average Compliance Points[1,2]	
03/23/21	-0.14

Notes, Abbreviations, and Units:

1. Compliance goal is -0.1 iwc of vacuum at all compliance monitoring points, based on a twelve-month rolling average. Time weighted rolling average calculated by summing the products of the instantaneous induced vacuum readings and the number of days between readings for a 12-month monitoring period, and dividing by the total time period between the first and last quarterly induced vacuum readings.
2. Gross average compliance points calculated by summing the induced vacuum values for the noted monitoring event and dividing by the number of readings.
3. Reading not measured due to well abandonment, replacement well VMWC-15E installed on 7/21/20.

DW	Depressurization Well
iwc	inches of water column
VMWC	Vapor Monitoring Well Cluster
NM	Not Measured
NA	Not Applicable

Table 3
Total Effluent Vapor Sample Analytical Results
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

ARCADIS

Compound (units in µg/m^3)	Sample ID[1]: Sample Date:	VSP-601 5/20/2020	VSP-601 7/29/2020	VSP-601 10/27/2020	VSP-601 3/23/2021
Project VOCs	**CAS No.**				
1,1,1-Trichloroethane	71-55-6	**3.0**	**2.8**	**2.5**	**2.4**
1,1-Dichloroethane	75-34-3	**2.5**	**2.0**	**2.3**	**4.5**
1,1-Dichloroethene	75-35-4	< 0.16	< 0.16	**2.3**	**9.9**
1,2-Dichloroethane	107-06-2	< 0.81	< 0.81	< 0.81	< 0.82
Benzene	71-43-2	**5.1**	**0.77**	**1.0**	**2.1**
cis-1,2-Dichloroethene	156-59-2	**97.5**	**54.3**	**87.2**	**354**
Tetrachloroethene	127-18-4	**2.4**	**3.8**	**3.5**	**6.6**
Toluene	108-88-3	< 0.75	**0.49 J**	**0.83**	**2.1**
trans-1,2-Dichloroethene	156-60-5	**0.63 J**	**0.83**	**1.9**	**15.0**
Trichloroethylene	79-01-6	**94.6**	**89.7**	**222**	**1550**
Vinyl chloride	75-01-4	< 0.10	< 0.10	**42.7**	**28.1**
Xylenes - O	95-47-6	< 0.87	< 0.87	**0.40 J**	**0.48 J**
Xylenes - M,P	1330-20-7	< 0.87	**0.74 J**	**1.0**	**0.56 J**
Subtotal Project VOCs		**206**	**155**	**368**	**1976**
Non-Project VOCs					
1,1,2,2-Tetrachloroethane	79-34-5	< 0.69	< 0.69	< 0.55	< 0.69
1,1,2-Trichloroethane	79-00-5	< 0.55	< 0.55	< 0.44	< 0.55
1,2-Dichloropropane	78-87-5	< 0.92	< 0.92	< 0.74	< 0.92
1,3-Butadiene	106-99-0	< 0.44	< 0.44	**1.5**	< 0.44
1-Chloro-1,1-difluoroethane (Freon 142B)	75-68-3	< 0.82	< 0.82	**30**	**16**
2-Butanone	78-93-3	**1.8**	**1.9**	**1.3**	**0.44 J**
2-Hexanone	591-78-6	< 0.82	< 0.82	< 0.65	< 0.82
4-Methyl-2-Pentanone	108-10-1	< 0.82	< 0.82	< 0.66	< 0.82
Acetone	67-64-1	**14**	**6.7**	**10**	**3.1**
Bromodichloromethane	75-27-4	< 0.67	< 0.67	< 0.54	< 0.67
Bromoform	75-25-2	< 0.41	< 0.41	< 0.33	< 0.41
Bromomethane	74-83-9	< 0.78	< 0.78	< 0.62	< 0.78
Carbon Disulfide	75-15-0	< 0.62	< 0.62	< 0.50	< 0.62
Carbon Tetrachloride	56-23-5	**0.53**	**0.42**	**0.48**	**0.34**
Chlorobenzene	108-90-7	< 0.92	< 0.92	< 0.74	< 0.92
Chlorodibromomethane	124-48-1	< 0.85	< 0.85	< 0.68	< 0.85
Chloroethane	75-00-3	< 0.53	< 0.53	< 0.42	< 0.53
Chlorodifluoromethane (Freon 22)	75-45-6	**0.67 J**	< 0.70	**0.91**	**0.56 J**
Chloroform	67-66-3	**11**	**6.8**	**6.3**	**15**
Chloromethane	74-87-3	< 0.41	**1.2**	< 0.33	**0.37 J**
cis-1,3-Dichloropropene	10061-01-5	< 0.91	< 0.91	< 0.73	< 0.91
Dichlorodifluoromethane (Freon 12)	75-71-8	**1.8**	**1.6**	**1.9**	**1.3**
Ethylbenzene	100-41-4	< 0.87	< 0.87	< 0.69	< 0.87
Methylene Chloride	75-09-2	< 0.69	**1.1**	< 0.56	< 0.69
Methyl Tert-Butyl Ether	1634-04-4	< 0.72	< 0.72	< 0.58	< 0.72
Styrene	100-42-5	< 0.85	< 0.85	< 0.68	**0.47**
trans-1,3-Dichloropropene	10061-02-6	< 0.91	< 0.91	< 0.73	< 0.91
Trichlorofluoromethane (Freon 11)	75-69-4	**1.0**	**1.0**	**1.2**	**0.79**
Trichlorotrifluoroethane (Freon 113)	76-13-1	< 0.77	< 0.77	< 0.61	< 0.77
Subtotal Non-Project VOCs		**31**	**21**	**54**	**38**
TVOC[(2)]		**237**	**176**	**421**	**2,014**

Notes, Abbreviations, Qualifiers, and Units on last page.

Table 3
Total Effluent Vapor Sample Analytical Results
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

Notes, Abbreviations, Qualifiers, and Units:

1. Vapor samples collected by Arcadis and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
2. TVOC determined by summing individual detections and rounding to the nearest whole number.
3. A notable but inconsequential spike in TCE and Vinyl Chloride noted in March 23rd, 2021 sample was expected due to the OU3 ISTR system activities.

CAS No.	Chemical Abstracts Service list number
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
NYSDEC	New York State Department of Environmental Conservation.
TVOC	Total Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

3.0	Bolding indicates that the analyte was detected at or above laboratory reporting limit
< 0.16	Compound not detected above its laboratory quantification limit
J	Compound detected below laboratory reporting limit; result is estimated
µg/m^3	micrograms per cubic meter

Table 4
Total Effluent Vapor Sample Analytical Results
Tentatively Identified Compounds
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

Sample ID: Sample Date[1]: Units: Tentatively Identified Compounds[2]	VSP - 601 5/20/2020 ppbv	VSP - 601 7/29/2020 ppbv	VSP - 601 10/27/2020 ppbv	VSP - 601 3/23/2021 ppbv
Carbon Dioxide	**130 JB**	**460 JNB**	**360 JNB**	**670 JNB**
Alkane	ND	ND	ND	**5.1 J**
Acetone	ND	ND	ND	ND
Ethanol	ND	ND	**5.7 JN**	ND
Ethane, 1-Chloro-1, 1-Difluoro-	**11 J**	ND	ND	ND
2-Ethylhexanol	ND	**4.6 JN**	**3.5 JN**	ND
2-Phenyl-2-Propanol	ND	**9.2 JN**	**5.3 JN**	ND
Acetophenone	ND	**9.4 JN**	**6.1 JN**	ND
2-Ethylhexyl acetate	ND	**3.7 JN**	ND	ND
Methylcyclohexane	ND	ND	ND	**7.5 JN**

Notes, Abbreviations, Qualifiers, and Units:

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. Tentatively identified compounds are identified based on review of mass spectrometry results via a comprehensive library search of all organic compounds.

ND	Not Detected
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
B	Indicates analyte found in associated method blank
J	Indicates an estimated value
JN	Compound tentatively identified, concentration is estimated
ppbv	parts per billion by volume

Table 5
Air Quality Impact Analysis
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

Toxic Air Contaminant[4]	CAS#	VSP-601 Vapor Effluent (µg/m^3) 3/23/2021	Emission Rate[1]			Scaled Impact - Hourly[2] (µg/m^3)	Scaled Impact - Annual[2] (µg/m^3)	SGC[3] (µg/m^3)	AGC[3] (µg/m^3)	% of SGC	% of AGC
			lb/yr	lb/hr	g/s						
Project VOCs											
1,1,1 - Trichloroethane	71-55-6	2.4	1.4E-01	1.5E-05	2.0E-06	2.4E-03	3.9E-05	9,000	5,000	0.0%	0.0%
1,1 - Dichloroethane	75-34-3	4.5	2.5E-01	2.9E-05	3.7E-06	4.4E-03	7.3E-05	NS	0.63	NS	0.0%
1,1 - Dichloroethene	75-35-4	9.9	5.6E-01	6.4E-05	8.1E-06	9.8E-03	1.6E-04	--	200	--	0.0%
Benzene	71-43-2	2.1	1.2E-01	1.4E-05	1.7E-06	2.1E-03	3.4E-05	1,300	0.13	0.0%	0.0%
cis- 1,2-Dichloroethene	156-59-2	354.0	2.0E+01	2.3E-03	2.9E-04	3.5E-01	5.8E-03	NS	63	NS	0.0%
Tetrachloroethene	127-18-4	6.6	3.7E-01	4.3E-05	5.4E-06	6.5E-03	1.1E-04	300	4	0.0%	0.0%
Toluene	108-88-3	2.1	1.2E-01	1.4E-05	1.7E-06	2.1E-03	3.4E-05	37,000	5000	0.0%	0.0%
trans- 1,2-Dichloroethene	156-60-5	15.0	8.5E-01	9.7E-05	1.2E-05	1.5E-02	2.4E-04	NS	63	NS	0.0%
Trichloroethene	79-01-6	1550.0	8.8E+01	1.0E-02	1.3E-03	1.5E+00	2.5E-02	20	0.2	7.6%	12.6%
Vinyl Chloride	75-01-4	28.1	1.6E+00	1.8E-04	2.3E-05	2.8E-02	4.6E-04	180,000	0.11	0.0%	0.4%
Xylene-O	95-47-6	0.48 J	1.2E-02	1.4E-06	1.7E-07	2.1E-04	3.4E-06	22,000	100	0.0%	0.0%
Xylenes - M,P	1330-20-7	0.56 J	3.2E-02	3.6E-06	4.6E-07	5.5E-04	9.1E-06	22,000	100	0.0%	0.0%
Non-Project VOCs											
1-Chloro-1,1-difluoroethane (Freon 142B)	75-68-3	16	9.0E-01	1.0E-04	1.3E-05	1.6E-02	2.6E-04	NS	50,000	NS	0.0%
2-Butanone	78-93-3	0.44	2.5E-02	2.8E-06	3.6E-07	4.3E-04	7.2E-06	13,000	5,000	0.0%	0.0%
Acetone	67-64-1	3.1	1.8E-01	2.0E-05	2.5E-06	3.1E-03	5.0E-05	180,000	30,000	0.0%	0.0%
Carbon Tetrachloride	56-23-5	0.34	1.9E-02	2.2E-06	2.8E-07	3.4E-04	5.5E-06	1,900	0.17	0.0%	0.0%
Chlorodifluoromethane (Freon 22)	75-45-6	0.56	3.2E-02	3.6E-06	4.6E-07	5.5E-04	9.1E-06	--	50,000	--	0.0%
Chloromethane	74-87-3	0.37	2.1E-02	2.4E-06	3.0E-07	3.7E-04	6.0E-06	--	--	--	--
Chloroform	67-66-3	15	8.5E-01	9.7E-05	1.2E-05	1.5E-02	2.4E-04	150	15	0.0%	0.0%
Dichlorodifluoromethane (Freon 12)	75-71-8	1.3	7.4E-02	8.4E-06	1.1E-06	1.3E-03	2.1E-05	NS	12,000	NS	0.0%
Styrene (Monomer)	100-42-5	0.47	0.0	1.3E-06	1.7E-07	2.1E-04	3.4E-06	17000.0	1000	0.0	0.0%
Trichlorofluoromethane (Freon 11)	75-69-4	0.79	4.5E-02	5.1E-06	6.4E-07	7.8E-04	1.3E-05	9,000	5,000	0.0%	0.0%

Notes, Abbreviations, and Units on last page.

Table 5
Air Quality Impact Analysis
Bethpage Park Soil Gas Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Northrop Grumman,
Bethpage, New York

Notes, Abbreviations, and Units:

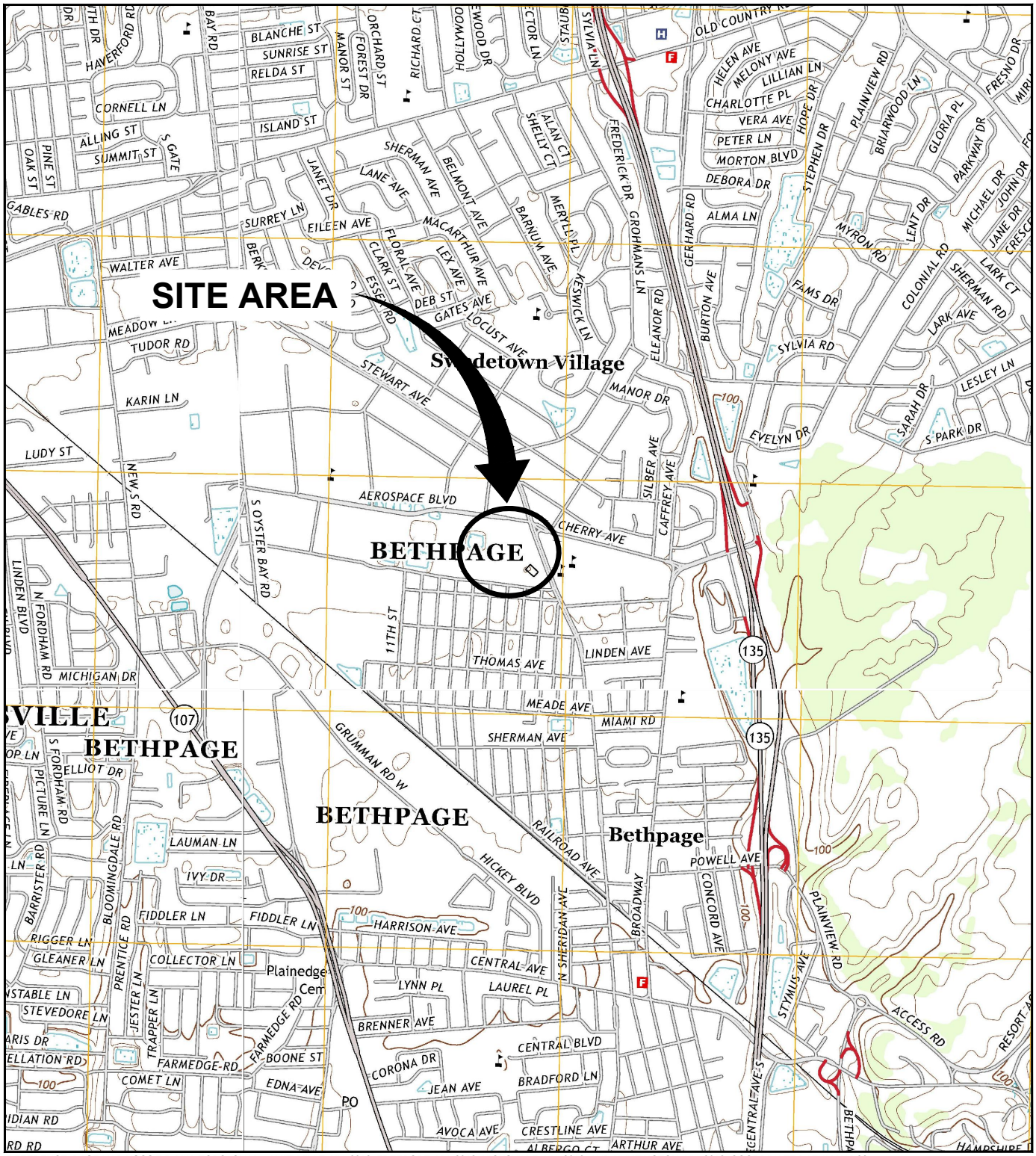
1. Emission rate calculated based on VSP-601 effluent concentration and an exit air flow rate of 1,727 ft^3/min for 3/23/21.
   TCE (lb/hr) = TCE [µg/m^3] x Air Flow Rate [ft^3/min] x (1 m^3/35.3147 ft^3) x (60 min/hr) x (0.000001 g/1 ug) x (0.0022 lb/g)
   lb/yr = lb/hr x 8,760 hrs/yr
   g/s = lb/hr x 1 hr/ 3,600 sec x 453.59 g/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) for the years 2015 through 2019. The maximum impact from all the years was used for the calculations.
   Scaled hourly impact (µg/m^3) = AERMOD predicted hourly ambient impact at 1 g/s ([µg/m^3]/[g/s]) x Actual emission rate (g/s)
   Scaled annual impact (µg/m^3) = AERMOD predicted annual ambient impact at 1 g/s ([µg/m^3]/[g/s]) x Actual emission rate (g/s)

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([µg/m^3]/[g/s])	Annual ([µg/m^3]/[g/s])
1,213.26	36.86

3. Short-term and annual guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
4. Only contaminants with detected concentrations are included in the table.

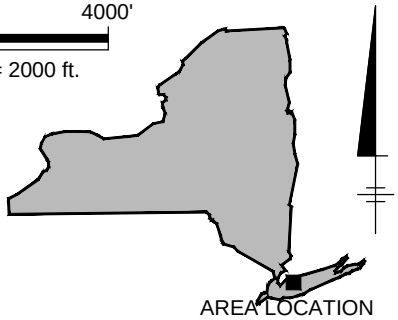
AGC	Annual Guideline Concentration
CAS#	Chemical Abstracts Service Registry Number
DAR-1	Division of Air Resources-1
NS	None Specified
NYSDEC	New York State Department of Environmental Conservation
SGC	Short-term Guideline Concentration
VSP	Vapor Sampling Point
ft^3/min	cubic feet per minute
g/s	grams per second
µg/m^3	micrograms per cubic meter
lb/hr	pounds per hour



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., AMITYVILLE, NY, 2013, FREEPORT, NY, 2013, HICKSVILLE, NY, 2013, AND HUNTINGTON, NY, 2013, COORDINATE DATUM NAD83.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



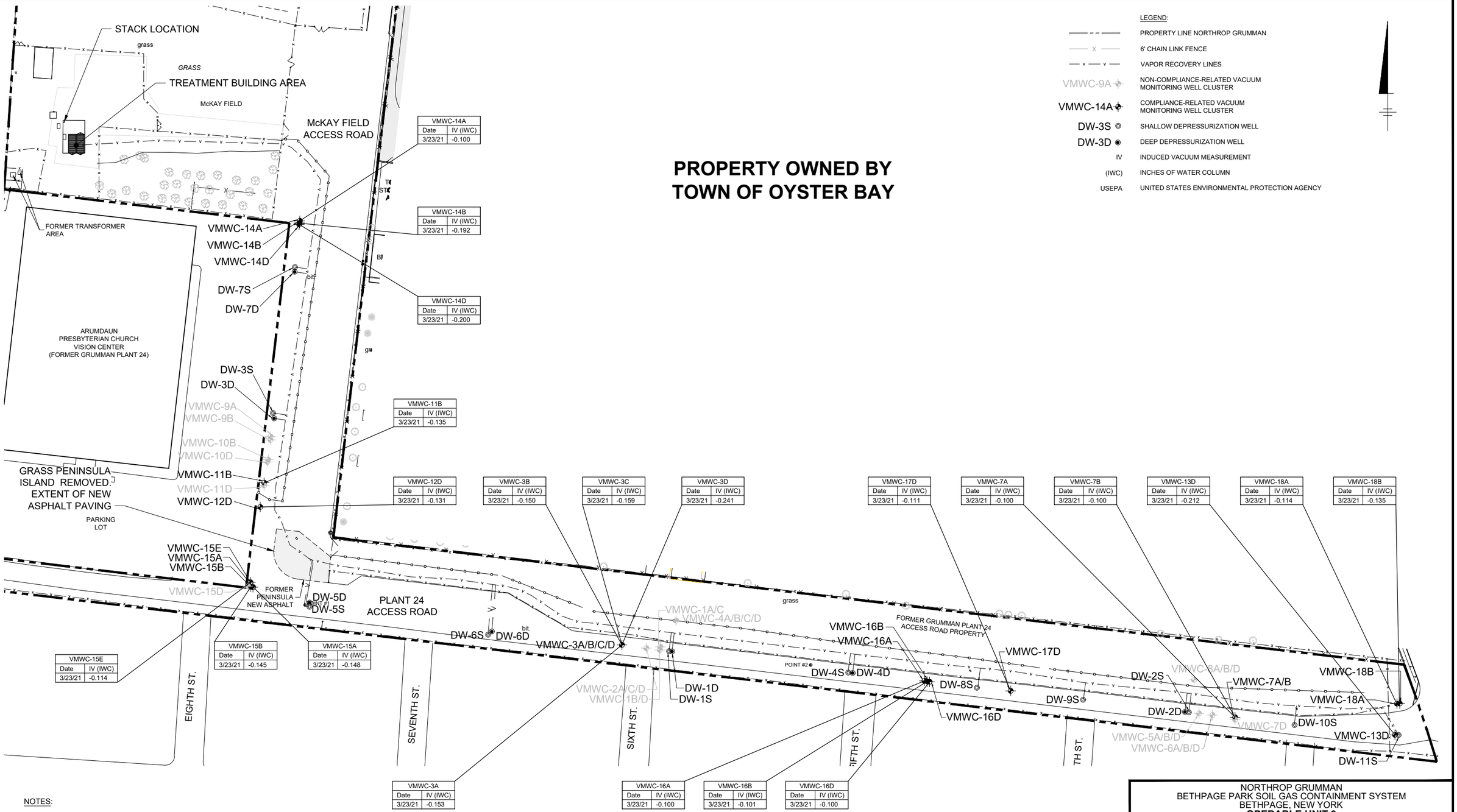
NORTHROP GRUMMAN
BETHPAGE PARK SOIL GAS CONTAINMENT SYSTEM
BETHPAGE, NEW YORK
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)

SITE LOCATION MAP

ARCADIS

FIGURE
1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
Z:\ENVCAD\SYRACUSE\ACTIVE\60014961\SiteLocMap.dwg LAYOUT: BP SAVED: 3/15/2017 9:38 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/15/2017 9:38 AM BY: SANCHEZ, ADRIAN
XREFS: IMAGES: PROJECTNAME: ----
2013Amityville.jpg
2013Freeport.jpg
2013Hicksville.jpg
2013Huntington.jpg



PROPERTY OWNED BY TOWN OF OYSTER BAY

LEGEND:

- PROPERTY LINE NORTHROP GRUMMAN
- 6' CHAIN LINK FENCE
- VAPOR RECOVERY LINES
- VMWC-9A — NON-COMPLIANCE-RELATED VACUUM MONITORING WELL CLUSTER
- VMWC-14A — COMPLIANCE-RELATED VACUUM MONITORING WELL CLUSTER
- DW-3S — SHALLOW DEPRESSURIZATION WELL
- DW-3D — DEEP DEPRESSURIZATION WELL
- IV — INDUCED VACUUM MEASUREMENT
- (IWC) — INCHES OF WATER COLUMN
- USEPA — UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NOTES:

1. USEPA'S RADON GUIDANCE RECOMMENDS NEGATIVE PRESSURE OF 0.035 INCHES OF WATER FOR THE CONTROL OF SOIL VAPOR (EPA 625/R-93-011, 1993).
2. SYSTEM DESIGN OBJECTIVE IS TO MAINTAIN -0.1 IWC OF INDUCED VACUUM AT ALL COMPLIANCE-RELATED VACUUM MONITORING WELLS ON A 12-MONTH ROLLING AVERAGE (ARCADIS 2007).
3. DATA SHOWN HEREIN ARE COLLECTED FROM COMPLIANCE-RELATED VACUUM MONITORING WELLS ONLY.

0 50' 100'
APPROXIMATE SCALE IN FEET

NORTHROP GRUMMAN
BETHPAGE PARK SOIL GAS CONTAINMENT SYSTEM
BETHPAGE, NEW YORK
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)

GENERAL SITE PLAN AND MONITORING WELL VACUUM MEASUREMENTS FIRST QUARTER 2021

ARCADIS

FIGURE
2

DISCHARGE TO ATMOSPHERE

DISCHARGE TO ATMOSPHERE

VSP-602

V-27

TEMPORARY VAPOR PHASE GAC VP-600 (REMOVED FROM OPERATION DECEMBER 2008)

AMBIENT AIR OUTLET

TI 602

TT 602

HEAT EXCHANGER HX-600

ON STANDBY

AMBIENT AIR INLET

FE

PIT 601

PI 601

TI 601

V-26

VSP-601

VSP-201

PI 201

BLOWER BL-200

VI 202

VIT 202

VSP-301

PI 301

BLOWER BL-300

VI 302

VIT 302

VSP-401

PI 401

BLOWER BL-400

VI 402

VIT 402

WSP-510

SG 510

STORAGE TANK ST-510

VENT

AIR FILTER AF-200

KNOCK OUT TANK KO-200

SG 200

WSP-210

VI 201

RECIRCULATION LINE (TYP. OF 3)

FE 210

FQI 210

TRANSFER PUMP TP-210

AIR FILTER AF-300

KNOCK OUT TANK KO-300

SG 300

WSP-310

VI 301

FE 310

FQI 310

TRANSFER PUMP TP-310

AIR FILTER AF-400

KNOCK OUT TANK KO-400

SG 400

WSP-410

VI 401

FE 410

FQI 410

TRANSFER PUMP TP-410

V-24

V-19

V-21

V-22

V-20

V-23

V-1 VSP-101 VI 119 FI 101 FROM DW-7D

V-2 VSP-102 VI 120 FI 102 FROM DW-3D

V-3 VSP-103 VI 121 FI 103 FROM DW-5D

V-4 VSP-104 VI 122 FI 104 FROM DW-6D

V-5 VSP-105 VI 123 FI 105 FROM DW-1D

V-6 VSP-106 VI 124 FI 106 FROM DW-4D

V-7 VSP-107 VI 125 FI 107 FROM DW-2D

V-8 VSP-108 VI 126 FI 108 FROM DW-11S

V-9 VSP-109 VI 127 FI 109 FROM DW-10S

V-10 VSP-110 VI 128 FI 110 FROM DW-2S

V-11 VSP-111 VI 129 FI 111 FROM DW-9S

V-12 VSP-112 VI 130 FI 112 FROM DW-8S

V-13 VSP-113 VI 131 FI 113 FROM DW-4S

V-14 VSP-114 VI 132 FI 114 FROM DW-1S

V-15 VSP-115 VI 133 FI 115 FROM DW-6S

V-16 VSP-116 VI 134 FI 116 FROM DW-5S

V-17 VSP-117 VI 135 FI 117 FROM DW-3S

V-18 VSP-118 VI 136 FI 118 FROM DW-7S

VI 101

DEPRESSURIZATION WELL (TYPICAL OF 7 DEEP)

VI 108

DEPRESSURIZATION WELL (TYPICAL OF 11 SHALLOW)

LIMIT OF TREATMENT BUILDING 2

LIMIT OF TREATMENT BUILDING 1

LEGEND:

- CONDENSATE LINE
- LIMITS OF TREATMENT BUILDING
- PROCESS VAPOR LINE
- BALL VALVE (NORMALLY OPEN)
- BALL VALVE (NORMALLY CLOSED)
- BUTTERFLY VALVE (NORMALLY OPEN)
- BUTTERFLY VALVE (NORMALLY CLOSED)
- CHECK VALVE
- UNION
- SAMPLE PORT/DRAIN
- REDUCER
- FERNCO
- FLEXIBLE HOSE
- FLANGE
- FE — FLOW ELEMENT ACCESS
- VI H2O — 1/4" BARB INDUCED VACUUM MONITORING CONNECTION
- INLINE INSTRUMENT
- ISOLATED INSTRUMENT CONNECTED TO PROCESS LINE
- INSTRUMENT CONNECTED TO PROCESS LINE

FE	FLOW MONITORING ELEMENT
FI	FLOW RATE INDICATOR
FQI	FLOW TOTALIZER INDICATOR
PI	PRESSURE INDICATOR
PIT	PRESSURE INDICATING TRANSMITTER
SG	SIGHT GLASS
TT	TEMPERATURE TRANSMITTER
VI	VACUUM INDICATOR
VIT	VACUUM INDICATING TRANSMITTER
VSP	VAPOR SAMPLE POINT
WSP	WATER SAMPLE POINT

NOTES:

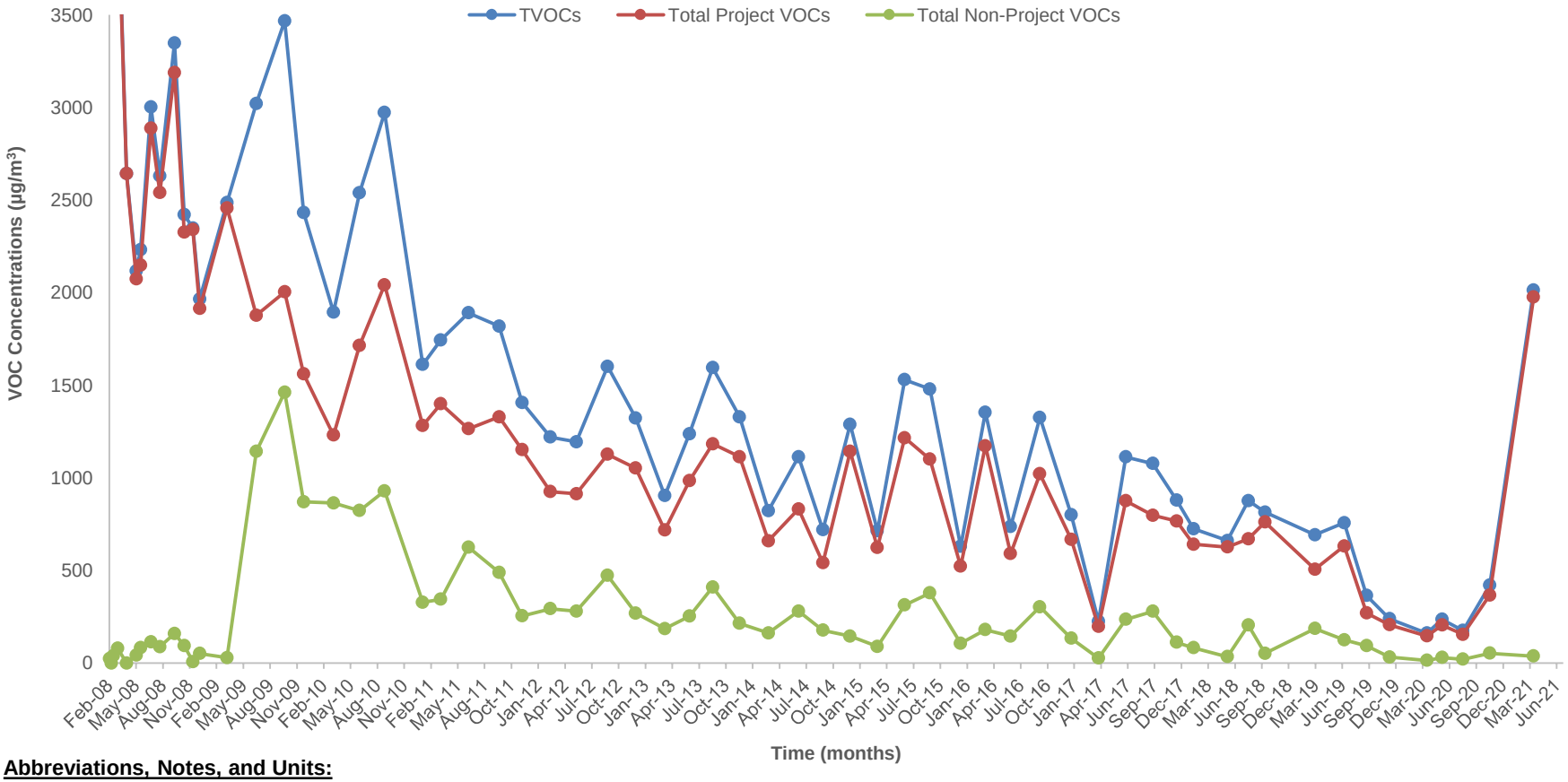
1. SEE TABLE 1 FOR BLOWER OPERATING STATUS.

NORTHROP GRUMMAN
BETHPAGE, NEW YORK

PROCESS FLOW DIAGRAM

ARCADIS

FIGURE 3



Abbreviations, Notes, and Units:

VOCs = Volatile Organic Compounds
TVOCs = Total VOCs detected

Total Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.
Total Non-Project VOCs = Sum of VOCs that are not Project VOCs.

1. Samples were collected at Vapor Sample Port-601 (VSP-601); refer to Figure 3 of this OM&M report for the location of VSP-601.
2. Results prior to April 16, 2008 are not shown to improve figure clarity. The TVOC and Total Project VOC concentrations are greater than 3,500 µg/m^3. See previous reports for full data set.
3. The sample results from December 3, 2010 are not consistent with historical data and the results are excluded from this figure. The TVOC concentration for December 3, 2010 was 13 µg/m^3.

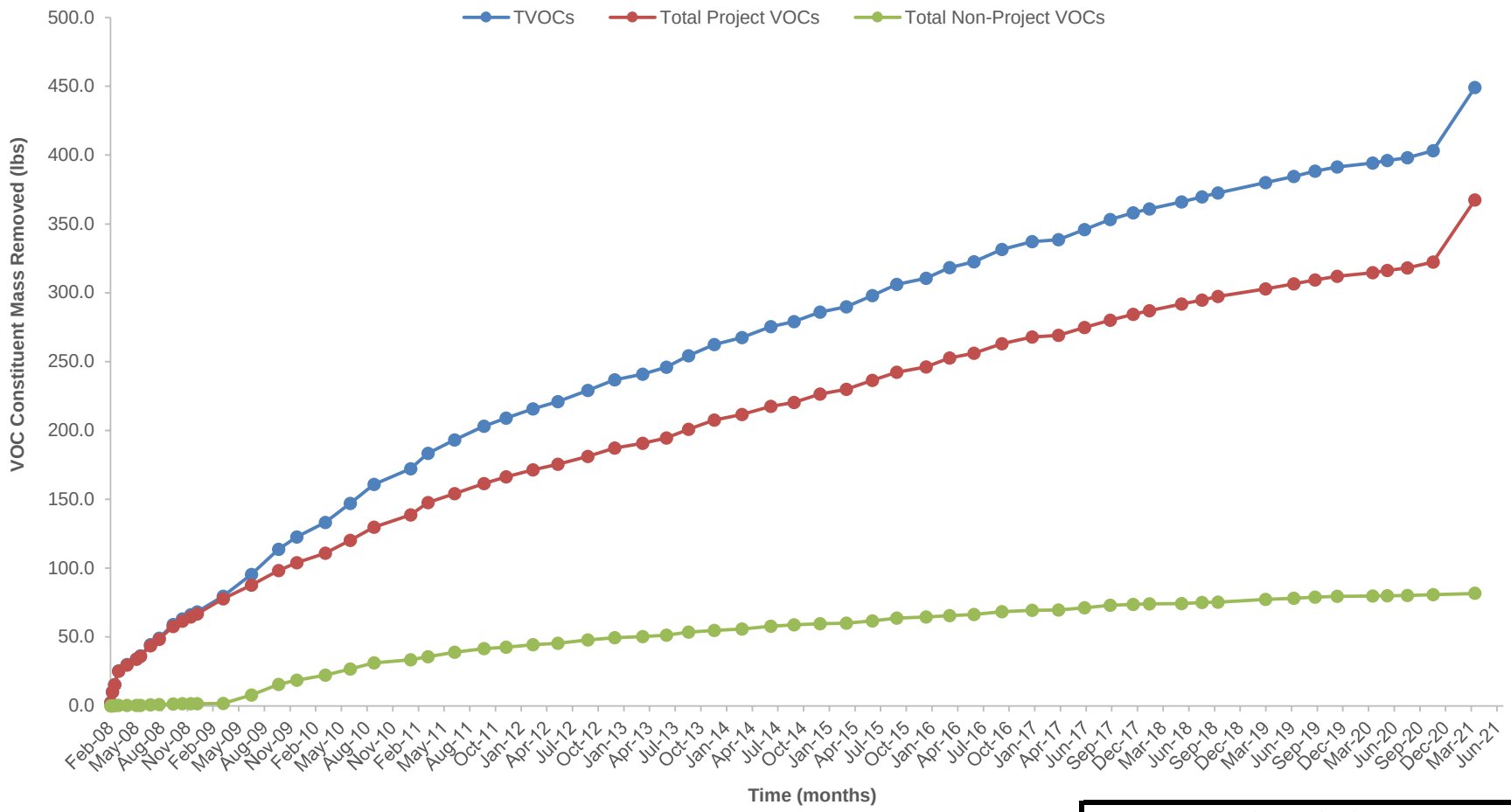
µg/m^3 = micrograms per cubic meter

NORTHROP GRUMMAN
BETHPAGE PARK SOIL GAS CONTAINMENT SYSTEM
BETHPAGE, NEW YORK, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)

SOIL GAS VOC CONCENTRATIONS

ARCADIS

FIGURE
4



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Total Non-Project VOCs = Sum of VOCs that are not Project VOCs.

1. The sample results from December 3, 2010 are not consistent with historical data and the results are excluded from this figure.

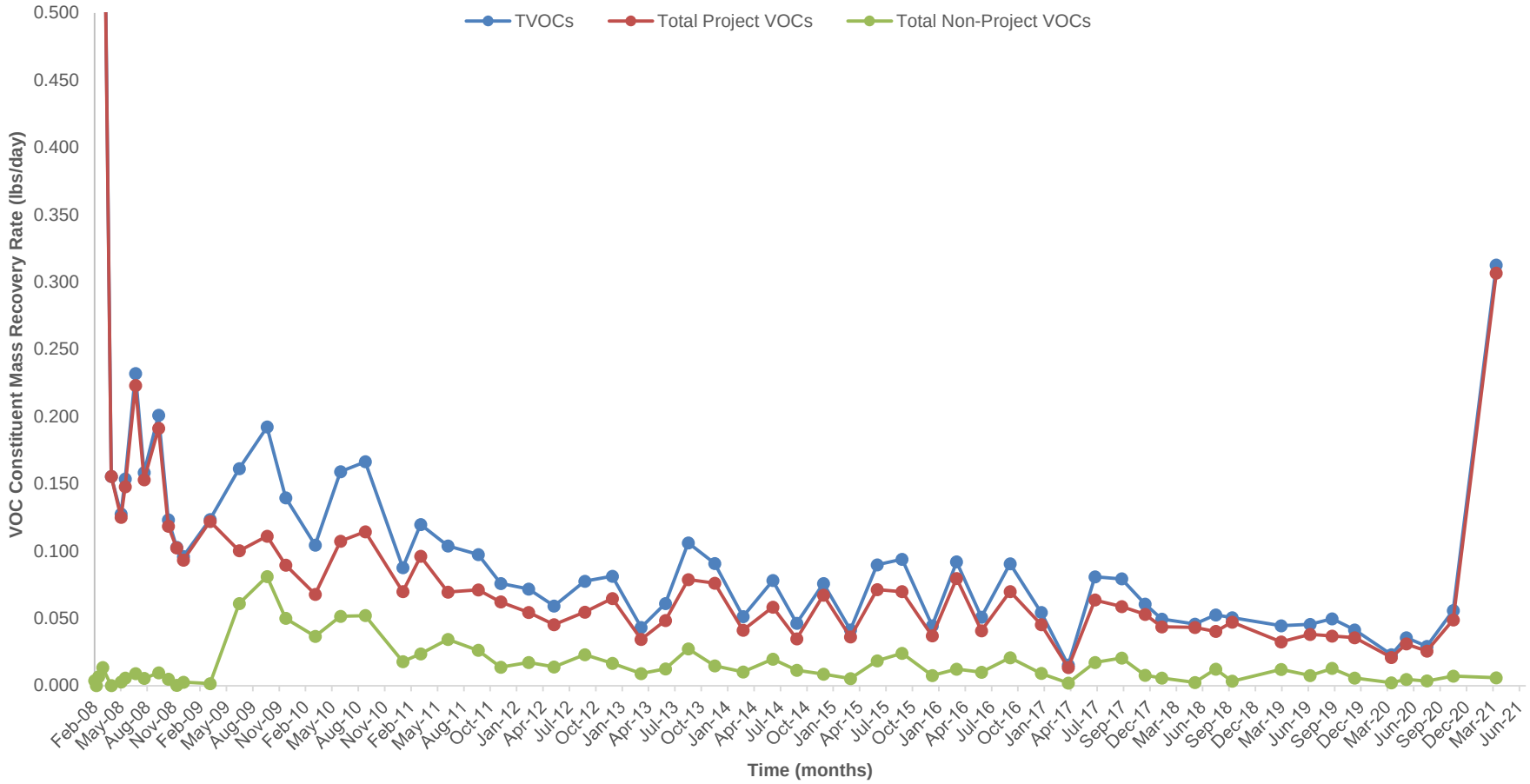
lbs = pounds

NORTHROP GRUMMAN
BETHPAGE PARK SOIL GAS CONTAINMENT SYSTEM
BETHPAGE, NEW YORK, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)

CUMULATIVE TOTAL, PROJECT, AND NON-PROJECT VOC MASS REMOVED

ARCADIS

FIGURE
5



Abbreviations, Notes, and Units:

VOCs = Volatile Organic Compounds
TVOCs = Total VOCs detected

Total Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.
Total Non-Project VOCs = Sum of VOCs that are not Project VOCs.

1. Results prior to April 16, 2008 are not shown to improve figure clarity. The TVOC and Total Project VOC concentrations are greater than 0.3 lbs/day. See previous reports for full data set.
2. The sample results from December 3, 2010 are not consistent with historical data and the results are excluded from this figure. The TVOC concentration for December 3, 2010 was 13 µg/L.

lbs/day = pounds per day

NORTHROP GRUMMAN
BETHPAGE PARK SOIL GAS CONTAINMENT SYSTEM
BETHPAGE, NEW YORK, OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)

VOC MASS RECOVERY RATES

ARCADIS

FIGURE
6