

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
Tel 631 249 7600
Fax 631 249 7610
www.arcadis.com

Subject:
Results of Second Quarter 2020 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

Date:
August 26, 2020

Dear Jason:

Contact:
Christopher Engler

Enclosed is one electronic PDF copy of the 2020 Second 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.

Phone:
315.409.6579

Email:
christopher.engler@arcadis.com

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

Our ref:
30037970

Sincerely,

Arcadis of New York, Inc.



Christopher Engler PE

Vice President

Enclosure

Jason Pelton
August 26, 2020

Copies:

Ed Hannon, Northrop Grumman
Donald Hesler, NYSDEC
Jim Sullivan, NYS Dept. of Health
John Lovejoy, Nassau County Dept. of Health
Carlo San Giovanni, Arcadis
Nidal Azzam, USEPA
Carol Stein, USEPA
Public Repository
File

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

Date	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
	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc
9/10/19	98	-17	-1.78	7.0	-7.0	-0.52	6.0	-7.5	-0.25	11.5	-9.5	-0.46	70	-11.5	-0.82	13	-7.0	-1.68	67	-13	-1.39	6.2	-5.2	-1.38
11/26/19	85	-22	-1.61	5.0	-14.0	-0.48	6.0	-5.0	-0.27	11.0	-10.0	-0.47	70	-12.5	-0.99	15	-9.0	-2.20	87	-19	-1.73	6.9	-5.0	-1.44
3/30/20	85	-17	-1.50	6.0	-20.0	-0.60	5.0	-7.0	-0.30	12.0	-8.0	-0.50	80	-13.0	-1.00	13	-7.0	-2.10	86	-15	-1.80	6.9	-5.5	-1.50
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

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 Systems Corporation,
Bethpage, New York

Date	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
	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc	scfm	iwc	iwc
9/10/19	74	-19	-1.67	5.1	-3.0	-1.33	78	-16.0	-1.64	7.5	-5.5	-0.73	55	-15.0	-1.68	38	-13	-1.60	48	-32	-2.54	38	-23	-2.47
11/26/19	90	-21	-2.07	5.1	-3.0	-1.80	82	-16.5	-1.77	7.0	-6.0	-0.76	68	-21.0	-2.25	37	-10	-1.63	29	-21	-1.60	39	-24	-2.63
3/30/20	65	-17	-1.50	5.5	-5.0	-1.70	75	-15.0	-2.00	7.0	-5.5	-1.30	73	-20.0	-2.20	33	-12	-1.50	46	-34	-2.50	38	-22	-2.40
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

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 Systems Corporation,
Bethpage, New York

Date	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.
	scfm	iwc	iwc	scfm	iwc	iwc	iwc	iwc	iwc	Gallons	iwc	iwc	Hz	iwc	iwc	Hz	iwc	iwc	Hz	scfm	ppmv	°F	iwc	°F
9/10/2019 ⁽³⁾	34	-14	-1.90	30	-26	-2.80	-41.5	NA	NA	0	-44.0	NM ⁽⁴⁾	59	NA	NA	NA	-5	14	60	1516	0.1	125	13.0	111
11/26/19	35	-18	-1.92	25 ⁽⁵⁾	-35	-0.45	-43	NA	NA	140	-46.4	-14.1	59	NA	NA	NA	-5	12	60	1920	0.0	117	12.0	106
3/30/20	33	-16	-1.93	32	-22	-2.40	-42	NA	NA	415	-42.5 ⁽⁶⁾	-5.0 ⁽⁶⁾	59	NA	NA	NA	-4	11	60	1587	0.0	100	12.0	92
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 ⁽⁷⁾	0.0	110	13.0	100

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 Systems Corporation,
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. On 08/14/19, the system began operating with two active blowers to increase system effluent flow rate.
4. Pressure not measured due to broken BL-200 effluent pressure gauge.
5. Reading estimated due to gauge variability.
6. Measurement taken on 4/17/2020 due to broken vacuum gauge, reading measured with manometer. For consistency effluent pressure was measured on 4/17/2020.
7. Reading estimated due to measuring equipment failure. There were no reported changes in the system operation during the 2nd quarter, 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 Systems Corporation,
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-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
09/10/19	-0.11	-0.19	-0.20	-0.10	-0.10	-0.12	-0.12	-0.13	-0.11	-0.13	-0.14	-0.13	-0.22	-1.78	-0.14	-0.14	-0.14	-0.17	-0.22	-0.10	-0.13
11/26/19 ⁽³⁾	-0.95	-0.19	-0.19	-0.12	-0.11	-0.12	-0.10	-0.07	-0.14	-0.14	-0.15	-1.41	-0.25	-0.20	-0.22	-0.10	-0.40	-0.25	-0.26	-0.03	-0.03
03/30/20	-0.11	-0.17	-0.19	-0.12	-0.14	-0.12	-0.12	NM ⁽⁴⁾	-0.15	-0.13	-0.43	-0.22	-0.13	-0.21	-0.35	-0.14	-0.15	-0.10	-0.14	-0.13	-0.14
05/20/20	-0.08	-0.16	-0.16	-0.15	-0.14	-0.13	-0.12	NM ⁽⁴⁾	-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
Time Weighted Rolling Average⁽¹⁾	-0.30	-0.18	-0.19	-0.12	-0.12	-0.12	-0.12	-0.10	-0.14	-0.13	-0.25	-0.50	-0.19	-0.55	-0.23	-0.17	-0.25	-0.17	-0.20	-0.09⁽⁵⁾	-0.11

Gross Average Compliance Points^(1,2)	
05/20/20	-0.19

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. Monitoring point vacuum was collected before condensate removal and system rebalancing.
4. Reading not measured due to well abandonment, replacement well VMWC-15E installed on 7/21/20.
5. VMWC-18A Time Weighted Average not representative of normal system operation due to Fourth Quarter 2019 vacuum reading taken before condensate removal and system rebalancing.

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

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

Compound (units in µg/m ³)	Sample ID ¹ : Sample Date:	VSP-601 9/10/2019	VSP-601 11/26/2019	VSP-601 3/30/2020	VSP-601 5/20/2020
Project VOCs					
	CAS No.				
1,1,1-Trichloroethane	71-55-6	4.8	3.9	2.2	3.0
1,1-Dichloroethane	75-34-3	3.6	3.7	2.1	2.5
1,1-Dichloroethene	75-35-4	< 0.16	< 0.16	0.33	< 0.16
1,2-Dichloroethane	107-06-2	< 0.81	< 0.81	< 0.65	< 0.81
Benzene	71-43-2	< 0.64	0.7	< 0.51	5.1
cis-1,2-Dichloroethene	156-59-2	79.7	67.8	68.2	97.5
Tetrachloroethene	127-18-4	6.2	3.8	2.3	2.4
Toluene	108-88-3	1.8	< 0.75	0.34 J	< 0.75
trans-1,2-Dichloroethene	156-60-5	1.2	1.1	0.52 J	0.63 J
Trichloroethylene	79-01-6	173	126	70.9	94.6
Vinyl chloride	75-01-4	< 0.10	< 0.10	< 0.082	< 0.10
Xylenes - O	95-47-6	< 0.87	< 0.87	< 0.69	< 0.87
Xylenes - M,P	1330-20-7	0.52 J	< 0.87	< 0.69	< 0.87
Subtotal Project VOCs		271	207	147	206
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	< 0.35	< 0.44
1-Chloro-1,1-difluoroethane (Freon 142B)	75-68-3	58.8	19	< 0.66	< 0.82
2-Butanone	78-93-3	1.4	< 0.59	< 0.47	1.8
2-Hexanone	591-78-6	< 0.82	< 0.82	< 0.65	< 0.82
4-Methyl-2-Pentanone	108-10-1	0.70 J	< 0.82	< 0.66	< 0.82
Acetone	67-64-1	26.8	4.5	< 0.38	14
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	0.75	< 0.25	0.42	0.53
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	< 0.70	0.88	< 0.56	0.67 J
Chloroform	67-66-3	4.9	7.8	9.8	11
Chloromethane	74-87-3	< 0.41	< 0.41	0.76	< 0.41
cis-1,3-Dichloropropene	10061-01-5	< 0.91	< 0.91	< 0.73	< 0.91
Dichlorodifluoromethane (Freon 12)	75-71-8	< 0.99	< 0.99	< 0.79	1.8
Ethylbenzene	100-41-4	< 0.87	< 0.87	< 0.69	< 0.87
Methylene Chloride	75-09-2	1.0	< 0.69	3.8	< 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	< 0.85
trans-1,3-Dichloropropene	10061-02-6	< 0.91	< 0.91	< 0.73	< 0.91
Trichlorofluoromethane (Freon 11)	75-69-4	< 0.56	1.1	< 0.45	1.0
Trichlorotrifluoroethane (Freon 113)	76-13-1	< 1.5	< 0.77	< 0.61	< 0.77
Subtotal Non-Project VOCs		94	33	15	31
TVOC²		365	240	162	237

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 Systems Corporation,
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.

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

0.42 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
 $\mu\text{g}/\text{m}^3$ 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)
Bethpage, New York

Sample ID: Sample Date ¹ : Units:	VSP - 601 9/10/2019 ppbv	VSP - 601 11/26/2019 ppbv	VSP - 601 3/30/2020 ppbv	VSP - 601 5/20/2020 ppbv
Tentatively Identified Compounds ²				
Carbon Dioxide	87 JB	12 JNB	18 JNB	130 JB
Alkane	ND	5.4 J	ND	ND
Acetone	ND	ND	2.1 JN	ND
Ethanol	ND	ND	0.81 JN	ND
Ethane, 1-Chloro-1, 1-Difluoro-	ND	ND	ND	11 J

Notes, Abbreviations, Qualifiers, and Units:

- 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.
- 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 Apprc
 NYSDOH New York State Department of E
 USEPA U.S. Environmental Protection A
 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 Systems Corporation,
Bethpage, New York

Toxic Air Contaminant ⁽⁴⁾	CAS#	VSP-601 Vapor Effluent (µg/m ³) 5/20/2020	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	3.0	1.6E-01	1.9E-05	2.4E-06	1.1E-03	4.7E-05	9,000	5,000	0.0%	0.0%
1,1 - Dichloroethane	75-34-3	2.5	1.4E-01	1.6E-05	2.0E-06	9.1E-04	3.9E-05	NS	0.63	NS	0.0%
Benzene	71-43-2	5.1	2.8E-01	3.2E-05	4.0E-06	1.9E-03	8.1E-05	1,300	0.13	0.0%	0.1%
cis- 1,2-Dichloroethene	156-59-2	97.5	5.3E+00	6.1E-04	7.7E-05	3.6E-02	1.5E-03	NS	63	NS	0.0%
Tetrachloroethene	127-18-4	2.4	1.3E-01	1.5E-05	1.9E-06	8.8E-04	3.8E-05	300	4	0.0%	0.0%
trans- 1,2-Dichloroethene	156-60-5	0.63	3.5E-02	3.9E-06	5.0E-07	2.3E-04	9.9E-06	NS	63	NS	0.0%
Trichloroethene	79-01-6	94.6	5.2E+00	5.9E-04	7.5E-05	3.5E-02	1.5E-03	20	0.2	0.2%	0.7%
Non-Project VOCs											
2-Butanone	78-93-3	1.8	9.9E-02	1.1E-05	1.4E-06	6.6E-04	2.8E-05	13,000	5,000	0.0%	0.0%
Acetone	67-64-1	14.0	7.7E-01	8.8E-05	1.1E-05	5.1E-03	2.2E-04	180,000	30,000	0.0%	0.0%
Carbon Tetrachloride	56-23-5	0.53	2.9E-02	3.3E-06	4.2E-07	1.9E-04	8.4E-06	1,900	0.17	0.0%	0.0%
Chlorodifluoromethane (Freon 22)	75-45-6	0.67	3.7E-02	4.2E-06	5.3E-07	2.4E-04	1.1E-05	--	50,000	--	0.0%
Chloroform	67-66-3	11	6.0E-01	6.9E-05	8.7E-06	4.0E-03	1.7E-04	150	15	0.0%	0.0%
Dichlorodifluoromethane (Freon 12)	75-71-8	1.8	9.9E-02	1.1E-05	1.4E-06	6.6E-04	2.8E-05	NS	12,000	NS	0.0%
Trichlorofluoromethane (Freon 11)	75-69-4	1.0	5.5E-02	6.3E-06	7.9E-07	3.6E-04	1.6E-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 Systems Corporation,
Bethpage, New York

Notes, Abbreviations, and Units:

1. Emission rate calculated based on VSP-601 effluent concentration and an exit air flow rate of 1674 ft³/min for 5/20/20. Air flowrate estimated due to measuring equipment failure. There were no reported changes in the system operation during the 2nd quarter, and therefore an average of the past three quarters is used as representative.

$$\text{TCE (lb/hr)} = \text{TCE } [\mu\text{g}/\text{m}^3] \times \text{Air Flow Rate } [\text{ft}^3/\text{min}] \times (1 \text{ m}^3/35.3147 \text{ ft}^3) \times (60 \text{ min/hr}) \times (0.000001 \text{ g/1 } \mu\text{g}) \times (0.0022 \text{ lb/g})$$

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

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

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 2011 through 2015. The maximum impact from all the years was used for the calculations.

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

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

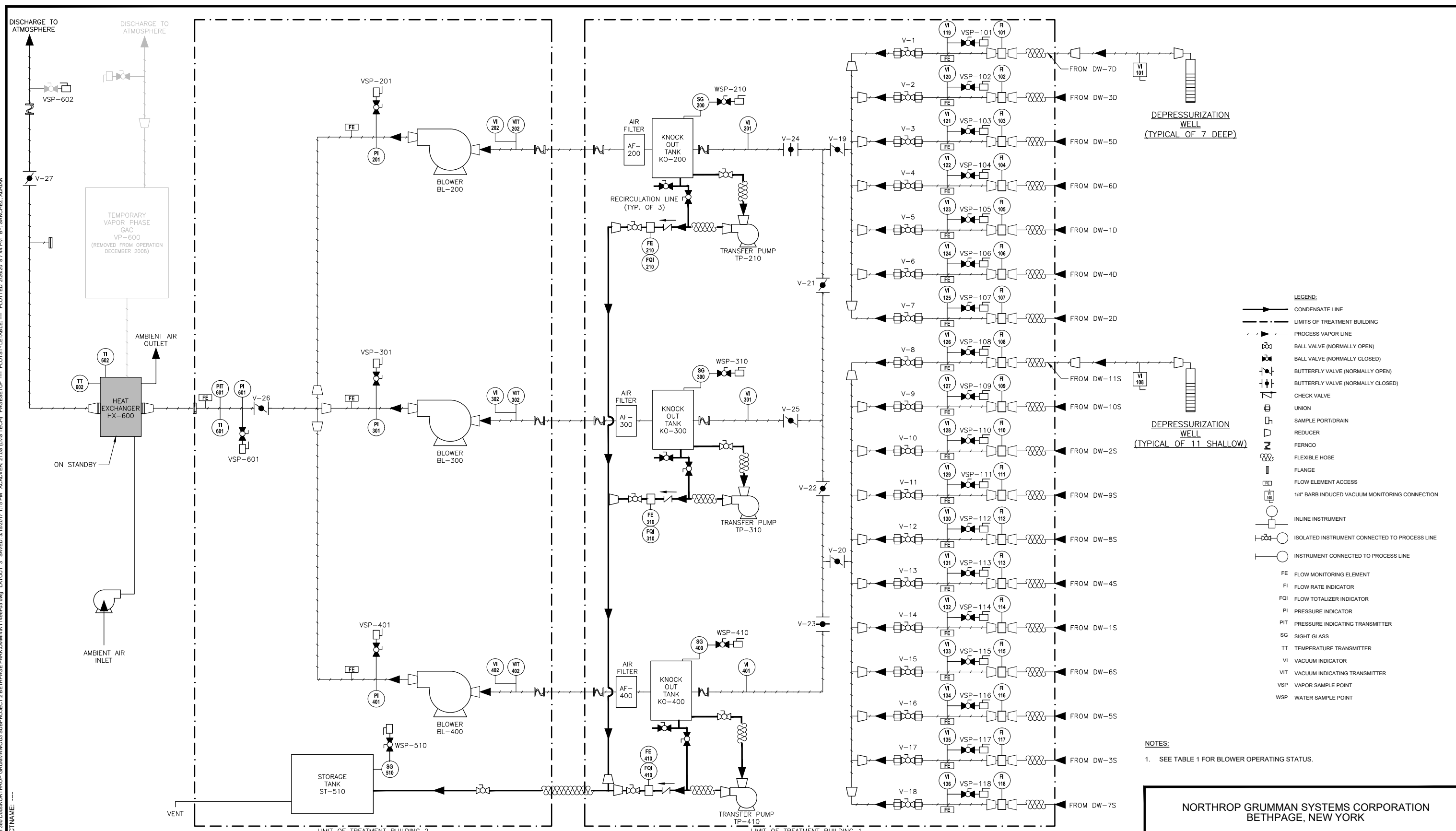
AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([\mu\text{g}/\text{m}^3]/[\text{g/s}])	Annual ([\mu\text{g}/\text{m}^3]/[\text{g/s}])
462.83	20.02

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

CITY: SYRACUSE, NY; DIVISION: ENVIRONMENTAL SERVICES; PROJECT: NORTHROP GRUMMAN BETHPAGE; DRAWING: PROCESS FLOW DIAGRAM; DATE: 11/15/2017; 1:15 PM; ACADVER: 2.105 (LMS TECH); PAGES: 3; PLOTTED: 2/28/2018 7:44 PM; BY: SANCHEZ, ADRIAN; XREFS: IMAGES: PROJECTNAME:



- 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
 - ◻ FLOW ELEMENT ACCESS
 - ◻ 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

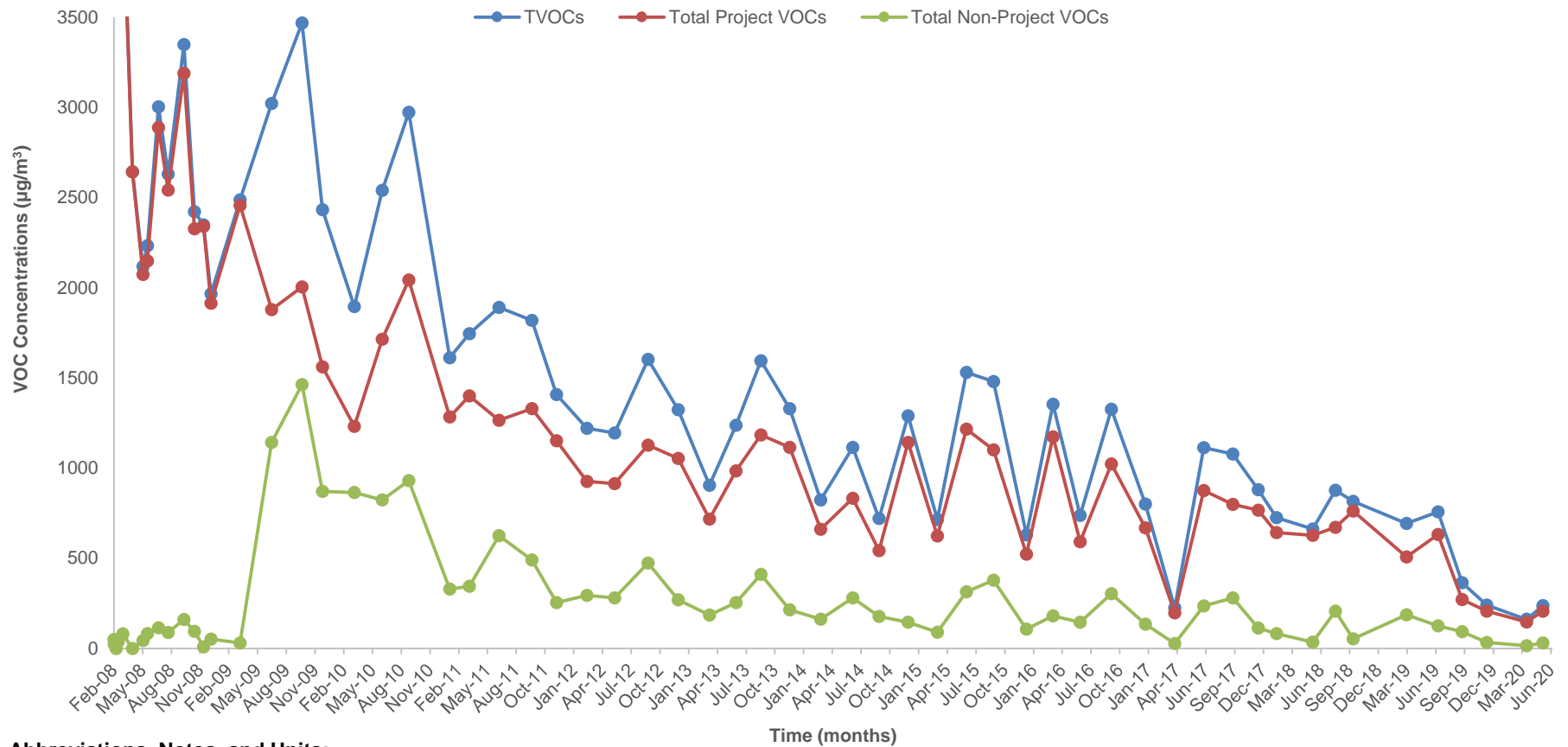
NOTES:
 1. SEE TABLE 1 FOR BLOWER OPERATING STATUS.

NORTHROP GRUMMAN SYSTEMS CORPORATION
 BETHPAGE, NEW YORK

PROCESS FLOW DIAGRAM

Design & Consultancy
 for natural and built assets

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/m³. 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/m³.

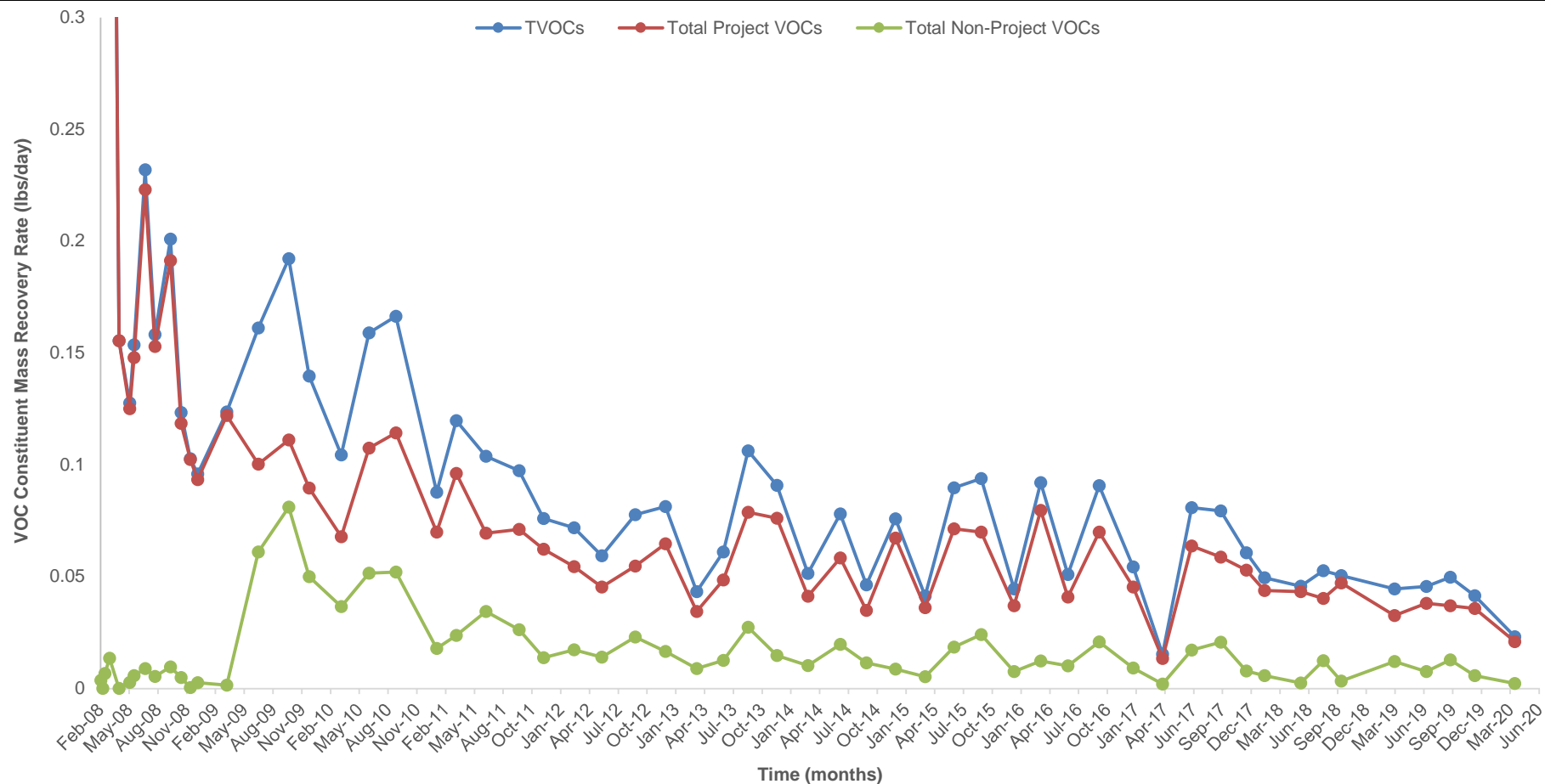
µg/m³ = micrograms per cubic meter

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

SOIL GAS VOC CONCENTRATIONS

 Design & Consultancy for natural and built assets	FIGURE 4
--	--





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

VOC MASS RECOVERY RATES



FIGURE

6