ARCADIS Design & Consultancy for natural and built assets

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ENVIRONMENT

Subject:
Results of First Quarter 2017 System Operation and Monitoring, Bethpage Park Groundwater Containment System (BPGWCS), Operable Unit 3 (OU3; Former Grumman Settling Ponds), Bethpage, New York, NYSDEC Site #1-30-003A

Date:
May 31, 2017

Contact:
David E. Stern

Phone:
631.391.5284

Email:
David E. Stern@arcadis.com

Our ref:
NY001496.1416

Dear Jason:

Enclosed is one electronic PDF copy of the first quarter results of the OU3 BPGWCS operation and monitoring, performed in accordance with the NYSDEC-approved OU3 Groundwater IRM OM&M Manual (Arcadis 2009) and the NYSDEC-approved Sampling and Analysis Plan (SAP; Arcadis 2009). As we have transitioned to electronic submittals (via PDF) as part of ongoing sustainability and cost savings efforts, hard copies of the report can be provided on request.

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ED_002631A_00011448-00001

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

Sincerely,

Arcadis of New York, Inc.

David E. Stern

Senior Hydrogeologist

Enclosure

Copies:
Donald Hesler, NYSDEC
Steven Karpinski, NYS Department of Health
Joseph DeFranco, Nassau County Department of Health
Lorenzo Thantu, USEPA Region 2
Ed Hannon, Northrop Grumman Corporation
Carlo San Giovanni, Arcadis
Christopher Engler, Arcadis
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TABLES

Table 1
Operational Summary, Bethpage Park
Groundwater Containment System, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York

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MONTH	DAY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Days Operational (1)
2009 Total																																160
2010 Total																																352
2011 Total																																351
2012 Total																																353
2013 Total																																354
2014 Total																																349
2015 Total																																348
2016 Total																																351
Jan-17																																31
Feb-17																																26
Mar-17																																31
1Q 2017																																88
2017 Total																																88
TOTAL																																**2,706**

Legend:

- Indicates system online for at least the majority of the day.
- Indicates system operated with reduced flow rates.
- Indicates system off-line for at least the majority of the day.
- K Indicates PPZ change-out.
- C Indicates carbon change-out.

Acronyms\Key:

1Q	first quarter
ECU	emission control unit
VPGAC	vapor phase granular activated carbon
PPZ	potassium permanganate-impregnated zeolite
RW	recovery well

Notes:

(1) Days in which the system was operational for the majority of the day are counted as one day.

First Quarter 2017

(2) RW-2 was offline for approximately 28 days for scheduled redevelopment.
(3) The system was offline for approximately 28 hours due to an air stripper low flow alarm.
(4) RW-2 was offline for approximately 6 days for scheduled motor replacement.

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Table 2
Summary of Influent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound	06/10/16 (µg/L)	08/23/16 (µg/L)	12/16/16 (µg/L)	03/17/17 (µg/L)
Project VOCs				
1,1,1 - Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1 - Dichloroethane	**0.39 J**	< 1.0	**0.31 J**	**0.29 J**
1,2 - Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1 - Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	**0.30 J**	**0.25 J**	< 1.0	< 1.0
Trichloroethene	**4.0**	**3.3**	**3.9**	**4.1**
Vinyl Chloride	**16**	**11**	**13**	**5.9**
cis 1,2-Dichloroethene	**12**	**8.0**	**7.7**	**8.2**
trans 1,2-Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	**6.1**	**4.5**	**2.5**	**0.63 J**
Xylene-O	**0.31 J**	**0.22 J**	< 1.0	< 1.0
Xylenes - M,P	**0.54 J**	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs	**40**	**27**	**27**	**19**

Compound	06/10/16 (µg/L)	08/23/16 (µg/L)	12/16/16 (µg/L)	03/17/17 (µg/L)
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	< 10	< 10	< 10	< 10
Bromodichloromethane	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifluoromethane (Freon 22)	**4.2 J**	**3.0 J**	**2.1 J**	**2.0 J**
Chloroethane	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	**1.8**	**1.5**	**1.3**	**1.0**
Chloromethane	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane (Freon 12)	< 2.0	< 2.0	< 2.0	< 2.0
Dichloromethane	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	**0.62 J**	**0.38 J**	**0.31 J**	**0.22 J**
Methyl N-Butyl Ketone	< 5.0	< 5.0	< 5.0	< 5.0
Methyl Tert-Butyl Ether	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane (Freon 11)	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorotrifluoroethane (Freon 113)	< 5.0	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs	**6.6**	**4.9**	**3.7**	**3.2**
Total VOCs[1]	**46**	**32**	**31**	**22**
1,4-Dioxane[2]	**0.47**	**0.28**	**0.97**	**0.93**

Notes and abbreviations on last page.

Table 2
Summary of Influent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound	06/10/16 (µg/L)	08/23/16 (µg/L)	12/16/16 (µg/L)	03/17/17 (µg/L)
Inorganics				
Dissolved Cadmium	--	--	< 3.0	--
Total Cadmium	--	--	< 3.0	--
Dissolved Chromium	--	--	**11**	--
Total Chromium	--	--	**20**	--
Dissolved Iron	**220**	**169**	**240**	**146**
Total Iron	**328**	**2,640**	**3,140**	**233**
Total Mercury	--	--	--	--
pH[3]	**5.8**	**5.6**	**5.7**	**5.5**

Notes and Abbreviations:

(1) "Total VOCs" represents the sum of individual concentrations of the compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

(2) Samples collected during Second and Third Quarters 2016 were analyzed for 1,4-Dioxane using USEPA Method 8270D SIM. Samples collected during Fourth Quarter 2016 and First Quarter 2017 were analyzed for 1,4-Dioxane using USEPA Method 522.

(3) Influent pH samples collected and measured in the field by Arcadis personnel on the dates listed using an Oakton Model 300 pH/conductivity meter. pH units are standard units.

700 Bold value indicates a detection.
-- not analyzed
J Compound detected below its reporting limit; value is estimated.
SIM selected ion monitoring
USEPA United States Environmental Protection Agency
VOC volatile organic compound
µg/L micrograms per liter
< 5 Compound not detected above its laboratory quantification limit.

Table 3
Summary of Effluent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound	Discharge Limit[1] (µg/L)	04/18/15 (µg/L)	05/18/15 (µg/L)	06/10/15 (µg/L)	07/14/15 (µg/L)	08/23/15 (µg/L)	09/14/15 (µg/L)	10/11/15 (µg/L)	11/20/15 (µg/L)	12/18/15 (µg/L)	01/20/17 (µg/L)	02/22/17 (µg/L)	03/17/17 (µg/L)
Project VOCs													
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.30 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans 1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-O	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes - M,P	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs	--	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.30**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Notes and abbreviations on last page.

Table 3
Summary of Effluent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound	Discharge Limit[1] (µg/L)	04/18/15 (µg/L)	05/18/15 (µg/L)	06/10/15 (µg/L)	07/14/15 (µg/L)	08/23/15 (µg/L)	09/14/15 (µg/L)	10/11/15 (µg/L)	11/20/15 (µg/L)	12/18/15 (µg/L)	01/20/17 (µg/L)	02/22/17 (µg/L)	03/17/17 (µg/L)
Non-Project VOCs													
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10 J	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifluoromethane (Freon 22)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methyl Tert-Butyl Ether	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane (Freon 11)	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorotrifluoroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs	--	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**	**0**
Total VOCs[2]	--	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.30**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Treatment Efficiency[3]	--	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	99.1%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%

Notes and abbreviations on last page.

Table 3
Summary of Effluent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound	Discharge Limit[1] (µg/L)	04/18/16 (µg/L)	05/18/16 (µg/L)	06/10/16 (µg/L)	07/14/16 (µg/L)	08/23/16 (µg/L)	09/14/16 (µg/L)	10/11/16 (µg/L)	11/29/16 (µg/L)	12/16/16 (µg/L)	01/20/17 (µg/L)	02/22/17 (µg/L)	03/17/17 (µg/L)
Inorganics													
Dissolved Cadmium	5	--	--	< 3.0	--	< 3.0	--	--	--	< 3.0	--	--	< 3.0
Total Cadmium	5	--	--	< 3.0	--	< 3.0	--	--	--	< 3.0	--	--	< 3.0
Dissolved Chromium	50	--	--	< 10	--	< 10	--	--	--	< 10	--	--	< 10
Total Chromium	50	--	--	< 10	--	< 10	--	--	--	< 10	--	--	< 10
Dissolved Iron	600	**195**	**202**	**205**	**199**	**162**	**270**	**201**	**262**	**224**	**223**	**1580**[7]	**155**
Total Iron	600	**228**	**229**	**266**	**241**	**208**	**304**	**205**	**280**	**622**[7]	**265**	**4590**[7]	**245**
Total Mercury	250	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.30	< 0.20
1,4-Dioxane[6]	--	**0.61**	< 0.11	**0.53**	**0.41**	**0.40**	**0.60**	**1.32**	**1.25**	**1.0**	**0.9**	**1.5**	**1.0**
pH[4]	5.5 - 8.5	**6.8**	**6.7**	**6.9**	--[5]	**6.4**	**6.6**	**6.7**	--[5]	**6.8**	**4.2**[8]	--[5]	**6.5**

Notes and Abbreviations:

(1) Discharge limits per the interim SPDES equivalency program or Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Quality Standards and Guidance Values and Groundwater Effluent Limitations, if the compound is not part of the interim SPDES equivalency program.

(2) "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

(3) Treatment efficiency was calculated by dividing the difference between the influent and effluent total VOC concentrations by the influent total VOC concentration.

(4) Effluent pH samples collected and measured in the field by Arcadis personnel on the dates listed using an Oakton Model 300 pH/conductivity meter. pH units are standard units.

(5) pHs not recorded due to technician error.

(6) Samples collected during Second and Third Quarters 2016 were analyzed for 1,4-Dioxane using USEPA Method 8270D SIM. Samples collected during Fourth Quarter 2016 and First Quarter 2017 were analyzed for 1,4-Dioxane using USEPA Method 522.

(7) The December 16, 2016 and February 22, 2017 iron concentrations exceeded their discharge limit of 600 µg/l. The exceedances are suspected to be the result of iron precipitates in the effluent sample line, and it was cleaned prior to the next sampling event.

(8) The anomalous pH value in January 2017 is suspected to be the result of an equipment calibration issue. The pH returned to typical values in subsequent sampling events.

700 Bold value indicates a detection.
J Compound detected below its reporting limit; value is estimated.
SIM selected ion monitoring
SPDES State Pollutant Discharge Elimination System
USEPA United States Environmental Protection Agency
VOC volatile organic compound
µg/L micrograms per liter
-- not analyzed
< 5 Compound not detected above its laboratory quantification limit.

Table 4
Influent Vapor Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound[1]	06/10/16 (µg/m³)	09/23/16 (µg/m³)	12/22/16 (µg/m³)	03/17/17 (µg/m³)
Project VOCs				
1,1,1 - Trichloroethane	**0.71**	**0.60**	< 1.1	< 0.55
1,1 - Dichloroethane	**4.9**	**4.5**	**4.5**	**3.5**
1,2 - Dichloroethane	**0.45 J**	< 0.81	< 1.6	< 0.81
1,1 - Dichloroethene	**1.5**	**1.5**	**1.9**	**1.8**
Tetrachloroethene	**3.5**	**3.1**	**142**	**0.50**
Trichloroethene	**53**	**47**	**58**	**11**
Vinyl Chloride	**184**	**180**	**143**	**95**
cis 1,2-Dichloroethene	**165**	**155**	**119**	**77**
trans 1,2-Dichloroethene	**0.44 J**	**0.35 J**	< 1.6	**0.27 J**
Benzene	**1.5**	**0.70**	**1.5**	< 0.64
Toluene	**90**	**77**	**37**	< 0.75
Xylene-O	**4.3**	**3.6**	**2.3**	< 0.87
Xylenes - M,P	**7.8**	**6.1**	**5.6**	< 0.87
Subtotal Project VOCs	**517**	**479**	**515**	**190**

Compound[1]	06/10/16 (µg/m³)	09/23/16 (µg/m³)	12/22/16 (µg/m³)	03/17/17 (µg/m³)
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 0.69	< 0.69	< 1.4	< 0.69
1,1,2-Trichloroethane	< 0.55	< 0.55	< 1.1	< 0.55
1,2-Dichloropropane	**0.60 J**	< 0.92	< 1.8	< 0.92
1,3-Butadiene	<0.44	< 0.44	< 0.88	< 0.44
2-Butanone	**0.88**	**1.1**	**3.2**	**0.94**
4-Methyl-2-Pentanone	< 0.82	< 0.82	< 1.6	< 0.82
Acetone	< 0.48	**7.1**	**19**	**15**
Bromodichloromethane	< 0.67	< 0.67	< 1.3	< 0.67
Bromoform	< 0.41	< 0.41	< 0.83	< 0.41
Bromomethane	< 0.78	< 0.78	< 1.6	< 0.78
Carbon Disulfide	< 0.62	< 0.62	**11**	< 0.62
Carbon Tetrachloride	< 0.25	< 0.25	< 0.50	< 0.25
Chlorobenzene	< 0.92	< 0.92	< 1.8	< 0.92
Chlorodibromomethane	< 0.85	< 0.85	< 1.7	< 0.85
Chlorodifluoromethane (Freon 22)	**28**	**35**	**26**	**22**
Chloroethane	< 0.53	< 0.53	< 1.1	< 0.53
Chloroform	**22**	**21**	**19**	**13**
Chloromethane	**1.2**	**1.3**	**1.4**	**1.2**
cis-1,3-Dichloropropene	< 0.91	< 0.91	< 1.8	< 0.91
Dichlorodifluoromethane (Freon 12)	**2.3**	**2.7**	**2.1**	**1.9**
Dichloromethane	**2.5**	**3.4**	**1.8**	**1.4**
Ethylbenzene	**9.6**	**6.1**	**5.2**	< 0.87
Methyl N-Butyl Ketone	< 0.82	< 0.82	< 1.6	< 0.82
Methyl Tert-Butyl Ether	< 0.72	**0.65 J**	< 1.4	< 0.72
Styrene (Monomer)	< 0.85	< 0.85	< 1.7	< 0.85
trans-1,3-Dichloropropene	< 0.91	< 0.91	< 1.8	< 0.91
Trichlorofluoromethane (Freon 11)	**1.6**	**2.1**	**1.5**	**1.3**
Trichlorotrifluoroethane (Freon 113)	**2.2**	**2.1**	**2.1**	**1.7**
1-Chloro-1,1-difluoroethane (Freon 142b)	< 0.82	< 0.82	< 1.6	< 0.82
Subtotal Non-Project VOCs	**71**	**83**	**92**	**58**
Total VOCs[2]	**588**	**562**	**607**	**248**

Notes and abbreviations on last page.

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). Influent samples were collected at Vapor Sampling Port-1 (VSP-1); refer to Figure 3 of this OM&M Report for the location of VSP-1.

(2) "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

700	Bold value indicates a detection.
ELAP	Environmental Laboratory Approval Program
IRM	interim remedial measure
J	Compound detected below its reporting limit; value is estimated.
ND	Analyte not detected at or above its laboratory reporting limit.
NYSDOH	New York State Department of Health
OM&M	operation, maintenance, and monitoring
SPDES	State Pollutant Discharge Elimination System
TIC	tentatively identified compound
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
$\mu g/m^3$	micrograms per cubic meter
< 5	Compound not detected above its laboratory quantification limit.

Table 5
Summary of Effluent Vapor Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound[1]	06/10/16 (µg/m³)	09/23/16 (µg/m³)	12/22/16 (µg/m³)	03/17/17 (µg/m³)
Project VOCs				
1,1,1 - Trichloroethane	< 0.55	< 0.55	< 0.55	< 1.1
1,1 - Dichloroethane	**4.0**	**6.1**	**4.5**	**11**
1,2 - Dichloroethane	< 0.81	< 0.81	< 0.81	< 1.6
1,1 - Dichloroethene	**0.48 J**	**0.63 J**	**0.83**	**2.4**
Tetrachloroethene	**2.0**	**0.29**	**0.64**	**25**
Trichloroethene	**1.7**	**1.1**	**2.7**	**10**
Vinyl Chloride	**2.8**	**3.6**	**17**	**53**
cis 1,2-Dichloroethene	**7.1**	**11**	**40**	**141**
trans 1,2-Dichloroethene	< 0.79	< 0.79	< 0.79	< 1.6
Benzene	**3.1**	**3.2**	**6.4**	**12**
Toluene	**9.0**	**8.7**	**4.1**	**7.2**
Xylene-O	**0.56 J**	< 0.87	**0.69 J**	**339**
Xylenes - M,P	**1.5**	**0.52 J**	**2.5**	**608**
Subtotal Project VOCs	**32**	**35**	**79**	**1209**

Compound[1]	06/10/16 (µg/m³)	09/23/16 (µg/m³)	12/22/16 (µg/m³)	03/17/17 (µg/m³)
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 0.69	< 0.69	< 0.69	< 1.4
1,1,2-Trichloroethane	< 0.55	< 0.55	< 0.55	< 1.1
1,2-Dichloropropane	< 0.92	< 0.92	< 0.92	< 1.8
1,3-Butadiene	< 0.44	< 0.44	< 0.44	< 0.88
2-Butanone	**6.2**	**2.5**	**8.8**	**27**
4-Methyl-2-Pentanone	< 0.82	< 0.82	< 0.82	< 1.6
Acetone	**107**	**51**	**143**	**190**
Bromodichloromethane	< 0.67	< 0.67	< 0.67	< 1.3
Bromoform	< 0.41	< 0.41	< 0.41	< 0.83
Bromomethane	< 0.78	< 0.78	< 0.78	< 1.6
Carbon Disulfide	< 0.62	< 0.62	**0.75**	< 1.2
Carbon Tetrachloride	< 0.25	< 0.25	< 0.25	< 0.50
Chlorobenzene	< 0.92	< 0.92	< 0.92	< 1.8
Chlorodibromomethane	< 0.85	< 0.85	< 0.85	< 1.7
Chlorodifluoromethane (Freon 22)	**23**	**40**	**21**	**48**
Chloroethane	< 0.53	< 0.53	< 0.53	< 1.1
Chloroform	**32**	**40**	**24**	**58**
Chloromethane	**2.9**	**6.0**	**2.0**	**2.9**
cis-1,3-Dichloropropene	< 0.91	< 0.91	< 0.91	< 1.8
Dichlorodifluoromethane (Freon 12)	**2.6**	**2.6**	**2.1**	**3.7**
Dichloromethane	**9.0**	**0.73**	**10**	**1.9**
Ethylbenzene	**0.56 J**	< 0.87	**0.96**	**5.6**
Methyl N-Butyl Ketone	< 0.82	< 0.82	< 0.82	< 1.6
Methyl Tert-Butyl Ether	< 0.72	< 0.72	< 0.72	< 1.4
Styrene (Monomer)	< 0.85	< 0.85	< 0.85	< 1.7
trans-1,3-Dichloropropene	< 0.91	< 0.91	< 0.91	< 1.8
Trichlorofluoromethane (Freon 11)	**2.9**	**1.7**	**1.7**	**3.0**
Trichlorotrifluoroethane (Freon 113)	< 0.77	**0.74 J**	**1.4**	**4.2**
1-Chloro-1,1-difluoroethane (Freon 142b)	< 0.82	< 0.82	< 0.82	< 1.6
Subtotal Non-Project VOCs	**186**	**146**	**216**	**344**
Total VOCs[2]	**218**	**181**	**295**	**1553**

Notes and abbreviations on last page.

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). Effluent samples were collected at Vapor Sampling Port-5 (VSP-5); refer to Figure 3 of this OM&M Report for the location of VSP-5.

(2) "Total VOCs" represents the sum of individual concentrations of all compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

700	Bold data indicates that the analyte was detected at or above its reporting
ELAP	Environmental Laboratory Approval Program
J	Compound detected below its reporting limit; value is estimated.
NYSDOH	New York State Department of Health
OM&M	operation, maintenance, and monitoring
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
$\mu g/m^3$	micrograms per cubic meter
< 5	Compound not detected above its laboratory quantification limit.

Table 6
Summary of Effluent Vapor Tentatively Identified Compounds
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound[1]	06/10/16 (ppbv)	09/23/16 (ppbv)	12/16/16 (ppbv)	03/17/17 (ppbv)
Tentatively Identified Compounds				
2-Phenyl-2-propanol	2.2 JN	--	--	--
Acetaldehyde	15 JN	--	--	--
Acetophenone	6.8 JN	--	--	--
alkane	6.7 J	3.1 J	6.1 J	36 J
alkane	2.0 J	2.9 J	3.6 J	33 J
alkane	1.8 J	2.3 J	3.5 J	27 J
alkane	1.4 J	2.1 J	2.9 J	23 J
alkane	--	1.9 J	2.7 J	21 J
alkane	--	1.8 J	2.7 J	20 J
alkane	--	1.4 J	--	17 J
alkane	--	--	--	16 J
alkane	--	--	--	14 J
C alkyl benzene				13 J
cycloalkane/alkene	1.5 J	2.6 J	7.1 J	19 J
cycloalkane/alkene	--	--	3.7 J	14 J
cycloalkane/alkene	--	--	3.4 J	12 J
cycloalkane/alkene	--	--	3.2 J	--
cycloalkane/alkene	--	--	1.3 J	--
cycloalkane/alkene	--	--	1.2 J	--
Ethylene Oxide	190 JNB	--	--	--
Naphthalene decahydro-methyl	--	3.5 J	6.0 J	--
Naphthalene decahydro-methyl	--	--	5.8 J	--
Naphthalene decahydro-methyl	--	--	4.2 J	--
Unknown	1.9 J	--	3.5 J	23 J
Unknown	--	--	2.0 J	21 J
Unknown	--	--	1.5 J	18 J
Unknown	--	--	--	16 J
Unknown	--	--	--	14 J
Unknown Alkane	--	--	--	14 J
Unknown Alkane	--	--	--	13 J
Total VOC TICs	**39 J**	**22 J**	**64 J**	**384 J**

Notes and abbreviations on last page.

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). Effluent samples were collected at Vapor Sampling Port-5 (VSP-5); refer to Figure 3 of this OM&M Report for the location of VSP-5.

700 Bold data indicates that the analyte was detected at or above its reporting limit.
ELAP Environmental Laboratory Approval Program
J Compound detected below its reporting limit; value is estimated.
B Compound was also detected in the associated field blank.
N Indicates presumptive evidence of a compound.
NYSDOH New York State Department of Health
OM&M operation, maintenance, and monitoring
USEPA United States Environmental Protection Agency
VOC volatile organic compound
ppbv parts per billion by volume

Table 7
Summary of System Parameters
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Date[1]	Water Flow Rates						Water Pressures[2]					Air Flow Rate[3]	Air Pressures[4]					Air Temp.[5]
	Remedial Well[2]				Combined Influent[3]	Effluent[3]	Remedial Well Effluent[3]				Effluent	Effluent	EC Influents				Effluent	Effluent
	RW-1	RW-2	RW-3	RW-4			RW-1	RW-2	RW-3	RW-4			GAC-501	GAC-502	PPZ-601	PPZ-602		
	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(psi)	(psi)	(scfm)	(iwc)	(iwc)	(iwc)	(iwc)	(iwc)	(°R)
04/18/16	30.9	75.8	75.7	29.9	212	216	55	30	14	55	11	1,814	5.8	3.4	0.5	2.0	0.0	532
05/18/16	29.9	75.4	75.7	30.2	211	224	56	22	20	55	12	1,973	6.5[6]	3.4[6]	1.0[6]	2.0[6]	2.0[6]	532[6]
06/10/16	30.2	73.7	75.2	30.3	209	211	56	11	22	54	11	1,827	7.0[7]	3.5[7]	1.0[7]	2.2[7]	0.0[7]	537[7]
07/14/16	30.3	75.1	75.0	30.8	211	222	55	13	25	54	12	1,816	6.9[8]	3.4[8]	1.0[8]	2.0[8]	0.0[8]	538[8]
08/23/16	30.1	62.7	75.3	29.8	198	203	55	6	21	54	12	1,840	6.5[9]	3.2[9]	1.0[9]	2.0[9]	0.0[9]	540[9]
09/14/16	30.7	74.7	75.1	30.8	211	221	54	6	19	53	11	1,738	6.0[10]	3.0[10]	1.0[10]	2.0[10]	0.0[10]	539[10]
10/11/16	30.0	72.9	74.4	30.9	208	233	55	9	20	53	13	1,689	6.4	3.2	1.0	2.0	0.0	538
11/28/16	30.8	75.9	75.2	29.9	212	226	54	50	43	54	13	1,719	6.5	3.2	1.0	2.0	0.0	532
12/16/16	30.0	74.6	74.8	29.8	209	229	55	46	40	53	12	1,736	6.5[11]	3.0[11]	1.0[11]	1.9[11]	0.0[11]	519[11]
01/20/17	31.0	76.2	75.3	30.1	213	234	54	12	32	53	13	1,757	6.5[12]	3.2[12]	1.0[12]	2.0[12]	0.0[12]	530[12]
02/22/17	30.5	81.2	75.0	30.2	217	230	54	53	28	53	18	1,698	7.0[13]	3.5[13]	1.0[13]	2.0[13]	0.0[13]	532[13]
03/17/17	30.2	79.8	76.0	30.3	216	227	55	53	26	53	25	1,690	6.4[14]	3.0[14]	1.0[14]	1.9[14]	0.0[14]	530[14]

Notes and abbreviations on last page.

Table 7
Summary of System Parameters
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Notes and Abbreviations:

(1) Operational data collected by Arcadis on days noted. Parameters listed were typically recorded during compliance monitoring events. Data in this table correspond to approximately the past year of system operation.
(2) Instantaneous parameters obtained from the SCADA HMI: Water Flow Rate, Water Pressure, Air Flow Rate.
(3) Combined influent water-flow rate is the sum of individual well flow rates via the SCADA System.
(4) Remedial Well effluent pressure readings measured at the influent manifold within the treatment system building.
(5) Instantaneous values from field-mounted instruments
(6) Values collected on May 16, 2016 during the weekly site visit. No values collected on day of sampling.
(7) Values collected on June 6, 2016 during the weekly site visit. No values collected on day of sampling.
(8) Values collected on July 11, 2016 during the weekly site visit. No values collected on day of sampling.
(9) Values collected on August 22, 2016 during the weekly site visit. No values collected on day of sampling.
(10) Values collected on September 13, 2016 during the weekly site visit. No values collected on day of sampling.
(11) Values collected on December 19, 2016 during the weekly site visit. No values collected on day of sampling.
(12) Values collected on January 16, 2017 during the weekly site visit. No values collected on day of sampling.
(13) Values collected on February 20, 2017 during the weekly site visit. No values collected on day of sampling.
(14) Values collected on March 20, 2017 during the weekly site visit. No values collected on day of sampling.

ECU emission control unit
gpm gallons per minute
HMI human-machine interface
iwc inches of water column
psi pounds per square inch
^{o}R degrees Rankine
SCADA Supervisory Control and Data Acquisition
scfm standard cubic feet per minute
Temp. temperature

Table 8
Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Operating Period[1]	Volume of Groundwater Recovered (x1,000 gal)[2]					VOC Mass Recovered (lbs)[3]															VOC Mass Recovery Rate (lbs/day)[4]													
						Total VOCs[5]					Project VOCs[6]					Non-Project VOCs[7]					Total VOCs[5]					Project VOCs[6]					Non-Project VOCs[7]				
	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total
System Pilot Test, Shakedown and Startup Totals [8]	137	270	251	150	808	NA	NA	NA	NA	1.1	NA	NA	NA	NA	1.0	NA	NA	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2009 Totals	6,592	13,838	16,445	6,574	43,449	0.17	275	53	14	342	0.17	273	19	0.20	293	<0.01	0.56	35	13	48	<0.01	1.7	0.33	0.086	2.1	<0.01	1.7	0.12	<0.01	1.8	<0.01	<0.01	0.22	0.080	0.30
2010 Totals	15,726	35,127	38,160	15,689	104,702	0.56	172	412	89	672	0.56	171	28	0.10	200	<0.01	0.17	383	89	469	<0.01	0.46	1.1	0.24	1.8	<0.01	0.46	0.075	<0.01	0.54	<0.01	<0.01	1.0	0.24	1.3
2011 Totals	15,218	36,570	37,682	15,196	104,666	0.36	167	271	78	516	0.36	167	35	0.090	203	<0.01	1.1	236	78	314	<0.01	0.45	0.73	0.21	1.4	<0.01	0.45	0.095	<0.01	0.55	<0.01	<0.01	0.64	0.21	0.85
2012 Totals	15,260	35,178	36,111	15,336	101,885	0.28	114	113	40	267	0.25	113	12	0.39	126	<0.01	1.5	101	40	141	<0.01	0.31	0.31	0.11	0.73	<0.01	0.31	0.032	<0.01	0.35	<0.01	<0.01	0.28	0.11	0.39
2013 Totals	15,968	37,514	36,622	16,036	106,140	0.14	111	41	18	171	0.14	110	4.3	0.36	113	<0.01	1.6	37	18	57	<0.01	0.30	0.11	0.050	0.47	<0.01	0.30	0.012	<0.01	0.31	<0.01	<0.01	0.10	0.049	0.16
2014 Totals	15,690	33,222	31,199	15,691	95,802	0.063	67	9.9	8.1	85	0.063	65	2.0	0.20	67	<0.01	1.5	8.1	7.9	17	<0.01	0.19	0.028	0.023	0.24	<0.01	0.18	<0.01	<0.01	0.19	<0.01	<0.01	0.023	0.022	0.047
2015 Totals	15,859	38,082	34,961	14,755	103,657	0.028	47	7.1	4.5	57	0.021	45	1.5	0.20	45	<0.01	1.7	5.6	4.2	12	<0.01	0.13	0.019	0.012	0.16	<0.01	0.12	<0.01	<0.01	0.12	<0.01	<0.01	0.015	0.012	0.032
2016 Totals	15,826	34,539	39,349	15,826	105,540	<0.01	38	3.2	2.2	44	<0.01	37	1.4	0.20	39	<0.01	1.5	1.7	2.0	5.2	<0.01	0.10	<0.01	<0.01	0.12	<0.01	0.10	<0.01	<0.01	0.11	<0.01	<0.01	<0.01	<0.01	0.014
January 2017 through March 2017 Totals																																		
01/01/17 - 02/01/17	1,404	2,631	3,511	1,405	8,951	<0.01	1.7	0.25	0.12	2.1	<0.01	1.6	0.13	0.012	1.7	<0.01	0.072	0.12	0.10	0.30	<0.01	0.055	<0.01	<0.01	0.068	<0.01	0.052	<0.01	<0.01	0.055	<0.01	<0.01	<0.01	<0.01	<0.01
02/01/17 - 03/01/17	1,237	879	3,091	1,237	6,444	<0.01	0.56	0.22	0.10	0.88	<0.01	0.53	0.11	0.011	0.65	<0.01	0.024	0.11	0.091	0.23	<0.01	0.020	<0.01	<0.01	0.031	<0.01	0.019	<0.01	<0.01	0.023	<0.01	<0.01	<0.01	<0.01	0.008
03/01/17 - 04/01/17	1,413	3,129	3,532	1,413	9,487	<0.01	2.0	0.25	0.12	2.4	<0.01	1.9	0.13	0.012	2.0	<0.01	0.086	0.12	0.10	0.31	<0.01	0.065	<0.01	<0.01	0.08	<0.01	0.061	<0.01	<0.01	0.065	<0.01	<0.01	<0.01	<0.01	0.010
Subtotal Jan - Mar 2017[9]	4,054	6,639	10,134	4,055	24,882	<0.01	4.3	0.72	0.34	5.4	<0.01	4.0	0.37	0.035	4.4	<0.01	0.18	0.35	0.29	0.80	<0.01	0.048	<0.01	<0.01	0.060	<0.01	0.044	<0.01	<0.01	0.049	<0.01	<0.01	<0.01	<0.01	0.009
2017 Totals	4,054	6,639	10,134	4,055	24,882	<0.01	4.3	0.72	0.34	5.4	<0.01	4.0	0.37	0.035	4.4	<0.01	0.18	0.35	0.29	0.80	<0.01	0.048	<0.01	<0.01	0.060	<0.01	0.044	<0.01	<0.01	0.049	<0.01	<0.01	<0.01	<0.01	0.009
Total[10]	120,330	270,979	280,914	119,308	791,531	1.6	995	911	254	2,159	1.6	985	103	1.8	1,091	<0.01	9.7	808	252	1063	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations:

(1) Represents operating period between consecutive monitoring events.
(2) Volume of groundwater recovered is based on individual local well totalized flow readings. Listed value is the difference between totalized flow values recorded between consecutive monitoring events. The total groundwater recovered during a given operating period is the sum of the individual well flow totals. Values shown are rounded to the nearest gallon, but should only be considered accurate to two significant figures to account for error associated with field measurements.
(3) Mass recovered per well was calculated by multiplying the Total VOC concentration from the most recent sampling event by the number of gallons extracted during the reporting period. The total amount recovered during a given operating period is the sum of masses recovered from each of the individual wells. Values less than ten pounds are presented using two significant figures and values greater than ten pounds have been rounded to the nearest whole number; however, these values should only be considered accurate to two significant figures to account for error associated with field measurements and analytical data.
(4) Mass recovery rates were calculated by dividing the total mass recovered for each well and for the system by the number of days in the respective operating period. Values are presented using two significant figures.
(5) "Total VOCs" represents the sum of individual concentrations of the VOCs detected.
(6) "Project VOCs" represents the sum of individual compound concentrations of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethelyene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and xylenes-o,m, p.
(7) "Non-Project VOCs" represents the difference between Total VOCs and Project VOCs.
(8) Values based on operational data recorded prior to system startup on July 21, 2009.
(9) The volume of groundwater recovered and mass recovered calculations represent the operational period between January 1, 2017 and April 1, 2017.
(10) "Total" refers to the amounts removed by the Operable Unit 3 Bethpage Park Groundwater Containment System.

gal gallons
HMI human-machine interface
lbs pounds
lbs/day pounds per day
-- not applicable

Table 9
Summary of Air Quality Impact Analysis
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Toxic Air Contaminant	CAS#	VSP-05 Vapor Effluent (µg/m³)	Emission Rate[1]			Scaled Impact - Hourly[2] (µg/m³)	Scaled Impact - Annual[2] (µg/m³)	SGC[3] (µg/m³)	AGC[3] (µg/m³)	% of SGC	% of AGC
		3/17/2017	lb/yr	lb/hr	g/s						
1,1 - Dichloroethane	00075-34-3	11	0.63	7.16E-05	9.02E-06	2.84E-02	8.71E-04	--	0.63	--	0.1%
1,1 - Dichloroethene	00075-35-4	2.4	0.14	1.56E-05	1.97E-06	6.21E-03	1.90E-04	--	200	--	0.0%
Tetrachloroethene	00127-18-4	25	1.43	1.63E-04	2.05E-05	6.47E-02	1.98E-03	300	4	0.0%	0.0%
Trichloroethene	00079-01-6	10	0.57	6.51E-05	8.20E-06	2.59E-02	7.91E-04	20	0.20	0.1%	0.4%
Vinyl Chloride	00075-01-4	53	3.02	3.44E-04	4.34E-05	1.37E-01	4.19E-03	180,000	0.11	0.0%	3.8%
cis 1,2-Dichloroethene	00156-59-2	141	8.04	9.18E-04	1.16E-04	3.65E-01	1.12E-02	--	63	--	0.0%
Benzene	00071-43-2	12	0.68	7.81E-05	9.84E-06	3.10E-02	9.50E-04	1,300	0.13	0.0%	0.7%
Toluene	00108-88-3	7.2	0.41	4.69E-05	5.91E-06	1.86E-02	5.70E-04	37,000	5,000	0.0%	0.0%
Xylene-O	01330-20-7	339	19.33	2.21E-03	2.78E-04	8.77E-01	2.68E-02	22,000	100	0.0%	0.0%
Xylenes - M,P	01330-20-7	608	34.67	3.96E-03	4.99E-04	1.57E+00	4.81E-02	22,000	100	0.0%	0.0%
2-Butanone	00078-93-3	27	1.54	1.76E-04	2.21E-05	6.98E-02	2.14E-03	13,000	5,000	0.0%	0.0%
Acetone	00067-64-1	190	10.83	1.24E-03	1.56E-04	4.91E-01	1.50E-02	180,000	30,000	0.0%	0.0%
Chlorodifluoromethane (Freon 22)	00075-45-6	48	2.73	3.11E-04	3.92E-05	1.24E-01	3.78E-03	--	50,000	--	0.0%
Chloroform	00067-66-3	58	3.31	3.78E-04	4.77E-05	1.50E-01	4.60E-03	150	14.7	0.1%	0.0%
Chloromethane	00074-87-3	2.9	0.17	1.89E-05	2.38E-06	7.50E-03	2.29E-04	22,000	90	0.0%	0.0%
Dichlorodifluoromethane (Freon 12)	00075-71-8	3.7	0.21	2.41E-05	3.03E-06	9.57E-03	2.93E-04	--	12,000	--	0.0%
Dichloromethane	00075-09-2	1.9	0.11	1.24E-05	1.56E-06	4.91E-03	1.50E-04	14,000	60	0.0%	0.0%
Ethylbenzene	00100-41-4	5.6	0.32	3.65E-05	4.59E-06	1.45E-02	4.43E-04	--	1,000	--	0.0%
Trichlorofluoromethane (Freon 11)	00075-69-4	3.0	0.17	1.95E-05	2.46E-06	7.76E-03	2.37E-04	9,000	5,000	0.0%	0.0%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	4.2	0.24	2.73E-05	3.44E-06	1.09E-02	3.32E-04	960,000	180,000	0.0%	0.0%

Notes and abbreviations on last page.

Table 9
Summary of Air Quality Impact Analysis
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Notes and Abbreviations:

--	none specified
AGC	annual guideline concentration
CAS#	Chemical Abstracts Service Registry Number
cfm	cubic feet per minute
DAR-1	Division of Air Resources-1
g/s	grams per second
lb/hr	pounds per hour
lb/yr	pounds per year
NYSDEC	New York State Department of Environmental Conservation
SGC	short-term guideline concentration
VSP	vapor sampling point
$\mu g/m^3$	micrograms per cubic meter

(1) Emission rate calculated based on an exit air flow rate of 1,726 ft^3/min.

1,1,1-Trichloroethane (lb/hr) = TCE [$\mu g/m^3$] x Air Flow Rate [ft^3/min] x (1 m^3/35 ft^3) x (60 min/hr) x (0.000001 g/1 µg) x (0.0022 lb/g)

lb/yr = lb/hr x 8,760 hrs/yr

g/s = lb/hr x 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 (Brookhaven/Farmingdale) for the years 2011 through 2015. The maximum impact from all the years was used for the calculations.

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

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

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([$\mu g/m^3$]/[g/s])	Annual ([$\mu g/m^3$]/[g/s])
3,153.03	96.49

(3) Short-term and annual guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.

Table 10
Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound[1] (µg/L)	Sample Location: Sample Date:	RW-1 8/10/2016	RW-1 9/22/2016	RW-1 12/15/2016	RW-1 3/17/2017	RW-2 8/10/2016	RW-2 9/23/2016	RW-2 12/16/2016	RW-2 3/17/2017	RW-3 8/10/2016	RW-3 9/23/2016	RW-3 12/16/2016	RW-3 3/17/2017	RW-4 8/10/2016	RW-4 9/23/2016	RW-4 12/16/2016	RW-4 3/17/2017
	6VOCDEC3CCs																
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**1.1**	**0.86 J**	**0.80 J**	**0.81 J**	< 1.0	< 1.0	< 1.0	< 1.0 U	**0.30 J**	**0.28 J**	**0.31 J**	< 1.0 U
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**0.35 J**	**0.23 J**	**0.21 J**	**0.37 J**	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
2-Butanone	NE	< 10	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10 U
4-methyl-2-pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U
Acetone	NE	< 10	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10 U
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50 U	< 0.50	< 0.50	< 0.50	< 0.50 U	< 0.50	< 0.50	< 0.50	< 0.50 U	< 0.50	< 0.50	< 0.50	< 0.50 U
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U
Carbon tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Chlorodifluoromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	**4.0 J**	**3.2 J**	**2.9 J**	**17**	**14**	**12**	**8.8**
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0 U	**3.2**	**2.9**	**2.6**	**2.5**	**2.5**	**2.1**	**1.8**	**1.3**	< 1.0	**0.28 J**	**0.29 J**	< 1.0 U
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
cis-1,2-dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**40**	**35**	**27**	**31**	**1.8**	**1.5**	**2.1**	**2.0**	< 1.0	< 1.0	< 1.0	< 1.0 U
cis-1,3-dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Dichlorodifluoromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**2.3**	**1.7**	**1.2**	**0.78 J**	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Methyl N-Butyl Ketone	50	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U
Methyl tert-Butyl Ether	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	**0.25 J**	**0.26 J**	< 1.0	**0.26 J**	**0.49 J**	**0.65 J**	**0.53 J**	**0.52 J**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**22**	**20**	**9.0**	**2.6**	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
trans-1,2-dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	**0.44 J**	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
trans-1,3-dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Trichloroethylene	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**11**	**11**	**12**	**14**	**2.2**	**1.9**	**2.4**	**2.2**	**0.57 J**	**0.59 J**	**0.51 J**	**0.54 J**
Trichlorofluoromethane (Freon 11)	5	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U	< 2.0	< 2.0	< 2.0	< 2.0 U
Trichlorotrifluoroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U	< 5.0	< 5.0	< 5.0	< 5.0 U
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0 U	**59**	**50**	**39**	**24**	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**1.1**	**0.93 J**	**0.40 J**	**0.32 J**	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Xylenes - m,p	5	< 1.0	< 1.0	< 1.0	< 1.0 U	**1.9**	**1.5**	**0.69 J**	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U	< 1.0	< 1.0	< 1.0	< 1.0 U
Total VOCs[2]		**0**	**0**	**0**	**0**	**143**	**123**	**93**	**76**	**6.8**	**9.8**	**8.5**	**8.7**	**18**	**16**	**13**	**10**
Project VOCs[3]		**0**	**0**	**0**	**0**	**137**	**119**	**89**	**73**	**4.3**	**3.7**	**4.5**	**4.5**	**1.4**	**1.5**	**1.4**	**1.1**
1,4-Dioxane[4]		**0.35**	**0.30**	**0.77**	**0.76**	**1.2**	**1.1**	**1.7**	**2.0**	**0.22**	**0.18**	**0.66**	**0.66**	< 0.11 U	< 0.10 U	**2.8**	**0.24**

Notes and abbreviations on last page.

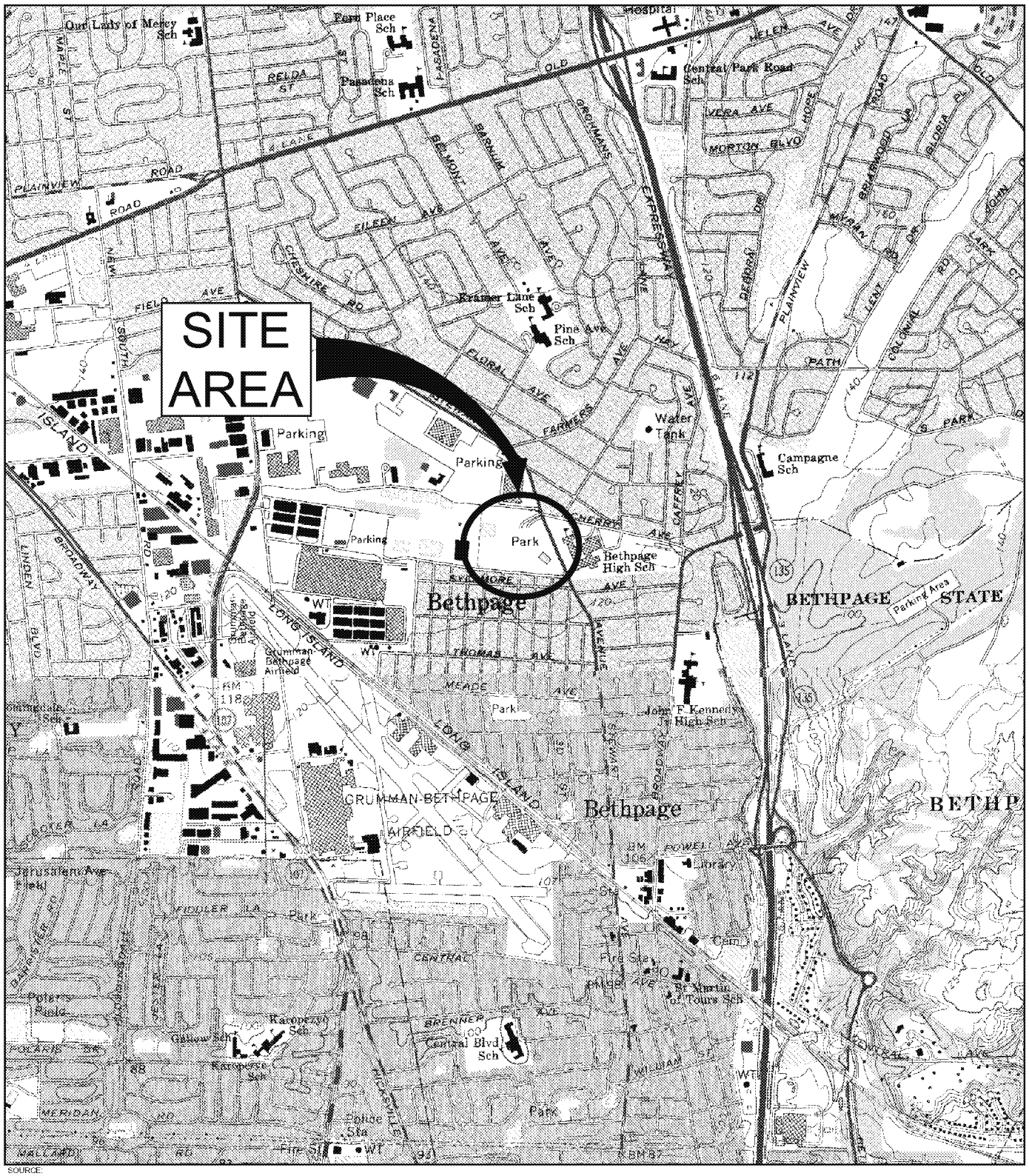
Table 10
Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

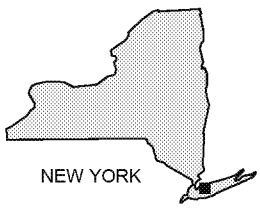
Notes and Abbreviations:

(1)	Water samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per NYSDEC ASP 2005, Method OLM 4.3 (prior to September 1, 2014) and per USEPA Method 8260C (after September 1, 2014). Results validated following protocols specified in Sampling and Analysis Plan in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). See previous quarterly reports for historical analytical results.
(2)	"Total VOCs" represents the sum of individual concentrations of the VOCs detected.
(3)	"Project VOCs" represents the sum of individual compound concentrations 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 xylenes-o,m, and p.
(4)	Samples collected during Second and Third Quarters 2016 were analyzed for 1,4-Dioxane using USEPA Method 8270D SIM. Samples collected during Fourth Quarter 2016 and First Quarter 2017 were analyzed for 1,4-Dioxane using USEPA Method 522.
	Indicates an exceedance of an SCG.
700	Bold data indicates a detection.
ASP	analytical services protocol
ELAP	Environmental Laboratory Approval Program
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
SCGs	standards, criteria, and guidance values
SIM	selected ion monitoring
VOC	volatile organic compound
µg/L	micrograms per liter
--	not analyzed
NE	not established
J	Compound detected below its reporting limit; value is estimated.
< 5	Compound not detected above its laboratory quantification limit.

FIGURES



SOURCE:
USGS 7.5 MIN AMITYVILLE QUADRANGLE, AMITYVILLE, N.Y., 1994, FREEPORT QUADRANGLE, FREEPORT, N.Y., 1994,
HICKSVILLE QUADRANGLE, HICKSVILLE, N.Y., 1967, PHOTOREVISED 1979, HUNTINGTON, N.Y., 1967, PHOTOREVISED 1979



0 2000' 4000'
SCALE IN FEET

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

SITE LOCATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD: PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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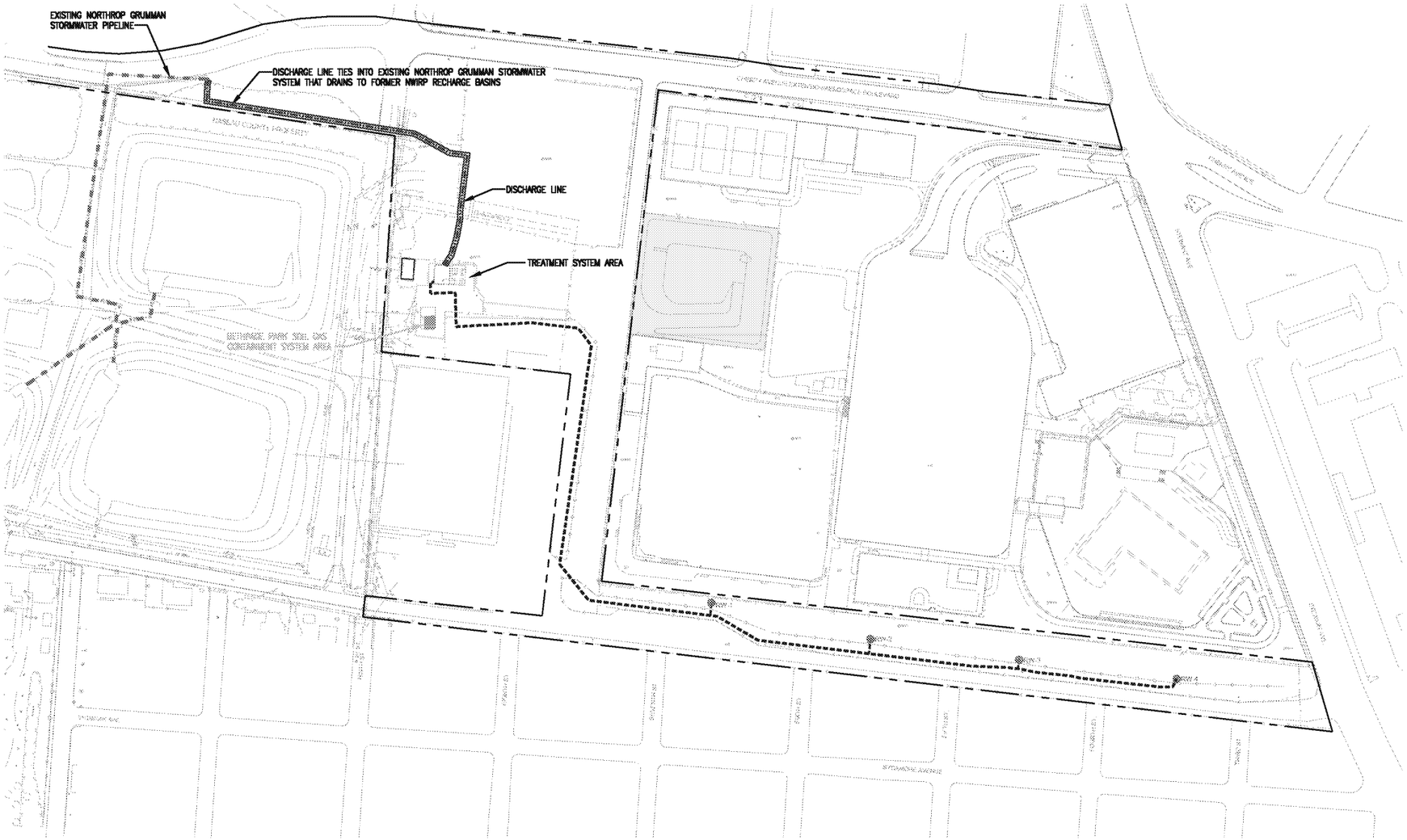
XREFS: IMAGES: AMITYVILLE.TIF FREEPORT.TIF HICKSVILLE.TIF HUNTINGTON.TIF PROJECTNAME: ----



LEGEND:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- BITUMINOUS PAVEMENT
- INFLUENT PIPELINE AND ELECTRICAL CONDUITS
- EFFLUENT PIPELINE
- EXISTING NORTHROP GRUMMAN STORMWATER PIPELINE
- REMEDIAL WELL
- NWIRP — NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NOW OWNED BY NASSAU COUNTY)

0 200' 400'

SCALE IN FEET

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

GROUNDWATER CONTAINMENT SYSTEM SITE PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:AS PIC:(Opt) PW:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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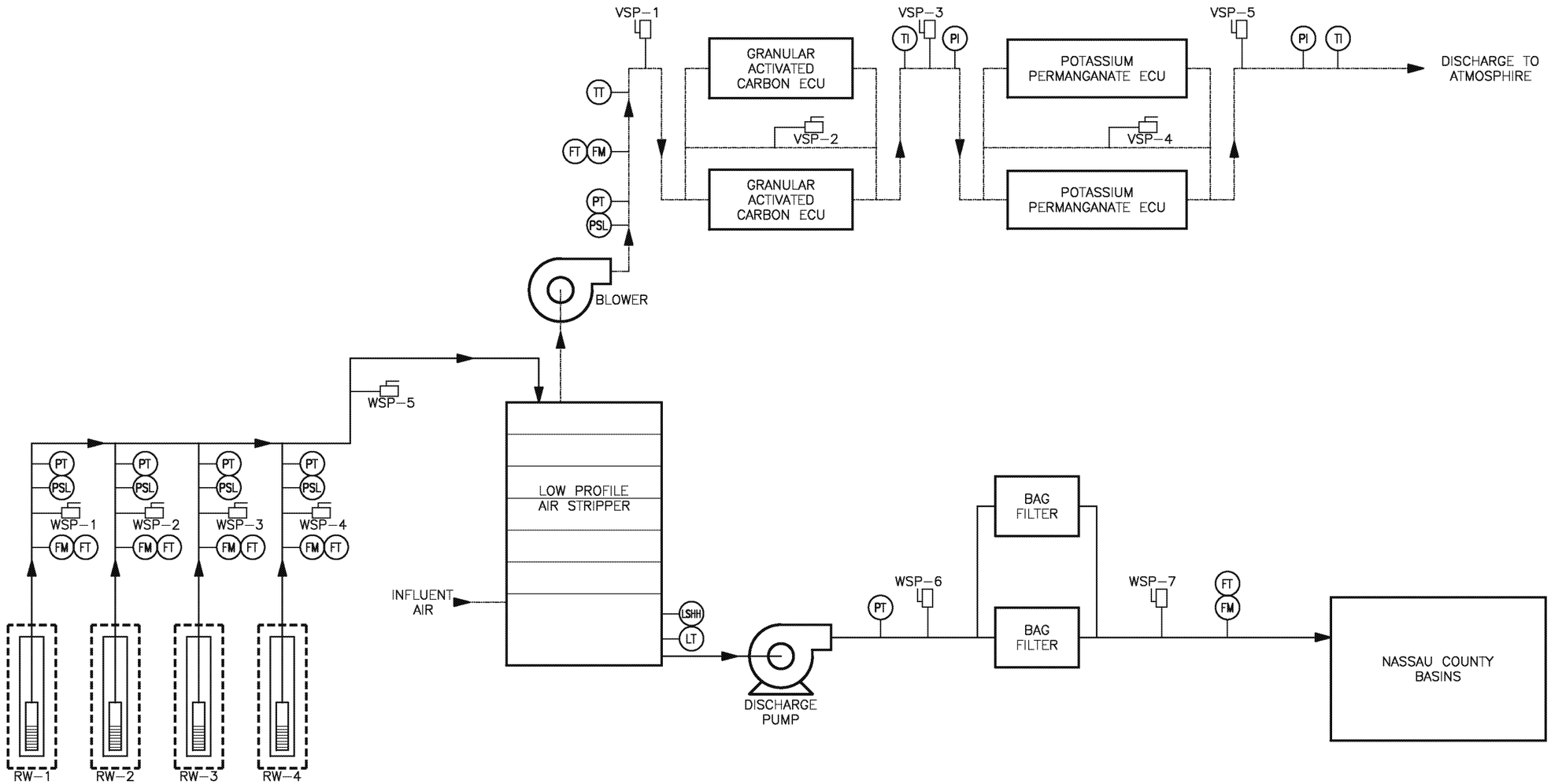

LEGEND:

	PROCESS WATER
	PROCESS AIR
FM	INSTRUMENT
	SAMPLE PORT
	FLOW DIRECTION
FM	FLOW METER
FT	FLOW RATE TRANSMITTER
PSL	PRESSURE SWITCH LOW
PT	PRESSURE TRANSMITTER
PI	PRESSURE INDICATOR
LSHH	LEVEL SWITCH HIGH HIGH
LT	LEVEL TRANSMITTER
TT	TEMPERATURE TRANSMITTER
TI	TEMPERATURE INDICATOR
WSP	WATER SAMPLE PORT
VSP	VAPOR SAMPLE PORT
ECU	EMISSION CONTROL UNIT

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

GROUNDWATER TREATMENT SYSTEM PROCESS SCHEMATIC AND MONITORING LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:AS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
\\arcadis-us.com\officedata\Syracuse-NYENV\CAD\SYRACUSE\ACT\NY001486\114\IO\MM\NY1486D02.dwg LAYOUT: 3 SAVED: 11/11/2015 2:57 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 5/13/2016 12:13 PM BY: HARRIS, JESSICA
XREFS: IMAGES: PROJECTNAME: ----
XR1496X00

EXPLANATION:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- BASIN
- bit. BITUMINOUS PAVEMENT
- MW-200-1 MONITORING WELL
- RW-2 REMEDIAL WELL
- PZ-2C PIEZOMETER

NOTES:

1. MONITORING WELLS, REMEDIAL WELLS, AND PIEZOMETERS SURVEYED TO NORTH AMERICAN DATUM (NAD) 83.
2. PARK FEATURES SHOWN WERE PRESENT PRIOR TO TOWN OF OYSTER BAY REDEVELOPMENT IN 2005.

0 100' 200'

APPROXIMATE SCALE IN FEET

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

GROUNDWATER MONITORING NETWORK PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4

CITY:SYRACUSE-NY DIV:GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)On*;Off=*REF*
Z:\ENVICAD\SYRACUSE\ACTIVO\0145\B0114-16\RPT\41361.dwg LAYOUT: 4 SAVED: 3/16/2017 3:54 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 3/16/2017 5:28 PM BY: SANCHEZ, ADRIAN
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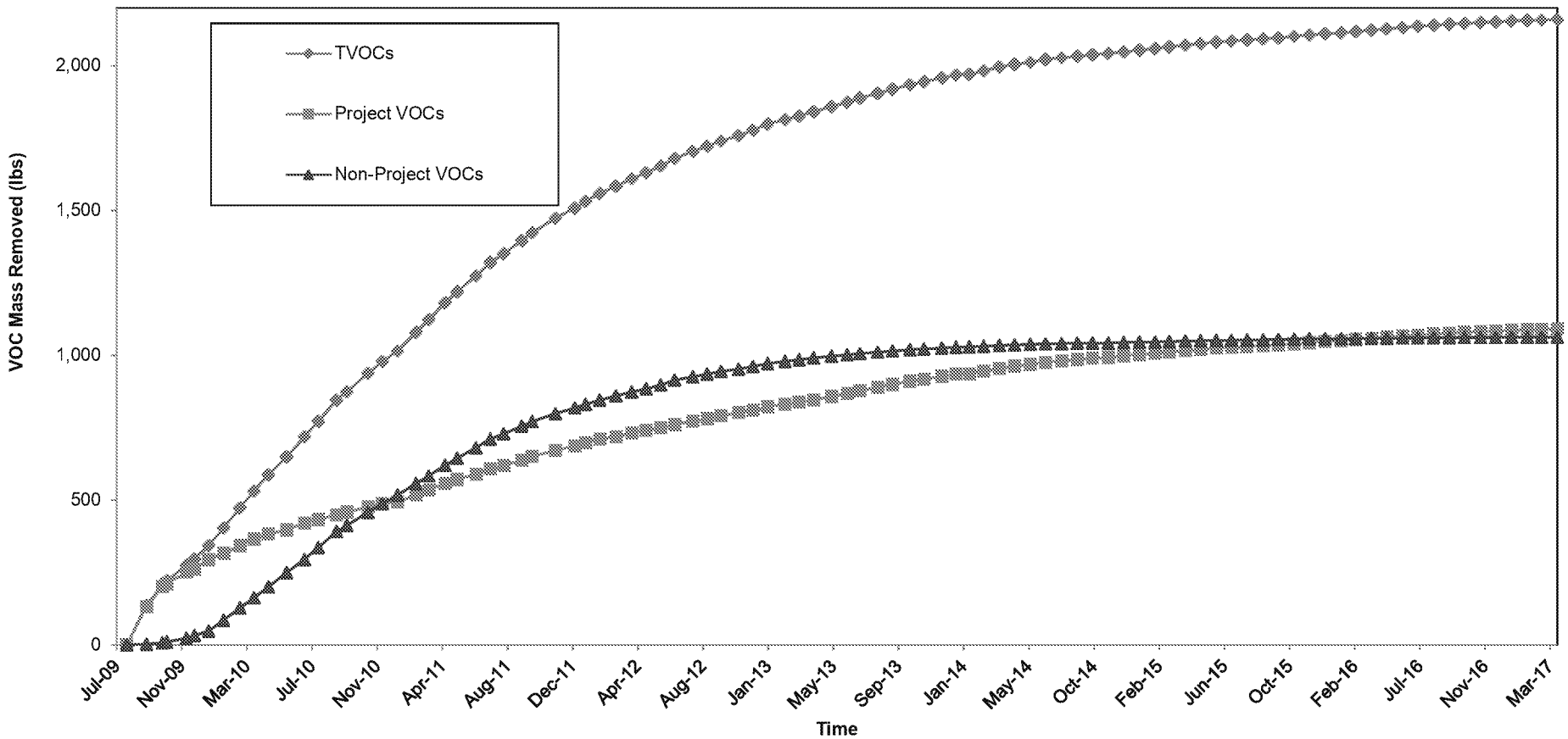
IMAGES: PROJECTNAME: ----

ED_002631A_00011448-00027



Notes:

VOC = volatile organic compound

lbs = pounds

TVOCs = total VOCs detected

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.

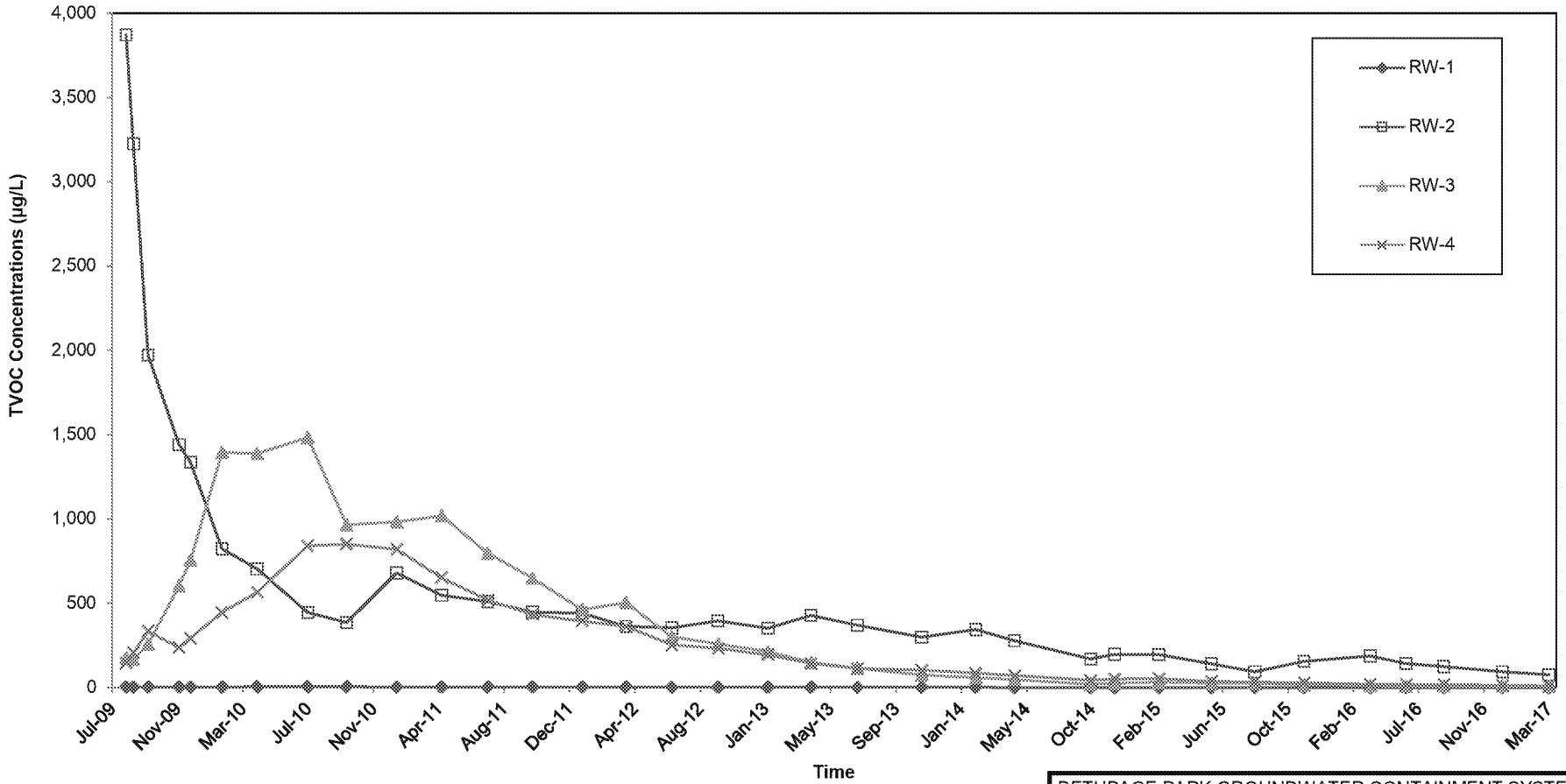
Non-Project VOCs = sum of VOCs that are not Project VOCs.

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

CUMULATIVE TOTAL, PROJECT, AND NON-PROJECT VOC MASS REMOVED THROUGH MARCH 2017

ARCADIS

FIGURE
5



Notes:

VOC = volatile organic compound

µg/L = micrograms per liter

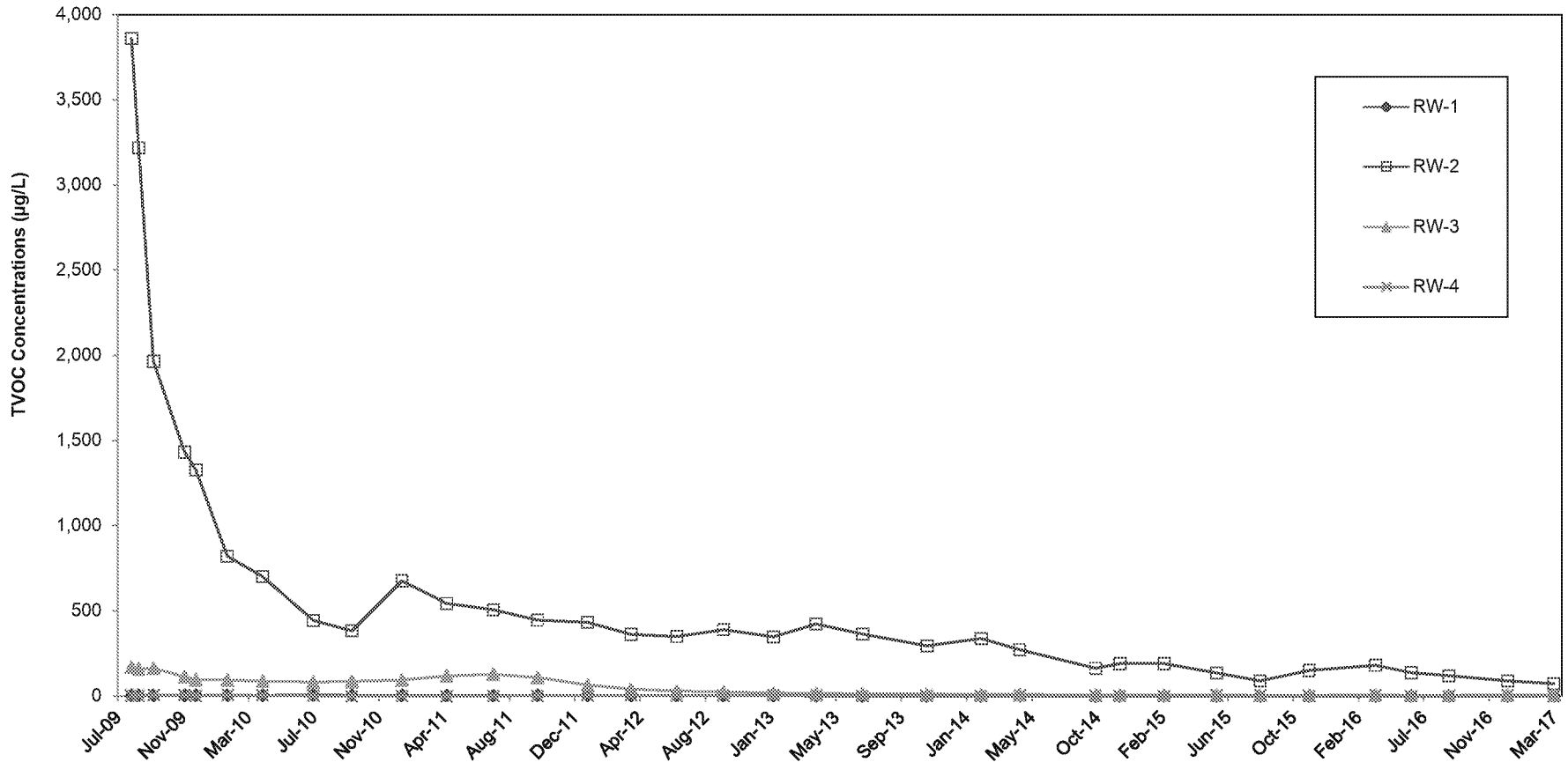
TVOCs = total VOCs detected

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

REMEDIAL WELL TOTAL VOC CONCENTRATIONS THROUGH MARCH 2017

ARCADIS

FIGURE
6A



Notes:

VOC = zolatile organic compound

µg/L = micrograms per liter

TVOCs = total VOCs detected

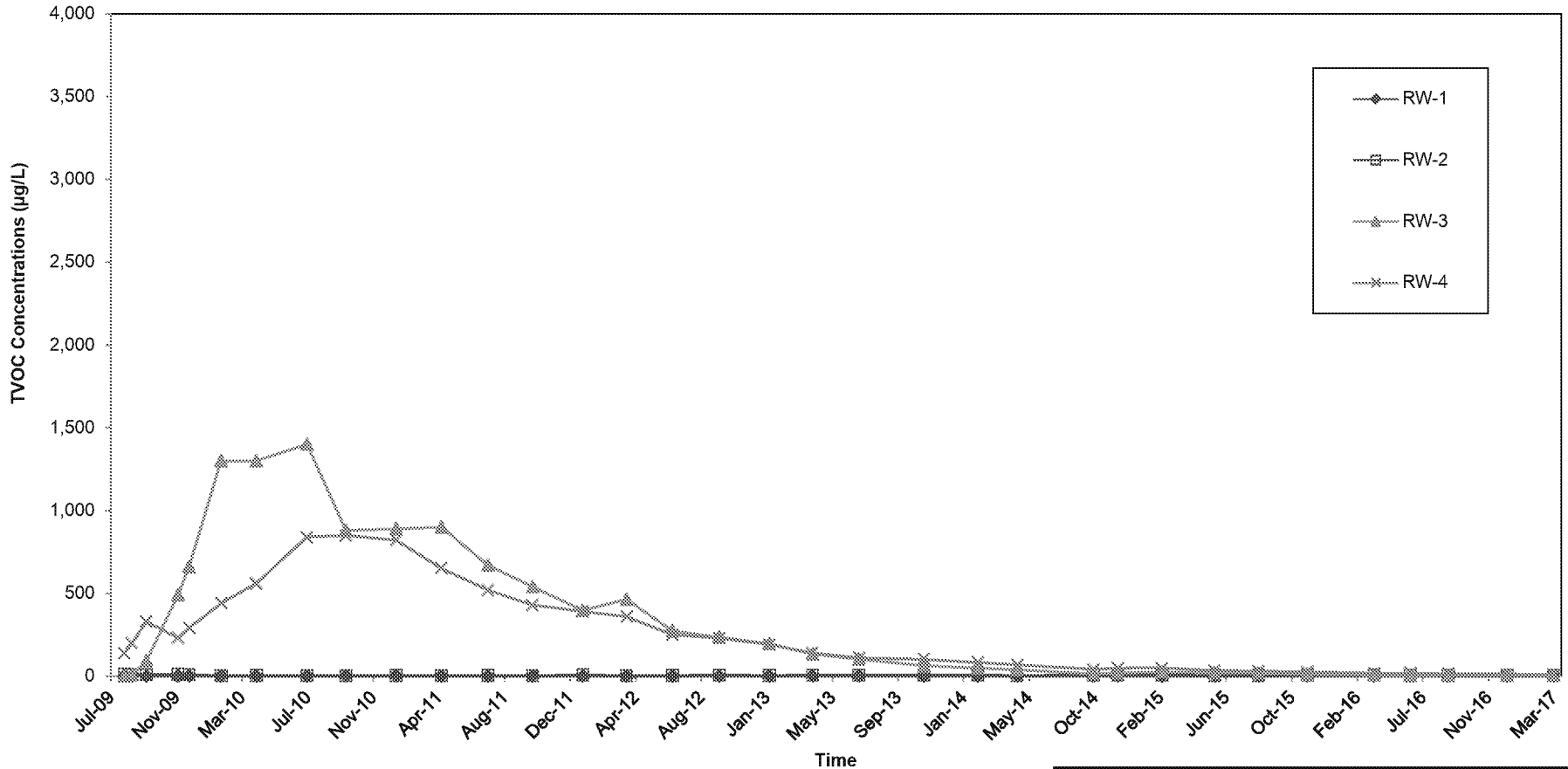
Project VOCs = sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene and total xylenes.

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

REMEDIAL WELL PROJECT VOC CONCENTRATIONS THROUGH MARCH 2017

ARCADIS

FIGURE
6B



Notes:

VOC = volatile organic compound

µg/L = micrograms per liter.

TVOCs = total VOCs detected.

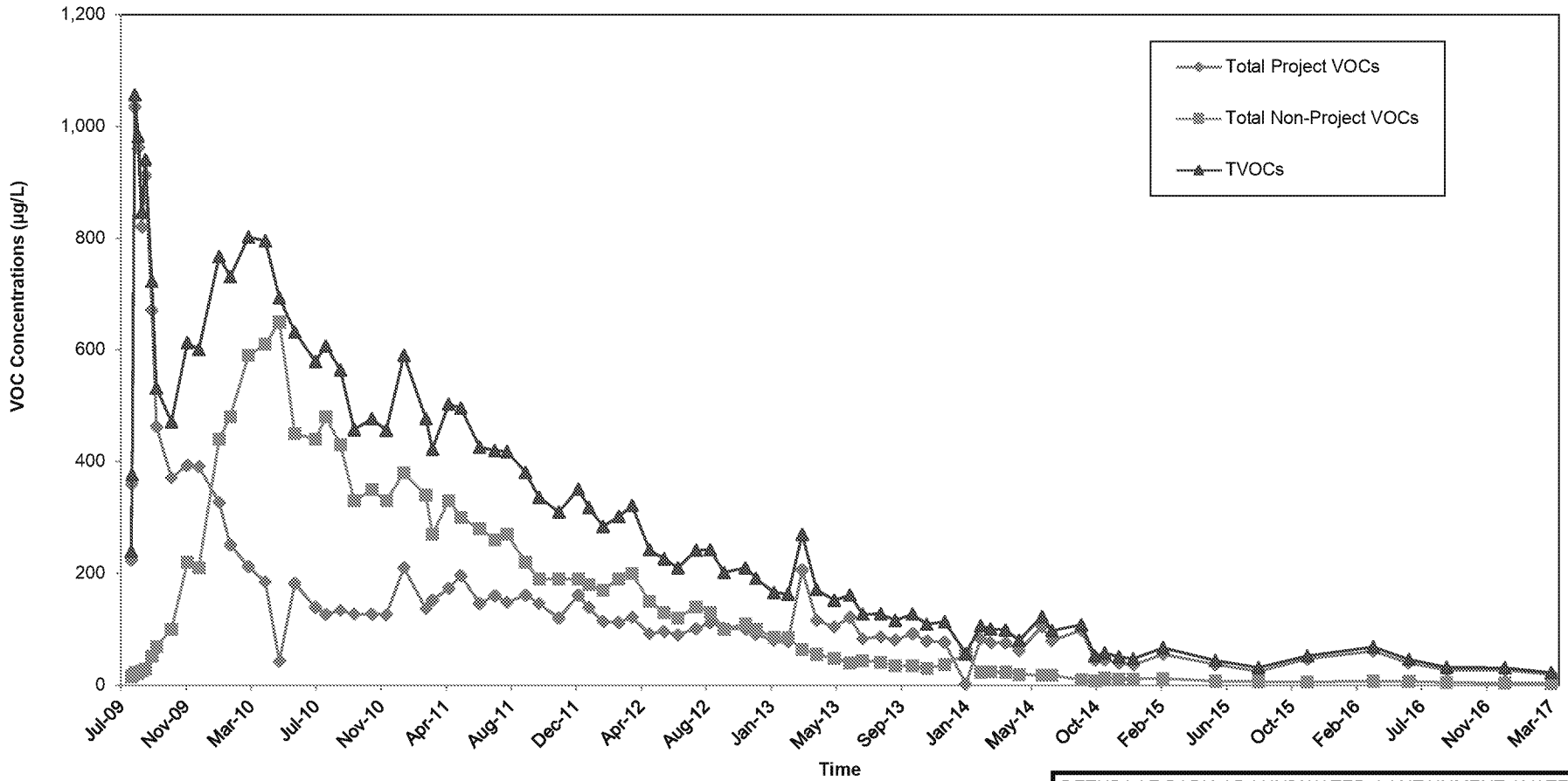
Non-Project VOCs = sum of TVOCs that are not Project VOCs.

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

REMEDIAL WELL NON-PROJECT VOC CONCENTRATIONS THROUGH MARCH 2017

ARCADIS

FIGURE
6C



Notes:

VOC = volatile organic compound

µg/L = micrograms per liter

TVOCs = total VOCs detected.

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.

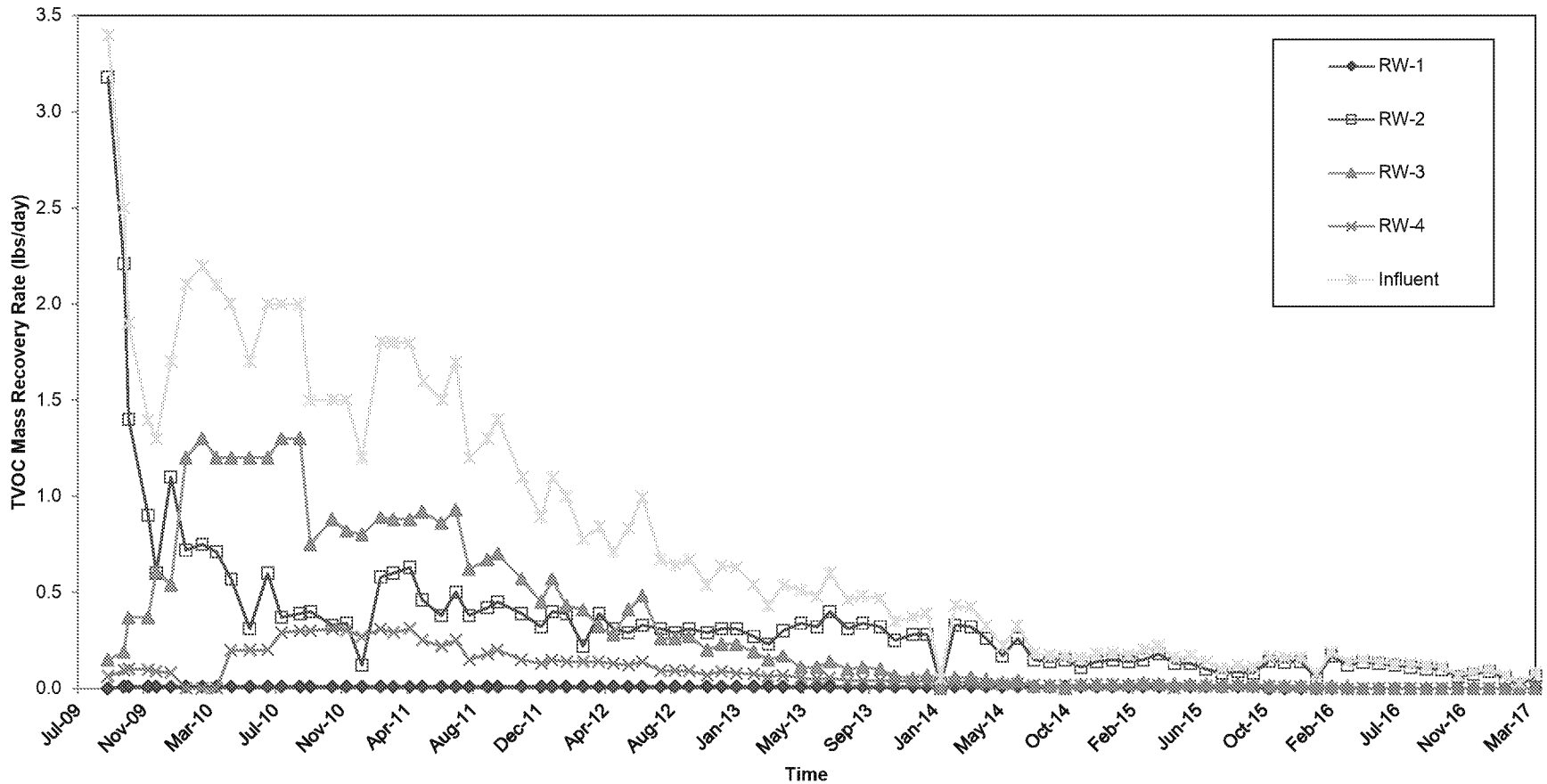
Non-Project VOCs = sum of VOCs that are not Project VOCs.

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

INFLUENT TOTAL, PROJECT AND NON-PROJECT VOC CONCENTRATIONS THROUGH MARCH 2017

ARCADIS

FIGURE
7



Notes:

VOC = volatile organic compound

lbs/day = pounds per day

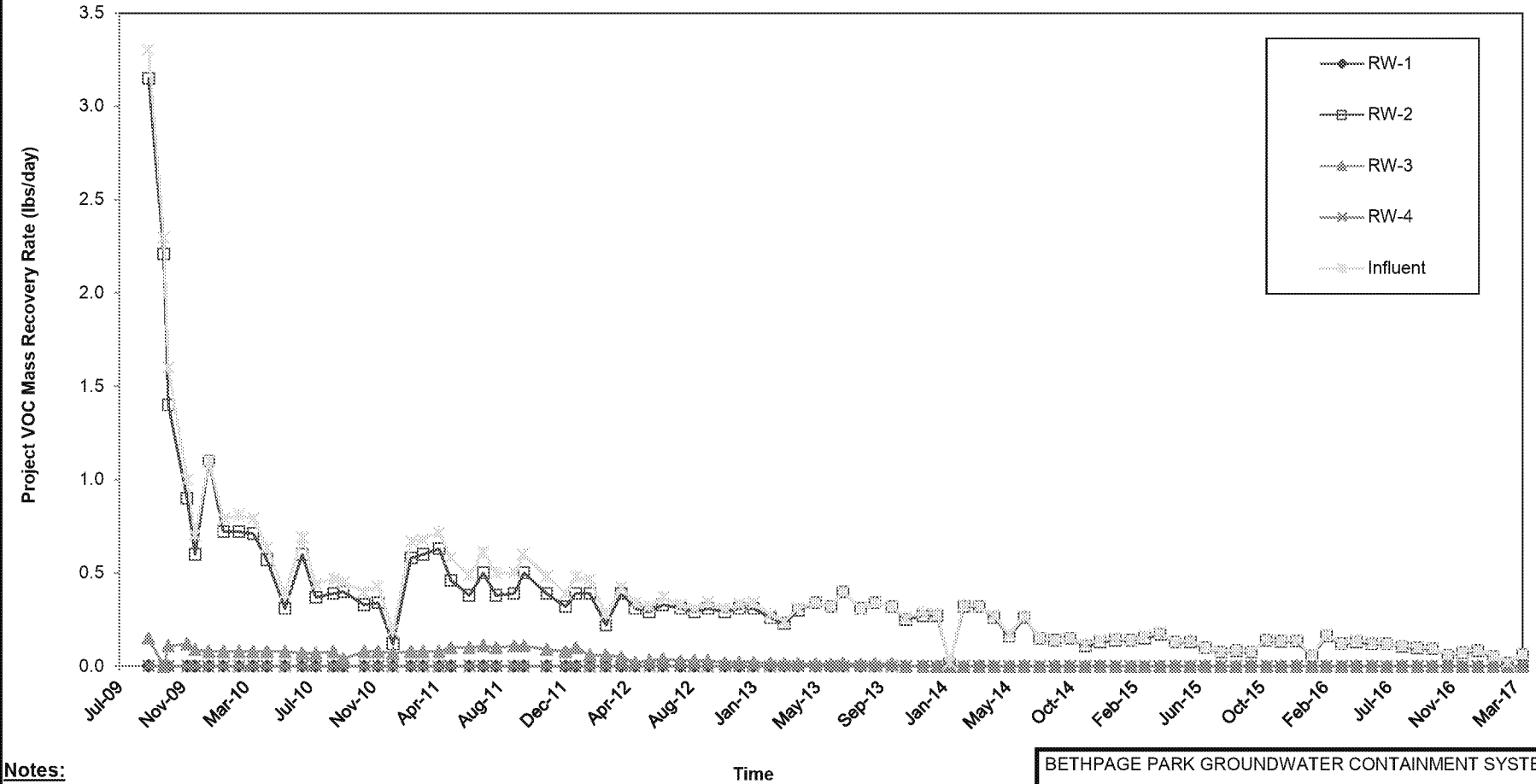
TVOCs = total VOCs detected

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

TOTAL VOC MASS RECOVERY RATES THROUGH MARCH 2017

ARCADIS

FIGURE
8A



Notes:

VOC = volatile organic compound

lbs/day = pounds per day.

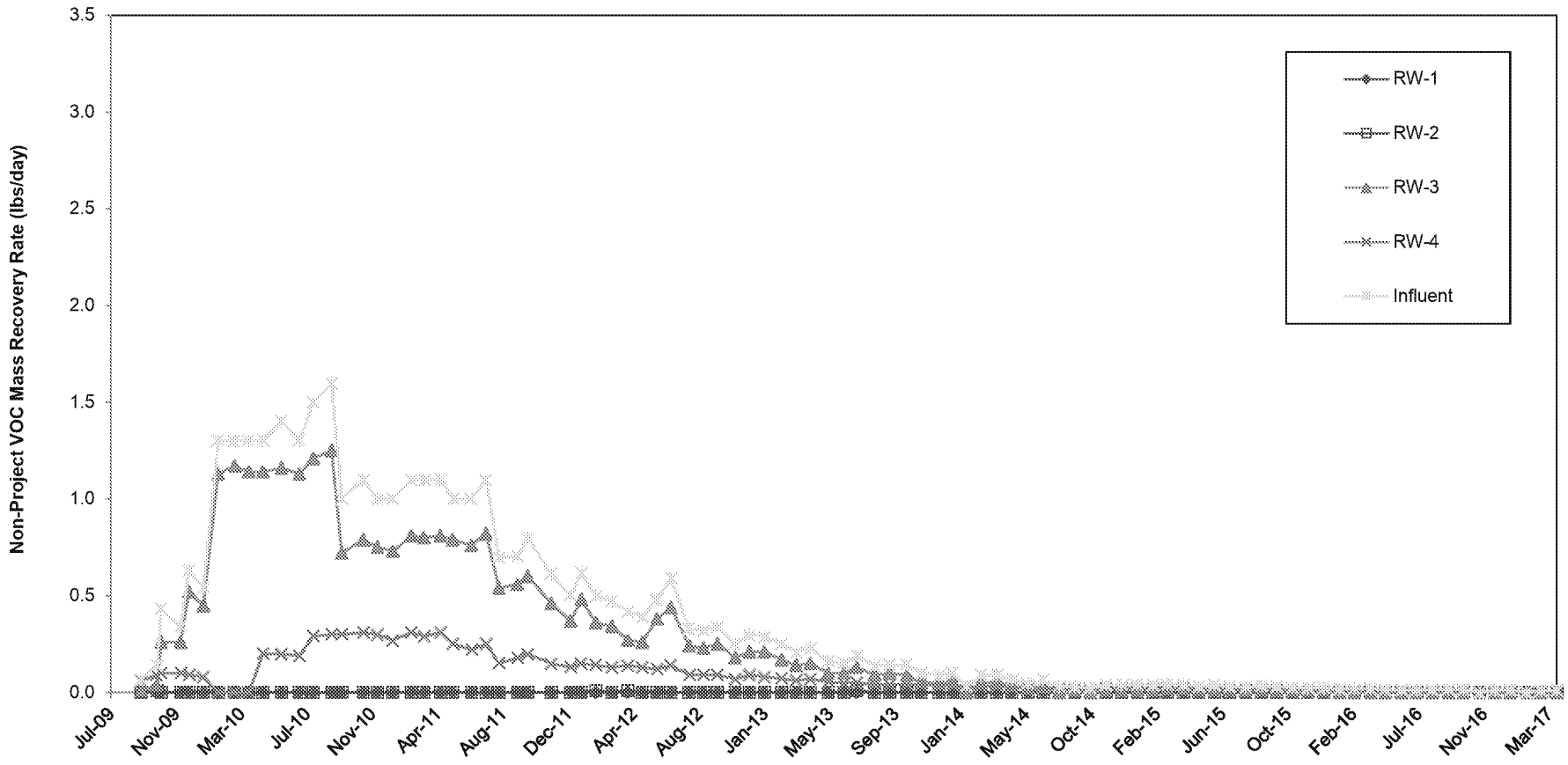
Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes

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

PROJECT VOC MASS RECOVERY RATES THROUGH MARCH 2017

ARCADIS

FIGURE
8B



Notes:

VOC = volatile organic compound

lbs/day = pounds per day

Non-Project VOCs = sum of VOCs that are not Project VOCs.

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

NON-PROJECT VOC MASS RECOVERY RATES THROUGH MARCH 2017

ARCADIS

FIGURE
8C