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ENVIRONMENT

Subject:
2017 Annual Summary Report - Operation, Maintenance, and Monitoring Report for the Bethpage Park Groundwater Containment System (BPGWCS), Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York, NYSDEC Site #1-30-003A.

Date:
March 30, 2018

Contact:
Christopher Engler

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Our ref:
NY001496.32TM.RPTI4

Dear Jason:

Enclosed is one electronic PDF copy of the 2017 Annual Summary Report for the BPGWCS, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. Additionally, the enclosed summarizes the operation, maintenance and monitoring activities performed during the 2017 reporting period (i.e., January 1 through December 31, 2017). 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.

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

Sincerely,

Arcadis of New York, Inc.

Christopher D. Engler

Christopher Engler, PE
New York PE-069748

Vice President

Enclosure

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ARCADIS Design & Consultancy for natural and built assets

Northrop Grumman Systems Corporation

2017 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

Operable Unit 3 - Groundwater

Bethpage, New York

NYSDEC ID # 1-30-003A

March 30, 2018

2017 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

Operable Unit 3 - Groundwater Containment System Bethpage, New York
NYSDEC ID # 1-30-003A

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2017 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT
Operable Unit 3 – Groundwater
Bethpage, New York
NYSDEC ID # 1-30-003A

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1 INTRODUCTION

Pursuant to the Administrative Order on Consent (AOC) Index #W1-0018-04-01 (New York State Department of Environmental Conservation [NYSDEC] 2005) and the Operable Unit 3 (OU3) Record of Decision (NYSDEC 2013), Arcadis of New York, Inc. (Arcadis), on behalf of Northrop Grumman Systems Corporation (Northrop Grumman), has prepared this OU3 Bethpage Park Groundwater Containment System (BPGWCS) Annual Summary Report for submittal to the NYSDEC. The present-day Bethpage Community Park property (Park), the McKay Field, and Plant 24 Access Road, which the NYSDEC has termed the "Former Grumman Settling Ponds Area" and designated as OU3, are referred to herein as the Site Area. Figure 1 provides a Site Area location map.

The BPGWCS (previously referred to as the Groundwater Interim Remedial Measure) has been operational since July 21, 2009. The operation, maintenance, and monitoring (OM&M) activities performed during 2017 (i.e., January 1 through December 31, 2017 [the "annual reporting period"]) are summarized in this Annual Summary Report. This report also describes the Operation, Maintenance, and Monitoring (OM&M) activities performed during the Fourth Quarter of 2017 (i.e., October 1 through December 31, 2016 [the "Fourth Quarter"]). Data summaries for the previous three 2017 quarterly operational periods are available in the following letter reports:

- Results of First Quarter 2017 System Operation and Monitoring for the Bethpage Park Groundwater Containment System, May 2017 (Arcadis 2017a)
- Results of Second Quarter 2017 System Operation and Monitoring for the Bethpage Park Groundwater Containment System, August 2017 (Arcadis 2017b)
- Results of Third Quarter 2017 System Operation and Monitoring for the Bethpage Park Groundwater Containment System, November 2017 (Arcadis 2017c)

During the annual reporting period, the BPGWCS Remedial System and Environmental Effectiveness Monitoring Programs were conducted in accordance with the OU3 Groundwater Interim Operation, Maintenance, and Monitoring Manual (OM&M Manual; Arcadis 2016).

As discussed in the OU3 Site Area Remedial Investigation Report (Site Area RI) (Arcadis 2011), Northrop Grumman does not take responsibility for certain compounds (e.g., Freon 12 and Freon 22) present in Site Area groundwater. Throughout this Annual Report, a distinction is made between "Project" and "Non-Project" volatile organic compounds (VOCs), defined as follows:

- Project VOCs: VOCs that may be related to former Northrop Grumman historical activities. For this OM&M Report, Project VOCs include 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene (TCE); vinyl chloride (VC); cis-1,2-dichloroethene (cis-1,2-DCE); trans-1,2-dichloroethene (trans-1,2-DCE); benzene; toluene; xylene-O, and xylenes-M,P.
- Non-Project VOCs: VOCs, such as Freon 12 and Freon 22, that are understood to be unrelated to former Northrop Grumman activities but have been detected in Site Area groundwater. As noted in the Site Area RI (Arcadis 2011), a sub-plume of Freon 22 has been identified originating from the area of the Town of Oyster Bay's (Town's) former ice rink (shown on Figure 2). Based on Town information (Zervos 2007), Freon 22 was used by the Town and released to the environment.

2 BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM OBJECTIVES

Remedial action objectives (RAOs) for the BPGWCS are as follows:

- Mitigate the off-site migration of dissolved-phase VOCs. Specifically, the BPGWCS addresses:
    - Groundwater that has total VOC concentrations greater than 5 micrograms per liter (µg/L) in the upper 20 feet of the surficial aquifer across the 1,200-foot-wide lateral extent of the Site Area southern boundary.
    - Groundwater below the upper 20 feet of the surficial aquifer that has total VOC concentrations greater than 50 µg/L across the 1,200-foot-wide lateral extent of the Site Area southern boundary.
- Comply with applicable NYSDEC standards, criteria, and guidance values (SCGs) for treated water and air emissions.

A secondary benefit of the BPGWCS is the creation of a clean-water front atop downgradient groundwater, which minimizes the potential for vapor intrusion downgradient of the Site Area.

3 BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM DESCRIPTION

The BPGWCS consists of:

- A pump-and-treat system where groundwater is:
    - Extracted along the Plant 24 Access Road via four remedial wells.
    - Conveyed to a treatment plant at McKay Field via four underground pipelines.
    - Treated via air stripping to reduce concentrations of Project and Non-Project VOCs to comply with applicable NYSDEC SCGs for treated water.
    - Filtered to remove oxidized metals to comply with applicable NYSDEC SCGs for treated water.
    - Returned to the aquifer via a discharge pipeline routed to a recharge basin located on the adjacent former Bethpage Navy Weapons Industrial Reserve Plant property.
- A vapor-phase treatment system that reduces concentrations of Project VOCs in the air stripper off-gas prior to discharge to the atmosphere.
- A groundwater monitoring network periodically monitored to assess environmental effectiveness of the BPGWCS.

Major components of the BPGWCS are as follows:

- Four remedial wells (RW-1, RW-2, RW-3, and RW-4) with design pumping rates of 30 gallons per minute (gpm), 75 gpm, 75 gpm, and 30 gpm, respectively; for a total design influent flow rate of 210 gpm.
- One low-profile air stripper to remove VOCs from extracted groundwater prior to discharge to the recharge basins.
- Two bag filter units configured so that one is operational and the other is in standby mode. The system control logic automatically switches from the operational filter unit to the standby filter unit when the bag filter is full to prevent a system shutdown and the spent filters are then replaced.
- Four emission control units, two containing vapor-phase granular-activated carbon and two containing potassium permanganate-impregnated zeolite, to treat Project VOCs in the air stripper off-gas.
- A groundwater monitoring network, consisting of 35 monitoring locations, including 17 groundwater monitoring wells, four remedial wells, and 14 piezometers.

The OM&M Manual (Arcadis 2016) provides additional information on the BPGWCS. Figure 2 shows the layout of the BPGWCS, and Figure 3 provides a schematic drawing. Figure 4 shows groundwater sampling locations that form the groundwater monitoring network. Appendix A provides construction details for the monitoring wells and piezometers.

4 OPERATION AND MAINTENANCE ACTIVITIES

4.1 Annual System Performance and Alarm Summary

The 2017 system operational up-time is provided on Table 1 and summarized below. System shutdowns that occurred in 2017 are summarized below.

In 2017:

- The system operated 354 out of 365 days (97% uptime), up from 96% runtime observed in 2016.
- The remedial wells operated at reduced flow rates during portions of the year due to pump wear, which is attributed to iron build-up in the pumps, influent pipelines and valves. The reduced flow rates were corrected by adjusting the manifold globe valves or through the performance of periodic system maintenance (i.e. pulling and replacing the remedial well pumps, well redevelopment and valve cleaning).
- There were thirty-eight (38) routine system shutdowns (less than 12 hours) due to alarm conditions encountered during normal operation of the system. Alarms in this category were responded to and troubleshooting was completed to restart the system within the same day (less than 12 hours).
- The following five (5) non-routine system shutdowns resulted in downtime for greater than 12 hours, of which:

- One (1) shutdown was due to LOTO (Lock out tag out) procedures to accommodate relocation of an electrical box. The system was restarted following completion.
- One (1) shutdown was due to a RW-2 pump motor overload condition. The system was restarted following completion of a pump and motor replacement.
- Two (2) shutdowns were due to alarm conditions encountered during the normal operation of the system:
    - One (1) alarm condition was due to an air stripper low air flow alarm. The problem was corrected by adjusting the air stripper blower variable frequency drive and resetting the alarm.
    - One (1) alarm condition was due to a sump-pump alarm. The problem was corrected by replacing the transfer pump and restarting the system.
- One (1) shutdown was required between July 25 and July 28 to accommodate vapor intrusion sampling at the former Plant 24 building.

There were approximately 66 days of reduced flow, which was due to unforeseen RW-2 motor and pump overload conditions associated with iron build-up. Generally, the system was restarted without incident the same day or the day following routine alarms. OM&M activities were conducted in accordance with the OU3 Groundwater Interim OM&M Manual.

5 SYSTEM MONITORING ACTIVITIES

5.1 2017 System Monitoring Activities

The following compliance and performance monitoring activities were conducted during the annual reporting period (see Appendix B, Appendix B-1 for a summary of the compliance and performance monitoring program requirements):

- Twelve (12) sampling events to collect required water samples and air samples
- Fifty (50) weekly site visits to monitor and record key system operational parameters

System O&M results for the annual reporting period are summarized in the following tables and figures:

- Operational Summary, including monitoring events, system operational days, and noteworthy site activities (Table 1);
- Summary of Influent and Effluent Water Sample Analytical Results (Tables 2 and 3, respectively) - Table 3 also provides the BPGWCS treatment system removal efficiency;
- Summary of Influent and Effluent Vapor Sample Analytical Results and Summary of Effluent Vapor Tentatively Identified Compounds (Tables 4, 5 and 6, respectively) - Table 5 also provides the BPGWCS treatment system removal efficiency;
- Summary of System Parameters, including flow rates, line pressures, and temperatures (Table 7);

- Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates (Table 8) - Table 8 provides a breakdown of these parameters by Remedial Well and System and breaks down the VOC mass recovered and VOC recovery rates into Project, Non-Project, and total VOCs;
- Cumulative Total, Project, and Non-Project VOC Mass Removed (Figure 5);
- Remedial Well Total, Project, and Non-Project VOC Concentrations (Figures 6A, 6B, and 6C, respectively);
- Influent Total, Project, and Non-Project VOC Concentrations (Figure 7); and,
- Total, Project, and Non-Project VOC Mass Recovery Rates (Figures 8A, 8B, and 8C, respectively).

5.2 Summary of Monitoring Results and Conclusions

5.2.1 System Operation and Effectiveness

Annual BPGWCS monitoring results and conclusions are summarized below:

- Total volume of groundwater recovered and treated (Table 8):
  - 2017 Annual Total: 101 million gallons
  - Cumulative total since system startup: 868 million gallons
- Total VOC mass recovered (Table 8 and Figure 8A):
  - 2017 Annual Total: 17 lbs of VOCs
  - Cumulative total since system startup: 2,172 lbs of VOCs
- VOC mass recovered and mass removal rates (Table 8 and Figures 8A, 8B, and 8C):
  - The majority of VOCs recovered during the annual reporting period were Project VOCs (82 percent or 14 lbs).
  - Majority of Project VOCs are recovered by RW-2 (91 percent or 12.8 lbs) and RW-3 (8 percent or 1.1 lbs)
  - Majority of Non-Project VOCs are recovered by RW-3 (41 percent or 1.13 lbs), RW-4 (38 percent or 1.05 lbs), and RW-2 (21 percent or 0.56 lbs)
- Treatment system influent concentrations (Tables 2 and 11, and Figures 6A, 6B, 6C, and 7):
  - Project VOC influent concentration, which ranged from 9.5 µg/L to 19 µg/L during the annual reporting period, is consistent with historical values. Project VOC influent concentration was generally stable over the annual reporting period. These concentrations are below the peak concentration observed in 2014 (105 µg/L) and lower than the lowest concentrations observed in 2016 (27 µg/L in August and December). Project VOC influent concentrations have generally decreased since 2010.

  - Non-Project VOC influent concentration, which ranged from 0.65 µg/L to 3.2 µg/L during the annual reporting period, is consistent with historical values. Non-Project VOC influent concentrations generally decreased over the annual reporting period. These concentrations are below the peak concentration observed in 2014 (55 µg/L). Non-Project VOC influent concentrations have generally decreased since 2010.
  - Total iron (161 µg/L to 1,080 µg/L) and dissolved iron (123 µg/L to 225 µg/L) were detected during the annual reporting period, which is consistent with historical values.
  - Total chromium (12 µg/L) and dissolved chromium (11 µg/L) were detected in the Third Quarter influent samples, which is consistent with historical values.
  - Mercury has not been detected in any influent or effluent sample since system startup.

- Project VOCs in Remedial Wells RW-1, RW-3, and RW-4 (Table 10) were not detected during the Fourth Quarter above applicable SCGs and generally decreased in concentration during the annual reporting period.
  - In RW-2, several Project VOCs (cis-1,2-DCE, toluene, TCE, and VC) continue to be detected above applicable SCGs, but the detections remained stable or have decreased in concentration during the annual reporting period.
  - RW-2 Project VOCs have decreased from the peak total concentration observed at system startup in July 2009 (3858 µg/L) to the most recent low of 32.2 µg/L in August 2017.
  - Similar to total influent concentrations, Project VOC remedial well concentrations have generally decreased since 2010, with Project VOCs not detected above applicable SCGs in Remedial Well RW-3 since November 2013, and no detections in RW-1 and RW-4 since system startup.
- Non-Project VOCs in Remedial Wells RW-1, RW-2, RW-3 and RW-4 (Table 10) were not detected above applicable SCGs during the Fourth Quarter. Similar to total influent concentrations, Non-Project VOC remedial well concentrations have generally decreased during the annual reporting period and since 2010, with Non-Project VOCs not detected above applicable SCGs in Remedial Wells RW-1, RW-2, or RW-4 since system startup. Only two detections of Non-Project VOCs have been above applicable SCGs in RW-3 since system startup.
- Metals concentrations in remedial wells during the annual reporting period (Table 11) are consistent with historical metals concentrations.
- The air stripper, air stripper off-gas treatment system, and bag filter system performed within acceptable operating ranges during the annual reporting period, as indicated by:
  - The air stripper VOC removal efficiency was greater than 99.9 percent for Project and Non-Project VOCs (Table 3).
  - Reduced air flow (monthly average flow rate of 1628 scfm) was observed during the annual reporting period (Table 7), which is likely due to iron build up on the lower tray of the air stripper

tower. Despite the lower air flow, proper treatment is still being obtained, as discussed above, and air stripper maintenance is scheduled for Spring 2018.

- With the exception of iron, both water and air discharges complied with applicable SCGs and discharge limits (Tables 3, and 9).

5.2.2 Regulatory Status of Discharges

5.2.2.1 Air Discharge

Influent concentrations for the annual reporting period were compared to 6NYCRR III A Part 212-2.3(b) (Rule 212), Table 4 - Degree of Air Cleaning Required for Non-Criteria Air Contaminants. Concentrations of all effluent compounds detected during the Fourth Quarter were less than 16,976 µg/m^3 (concentration equivalent to 0.1 pounds per hour at a flow rate of 1,576 standard cubic feet per minute), as shown in Table 9 of this report. Therefore, in accordance with the requirements of Table 4 of the NYSDEC regulations, air dispersion modeling was performed to demonstrate that the maximum off-site air concentration is less than the NYSDEC Division of Air Resources (DAR-1) Annual Guidance Concentrations (AGCs) on a 12-month rolling average and Short-term Guidance Concentrations (SGCs), issued August 10, 2016 (NYSDEC 2016).

Effluent concentrations for the annual period are provided on Table 5. The U.S. Environmental Protection Agency (USEPA) air quality dispersion model AERMOD was executed to estimate the highest ambient air concentration of the compounds on Table 5. AERMOD is the USEPA's recommended best state-of-the-art practice Gaussian plume dispersion model. Gaussian models are the most widely used techniques for estimating the impact of non-reactive pollutants, per Appendix W of Title 40 Code of Federal Regulations (CFR) 51 – Guideline of Air Quality Models.

The following parameters were used for the AERMOD model analysis:

- Urban dispersion coefficients
- AERMAP base and terrain elevations, processed using National Elevation Dataset (NED) digitized terrain data
- Surface and upper air observations measured at the Nation Weather Service stations located at Farmingdale and Brookhaven airports for calendar years 2011-2015, in accordance with NYSDEC's DAR-1 Air Dispersion Modeling Guidance Document. This longer timeframe was reviewed for the model run, to provide a conservative estimate of atmospheric impacts on the off-site concentrations.
- Discrete receptor grids, per the following methodology:
  - Receptors were located along the property boundary at distances not exceeding 25 meters;
  - A 1.5 km x 1.5 km Cartesian grid receptors with distances of 50 meters between the receptors; and
  - A 3.0 km x 3.0 km Cartesian grid receptors with distances of 100 meters between the receptors.
- Emission rate: 1 gram per second (g/s).

Table 9 provides the compound specific scaled hourly ambient air impact and the scaled annual ambient air impact for the Fourth Quarter sampling event. Based on the model, the maximum one-hour ambient air impact was 3,153.03 [µg/m^3]/[g/s] and the maximum annual ambient air impact was 96.49 [µg/m^3]/[g/s]. As shown, the scaled ambient air impacts for the BPGWCS are below the corresponding SGCs and AGCs, which is consistent with the previous quarterly results during the annual reporting period.

Based on the ambient modeling analysis, the BPGWCS effluent air discharge for the annual reporting period meets the requirements for DAR-1 and is below the Rule 212 requirements.

5.2.2.2 Water Discharge

The BPGWCS-treated water effluent met NYSDEC regulatory requirements during the annual reporting period (Table 3 and Appendix B), except where noted below:

- The measured concentration of individual VOCs in the treated water effluent were below applicable discharge limits, per the interim State Pollutant Discharge Elimination System (SPDES) equivalency permit.
- The measured concentration of total and dissolved iron in the treated water effluent were below applicable SPDES discharge limits, except for the February 2017 effluent iron samples (4,590 µg/L and 1,580 µg/L, respectively), which exceeded the discharge limit of 600 µg/L. The exceedance is attributed to iron precipitate in the sampling port. Total and dissolved iron was generally stable over the annual reporting period, excluding the February sample.
- Dissolved cadmium (3.1 µg/L) was detected for the first time since system startup in the June 2017 effluent sample. The detection was below the discharge limit of 5.0 µg/L.
- Total and dissolved chromium continued to be non-detect during the annual reporting period and have only been detected once in effluent samples in February 2015.
- Total cadmium and total mercury continue to be non-detect and have not been detected in effluent samples since system startup.

6 ENVIRONMENTAL EFFECTIVENESS MONITORING

BPGWCS environmental effectiveness (i.e., hydraulic monitoring and groundwater quality monitoring) activities and results for the annual reporting period are discussed below.

6.1 Hydraulic Monitoring

6.1.1 Activities

In accordance with OM&M Manual requirements and methodologies (ARCADIS 2016), groundwater hydraulic monitoring was performed quarterly during the annual reporting period. Specifically, depth-to-water measurements were completed on March 31, June 13, August 22 and November 17, 2017, at the

42 locations forming the approved monitoring well network (Figure 4). Table 12 summarizes results of depth-to-water measurements to date.

6.2 Groundwater Quality Monitoring

6.2.1 Activities

An annual groundwater sampling round was performed in July and August 2017 as part of site-wide sampling activity. Groundwater samples were collected from 13 monitoring wells included in the OU3 OM&M Manual (Arcadis 2016). A Phase 1 Hydraulic Effectiveness Evaluation (HEE) of the BPGWCS was performed in 2014-2015 (ERM 2015). As part of this HEE, a total of 6 monitoring wells and 6 piezometers were installed. Groundwater samples were also collected during this annual round from 4 of the monitoring wells installed during the Phase 1 HEE (i.e., MW-204-1, MW-205-1, MW-206-1 and MW-208-1). Monitoring Wells MW-207A and MW-207B, installed during the Phase 1 HEE, were assessed and found to be unusable. Therefore, monitoring wells will be replaced in 2018 as part of a Phase 2 HEE being conducted in accordance with the NYSDEC-approved "Work Plan for Supplemental Groundwater Characterization Bethpage Park Groundwater Containment System", dated September 30, 2016 (EMAGIN 2016).

Groundwater samples collected from the 17 monitoring wells were analyzed for Target Compound List (TCL) VOCs, plus Freon 12 and Freon 22, using USEPA Method 8260C, 1,4-Dioxane using USEPA Method 522 SIM and total and dissolved metals (cadmium and chromium) using USEPA Method 6010.

6.2.2 Results

Groundwater quality data, including historical results to date, are summarized in Table 13 (VOCs and 1,4-Dioxane) and Table 14 (metals).

6.3 Environmental Effectiveness Monitoring Conclusions

An evaluation of the hydraulic control of the BPGWCS will be performed when the Phase 2 HEE is completed. The results of this evaluation will be reviewed, as appropriate, and provided to NYSDEC for comments.

- The BPGWCS is operating as designed and as stated in the Phase 1 HEE (ERM 2015) and the BPGWCS is effective in controlling shallow Project and Non-Project VOCs in groundwater at and below the water table (down to a depth of at least 175 feet below grade surface).
- The presence of toluene was indicated in deep groundwater during the Phase 1 HEE. This will be further evaluated during the Phase 2 HEE, which will be completed in 2018.

7 RECOMMENDATIONS

- Based on the results of the Phase 1 HEE and the groundwater analytical results collected during the annual reporting period, Arcadis recommends continued operation of the BPGWCS.
- Remove mercury from the SPDES equivalency monitoring program because mercury has not been detected in any system effluent water sample analyzed for mercury.

8 REFERENCES

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TABLES

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

ARCADIS Design & Consultancy for natural and built assets

MONTH	DAY																													Days Operational [1]
	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	
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																								2								31
Feb-17																									3							26
Mar-17																									4							31
1Q 2017																																88
Apr-17																																30
May-17																																31
Jun-17													5							6												29
2Q 2017																																90
Jul-17																	7								8							25
Aug-17																																31
Sep-17											9																					30
3Q 2017																																86
Oct 2017																																31
Nov 2017																							10		11							28
Dec 2017																																31
4Q 2017																																90
2017 Total																																354
TOTAL																																**2972**

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

Legend:

	Indicates system online the majority or all of the day.
	Indicates system operated with reduced flow rates.
	Indicates system off-line the majority or all of the day.

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.

Second Quarter 2017

5. RW-2 flow less than 60 gpm due to pump fouling and motor issues. Pump fouling is attributed to iron buildup from high influent iron concentrations. A new pump and motor were installed on June 27, 2017
6. The system was offline for approximately 26 hours due to LOTO procedures to accommodate relocation of an electrical box during excavation and paving.

Third Quarter 2017

7. System shut down due to sump-pump alarm.
8. Various system alarms during pH calibration.
9. RW-2 flow less than 60 gpm due to pump fouling and motor issues. Pump fouling is attributed to iron buildup from high influent iron concentrations. A new pump and motor were installed on September 25, 2017.

Fourth Quarter 2017

10. System shut down due to replacement of RW-2 pump.
11. System running at a reduced flow due to RW-2 shutdown. RW-1, RW-3, and RW-4 operational.

Abbreviations/Units:

4Q	fourth quarter
LOTO	Lock Out Tag Out
RW	Recovery Well
gpm	gallons per minute

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

Compound	03/17/17 (µg/L)	06/16/17 (µg/L)	08/16/17 (µg/L)	11/29/17 (µg/L)
Project VOCs				
1,1,1 - Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1 - Dichloroethane	**0.29 J**	< 1.0	< 1.0	< 1.0
1,2 - Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1 - Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	**4.1**	**3.5**	**3.3**	**3.9**
Vinyl Chloride	**5.9**	**3.4**	**2.1**	**4.3**
cis 1,2-Dichloroethene	**8.2**	**4.7**	**4.1**	**6.2**
trans 1,2-Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	**0.63 J**	< 1.0	< 1.0	< 1.0
Xylene-O	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes - M,P	< 1.0	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs	**19**	**12**	**9.5**	**14**
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
1,3-Butanone	NA	< 5.0	< 5.0	< 5.0
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 J
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)	**2.0 J**	< 5.0	< 5.0	< 5.0
Chloroethane	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	**1.0**	**0.88 J**	**0.71 J**	**0.65 J**
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	**0.22 J**	< 1.0	< 1.0	< 1.0
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
1-Chloro-1,1-difluoroethane (Freon 142b)	NA	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs	**3.2**	**0.88**	**0.71**	**0.65**
Total VOCs[1]	**22**	**13**	**10**	**15**
1,4-Dioxane[2]	**0.93**	**0.87**	**0.67**	**0.85**

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

Compound	03/17/17 (µg/L)	06/16/17 (µg/L)	08/16/17 (µg/L)	11/29/17 (µg/L)
Inorganics				
Dissolved Cadmium	NA	NA	< 3.0	NA
Total Cadmium	NA	NA	< 3.0	NA
Dissolved Chromium	NA	NA	**12**	NA
Total Chromium	NA	NA	**11**	NA
Dissolved Iron	**146**	**123**	**151**	**225**
Total Iron	**233**	**161**	**195**	**1080**
pH[3]	**5.5**	**5.3**	**5.6**	**5.7**

Abbreviations, Notes, Qualifiers, and Units:

NA Not Analyzed
ND Not Dectected
USEPA United States Environmental Protection Agency
VOC Volatile Organic Compound

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 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 a field calibrated pH/conductivity meter. pH units are standard units.

146 Bold value indicates a detection.
< 1.0 Compound not detected at or above the laboratory quantification limit.
J Compound detected below the reporting limit; value is estimated.

µg/L micrograms per liter

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

Compound	Discharge Limit[1] (µg/L)	01/20/17 (µg/L)	02/22/17 (µg/L)	03/17/17 (µg/L)	04/21/17 (µg/L)	05/11/17 (µg/L)	06/18/17 (µg/L)	08/01/17 (µg/L)	08/16/17 (µg/L)	09/11/17 (µg/L)	10/12/17 (µg/L)	11/29/17 (µg/L)	12/20/17 [2] (µg/L)
Project VOCs													
1,1,1-Trichloroethane	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50
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	NA
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	NA
1,1-Dichloroethene	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50 J	< 0.50
Tetrachloroethene	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50
Trichloroethene	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50
Vinyl Chloride	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50
cis 1,2-Dichloroethene	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50
trans 1,2-Dichloroethene	5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50 J	< 0.50
Benzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	NA
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
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	NA
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	NA
Subtotal Project VOCs		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**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

Compound	Discharge Limit[1] (µg/L)	01/20/17 (µg/L)	02/22/17 (µg/L)	03/17/17 (µg/L)	04/21/17 (µg/L)	05/11/17 (µg/L)	06/16/17 (µg/L)	08/01/17 (µg/L)	08/16/17 (µg/L)	09/11/17 (µg/L)	10/12/17 (µg/L)	11/29/17 (µg/L)	12/20/17 [2] (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	NA
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
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	NA
1,3-Butadiene	0.5 [4]	NA	NA	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NA
2-Butanone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 5.0	NA
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	NA
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 5.0	NA
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	NA
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	R [5]	NA
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	NA
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
Chlorodifluoromethane (Freon 22)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	R [5]	NA
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
Chloroform	7, 5[3]	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
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	NA
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	NA
Dichloromethane	5[3]	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	< 0.50
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NA
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	NA
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	NA
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	NA
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	NA
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	NA
Trichlorotrifluoroethane (Freon 113)	5[3]	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.50 J	< 0.50
1-Chloro-1,1-difluoroethane (Freon 142b)	NE	NA	NA	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NA
Subtotal Non-Project VOCs		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total VOCs[6]		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Treatment Efficiency[7]		> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 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

Compound	Discharge Limit[1] (µg/L)	01/20/17 (µg/L)	02/22/17 (µg/L)	03/17/17 (µg/L)	04/21/17 (µg/L)	05/11/17 (µg/L)	06/16/17 (µg/L)	08/01/17 (µg/L)	08/16/17 (µg/L)	09/11/17 (µg/L)	10/12/17 (µg/L)	11/29/17 (µg/L)	12/20/17 [2] (µg/L)
Inorganics													
Dissolved Cadmium	5	NA	NA	< 3.0	NA	NA	**3.1**	< 3.0	< 3.0	NA	NA	< 3.0	NA
Total Cadmium	5	NA	NA	< 3.0	NA	NA	< 3.0	< 3.0	< 3.0	NA	NA	< 3.0	NA
Dissolved Chromium	50	NA	NA	< 10	NA	NA	< 10	< 10	< 10	NA	NA	< 10	NA
Total Chromium	50	NA	NA	< 10	NA	NA	< 10	< 10	< 10	NA	NA	< 10	NA
Dissolved Iron	600	**223**	**1580** [8]	**155**	**136**	**184**	**102**	**200**	**163**	< 100 [9]	**132**	**245**	**153**
Total Iron	600	**265**	**4590** [8]	**245**	**236**	**242**	**140**	**241**	**179**	**129** [9]	**193**	**275**	**212**
Total Mercury	250	< 0.20	< 0.30	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
1,4-Dioxane[10]	NE	**0.86**	**1.5**	**1.0**	**0.82**	**1.0**	**0.89**	**0.78**	**0.75**	**0.70**	**0.64**	**0.77**	**0.85**
pH[11]	5.5 - 8.5	**4.2** [12]	NA [13]	**6.5**	**6.4**	**6.4**	**7.0**	NA [13]	**6.2**	**6.6**	**6.3**	**6.6**	**6.9**

Abbreviations, Notes, Qualifiers, and Units:

MS	Matrix Spike
MSD	Matrix Spike Duplicate
NA	Not Analyzed
NE	Not Established
NYSDEC	New York State Department of Environmental Conservation
SPDES	State Pollutant Discharge Elimination System
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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. As of December 2017, plant effluent is only analyzed for the following 10 SPDES VOCs: 1,1,1-Trichloroethane, 1,1-Dichloroethene, Tetrachloroethene, Trichloroethene, Vinyl Chloride, cis 1,2-dichloroethene, trans 1,2-dichloroethene, chloroform, dichloromethane, trichlorotrifuoroethane;in accordance with Site Number 1-30-003A operable Unit 3 SPDES Permit Equivalency.
3. As of September 2017, discharge limits for the 10 SPDES VOCs, per Site Number 1-30-003A Operable Unit 3 SPDES Permit Equivalency.
4. Discharge limit per Department of Environmental Conservation Chapter X- Division of Water Part 703.
5. Carbon Disulfide and Chlorodifluoromethane (Freon 22) results rejected due to compounds MS/MSD recovery precentage falling below 10%.
6. "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
7. Treatment efficiency was calculated by dividing the difference between the influent and effluent total VOC concentrations by the influent total VOC concentration.
8. The 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
9. Iron sampled on 09/13/17 due to technician error.
10. Samples collected were analyzed for 1,4-Dioxane using USEPA Method 522.
11. 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.
12. 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.
13. pH not recorded due to technician error.

200	Bold value indicates a detection.
< 1.0	Compound not detected above the laboratory quantification limit.
J	Compound detected below the reporting limit; value is estimated.
R	Indicates rejected value
	Indicates an exceedance of an SCG.
µg/L	micrograms per liter

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

Compound[1]	03/17/17 (µg/m^3)	06/16/17 (µg/m^3)	08/16/17 (µg/m^3)	11/29/17 (µg/m^3)
Project VOCs				
1,1,1 - Trichloroethane	< 0.55	< 2.2	**0.71**	**0.65**
1,1 - Dichloroethane	**3.5**	**3.4**	**4.0**	**3.6**
1,2 - Dichloroethane	< 0.81	< 3.2	< 0.81	< 0.81
1,1 - Dichloroethene	**1.8**	< 3.2	**2.3**	**2.1**
Tetrachloroethene	**0.50**	**3.8**	**20**	**5.2**
Trichloroethene	**11**	**58**	**74.7**	**70.4**
Vinyl Chloride	**95**	**45**	**52.1**	**71.8**
cis 1,2-Dichloroethene	**77**	**67**	**93.6**	**122**
trans 1,2-Dichloroethene	**0.27 J**	< 3.2	**0.48 J**	< 0.79
Benzene	< 0.64	< 2.6	< 0.64	**0.32 J**
Toluene	< 0.75	**2.4 J**	**0.60 J**	**2.4**
Xylene-O	< 0.87	< 3.5	< 0.87	< 0.87
Xylenes - M,P	< 0.87	< 3.5	< 0.87	**0.69 J**
Subtotal Project VOCs	**190**	**179**	**248**	**279**
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 0.69	< 2.7	< 0.69	< 0.69
1,1,2-Trichloroethane	< 0.55	< 2.2	< 0.55	< 0.55
1,2-Dichloropropane	< 0.92	< 3.7	< 0.92	< 0.92
1,3-Butadiene	< 0.44	< 1.8	< 0.44	< 0.44
2-Butanone	**0.94**	**1.6 J**	**0.65**	**0.62**
4-Methyl-2-Pentanone	< 0.82	< 3.3	< 0.82	< 0.82
Acetone	**15**	**21**	**4.3**	**7.1**
Bromodichloromethane	< 0.67	< 2.7	< 0.67	< 0.67
Bromoform	< 0.41	< 1.7	< 0.41	< 0.41
Bromomethane	< 0.78	< 3.1	< 0.78	< 0.78
Carbon Disulfide	< 0.62	< 2.5	**0.72**	< 0.62
Carbon Tetrachloride	< 0.25	< 1.0	< 0.25	< 0.25
Chlorobenzene	< 0.92	< 3.7	< 0.92	< 0.92
Chlorodibromomethane	< 0.85	< 3.4	< 0.85	< 0.85
Chlorodifluoromethane (Freon 22)	**22**	**26**	**26**	**16**
Chloroethane	< 0.53	< 2.1	< 0.53	< 0.53
Chloroform	**13**	**15**	**18**	**13**
Chloromethane	**1.2**	1.5 J	**1.3**	**1.3**
cis-1,3-Dichloropropene	< 0.91	< 3.6	< 0.91	< 0.91
Dichlorodifluoromethane (Freon 12)	**1.9**	2.7 J	**3.0**	**2.4**
Dichloromethane	**1.4**	**3.8**	**1.8**	< 0.69
Ethylbenzene	< 0.87	< 3.5	**0.42 J**	< 0.87
Methyl N-Butyl Ketone	< 0.82	< 3.3	< 0.82	< 0.82
Methyl Tert-Butyl Ether	< 0.72	< 2.9	**0.72**	**0.35 J**
Styrene (Monomer)	< 0.85	< 3.4	< 0.85	< 0.85
trans-1,3-Dichloropropene	< 0.91	< 3.6	< 0.91	< 0.91
Trichlorofluoromethane (Freon 11)	**1.3**	< 2.2	**1.9**	**1.9**
Trichlorotrifluoroethane (Freon 113)	**1.7**	< 3.1	**2.5**	**2.1**
1-Chloro-1,1-difluoroethane (Freon 142b)	< 0.82	< 3.3	< 0.82	< 0.82
Subtotal Non-Project VOCs	**58**	**72**	**61**	**45**
Total VOCs[2]	**248**	**251**	**309**	**324**

Notes and abbreviations on last page.

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

Abbreviations, Notes, Qualifiers, and Units:

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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 sed in calculations referenced in this report have been rounded to the nearest whole number.

95	Bold value indicates a detection.
< 1.0	Compound not detected above the laboratory quantification limit.
J	Compound detected below the reporting limit; value is estimated.
µg/m^3	micrograms per cubic meter

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

Compound[1]	03/17/17 (µg/m^3)	06/16/17 (µg/m^3)	08/16/17 (µg/m^3)	12/1/2017 [3] (µg/m^3)
Project VOCs				
1,1,1 - Trichloroethane	< 1.1	< 2.2	< 0.55	< 0.55
1,1 - Dichloroethane	**11**	**5.3**	**3.9**	**3.9**
1,2 - Dichloroethane	< 1.6	< 3.2	< 0.81	< 0.81
1,1 - Dichloroethene	**2.4**	< 3.2	< 0.79	**0.83**
Tetrachloroethene	**25**	< 1.1	**1.8**	**0.47**
Trichloroethene	**10**	**2.1**	**2.1**	**4.2**
Vinyl Chloride	**53**	**2.8**	**1.6**	**8.9**
cis 1,2-Dichloroethene	**141**	**21**	**10**	**31**
trans 1,2-Dichloroethene	< 1.6	< 3.2	< 0.79	< 0.79
Benzene	**12**	< 2.6	**5.8**	**1.6**
Toluene	**7.2**	**1.1 J**	**1.8**	< 0.75
Xylene-O	**339**	**1.7 J**	< 0.87	< 0.87
Xylenes - M,P	**608**	**2.6 J**	**0.87**	< 0.87
Subtotal Project VOCs	**1209**	**37**	**28**	**51**
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 1.4	< 2.7	< 0.69	< 0.69
1,1,2-Trichloroethane	< 1.1	< 2.2	< 0.55	< 0.55
1,2-Dichloropropane	< 1.8	< 3.7	< 0.92	< 0.92
1,3-Butadiene	< 0.88	< 1.8	< 0.44	< 0.44
2-Butanone	**27**	< 2.4	**4.4**	**1.1**
4-Methyl-2-Pentanone	< 1.6	< 3.3	< 0.82	< 0.82
Acetone	**190**	**21**	**72**	**43**
Bromodichloromethane	< 1.3	< 2.7	< 0.67	< 0.67
Bromoform	< 0.83	< 1.7	< 0.41	< 0.41
Bromomethane	< 1.6	< 3.1	< 0.78	< 0.78
Carbon Disulfide	< 1.2	< 2.5	**0.72**	< 0.62
Carbon Tetrachloride	< 0.50	< 1.0	< 0.25	< 0.25
Chlorobenzene	< 1.8	< 3.7	< 0.92	< 0.92
Chlorodibromomethane	< 1.7	< 3.4	< 0.85	< 0.85
Chlorodifluoromethane (Freon 22)	**48**	**27**	**22**	**17**
Chloroethane	< 1.1	< 2.1	< 0.53	< 0.53
Chloroform	**58**	**27**	**19**	**20**
Chloromethane	**2.9**	**1.7**	**1.6**	**1.2**
cis-1,3-Dichloropropene	< 1.8	< 3.6	< 0.91	< 0.91
Dichlorodifluoromethane (Freon 12)	**3.7**	< 4.0	**3.3**	**2.3**
Dichloromethane	**1.9**	**3.2**	**1.8**	< 0.69
Ethylbenzene	**5.6**	**2.0 J**	**0.43 J**	< 0.87
Methyl N-Butyl Ketone	< 1.6	< 3.3	< 0.82	< 0.82
Methyl Tert-Butyl Ether	< 1.4	< 2.9	< 0.72	< 0.72
Styrene (Monomer)	< 1.7	< 3.4	< 0.85	< 0.85
trans-1,3-Dichloropropene	< 1.8	< 3.6	< 0.91	< 0.91
Trichlorofluoromethane (Freon 11)	**3.0**	< 2.2	**2.2**	**1.9**
Trichlorotrifluoroethane (Freon 113)	**4.2**	< 3.1	**2.4**	**2.5**
1-Chloro-1,1-difluoroethane (Freon 142b)	< 1.6	< 3.3	< 0.82	< 0.82
Subtotal Non-Project VOCs	**344**	**82**	**130**	**89**
Total VOCs[2]	**1553**	**119**	**158**	**140**

Notes and abbreviations on last page.

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

Abbreviations, Notes, Qualifers, and Units:

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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.
3. Fourth quarter effluent vapor sample collected two days after the influent vapor sample.

190	Bold data indicates that the analyte was detected at or above the reporting limit.
< 1.0	Compound not detected above the laboratory quantification limit.
J	Compound detected below the reporting limit; value is estimated.
$\mu g/m^3$	micrograms per cubic meter

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

Compound[1]	03/17/17 (ppbv)	06/23/17 (ppbv)	08/16/17 (ppbv)	12/01/17 (ppbv)
Tentatively Identified Compounds				
alkane	**36 J**	--	**14 JN**	--
alkane	**33 J**	--	**9.4 JN**	--
alkane	**27 J**	--	**9.2 JN**	--
alkane	**23 J**	--	**8.3 JN**	--
alkane	**21 J**	--	**7.8 JN**	--
alkane	**20 J**	--	**7.6 JN**	--
alkane	**17 J**	--	**7.4 JN**	--
alkane	**16 J**	--	**7.0 JN**	--
alkane	**14 J**	--	**7.0 JN**	--
C alkyl benzene	**13 J**	--	--	--
Cycloalkane/alkene	**19 J**	--	--	--
Cycloalkane/alkene	**14 J**	--	--	--
Cycloalkane/alkene	**12 J**	--	--	--
Carbon Dioxide	--	--	--	**290 JNB**
Pentyl-Cyclohexane	--	--	**11 JN**	**2.4 JN**
trans-2-methyl decalin	--	--	--	**3.0 JN**
Unknown	**23 J**	--	**8.8 JN**	--
Unknown	**21 J**	--	**8.1 JN**	--
Unknown	**18 J**	--	**6.3 JN**	--
Unknown	**16 J**	--	**5.4 JN**	--
Unknown	**14 J**	--	**4.4 JN**	--
Unknown Alkane	**14 J**	--	**6.5 JN**	--
Unknown Alkane	**13 J**	--	**6.1 JN**	--
Unknown Alkane	--	--	**5.1 JN**	--
Unknown Alkane	--	--	**5.0 JN**	--
Unknown Alkene	--	--	**7.9 JN**	--
Total VOC TICs	**384 J**	**0**	**152 JN**	**5.4 J**

Abbreviations, Notes, Qualifiers, and Units:

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
TIC	Tentatively Identified Compound
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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.

290	Bold data indicates that the TIC was detected at or above the reporting limit.
--	TIC not detected.
B	TIC was detected in the associated field blank.
J	TIC detected below the reporting limit; value is estimated.
N	Indicates presumptive evidence of a 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

Date [1]	Water Flow Rates						Water Pressures [2]					Air Flow Rate [2]	Air Pressures [5]					Air Temp. [5]
	Remedial Well [2]				Combined Influent [3]	Effluent [2]	Remedial Well Effluent [4]				Effluent	Effluent	ECU 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)	(^{o}R)
01/20/17	31.0	76.2	75.3	30.1	213	234	54	12	32	53	13	1,757	6.5	3.2	1.0	2.0	0.0	530
02/22/17	30.5	81.2	75.0	30.2	217	230	54	53	28	53	18	1,698	7.0	3.5	1.0	2.0	0.0	532
03/17/17	30.2	79.8	76.0	30.3	216	227	55	53	26	53	25	1,690	6.4	3.0	1.0	1.9	0.0	530
04/21/17	30.6	74.8	75.3	29.8	210	219	55	69	26	54	13	1,695	6.5	3.0	1.0	1.5	0.0	534
05/18/17	30.9	73.9	75.7	30.0	211	229	54	50	25	54	13	1,676	6.0	3.0	1.0	1.9	0.0	538
06/16/17	30.0	58.2	73.1	30.7	192	213	55	8	25	54	14	1,571	6.0	2.9	1.0	1.9	0.0	540
08/01/17	30.7	77.1	74.6	29.5	212	242	55	50	25	55	10	1,607	4.9	2.5	1.0	1.5	0.0	538
08/16/17	30.3	75.0	75.0	30.8	211	234	55	67	17	54	10	1,549	6.0	2.9	1.0	1.8	0.0	542
09/09/17	29.2	61.2	75.3	29.8	196	226	56	16	18	55	13	1,596	6.0	2.9	1.0	1.7	0.0	540
10/12/17	30.4	74.0	74.4	29.9	209	239	55	69	19	55	15	1,577	6.0	2.9	1.0	1.6	0.0	539
11/29/17	30.8	84.3	62.8	30.2	208	240	54	51	50	54	13	1,571	5.5	2.5	0.5	1.5	0.0	532
12/20/17	31.0	80.5	63.6	30.4	205	237	54	53	46	54	14	1,551	5.5	2.5	0.5	1.5	0.0	532

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

Abbreviations, Notes, and Units:

ECU	Emission Control Unit
GAC	Granular Activated Carbon
HMI	Human-Machine Interface
PPZ	Potassium Permanganate-impregnated Zeolite
RW	Remedial Well
SCADA	Supervisory Control and Data Acquisition
Temp	Temperature

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 recorded from field-mounted instruments during weekly site visits.

gpm	gallons per minute
iwc	inches of water column
psi	pounds per square inch
^{o}R	degrees Rankine
scfm	standard cubic feet per minute

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

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	< 0.01
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	< 0.01
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	< 0.01
April 2017 Through June 2017 Totals																																			
04/01/17 - 05/01/17	1,379	2,759	3,448	1,379	8,965	< 0.01	1.1	0.22	0.12	1.4	< 0.01	1.1	0.11	0.017	1.2	< 0.01	0.06	0.12	0.11	0.28	< 0.01	0.037	< 0.01	< 0.01	0.048	< 0.01	0.037	< 0.01	< 0.01	0.041	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
05/01/17 - 06/01/17	1,427	2,853	3,567	1,427	9,274	< 0.01	1.2	0.23	0.13	1.6	< 0.01	1.1	0.11	0.018	1.2	< 0.01	0.06	0.12	0.11	0.29	< 0.01	0.039	< 0.01	< 0.01	0.050	< 0.01	0.035	< 0.01	< 0.01	0.040	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
06/01/17 - 07/01/17	1,325	2,649	3,312	1,325	8,611	< 0.01	1.1	0.22	0.12	1.4	< 0.01	1.0	0.10	0.017	1.1	< 0.01	0.05	0.11	0.10	0.26	< 0.01	0.037	< 0.01	< 0.01	0.048	< 0.01	0.033	< 0.01	< 0.01	0.037	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Subtotal Apr - Jun 2017 [10]	4,131	8,261	10,327	4,131	26,850	< 0.01	3.4	0.67	0.37	4.4	< 0.01	3.2	0.32	0.050	3.6	< 0.01	0.17	0.34	0.32	0.83	< 0.01	0.037	< 0.01	< 0.01	0.049	< 0.01	0.04	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
July 2017 Through September 2017 Totals																																			
07/01/17 - 08/01/17	1,109	2,218	2,773	1,109	7,209	< 0.01	0.63	0.14	0.071	0.84	< 0.01	0.60	0.067	0.009	0.68	< 0.01	0.031	0.073	0.062	0.17	< 0.01	0.020	< 0.01	< 0.01	0.027	< 0.01	0.019	< 0.01	< 0.01	0.022	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
08/01/17 - 09/01/17	1,426	2,854	3,566	1,427	9,273	< 0.01	0.81	0.18	0.091	1.1	< 0.01	0.77	0.086	0.012	0.87	< 0.01	0.040	0.093	0.080	0.21	< 0.01	0.026	< 0.01	< 0.01	0.035	< 0.01	0.025	< 0.01	< 0.01	0.028	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
09/01/17 - 10/01/17	1,377	2,751	3,440	1,376	8,944	< 0.01	0.78	0.17	0.088	1.0	< 0.01	0.74	0.083	0.011	0.83	< 0.01	0.039	0.090	0.077	0.21	< 0.01	0.026	< 0.01	< 0.01	0.035	< 0.01	0.025	< 0.01	< 0.01	0.028	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
Subtotal Jul - Sept 2017 [11]	3,912	7,823	9,779	3,912	25,426	< 0.01	2.2	0.49	0.25	3.0	< 0.01	2.1	0.24	0.032	2.4	< 0.01	0.110	0.260	0.22	0.59	< 0.01	0.024	< 0.01	< 0.01	0.032	< 0.01	0.023	< 0.01	< 0.01	0.026	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
October 2017 Through December 2017 Totals																																			
10/01/17 - 11/01/17	1,362	2,967	3,392	1,357	9,078	< 0.01	1.2	0.16	0.09	1.4	< 0.01	1.2	0.082	0.014	1.3	< 0.01	0.035	0.083	0.078	0.20	< 0.01	0.038	< 0.01	< 0.01	0.046	< 0.01	0.037	< 0.01	< 0.01	0.040	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
11/01/17 - 12/01/17	1,199	2,413	2,059	1,183	6,854	< 0.01	0.97	0.10	0.08	1.2	< 0.01	0.94	0.050	0.012	1.0	< 0.01	0.028	0.050	0.068	0.15	< 0.01	0.032	< 0.01	< 0.01	0.038	< 0.01	0.031	< 0.01	< 0.01	0.033	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
12/01/17 - 01/01/18	1,347	3,497	1,924	1,327	8,094	< 0.01	1.4	0.09	0.09	1.6	< 0.01	1.4	0.046	0.014	1.4	< 0.01	0.041	0.047	0.076	0.16	< 0.01	0.045	< 0.01	< 0.01	0.051	< 0.01	0.044	< 0.01	< 0.01	0.046	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
Subtotal Oct - Dec 2017 [12]	3,908	8,877	7,374	3,867	24,026	< 0.01	3.6	0.35	0.26	4.2	< 0.01	3.5	0.18	0.040	3.7	< 0.01	0.104	0.180	0.22	0.51	< 0.01	0.039	< 0.01	< 0.01	0.045	< 0.01	0.038	< 0.01	< 0.01	0.040	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
2017 Totals	16,005	31,600	37,614	15,965	101,184	< 0.01	13	2.2	1.2	17	< 0.01	13	1.1	0.16	14	< 0.01	0.56	1.1	1.1	2.7	< 0.01	0.037	< 0.01	< 0.01	0.046	< 0.01	0.035	< 0.01	< 0.01	0.038	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total [13]	132,281	295,940	308,394	131,218	867,833	1.6	1,005	913	255	2,172	1.6	993	104	1.9	1,101	< 0.01	10.1	809	253	1,065	< 0.01	3.68	2.63	0.73	7.06	< 0.01	3.66	0.33	< 0.01	4.01	< 0.01	< 0.01	2.28	0.72	3.09

Abbreviations, Notes, Qualifiers, and Units:

NA Not Applicable
VOC Volatile Organic Compound.

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. The volume of groundwater recovered and mass recovered calculations represent the operational period between April 1, 2017 and July 1, 2017.
11. The volume of groundwater recovered and mass recovered calculations represent the operational period between July 1, 2017 and October 1, 2017.
12. The volume of groundwater recovered and mass recovered calculations represent the operational period between October 1, 2017 and January 1, 2018.
13. "Total" refers to the amounts removed by the Operable Unit 3 Bethpage Park Groundwater Containment System.

< Less than
gal Gallons
lbs Pounds
lbs/day Pounds per day

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	VSP-05 Vapor Effluent ($\mu g/m^3$)	Emission Rate[1]			Scaled Impact - Hourly[2] ($\mu g/m^3$)	Scaled Impact - Annual[2] ($\mu g/m^3$)	SGC[3] ($\mu g/m^3$)	AGC[3] ($\mu g/m^3$)	% of SGC	% of AGC
	12/1/2017[4]	lb/yr	lb/hr	g/s						
Project VOCs										
1,1 - Dichloroethane	3.9	0.20	2.30E-05	2.9E-06	9.1E-03	2.8E-04	NS	0.63	NS	0.0%
1,1 - Dichloroethene	0.8	0.04	4.89E-06	6.16E-07	1.94E-03	5.9E-05	NS	200	NS	0.0%
Tetrachloroethene	0.5	0.02	2.77E-06	3.5E-07	1.1E-03	3.4E-05	300	4	0.0%	0.0%
Trichloroethene	4.2	0.22	2.47E-05	3.1E-06	9.8E-03	3.0E-04	20	0.20	0.0%	0.2%
Vinyl Chloride	8.9	0.46	5.24E-05	6.6E-06	2.1E-02	6.4E-04	180,000	0.11	0.0%	0.6%
cis-1,2-Dichloroethene	31	1.60	1.83E-04	2.3E-05	7.3E-02	2.2E-03	NS	63	NS	0.0%
Benzene	1.6	0.08	9.43E-06	1.2E-06	3.7E-03	1.1E-04	1,300	0.13	0.0%	0.1%
Non-Project VOCs										
2-Butanone	1.1	0.06	6.48E-06	8.2E-07	2.6E-03	7.9E-05	13,000	5,000	0.0%	0.0%
Acetone	43.2	2.2	2.54E-04	3.2E-05	1.0E-01	3.1E-03	180,000	30,000	0.0%	0.0%
Chlorodifluoromethane (Freon 22)	17	0.9	1.00E-04	1.3E-05	4.0E-02	1.2E-03	NS	50,000	NS	0.0%
Chloroform	20	1.0	1.18E-04	1.5E-05	4.7E-02	1.4E-03	150	15	0.0%	0.0%
Chloromethane	1.2	0.06	7.07E-06	8.9E-07	2.8E-03	8.6E-05	22,000	90	0.0%	0.0%
Dichlorodifluoromethane (Freon 12)	2.3	0.12	1.35E-05	1.7E-06	5.4E-03	1.6E-04	NS	12,000	NS	0.0%
Trichlorofluoromethane (Freon 11)	1.9	0.10	1.12E-05	1.4E-06	4.4E-03	1.4E-04	9,000	5,000	0.0%	0.0%
Trichlorotrifluoroethane (Freon 113)	2.5	0.13	1.47E-05	1.9E-06	5.9E-03	1.8E-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

Abbreviations, Notes, and Units:

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

1. Emission rate calculated based on VSP-05 effluent concentration and a daily average exit air flow rate of 1,576 ft^3/min for 12/1/2017.
   1,1,1-Trichloroethane (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 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 (µg/m^3) = AERMOD predicted hourly ambient impact at 1 g/s ([µg/m^3]/[g/s]) x Actual emission rate
   Scaled annual impact (µg/m^3) = AERMOD predicted annual ambient impact at 1 g/s ([µg/m^3]/[g/s]) x Actual emission rate

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([µg/m^3]/[g/s])	Annual ([µg/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.
4. Compounds not detected above the laboratory reporting limit are excluded from the air quality impact analysis summary.

cfm	cubic feet per minute
g/s	grams per second
lb/hr	pounds per hour
lb/yr	pounds per year
µg/m^3	micrograms per cubic meter

Table 10
Summary of Remedial Well Groundwater Sample Analytical Results - VOCs
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound[1] (µg/L)	Sample Location: Sample Date: NYSDEC SCGs	RW-1 3/17/2017	RW-1 6/16/2017	RW-1 8/16/2017	RW-1 11/29/2017	RW-2 3/17/2017	RW-2 6/16/2017	RW-2 8/16/2017	RW-2 11/29/2017	RW-3 3/17/2017	RW-3 6/16/2017	RW-3 8/16/2017	RW-3 11/29/2017	RW-4 3/17/2017	RW-4 6/16/2017	RW-4 8/16/2017	RW-4 11/29/2017
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	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	**0.81 J**	**0.58 J**	**0.34 J**	**0.48 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.34 J**	< 1.0	**0.27 J**
1,2-Dichloroethane	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	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	**0.37 J**	< 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	**0.26 J**	< 1.0	< 1.0	< 1.0	**0.52 J**	**0.65 J**	**0.54 J**	**0.51 J**
Trichloroethylene	5	< 1.0	< 1.0	< 1.0	< 1.0	**13.6**	**12.1**	**10.4**	**11.4**	**2.2**	**2.2**	**1.7**	**1.8**	**0.54 J**	**0.52 J**	**0.45 J**	**0.46 J**
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	**23.9**	**15.2**	**6.7**	**15.0**	< 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	**30.9**	**18.9**	**14.8**	**19.4**	**2.0**	**1.6**	**1.2**	**1.1**	< 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	**0.43 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 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	**2.6**	**0.41 J**	< 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	**0.32 J**	< 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	< 1.0	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs		0.0	0.0	0.0	0.0	72.5	47.2	32.2	46.7	4.5	3.8	2.9	2.9	1.1	1.5	1.0	1.2
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	< 1.0	< 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	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	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	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Butadiene	0.5	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0
2-Butanone	NE	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 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	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	< 10	< 10	< 10	< 10	< 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	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J
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	< 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	< 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	< 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	< 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	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifluoromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.9 J**	**2.8 J**	**2.2 J**	**2.1 J**	**8.8**	**9.3**	**6.7**	**6.9**
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	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	**2.5**	**2.4**	**1.7**	**1.4**	**1.3**	**1.2**	**0.94 J**	**0.83 J**	< 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	< 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	< 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	< 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	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	**0.78 J**	< 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	< 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	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	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	< 1.0	< 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	< 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	< 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	< 5.0	< 5.0	< 5.0	< 5.0
1-Chloro-1,1-difluoroethane (Freon 142b)	NE	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs		0.0	0.0	0.0	0.0	3.3	2.4	1.7	1.4	4.2	4.0	3.2	2.9	8.8	9.3	6.7	6.9
Total VOCs[2]		0.0	0.0	0.0	0.0	75.8	49.6	33.9	48.1	8.7	7.8	6.0	5.83	9.9	10.8	7.7	8.1
1,4-Dioxane[3]		0.758	0.695	0.652	0.737	1.97	1.76	1.27	1.38	0.663	0.612	0.491	0.522	0.238	0.227	0.214	0.238

Notes and abbreviations on last page.

Table 10
Summary of Remedial Well Groundwater Sample Analytical Results - VOCs
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Abbreviations, Notes, Qualifiers, and Units:

ASP	Analytical Services Protocol
ELAP	Environmental Laboratory Approval Program
NA	Not Analyzed
NE	Not Established
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OLM	Ozone Limited Method
OM&M	Operation, Maintenance, and Monitoring
SCGs	Standards, Criteria, and Guidance values
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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 EPA 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. Samples collected were analyzed for 1,4-Dioxane using USEPA Method 522.

	Bold cell outline indicates an exceedance of an SCG
700	Bold data indicates a detection
< 5	Compound not detected above its laboratory quantification limit
J	Compound detected below its reporting limit; value is estimated
µg/L	micrograms per liter

Table 11
Summary of Remedial Well Groundwater Sample Analytical Results - Metals
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

COMPOUND[1] (µg/L)	NYSDEC SCGs	RW-1[2] 8/16/2017	RW-2[2] 8/16/2017	RW-3[2] 8/16/2017	RW-4[2] 8/16/2017
Total Cadmium	5	< 3.0	< 3.0	< 3.0	< 3.0
Dissolved Cadmium	5	< 3.0	< 3.0	< 3.0	< 3.0
Total Chromium	50	**36.4**	< 10	< 10	< 10
Dissolved Chromium	50	**34.4**	< 10	< 10	< 10
Total Iron	600	< 100	**719**	< 100	< 100
Dissolved Iron	600	< 100	**588**	< 100	< 100

Abbreviations, Notes, Qualifiers, and Units:

ELAP	Environmental Laboratory Approval Program
NS	Not Specified
NYSDEC	New York State Department of Environmental Conservation.
NYSDOH	New York State Department of Health
SCGs	Standards, Criteria, and Guidance values
USEPA	United States Environmental Protection Agency

1. Water samples collected by Arcadis on the dates shown and submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory for metals analysis using USEPA Method 6010. Results validated following protocols specified in Sampling and Analysis Plan in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016).
2. Beginning August 2017, metals analyses for recovery wells RW-1 through RW-4 are included with annual recovery well sampling performed in the third quarter of each year.

	Indicates an exceedance of an SCG.
719	Bold data indicates that the analyte was detected at or above its reporting limit.
< 5	Compound not detected above its laboratory quantification limit.
µg/L	micrograms per liter

Table 12
Summary of Water-Level Elevations
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Well Identification	Well Casing Elevation (ft msl)	Event Date	Baseline[1] 5/8/2009 (ft msl)	1Q2016 3/3/2016 (ft. msl)	2Q2016 5/27/2016 (ft. msl)	3Q2016 8/29/2016 (ft. msl)	4Q2016 11/8/2016 (ft. msl)
Recovery Wells							
RW-1	125.18		69.75	67.55	67.23	65.32	64.10
RW-2	124.48		72.27	58.96	58.83	58.68	55.22
RW-3	122.84		69.40	64.37	64.18	62.26	60.97
RW-4	121.24		69.25	66.84	66.61	64.60	63.46
Monitoring Wells							
B24MW-2	126.96		74.31	71.65	69.56	69.16	68.02
B24MW-3	127.11		72.63	69.39	69.06	67.16	65.85
B30MW-1	128.33		73.55	70.21	70.93	67.98	66.72
BCPMW-1	125.73		73.16	67.97	70.26	67.63	66.38
BCPMW-2	126.39		72.55	69.05	68.99	66.81	65.54
BCPMW-3	124.94		72.46	68.69	68.63	66.55	65.27
BCPMW-4-1	128.71		72.30	68.43	68.19	66.32	64.98
BCPMW-4-2	129.33		72.58	68.66	68.45	66.56	65.24
BCPMW-4-3	129.20		72.32	68.61	68.38	66.42	65.18
BCPMW-5-1	129.37		72.79	69.17	68.98	66.99	65.70
BCPMW-6-1	126.01		72.12	68.23	68.10	66.10	64.88
BCPMW-6-2	125.16		71.74	67.96	67.75	65.75	64.59
BCPMW-7-1	124.81		72.00	68.24	68.18	66.14	64.93
MW-200-1	123.49		72.16	68.55	68.23	66.40	65.11
MW-201-1	121.69		72.04	68.24	67.96	66.06	64.82
MW-202-1	119.27		71.90	68.18	67.98	66.00	64.82
MW-203-1	118.25		71.83	68.15	67.86	65.97	64.73
MW-204-1[2]	124.95		--	68.48	68.23	66.37	65.06
MW-205-1[2]	123.47		--	68.12	67.89	66.02	64.74
MW-206-1[2]	120.80		--	68.20	67.91	66.00	64.80
MW-207-1a[2]	120.38		--	NM[3]	NM[3]	NM[3]	NM[3]
MW-207-1b[2]	120.48		--	NM[3]	NM[3]	NM[3]	NM[3]
MW-208-1[2]	118.56		--	68.22	67.69	65.80	64.50
Piezometers							
PZ-1a	128.82		72.56	NM[4]	67.82	65.85	64.48
PZ-1b	128.92		72.47	68.21	68.14	66.21	64.82
PZ-1c	128.96		72.47	68.62	68.44	66.41	65.17
PZ-2a	128.36		72.47	68.22	68.03	66.08	64.82
PZ-2b	128.37		72.43	68.20	68.10	66.10	64.78
PZ-2c	128.55		72.41	68.53	68.28	66.30	65.08
PZ-3	124.99		72.52	68.10	67.93	66.01	64.66
PZ-4	125.31		72.50	68.18	68.01	66.15	64.79
PZ-5a	129.07		72.50	69.41	68.86	66.90	65.63
PZ-5b	129.06		72.50	69.06	68.70	66.80	65.58
PZ-5c[2]	128.84		--	69.01	68.68	66.74	65.50
PZ-6a	125.67		72.50	68.04	72.15	65.89	64.67
PZ-6b	125.74		72.50	67.98	70.07	65.82	64.57
PZ-7a	125.10		72.50	68.31	68.66	66.19	65.00
PZ-7b	125.06		72.50	68.18	67.96	65.97	64.78
PZ-8a[2]	127.63		--	67.94	67.83	65.89	64.57
PZ-8b[2]	127.54		--	68.06	67.89	65.92	64.67
PZ-8c[2]	127.57		--	68.40	68.16	66.15	64.96
PZ-9a[2]	125.30		--	69.84	69.57	67.59	66.29
PZ-10a[2]	125.27		--	69.58	69.06	67.06	65.64

Notes and abbreviations on last page.

Table 12
Summary of Water-Level Elevations
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Well Identification	Well Casing Elevation (ft msl)	Event Date	Baseline[1] 5/8/2009 (ft msl)	1Q 2017 3/31/2017 (ft. msl)	2Q 2017 6/13/2017 (ft. msl)	3Q 2017 8/22/2017 (ft. msl)	4Q 2017 11/17/2017 (ft. msl)
Recovery Wells							
RW-1	125.18		69.75	64.07	65.28	64.75	64.49
RW-2	124.48		72.27	57.49	58.58	56.86	57.73
RW-3	122.84		69.40	60.76	61.84	61.40	61.23
RW-4	121.24		69.25	NM	64.24	63.96	63.84
Monitoring Wells							
B24MW-2	126.96		74.31	68.28	68.79	68.87	68.23
B24MW-3	127.11		72.63	NM[5]	NM[5]	NM[5]	67.51
B30MW-1	128.33		73.55	66.47	67.40	68.23	67.03
BCPMW-1	125.73		73.16	66.30	67.12	67.09	66.80
BCPMW-2	126.39		72.55	65.49	66.33	66.21	NM
BCPMW-3	124.94		72.46	65.10	66.06	65.85	65.62
BCPMW-4-1	128.71		72.30	64.74	65.80	65.61	65.19
BCPMW-4-2	129.33		72.58	65.04	66.07	65.87	65.75
BCPMW-4-3	129.20		72.32	65.04	65.98	65.81	65.97
BCPMW-5-1	129.37		72.79	65.49	66.48	66.18	66.11
BCPMW-6-1	126.01		72.12	64.53	65.63	65.39	65.30
BCPMW-6-2	125.16		71.74	64.30	65.30	65.00	64.92
BCPMW-7-1	124.81		72.00	64.56	65.68	65.45	65.28
MW-200-1	123.49		72.16	64.89	65.92	65.76	65.65
MW-201-1	121.69		72.04	64.60	65.65	65.41	65.27
MW-202-1	119.27		71.90	64.56	65.54	65.35	65.24
MW-203-1	118.25		71.83	64.49	65.48	65.31	65.15
MW-204-1[2]	124.95		--	64.85	65.92	59.74	65.55
MW-205-1[2]	123.47		--	64.51	65.55	65.36	65.22
MW-206-1[2]	120.80		--	64.57	65.54	65.31	65.20
MW-207-1a[2]	120.38		--	NM[6]	NM[6]	NM[6]	NM[7]
MW-207-1b[2]	120.48		--	NM[6]	NM[6]	NM[6]	NM[7]
MW-208-1[2]	118.56		--	64.62	65.23	65.13	65.34
Piezometers							
PZ-1a	128.82		72.56	64.24	65.34	65.10	64.98
PZ-1b	128.92		72.47	64.60	65.68	65.42	65.32
PZ-1c	128.96		72.47	65.05	65.93	65.76	65.62
PZ-2a	128.36		72.47	64.58	65.64	65.36	65.27
PZ-2b	128.37		72.43	64.54	65.59	65.36	65.22
PZ-2c	128.55		72.41	64.92	65.81	65.65	65.55
PZ-3	124.99		72.52	64.45	65.50	65.25	65.14
PZ-4	125.31		72.50	64.57	65.63	64.01	65.28
PZ-5a	129.07		72.50	65.53	66.42	66.36	66.12
PZ-5b	129.06		72.50	65.55	66.30	66.24	66.09
PZ-5c[2]	128.84		--	65.46	66.25	66.19	65.97
PZ-6a	125.67		72.50	64.39	65.41	65.18	64.85
PZ-6b	125.74		72.50	64.35	65.32	65.03	64.97
PZ-7a	125.10		72.50	64.64	65.76	65.50	65.30
PZ-7b	125.06		72.50	64.50	65.48	65.25	65.14
PZ-8a[2]	127.63		--	64.33	65.36	65.13	65.02
PZ-8b[2]	127.54		--	64.40	65.45	65.34	65.09
PZ-8c[2]	127.57		--	64.74	65.69	65.47	65.41
PZ-9a[2]	125.30		--	61.20	67.07	66.99	66.71
PZ-10a[2]	125.27		--	65.60	66.54	60.36	66.16

Notes and abbreviations on last page.

Table 12
Summary of Water-Level Elevations
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. Baseline readings were taken prior to system startup, which occurred on July 21, 2009.
2. Wells installed by ERM in 2015.
3. Well screen is blocked.
4. Wells recently repaired and to be surveyed.
5. Measurement collected is believed to be anomalous.
6. Well casing is broken and blockage exists at around 2 feet below top of casing.
7. Car parked on well

ft msl feet relative to mean sea level
NM not measured

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	B24MW-2 12/29/2016	B24MW-2 8/4/2017	B24MW-3 1/20/2017	B24MW-3 8/2/2017	B30MW-1 1/4/2017	B30MW-1 8/3/2017
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 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*
1,1-Dichloroethane	5	< 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*
1,2-Dichloroethane	0.6	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
2-Btanone	NE	< 10	*< 10*	< 10	*< 10*	< 10	*< 10*
2-Hexanone	50	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
Acetone	NE	< 10	*< 10*	< 10	*< 10*	< 10	*< 10*
Benzene	1	< 0.50	*< 0.50*	< 0.50	*< 0.50*	< 0.50	*< 0.50*
Bromodichloromethane	50	< 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*
Bromomethane	5	< 2.0	*< 2.0*	< 2.0	*< 2.0*	< 2.0	*< 2.0*
Carbon Dislfide	60	< 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*
Chlorobenzene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 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*
Chloroform	7	< 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*
cis-1,2-Dichloroethene	5	< 1.0	*< 1.0*	< 1.0	***0.59 J***	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 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*
Dichlorodifloromethane (Freon 12)	5	< 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*
Methyl-Tert-Btylether	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	*< 2.0*	< 2.0	*< 2.0*	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 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*
Tolene	5	< 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*
trans-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Trichloroethene	5	**2.4**	***2.1***	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Trichlorotrifloroethane (Freon 113)	5	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Total VOCs [3]		**2.4**	***2.1***	0	**0.59**	0	*0*
Project VOCs [4]		**2.4**	***2.1***	0	**0.59**	0	*0*
1,4-Dioxane		**0.417**	***0.348***	**0.918**	**0.675**	< 0.200	*< 0.200*

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	BCPMW-4-1 12/28/2016	BCPMW-4-1 7/31/2017	BCPMW-4-2 12/22/2016	BCPMW-4-2 (REP) 12/22/2016	BCPMW-4-2 7/31/2017
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	**0.36 J**	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 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*
1,1-Dichloroethane	5	**3.2**	***1.6***	**0.22 J**	**0.23 J**	***0.25 J***
1,1-Dichloroethene	5	**0.42 J**	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	**0.87 J**	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
2-Btanone	NE	< 10	*< 10*	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	*< 10*	< 10	< 10	*< 10*
Benzene	1	< 0.50	*< 0.50*	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Carbon Dislfide	60	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chloroform	7	**1.4**	***0.76 J***	**3.9**	**3.6**	***2.3***
Chloromethane	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	**81.4**	***53.5***	**16.9**	**17.4**	***19.9***
cis-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Btylether	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	**0.50 J**	*< 1.0*	< 1.0	**0.27 J**	*< 1.0*
Tolene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	**0.49 J**	*< 1.0*	**0.62 J**	**0.58 J**	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	**48.2**	***21.9***	**18.0**	**18.1**	***17.6***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	**3.3**	*< 1.0*	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Total VOCs [3]		**140**	***78***	**40**	**40**	***40***
Project VOCs [4]		**140**	***77***	**36**	**37**	***38***
1,4-Dioxane		**39.3**	***2.64***	**2.34**	**2.40**	***1.35***

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	BCPMW-4-3 12/22/2016	BCPMW-4-3 8/3/2017	BCPMW-6-1 12/27/2016	BCPMW-6-1 8/1/2017	BCPMW-6-2 12/27/2016	BCPMW-6-2 8/2/2017
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 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*
1,1-Dichloroethane	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	***0.21 J***
1,1-Dichloroethene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
2-Btanone	NE	< 10	*< 10*	< 10	*< 10*	< 10	*< 10*
2-Hexanone	50	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
Acetone	NE	< 10	*< 10*	< 10	*< 10*	< 10	*< 10*
Benzene	1	< 0.50	*< 0.50*	< 0.50	*< 0.50*	< 0.50	*< 0.50*
Bromodichloromethane	50	< 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*
Bromomethane	5	< 2.0	*< 2.0*	< 2.0	*< 2.0*	< 2.0	*< 2.0*
Carbon Dislfide	60	< 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*
Chlorobenzene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 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*
Chloroform	7	**0.52 J**	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Chloromethane	5	< 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*
cis-1,3-Dichloropropene	0.4	< 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*
Dichlorodifloromethane (Freon 12)	5	< 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*
Methyl-Tert-Btylether	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	*< 2.0*	< 2.0	*< 2.0*	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 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*
Tolene	5	< 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*
trans-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Trichloroethene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Trichlorotrifloroethane (Freon 113)	5	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Total VOCs [3]		**0.52**	*0*	0	*0*	0	***0.21***
Project VOCs [4]		0	0	0	*0*	0	***0.21***
1,4-Dioxane		**0.776**	***0.616***	< 0.200	*< 0.200*	< 0.200	*< 0.100*

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	BCPMW-7-1 12/28/2016	BCPMW-7-1 8/1/2017	MW-200-1 1/17/2017	MW-200-1 8/7/2017	MW-201-1 1/18/2017	MW-201-1 8/8/2017
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 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*
1,1-Dichloroethane	5	< 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*
1,2-Dichloroethane	0.6	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
2-Btanone	NE	< 10	*< 10*	< 10	*< 10*	< 10	*< 10*
2-Hexanone	50	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
Acetone	NE	< 10	*< 10*	< 10	*< 10*	< 10	*< 10*
Benzene	1	< 0.50	*< 0.50*	< 0.50	*< 0.50*	< 0.50	*< 0.50*
Bromodichloromethane	50	< 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*
Bromomethane	5	< 2.0	*< 2.0*	< 2.0	*< 2.0*	< 2.0	*< 2.0*
Carbon Dislfide	60	< 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*
Chlorobenzene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 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*
Chloroform	7	< 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*
cis-1,2-Dichloroethene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	**2.0**	***1.5***
cis-1,3-Dichloropropene	0.4	< 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*
Dichlorodifloromethane (Freon 12)	5	< 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*
Methyl-Tert-Btylether	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	*< 2.0*	< 2.0	*< 2.0*	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 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*
Tolene	5	< 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*
trans-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Trichloroethene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	**1.6**	***1.3***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	*< 5.0*	< 5.0	*< 5.0*	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	*< 1.0*	< 1.0	*< 1.0*	< 1.0	*< 1.0*
Total VOCs [3]		0	*0*	0	*0*	**3.6**	***2.8***
Project VOCs [4]		0	*0*	0	*0*	**3.6**	***2.8***
1,4-Dioxane		< 0.200	*< 0.200*	**0.725**	***0.537***	0.655	***0.676***

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	MW-202-1 1/19/2017	MW-202-1 8/9/2017	MW-203-1 1/20/2017	MW-203-1 8/10/2017	MW-204-1 12/24/2015	MW-204-1 1/17/2017
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 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
1,1-Dichloroethane	5	**0.66 J**	***0.80 J***	**0.30 J**	***0.34 J***	< 1.0	< 1.0
1,1-Dichloroethene	5	**0.33 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Btanone	NE	< 10	< 10	< 10	< 10	< 10	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 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
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Dislfide	60	< 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
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	**2.0 J**	***3.3 J***	< 5.0	< 5.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	**0.27 J**	***0.35 J***	**0.50 J**	**0.24 J**
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**0.45 J**	< 1.0	**0.92 J**	***0.55 J***	**2.5**	**3.4**
cis-1,3-Dichloropropene	0.4	< 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
Dichlorodifloromethane (Freon 12)	5	< 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
Methyl-Tert-Btylether	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**1.3**	***1.4***	**0.76 J**	***1.2***	< 1.0	< 1.0
Tolene	5	< 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
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**0.68 J**	***0.96 J***	**3.9**	***2.9***	**4.0**	**4.1**
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [3]		**3.4**	***3.2***	**8.2**	***8.6***	**7.0**	**7.7**
Project VOCs [4]		**3.4**	***3.2***	**5.9**	***5.0***	**6.5**	**7.5**
1,4-Dioxane		**0.396**	***0.518***	**0.401**	***0.262***	< 0.11	**0.350**

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	MW-204-1 8/7/2017	MW-204-1 (REP) 8/7/2017	MW-205-1 12/29/2015	MW-205-1 1/18/2017	MW-205-1 8/8/2017
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	*< 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*
1,1-Dichloroethane	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
2-Btanone	NE	*< 10*	*< 10*	< 10	< 10	*< 10*
2-Hexanone	50	*< 5.0*	*< 5.0*	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	*< 5.0*	*< 5.0*	**3.0 J**	< 5.0	*< 5.0*
Acetone	NE	*< 10*	*< 10*	< 10	< 10	*< 10*
Benzene	1	*< 0.50*	*< 0.50*	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Bromoform	50	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	*< 2.0*	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Carbon Dislfide	60	*< 2.0*	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	*< 5.0*	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chloroform	7	*< 1.0*	*< 1.0*	< 1.0	**0.64 J**	*< 1.0*
Chloromethane	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	*< 1.0*	*< 1.0*	**1.1**	**0.39 J**	***0.62 J***
cis-1,3-Dichloropropene	0.4	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	*< 2.0*	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Btylether	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	*< 2.0*	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Tolene	5	*< 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*
trans-1,3-Dichloropropene	0.4	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	***2.4***	***2.5***	**0.76 J**	**0.91 J**	***0.41 J***
Trichlorotrifloroethane (Freon 113)	5	*< 5.0*	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	*< 1.0*	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Total VOCs [3]		***2.4***	***2.5***	**4.9**	**1.9**	***1.0***
Project VOCs [4]		***2.4***	***2.5***	**1.9**	**1.3**	***1.0***
1,4-Dioxane		***0.306***	***0.319***	**0.162**	**0.366**	***0.714***

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Compound [1, 2] (units in µg/L)	Sample Location: Sample Date:	MW-206-1 1/19/2017	MW-206-1 8/9/2017	MW-208-1 12/29/2015	MW-208-1 1/20/2017	MW-208-1 8/10/2017
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	**0.27 J**	***0.76 J***	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 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*
1,1-Dichloroethane	5	**0.74 J**	***3.0***	**2.9**	**2.1**	***1.1***
1,1-Dichloroethene	5	**0.27 J**	***1.7***	**0.89 J**	**0.70 J**	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	*< 1.0*	< 1.0	**0.35 J**	*< 1.0*
2-Btanone	NE	< 10	*< 10*	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	*< 10*	< 10	< 10	*< 10*
Benzene	1	< 0.50	*< 0.50*	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Carbon Dislfide	60	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chloroform	7	< 1.0	*< 1.0*	**3.1**	**2.8**	***1.4***
Chloromethane	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	**0.92 J**	***1.3***	**546 D**	**597**	***268***
cis-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Btylether	5	< 1.0	*< 1.0*	**0.39 J**	**0.43 J**	*< 1.0*
Methylene Chloride	5	< 2.0	*< 2.0*	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	**0.56 J**	***2.8***	< 1.0	< 1.0	*< 1.0*
Tolene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	*< 1.0*	< 1.0	**0.60 J**	***1.6***
trans-1,3-Dichloropropene	0.4	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	< 1.0	***0.65 J***	**17.4**	**10.9**	***12.8***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	*< 5.0*	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	*< 1.0*	**6.4**	**3.3**	***1.8***
o-Xylene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	*< 1.0*	< 1.0	< 1.0	*< 1.0*
Total VOCs [3]		**2.8**	***10***	**580**	**620**	***290***
Project VOCs [4]		**2.8**	***10***	**570**	**610**	***290***
1,4-Dioxane		**0.301**	***1.06***	**0.526**	**1.02**	***0.800***

See Notes and Abbreviations on last page

Table 13
Summary of Monitoring Well Groundwater Sample Analytical Results - VOCs and 1,4-Dioxane
Bethpage Park Grondwater Containment System
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York

Notes and Abbreviations:

(1) Results are validated at 20% frequency, per protocols specified in Sampling and Analysis Plan in the Bethpage Park Groundwater Containment System OM&M Manual (ARCADIS 2016).

(2) Samples analyzed for the TCL VOCs using NYSDEC ASP 2005 Method OLM4.3 (prior to November 2014) and per USEPA Method 8260C (after November 2014). Samples analyzed for 1,4-Dioxane using USEPA Method 8270D SIM (prior to 2016) and per USEPA Method 522 SIM (starting 2016).

(3) "Total VOCs" represents the sum of individual concentrations of the VOCs detected. TVOCs were rounded to two significant figures.

(4) "Project VOCs" represents the sum of individual 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.

italicized indicates most recent data

Bolded outline indicates an exceedance of an SCG.

Bold value indicates a detection.

B	Compound detected in associated blank sample.
D	Constituent identified from secondary dilution.
E	Concentration for the constituent exceeded the calibration range.
J	Value is estimated.
R	Concentration for the constituent was rejected.
--	Not analyzed
< 5	Compound not detected above its laboratory quantification limit.
µg/L	Micrograms per liter.
ASP	Analytical services protocol.
NE	Not established.
NYSDEC	New York State Department of Environmental Conservation.
REP	Field replicate QA/QC sample
SCGs	Standards, criteria, and guidance values.
SIM	Selective Ion Monitoring
TCL	Target compound list.
USEPA	United State Environmental Protection Agency.
VOC	Volatile Organic Compound.

Table 14
Summary of Monitoring Well Groundwater Sample Analytical Results - Metals
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York [1,2]

ARCADIS Design & Consultancy for natural and built assets

Constituents (units in ug/L)	Sample Location: Sample Date:	BCPMW-4-1 12/28/2016	BCPMW-4-1 7/31/2017	BCPMW-4-2 12/22/2016	BCPMW-4-2 (REP) 12/22/2016	BCPMW-4-2 7/31/2017	BCPMW-4-3 12/22/2016	BCPMW-4-3 8/3/2017
	NYSDEC SCGs							
Cadmium, Total		< 3.0	< *3.0*	< 3.0	< 3.0	< *3.0*	< 3.0	< *3.0*
Cadmium, Dissolved	5	< 3.0	< *3.0*	< 3.0	< 3.0	< *3.0*	< 3.0	< *3.0*
Chromium, Total	50	< 10	< *10*	**17.3**	**20.5**	< *10*	**11.2**	< *10*
Chromium, Dissolved	50	< 10	< *10*	< 10	< 10	< *10*	< 10	< *10*

Notes and Abbreviations on last page

Table 14
Summary of Monitoring Well Groundwater Sample Analytical Results - Metals
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York [1,2]

Constituents (units in ug/L)	Sample Location: Sample Date:	BCPMW-6-1 12/27/2016	BCPMW-6-1 8/1/2017	BCPMW-6-2 12/27/2016	BCPMW-6-2 8/2/2017	BCPMW-7-1 12/28/2016	BCPMW-7-1 8/1/2017	MW-200-1 1/17/2017
	NYSDEC SCGs							
Cadmium, Total		< 3.0	< *3.0*	< 3.0	***3.3***	< 3.0	< *3.0*	< 3.0
Cadmium, Dissolved	5	< 3.0	< *3.0*	< 3.0	< *3.0*	< 3.0	< *3.0*	< 3.0
Chromium, Total	50	**223**	< *10*	**13.5**	***87.7***	**66.0**	< *10*	< 10
Chromium, Dissolved	50	< 10	< *10*	< 10	< *10*	< 10	< *10*	< 10

Notes and Abbreviations on last page

Table 14
Summary of Monitoring Well Groundwater Sample Analytical Results - Metals
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York [1,2]

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-200-1 8/7/2017	MW-201-1 1/18/2017	MW-201-1 8/8/2017	MW-202-1 1/19/2017	MW-202-1 8/9/2017	MW-203-1 1/20/2017	MW-203-1 8/10/2017
	NYSDEC SCGs							
Cadmium, Total		*< 3.0*	< 3.0	*< 3.0*	< 3.0	*< 3.0*	< 3.0	*< 3.0*
Cadmium, Dissolved	5	*< 3.0*	< 3.0	*< 3.0*	< 3.0	*< 3.0*	< 3.0	*< 3.0*
Chromium, Total	50	***11.1***	< 10	***11.7***	< 10	***73.4***	< 10	***138***
Chromium, Dissolved	50	*< 10*	< 10	*< 10*	< 10	***14.4***	< 10	*< 10*

Notes and Abbreviations on last page

Table 14
Summary of Monitoring Well Groundwater Sample Analytical Results - Metals
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York [1,2]

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-204-1 1/17/2017	MW-204-1 8/7/2017	MW-204-1 (REP) 8/7/2017	MW-205-1 1/18/2017	MW-205-1 8/8/2017	MW-206-1 1/19/2017	MW-206-1 8/9/2017
	NYSDEC SCGs							
Cadmium, Total		< 3.0	< *3.0*	< *3.0*	< 3.0	< *3.0*	< 3.0	< *3.0*
Cadmium, Dissolved	5	< 3.0	< *3.0*	< *3.0*	< 3.0	< *3.0*	< 3.0	< *3.0*
Chromium, Total	50	**57.0**	***175***	***171***	**73.4**	***134***	**162**	***82.0***
Chromium, Dissolved	50	**31.1**	***87.0***	***85.3***	< 10	< *10*	< 10	***10.7***

Notes and Abbreviations on last page

Table 14
Summary of Monitoring Well Groundwater Sample Analytical Results - Metals
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York [1,2]

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-208-1 1/20/2017	MW-208-1 8/10/2017
	NYSDEC SCGs		
Cadmium, Total		< 3.0	*< 3.0*
Cadmium, Dissolved	5	< 3.0	*< 3.0*
Chromium, Total	50	< 10	*< 10*
Chromium, Dissolved	50	< 10	*< 10*

Notes and Abbreviations on last page

Table 14
Summary of Monitoring Well Groundwater Sample Analytical Results - Metals
Operable Unit 3 (Former Settling Ponds)
Bethpage, New York [1,2]

Notes and Abbreviations:

1. Results are validated at 20% frequency, per protocols specified in Sampling and Analysis Plan in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (ARCADIS 2016).
2. Samples analyzed for metals using USEPA Method 6010.

italicized indicates most recent data

	Indicates an exceedance of an SCG
20.5	Bold indicates a detection
NYSDEC	New York State Department of Environmental Conservation
SCGs	Standards, Criteria, and Guidance values
USEPA	United State Environmental Protection Agency
ug/L	Micrograms per liter
< 5	Compound not detected above its laboratory quantification limit
B	Compound detected in associated blank sample
J	Value is estimated

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

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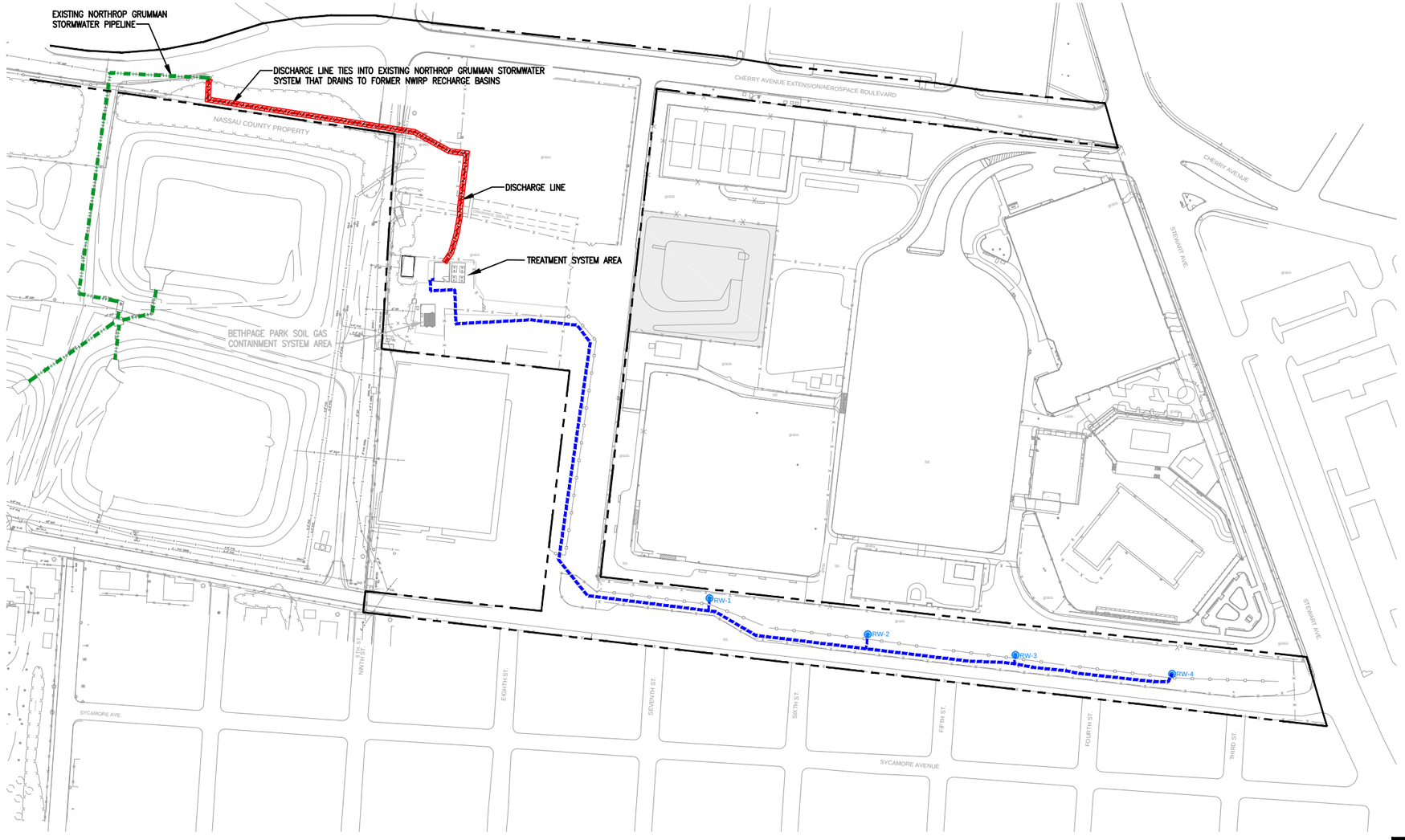
FIGURE

1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD: PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\NY001496\1141\OMMI4\NY1496_B01.dwg LAYOUT: BETHPAGE PARK SAVED: 11/11/2015 4:51 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 11/11/2015 4:54 PM BY: STOWELL, GARY

XREFS: IMAGES: AMITYVILLE.TIF FREEPORT.TIF HICKSVILLE.TIF HUNTINGTON.TIF PROJECTNAME: ----



LEGEND:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- bit. BITUMINOUS PAVEMENT
- INFLUENT PIPELINE AND ELECTRICAL CONDUITS
- EFFLUENT PIPELINE
- EXISTING NORTHROP GRUMMAN STORMWATER PIPELINE
- RW-4 REMEDIAL WELL
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NOW OWNED BY NASSAU COUNTY)

0 200' 400'

SCALE IN FEET

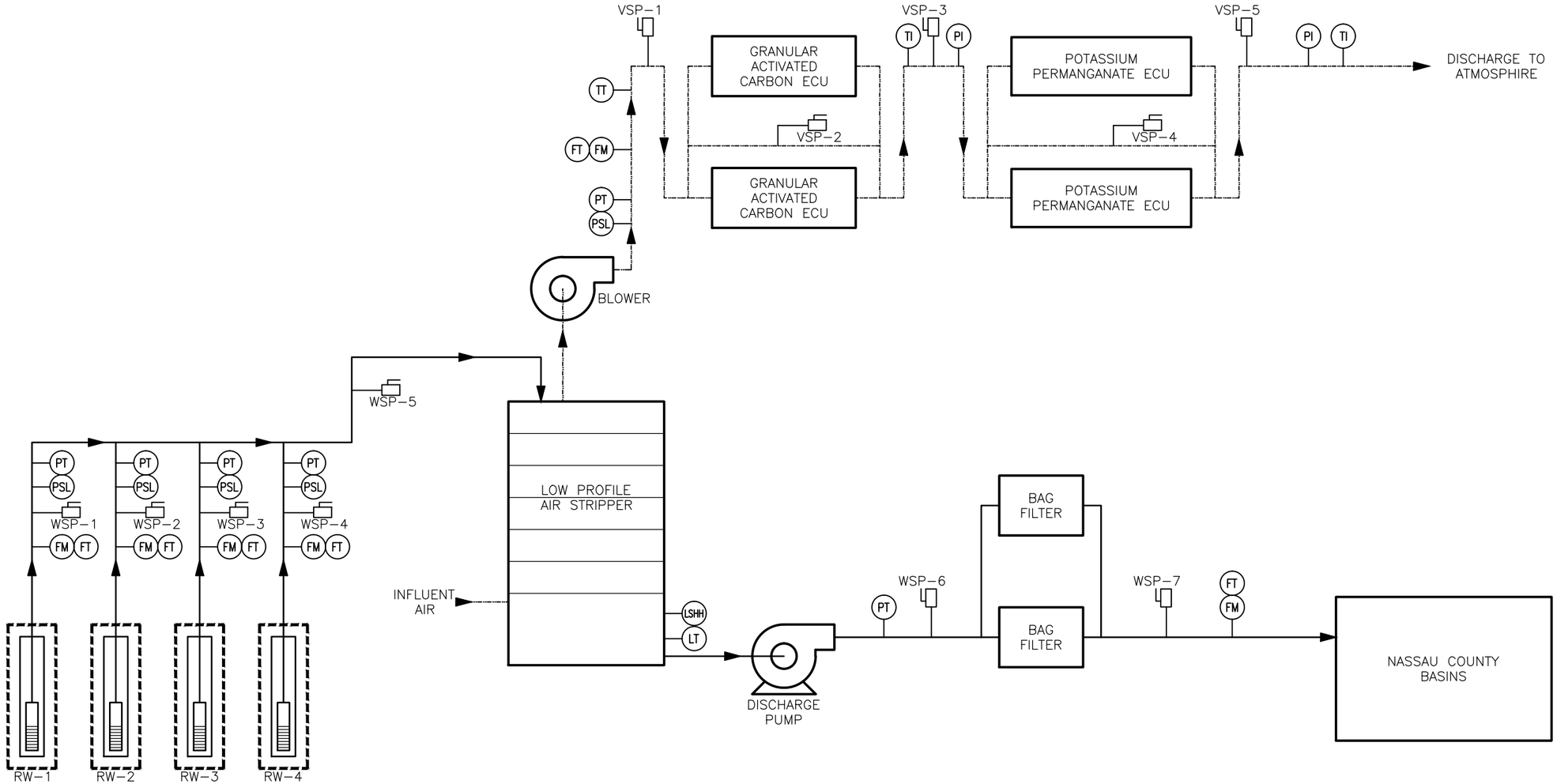
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

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) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVITY\00149\6114\IOMM\4NY1496B01.DWG LAYOUT: 2 SAVED: 11/11/2015 4:26 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 11/11/2015 4:54 PM BY: STOWELL, GARY
XREFS:
X:\1496X00
X:\1496X01
IMAGES:
PROJECTNAME: ----



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

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

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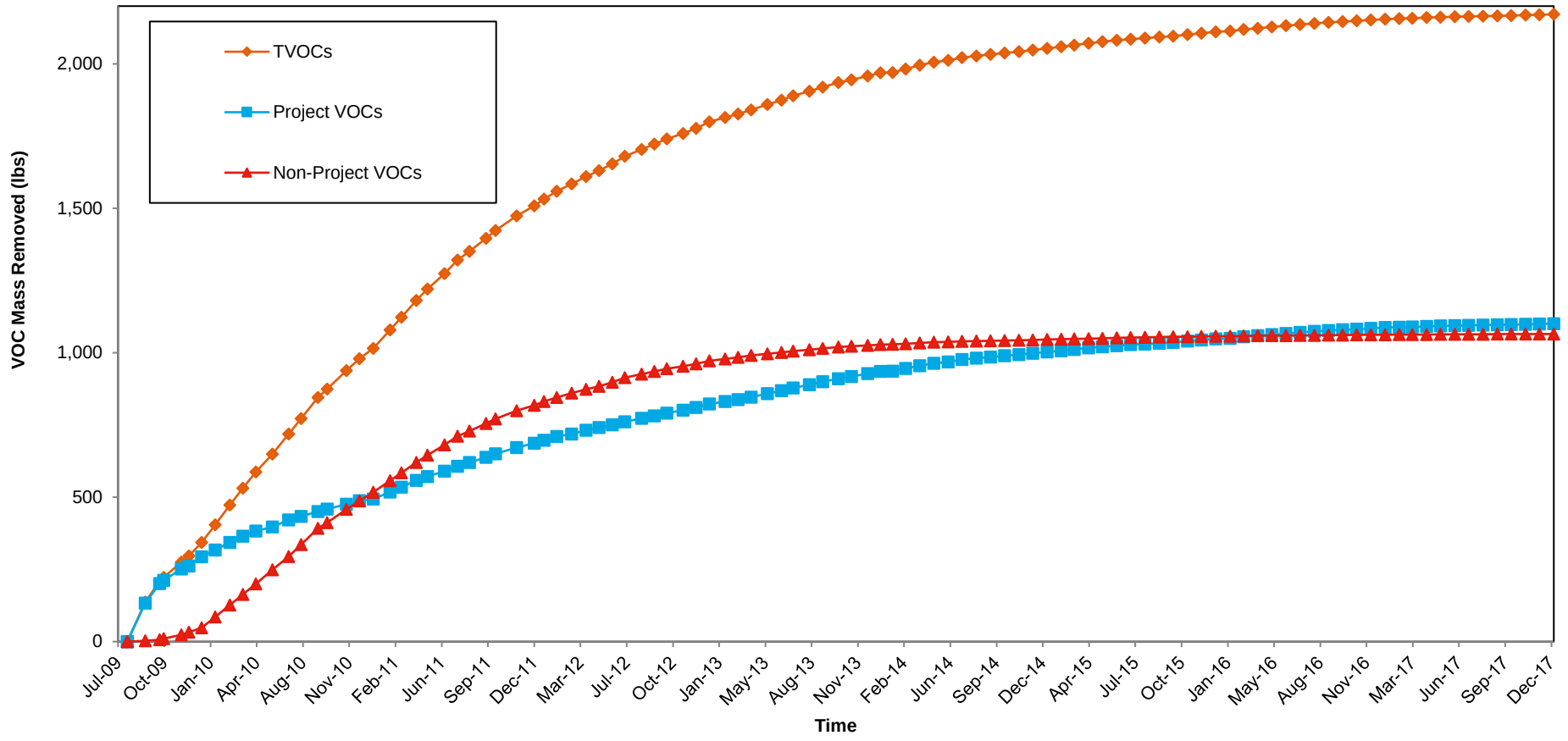
FIGURE 4



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.

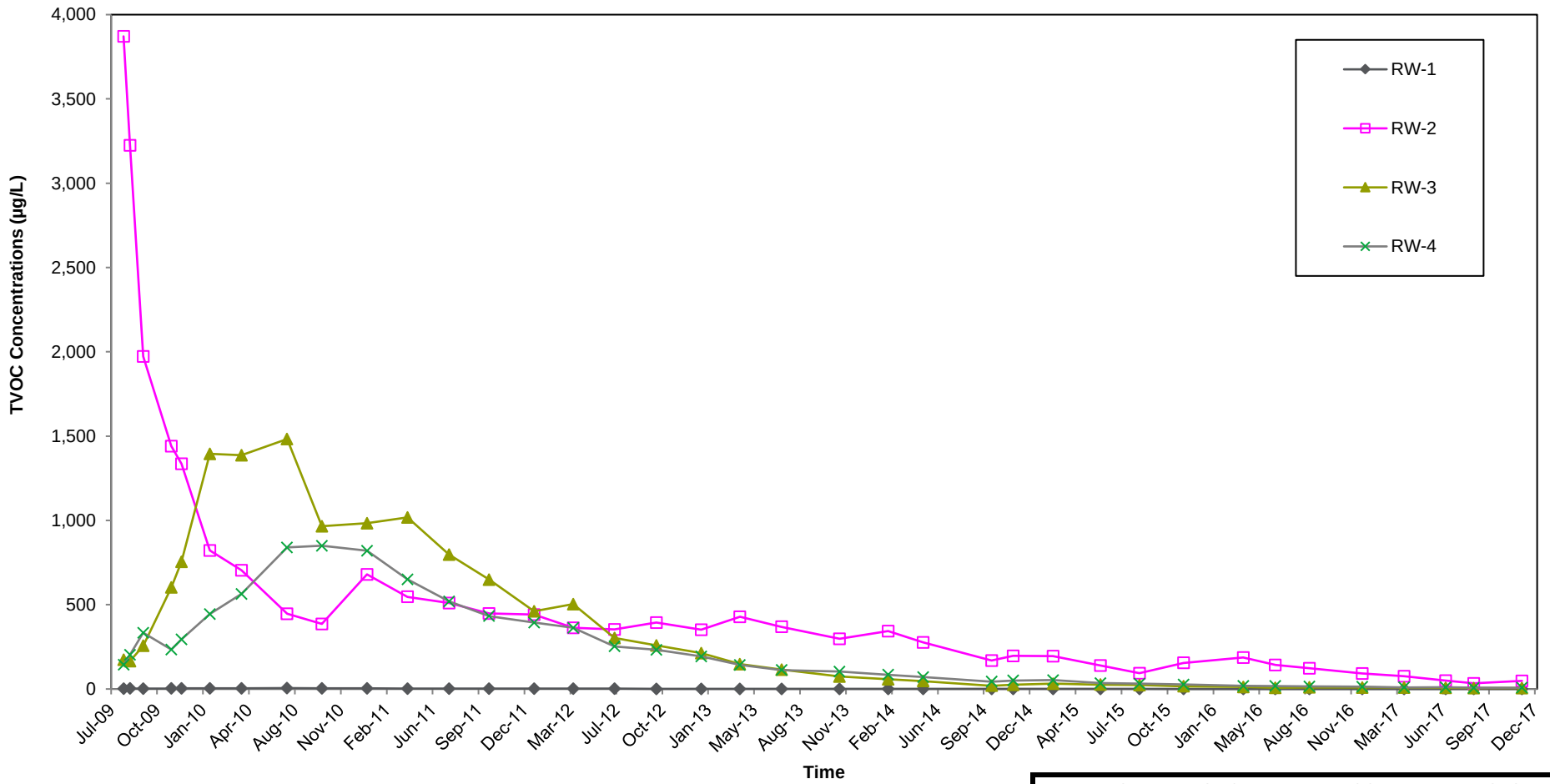
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

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

ARCADIS

FIGURE 5

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 5 TVOC Mass Graph



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

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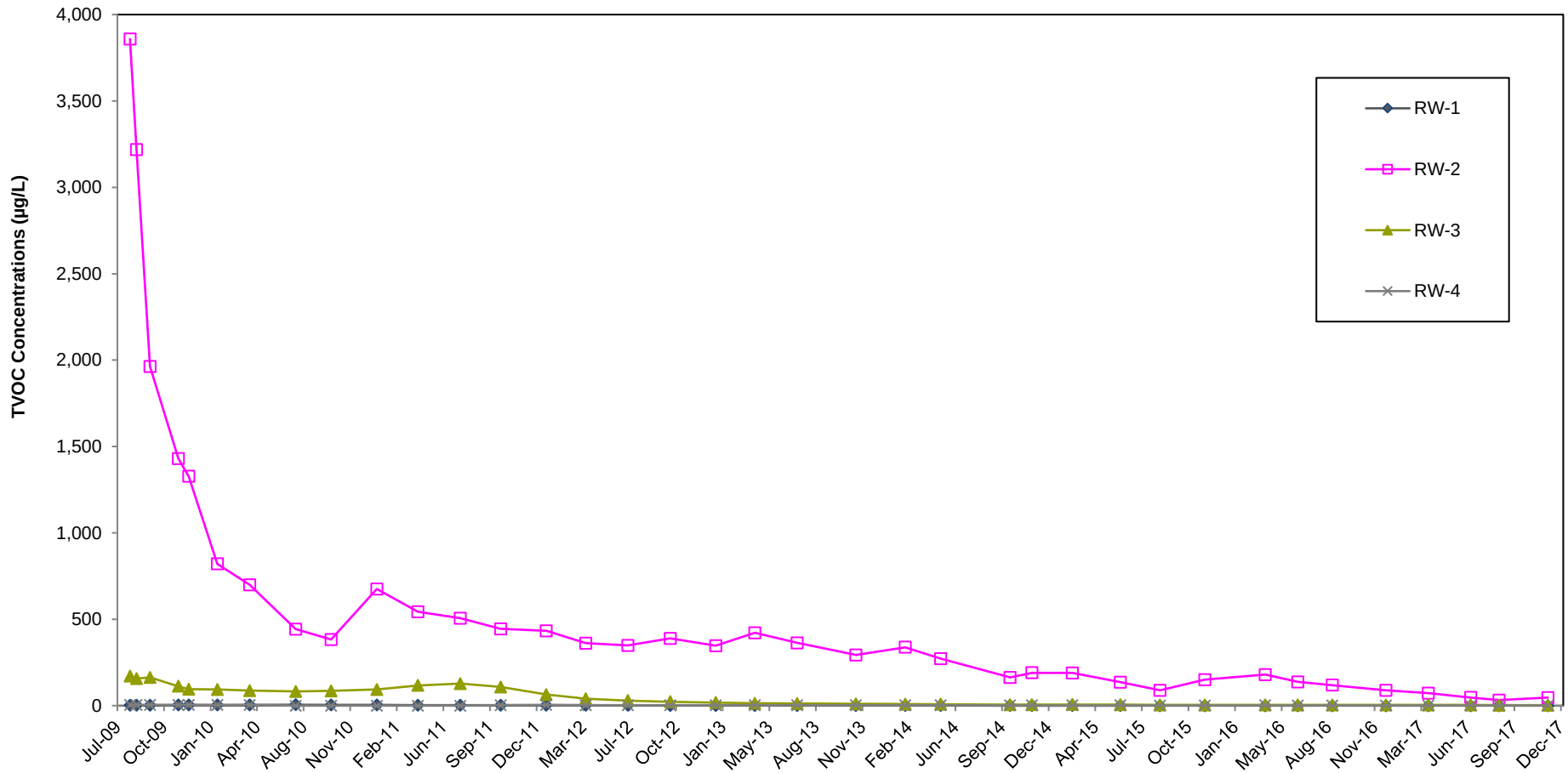
FIGURE 6A

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 6A RW Total VOC



Notes:

VOC = Volatile Organic Compound

µg/L = micrograms per liter

TVOCs = total VOCs detected

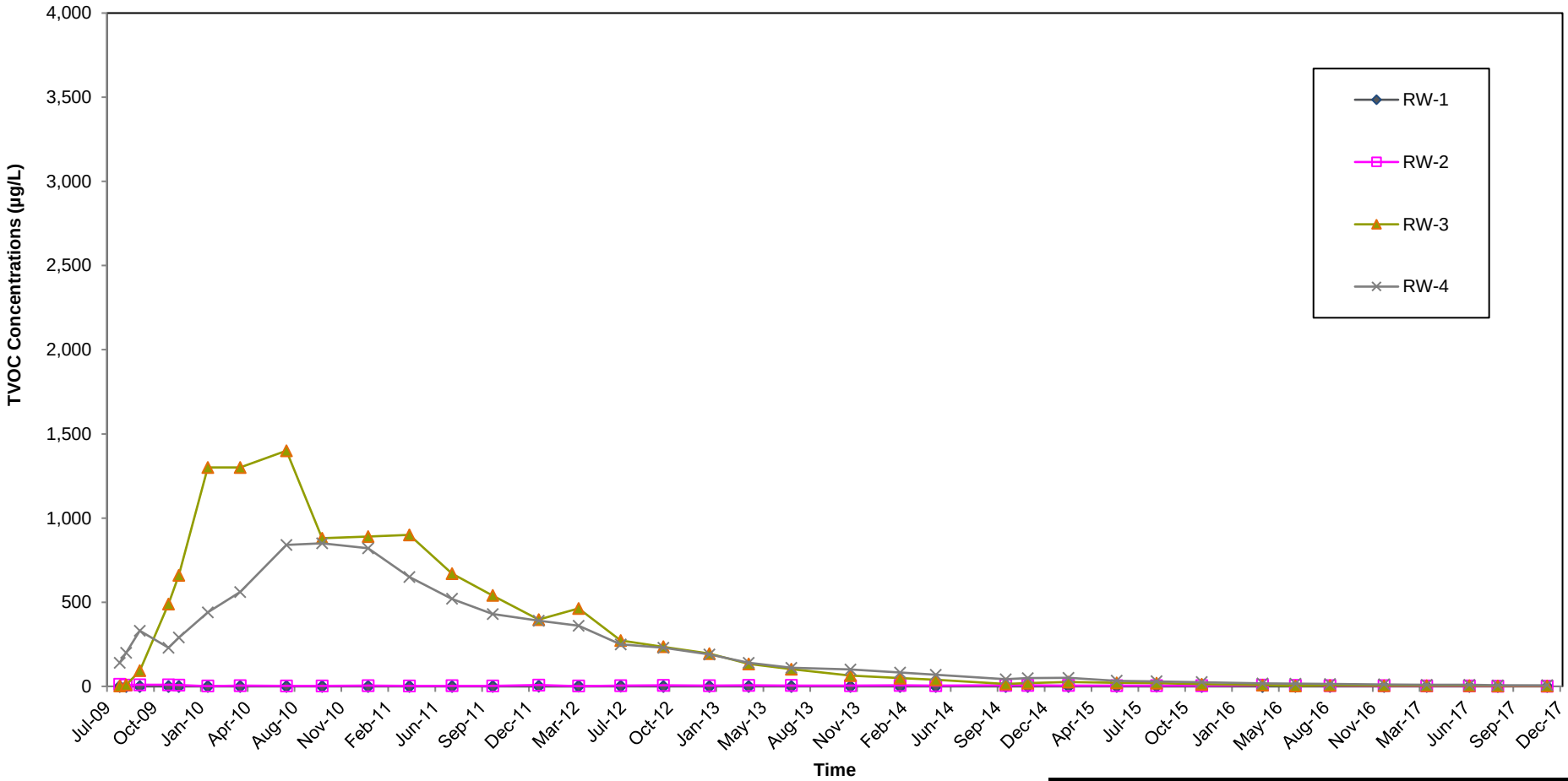
Project VOCs = sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.

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

REMEDIAL WELL PROJECT VOC CONCENTRATIONS

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.

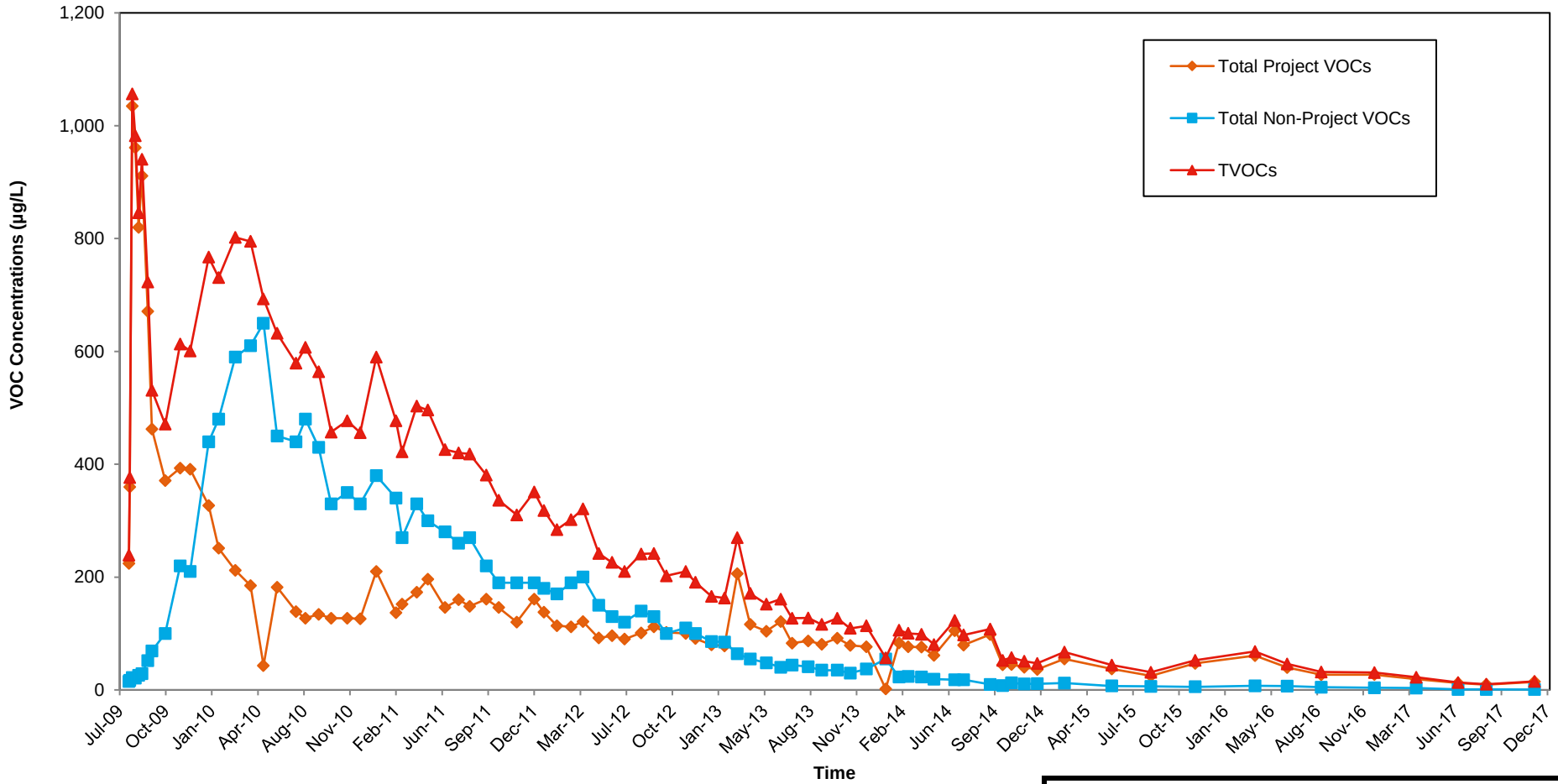
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL NON-PROJECT VOC CONCENTRATIONS

ARCADIS

FIGURE 6C

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 6C RW Non-Proj VOC



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

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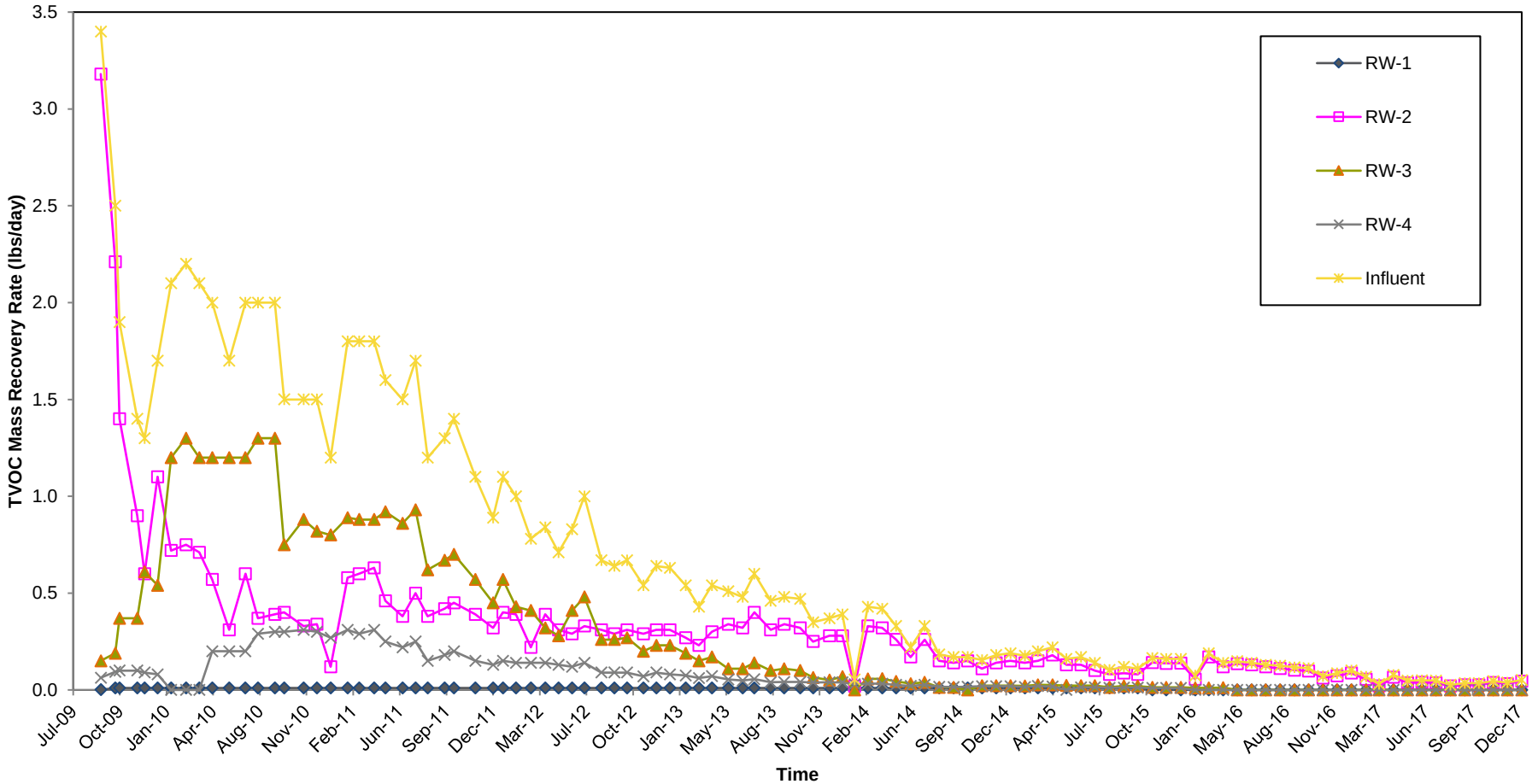
FIGURE
7

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 7 Comb. Inf. VOC Conc.



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

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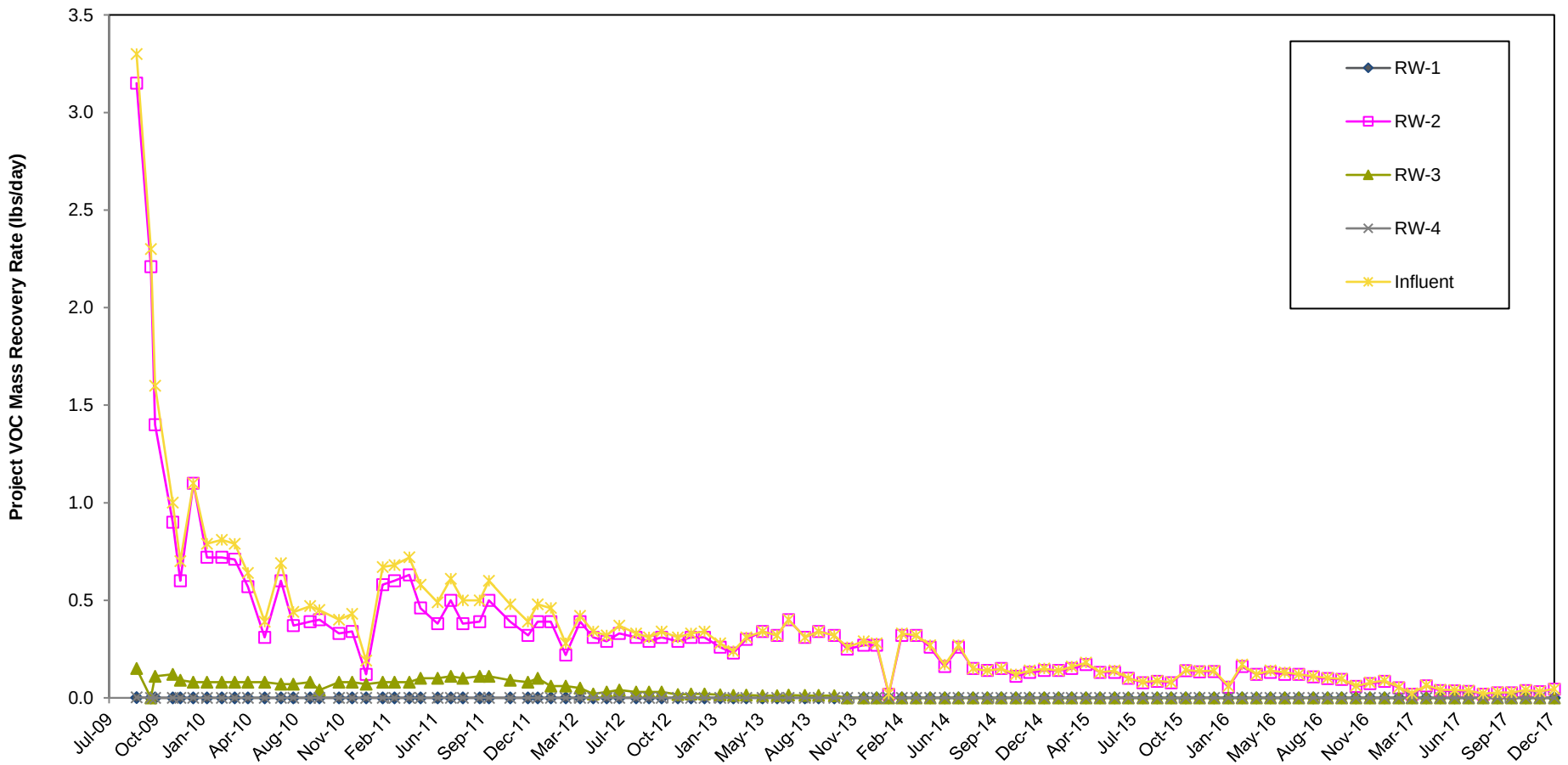
FIGURE 8A

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 8A VOC Recovery Rates



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

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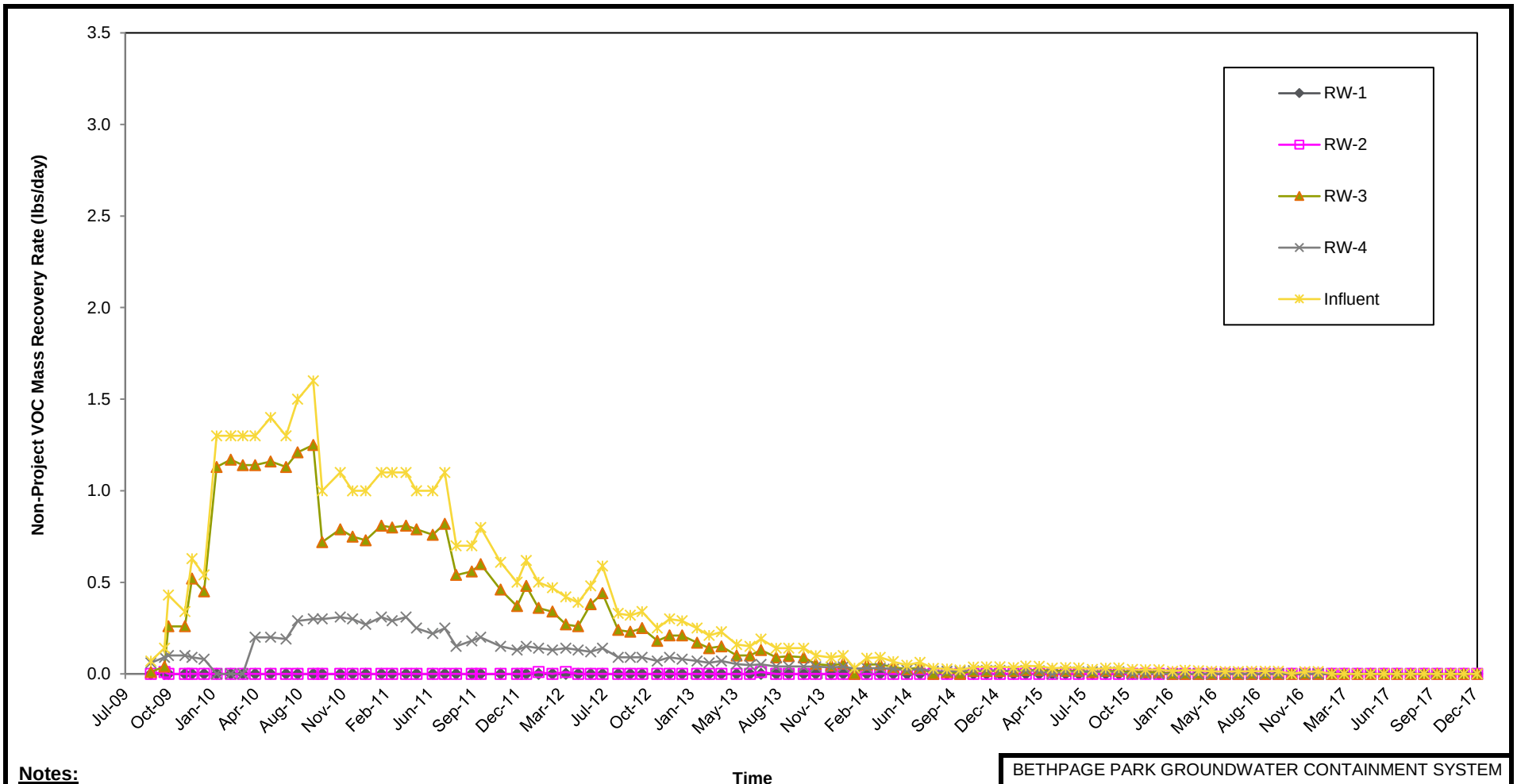
FIGURE
8B

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 8B VOC Recovery Rates



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

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FIGURE
8C

\\NY1FP1\Data\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2017 Q4\Q4_Table 2-8Figure 8C VOC Recovery Rates

APPENDIX A

Well Construction Information and Environmental Effectiveness Monitoring Program

Appendix A-1
Well Construction Information and Environmental Effectiveness Monitoring Program
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Well ID [1,2]	Well Diameter (inches)	Depth to Screen		Screen Length (ft)	Well Depth (ft)	Well Materials	Water Levels [3]	Monitoring Activity		
		Top (ft bls)	Bottom (ft bls)					Water Quality [4]		
								VOC	Cd/Cr	Fe/Mn
Monitoring Wells										
BCPMW-1	2	50	65	15	65	Sch. 40 PVC	Quarterly	Baseline	Baseline	--
BCPMW-2	2	60	75	15	75	Sch. 40 PVC	Quarterly	Baseline	Baseline	Baseline
BCPMW-3	2	59	74	15	74	Sch. 40 PVC	Quarterly	Baseline	Baseline	Baseline
BCPMW-4-1	4	45	65	20	70	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	Baseline
BCPMW-4-2	4	68.5	83.5	15	88.5	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	Baseline
BCPMW-4-3	4	115	125	10	130	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	Baseline
BCPMW-5-1	4	50	65	15	70	Sch. 80 PVC/SS	Quarterly	Baseline	Baseline	Baseline
BCPMW-6-1	4	88.5	98.5	10	103.5	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
BCPMW-6-2	4	133	143	10	148	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
BCPMW-7-1	4	90	100	10	105	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
B24MW-2	2	54	74	20	74	PVC	Quarterly	Baseline/Annual	Baseline	--
B24MW-3	2	55	70	15	70	PVC	Quarterly	Baseline/Annual	Baseline	--
B30MW-1	2	57	72	15	72	PVC	Quarterly	Baseline/Annual	Baseline	--
MW-200-1	4	85	95	10	100	Sch. 40 PVC/SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
MW-201-1	4	70	80	10	85	Sch. 40 PVC/SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
MW-202-1	4	125	135	10	140	Sch. 40 PVC/SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
MW-203-1	4	103	113	10	118	Sch. 40 PVC/SS	Quarterly	Baseline/Semiannual [5]	Baseline/Annual	--
Remedial Wells [6]										
RW-01	8	108	128	20	134	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--
RW-02	6	84	104	20	104	Steel/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--
RW-03	8	84	104	20	107	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--
RW-04	8	110	130	20	133	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Annual	--

Appendix A-1
Well Construction Information and Environmental Effectiveness Monitoring Program
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Well ID [1,2]	Well Diameter (inches)	Depth to Screen		Screen Length (ft)	Well Depth (ft)	Well Materials	Water Levels [3]	Monitoring Activity		
		Top (ft bls)	Bottom (ft bls)					Water Quality [4]		
								VOC	Cd/Cr	Fe/Mn
Piezometers										
PZ-01a	2	60	65	5	68	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-01b	1	80	85	5	88	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-01c	1	130	135	5	138	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-02a	2	60	65	5	68	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-02b	1	80	85	5	85	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-02c	1	130	135	5	138	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-03	1	80	85	5	88	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-04	1	80	85	5	88	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-05a	2	65	70	5	74	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-05b	1	110	115	5	117	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-06a	2	65	70	5	72	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-06b	1	90	95	5	97	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-07a	2	65	70	5	72	Sch. 40 PVC/SS	Quarterly	--	--	--
PZ-07b	1	113	118	5	120	Sch. 40 PVC/SS	Quarterly	--	--	--

Notes:

(1) Water samples will be collected and analyzed in accordance with the method and procedures described in the Sampling and Analysis Plan (SAP).
(2) Approximate locations of the wells and piezometers in the OU3 Bethpage Park Groundwater Containment System are shown in Figure 4.
(3) Water levels will be measured in all wells/piezometers during the baseline monitoring event. Water levels will be measured in accordance with the procedures presented in the SAP.
(4) VOC: VOC analyses per NYSDEC ASP 2005, Method OLM 4.3 (prior to September 1, 2014) and per USEPA Method 8260C (after September 1, 2014).
Cd/Cr: Cadmium and Chromium using USEPA Method 6010C.
Fe/Mn: Iron and Manganese using USEPA Method 6010C, both total and dissolved.
(5) Semiannual wells will be monitored annually after Year 1.
(6) Some of the analyses listed here are also covered in the Remedial System Sampling Program (Table B-1) and some of the analyses and/or frequencies may be modified based on review of short-term and/or long-term testing results. (e.g. the Cd/Cr sampling frequency was changed from quarterly to annually in 2011).

Abbreviations/Units:

NYSDEC	New York State Department of Enviromental Conservation	ft	Feet
--	Not applicable	ft bls	Feet below land surface
Sch. 40 PVC	Schedule 40 polyvinyl chloride	ft ms	Feet relative to mean sea level
Sch. 80 PVC	schedule 80 polyvinyl chloride		
SS	Stainless steel		
Steel	Low carbon steel		
USEPA	United States Environmental Protection Agency		
VOC	Volatile Organic Compound		

APPENDIX B

Compliance and Performance Program

Appendix B-1
Compliance and Performance Program Elements
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency			
		Short-Term [3]		Long-Term [4]	SCADA Data Acquisition
		(First month)	(Five month period following first month)		
Water Samples [5]					
Remedial Well 1 (WSP-1)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Remedial Well 2 (WSP-2)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Remedial Well 3 (WSP-3)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)		Quarterly	Quarterly	NA
Remedial Well 4 (WSP-4)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Air Stripper Influent (WSP-5)	VOCs (USEPA Method 8260C)	1-hr [6]; Days 1, 3, & Weekly	Monthly	Quarterly	NA
	Iron (USEPA 6010C)	1-hr [6]; Days 1, 3, & Weekly	Monthly	Quarterly	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Air Stripper Effluent (WSP-6)	Iron (USEPA 6010C)	1-hr [6]; As Needed	As Needed	As Needed	NA
Plant Effluent (WSP-7)	**VOCs (USEPA Method 8260C and 624)[13]**	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	Iron (USEPA 6010C)	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	Mercury (USEPA 7470A) [7]	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	1,4-Dioxane (USEPA Method 522)[12]		**Monthly**	**Monthly**	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		**Quarterly**	**Quarterly**	NA
	Total Nitrogen, Nitrate + Nitrite (USEPA Method 353.2)[13]		**Monthly**	**Monthly**	NA
	TKN (USEPA Method 351.2)[13]		**Monthly**	**Monthly**	NA
	pH (field) [8]	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	and		Quarterly	Quarterly	NA
Air Samples [9] [10]					
Air Stripper Effluent/ECU-1 Influent (VSP-1)	VOCs (TO-15 Modified)	Monthly	Monthly	Quarterly	NA
ECU-1 Effluent/ECU-2 Influent (VSP-2)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
ECU-2 Effluent/ECU-3 Influent (VSP-3)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
ECU-3 Effluent/ECU-4 Influent (VSP-4)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
Total Effluent (VSP-5)	**VOCs (TO-15 Modified)**	**Monthly**	**Monthly**	**Quarterly**	NA

See notes on last page.

Appendix B-1
Compliance and Performance Program Elements
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency			
		Short-Term [3]		Long-Term [4]	SCADA Data Acquisition
		(First month)	(Five month period following first month)		
Water Flow Measurements					
Remedial Well RW-1 (FT - 110)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-2 (FT - 120)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-3 (FT - 130)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-4 (FT - 140)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Combined Influent (FR - 200)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
System Effluent (FT-700)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Flow Measurements					
Air Stripper Effluent (FT-500)	Flow rate (SCFM)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Water Pressure Measurements					
Remedial Well RW-1 (PT - 110)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-2 (PT - 120)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-3 (PT - 130)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-4 (PT - 140)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Stripper Effluent (PT-700)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Temperature & Relatively Humidity Measurements					
Air Stripper Effluent (TT-500)	Temperature	Weekly	Weekly	Weekly	Continuously
ECU Mid-Train (TI-503)	Temperature	Weekly	Weekly	Weekly	NA
Effluent (TI-603)	Temperature	Weekly	Weekly	Weekly	NA
Air Pressure Measurements					
Air Stripper Effluent (PT-500)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	Continuously
ECU #1 Influent (PI-501)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #2 Influent (PI-502)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #3 Influent (PI-601)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #4 Influent (PI-602)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
System Effluent (PI-603)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA

See notes on last page.

Abbreviations, Notes and Units:

(1) Refer to Figure 3 of this Operation, Maintenance, & Monitoring (OM&M) Report and Appendix E of the Groundwater IRM OM&M Manual (OM&M Manual (ARCADIS 2009)) for a diagram showing referenced sample locations and measurement points.
(2) Parameters/methods may be modified based on review of short-term and/or long-term testing results. Parameters shown in **Bold** indicate parameters that require NYSDEC notification/approval prior to change in monitoring schedule.
(3) Short-term schedule is tentative. Modification may be required/recommended based on the results of start-up and performance testing.
(4) Long-term schedule is tentative. Modification may be required/recommended based on the results of short-term testing or water quality trends.
(5) Water samples will be collected in accordance with the methods described in the Sampling and Analysis Plan, which is included as Appendix A of the OM&M Manual (ARCADIS 2009). Samples will be analyzed in accordance with the methods and procedures described in the Sampling and Analysis Plan.
(6) Per NYSDEC request, a 1-hr pilot test was performed during system shake-down. The 1-hr pilot test samples were also analyzed for Mercury (Hg).
(7) Per the interim treated effluent (water) discharge criteria provided in the NYSDEC letter dated March 19, 2009, select samples were analyzed for Mercury (Hg).
(8) As authorized by the NYSDEC, the pH monitoring frequency was reduced from weekly to monthly beginning on February 8, 2010.
(9) Air samples collected and analyzed in accordance with methods described in the Sampling and Analysis Plan, which is included as Appendix A of the OM&M Manual (ARCADIS 2009).
(10) Additional air samples will be collected to help calculate media usage rates and to help determine media changeout frequencies.
(11) Cadium and Chromium analyses are part of the Environmental Effectiveness Monitoring Program (Table A-1) and the original discharge permit application. They are included here for consistency.
(12) As of January 2017, 1,4-Dioxane is analyzed per USEPA Method 522.
(13) As of November 2017, plant effluent is analyzed for VOC's per USEPA Method 624, Total Nitrogen per USEPA Methods 353.2 and 351.2, in accordance with the Site Number 1-30-003A Operable Unit 3 SPDES Permit Equivalency.

ECU	Emissions Control Unit
EPA	U.S. Environmental Protection Agency
NA	Not Applicable
---	Not Required
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operation, Maintenance and Monitoring
SCADA	Supervisory Control And Data Acquisition
SPDES	State Pollutant Discharge Elimination System
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds (refer Tables D-3 and D-5 in the Quality Assurance Project Plan (QAPP) (Appendix D of the OM&M Manual (ARCADIS 2009)) for the analyte lists for aqueous and air samples, respectively)
gal	gallons
gpm	gallons per minute
i.w.g.	inches water gauge

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