

**Quarterly Operation, Maintenance,
and Monitoring Report for the
Groundwater Interim Remedial
Measure**

January through March 2011

Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

NYSDEC ID # 1-30-003A

May 2011



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**Quarterly Operation,
Maintenance, and Monitoring
Report for the Groundwater
Interim Remedial Measure**

January through March 2011
(Former Grumman Settling
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Bethpage, New York
NYSDEC ID# 1-30-003A

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- B Compliance and Performance Program and Water Sample Analytical Results
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1. Introduction

Pursuant to the Administrative Order on Consent (AOC) Index # W1-0018-04-01 (NYSDEC 2005), ARCADIS of New York, Inc. (ARCADIS), on behalf of Northrop Grumman Systems Corporation (Northrop Grumman), has prepared this Operable Unit 3 (OU3) Groundwater Interim Remedial Measure (Groundwater IRM) Quarterly Operation, Maintenance, and Monitoring (OM&M) Report for submittal to the New York State Department of Environmental Conservation (NYSDEC). The present day Bethpage Community Park property (Park) and the Former Grumman 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. The Groundwater IRM has been operational since July 21, 2009. A Site Area Location map is provided on Figure 1.

This quarterly OM&M report summarizes the Groundwater IRM OM&M activities performed between January 1, and March 31, 2011 (i.e., the "reporting period"). During this reporting period, the Remedial System and Environmental Effectiveness Monitoring Programs were conducted in accordance with the NYSDEC-approved OU3 Interim Groundwater IRM OM&M Manual (ARCADIS 2009).

As discussed in the OU3 Site Area Remedial Investigation Report (Site Area RI) (ARCADIS 2011a), Northrop Grumman does not take responsibility for Freon 12 and Freon 22, which are present in the Site Area. Throughout this report, a distinction is made between the "project" and "non-project" Volatile Organic Compounds (VOCs); which are defined as follows:

- "Project VOCs:" are VOCs that may be related to former Grumman historical activities. For this report, Project VOCs are the VOCs listed in the Interim State Pollutant Elimination Discharge System (SPDES) permit equivalency (NYSDEC 2009), plus Toluene, Benzene, and Total Xylenes. A list of "Project VOCs" is provided in various tables throughout this report.
- "Non-project VOCs:" are VOCs, such as Freon 12 and Freon 22 that are not related to former Grumman activities but have been detected in the Site Area. As noted in the Site Area RI (ARCADIS 2011a), 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. Based on Town information (Zervos, Theodore 2007), Freon 22 was used and released to the environment.

2. Groundwater Interim Remedial Measure Objectives

The remedial action objectives (RAOs) for the Groundwater IRM are as follows:

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

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

3. Groundwater Interim Remedial Measure Description

The Groundwater IRM consists of:

- A “pump-and-treat system” where groundwater is:
 - Extracted along the southern portion of the Northrop Grumman Former 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.
 - Filtered to remove oxidized metals.



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- Returned to the aquifer, via a discharge pipeline routed to a recharge basin located on the adjacent former Bethpage Navy Weapons Industrial Reserve Plant (NWIRP) 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 that is periodically monitored to assess the environmental effectiveness of the Groundwater IRM.

The major components of the Groundwater IRM are briefly described below; additional information is provided in the OM&M Manual (ARCADIS 2009). The layout of the Groundwater IRM is shown on Figure 2 and a schematic drawing is provided on Figure 3. The groundwater sampling locations in the Groundwater Monitoring Network are shown on Figure 4.

Groundwater Extraction and Conveyance System

The GW IRM is designed to extract groundwater at a rate of approximately 210 gallons per minute (gpm) from four remedial wells (RW-1 through RW-4) located along the downgradient (i.e., southern) boundary of the Site Area (Figure 2). The individual design pumping rates for RW-1 through RW-4 are 30 gpm, 75 gpm, 75 gpm, and 30 gpm, respectively. Each remedial well is equipped with a submersible pump; RW-1 and RW-4 have 3 horsepower (hp) pumps and RW-2 and RW-3 have 7.5 hp pumps. Remedial Well construction details are summarized in Table A-1 (Appendix A).

Extracted groundwater is conveyed to the treatment plant via four, underground influent pipelines, one for each Remedial Well. RW-1 and RW-4 have 2-inch diameter high-density polyethylene (HDPE) pipelines and RW-2 and RW-3 have 3-inch diameter HDPE pipelines.

Groundwater Treatment

VOCs are removed from the extracted groundwater via a low-profile air stripper equipped with a 40 hp blower. Metals, such as iron, which are oxidized during the air stripping process, are removed from the air stripper effluent by bag filters. To eliminate the need to shut down the plant when the spent bag filters need replacement, two filter units are used so that when one unit is "on-line", the other is in "stand by" mode. Each unit has eight bag filters.



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Groundwater Discharge

Treated groundwater is pumped using a 10 hp pump to a stormwater manhole that discharges to a recharge basin on the adjacent NWIRP property, which is now owned by Nassau County. This discharge is permitted by Nassau County.

Air Stripper Off-gas Treatment

Project VOCs are removed from the air stripper off-gas using two 10,000 pound (lb), vapor phase granular activated carbon (VPGAC) emission control units (ECUs) and two 10,000 lb potassium permanganate-impregnated zeolite (PPZ) ECUs.

Groundwater Monitoring Network

The Groundwater Monitoring Network consists of 35 monitoring locations (i.e., 17 groundwater monitoring wells, 4 remedial wells, and 14 piezometers) as shown on Figure 4. Construction details for the monitoring wells and piezometers are provided in Appendix A. In accordance with the Groundwater IRM Environmental Effectiveness Monitoring Program, depth-to-water measurements are collected quarterly and groundwater quality samples are collected annually from the Groundwater Monitoring Network to assess the effectiveness of the Groundwater IRM.

4. Operation and Maintenance Activities

Groundwater IRM operation and maintenance (O&M) activities conducted during the reporting period are described below and are summarized in Table 1:

- The system operated full-time, 90 out of 90 days (100 percent uptime).
- The system was monitored during the majority of business days, either via a site visit or remotely by wireless computer link-up.
- The Supervisory Control and Data Acquisition (SCADA) system operated as designed, and when conditions warranted (see below), shut the system down automatically and instantaneously, and provided notification of system advisories and alarms to plant operators.
- Remedial Well RW-2 was brought back on-line on January 5, 2011. As discussed in the 2010 Annual OM&M Report (ARCADIS 2011b), RW-2 was taken off-line on



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December 17, 2010 for an inspection and kept off-line for subsequent well rehabilitation/redevelopment work.

- The system shut down automatically for the alarm conditions listed below. Alarm conditions were responded to and the system restarted on the same day or early the following day (see Table 1 for details):
 - Pump Overload Alarm: Remedial Well RW-2 motor overload alarm shut the system down on January 29, 2011. The system was restarted on January 30, 2011 with RW-2 off-line for troubleshooting. RW-2 was later restarted on January 31, 2011.
 - Blower High Vacuum Alarm: A blower high-vacuum alarm shut the system down on February 16, 2011. Troubleshooting was completed, and the system was restarted the same day with the remedial wells temporarily operating at reduced flow rates through February 18, 2011. The air stripper is scheduled to be disassembled and cleaned during the next reporting period.
- A temporary power supply interruption shut down the system on January 29, 2011. The system was restarted without incident the same day.

5. Treatment System Compliance and Performance Monitoring

5.1 System Monitoring Activities

The following compliance and performance monitoring events were performed during this reporting period (see Appendix B, Table B-1 for a summary of the compliance and performance monitoring program requirements):

- Three sampling events to collect required monthly water samples and quarterly air samples.
- Thirteen weekly site visits to monitor and record key system operational parameters.
- The following additional, non-routine monitoring activities were performed during this reporting period to assess system performance:



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- On February 10, 2011, RW-1 and RW-2 water samples were analyzed for total and dissolved iron (Fe).
- On March 7, 2011, RW-2 and RW-3 water samples were analyzed for total and dissolved iron (Fe).

Field and analytical data collected during these monitoring events were used to assess performance of the Groundwater IRM and to determine whether the system discharges were compliant with project objectives. System performance and compliance results are discussed in Sections 5.2 and 5.3, respectively, of this report.

5.2 System Operation and Monitoring Results

The following tables, graphs, and appendices were developed to summarize the system operation and monitoring results:

- An 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 Groundwater IRM treatment system removal efficiency. Complete validated Water Sample Analytical Result Summaries, for each sampling event, are included in Appendix B.
- Summary of Influent and Effluent Vapor Sample Analytical Results (Tables 4 and 5, respectively). Table 5 also provides the Groundwater IRM treatment system removal efficiency. Complete, validated Vapor Sample Analytical Results, for each sample event, are included in Appendix C.
- System Parameters including flow rates, line pressures, and temperatures (Table 6).
- Summaries of Groundwater Recovered, VOC Mass Recovered, and VOC Recovery Rates (Table 7). Table 7 provides a breakdown of these parameters by Remedial Well and System and also breaks down the VOC Mass Recovered and VOC Recovery Rates into Project, Non-Project, and Total VOCs.
- Air Discharge Quality Evaluation and Compliance Table (Appendix D and Table 8, respectively).



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- Concentrations of VOCs and Metals in Remedial Well Groundwater Samples (Tables 9 and 10, respectively).
- 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).
- Total, Project, and Non-Project VOC Mass Recovery Rates (Figures 8A, 8B, and 8C, respectively).

5.3 Summary of OM&M Results

5.3.1 System Operation and Effectiveness

Groundwater IRM OM&M results for the reporting period are summarized below:

- Total volume of groundwater recovered and treated (Table 7):
 - 1st Quarter 2011: 28 million gallons.
 - Project Total: 177 million gallons.
- Total VOC mass recovered and mass recovery rates (Table 7 and Figures 5, 8A, 8B, and 8C):
 - 1st Quarter 2011: 167 pounds (lbs) of VOCs at an average rate of 1.8 lbs per day. 62% (103 lbs) of the Total VOC mass recovered is from Non-project VOCs.
 - Cumulative Total: 1,185 lbs of VOCs.
- Per well VOC mass recovered and mass removal rates (Table 7 and Figures 8A, 8B, and 8C):
 - RW-1: 0.12 lbs, (<1% of total mass) at an average rate of less than 0.01 lbs/day.



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- RW-2: 56 lbs (34% of total mass) at an average rate of 0.60 lbs/day.
- RW-3: 83 lbs (49% of total mass) at an average rate of 0.89 lbs/day.
- RW-4: 28 lbs (17% of total mass) at an average rate of 0.30 lbs/day.
- For Project VOCs, RW-2 recovered 88% of the mass and, and RW-3 recovered 12% of the mass. The average rate of Project VOC recovery by RW-2 during the reporting period (0.69 lbs/day) is higher than the 2010 annual removal rate (0.54 lbs/day) but significantly lower than the 2009 average recovery rate (1.9 lbs/day).
- For Non-Project VOCs, RW-3 and RW-4 recovered over 99% of the mass. The rate of Non-Project VOCs recovered by RW-3 and RW-4 during the reporting period (1.1 lbs/day) is slightly lower than the 2010 average recovery rate (1.3 lbs/day) but significantly higher than the 2009 average recovery rate (0.31 lbs/day).
- Treatment system influent concentrations (Table 2 and Figure 7):
 - Project VOCs: The 1st Quarter average Project VOC influent concentration (166 ug/L) is slightly higher than the average of the previous two quarters (130 ug/L), but well below the highest influent concentration, observed in August 2009 (~1,000 ug/L).
 - Non-project VOCs: The average Non-project influent concentrations of 330 ug/L is approximately one-half the peak concentration of 650 ug/L (in May 2010).
 - During the reporting period, the average influent concentration of Non-project VOCs was 198% greater than the average influent concentration of Project VOCs.
 - Influent total iron concentrations ranged from 440 to 600 ug/L during the current reporting period, which are significantly lower than the peak influent concentration (6,640 ug/L since system startup) (Table 10).
 - Mercury has not been detected in any influent sample since system start-up.

- Remedial Well VOC concentrations have remained constant for Total, Project, and Non-Project VOCs during the reporting period, except for RW-2 which had a slight increase in January 2011 (Table 9, Figures 6A, 6B, and 6C).
- Metals concentrations in Remedial Wells have remained constant during the reporting period (Table 10).
- Treatment efficiency of the air stripper, air stripper off-gas treatment system, and bag filter system for this reporting period:
 - The air stripper VOC removal efficiency was greater than 99.9 percent for Project and Non-Project VOCs (Table 3).
 - The air stripper off-gas emission control system's Project VOCs removal efficiency was calculated at 89% (Table 5). The treatment efficiency for Total VOCs could not be calculated due to an apparent anomaly in the analytical results for the effluent vapor sample. Specifically, Freon 22 was detected in the effluent at a concentration of 8,100 ug/m³, which is 2.3 times its influent concentration of 3,400 ug/m³, and which makes the Total VOCs in the effluent greater than the amount of Total VOCs in the influent. As this is a first time occurrence and, there is no known reason for this apparent data anomaly, we will continue to monitor this situation for a pattern and/or to determine a cause.
 - The post-air stripper bag filter system reduced total iron concentration in the system effluent below regulated discharge limits (Table 3).

5.3.2 Regulatory Status of Discharges

5.3.2.1 Air Discharge

To determine the compliance status of air discharge from the Groundwater IRM treatment system, the system's effluent vapor concentrations were compared to NYSDEC Division of Air Resources Air Guide-1 (DAR-1) Model Short-term Guideline Concentrations (SGCs [NYSDEC 2010]) (Table 5) and the effluent vapor laboratory results were compared to a site-specific modeled annual maximum allowable stack concentration (MASC). The annual MASC was calculated during each monitoring event for individual compounds using the output from the USEPA SCREEN3 Model in conjunction with the NYSDEC DAR-1 AGCs. A scaling factor was calculated using the



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SCREEN3 model with site-specific physical layout information (e.g. building dimensions, stack height, terrain, etc.) and operating data (e.g. air flow rate, temperature, etc.) inputs for each monitoring event. The scaling factor was then used to adjust (scale) the NYSDEC DAR-1 AGC to a site-specific MASC. A summary of the instantaneous percent (i.e., not time-weighted) of the site-specific annual MASC for Project VOCs, Freon 12, and Freon 22 is provided in Table 8. A summary of the cumulative annual percent (i.e. time-weighted) of the site-specific MASC for detected compounds is also provided in Table 8. A summary of the model inputs, outputs, and backup calculations is provided in Appendix D.

The Groundwater IRM air effluent met NYSDEC requirements throughout the reporting period, as indicated by the following:

- The measured concentrations of individual VOCs in the vapor effluent did not exceed applicable SGCs (Table 5).
- The measured concentration of individual VOCs in the vapor effluent did not exceed their applicable, instantaneous MASCS, as calculated using the USEPA SCREEN 3 Model (Table 8). Similarly, the time-weighted rolling averages for the individual Project VOCs, Freon 12, and Freon 22 are below their respective MASCS.

5.3.2.2 Water Discharge

The Groundwater IRM treated water effluent met NYSDEC regulatory requirements during the reporting period (Table 3 and Appendix B).

5.4 Performance and Compliance Monitoring Conclusions

Based on the data collected during the reporting period, the following conclusions were made about the system operation:

- The system operated within its normal operational parameters during this reporting period; except for the three unanticipated alarms that shut the plant down (which are described in Section 4). The system controls and interlocks functioned correctly during this reporting period.
- The majority (83 percent) of the VOC mass removed came from RW-2 and RW-3 (i.e. 139 lbs of the 167 total lbs) (Table 7).



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- Project VOCs were not detected in RW-1 or RW-4 above their respective SCGs.
- The majority (99% or greater) of VOCs detected in RW-4 are from non-project VOCs (i.e., Freon 22) (Appendix B).
- Concentrations of project-related VOCs appear to be slightly higher in this reporting period compared to the last six months of 2010. Concentrations of non-project VOCs (Freon 22) decreased during the current reporting period, but continue to remain elevated when compared with concentrations observed during system start-up. The percentage of Non-Project VOCs in the system influent is still greater than the percentage of Project VOCs (Table 2 and Figure 7).
- Mercury does not appear to be present in the site groundwater, as indicated by its absence in project water samples.
- The water and air discharges were compliant with project requirements.

6. Environmental Effectiveness Monitoring

Groundwater IRM treatment system environmental effectiveness (i.e., hydraulic monitoring and groundwater quality monitoring) activities and results for this reporting period are discussed below.

6.1 Hydraulic Monitoring

6.1.1 Activities

As required, a quarterly round of groundwater hydraulic monitoring was performed during this reporting period. Specifically, depth-to-water measurements were collected on February 4, 2011 from the 35 locations forming the approved monitoring well network (Figure 4).

6.1.2 Results

Figure 4 shows the water-level elevations observed on February 4, 2011 (these data are also summarized in Table 11) and the inferred horizontal groundwater flow directions. In addition an evaluation of vertical hydraulic gradients was conducted. The vertical hydraulic gradient is a measure of the potential for vertical groundwater flow between two vertically separated, closely spaced (e.g., clustered or nested observation

wells) observation points. The magnitude of the gradient indicates the steepness of the gradient, and the sign of the gradient indicates the direction of vertical flow (i.e., a positive vertical gradient indicates upward flow, while a negative vertical gradient indicates downward groundwater flow). The gradient does not provide any insight with respect to the rate of groundwater movement, which is affected by the hydraulic conductivity of the aquifer material through which the water is moving.

Table 12 provides a summary of observed vertical groundwater hydraulic gradients at key well pairs located along the site's southern boundary during the February 4, 2011 monitoring event and the vertical gradient directions are shown on Figure 9. The vertical hydraulic gradients indicate that shallow groundwater is moving downward and deeper groundwater is being drawn upward toward the well screens of remedial wells RW-1 through RW-4, thereby documenting an area of vertical hydraulic control.

Based on these evaluations, the potentiometric surface configuration and inferred horizontal groundwater flow directions indicate that the operation of the groundwater containment system has created a capture zone that prevents the off-site migration of shallow groundwater.

6.2 Groundwater Quality Monitoring

6.2.1 Activities

During the First Quarter of 2011, no groundwater quality monitoring took place.

6.2.2 Results

Table 13 summarizes the results of laboratory analysis of VOCs in groundwater samples collected from monitoring wells associated with the Groundwater IRM to date. Table 14 summarizes the results of laboratory analysis of metals in groundwater samples collected from monitoring wells associated with the Groundwater IRM to date. When an appropriate amount of data has been collected, trend graphs will be developed for selected wells.

6.3 Environmental Effectiveness Monitoring Conclusions

As shown on Figure 4, an evaluation of the operational hydraulic monitoring data indicates that the groundwater containment system is operating as designed and the associated capture zone has developed.



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7. Groundwater IRM Recommendations

- Remove mercury from the SPDES equivalency monitoring program because mercury has never been detected in any system water sample.
- Continue operating, maintaining, and monitoring the system in accordance with the Groundwater OM&M Manual (ARCADIS 2009) including the preventative maintenance program to address iron fouling in Remedial Wells RW-2 and RW-3 presented in the 2010 Annual Report.



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8. References

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Table 1. Operational Summary, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

MONTH	DAY																															Days Operation (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 Totals																																160
2010 Totals																																352
Jan-11	(2)				bbbb	b			b	#/*			b					b										(3,4) b			31	
Feb-11	b		b					b		###			b		(5)		b				b							b			28	
Mar-11					b		###			b			b					b						b				b			31	
Q1 2011																																90
TOTAL																																602

Legend:


- Indicates system online for at least the majority of the day.
- Indicates system operated with reduced flow rates.
- Indicates system offline for at least the majority of the day.
- # Indicates water compliance samples were collected.
- ## Indicates water performance samples were collected.
- ** Indicates vapor compliance samples were collected.
- * Indicates vapor performance samples were collected.
- b Indicates filter bag unit changed over.

Notes:

- (1) Days in which the system was operational for the majority of the day are counted as one day.
- (2) As discussed in the Operation, Maintenance, and Monitoring Report for the Groundwater Interim Remedial Measure, 2010 Annual Summary Report (ARCADIS 2011b), Remedial Well RW-2 was off-line for rehabilitation/redevelopment beginning on December 17, 2010. Remedial Well RW-2 was placed back online January 5, 2011 at 12:12 after rehabilitation/redevelopment activities were completed.
- (3) The system shut down at 11:32 AM on January 29, 2011 due to a temporary power supply interruption. Melting snow fell from the roof of the building and hit the building circuit breaker handle, shutting off power to the system. The system was physically inspected and restarted. The system was off-line for approximately 2 hours.
- (4) The system shut down at 8:43 PM on January 29, 2011 due to an motor overload alarm condition at Remedial Well RW-2. The system was off-line for approximately 15 hours. The system was restarted on January 30, 2011 with Remedial Well RW-2 off-line for troubleshooting. Remedial Well RW-2 was later restarted at 1:30 PM on January 31, 2011.
- (5) The system shut down at 9:36 AM on February 16, 2011 due to a blower high-vacuum alarm condition. The alarm condition appeared to be due to restricted air flow through the air stripper trays caused by particulate fouling. Troubleshooting was completed, and the system was restarted with all remedial wells temporarily operating at reduced flow rates. The system was off-line for approximately 6.5 hours. On February 18, 2011, blower motor drive changes were implemented to increase the remedial well flow rates to their design pumping rates. The air stripper is scheduled to be disassembled and cleaned during the next reporting period.

Table 2. Summary of Influent Water Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Compound ⁽²⁾	04/12/10 (µg/L)	05/10/10 (µg/L)	06/09/10 (µg/L)	07/20/10 (µg/L)	08/09/10 (µg/L)	09/07/10 (µg/L)	10/04/10 (µg/L)	11/08/10 (µg/L)	12/06/10 (µg/L)	01/10/11 (µg/L)	02/10/11 (µg/L)	03/07/11 (µg/L)
Project VOCs												
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	1.1	0.90	ND	ND	0.75	0.80	0.85	1.3	0.88	0.98
1,2 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	0.93	ND	ND	ND	0.80	0.88	0.88	0.98	0.8	0.78
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	17	10	17	14	14	13	14	15	14	18	13	12
Vinyl Chloride	20	ND	22	15	14	11	13	12	12	25	15	19
cis 1,2-Dichloroethene	130	33	130	100	99	110	92	91	90	140	93	100
trans 1,2-Dichloroethene	2.6	ND	0.9	ND	ND	ND	ND	0.98	ND	9	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	15	ND	9.9	9.4	ND	ND	6.6	5.9	8.1	15	13	17
Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.93	2.3
Subtotal Project VOCs	185	43	182	139	127	134	127	127	126	210	137	152
Non-Project VOCs												
Dichlorodifluoromethane (Freon 12)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane (Freon 22)	610	650	450	440	480	430	330	350	330	380	340	270
Subtotal Non-Project VOCs	610	650	450	440	480	430	330	350	330	380	340	270
Total VOCs ⁽³⁾	795	693	632	579	607	564	457	477	456	590	477	422
Inorganics												
Total Iron	1,470	1,060	4,840	540	540	6,640	1,180	2,000	770	600	440	440
Total Mercury	ND	ND	ND	NA	ND	NA	NA	NA	NA	NA	NA	ND
pH ⁽⁴⁾	6.7	6.8	6.0	5.8	6.4	6.3	6.5	5.7	6.3	6.0	6.1	5.4 ⁽⁵⁾

See notes on last page.

Table 2. Summary of Influent Water Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Notes:

- (1) Water samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses per NYSDEC ASP 2000, Method OLM 4.3, for iron analyses per USEPA Method 6010 and for mercury analyses per USEPA Method 7470. The VOC analyte list is provided in the DRAFT Groundwater IRM OM&M Manual (ARCADIS 2009b). Influent water samples were collected from Water Sampling Port-5 (WSP-5); refer to Figure 3 of this OM&M Report for the schematic location of WSP-5. Data in this tables corresponds to approximately the past year of system operation.
- (2) Only VOCs associated with the interim State Pollutant Discharge Elimination System (SPDES) equivalency program, plus Toluene, Benzene, Xylenes, non-project related Freon 12 and Freon 22, Mercury and Iron are included in this table. Complete VOC and inorganic data summary tables, including VOC TICs, are provided in Appendix B. Laboratory data qualifiers are included in the Appendix B tables.
- (3) "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.
- (4) pH samples collected and measured in the field by ARCADIS personnel on the dates listed using an Oakton Model 300 pH/conductivity meter. pH units are standard units.
- (5) The March 2011 pH value was measured on March 31, 2011.

Acronyms/Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
IRM	Interim remedial measure.
NA	Not analyzed.
ND	Analyte not detected at, or above its laboratory quantification limit.
NYSDEC	New York State Department of Environmental Conservation.
OM&M	Operation, maintenance and monitoring.
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.

Table 3. Summary of Effluent Water Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Compound ⁽²⁾	Discharge	04/12/10	05/10/10	06/09/10	07/20/10	08/09/10	09/07/10	10/04/10	11/08/10	12/06/10	01/10/11	02/10/11	03/07/11
	Limit ⁽³⁾												
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Project VOCs													
1,1,1 - Trichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis 1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans 1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
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
Non-Project VOCs													
Dichlorodifluoromethane (Freon 12)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane (Freon 22)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Subtotal Non-Project VOCs	--	0	0	0	0	0	0	0	0	0	0	0	0
Total VOCs ⁽⁴⁾	--	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 ⁽⁵⁾	--	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%
Inorganics													
Total Iron	600	520	400	490	300	310	380	210	270	200	270	350	320
Total Mercury	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pH ⁽⁶⁾	5.5 - 8.5	7.0	7.0	6.4	6.2	6.9	6.5	6.4	6.1	6.6	6.6	6.4	6.2 ⁽⁷⁾

See notes on last page.

Table 3. Summary of Effluent Water Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Notes:

- (1) Water samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses per NYSDEC ASP 2000, Method OLM 4.3, for iron analyses per USEPA Method 6010 and for mercury analyses per USEPA Method 7470. The VOC analyte list is provided in the DRAFT Groundwater IRM OM&M Manual (ARCADIS 2009b). Effluent water samples were collected from Water Sampling Port-7 (WSP-7); refer to Figure 3 of this OM&M Report for the location of WSP-7. Data in this tables corresponds to approximately the past year of system operation.
- (2) Only VOCs associated with the interim SPDES equivalency program, including Toluene, Benzene, Xylenes, non-project related Freon 12 and Freon 22, Mercury and Iron are included in this table. Complete VOC and inorganic data summary tables, including VOC TICs, are provided in Appendix B. Laboratory data qualifiers are included in the Appendix B tables.
- (3) 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.
- (4) "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.
- (5) Treatment efficiency was calculated by dividing the difference between the influent and effluent total VOC concentrations by the influent total VOC concentration.
- (6) 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
- (7) The March 2011 pH value was measured on March 31, 2011.

Acronyms\Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
IRM	Interim remedial measure.
ND	Analyte not detected at, or above its laboratory quantification limit.
NYSDEC	New York State Department of Environmental Conservation.
OM&M	Operation, maintenance, and monitoring.
SPDES	State pollutant discharge elimination system.
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/L	Micrograms per liter.
--	Not applicable.
>	Greater than.

Table 4. Summary of Influent Vapor Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Compound ⁽²⁾	02/02/10 (µg/m ³)	04/12/10 (µg/m ³)	06/09/10 (µg/m ³)	07/20/10 (µg/m ³)	08/10/10 (µg/m ³)	10/04/10 ⁽⁴⁾ (µg/m ³)	01/10/11 (µg/m ³)
Project VOCs							
1,1,1 - Trichloroethane	ND	ND	3.6	ND	3.6	ND	ND
1,1 - Dichloroethane	26	20	15	14	17	12	20
1,2 - Dichloroethane	ND	ND	ND	ND	0.77	ND	ND
1,1 - Dichloroethene	16	14	12	9.0	11	ND	23
Tetrachloroethene	6.1	ND	5.5	ND	6.4	ND	ND
Trichloroethene	370	280	230	190	190	200	290
Vinyl Chloride	410	330	220	180	150	170	400
cis 1,2-Dichloroethene	3,100	2,400	1,900	1,700	1,500	1,800	3,400
trans 1,2-Dichloroethene	4.6	ND	2.5	ND	4.6	ND	ND
Benzene	ND	ND	2.1	ND	1.2	ND	ND
Toluene	370	340	150	150	150	100	290
Xylenes	45	34	24	ND	19	ND	ND
Subtotal Project VOCs	4,348	3,418	2,565	2,243	2,054	2,282	4,423
Non-Project VOCs							
Dichlorodifluoromethane (Freon 12)	ND	ND	3.5	ND	4.6	ND	ND
Chlorodifluoromethane (Freon 22)	3,700	4,700	5,200	6,100	5,800	4,600	3,400
Subtotal Non-Project VOCs	3,700	4,700	5,204	6,100	5,805	4,600	3,400
Total VOCs ⁽³⁾	8,048	8,118	7,769	8,343	7,859	6,882	7,823

See notes on last page.

Table 4. Summary of Influent Vapor Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Notes:

- (1) Vapor samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses per Modified USEPA Method T0-15. A VOC analyte list is provided in the DRAFT Groundwater IRM OM&M Manual (ARCADIS 2009b). 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. Data in this tables corresponds to approximately the past year of system operation.
- (2) Only VOCs that are associated with the interim State Pollutant Discharge Elimination System (SPDES) equivalency program, Toluene, Benzene, Xylenes, and non-project related Freon 12 and Freon 22 are included in this table. Complete VOC summary tables, including VOC TICs, are provided in Appendix C. Laboratory data qualifiers are included in the Appendix C tables.
- (3) "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.
- (4) The influent sample container, when it arrived at the laboratory, had a pressure that exceeded the allowable limits. Therefore, per our laboratory data validation program, all the data for this sample have been qualified to indicate that the values are "estimated".

Acronyms/Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
IRM	Interim remedial measure.
ND	Analyte not detected at or above its laboratory reporting limit.
OM&M	Operation, maintenance, and monitoring.
R	The sample results are rejected.
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
µg/m ³	Micrograms per cubic meter.

Table 5. Summary of Effluent Vapor Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Compound ⁽²⁾	Discharge	04/12/10 (µg/m ³)	05/10/10 (µg/m ³)	06/09/10 (µg/m ³)	07/20/10 (µg/m ³)	08/12/10 (µg/m ³)	10/04/10 (µg/m ³)	12/06/10 (µg/m ³)	01/10/11 (µg/m ³)
	Limit ⁽³⁾ (µg/m ³)								
Project VOCs									
1,1,1 - Trichloroethane	68,000	ND	ND	0.97	ND	ND	ND	ND	ND
1,1 - Dichloroethane	NS	ND	1.2	4.4	ND	3.3	8.1	1.3	5.0
1,2 - Dichloroethane	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	380 ⁽⁴⁾	ND	ND	0.77	ND	2.0	3.9	0.66	4.0
Tetrachloroethene	1,000	ND	ND	1.1	ND	0.82	0.92	ND	ND
Trichloroethene	14,000	17	5.1	12	9.9	12	13	9.6	44
Vinyl Chloride	180,000	27	ND	5	17	15	14	2.4	73
cis 1,2-Dichloroethene	190,000 ⁽⁵⁾	65	9.2	21	40	49	120	50	290
trans 1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1,300	29	7.8	13	17	11	11	2.6	8.2
Toluene	37,000	80	ND	44	31	25	26	11	74
Xylenes	37,000	ND	ND	3.8	ND	ND	2.7	ND	8.3
Subtotal Project VOCs	NA	218	23	106	115	118	200	78	507
Non-Project VOCs									
Dichlorodifluoromethane (Freon 12)	NS	ND	3.5	3.5	ND	2.8	3.5	ND	9.8
Chlorodifluoromethane (Freon 22)	NS	4,800	3,500	5,400	6,000	5,200	3,900	3,500	8,100
Subtotal Non-Project VOCs	NA	4,800	3,504	5,404	6,000	5,203	3,904	3,500	8,110
Total VOCs ⁽⁶⁾	NA	5,018	3,527	5,510	6,115	5,321	4,104	3,578	8,617
Treatment Efficiency (Total VOCs) ⁽⁷⁾	NA	38.2%	--	29.1%	26.7%	32.3%	40.4%	--	-- ⁽⁹⁾
Treatment Efficiency (Project VOCs) ⁽⁸⁾	NA	93.6%	--	95.9%	94.9%	94.3%	91.2%	--	88.5%

See notes on last page.

Table 5. Summary of Effluent Vapor Sample Analytical Results, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Notes:

- (1) Vapor samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses per Modified USEPA Method T0-15. A VOC analyte list is provided in the DRAFT Groundwater IRM OM&M Manual (ARCADIS 2009b). 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. Data in this tables corresponds to approximately the past year of system operation.
- (2) Only VOCs that are associated with the interim State Pollutant Discharge Elimination System (SPDES) equivalency program, Toluene, Benzene, Xylenes, and non-project related Freon 12 and Freon 22 are included in this table. Complete VOC summary tables, including VOC TICs, are provided in Appendix C. Laboratory data qualifiers are included in the Appendix C tables.
- (3) Discharge limit is compound specific short-term guidance concentration (SGC) per the NYSDEC DAR-1 AGC/SGC tables revised October 18, 2010.
- (4) An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on guidance of the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically for 1,1- dichloroethene, which is not defined as provided in Section IV.A.2.b.1 a high-toxicity compound, the Interim SGC = (smaller of Time Weighted Average [TWA] - Threshold Limit Value or TWA - Recommended Exposure Limit)/4.2. or $1,600 \mu\text{g}/\text{m}^3 / 4.2 = \text{approximately } 380 \mu\text{g}/\text{m}^3$. An interim SGC was developed for this compound because it has a moderate toxicity rating, as specified in the DAR-1 AGC/SGC Tables, dated October 18, 2010.
- (5) An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on guidance provided in Section IV.A.2.b.1 of the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically for cis-1,2 dichloroethene, which is not defined as a high-toxicity compound, the interim SGC = (smaller of Time Weighted Average [TWA] - Threshold Limit Value or TWA - Recommended Exposure Limit)/4.2 or $790,000 \mu\text{g}/\text{m}^3 / 4.2 = \text{approximately } 190,000 \mu\text{g}/\text{m}^3$. An interim SGC was developed for this compound because it has a moderate toxicity rating, as specified in the DAR-1 AGC/SGC Tables, dated October 18, 2010.
- (6) "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.
- (7) Treatment efficiency was calculated by dividing the difference between the influent and effluent Total VOC concentrations by the influent Total VOC concentration. Treatment efficiency is only calculated when there is a corresponding influent sample.
- (8) Treatment efficiency was calculated by dividing the difference between the influent and effluent total Project VOC concentrations by the influent total Project VOC concentration. Treatment efficiency is only calculated when there is a corresponding influent sample.
- (9) Treatment efficiency could not be calculated for the January 2011 event because the effluent Total VOC concentration was greater than the influent Total VOC concentration due to an apparent anomalous concentration of Freon 22 in the effluent sample.

Acronyms/Key:

700	Bold data indicates that the analyte was detected at or above its reporting limit.
16	Data that is not bold indicates analyte detected but below its reporting limit; the value is estimated.
AGC	Annual guideline concentration.
IRM	Interim remedial measure.
NA	Not applicable.
ND	Analyte not detected at or above its laboratory reporting limit.
NS	Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007. An interim SGC was not developed for these compounds because they have low toxicity ratings in the NYSDEC DAR-1 AGC/SGC tables revised October 18, 2010.
NYSDEC	New York State Department of Environmental Conservation.
OM&M	Operation, maintenance, and monitoring.
TICs	Tentatively identified compounds.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
$\mu\text{g}/\text{m}^3$	Micrograms per cubic meter.
--	Data not available or value could not be calculated.

Table 6. Summary of System Parameters, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Date ⁽¹⁾	Water Flow Rates ⁽²⁾						Water Pressures ⁽²⁾					Air Flow Rate ⁽²⁾	Air Pressures ⁽²⁾					Air Temp. ⁽²⁾
	Remedial Well				Combined Influent	Effluent	Remedial Well Effluent ⁽³⁾				Effluent	Effluent	ECU Influent				Effluent	Stack Temp.
	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)	(inH ₂ O)	(inH ₂ O)	(inH ₂ O)	(inH ₂ O)	(inH ₂ O)	(°R)
04/12/10	30.1	75.2	75.6	30.5	218	229	59.0	28.2	67.2	58.2	7.5	2,086	5.8	7.5	3.2	1.1	0.0	540
05/10/10	30.3	0.0 ⁽⁴⁾	75.6	30.6	139	137	59.3	0.0 ⁽⁴⁾	68.8	59.0	6.0	2,076	6.0	7.7	3.3	1.1	0.0	540
06/09/10	30.3	75.4	75.6	30.4	216	218	59.4	58.7	68.0	59.0	8.0	2,003	7.8	9.5	5.2	3.5	0.0	537
07/20/10	30.4	75.8	75.8	30.6	219	216	58.5	54.9	66.2	58.0	7.0	2,114	5.6	6.8	3.9	1.6	0.0	550
08/09/10	30.7	75.4	75.5	30.8	219	218	58.1	54.5	67.8	57.7	7.0	2,097	5.5	6.5	3.5	1.5	0.0	551
09/07/10	30.4	75.4	75.4	30.5	218	212	58.0	52.4	56.4	57.6	6.0 ⁽⁵⁾	2,134	5.2	6.5	3.5	1.5	0.0	548
10/04/10	30.1	75.4	75.5	30.2	217	211	58.7	49.9	70.1	57.7	8.3	2,112	5.4	4.3	3.4	1.5	0.0	547
11/08/10	30.1	75.3	75.5	30.5	217	202	58.2	46.2	67.0	58.0	7.5	1,967	7.5	5.5	3.0	2.3	0.5	534
12/06/10	30.1	75.1	75.2	30.1	216	213	58.2	43.9	61.3	57.8	6.0	2,021	8.2	4.6	2.8	1.2	0.0	532
01/10/11	30.0	75.6	75.2	30.1	217	239	58.0	57.3	69.1	57.4	5.0	2,035	8.5	5.0	1.5	1.0	0.0	528
02/10/11	30.7	75.6	75.4	30.4	219	209	57.4	54.1	66.9	56.8	6.0	2,024	8.2	4.6	3.0	1.2	0.0	529
03/07/11	30.6	75.9	75.5	30.3	218	216	57.6	51.3	64.2	57.2	6.5	1,945	8.0	4.5	2.4	1.2	0.0	529

See notes on last page.

Table 6. Summary of System Parameters, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Notes:

- (1) Operational data collected by ARCADIS on days noted. Parameters listed were typically recorded during compliance monitoring events. Data in this table corresponds to approximately the past year of system operation.
- (2) Instantaneous values from field-mounted instruments, except for the combined influent water-flow rate, which is the sum of individual well flow rates via the Supervisory Control and Data Acquisition (SCADA) System.
- (3) Remedial Well effluent pressure readings measured at the influent manifold within the treatment system building.
- (4) Remedial Well RW-2 was off-line between April 24 and May 14, 2010 for rehabilitation activities and to replace the well pump and motor.
- (5) Value is from September 14, 2010, data was not collected during the September 7, 2010 event.

Acronyms\Key:

ECU	Emission control unit.
gpm	Gallons per minute.
inH ₂ O	Inches of water column.
psi	Pounds per square inch.
°R	Degrees Rankine.
scfm	Standard cubic feet per minute.
Temp.	Temperature.



Table 7. Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates, Groundwater Interim Remedial Measure, 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 Start Up 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	NA	NA
2009 Totals ⁽⁹⁾																																				
7/21/09 - 12/30/09	6,592	13,838	16,445	6,574	43,449	0.41	280	54	14	343	0.17	273	19	0.20	293	<0.01	0.60	35	13	49	<0.01	1.9	0.34	0.09	2.2	<0.01	1.9	0.12	0.00	1.9	<0.01	0.00	0.22	0.08	0.31	
2010 Totals ⁽¹⁰⁾																																				
12/30/09 - 01/05/11	15,726	35,127	38,160	15,689	104,702	0.60	173	412	89	674	0.56	171	27	0.10	199	<0.01	0.32	384	89	472	<0.01	0.47	1.1	0.24	1.8	<0.01	0.46	0.07	0.00	0.54	<0.01	0.00	1.0	0.24	1.3	
January 2011 through March 2011 Totals																																				
01/05/11 - 02/10/11	1,545	3,746	3,848	1,542	10,681	0.05	21	32	11	64	0.05	21	3.0	0.00	24	<0.01	0.18	29	11	40	<0.01	0.58	0.89	0.31	1.8	<0.01	0.58	0.08	0.00	0.67	<0.01	0.01	0.81	0.31	1.1	
02/10/11 - 03/07/11	1,071	2,668	2,673	1,062	7,474	0.03	15	22	7.3	44	0.03	15	2.1	0.00	17	<0.01	0.13	20	7.3	27	<0.01	0.60	0.88	0.29	1.8	<0.01	0.60	0.08	0.00	0.68	<0.01	0.01	0.80	0.29	1.1	
03/07/11 - 04/08/11	1,404	3,459	3,474	1,395	9,732	0.04	20	29	10	59	0.04	20	2.7	0.00	23	<0.01	0.17	26	10	36	<0.01	0.63	0.91	0.31	1.8	<0.01	0.63	0.08	0.00	0.72	<0.01	0.01	0.81	0.31	1.1	
Subtotal Jan-Mar 11 ⁽¹¹⁾	4,020	9,873	9,995	3,999	27,887	0.12	56	83	28	167	0.12	56	7.8	0.00	64	0.00	0.48	75	28	103	<0.01	0.60	0.89	0.30	1.8	<0.01	0.60	0.08	0.00	0.69	<0.01	0.01	0.81	0.30	1.1	
Total ⁽¹²⁾	26,475	59,108	64,851	26,412	176,846	1.1	509	549	131	1,185	0.85	500	54	0.30	557	<0.01	1.4	494	130	624	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

See notes on last page.

Table 7. Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Notes:	
(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 TVOC concentration from the most recent sampling event by the number of gallons extracted between sampling events. 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, and 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 system start-up on July 21, 2009 and December 30, 2009.
(10)	The volume of groundwater recovered and mass recovered calculations represent the operational period between December 30, 2009 and December 31, 2010.
(11)	The volume of groundwater recovered and mass recovered calculations represent the operational period between January 5, 2010 and April 8, 2011. Mass recovery rates are averages and not totals.
(12)	"Total" refers to the amounts removed by the Operable Unit 3 Groundwater Interim Remedial Measure.

Acronyms\Key:	
IRM	Interim Remedial Measure.
gal	Gallons.
lbs	Pounds.
lbs/day	Pounds per day.
NA	Not applicable.
TVOC	Total volatile organic compounds.
<	Less than.

Table 8. Summary of Air Emissions Model Output, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Compound ⁽¹⁾	AGC ⁽²⁾ ($\mu\text{g}/\text{m}^3$)	Percent of MASC Per Event ⁽³⁾								Percent AGC ⁽⁴⁾
		4/12/10	5/10/10	6/9/10	7/20/10	8/12/10	10/4/10	12/6/10	1/10/11	
1,1,1 - Trichloroethane	5,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1 - Dichloroethane	0.63	0.00%	0.03%	0.11%	0.00%	0.08%	0.20%	0.03%	0.12%	0.09%
1,1 - Dichloroethene	70	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2-Butanone	5,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	30,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chloroform	0.043	0.00%	1.25%	2.37%	0.00%	1.72%	3.30%	1.67%	3.92%	2.26%
Ethylbenzene	1,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Xylenes (o)	100	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Xylenes (m,p)	100	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chloromethane	90	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Methylene Chloride	2.1	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
Tetrachloroethene	1.0	0.00%	0.00%	0.02%	0.00%	0.01%	0.01%	0.00%	0.00%	0.01%
Trichloroethene	0.5	0.52%	0.16%	0.36%	0.30%	0.37%	0.40%	0.29%	1.35%	0.60%
Vinyl Chloride	0.11	3.76%	0.00%	0.69%	2.38%	2.10%	1.97%	0.33%	10.17%	3.82%
cis 1,2 Dichloroethene	63	0.02%	0.00%	0.01%	0.01%	0.01%	0.03%	0.01%	0.07%	0.03%
Benzene	0.13	3.42%	0.92%	1.52%	2.01%	1.30%	1.31%	0.31%	0.97%	1.36%
Toluene	5,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2-Hexanone	30	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	5,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dichlorodifluoromethane (Freon 12)	12,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chlorodifluoromethane (Freon 22)	50,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

See notes on last page.

Table 8. Summary of Air Emissions Model Output, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Notes:

- (1) Only VOCs that were detected in the effluent vapor sample (VSP-5) over the past year of system operation are included in this table.
- (2) AGC refers to the compound-specific annual guideline concentration per the NYSDEC DAR-1 AGC/SGC tables, revised October 18, 2010. NYSDEC DAR-1 AGCs were scaled using the results of a site-specific annual USEPA SCREEN 3 model to calculate the annual MASC per monitoring event.
- (3) Percent of AGC (or Percent MASC) was calculated by dividing the actual effluent concentration by the site-specific annual MASC. Detailed calculations are included in Appendix D.
- (4) Percent AGC is the twelve month average at the end of the reporting period. The Percent AGC was calculated by time-weighting the "Percent MASCs" for the individual sampling events over the past year. For this period, the MASCs for September 2010 were assumed to be the same as for August 2010, the MASCs for November 2010 were assumed to be the same as for October 2010, and the MASCs for February and March 2011 were assumed to be the same as for January 2011.

Acronyms/Key:

AGC	Annual Guideline Concentration.
DAR-1	Division of Air Resources-1.
MASC	Maximum allowable stack concentration.
NYSDEC	New York State Department of Environmental Conservation.
SGC	Short-term Guideline Concentration.
USEPA	United States Environmental Protection Agency.
VOCs	Volatile Organic Compounds.
$\mu\text{g}/\text{m}^3$	Micrograms per cubic meter.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-1 7/29/2009	RW-1 8/12/2009	RW-1 9/10/2009	RW-1 11/10/2009	RW-1 12/2/2009	RW-1 2/2/2010
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	1	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	0.6	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane	1	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone	NE	6.5 J	< 50	< 50	< 50	< 50	< 50
2-Hexanone	50	< 50	< 50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone	50	< 50	< 50	< 50	< 50	< 50	< 50
Acetone	NE	3.5 J	< 50	2.9 J	1.5 J	< 50	< 50
Benzene	1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane	50	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform	50	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane	5	< 5	< 5	< 5	< 5	< 5 R	< 5
Carbon Disulfide	60	< 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride	5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform	7	3 J	2.4 J	1.9 J	1.4 J	1.3 J	0.8 J
Chloromethane	5	< 5	< 5	< 5	< 5	< 5 R	< 5
cis-1,2-dichloroethene	5	1.5 J	1.5 J	1.4 J	1.5 J	1.7 J	1.5 J
cis-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane	50	< 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	5	< 5	< 5	< 5	< 5	< 5	< 5
Methyl tert-Butyl Ether	5	--	--	--	--	--	< 5
Methylene Chloride	5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene	5	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	5	< 5	< 5	< 5	< 5	< 5	< 5
Toluene	5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene	5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene	5	1.3 J	1.7 J	1.5 J	1.8 J	2 J	2 J
Trichlorotrifluoroethane (Freon 113)	5	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride	2	< 2	< 2	< 2	< 2	< 2	< 2
Xylene-o	5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p	5	< 5	< 5	< 5	< 5	< 5	< 5
Total VOCs ⁽²⁾		15.8	5.6	7.7	6.2	5.0	4.3
Project VOCs ⁽³⁾		2.8	3.2	2.9	3.3	3.7	3.5

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-1 4/12/2010	RW-1 7/20/2010	RW-1 10/4/2010	RW-1 1/10/2011	RW-2 7/29/2009	RW-2 8/12/2009
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 5	< 5	< 5	< 5	< 100	< 100
1,1,2,2-Tetrachloroethane	5	< 5	< 5	< 5	< 5	< 100	< 100
1,1,2-Trichloroethane	1	< 5	< 5	< 5	< 5	< 100	< 100
1,1-Dichloroethane	5	< 5	< 5	< 5	< 5	9.2 J	8.8 J
1,1-Dichloroethene	5	< 5	< 5	< 5	< 5	< 100	< 100
1,2-Dichloroethane	0.6	< 5	< 5	< 5	< 5	< 100	< 100
1,2-Dichloropropane	1	< 5	< 5	< 5	< 5	< 100	< 100
2-Butanone	NE	< 50	< 50	< 50	< 50	< 1000	< 1000
2-Hexanone	50	< 50	< 50	< 50	< 50	< 1000	< 1000
4-methyl-2-pentanone	50	< 50	< 50	< 50	< 50	< 1000	< 1000
Acetone	NE	< 50	< 50	< 50	< 50	< 1000	< 1000
Benzene	1	< 0.7	< 0.7	< 0.7	< 0.7	< 14	< 14
Bromodichloromethane	50	< 5	< 5	< 5	< 5	< 100	< 100
Bromoform	50	< 5	< 5	< 5	< 5	< 100	< 100
Bromomethane	5	< 5	< 5	< 5	< 5	< 100	< 100
Carbon Disulfide	60	< 5	< 5	< 5	< 5	< 100	< 100
Carbon tetrachloride	5	< 5	< 5	< 5	< 5	< 100	< 100
Chlorobenzene	5	< 5	< 5	< 5	< 5	< 100	< 100
Chlorodifluoromethane (Freon 22)	NE	< 5	< 5	< 5	< 5	< 100	< 100
Chloroethane	5	< 5	< 5	< 5	< 5	< 100	< 100
Chloroform	7	0.42 J	0.36 J	0.31 J	< 5	< 100	< 100
Chloromethane	5	< 5	< 5	< 5	< 5	< 100	< 100
cis-1,2-dichloroethene	5	1.5 J	2 J	1.3 J	1.3 J	2,600	2,300
cis-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 100	< 100
Dibromochloromethane	50	< 5	< 5	< 5	< 5	< 100	< 100
Dichlorodifluoromethane (Freon 12)	5	< 5	< 5	< 5	< 5	< 100	< 100
Ethylbenzene	5	< 5	< 5	< 5	< 5	13 J	7.2 J
Methyl tert-Butyl Ether	5	< 5	< 5	< 5	< 5	--	--
Methylene Chloride	5	< 5	< 5	< 5	< 5	< 100	< 100
Styrene	5	< 5	< 5	< 5	< 5	< 100	< 100
Tetrachloroethene	5	< 5	< 5	< 5	< 5	< 100	< 100
Toluene	5	< 5	< 5	< 5	< 5	520	170
trans-1,2-dichloroethene	5	< 5	< 5	< 5	< 5	12 J	21 J
trans-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 100	< 100
Trichloroethylene	5	2.4 J	3.4 J	3 J	2.4 J	46 J	30 J
Trichlorotrifluoroethane (Freon 113)	5	< 5	< 5	< 5	< 5	< 100	< 100
Vinyl Chloride	2	< 2	< 2	< 2	< 2	630	670
Xylene-o	5	< 5	< 5	< 5	< 5	14 J	9.4 J
Xylenes - m,p	5	< 5	< 5	< 5	< 5	27 J	9.2 J
Total VOCs ⁽²⁾		4.3	5.8	4.6	3.7	3,871	3,226
Project VOCs ⁽³⁾		3.9	5.4	4.3	3.7	3,849	3,210

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-2 9/10/2009	RW-2 11/10/2009	RW-2 12/2/2009	RW-2 2/2/2010	RW-2 4/12/2010	RW-2 7/20/2010
		NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 50	< 25	< 25	< 25	< 13	< 13
1,1,2,2-Tetrachloroethane	5	< 50	< 25	< 25	< 25	< 13	< 13
1,1,2-Trichloroethane	1	< 50	< 25	< 25	< 25	< 13	< 13
1,1-Dichloroethane	5	6.4 J	5.2 J	5.3 J	3.5 J	3.2 J	2.3 J
1,1-Dichloroethene	5	< 50	2.9 J	3.1 J	< 25	3 J	2.1 J
1,2-Dichloroethane	0.6	< 50	< 25	< 25	< 25	< 13	< 13
1,2-Dichloropropane	1	< 50	< 25	< 25	< 25	< 13	< 13
2-Butanone	NE	< 500	< 250	< 250	< 250	< 130	< 130
2-Hexanone	50	< 500	< 250	< 250	< 250	< 130	< 130
4-methyl-2-pentanone	50	< 500	< 250	< 250	< 250	< 130	< 130
Acetone	NE	< 500	< 250	< 250	< 250	< 130	< 130
Benzene	1	< 7	< 3.5	< 3.5	< 3.5	< 1.8	< 1.8
Bromodichloromethane	50	< 50	< 25	< 25	< 25	< 13	< 13
Bromoform	50	< 50	< 25	< 25	< 25	< 13	< 13
Bromomethane	5	< 50	< 25	< 25 R	< 25	< 13	< 13
Carbon Disulfide	60	< 50	< 25	< 25	< 25	< 13	< 13
Carbon tetrachloride	5	< 50	< 25	< 25	< 25	< 13	< 13
Chlorobenzene	5	< 50	< 25	< 25	< 25	< 13	< 13
Chlorodifluoromethane (Freon 22)	NE	4 J	3.5 J	3.3 J	< 25	1.7 J	1.1 J
Chloroethane	5	< 50	< 25	< 25	< 25	< 13	< 13
Chloroform	7	3.4 J	3 J	2.3 J	2 J	1.5 J	1.4 J
Chloromethane	5	< 50	< 25	< 25 R	< 25	< 13	< 13
cis-1,2-dichloroethene	5	1,300	930	880	590	480	310
cis-1,3-dichloropropene	0.4	< 50	< 25	< 25	< 25	< 13	< 13
Dibromochloromethane	50	< 50	< 25	< 25	< 25	< 13	< 13
Dichlorodifluoromethane (Freon 12)	5	< 50	< 25	< 25	< 25	< 13	< 13
Ethylbenzene	5	4.8 J	6.4 J	5.1 J	1.8 J	2.2 J	1.7 J
Methyl tert-Butyl Ether	5	--	--	--	< 25	< 13	< 13
Methylene Chloride	5	< 50	< 25	< 25	< 25	< 13	< 13
Styrene	5	< 50	< 25	< 25	< 25	< 13	< 13
Tetrachloroethene	5	< 50	< 25	< 25	< 25	< 13	< 13
Toluene	5	190	200	150	49	71	35
trans-1,2-dichloroethene	5	32 J	6.2 J	2.1 J	49	< 13	0.95 J
trans-1,3-dichloropropene	0.4	< 50	< 25	< 25	< 25	< 13	< 13
Trichloroethylene	5	52	59	63	46	43	35
Trichlorotrifluoroethane (Freon 113)	5	< 50	< 25	< 25	< 25	< 13	< 13
Vinyl Chloride	2	370	210	210	83	94	54
Xylene-o	5	5.4 J	6 J	4.9 J	< 25	2.2 J	1.3 J
Xylenes - m,p	5	7.9 J	11 J	9 J	< 25	3.5 J	2.4 J
Total VOCs ⁽²⁾		1,976	1,443	1,338	824	705	447
Project VOCs ⁽³⁾		1,957	1,430	1,327	821	699	443

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-2 10/4/2010	RW-2 1/10/2011	RW-3 7/29/2009	RW-3 8/12/2009	RW-3 9/10/2009	RW-3 11/10/2009
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 13	0.78 J	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	5	< 13	< 13	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	1	< 13	< 13	< 5	< 5	< 5	< 5
1,1-Dichloroethane	5	2.2 J	3.5 J	2.4 J	2.1 J	1.9 J	1.4 J
1,1-Dichloroethene	5	2.2 J	4.9 J	< 5	0.35 J	0.41 J	0.53 J
1,2-Dichloroethane	0.6	< 13	< 13	< 5	< 5	< 5	< 5
1,2-Dichloropropane	1	< 13	< 13	< 5	< 5	< 5	< 5
2-Butanone	NE	< 130	< 130	< 50	< 50	< 50	< 50
2-Hexanone	50	< 130	< 130	< 50	< 50	< 50	< 50
4-methyl-2-pentanone	50	< 130	< 130	< 50	< 50	< 50	< 50
Acetone	NE	< 130 B	< 130 B	< 50	< 50	2 J	3.1 J
Benzene	1	< 1.8	< 1.8	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane	50	< 13	< 13	0.35 J	< 5	< 5	< 5
Bromoform	50	< 13	< 13	< 5	< 5	< 5	< 5
Bromomethane	5	< 13	< 13	< 5	< 5	< 5	< 5
Carbon Disulfide	60	< 13	< 13	< 5	< 5	< 5	< 5
Carbon tetrachloride	5	< 13	< 13	< 5	< 5	< 5	< 5
Chlorobenzene	5	< 13	< 13	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	1 J	1.4 J	2.1 J	8.5	93	490 D
Chloroethane	5	< 13	< 13	< 5	< 5	< 5	< 5
Chloroform	7	1.9 J	1.9 J	2.1 J	2.3 J	2.9 J	5.9
Chloromethane	5	< 13	< 13	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene	5	270	460	130	120	130	85
cis-1,3-dichloropropene	0.4	< 13	< 13	< 5	< 5	< 5	< 5
Dibromochloromethane	50	< 13	< 13	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 13	< 13	< 5	< 5	< 5	< 5
Ethylbenzene	5	1.5 J	2.6 J	< 5	< 5	< 5	< 5
Methyl tert-Butyl Ether	5	< 13	< 13	--	--	--	--
Methylene Chloride	5	< 13	< 13	< 5	< 5	< 5	< 5
Styrene	5	< 13	< 13	< 5	< 5	< 5	< 5
Tetrachloroethene	5	< 13	< 13	0.81 J	0.56 J	0.83 J	0.54 J
Toluene	5	25	62	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene	5	< 13	< 13	0.68 J	0.54 J	0.59 J	0.52 J
trans-1,3-dichloropropene	0.4	< 13	< 13	< 5	< 5	< 5	< 5
Trichloroethylene	5	36	51	37	34	29	24
Trichlorotrifluoroethane (Freon 113)	5	< 13	< 13	< 5	< 5	< 5	< 5
Vinyl Chloride	2	45	87	< 2	< 2	0.47 J	0.42 J
Xylene-o	5	0.9 J	2.6 J	< 5	< 5	< 5	< 5
Xylenes - m,p	5	1.9 J	3.8 J	< 5	< 5	< 5	< 5
Total VOCs ⁽²⁾		388	681	175	168	261	611
Project VOCs ⁽³⁾		383	676	171	158	163	112

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-3 12/2/2009	RW-3 2/2/2010	RW-3 4/12/2010	RW-3 7/20/2010	RW-3 10/4/2010	RW-3 1/10/2011
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 13	< 25	< 25	< 50	< 25	< 25
1,1,2,2-Tetrachloroethane	5	< 13	< 25	< 25	< 50	< 25	< 25
1,1,2-Trichloroethane	1	< 13	< 25	< 25	< 50	< 25	< 25
1,1-Dichloroethane	5	1.3 J	< 25	< 25	< 50	< 25	< 25
1,1-Dichloroethene	5	< 13	< 25	< 25	< 50	< 25	< 25
1,2-Dichloroethane	0.6	< 13	< 25	< 25	< 50	< 25	< 25
1,2-Dichloropropane	1	< 13	< 25	< 25	< 50	< 25	< 25
2-Butanone	NE	< 130	< 250	< 250	< 500	< 250	< 250
2-Hexanone	50	< 130	< 250	< 250	< 500	< 250	< 250
4-methyl-2-pentanone	50	< 130	< 250	< 250	< 500	< 250	< 250
Acetone	NE	< 130	< 250	< 250	< 500	< 250	< 250 B
Benzene	1	< 1.8	< 3.5	< 3.5	< 7	< 3.5	< 3.5
Bromodichloromethane	50	< 13	< 25	< 25	< 50	< 25	< 25
Bromoform	50	< 13	< 25	< 25	< 50	< 25	< 25
Bromomethane	5	< 13	< 25	< 25	< 50	< 25	< 25
Carbon Disulfide	60	< 13	< 25	< 25	< 50	< 25	< 25
Carbon tetrachloride	5	< 13	< 25	< 25	< 50	< 25	< 25
Chlorobenzene	5	< 13	< 25	< 25	< 50	< 25	< 25
Chlorodifluoromethane (Freon 22)	NE	660 D	1,300 D	1,300 D	1400	880	890
Chloroethane	5	< 13	< 25	< 25	< 50	< 25	< 25
Chloroform	7	6 J	4.3 J	3.2 J	< 50	6.6 J	5.8 J
Chloromethane	5	< 13 R	< 25	< 25	< 50	< 25	< 25
cis-1,2-dichloroethene	5	72	68	70	64	64	74
cis-1,3-dichloropropene	0.4	< 13	< 25	< 25	< 50	< 25	< 25
Dibromochloromethane	50	< 13	< 25	< 25	< 50	< 25	< 25
Dichlorodifluoromethane (Freon 12)	5	< 13	< 25	< 25	< 50	< 25	< 25
Ethylbenzene	5	< 13	< 25	< 25	< 50	< 25	< 25
Methyl tert-Butyl Ether	5	--	< 25	< 25	< 50	< 25	< 25
Methylene Chloride	5	< 13	< 25	< 25	< 50	< 25	< 25
Styrene	5	< 13	< 25	< 25	< 50	< 25	< 25
Tetrachloroethene	5	< 13	< 25	< 25	< 50	< 25	< 25
Toluene	5	< 13	< 25	< 25	< 50	< 25	< 25
trans-1,2-dichloroethene	5	< 13	7.2 J	< 25	4.8 J	6.7 J	3.9 J
trans-1,3-dichloropropene	0.4	< 13	< 25	< 25	< 50	< 25	< 25
Trichloroethylene	5	22	19 J	17 J	14 J	12 J	10 J
Trichlorotrifluoroethane (Freon 113)	5	< 13	< 25	< 25	< 50	< 25	< 25
Vinyl Chloride	2	< 5	< 10	< 10	< 20	2.6 J	5.1 J
Xylene-o	5	< 13	< 25	< 25	< 50	< 25	< 25
Xylenes - m,p	5	< 13	< 25	< 25	< 50	< 25	< 25
Total VOCs ⁽²⁾		761	1,399	1,390	1,483	972	989
Project VOCs ⁽³⁾		95	94	87	83	85	93

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-4 7/29/2009	RW-4 8/12/2009	RW-4 9/10/2009	RW-4 11/10/2009	RW-4 12/2/2009	RW-4 2/2/2010
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 5	< 5	< 5	< 5	< 10	< 10
1,1,2,2-Tetrachloroethane	5	< 5	< 5	< 5	< 5	< 10	< 10
1,1,2-Trichloroethane	1	< 5	< 5	< 5	< 5	< 10	< 10
1,1-Dichloroethane	5	0.42 J	0.38 J	0.47 J	0.52 J	< 10	0.6 J
1,1-Dichloroethene	5	< 5	< 5	< 5	< 5	< 10	< 10
1,2-Dichloroethane	0.6	< 5	< 5	< 5	< 5	< 10	< 10
1,2-Dichloropropane	1	< 5	< 5	< 5	< 5	< 10	< 10
2-Butanone	NE	< 50	< 50	< 50	< 50	< 100	< 100
2-Hexanone	50	< 50	< 50	< 50	< 50	< 100	< 100
4-methyl-2-pentanone	50	< 50	< 50	< 50	< 50	< 100	< 100
Acetone	NE	< 50	< 50	< 50	3.5 J	< 100	< 100
Benzene	1	< 0.7	< 0.7	< 0.7	< 0.7	< 1.4	< 1.4
Bromodichloromethane	50	< 5	< 5	< 5	< 5	< 10	< 10
Bromoform	50	< 5	< 5	< 5	< 5	< 10	< 10
Bromomethane	5	< 5	< 5	< 5	< 5	< 10 R	< 10
Carbon Disulfide	60	< 5	< 5	< 5	< 5	< 10	< 10
Carbon tetrachloride	5	< 5	< 5	< 5	< 5	< 10	< 10
Chlorobenzene	5	< 5	< 5	< 5	< 5	< 10	< 10
Chlorodifluoromethane (Freon 22)	NE	140	200	330 D	230 D	290	440 D
Chloroethane	5	< 5	< 5	< 5	< 5	< 10	< 10
Chloroform	7	1 J	0.88 J	0.78 J	0.95 J	0.88 J	0.72 J
Chloromethane	5	< 5	< 5	< 5	< 5	< 10 R	< 10
cis-1,2-dichloroethene	5	1.5 J	1.7 J	1.9 J	1.9 J	2.2 J	1.8 J
cis-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 10	< 10
Dibromochloromethane	50	< 5	< 5	< 5	< 5	< 10	< 10
Dichlorodifluoromethane (Freon 12)	5	< 5	< 5	< 5	< 5	< 10	< 10
Ethylbenzene	5	< 5	< 5	< 5	< 5	< 10	< 10
Methyl tert-Butyl Ether	5	--	--	--	--	--	< 10
Methylene Chloride	5	< 5	< 5	< 5	< 5	< 10	< 10
Styrene	5	< 5	< 5	< 5	< 5	< 10	< 10
Tetrachloroethene	5	0.44 J	0.44 J	0.44 J	0.48 J	< 10	0.64 J
Toluene	5	< 5	< 5	< 5	< 5	< 10	< 10
trans-1,2-dichloroethene	5	< 5	< 5	< 5	< 5	< 10	< 10
trans-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 10	< 10
Trichloroethylene	5	1.1 J	1.2 J	1.6 J	1.9 J	1.8 J	1.4 J
Trichlorotrifluoroethane (Freon 113)	5	< 5	< 5	< 5	< 5	< 10	< 10
Vinyl Chloride	2	< 2	< 2	< 2	< 2	< 4	< 4
Xylene-o	5	< 5	< 5	< 5	< 5	< 10	< 10
Xylenes - m,p	5	< 5	< 5	< 5	< 5	< 10	< 10
Total VOCs ⁽²⁾		144	205	335	239	295	445
Project VOCs ⁽³⁾		3.5	3.7	4.4	4.8	4.0	4.4

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-4 4/12/2010	RW-4 7/20/2010	RW-4 10/4/2010	RW-4 1/10/2011
	NYSDEC SCGs				
1,1,1-Trichloroethane	5	< 13	< 25	< 25	< 25
1,1,2,2-Tetrachloroethane	5	< 13	< 25	< 25	< 25
1,1,2-Trichloroethane	1	< 13	< 25	< 25	< 25
1,1-Dichloroethane	5	< 13	< 25	< 25	< 25
1,1-Dichloroethene	5	< 13	< 25	< 25	< 25
1,2-Dichloroethane	0.6	< 13	< 25	< 25	< 25
1,2-Dichloropropane	1	< 13	< 25	< 25	< 25
2-Butanone	NE	< 130	< 250	< 250	< 250
2-Hexanone	50	< 130	< 250	< 250	< 250
4-methyl-2-pentanone	50	< 130	< 250	< 250	< 250
Acetone	NE	< 130	< 250	< 250	< 250
Benzene	1	< 1.8	< 3.5	< 3.5	< 3.5
Bromodichloromethane	50	< 13	< 25	< 25	< 25
Bromoform	50	< 13	< 25	< 25	< 25
Bromomethane	5	< 13	< 25	< 25	< 25
Carbon Disulfide	60	< 13	< 25	< 25	< 25
Carbon tetrachloride	5	< 13	< 25	< 25	< 25
Chlorobenzene	5	< 13	< 25	< 25	< 25
Chlorodifluoromethane (Freon 22)	NE	560 D	840	850	820
Chloroethane	5	< 13	< 25	< 25	< 25
Chloroform	7	0.8 J	< 25	< 25	< 25
Chloromethane	5	< 13	< 25	< 25	< 25
cis-1,2-dichloroethene	5	1.5 J	< 25	< 25	< 25
cis-1,3-dichloropropene	0.4	< 13	< 25	< 25	< 25
Dibromochloromethane	50	< 13	< 25	< 25	< 25
Dichlorodifluoromethane (Freon 12)	5	< 13	< 25	< 25	< 25
Ethylbenzene	5	< 13	< 25	< 25	< 25
Methyl tert-Butyl Ether	5	< 13	< 25	< 25	< 25
Methylene Chloride	5	< 13	< 25	< 25	< 25
Styrene	5	< 13	< 25	< 25	< 25
Tetrachloroethene	5	0.9 J	< 25	< 25	< 25
Toluene	5	< 13	< 25	< 25	< 25
trans-1,2-dichloroethene	5	< 13	< 25	< 25	< 25
trans-1,3-dichloropropene	0.4	< 13	< 25	< 25	< 25
Trichloroethylene	5	1.4 J	< 25	< 25	< 25
Trichlorotrifluoroethane (Freon 113)	5	< 13	< 25	< 25	< 25
Vinyl Chloride	2	< 5	< 10	< 10	< 10
Xylene-o	5	< 13	< 25	< 25	< 25
Xylenes - m,p	5	< 13	< 25	< 25	< 25
Total VOCs ⁽²⁾		565	840	850	820
Project VOCs ⁽³⁾		3.8	0.0	0.0	0.0

See notes on last page.

Table 9. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

Notes:

- (1) Water samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analysis using NYSDEC ASP 2000 Method OLM4.2. Results validated following protocols specified in Sampling and Analysis Plan in the December 2009 DRAFT OM&M Manual (ARCADIS 2009).
- (2) "Total VOCs" represents the sum of individual concentrations of the VOCs detected.
- (3) "Project VOCs" represents the sum of individual compound concentrations of 1,1,1-Trichloroethane; 1,1-Dichloroethane; 1,2-Dichloroethane; 1,1-Dichloroethene; Tetrachloroethene; Trichloroethene; Vinyl Chloride; cis-1,2-Dichloroethene; trans-1,2-Dichloroethene; Benzene; Toluene; and Xylenes-o,m, and p.

Acronyms/Key:


	Indicates an exceedance of an SCG.
700	Bold data indicates that the analyte was detected at or above its reporting limit.
NYSDEC	New York State Department of Environmental Conservation.
VOC	Volatile organic compound.
ASP	Analytical services protocol.
SCGs	Standards, criteria, and guidance values.
ug/L	Micrograms per liter.
NE	Not established.
J	Value is estimated.
D	Constituent identified from secondary dilution.
R	Concentration for the constituent was rejected.
B	Compound detected in associated blank sample.
< 5	Compound not detected above its laboratory quantification limit.

Table 10. Concentrations of Metals in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-1 4/21/2009	RW-1 7/29/2009	RW-1 8/12/2009	RW-1 9/10/2009	RW-1 11/10/2009	RW-1 12/2/2009	RW-1 10/4/2010	RW-1 2/10/2011	RW-2 4/21/2009	RW-2 7/29/2009
	NYSDEC SCGs										
Total Cadmium	5	< 5	--	--	--	--	--	< 5	--	< 5	--
Dissolved Cadmium	5	< 5	--	--	--	--	--	< 5	--	< 5	--
Total Chromium	50	24.3	--	--	--	--	--	27	--	< 10	--
Dissolved Chromium	50	20.2	--	--	--	--	--	27	--	< 10	--
Total Iron	300	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	2,330	5,950
Dissolved Iron	300	< 100	--	--	--	--	--	< 100	< 100	781	--
Total Manganese	300	23.6	--	--	--	--	--	12	--	241	--
Dissolved Manganese	300	22.4	--	--	--	--	--	11	--	248	--
Total Mercury	0.7	< 0.2	--	--	--	--	--	--	--	< 0.2	--
Dissolved Mercury	0.7	< 0.2	--	--	--	--	--	--	--	< 0.2	--

See notes on last page.

Table 10. Concentrations of Metals in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-2 8/12/2009	RW-2 9/10/2009	RW-2 10/9/2009	RW-2 11/10/2009	RW-2 12/2/2009	RW-2 1/11/2010	RW-2 2/2/2010	RW-2 3/10/2010	RW-2 4/12/2010	RW-2 7/20/2010
	NYSDEC SCGs										
Total Cadmium	5	--	--	--	--	--	--	--	--	--	--
Dissolved Cadmium	5	--	--	--	--	--	--	--	--	--	--
Total Chromium	50	--	--	--	--	--	--	--	--	--	--
Dissolved Chromium	50	--	--	--	--	--	--	--	--	--	--
Total Iron	300	4,870	3,550	3,800	2,040	1,260	1,140	1,000	2,550	880	1,180
Dissolved Iron	300	--	--	--	--	--	--	--	--	--	--
Total Manganese	300	--	--	--	--	--	--	--	--	--	--
Dissolved Manganese	300	--	--	--	--	--	--	--	--	--	--
Total Mercury	0.7	--	--	--	--	--	--	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	--	--	--	--	--	--

See notes on last page.

Table 10. Concentrations of Metals in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-2 10/4/2010	RW-2 12/6/2010	RW-2 2/10/2011	RW-2 3/7/2011	RW-3 4/22/2009	RW-3 7/29/2009	RW-3 9/10/2009	RW-3 11/10/2009	RW-3 12/2/2009	RW-3 3/10/2010
	NYSDEC SCGs										
Total Cadmium	5	< 5	--	--	--	< 5	--	--	--	--	--
Dissolved Cadmium	5	< 5	--	--	--	< 5	--	--	--	--	--
Total Chromium	50	< 10	--	--	--	22.6	--	--	--	--	--
Dissolved Chromium	50	< 10	--	--	--	< 10	--	--	--	--	--
Total Iron	300	710	590	970	850	246	< 100	< 100	< 100	< 100	200
Dissolved Iron	300	380	270	550	530	< 100	--	--	--	--	--
Total Manganese	300	187	--	--	--	< 10	--	--	--	--	--
Dissolved Manganese	300	192	--	--	--	< 10	--	--	--	--	--
Total Mercury	0.7	--	--	--	--	< 0.2	--	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	< 0.2	--	--	--	--	--

See notes on last page.

Table 10. Concentrations of Metals in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: Sample Date:	RW-3 4/12/2010	RW-3 7/20/2010	RW-3 10/4/2010	RW-3 12/6/2010	RW-3 3/7/2011	RW-4 4/22/2009	RW-4 7/29/2009	RW-4 8/12/2009	RW-4 9/10/2009	RW-4 11/10/2009
	NYSDEC SCGs										
Total Cadmium	5	--	--	< 5	--	--	< 5	--	--	--	--
Dissolved Cadmium	5	--	--	< 5	--	--	< 5	--	--	--	--
Total Chromium	50	--	--	< 10	--	--	< 10	--	--	--	--
Dissolved Chromium	50	--	--	< 10	--	--	< 10	--	--	--	--
Total Iron	300	470	890	350	340	530	< 100	< 100	< 100	< 100	< 100
Dissolved Iron	300	--	--	< 100	150	200	< 100	--	--	--	--
Total Manganese	300	--	--	35	--	--	10.4	--	--	--	--
Dissolved Manganese	300	--	--	34	--	--	< 10	--	--	--	--
Total Mercury	0.7	--	--	--	--	--	< 0.2	--	--	--	--
Dissolved Mercury	0.7	--	--	--	--	--	< 0.2	--	--	--	--

See notes on last page.

Table 10. Concentrations of Metals in Groundwater Samples Collected from Remedial Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ⁽¹⁾

COMPOUND (ug/L)	Sample Location: RW-4		
	Sample Date: 12/2/2009 10/4/2010		
	NYSDEC SCGs		
Total Cadmium	5	--	< 5
Dissolved Cadmium	5	--	< 5
Total Chromium	50	--	< 10
Dissolved Chromium	50	--	< 10
Total Iron	300	< 100	< 100
Dissolved Iron	300	--	< 100
Total Manganese	300	--	28
Dissolved Manganese	300	--	29
Total Mercury	0.7	--	--
Dissolved Mercury	0.7	--	--

Notes:

- (1) Water samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for metals analysis using NYSDEC ASP Method 2000 ILM4.0. Results validated following protocols specified in Sampling and Analysis Plan in the December 2009 DRAFT OM&M Manual (ARCADIS 2009).

Acronyms/Key:

700	Indicates an exceedance of an SCG.
700	Bold data indicates that the analyte was detected at or above its reporting limit.
NYSDEC	New York State Department of Environmental Conservation.
ASP	Analytical services protocol.
SCGs	Standards, criteria, and guidance values.
ug/L	Micrograms per liter.
--	Not analyzed.
< 5	Compound not detected above its laboratory quantification limit.



Table 11. Summary of Water Level Elevations, Groundwater Interim Remedial Measure, 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)		Week 3 08/05/09 (ft msl)		Week 6 08/27/09 (ft msl)		Week 7 09/01/09 (ft msl)		Week 8 09/11/09 (ft msl)		Week 9 09/17/09 (ft msl)		Week 10 09/23/09 (ft msl)		Week 20 11/30/09 (ft msl)		1Q2010 2/4/2010 (ft msl)		2Q2010 04/23/10 (ft msl)		3Q2010 08/26/10 (ft msl)		4Q2010 12/10/10 (ft msl)		1Q2011 02/04/11 (ft msl)
Recovery Wells																											
RW-1	125.18		69.75		NM		70.88		69.85		70.21		70.93		70.74		70.32		70.67		74.38		72.52		71.11		70.96
RW-2	124.48		72.27		65.60		63.42		63.16		63.27		61.51		61.30		63.07		61.80		64.88		63.44		61.35		67.99
RW-3	122.84		69.40		68.49		67.89		68.05		68.04		67.88		67.68		67.29		67.64		71.4		69.44*		68.13		67.74
RW-4	121.25		69.25		71.23		70.55		69.40		70.12		70.77		70.37		70.01		70.35		74.02		71.93		70.56		67.06
Monitoring Wells																											
B24MW-2	126.96		74.31		75.04		74.48		74.58		74.56		74.69		74.35		73.54		74.13		76.16		75.86		75.65		74.96
B24MW-3	127.11		72.63		73.07		72.37		71.46		69.71		72.33		72.23		71.71		72.16		75.87		74.10		72.89	72.40	
B30MW-1	128.33		73.55		73.92		73.27		73.43		73.35		73.29		73.19		72.68		73.00		76.54		74.96		73.86	73.38	
BCPMW-1	125.73		73.16		73.56		72.83		73.16		73.00		72.98		72.79		72.43		72.67		76.26		74.66		73.43	72.94	
BCPMW-2	126.39		72.55		72.71		72.01		72.26		72.16		72.04		71.93		71.38		71.83		75.52		73.69		72.55	72.03	
BCPMW-3	124.94		72.46		72.39		71.74		71.94		71.82		71.75		71.60		71.12		71.59		75.24		73.40		72.27	71.74	
BCPMW-4-1	128.76		72.30		72.13		71.51		70.36		71.55		71.51		71.40		70.96		71.33		75.05		73.13		72.02	71.56	
BCPMW-4-2	129.15		72.58		72.16		71.53		70.43		71.59		71.55		71.44		70.95		71.36		75.07		73.16		72.08	71.56	
BCPMW-4-3	129.19		72.32		72.31		71.67		70.59		71.81		71.65		71.55		71.07		71.46		75.16		73.26		72.14	71.73	
BCPMW-5-1	129.37		72.79		73.42		72.22		72.55		72.36		72.24		72.15		71.77		72.14		75.66		73.94		72.72	72.74	
BCPMW-6-1	126.01		72.12		72.09		71.47		71.61		71.58		71.43		71.31		70.85		71.26		74.91		72.96		71.91	71.49	
BCPMW-6-2	125.16		71.74		71.73		71.11		71.29		70.53		71.11		70.87		70.58		70.96		74.64		72.60		71.59	71.17	
BCPMW-7-1	124.81		72.00		72.14		71.55		71.68		71.62		71.50		71.41		70.94		71.33		74.99		72.99		71.97	71.51	
MW-200-1	123.49		72.16		72.22		71.58		70.52		71.74		71.66		72.64		70.95		71.37		75.07		73.14		72.08	71.72	
MW-201-1	121.69		72.04		71.96		71.38		71.50		71.40		71.37		72.45		70.69		71.10		74.84		72.87		71.79	71.33	
MW-202-1	119.27		71.90		72.94		71.35		71.48		71.46		71.40		72.26		70.72		71.13		74.83		72.82		71.77	71.32	
MW-203-1	118.25		71.83		71.93		71.32		71.45		71.40		71.40		72.24		70.69		71.10		74.75		72.77		71.75	71.30	
Piezometers																											
PZ-1a	128.82		72.56		71.90		71.30		71.40		71.50		71.31		71.20		70.75		71.15		74.87		72.94		71.85		71.33
PZ-1b	128.92		72.47		71.78		71.18		71.35		71.37		71.21		71.11		70.67		71.09		74.78		72.88		71.82	71.28	
PZ-1c	128.96		72.47		72.34		71.65		71.21		71.75		71.62		71.48		71.11		71.48		75.15		73.23		72.13	71.74	
PZ-2a	128.36		72.47		71.87		71.27		71.41		71.38		71.27		71.15		70.73		71.09		74.82		72.87		71.81	71.34	
PZ-2b	128.37		72.43		71.86		71.26		71.40		71.37		71.24		71.13		70.70		71.08		74.77		72.86		71.78	71.30	
PZ-2c	128.55		72.41		72.21		71.57		71.75		71.66		71.57		71.44		71.02		71.40		75.05		73.15		72.05	71.68	
PZ-3	124.99		72.52		71.72		71.10		71.27		71.18		71.10		71.03		70.52		70.94		74.69		72.71		71.65	70.93	
PZ-4	125.31		72.50		71.84		71.20		71.38		71.29		71.21		71.11		70.64		71.07		74.81		72.83		71.78	71.45	
PZ-5a	129.07		72.50		72.79		72.12		72.33		72.17		72.12		71.99		71.53		71.94		75.61		73.79		72.59	72.17	
PZ-5b	129.06		72.50		72.72		72.01		72.24		72.07		71.98		71.90		71.45		71.84		75.53		73.69		72.51	72.08	
PZ-6a	125.67		72.50		71.84		71.24		71.35		71.31		71.21		71.09		70.65		71.03		74.73		72.84		71.70	71.24	
PZ-6b	125.74		72.50		71.76		71.16		71.29		71.22		71.12		71.00		72.54		70.93		74.7		72.65		71.58	71.11	
PZ-7a	125.10		72.50		72.16		71.57		71.69		71.61		71.52		71.41		70.96		71.32		75.02		73.00		72.00	71.54	
PZ-7b	125.06		72.50		71.94		71.31		71.49		71.15		71.29		71.18		70.81		71.21		74.85		72.83		71.83	71.37	

Notes:
(1) Baseline readings were taken prior to system start-up, which occurred on July 21, 2009.

Acronyms/Key:
ft msl: feet relative to mean sea level
NM: not measured
*: RW-3 water level measurement collected on September 9, 2010.



Table 12. Summary of Calculated Vertical Groundwater Hydraulic Gradients on December 10, 2010, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Observation Well Pairing Shallow Deep	Vertical Distance Between Screens (ft)	12/10/2010				2/4/2011		
		Observed Head Shallow (ft msl)	Observed Head Deep (ft msl)	Vertical Hydraulic Gradient (ft/ft)		Observed Head Shallow (ft msl)	Observed Head Deep (ft msl)	Vertical Hydraulic Gradient (ft/ft)
PZ-01a PZ-01b	20	71.85	71.82	-0.0015		71.33	71.28	-0.0025
PZ-01b PZ-01c	50	71.82	72.13	0.0062		71.28	71.74	0.0092
PZ-02a PZ-02b	20	71.81	71.78	-0.0015		71.34	71.3	-0.002
PZ-02b PZ-02c	50	71.78	72.05	0.0054		71.3	71.68	0.0076
PZ-05a PZ-05b	45	72.59	72.51	-0.0018		72.17	72.08	-0.002
PZ-06a PZ-06b	25	71.7	71.58	-0.0048		71.24	71.11	-0.0052
PZ-07a PZ-07b	48	72	71.83	-0.0035		71.54	71.37	-0.0035
BCPMW-4-1 BCPMW-4-2	21	72.02	72.08	0.0029		71.56	71.56	0
BCPMW-4-2 BCPMW-4-3	44	72.08	72.14	0.0014		71.56	71.73	0.0039
BCPMW-6-1 BCPMW-6-2	44.5	71.91	71.59	-0.0072		71.49	71.17	-0.0072

Positive groundwater hydraulic gradient indicates vertically upward gradient.
Negative groundwater hydraulic gradient indicates vertically downward gradient.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: B24MW-2		B24MW-2	B24MW-3	B24MW-3	B30MW-1	B30MW-1
	Sample Date: 4/23/2009		10/4/2010	4/20/2009	10/6/2010	4/23/2009	10/4/2010
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 5	< 5	0.62 J	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	1	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	0.6	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane	1	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone	NE	< 50	< 50	< 50	< 50	< 50	< 50
2-Hexanone	50	< 50	< 50	< 50 J	< 50	< 50	< 50
4-methyl-2-pentanone	50	< 50	< 50	< 50 J	< 50	< 50	< 50
Acetone	NE	< 50 B	< 50	< 50	< 50	< 50 B	< 50 B
Benzene	1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane	50	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform	50	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane	5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon Disulfide	60	< 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride	5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform	7	< 5	0.3 J	< 5	< 5	< 5	< 5
Chloromethane	5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene	5	< 5	< 5	10	1.2 J	< 5	< 5
cis-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane	50	< 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	5	< 5	< 5	< 5	< 5	< 5	< 5
Methyl tert-Butyl Ether	5	--	< 5	--	< 5	--	< 5
Methylene Chloride	5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene	5	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	5	< 5	< 5	0.51 J	< 5	< 5	< 5
Toluene	5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene	5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene	5	3.7 J	4.4 J	45	5.9	< 5	< 5
Trichlorotrifluoroethane (Freon 113)	5	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride	2	< 2	< 2	< 2	< 2	< 2	< 2
Xylene-o	5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p	5	< 5	< 5	< 5	< 5	< 5	< 5
Total VOCs ⁽³⁾		3.7	4.7	56	7.1	0	0
Project VOCs ⁽⁴⁾		3.7	4.4	56	7.1	0	0

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: BCPMW-1 Sample Date: 4/28/2009	BCPMW-2 4/28/2009	BCPMW-3 4/29/2009	BCPMW-4-1 4/17/2009	BCPMW-4-1 12/1/2009	BCPMW-4-1 10/4/2010
	NYSDEC SCGs					
1,1,1-Trichloroethane	5 < 5	< 10	< 25	< 25	2.4 J	14 J
1,1,2,2-Tetrachloroethane	5 < 5	< 10	< 25	< 25	< 5	< 25
1,1,2-Trichloroethane	1 < 5	< 10	< 25	< 25	0.38 J	< 25
1,1-Dichloroethane	5 0.37 J	8 J	9.6 J	6.5 J	46	38
1,1-Dichloroethene	5 < 5	3.8 J	43	1.8 J	14	21 J
1,2-Dichloroethane	0.6 < 5	0.68 J	< 25	< 25	0.65 J	< 25
1,2-Dichloropropane	1 < 5	< 10	< 25	< 25	4.7 J	3.8 J
2-Butanone	NE < 50	< 100	< 250	< 250	< 50	< 250
2-Hexanone	50 < 50	< 100	< 250	< 250 J	< 50	< 250
4-methyl-2-pentanone	50 < 50	< 100	< 250	< 250 J	< 50	< 250
Acetone	NE < 50 B	< 100	< 250	< 250 J	< 50	< 250
Benzene	1 < 0.7	< 1.4	< 3.5	< 3.5	0.44 J	< 3.5
Bromodichloromethane	50 < 5	< 10	< 25	< 25	< 5	< 25
Bromoform	50 < 5	< 10	< 25	< 25	< 5	< 25
Bromomethane	5 < 5	< 10	< 25	< 25	R	< 25
Carbon Disulfide	60 < 5	< 10	< 25	< 25	< 5	< 25
Carbon tetrachloride	5 < 5	< 10	< 25	< 25	< 5	< 25
Chlorobenzene	5 < 5	< 10	< 25	< 25	< 5	< 25
Chlorodifluoromethane (Freon 22)	NE < 5	< 10	< 25	17 J	6.2	4.3 J
Chloroethane	5 < 5	< 10	< 25	< 25	2.4 J	4.1 J
Chloroform	7 0.88 J	< 10	< 25	< 25	< 5	< 25
Chloromethane	5 < 5	< 10	< 25	< 25	R	< 25
cis-1,2-dichloroethene	5 22	310	900	1800 D	750 D	510
cis-1,3-dichloropropene	0.4 < 5	< 10	< 25	< 25	< 5	< 25
Dibromochloromethane	50 < 5	< 10	< 25	< 25	< 5	< 25
Dichlorodifluoromethane (Freon 12)	5 < 5	< 10	< 25	< 25	< 5	< 25
Ethylbenzene	5 < 5	< 10	< 25 B	< 25	< 5	< 25
Methyl tert-Butyl Ether	5 --	--	--	--	--	< 25
Methylene Chloride	5 0.52 J	< 10	< 25	< 25	< 5	< 25
Styrene	5 < 5	< 10	< 25	< 25	< 5	< 25
Tetrachloroethene	5 < 5	1.5 J	< 25	< 25	0.64 J	< 25
Toluene	5 0.33 J	< 10	< 25 B	< 25	< 5	< 25
trans-1,2-dichloroethene	5 0.44 J	2.4 J	8.9 J	110	2.5 J	3.9 J
trans-1,3-dichloropropene	0.4 < 5	< 10	< 25	< 25	< 5	< 25
Trichloroethylene	5 190	180	470	22 J	170	45
Trichlorotrifluoroethane (Freon 113)	5 < 5	< 10	< 25	< 25	< 5	< 25
Vinyl Chloride	2 < 2	4.1	300	180	540 D	220
Xylene-o	5 < 5	< 10	< 25 B	< 25	8	< 25
Xylenes - m,p	5 < 5	< 10	< 25 B	< 25	< 5	< 25
Total VOCs ⁽³⁾	215	510	1,732	2,137	1,548	864
Project VOCs ⁽⁴⁾	213	511	1,732	2,120	1,535	852

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: BCPMW-4-2			Sample Date: 4/17/2009 12/4/2009 10/7/2010			BCPMW-4-3			Sample Date: 4/17/2009 12/1/2009 10/7/2010		
	NYSDEC SCGs											
1,1,1-Trichloroethane	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	1	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	5	57 J	8.7 J	7.3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	5	34 J	2.7 J	1.9 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	0.6	< 250	< 10	0.91 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane	1	< 250	< 10	0.9 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone	NE	< 2500	< 100	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
2-Hexanone	50	< 2500 J	< 100	< 50	< 50 J	< 50	< 50	< 50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone	50	< 2500 J	< 100	< 50	< 50 J	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Acetone	NE	< 2500 J	< 100	< 50 B	< 50 J	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Benzene	1	< 35	< 1.4	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane	50	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromoform	50	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon Disulfide	60	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	< 250	0.8 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	5	< 250	1.1 J	0.79 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform	7	< 250	< 10	0.96 J	0.53 J	0.32 J	< 5	< 5	< 5	< 5	< 5	< 5
Chloromethane	5	< 250	R	< 5	< 5	R	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene	5	18000 D	270	99	0.37 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,3-dichloropropene	0.4	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane	50	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	5	62 J	0.78 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methyl tert-Butyl Ether	5	--	--	0.35 J	--	--	< 5	< 5	< 5	< 5	< 5	< 5
Methylene Chloride	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	5	< 250	0.82 J	0.73 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Toluene	5	2400	< 10 B	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene	5	< 250	1.3 J	0.65 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene	0.4	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene	5	< 250	310	66	0.56 J	0.51 J	0.41 J	0.41 J	0.41 J	0.41 J	0.41 J	0.41 J
Trichlorotrifluoroethane (Freon 113)	5	< 250	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride	2	6300	58	54	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Xylene-o	5	110 J	< 10 B	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p	5	190 J	< 10 B	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Total VOCs ⁽³⁾		27,153	655	233	1.5	0.83	0.41	0.41	0.41	0.41	0.41	0.41
Project VOCs ⁽⁴⁾		27,091	652	231	0.9	0.51	0.41	0.41	0.41	0.41	0.41	0.41

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: BCPMW-5-1 Sample Date: 4/23/2009		BCPMW-6-1 4/20/2009	BCPMW-6-1 12/4/2009	BCPMW-6-1 10/6/2010	BCPMW-6-2 5/8/2009	BCPMW-6-2 12/4/2009
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 100	< 5	< 5	< 100	< 5	0.78 J
1,1,2,2-Tetrachloroethane	5	< 100	< 5	< 5	< 100	< 5	< 5
1,1,2-Trichloroethane	1	< 100	< 5	< 5	< 100	< 5	< 5
1,1-Dichloroethane	5	< 100	0.3 J	< 5	< 100	0.37 J	0.65 J
1,1-Dichloroethene	5	21 J	< 5	< 5	< 100	< 5	0.44 J
1,2-Dichloroethane	0.6	< 100	< 5	< 5	< 100	< 5	< 5
1,2-Dichloropropane	1	< 100	< 5	< 5	< 100	< 5	< 5
2-Butanone	NE	< 1000	< 50	< 50	< 1000	< 50	< 50
2-Hexanone	50	< 1000	< 50 J	< 50	< 1000	< 50	< 50
4-methyl-2-pentanone	50	< 1000	< 50 J	< 50	< 1000	< 50	< 50
Acetone	NE	< 1000	< 50 J	< 50	< 1000	< 50	< 50
Benzene	1	< 14	< 0.7	< 0.7	< 14	< 0.7	< 0.7
Bromodichloromethane	50	< 100	< 5	< 5	< 100	< 5	< 5
Bromoform	50	< 100	< 5	< 5	< 100	< 5	< 5
Bromomethane	5	< 100	< 5	R	< 100	< 5	R
Carbon Disulfide	60	< 100	< 5	< 5	< 100	< 5	< 5
Carbon tetrachloride	5	< 100	< 5	< 5	< 100	< 5	< 5
Chlorobenzene	5	< 100	< 5	< 5	< 100	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	< 100	4500 D	1700 EJ	10000 D	< 5	< 5
Chloroethane	5	< 100	< 5	< 5	< 100	< 5	< 5
Chloroform	7	< 100	1.7 J	0.32 J	< 100	0.53 J	< 5
Chloromethane	5	< 100	< 5	R	< 100	< 5	R
cis-1,2-dichloroethene	5	960	21	1.7 J	< 100	< 5	< 5
cis-1,3-dichloropropene	0.4	< 100	< 5	< 5	< 100	< 5	< 5
Dibromochloromethane	50	< 100	< 5	< 5	< 100	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 100	< 5	< 5	< 100	< 5	< 5
Ethylbenzene	5	48 J	< 5	< 5	< 100	< 5	< 5
Methyl tert-Butyl Ether	5	--	--	--	< 100	--	--
Methylene Chloride	5	< 100	< 5	< 5	< 100	< 5	< 5
Styrene	5	< 100	< 5	< 5	< 100	< 5	< 5
Tetrachloroethene	5	< 100	0.34 J	< 5	< 100	< 5	0.79 J
Toluene	5	2700	< 5	< 5	< 100	< 5	< 5
trans-1,2-dichloroethene	5	< 100	< 5	< 5	< 100	< 5	< 5
trans-1,3-dichloropropene	0.4	< 100	< 5	< 5	< 100	< 5	< 5
Trichloroethylene	5	220	4.9 J	1.6 J	< 100	< 5	0.45 J
Trichlorotrifluoroethane (Freon 113)	5	< 100	< 5	< 5	< 100	< 5	< 5
Vinyl Chloride	2	330	< 2	< 2	< 40	< 2	< 2
Xylene-o	5	40 J	< 5	< 5	< 100	< 5	< 5
Xylenes - m,p	5	110	< 5	< 5	< 100	< 5	< 5
Total VOCs ⁽³⁾		4,429	4,528	1,704	10,000	0.9	3.1
Project VOCs ⁽⁴⁾		4,381	27	2.3	0	0.4	3.1

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: BCPMW-6-2 Sample Date: 10/6/2010	BCPMW-7-1 4/20/2009	BCPMW-7-1 12/1/2009	BCPMW-7-1 10/7/2010	MW-200-1 4/29/2009	MW-200-1 12/2/2009
	NYSDEC SCGs					
1,1,1-Trichloroethane	5 < 5	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	5 < 5	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	1 < 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	5 0.47 J	< 5	< 5	< 5	0.79 J	< 5
1,1-Dichloroethene	5 < 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	0.6 < 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane	1 < 5	< 5	< 5	< 5	< 5	< 5
2-Butanone	NE < 50	< 50	< 50	< 50	< 50	< 50
2-Hexanone	50 < 50	< 50 J	< 50	< 50	< 50	< 50
4-methyl-2-pentanone	50 < 50	< 50 J	< 50	< 50	< 50	< 50
Acetone	NE < 50	< 50	< 50	< 50	< 50 B	< 50
Benzene	1 < 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane	50 < 5	< 5	< 5	< 5	< 5	< 5
Bromoform	50 < 5	< 5	< 5	< 5	< 5	< 5
Bromomethane	5 < 5	< 5	R	< 5	< 5	R
Carbon Disulfide	60 < 5	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride	5 < 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	5 < 5	< 5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE < 5	2.6 J	1.5 J	5.2	< 5	< 5
Chloroethane	5 < 5	< 5	< 5	< 5	< 5	< 5
Chloroform	7 0.41 J	< 5	< 5	< 5	2.3 J	2.3 J
Chloromethane	5 < 5	< 5	R	< 5	< 5	R
cis-1,2-dichloroethene	5 < 5	< 5	< 5	< 5	38	5.7
cis-1,3-dichloropropene	0.4 < 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane	50 < 5	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5 < 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	5 < 5	< 5	< 5	< 5	< 5	< 5
Methyl tert-Butyl Ether	5 < 5	--	--	< 5	--	--
Methylene Chloride	5 < 5	< 5	< 5	< 5	< 5	< 5
Styrene	5 < 5	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	5 2.1 J	< 5	< 5	< 5	0.54 J	< 5
Toluene	5 < 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene	5 < 5	< 5	< 5	< 5	0.3 J	< 5
trans-1,3-dichloropropene	0.4 < 5	< 5	< 5	< 5	< 5	< 5
Trichloroethylene	5 < 5	< 5	< 5	< 5	34	12
Trichlorotrifluoroethane (Freon 113)	5 < 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride	2 < 2	< 2	< 2	< 2	< 2	< 2
Xylene-o	5 < 5	< 5	< 5	< 5	< 5	< 5
Xylenes - m,p	5 < 5	< 5	< 5	< 5	< 5	< 5
Total VOCs ⁽³⁾	3.0	2.6	1.5	5.2	76	20
Project VOCs ⁽⁴⁾	2.6	0.0	0.0	0.0	74	18

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: Sample Date:	MW-200-1 10/5/2010	MW-201-1 5/1/2009	MW-201-1 12/2/2009	MW-201-1 10/5/2010	MW-202-1 5/1/2009	MW-202-1 12/2/2009
	NYSDEC SCGs						
1,1,1-Trichloroethane	5	< 5	5.5 J	3.3 J	< 50	< 5	< 5
1,1,2,2-Tetrachloroethane	5	< 5	< 25	< 50	< 50	< 5	< 5
1,1,2-Trichloroethane	1	< 5	< 25	< 50	< 50	< 5	< 5
1,1-Dichloroethane	5	< 5	10 J	9 J	14 J	< 5	< 5
1,1-Dichloroethene	5	< 5	7.9 J	8.1 J	6.9 J	< 5	< 5
1,2-Dichloroethane	0.6	< 5	< 25	< 50	< 50	< 5	< 5
1,2-Dichloropropane	1	< 5	< 25	< 50	< 50	< 5	< 5
2-Butanone	NE	< 50	< 250	< 500	< 500	< 50	< 50
2-Hexanone	50	< 50	< 250	< 500	< 500	< 50	< 50
4-methyl-2-pentanone	50	< 50	< 250	< 500	< 500	< 50	< 50
Acetone	NE	< 50	< 250 B	< 500	< 500	< 50	< 50
Benzene	1	< 0.7	< 3.5	< 7	< 7	< 0.7	< 0.7
Bromodichloromethane	50	< 5	< 25	< 50	< 50	< 5	< 5
Bromoform	50	< 5	< 25	< 50	< 50	< 5	< 5
Bromomethane	5	< 5	< 25	< 50	< 50	< 5	< 5
Carbon Disulfide	60	< 5	< 25	< 50	< 50	< 5	< 5
Carbon tetrachloride	5	< 5	< 25	< 50	< 50	< 5	< 5
Chlorobenzene	5	< 5	< 25	< 50	< 50	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	< 5	< 25	< 50	< 50	< 5	< 5
Chloroethane	5	< 5	< 25	< 50	< 50	< 5	< 5
Chloroform	7	0.5 J	< 25	< 50	4.2 J	6.2	6.7
Chloromethane	5	< 5	< 25	R	< 50	< 5	< 5
cis-1,2-dichloroethene	5	3.5 J	970 D	1300	3900 D	0.64 J	0.58 J
cis-1,3-dichloropropene	0.4	< 5	< 25	< 50	< 50	< 5	< 5
Dibromochloromethane	50	< 5	< 25	< 50	< 50	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 5	< 25	< 50	< 50	< 5	< 5
Ethylbenzene	5	< 5	< 25	< 50	< 50	< 5	< 5
Methyl tert-Butyl Ether	5	< 5	--	--	< 50	--	--
Methylene Chloride	5	< 5	< 25	< 50	< 50	< 5	< 5
Styrene	5	< 5	< 25	< 50	< 50	< 5	< 5
Tetrachloroethene	5	< 5	< 25	< 50	< 50	< 5	< 5
Toluene	5	< 5	< 25	< 50	< 50	< 5	< 5
trans-1,2-dichloroethene	5	< 5	2.7 J	3.5 J	6.7 J	< 5	< 5
trans-1,3-dichloropropene	0.4	< 5	< 25	< 50	< 50	< 5	< 5
Trichloroethylene	5	7	160	230	72	7.5	9.3
Trichlorotrifluoroethane (Freon 113)	5	< 5	< 25	< 50	< 50 U	< 5	< 5
Vinyl Chloride	2	< 2	< 10	38	820	< 2	< 2
Xylene-o	5	< 5	< 25	< 50	7.2 J	< 5	< 5
Xylenes - m,p	5	< 5	< 25	< 50	< 50	< 5	< 5
Total VOCs ⁽³⁾		11	1,156	1,592	4,831	14	17
Project VOCs ⁽⁴⁾		11	1,156	1,592	4,827	8.1	9.9

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells,
Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: Sample Date:	MW-202-1 10/6/2010	MW-203-1 5/1/2009	MW-203-1 12/2/2009	MW-203-1 10/5/2010
	NYSDEC SCGs				
1,1,1-Trichloroethane	5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	1	< 5	< 5	< 5	< 5
1,1-Dichloroethane	5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	0.6	< 5	< 5	< 5	< 5
1,2-Dichloropropane	1	< 5	< 5	< 5	< 5
2-Butanone	NE	< 50	< 50	< 50	< 50
2-Hexanone	50	< 50	< 50	< 50	< 50
4-methyl-2-pentanone	50	< 50	< 50	< 50	< 50
Acetone	NE	< 50	< 50 B	< 50	< 50 B
Benzene	1	< 0.7	< 0.7	< 0.7	< 0.7
Bromodichloromethane	50	< 5	< 5	< 5	< 5
Bromoform	50	< 5	< 5	< 5	< 5
Bromomethane	5	< 5	< 5	< 5	< 5
Carbon Disulfide	60	< 5	< 5	< 5	< 5
Carbon tetrachloride	5	< 5	< 5	< 5	< 5
Chlorobenzene	5	< 5	< 5	< 5	< 5
Chlorodifluoromethane (Freon 22)	NE	0.61 J	73	17	29
Chloroethane	5	< 5	< 5	< 5	< 5
Chloroform	7	0.93 J	7.9	2.6 J	1.5 J
Chloromethane	5	< 5	< 5	< 5	< 5
cis-1,2-dichloroethene	5	< 5	1.6 J	0.83 J	0.97 J
cis-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5
Dibromochloromethane	50	< 5	< 5	< 5	< 5
Dichlorodifluoromethane (Freon 12)	5	< 5	< 5	< 5	< 5
Ethylbenzene	5	< 5	< 5	< 5	< 5
Methyl tert-Butyl Ether	5	< 5	--	--	0.88 J
Methylene Chloride	5	< 5	< 5	< 5	< 5
Styrene	5	< 5	< 5	< 5	< 5
Tetrachloroethene	5	0.48 J	< 5	< 5	< 5
Toluene	5	< 5	< 5	< 5	< 5
trans-1,2-dichloroethene	5	< 5	< 5	< 5	< 5
trans-1,3-dichloropropene	0.4	< 5	< 5	< 5	< 5
Trichloroethylene	5	2.4 J	1.3 J	0.7 J	1.6 J
Trichlorotrifluoroethane (Freon 113)	5	0.43 J	< 5	< 5	< 5
Vinyl Chloride	2	< 2	< 2	< 2	< 2
Xylene-o	5	< 5	< 5	< 5	< 5
Xylenes - m,p	5	< 5	< 5	< 5	< 5
Total VOCs ⁽³⁾		4.9	84	21	34
Project VOCs ⁽⁴⁾		2.9	2.9	1.5	2.6

See notes on last page.



Table 13. Concentrations of Volatile Organic Compounds in Groundwater Samples Collected from Monitoring Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

Notes:

- (1) Results validated following protocols specified in Sampling and Analysis Plan in the December 2009 DRAFT OM&M Manual (ARCADIS 2009).
- (2) Samples analyzed for the TCL VOCs using NYSDEC ASP 2000 Method OLM4.2.
- (3) "Total VOCs" represents the sum of individual concentrations of the VOCs detected.
- (4) "Project VOCs" represents the sum of individual compound concentrations of 1,1,1-Trichloroethane; 1,1-Dichloroethane; 1,2-Dichloroethane; 1,1-Dichloroethene; Tetrachloroethene; Trichloroethene; Vinyl Chloride; cis-1,2-Dichloroethene; trans-1,2-Dichloroethene; Benzene; Toluene; and Xylenes-o,m, and p.

Acronyms/Key:

 Indicates an exceedance of an SCG.

Bold value indicates a detection.

RI/FS	Remedial Investigation/Feasibility Study.
NYSDEC	New York State Department of Environmental Conservation.
TCL	Target compound list.
VOC	Volatile Organic Compound.
ASP	Analytical services protocol.
SCGs	Standards, criteria, and guidance values.
ug/L	Micrograms per liter.
NE	Not established.
E	Concentration for the constituent exceeded the calibration range.
J	Value is estimated.
D	Constituent identified from secondary dilution.
R	Concentration for the constituent was rejected.
B	Compound detected in associated blank sample.
< 5	Compound not detected above its laboratory quantification limit.

Table 14. Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location: B24MW-2 Sample Date: 4/23/2009	B24MW-3 4/20/2009	BCPMW-1 4/28/2009	BCPMW-2 4/28/2009	BCPMW-3 4/29/2009	BCPMW-4-1 4/17/2009	BCPMW-4-1 10/4/2010	BCPMW-4-2 4/17/2009	BCPMW-4-2 10/7/2010
	NYSDEC SCGs								
Cadmium (total)	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Cadmium (dissolved)	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	--
Chromium (total)	50	40.3	28.2	20.8	< 10	< 10	22.7	43	10.6
Chromium (dissolved)	50	< 10	10.6	< 10	< 10	< 10	12.8	41	< 10
Iron (total)	300	--	597	--	< 100	2,080	103	--	4,630
Iron (dissolved)	300	--	< 100	--	< 100	1,760	< 100	--	4,080
Manganese (total)	300	--	16.9	--	12.7	51.4	11.2	--	228
Manganese (dissolved)	300	--	13.7	--	11.3	49.2	< 10	--	217

See notes on last page.

Table 14. Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

		Sample Location: BCPMW-4-3	BCPMW-4-3	BCPMW-5-1	BCPMW-6-1	BCPMW-6-1	BCPMW-6-2	BCPMW-6-2	BCPMW-7-1	BCPMW-7-1
COMPOUND (ug/L)	Sample Date:	4/17/2009	10/7/2010	4/23/2009	4/20/2009	10/6/2010	5/8/2009	10/6/2010	4/20/2009	10/7/2010
NYSDEC SCGs										
Cadmium (total)	5	< 5	< 5	< 5	< 5	<5	< 5	<5	< 5	< 5
Cadmium (dissolved)	5	< 5	< 5	< 5	< 5	<5	< 5	<5	< 5	< 5
Chromium (total)	50	< 10	< 10	< 10	< 10	< 10	10.3	<10	< 10	< 10
Chromium (dissolved)	50	< 10	< 10	< 10	< 10	<10	< 10	<10	< 10	< 10
Iron (total)	300	< 100	--	7,420	< 100	--	--	--	< 100	--
Iron (dissolved)	300	< 100	--	6,370	< 100	--	--	--	< 100	--
Manganese (total)	300	< 10	--	145	< 10	--	--	--	106	--
Manganese (dissolved)	300	< 10	--	131	< 10	--	--	--	94.8	--

See notes on last page.


Table 14. Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York. ^(1,2)

COMPOUND (ug/L)	Sample Location:	MW-200-1	MW-200-1	MW-201-1	MW-201-1	MW-202-1	MW-202-1	MW-203-1	MW-203-1
	Sample Date:	4/29/2009	10/5/2010	5/1/2009	10/5/2010	5/1/2009	10/6/2010	5/1/2009	10/5/2010
NYSDEC SCGs									
Cadmium (total)	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Cadmium (dissolved)	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chromium (total)	50	< 10	14	< 10	< 10	16.5	15	31.5	31
Chromium (dissolved)	50	< 10	< 10	< 10	< 10	< 10	<10	< 10	< 10
Iron (total)	300	--	--	--	--	--	--	--	--
Iron (dissolved)	300	--	--	--	--	--	--	--	--
Manganese (total)	300	--	--	--	--	--	--	--	--
Manganese (dissolved)	300	--	--	--	--	--	--	--	--

Notes:

- (1) Results validated following protocols specified in Sampling and Analysis Plan in the December 2009 DRAFT OM&M Manual (ARCADIS 2009).
(2) Samples analyzed for the metals using NYSDEC ASP Method 2000 ILM4.0.

Acronyms/Key:

 Indicates an exceedance of an SCG.

Bold value indicates a detection.

RI/FS Remedial Investigation/Feasibility Study.

NYSDEC New York State Department of Environmental Conservation.

ASP Analytical services protocol.

SCGs Standards, criteria, and guidance values.

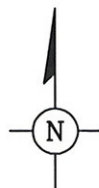
ug/L Micrograms per liter.

-- Not analyzed.

< 5 Compound not detected above its laboratory quantification limit.



QUADRANGLE LOCATION



A horizontal scale bar with alternating black and white segments. It is labeled with '0' at the left end, '2000'' at the midpoint, and '4000'' at the right end. Below the bar, the text 'SCALE IN FEET' is centered.

SOURCE
USGS 7.5 MIN. AMITYVILLE QUADRANGLE, AMITYVILLE, NY. 1994
USGS 7.5 MIN. FREEPORT QUADRANGLE, FREEPORT, NY., 1994
USGS 7.5 MIN. HICKSVILLE QUADRANGLE, HICKSVILLE, NY., 1967, PHOTOREVISED 1979
USGS 7.5 MIN. HUNTINGTON QUADRANGLE, HUNTINGTON, NY. 1967, PHOTOREVISED 1979

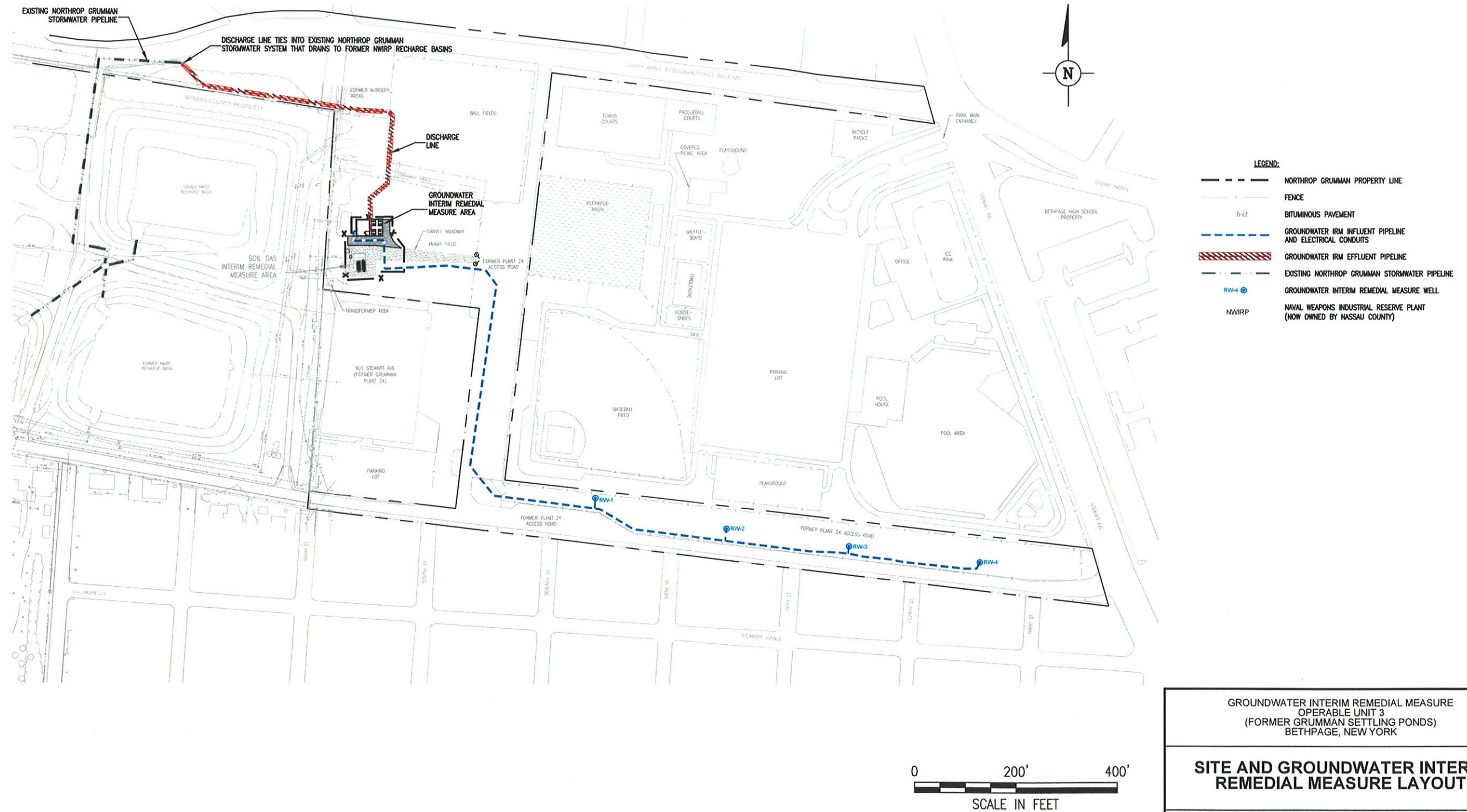
GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE AREA LOCATION



FIGURE

1

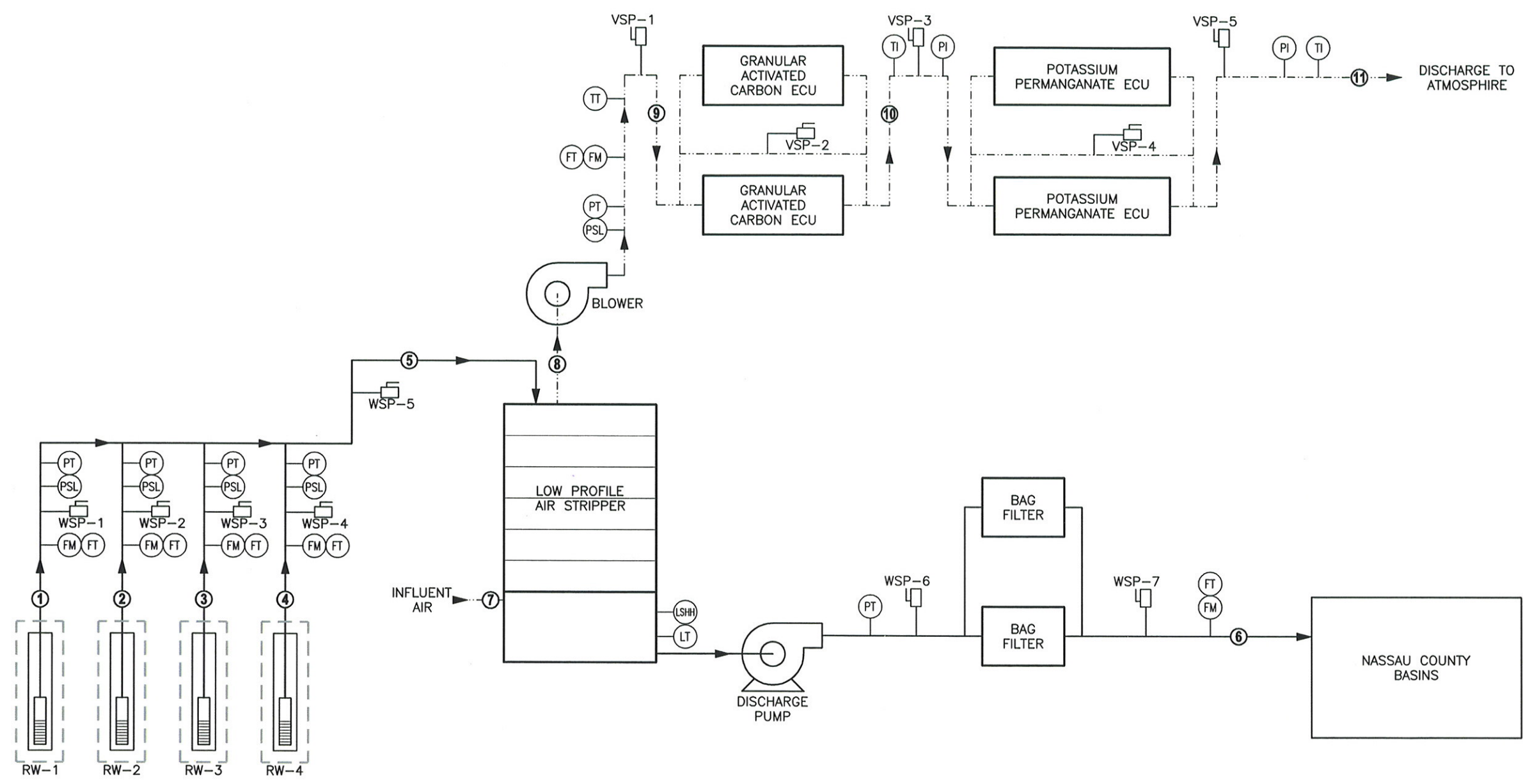


GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE AND GROUNDWATER INTERIM REMEDIAL MEASURE LAYOUT



CITY/Region: DIV/Group/Reqd: DB/Reqd: LD/Opd: PIC/Opd: PM/Reqd: TM/Opd: LYP/Opd/On=OFF=REF: G:\PROJECT\Northrop Grumman\Superfund\2010\03\NY001466\0910 OM&MT\Task 2 GW RMR\Report\3rd Quarter 2010\Figures\cad03_processflowdiagram.dwg LAYOUT: 3 SAVED: 11/12/2010 2:56 PM ACADVER: 18.05 (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: ARCADIS_MELVILLE.CTB PLOTTED: 11/12/2010 3:02 PM BY: SANCHEZ, ADRIAN XREFS: IMAGES: PROJECTNAME: NY001466\0000\00012



- LEGEND:**
- PROCESS WATER
 - - - PROCESS AIR
 - Ⓜ INSTRUMENT
 - SAMPLE PORT
 - ▶ FLOW DIRECTION
 - FM FLOW METER
 - FT FLOW RATE TRANSMITTER
 - PSL PRESSURE VACUUM LOW
 - PT PRESSURE TRANSMITTER
 - PI PRESSURE INDICATOR
 - LSHH LEVEL SWITCH HIGH HIGH
 - LT LEVEL TRANSMITTER
 - TT TEMPERATURE TRANSMITTER
 - TI TEMPERATURE INDICATOR
 - ⑧ PROCESS DESIGNATION
 - WSP WATER SAMPLE PORT
 - VSP VAPOR SAMPLE PORT

PROCESS	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Mass Loading (lbs/day)											
Trichloroethene	0.009	0.041	0.082	0.008	0.140	<0.008	0.000	0.140	0.140	<0.014	<0.014
cis -1,2 Dichloroethene	0.007	1.877	0.431	0.030	2.346	<0.008	0.000	2.346	2.346	<0.235	<0.235
Vinyl Chloride	0.000	0.443	0.001	0.000	0.444	<0.003	0.000	0.444	0.444	0.444	<0.044
Flow Rate (gpm)	40	85	85	40	250	250	---	---	---	---	---
Flow Rate (CFM)	---	---	---	---	---	---	1,300 - 1,600	1,300	1,535	1,557	1,581
Pressure (feet of water)	10	10	10	10	8	15	---	---	---	---	---
Pressure (inches of water)	---	---	---	---	---	---	0	- 28 to - 38	12	6	0
pH	6.4	6.4	6.4	6.4	6.4	6.2	---	---	---	---	---
Temperature	55	55	55	55	55	55	10	55	97	95	95
Relative Humidity	---	---	---	---	---	---	20 - 80	100	<50	<50	<50

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

GROUNDWATER TREATMENT SYSTEM
PROCESS SCHEMATIC,
PROCESS FLOW DIAGRAM,
AND MONITORING LOCATIONS


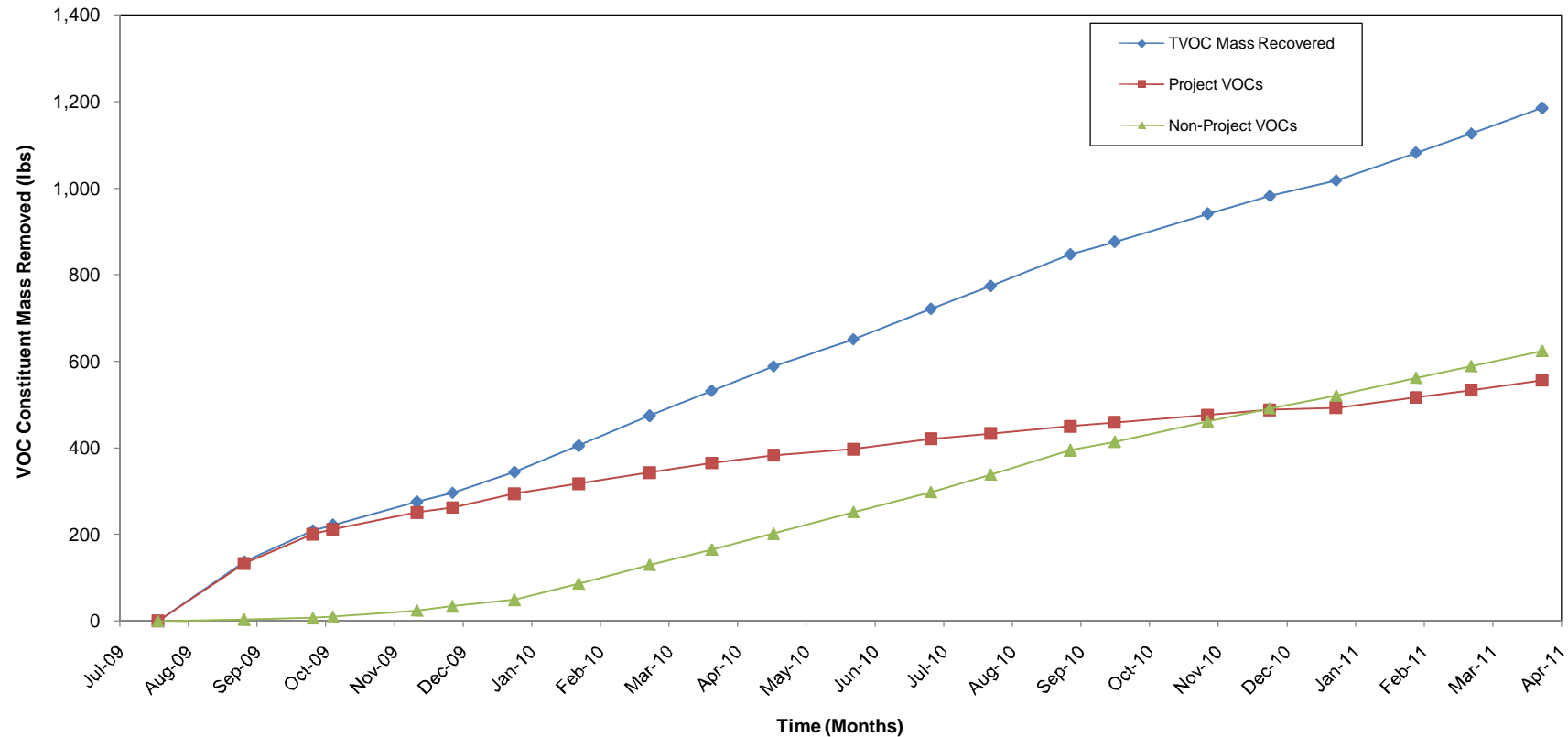
 **ARCADIS**

FIGURE
3

**Notes:**

VOC = Volatile organic compound.

lbs = Pounds.

Total VOCs = Sum of 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.

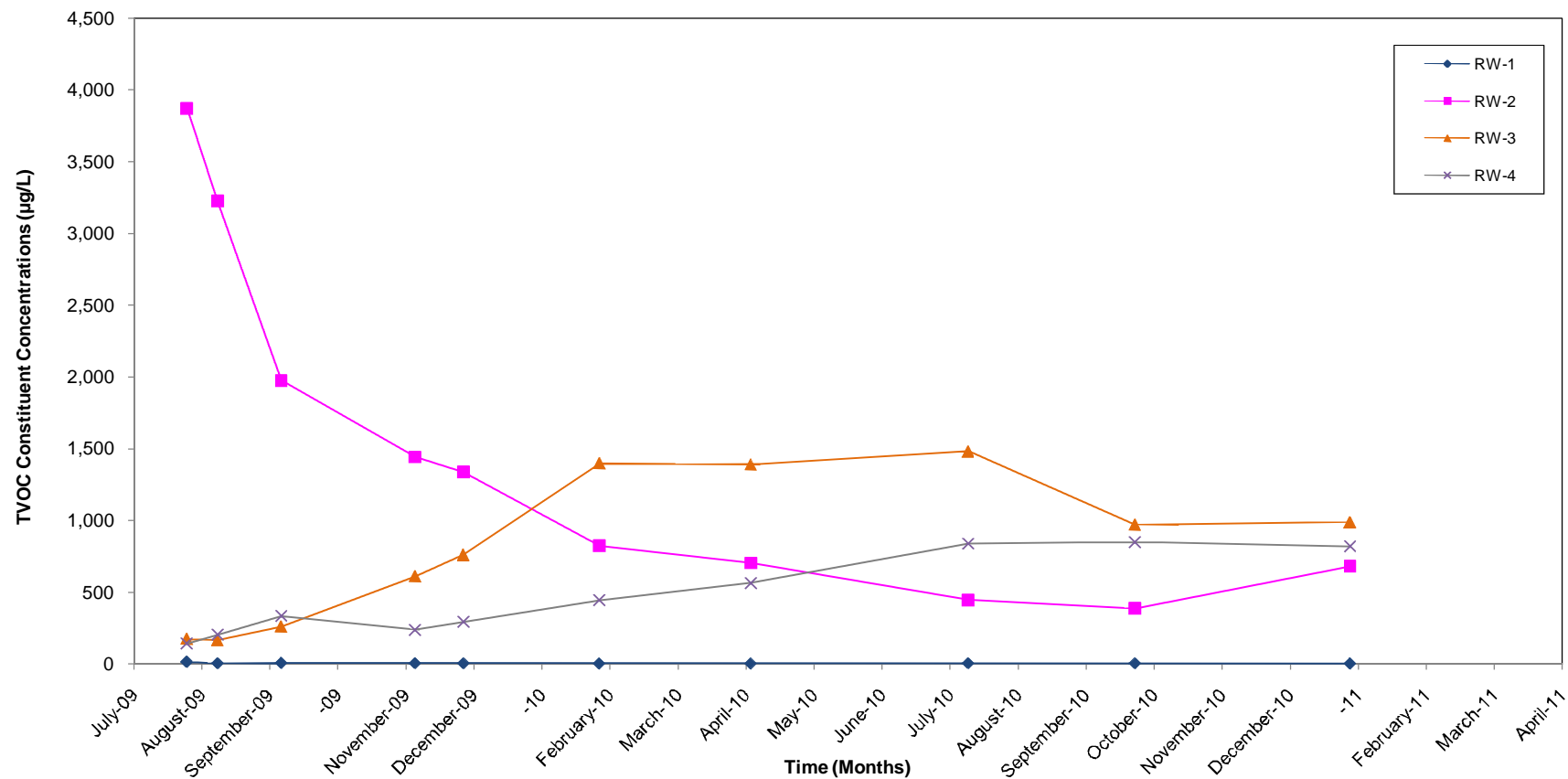
Non-Project VOCs = Sum of Total VOCs that are not Project VOCs.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

**CUMULATIVE TOTAL, PROJECT,
AND NON-PROJECT VOC MASS
REMOVED THROUGH MARCH 2011**



FIGURE
5

**Notes:**

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

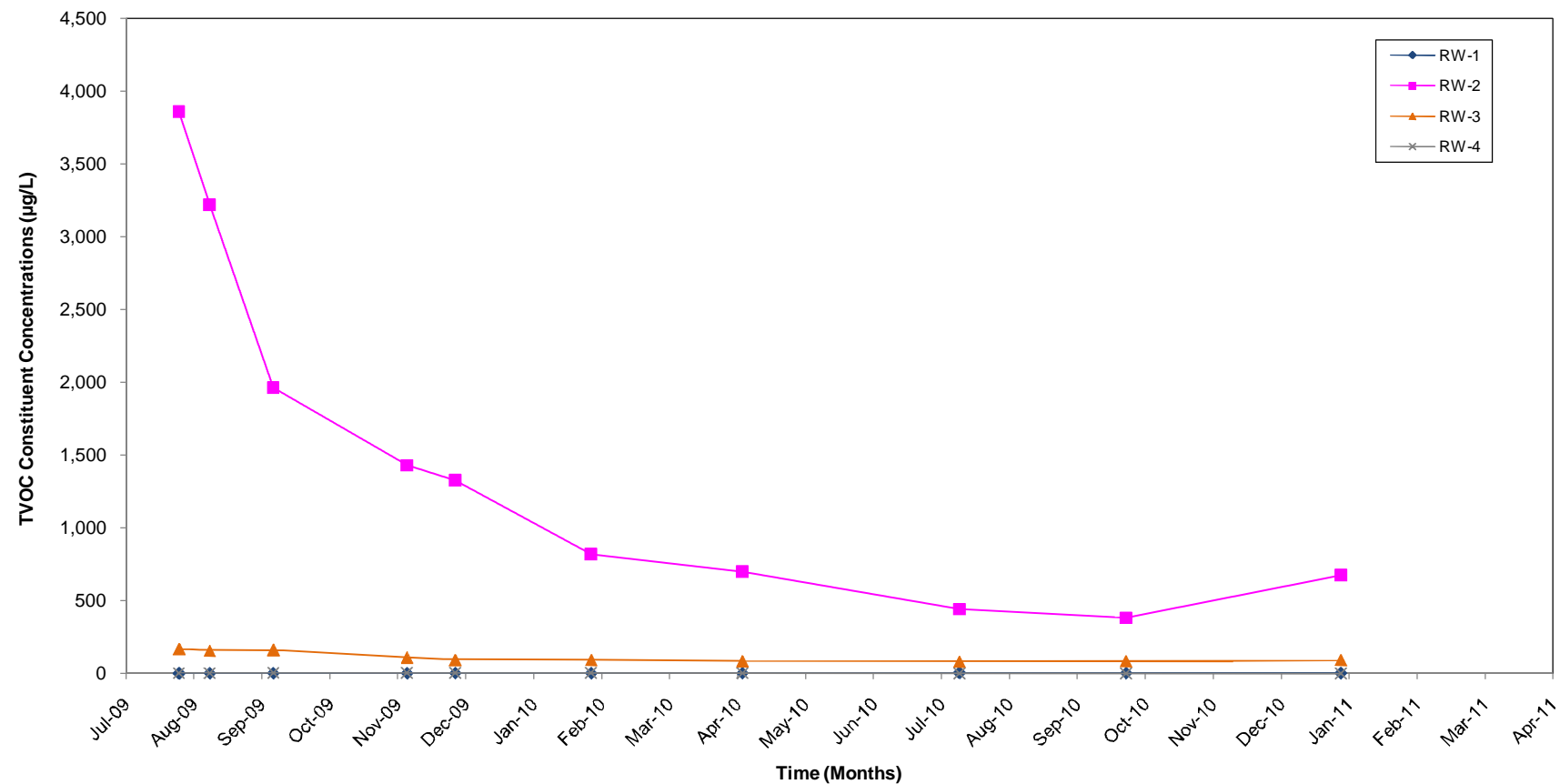
Total VOCs = Sum of VOCs detected.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

**REMEDIAL WELL TOTAL VOC
CONCENTRATIONS THROUGH
MARCH 2011**



FIGURE
6A

**Notes:**

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

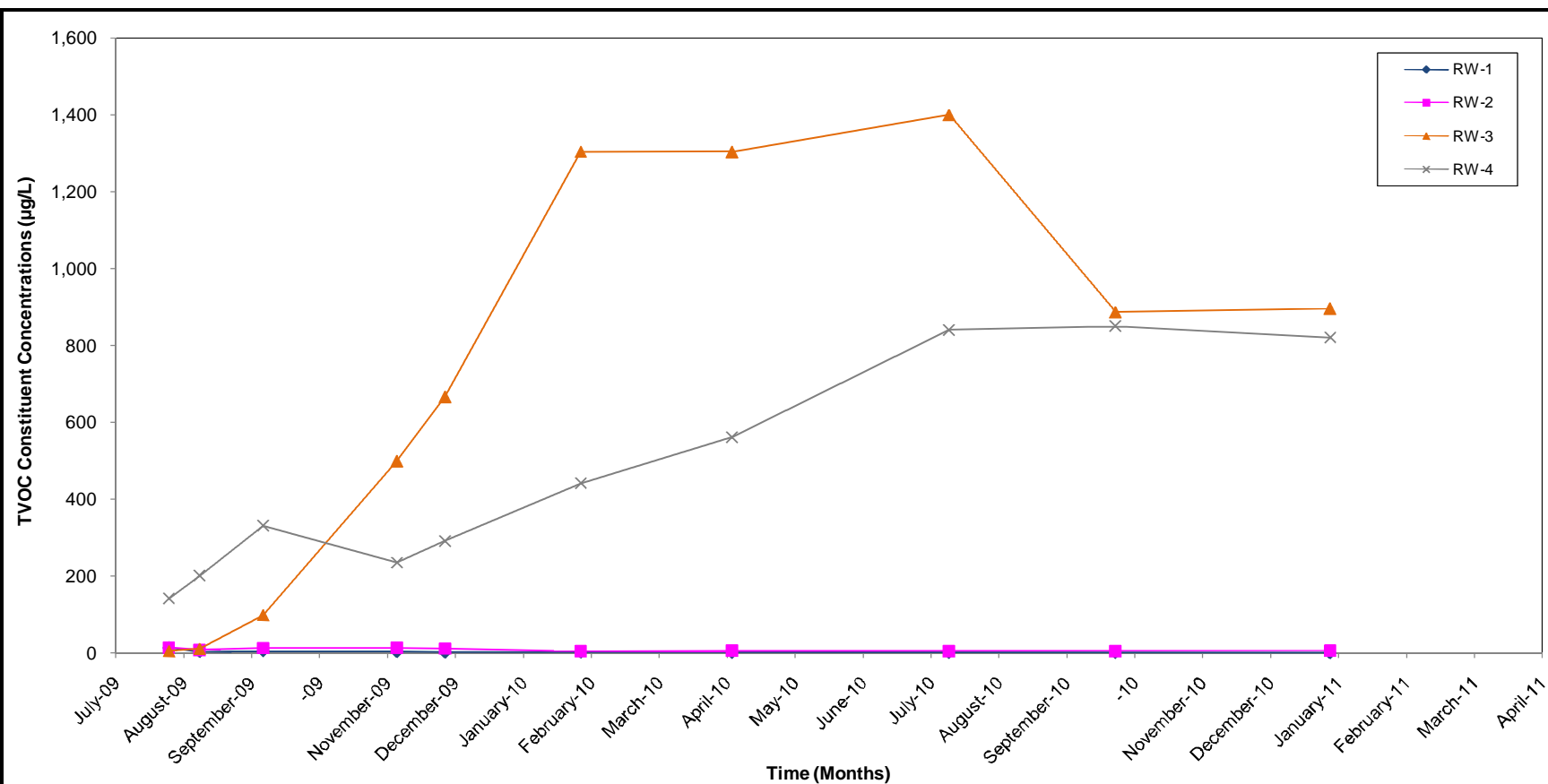
Project VOCs = Sum of 1,1,1-Trichloroethane; 1,1-Dichloroethane; 1,2-Dichloroethane; 1,1-Dichloroethene; Tetrachloroethene; Trichloroethene; Vinyl Chloride; cis-1,2-Dichloroethene; trans-1,2-Dichloroethene; Benzene; Toluene; and Total Xylenes.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

**REMEDIAL WELL PROJECT VOC
CONCENTRATIONS THROUGH
MARCH 2011**



FIGURE
6B

**Notes:**

VOC = Volatile organic compound.

µg/L = Micrograms per liter.

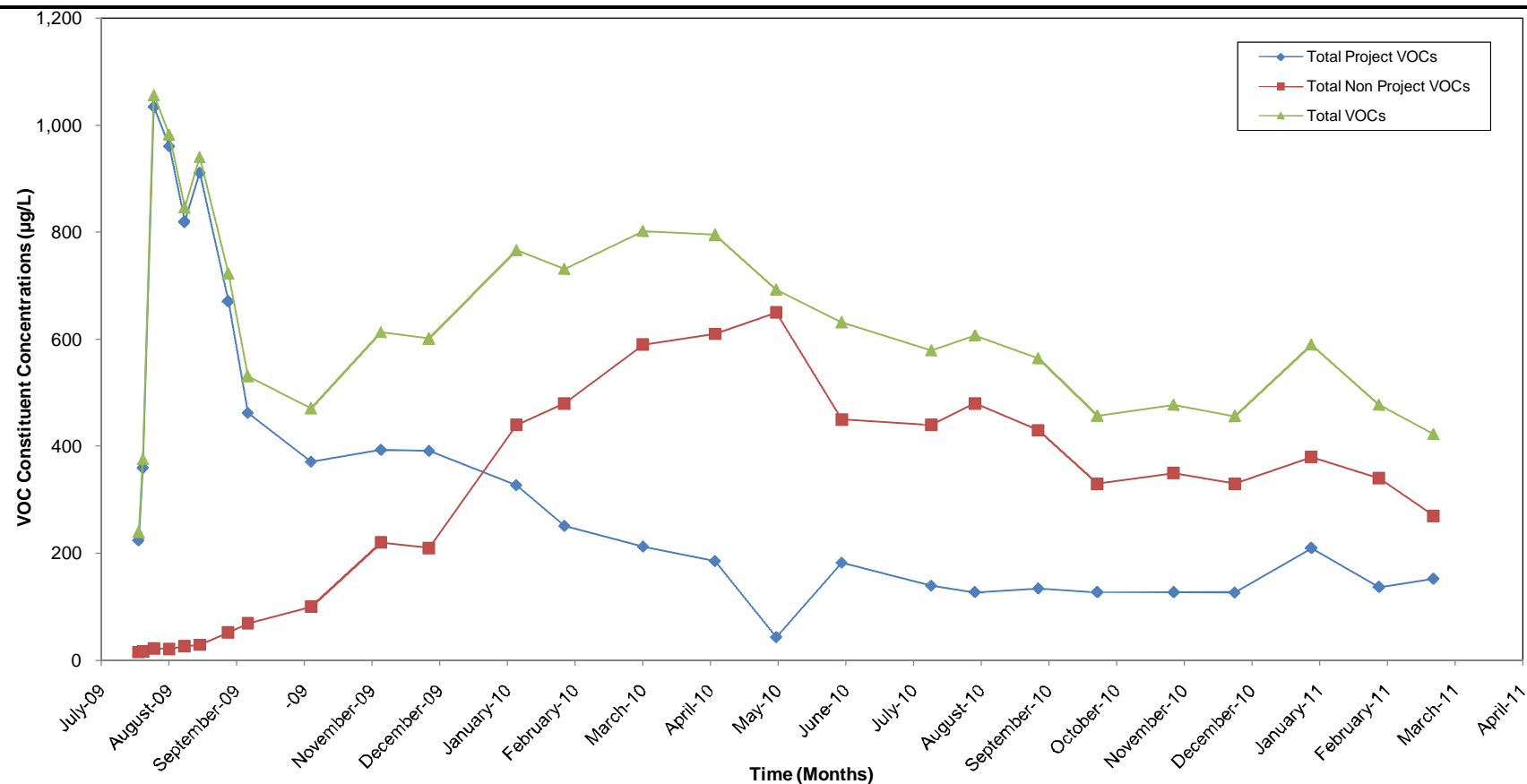
Non-Project VOCs = Sum of Total VOCs that are not Project VOCs.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

**REMEDIAL WELL NON-PROJECT
VOC CONCENTRATIONS THROUGH
MARCH 2011**



FIGURE
6C

**Notes:**

VOC = Volatile organic compound.

ug/L = Microgram per liter.

Total VOCs = Sum of 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.

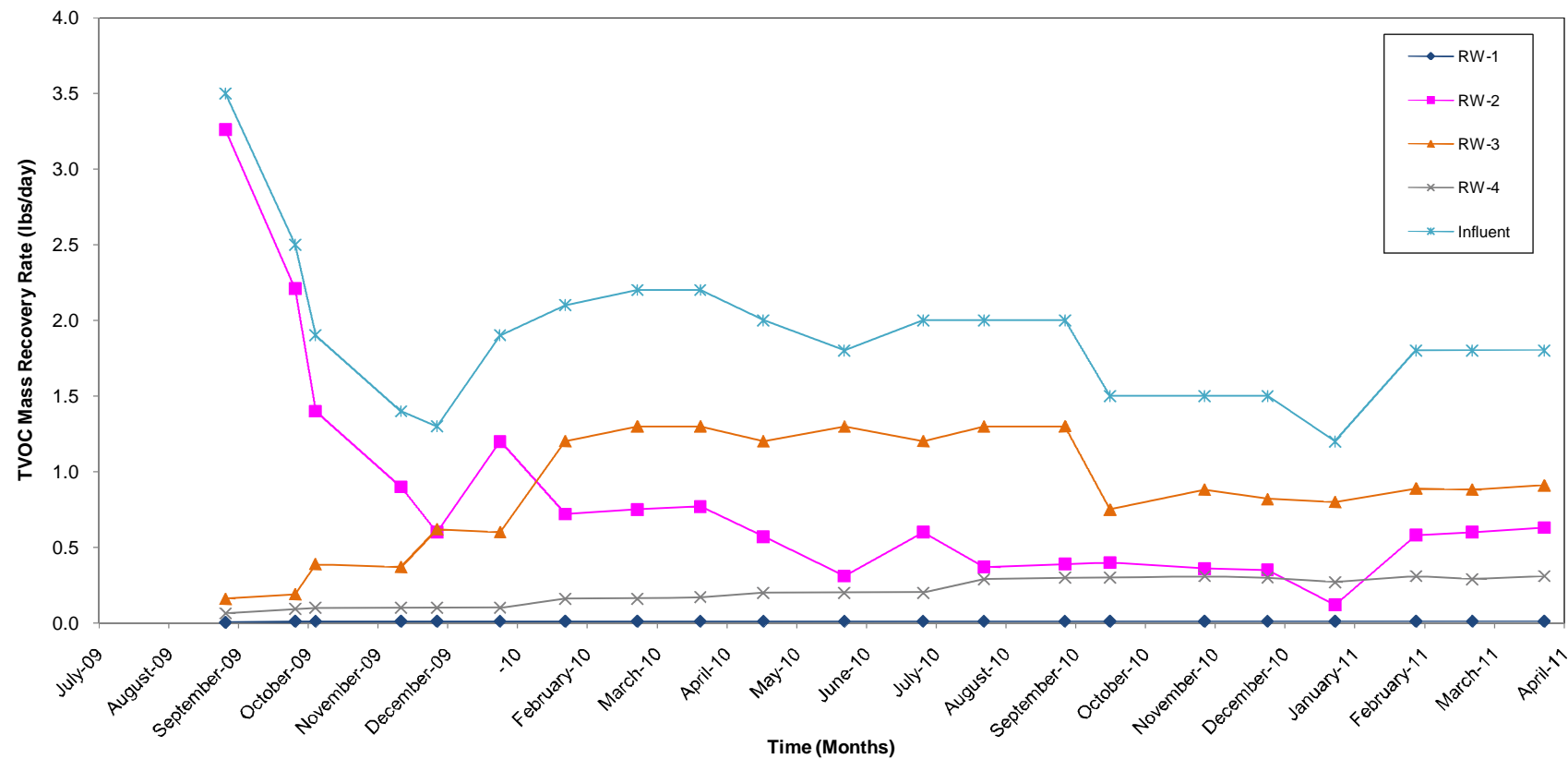
Non-Project VOCs = Sum of Total VOCs that are not Project VOCs.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

INFLUENT TOTAL, PROJECT, AND NON-PROJECT VOC CONCENTRATIONS THROUGH MARCH 2011



FIGURE
7

**Notes:**

VOC = Volatile organic compound.

lbs/day = Pounds per day.

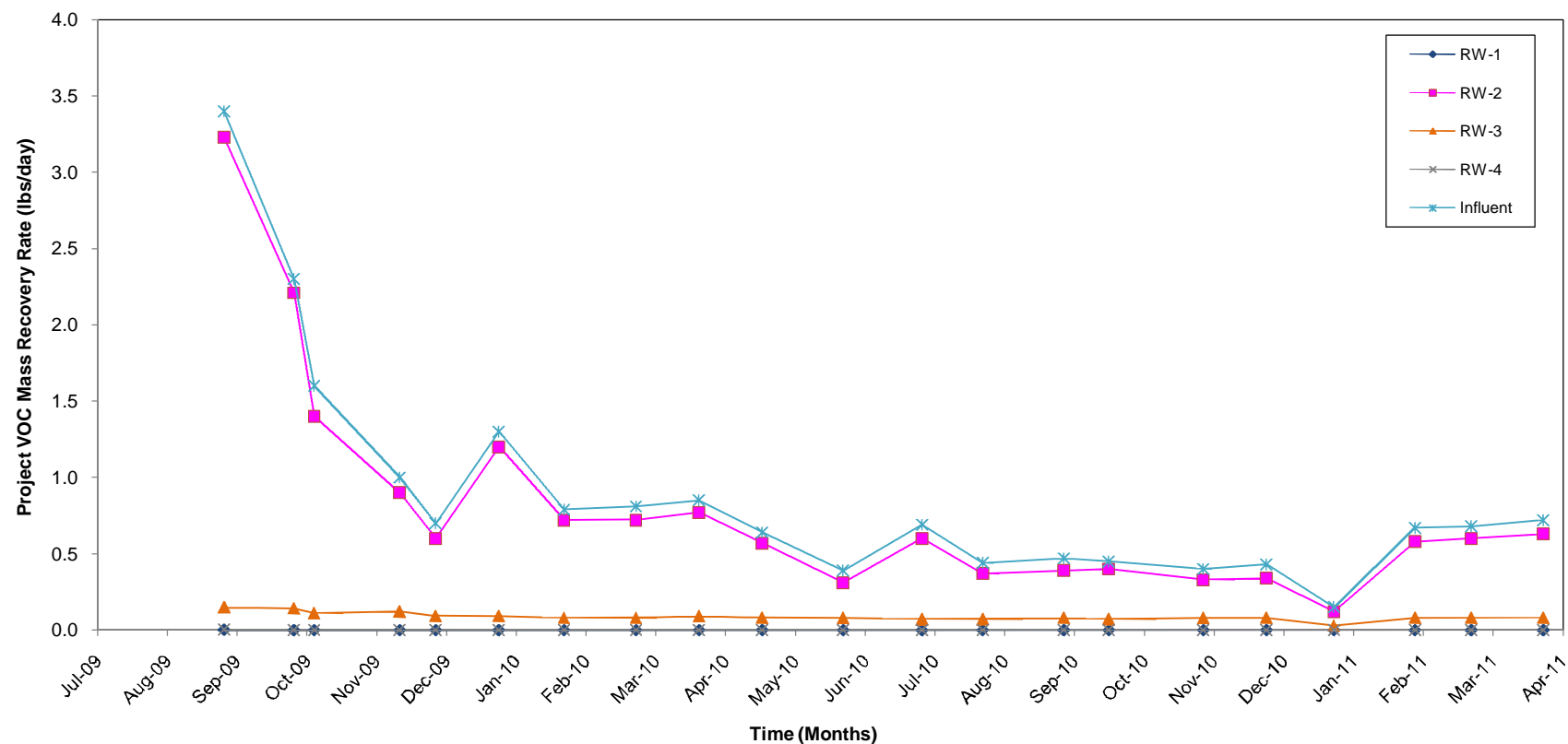
Total VOCs = Sum of VOCs detected.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

**TOTAL VOC MASS RECOVERY
RATES THROUGH MARCH 2011**



FIGURE
8A

**Notes:**

VOC = Volatile organic compound.

lbs/day = Pounds per day.

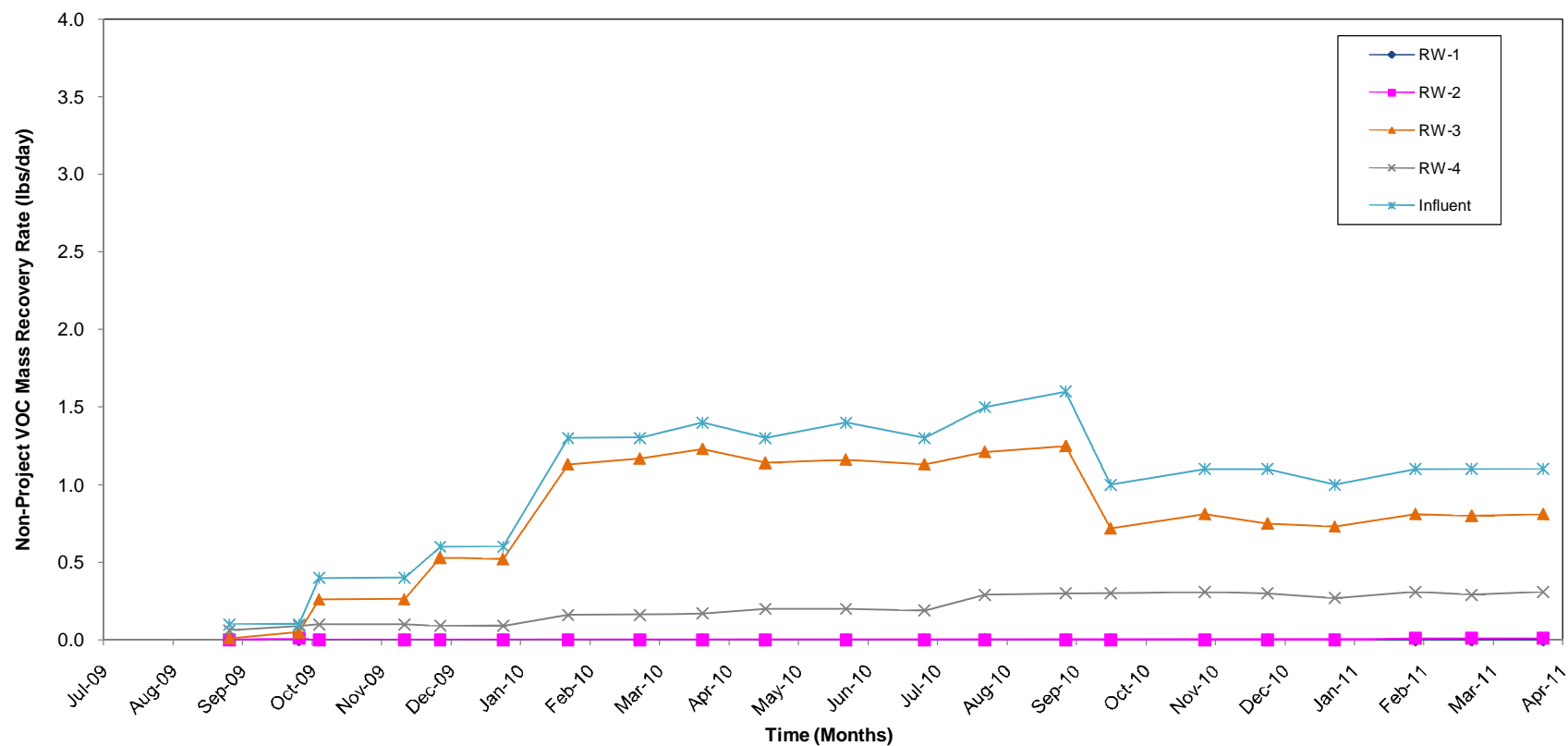
Project VOCs = Sum of 1,1,1-Trichloroethane; 1,1-Dichloroethane; 1,2-Dichloroethane; 1,1-Dichloroethene; Tetrachloroethene; Trichloroethene; Vinyl Chloride; cis-1,2-Dichloroethene; trans-1,2-Dichloroethene; Benzene; Toluene; and Total Xylenes.

GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

**PROJECT VOC MASS RECOVERY
RATES THROUGH MARCH 2011**



FIGURE
8B

**Notes:**

VOC = Volatile organic compound.

lbs/day = Pounds per day.

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

GROUNDWATER INTERIM REMEDIAL MEASURE
 OPERABLE UNIT 3
 (FORMER GRUMMAN SETTLING PONDS)
 BETHPAGE, NEW YORK

**NON-PROJECT VOC MASS
 RECOVERY RATES THROUGH
 MARCH 2011**



FIGURE
8C



Appendix A

Well Construction Information and
Environmental Effectiveness
Monitoring Program

Table A-1. Well Construction Information and Environmental Effectiveness Monitoring Program, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems Corporation, Bethpage, New York. ^(1,2)

Well ID	Well	Depth to Screen		Screen	Well	Well	MONITORING ACTIVITY			
	Diameter (inches)	Top (ft bls)	Bottom (ft bls)	Length (ft)	Depth (ft)	Materials	Water Levels ⁽³⁾	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/Quarterly	--
RW-02	6	84	104	20	104	Steel/SS	Quarterly	Baseline/Quarterly	Baseline/Quarterly	--
RW-03	8	84	104	20	107	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Quarterly	--
RW-04	8	110	130	20	133	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Baseline/Quarterly	--

See notes on last page.

Table A-1. Well Construction Information and Environmental Effectiveness Monitoring Program, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems Corporation, Bethpage, New York. ^(1,2)

Well ID	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	Quarterly	--	--	--
PZ-01b	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--
PZ-01c	1	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--
PZ-02a	2	60	65	5	68	Sch. 40 PVC	Quarterly	--	--	--
PZ-02b	1	80	85	5	85	Sch. 40 PVC	Quarterly	--	--	--
PZ-02c	1	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--
PZ-03	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--
PZ-04	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--
PZ-05a	2	65	70	5	74	Sch. 40 PVC	Quarterly	--	--	--
PZ-05b	1	110	115	5	117	Sch. 40 PVC	Quarterly	--	--	--
PZ-06a	2	65	70	5	72	Sch. 40 PVC	Quarterly	--	--	--
PZ-06b	1	90	95	5	97	Sch. 40 PVC	Quarterly	--	--	--
PZ-07a	2	65	70	5	72	Sch. 40 PVC	Quarterly	--	--	--
PZ-07b	1	113	118	5	120	Sch. 40 PVC	Quarterly	--	--	--

Notes:

- (1) Water samples will be collected and analyzed in accordance with the method and procedures described in this Sampling and Analysis Plan (SAP).
- (2) Approximate locations of the wells and piezometers in the OU-3 Groundwater Interim Remedial Measure Monitoring Program are shown in Figure 1.
- (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 this SAP.
- (4) VOC: VOCs, per Table D-3 in the Quality Assurance Project Plan (QAPP), using NYSDEC ASP 2000 Method OLM 4.3.
Cd/Cr: Cadmium and Chromium using USEPA Method 6010.
Fe/Mn: Iron and Manganese using USEPA Method 6010, 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.

Acronyms\Key:

Sch. 80 PVC	Schedule 80 polyvinyl chloride.
Sch. 40 PVC	schedule 40 polyvinyl chloride.
SS	Stainless steel.
Steel	Low carbon steel.
ft	Feet.
ft ms	Feet relative to mean sea level.
ft bls	Feet below land surface.
--	Not applicable.
VOC	Volatile organic compound.



Appendix B

Compliance and Performance
Program and Water Sample
Analytical Results

Table B-1. Compliance and Performance Program Elements, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Sample Location/Instrument ⁽¹⁾	Parameter (Method) ⁽²⁾	Frequency			SCADA Data Acquisition
		Short-Term ⁽³⁾ (first month)	(five month period following first month)	Long-Term ⁽⁴⁾	
<u>Water Samples</u> ⁽⁵⁾					
Remedial Well 1 (WSP-1)	VOCs (NYSDEC 2000 OLM 4.3)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010)	Bi-Weekly	Annually	Annually	NA
Remedial Well 2 (WSP-2)	VOCs (NYSDEC 2000 OLM 4.3)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010)	Bi-Weekly	Annually	Annually	NA
Remedial Well 3 (WSP-3)	VOCs (NYSDEC 2000 OLM 4.3)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010)	Bi-Weekly	Annually	Annually	NA
Remedial Well 4 (WSP-4)	VOCs (NYSDEC 2000 OLM 4.3)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010)	Bi-Weekly	Annually	Annually	NA
Air Stripper Influent (WSP-5)	VOCs (NYSDEC 2000 OLM 4.3)	1-hr ⁽⁶⁾ ; Days 1, 3, & Weekly	Monthly	Quarterly	NA
	Iron (USEPA 6010)	1-hr ⁽⁶⁾ ; Days 1, 3, & Weekly	Monthly	Quarterly	NA
Air Stripper Effluent (WSP-6)	Iron (USEPA 6010)	1-hr ⁽⁶⁾ ; As Needed	As Needed	As Needed	NA
Plant Effluent (WSP-7)	VOCs (NYSDEC 2000 OLM 4.3)	1-hr ⁽⁶⁾; Days 1, 3, & Weekly	Monthly	Monthly	NA
	Iron (USEPA 6010)	1-hr ⁽⁶⁾; Days 1, 3, & Weekly	Monthly	Monthly	NA
	Mercury (USEPA 7470) ⁽⁷⁾	1-hr ⁽⁶⁾; Days 1, 3, & Weekly	Monthly	Monthly	NA
	ph (field) ⁽⁸⁾	1-hr ⁽⁶⁾; Days 1, 3, & Weekly	Monthly	Monthly	NA
<u>Air Samples</u> ^{(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.

Table B-1. Compliance and Performance Program Elements, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems Corporation, Bethpage, New York.

Sample Location/Instrument ⁽¹⁾	Parameter (Method) ⁽²⁾	Frequency			
		Short-Term ⁽³⁾ (first month)	(five month period following first month)	Long-Term ⁽⁴⁾	SCADA Data Acquisition
<u>Water Flow Measurements</u>					
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
<u>Air Flow Measurements</u>					
Air Stripper Effluent (FT-500)	Flow rate (SCFM)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
<u>Water Pressure Measurements</u>					
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
<u>Air Temperature & Relatively Humidity Measurements</u>					
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

See notes on last page.

Table B-1. Compliance and Performance Program Elements, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems Corporation, Bethpage, New York.

Sample Location/Instrument ⁽¹⁾	Parameter (Method) ⁽²⁾	Frequency			
		Short-Term ⁽³⁾		Long-Term ⁽⁴⁾	SCADA
		(first month)	(five month period following first month)		Data Acquisition
<u>Air Pressure Measurements</u>					
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.

Table B-1. Compliance and Performance Program Elements, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems Corporation, Bethpage, New York.

Notes:

- (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 2009c)) 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 2009c). 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. 1-hr pilot test samples were also analyzed for mercury.
- (7) Per the interim treated effluent (water) discharge criteria provided in the NYSDEC letter dated March 19, 2009 (NYSDEC 2009a), select samples are being analyzed for Mercury (Hg). However, this analyte is not expected to be a long-term analyte since it is not a site contaminant of concern.
- (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 2009c).
- (10) Additional air samples will be collected to help calculate media usage rates and to help determine media changeout frequencies.

Acronyms/Key:

NA	Not applicable.
ECU	Emissions control unit.
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 2009c)) for the analyte lists for aqueous and air samples, respectively).
gal.	Gallons.
gpm	Gallons per minute.
i.w.g.	Inches water gauge.
NYSDEC	New York State Department of Environmental Conservation.
EPA	U.S. Environmental Protection Agency.
SCADA	Supervisory Control And Data Acquisition.
OM&M	Operation, maintenance and monitoring.

Table B-2. Water Sample Analytical Results - January 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/L)	Sample ID: Sample Location: Sample Date:	WSP-01 RW-1 1/10/2011	WSP-02 RW-2 1/10/2011	WSP-03 RW-3 1/10/2011	WSP-04 RW-4 1/10/2011	WSP-05 Influent 1/10/2011	WSP-07 Effluent 1/10/2011
<u>Volatile Organic Compounds</u>							
1,1,1-Trichloroethane		< 5.0 U	0.78 J	< 25 U	< 25 U	< 13 U	< 5.0 U
1,1,2,2-Tetrachloroethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
1,1,2-Trichloroethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
1,1-Dichloroethane		< 5.0 U	3.5 J	< 25 U	< 25 U	1.3 J	< 5.0 U
1,1-Dichloroethene		< 5.0 U	4.9 J	< 25 U	< 25 U	0.98 J	< 5.0 U
1,2-Dichloroethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
1,2-Dichloropropane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
2-Butanone		< 50 U	< 130 U	< 250 U	< 250 U	< 130 U	< 50 U
2-Hexanone		< 50 U	< 130 U	< 250 U	< 250 U	< 130 U	< 50 U
4-methyl-2-pentanone		< 50 U	< 130 U	< 250 U	< 250 U	< 130 U	< 50 U
Acetone		< 50 U	< 130 UB	< 250 UB	< 250 U	< 130 UB	< 50 UB
Benzene		< 0.7 U	< 1.8 U	< 3.5 U	< 3.5 U	< 1.8 U	< 0.70 U
Bromodichloromethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Bromoform		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Bromomethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Carbon Disulfide		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Carbon tetrachloride		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Chlorobenzene		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Chlorodifluoromethane (Freon 22)		< 5.0 U	1.4 J	890	820	380	< 5.0 U
Chloroethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Chloroform		< 5.0 U	1.9 J	5.8 J	< 25 U	2.4 J	< 5.0 U
Chloromethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
cis-1,2-dichloroethene		1.3 J	460	74	< 25 U	140	< 5.0 U
cis-1,3-dichloropropene		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Dibromochloromethane		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Dichlorodifluoromethane (Freon 12)		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Ethylbenzene		< 5.0 U	2.6 J	< 25 U	< 25 U	< 13 U	< 5.0 U
Methyl tert-Butyl Ether		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Methylene Chloride		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Styrene		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Tetrachloroethene		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Toluene		< 5.0 U	62	< 25 U	< 25 U	15	< 5.0 U
trans-1,2-dichloroethene		< 5.0 U	< 13 U	3.9 J	< 25 U	9.3 J	< 5.0 U
trans-1,3-dichloropropene		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Trichloroethylene		2.4 J	51	10 J	< 25 U	18	< 5.0 U
Trichlorofluoromethane (CFC-11)		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Trichlorotrifluoroethane (Freon 113)		< 5.0 U	< 13 U	< 25 U	< 25 U	< 13 U	< 5.0 U
Vinyl Chloride		< 2.0 U	87	5.1 J	< 10 U	25	< 2.0 U
Xylene-o		< 5.0 U	2.6 J	< 25 U	< 25 U	< 13 U	< 5.0 U
Xylenes - m,p		< 5.0 U	3.8 J	< 25 U	< 25 U	< 13 U	< 5.0 U
Subtotal VOCs ⁽⁴⁾		4	681	989	820	592	0
Tentatively Identified Compounds		ND	ND	ND	ND	ND	ND
Subtotal TICs ⁽⁵⁾		0	0	0	0	0	0
Total VOCs ⁽⁶⁾		4	681	989	820	592	0

See notes on last page.

Table B-2. Water Sample Analytical Results - January 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/L)	Sample ID: Sample Location: Sample Date:	WSP-01 RW-1 1/10/2011	WSP-02 RW-2 1/10/2011	WSP-03 RW-3 1/10/2011	WSP-04 RW-4 1/10/2011	WSP-05 Influent 1/10/2011	WSP-07 Effluent 1/10/2011
Metals							
Cadmium (Dissolved)		--	--	--	--	--	--
Cadmium (Total)		--	--	--	--	--	--
Chromium (Dissolved)		--	--	--	--	--	--
Chromium (Total)		--	--	--	--	--	--
Iron (Dissolved)		--	--	--	--	180	150
Iron (Total)		--	--	--	--	600	270
Manganese (Dissolved)		--	--	--	--	--	--
Manganese (Total)		--	--	--	--	--	--
Mercury (Dissolved)		--	--	--	--	--	--
Mercury (Total)		--	--	--	--	--	< 0.3 U

Notes:

- (1) Samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses using New York State Department of Environmental Conservation ASP 2000 Method OLM 4.3 and metals using USEPA Method 6010, except for mercury, which was analyzed using USEPA Method 7470.
- (2) Refer to Figure 3 of this OM&M Report for schematic sample locations.
- (3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS 2009c).
- (4) "Subtotal VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.
- (5) "Subtotal TICs" represents the sum of individual TICs detected. Values shown have been rounded to the nearest whole number.
- (6) "Total VOCs" represent the sum of VOCs and TICs detected. Values shown have been rounded to the nearest whole number.

Acronyms/Key:

Bold value indicates a detection.

J	Estimated value.
ND	TIC not detected.
OM&M	Operation, maintenance and monitoring.
TIC	Tentatively identified compound.
UB	Compound considered non-detect due to associated blank contamination.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
ug/L	Micrograms per liter.
--	Not analyzed.
< 5 U	Compound not detected above its laboratory quantification limit.

Table B-3. Water Sample Analytical Results - February 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/L)	Sample ID: Sample Location: Sample Date:	WSP-01 RW-1 2/10/2011	WSP-02 RW-2 2/10/2011	WSP-05 Influent 2/10/2011	WSP-07 Effluent 2/10/2011
<u>Volatile Organic Compounds</u>					
1,1,1-Trichloroethane		--	--	< 13 U	< 5.0 U
1,1,2,2-Tetrachloroethane		--	--	< 13 U	< 5.0 U
1,1,2-Trichloroethane		--	--	< 13 U	< 5.0 U
1,1-Dichloroethane		--	--	0.88 J	< 5.0 U
1,1-Dichloroethene		--	--	0.8 J	< 5.0 U
1,2-Dichloroethane		--	--	< 13 U	< 5.0 U
1,2-Dichloropropane		--	--	< 13 U	< 5.0 U
2-Butanone		--	--	< 130 U	< 50 U
2-Hexanone		--	--	< 130 U	< 50 U
4-methyl-2-pentanone		--	--	< 130 U	< 50 U
Acetone		--	--	< 130 U	< 50 U
Benzene		--	--	< 1.8 U	< 0.70 U
Bromodichloromethane		--	--	< 13 U	< 5.0 U
Bromoform		--	--	< 13 U	< 5.0 U
Bromomethane		--	--	< 13 U	< 5.0 U
Carbon Disulfide		--	--	< 13 U	< 5.0 U
Carbon tetrachloride		--	--	< 13 U	< 5.0 U
Chlorobenzene		--	--	< 13 U	< 5.0 U
Chlorodifluoromethane (Freon 22)		--	--	340	< 5.0 U
Chloroethane		--	--	< 13 U	< 5.0 U
Chloroform		--	--	1.8 J	< 5.0 U
Chloromethane		--	--	< 13 U	< 5.0 U
cis-1,2-dichloroethene		--	--	93	< 5.0 U
cis-1,3-dichloropropene		--	--	< 13 U	< 5.0 U
Dibromochloromethane		--	--	< 13 U	< 5.0 U
Dichlorodifluoromethane (Freon 12)		--	--	< 13 U	< 5.0 U
Ethylbenzene		--	--	< 13 U	< 5.0 U
Methyl tert-Butyl Ether		--	--	< 13 U	< 5.0 U
Methylene Chloride		--	--	< 13 U	< 5.0 U
Styrene		--	--	< 13 U	< 5.0 U
Tetrachloroethene		--	--	< 13 U	< 5.0 U
Toluene		--	--	13	< 5.0 U
trans-1,2-dichloroethene		--	--	< 13 U	< 5.0 U
trans-1,3-dichloropropene		--	--	< 13 U	< 5.0 U
Trichloroethylene		--	--	13 J	< 5.0 U
Trichlorofluoromethane (CFC-11)		--	--	< 13 U	< 5.0 U
Trichlorotrifluoroethane (Freon 113)		--	--	< 13 U	< 5.0 U
Vinyl Chloride		--	--	15	< 2.0 U
Xylene-o		--	--	< 13 U	< 5.0 U
Xylenes - m,p		--	--	< 13 U	< 5.0 U
Subtotal VOCs ⁽⁴⁾		--	--	477	0
Tentatively Identified Compounds		--	--	ND	ND
Subtotal TICs ⁽⁵⁾		--	--	0	0
Total VOCs ⁽⁶⁾		--	--	477	0

See notes on last page.

Table B-3. Water Sample Analytical Results - February 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/L)	Sample ID: Sample Location: Sample Date:	WSP-01 RW-1 2/10/2011	WSP-02 RW-2 2/10/2011	WSP-05 Influent 2/10/2011	WSP-07 Effluent 2/10/2011
Metals					
Cadmium (Dissolved)		--	--	--	--
Cadmium (Total)		--	--	--	--
Chromium (Dissolved)		--	--	--	--
Chromium (Total)		--	--	--	--
Iron (Dissolved)		< 100 U	550	200	150
Iron (Total)		< 100 U	970	440	350
Manganese (Dissolved)		--	--	--	--
Manganese (Total)		--	--	--	--
Mercury (Dissolved)		--	--	--	--
Mercury (Total)		--	--	--	< 0.30 U

Notes:

- (1) Samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses using New York State Department of Environmental Conservation ASP 2000 Method OLM 4.3 and metals using USEPA Method 6010, except for mercury, which was analyzed using USEPA Method 7470.
- (2) Refer to Figure 3 of this OM&M Report for schematic sample locations.
- (3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS 2009c).
- (4) "Subtotal VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.
- (5) "Subtotal TICs" represents the sum of individual TICs detected. Values shown have been rounded to the nearest whole number.
- (6) "Total VOCs" represent the sum of VOCs and TICs detected. Values shown have been rounded to the nearest whole number.

Acronyms/Key:

Bold value indicates a detection.

J	Estimated value.
ND	TIC not detected.
OM&M	Operation, maintenance and monitoring.
TIC	Tentatively identified compound.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
ug/L	Micrograms per liter.
--	Not analyzed.
< 5 U	Compound not detected above its laboratory quantification limit.

Table B-4. Water Sample Analytical Results - March 7, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/L)	Sample ID: Sample Location: Sample Date:	WSP-02 RW-2 3/7/2011	WSP-03 RW-3 3/7/2011	WSP-05 Influent 3/7/2011	WSP-07 Effluent 3/7/2011
<u>Volatile Organic Compounds</u>					
1,1,1-Trichloroethane		--	--	< 13 U	< 5.0 U
1,1,2,2-Tetrachloroethane		--	--	< 13 U	< 5.0 U
1,1,2-Trichloroethane		--	--	< 13 U	< 5.0 U
1,1-Dichloroethane		--	--	0.98 J	< 5.0 U
1,1-Dichloroethene		--	--	0.78 J	< 5.0 U
1,2-Dichloroethane		--	--	< 13 U	< 5.0 U
1,2-Dichloropropane		--	--	< 13 U	< 5.0 U
2-Butanone		--	--	< 130 U	< 50 U
2-Hexanone		--	--	< 130 U	< 50 U
4-methyl-2-pentanone		--	--	< 130 U	< 50 U
Acetone		--	--	< 130 U	< 50 U
Benzene		--	--	< 1.8 U	< 0.70 U
Bromodichloromethane		--	--	< 13 U	< 5.0 U
Bromoform		--	--	< 13 U	< 5.0 U
Bromomethane		--	--	< 13 U	< 5.0 U
Carbon Disulfide		--	--	< 13 U	< 5.0 U
Carbon tetrachloride		--	--	< 13 U	< 5.0 U
Chlorobenzene		--	--	< 13 U	< 5.0 U
Chlorodifluoromethane (Freon 22)		--	--	270	< 5.0 U
Chloroethane		--	--	< 13 U	< 5.0 U
Chloroform		--	--	1.8 J	< 5.0 U
Chloromethane		--	--	< 13 U	< 5.0 U
cis-1,2-dichloroethene		--	--	100	< 5.0 U
cis-1,3-dichloropropene		--	--	< 13 U	< 5.0 U
Dibromochloromethane		--	--	< 13 U	< 5.0 U
Dichlorodifluoromethane (Freon 12)		--	--	< 13 U	< 5.0 U
Ethylbenzene		--	--	< 13 U	< 5.0 U
Methyl tert-Butyl Ether		--	--	< 13 U	< 5.0 U
Methylene Chloride		--	--	< 13 U	< 5.0 U
Styrene		--	--	< 13 U	< 5.0 U
Tetrachloroethene		--	--	< 13 U	< 5.0 U
Toluene		--	--	17	< 5.0 U
trans-1,2-dichloroethene		--	--	< 13 U	< 5.0 U
trans-1,3-dichloropropene		--	--	< 13 U	< 5.0 U
Trichloroethylene		--	--	12 J	< 5.0 U
Trichlorofluoromethane (CFC-11)		--	--	< 13 U	< 5.0 U
Trichlorotrifluoroethane (Freon 113)		--	--	< 13 U	< 5.0 U
Vinyl Chloride		--	--	19	< 2.0 U
Xylene-o		--	--	< 13 U	< 5.0 U
Xylenes - m,p		--	--	0.93 J	< 5.0 U
Subtotal VOCs ⁽⁴⁾		--	--	422	0
Tentatively Identified Compounds		--	--	ND	ND
Subtotal TICs ⁽⁵⁾		--	--	0	0
Total VOCs ⁽⁶⁾		--	--	422	0

See notes on last page.

Table B-4. Water Sample Analytical Results - March 7, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/L)	Sample ID: Sample Location: Sample Date:	WSP-02 RW-2 3/7/2011	WSP-03 RW-3 3/7/2011	WSP-05 Influent 3/7/2011	WSP-07 Effluent 3/7/2011
Metals					
Cadmium (Dissolved)		--	--	--	--
Cadmium (Total)		--	--	--	--
Chromium (Dissolved)		--	--	--	--
Chromium (Total)		--	--	--	--
Iron (Dissolved)		530	200	190	150
Iron (Total)		850	530	440	320
Manganese (Dissolved)		--	--	--	--
Manganese (Total)		--	--	--	--
Mercury (Dissolved)		--	--	--	--
Mercury (Total)		< 0.30 U	< 0.30 U	< 0.30 U	< 0.30 U

Notes:

- (1) Samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses using New York State Department of Environmental Conservation ASP 2000 Method OLM 4.3 and metals using USEPA Method 6010, except for mercury, which was analyzed using USEPA Method 7470.
- (2) Refer to Figure 3 of this OM&M Report for schematic sample locations.
- (3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS 2009c).
- (4) "Subtotal VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.
- (5) "Subtotal TICs" represents the sum of individual TICs detected. Values shown have been rounded to the nearest whole number.
- (6) "Total VOCs" represent the sum of VOCs and TICs detected. Values shown have been rounded to the nearest whole number.

Acronyms/Key:

Bold value indicates a detection.

J	Estimated value.
ND	TIC not detected.
OM&M	Operation, maintenance and monitoring.
TIC	Tentatively identified compound.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
ug/L	Micrograms per liter.
--	Not analyzed.
< 5 U	Compound not detected above its laboratory quantification limit.



Appendix C

Vapor Sample Analytical Results

Table C-1. Vapor Sample Analytical Results - January 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/m ³)	Location ID: Sample Location: Sample Date:	VSP-1 System Influent 1/10/2011	VSP-5 System Effluent 1/10/2011
<u>Volatile Organic Compounds</u>			
1,1,1-Trichloroethane		< 19 U	< 1.5 U
1,1,2,2-Tetrachloroethane		< 19 U	< 1.5 U
1,1,2-Trichloroethane		< 19 U	< 1.5 U
1,1-Dichloroethane		20	5.0
1,1-Dichloroethene		23	4.0
1,2-Dichloroethane		< 19 U	< 1.5 U
1,2-Dichloropropane		< 19 U	< 1.5 U
1,3-butadiene		< 19 U	< 1.5 U
1-Chloro-1,1-difluoroethane (CFC 142b)		< 19 U	< 1.5 U
2-Butanone		< 190 U	< 15 U
2-Hexanone		< 19 U	< 1.5 U
4-methyl-2-pentanone		< 19 U	< 1.5 U
Acetone		< 190 U	340
Benzene		< 19 U	8.2
Bromodichloromethane		< 19 U	< 1.5 U
Bromoform		< 19 U	< 1.5 U
Bromomethane		< 19 U	< 1.5 U
Carbon Disulfide		< 190 U	< 15 U
Carbon tetrachloride		< 19 U	< 1.5 U
Chlorobenzene		< 19 U	< 1.5 U
Chlorodifluoromethane (Freon 22)		3,400	8,100 D
Chloroethane		< 19 U	< 1.5 U
Chloroform		39	11
Chloromethane		< 19 U	2.6
cis-1,2-dichloroethene		3,400	290 D
cis-1,3-dichloropropene		< 19 U	< 1.5 U
Dibromochloromethane		< 19 U	< 1.5 U
Dichlorodifluoromethane (Freon 12)		< 19 U	9.8
Ethylbenzene		< 19 U	2.7
Methyl tert-Butyl Ether		< 19 U	< 1.5 U
Methylene Chloride		< 19 U	< 1.5 U
Styrene		< 19 U	< 1.5 U
Tetrachloroethene		< 19 U	< 1.5 U
Toluene		290	74
trans-1,2-dichloroethene		< 19 U	< 1.5 U
trans-1,3-dichloropropene		< 19 U	< 1.5 U
Trichloroethylene		290	44
Trichlorofluoromethane (CFC-11)		< 19 U	< 1.5 U
Trichlorotrifluoroethane (Freon 113)		< 19 U	< 1.5 U
Vinyl Chloride		400	73
Xylene-o		< 19 U	3.4
Xylenes - m,p		< 38 U	4.9
Subtotal VOCs ⁽⁴⁾		7,862	8,973

See notes on last page.

Table C-1. Vapor Sample Analytical Results - January 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

COMPOUND (ug/m ³)	Location ID:	VSP-1	VSP-5
	Sample Location:	System Influent	System Effluent
	Sample Date:	1/10/2011	1/10/2011
<u>Tentatively Identified Compounds</u>			
2-Methylundecane	--	--	47 JN
2-Methyldecane + alpha-Cumylalcohol	--	--	35 JN
3-Methylundecane	--	--	55 JN
5-Methylundecane	--	--	59 JN
Acetophenone	--	--	110 JN
C11H20 Compound With the 3rd Highest Concentration	--	--	37 JN
C11H20 Compound With the 2nd Highest Concentration	--	--	64 JN
C11H20 Compound With the Highest Concentration	--	--	77 JN
C12H26 Branched Alkane WITH 2ND HIGHEST CONC	--	--	40 JN
C12H26 Branched Alkane WITH 3RD HIGHEST CONC.	--	--	23 JN
C12H26 Branched Alkane WITH HIGHEST CONC.	--	--	55 JN
C13H28 Branched Alkane WITH HIGHEST CONC.	--	--	60 JN
Pentylcyclohexane	--	--	58 JN
Undecane	--	--	38 JN
UNKNOWN WITH HIGHEST CONC.	--	--	67 JN
UNKNOWN WITH 2ND HIGHEST CONC.	--	--	57 JN
UNKNOWN WITH 3RD HIGHEST CONC.	--	--	37 JN
UNKNOWN WITH 4TH HIGHEST CONC.	--	--	30 JN
UNKNOWN WITH 5TH HIGHEST CONC.	--	--	27 JN
UNKNOWN WITH 6TH HIGHEST CONC.	--	--	23 JN
Subtotal TICs ⁽⁵⁾		0	999
Total VOCs ⁽⁶⁾		7,862	9,972

See notes on last page.

Table C-1. Vapor Sample Analytical Results - January 10, 2011, Groundwater Interim Remedial Measure, Operable Unit 3
(Former Grumman Settling Ponds), Bethpage, New York. ^(1,2,3)

Notes:

- (1) Samples collected by ARCADIS on the dates shown and submitted to Columbia Analytical Services, Inc. for VOC analyses per Modified USEPA Method TO-15.
- (2) Refer to Figure 3 of this OM&M Report for schematic sample locations.
- (3) Results validated following protocols specified in the Sampling and Analysis Plan (Appendix A) of the Groundwater OM&M Manual (ARCADIS 2009c).
- (4) "Subtotal VOCs" represents the sum of individual concentrations of VOCs detected. Values shown have been rounded to the nearest whole number.
- (5) "Subtotal TICs" represents the sum of individual TICs detected. Values shown have been rounded to the nearest whole number.
- (6) "Total VOCs" represent the sum of VOCs and TICs detected. Values shown have been rounded to the nearest whole number.

Acronyms\Key:

Bold value indicates a detection.

D	Concentration is based on a diluted sample analysis.
JN	Compound tentatively identified, concentration is estimated.
OM&M	Operation, maintenance and monitoring.
TIC	Tentatively identified compound.
USEPA	United States Environmental Protection Agency.
VOC	Volatile organic compound.
ug/m ³	Micrograms per cubic meter.
< 9.2 U	Compound not detected above its laboratory quantification limit.
--	TIC not detected.



Appendix D

Air Discharge Quality Evaluation

Table D-1. Annual Summary of SCREEN3 Model Input and Outputs, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Parameters	Date Sampled:	04/12/10	05/10/10	06/09/10	07/20/10	08/12/10	10/04/10	12/06/10	01/10/11
SCREEN3 Model Input									
Source Type	Point	Point	Point	Point	Point	Point	Point	Point	Point
Emission Rate (g/s)	1	1	1	1	1	1	1	1	1
Stack Height (ft)	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Stack Height (m)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Stack Inside Diameter (m)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Air Flow Rate (scfm) ⁽¹⁾	2,086	2,076	2,003	2,114	2,097	2,112	2,021	2,035	2,035
Air Flow Rate (acfm @ stack temp) ⁽²⁾	2,125	2,115	2,029	2,194	2,180	2,180	2,029	2,027	2,027
Stack Gas Exit Temperature (K) ⁽¹⁾	300	300	298	306	306	304	296	293	293
Ambient Air Temperature (K) ⁽³⁾	285	283	288	299	296	285	280	273	273
Receptor Height (m) ⁽⁴⁾	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Urban/Rural	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban
Building Height (m)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Min Horizontal Bldg Dim (m)	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
Max Horizontal Bldg Dim (m)	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Consider Bldg Downwash?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simple/Complex Terrain Above Stack	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple
Simple/Complex Terrain Above Stack Base	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple
Meteorology	Full	Full	Full	Full	Full	Full	Full	Full	Full
Automated Distances Array	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terrain Height Above Stack Base	0	0	0	0	0	0	0	0	0
SCREEN3 Model Output									
1-HR Max Concentration at Receptor Height ($\mu\text{g}/\text{m}^3$) ⁽⁵⁾	1,911	1,919	1,985	1,857	1,869	1,876	1,993	2,002	2,002
Annualization Factor ⁽⁶⁾	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Average Annual Concentration at Receptor Height ($\mu\text{g}/\text{m}^3$) ⁽⁷⁾	152.9	153.5	158.8	148.6	149.5	150.1	159.4	160.2	160.2
Distance To Max Concentration (m) ⁽⁸⁾	8	8	8	8	8	8	8	8	8

See notes on last page.

Table D-1. Annual Summary of SCREEN3 Model Input and Outputs, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Notes:

- (1) The stack air flow rate (in scfm) and temperature were measured using inline instrumentation. Values were measured at the blower effluent location.
- (2) The stack air flow rate at the stack temperature (in acfm) was calculated by dividing the stack air flow rate in scfm by the ratio of the standard temperature to the actual stack gas exit temperature.
- (3) The ambient temperature was recorded from the weather.newday.com website for Islip, New York. The mean actual temperature from the website was used in model calculation.
- (4) The receptor height corresponds to the average inhalation level.
- (5) SCREEN3 calculated constituent concentration at listed conditions at the specified inhalation level.
- (6) A USEPA time averaging conversion factor of 1/0.08 was used to convert the 1-hour maximum concentration output to an annual average.
- (7) Average annual constituent concentration at the receptor height was calculated by multiplying the one hour maximum concentration by the annualization factor.
- (8) SCREEN3 calculated distance to the 1-hour maximum concentration.

Acronyms\Key:

µg/m ³	Micrograms per cubic meter.
acfm	Actual cubic feet per minute.
ft	Feet.
g/s	Grams per second.
K	Kelvin.
m	Meters.
scfm	Standard cubic feet per minute.
USEPA	United States Environmental Protection Agency.

Table D-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Compound	Actual Effluent Concentrations ⁽¹⁾ (µg/m ³)							
	4/12/10	5/10/10	6/9/10	7/20/10	8/12/10	10/4/10	12/6/10	1/10/11
1,1,1 - Trichloroethane	0	0	0.97	0	0	0	0	0
1,1 - Dichloroethane	0	1.2	4.4	0	3.3	8.1	1.3	5.0
1,1 - Dichloroethene	0	0	0.77	0	2	3.9	0.66	4.0
2-Butanone	0	9.2	9.1	0	8.1	16	0	0
Acetone	200	95	170	930	230	390	56	340
Chloroform	0	3.5	6.7	0	4.8	9.2	4.7	11
Ethylbenzene	0	0	0.79	0	0	0.93	0	2.7
Xylenes (o)	0	0	1.4	0	0	0.90	0	3.4
Xylenes (m,p)	0	0	2.4	0	0	1.8	0	4.9
Chloromethane	0	0.97	2.8	0	0	2.7	0	2.6
Methylene Chloride	0	0	0	0	0	0.91	0	0
Tetrachloroethene	0	0	1.1	0	0.82	0.92	0	0
Trichloroethene	17	5.1	12	9.9	12	13	9.6	44
Vinyl Chloride	27	0	5.0	17	15	14	2.4	73
cis 1,2 Dichloroethene	65	9.2	21	40	49	120	50	290
Benzene	29	7.8	13	17	11	11	2.6	8.2
Toluene	80	0	44	31	25	26	11	74
2-Hexanone	0	0	0	0	0	0	0	0
Trichlorofluoromethane (Freon 11)	0	0	0	0	1.2	1.6	0	0
Dichlorodifluoromethane (Freon 12)	0	3.5	3.5	0	2.8	3.5	0	9.8
Chlorodifluoromethane (Freon 22)	4,800	3,500	5,400	6,000	5,200	3,900	3,500	8,100

See notes on last page.

Table D-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Compound	AGC ⁽²⁾	Maximum Allowable Stack Concentration ⁽³⁾ (µg/m ³)							
	(µg/m ³)	4/12/10	5/10/10	6/9/10	7/20/10	8/12/10	10/4/10	12/6/10	1/10/11
1,1,1 - Trichloroethane	5,000	3.26E+07	3.26E+07	3.29E+07	3.25E+07	3.25E+07	3.24E+07	3.28E+07	3.26E+07
1,1 - Dichloroethane	0.63	4.11E+03	4.11E+03	4.14E+03	4.09E+03	4.10E+03	4.08E+03	4.13E+03	4.11E+03
1,1 - Dichloroethene	70	4.56E+05	4.57E+05	4.60E+05	4.55E+05	4.55E+05	4.53E+05	4.59E+05	4.57E+05
2-Butanone	5,000	3.26E+07	3.26E+07	3.29E+07	3.25E+07	3.25E+07	3.24E+07	3.28E+07	3.26E+07
Acetone	30,000	1.96E+08	1.96E+08	1.97E+08	1.95E+08	1.95E+08	1.94E+08	1.97E+08	1.96E+08
Chloroform	0.043	2.80E+02	2.81E+02	2.83E+02	2.79E+02	2.80E+02	2.78E+02	2.82E+02	2.81E+02
Ethylbenzene	1,000	6.52E+06	6.53E+06	6.58E+06	6.50E+06	6.50E+06	6.48E+06	6.55E+06	6.53E+06
Xylenes (o)	100	6.52E+05	6.53E+05	6.58E+05	6.50E+05	6.50E+05	6.48E+05	6.55E+05	6.53E+05
Xylenes (m,p)	100	6.52E+05	6.53E+05	6.58E+05	6.50E+05	6.50E+05	6.48E+05	6.55E+05	6.53E+05
Chloromethane	90	5.87E+05	5.87E+05	5.92E+05	5.85E+05	5.85E+05	5.83E+05	5.90E+05	5.87E+05
Methylene Chloride	2.1	1.37E+04	1.37E+04	1.38E+04	1.36E+04	1.37E+04	1.36E+04	1.38E+04	1.37E+04
Tetrachloroethene	1	6.52E+03	6.53E+03	6.58E+03	6.50E+03	6.50E+03	6.48E+03	6.55E+03	6.53E+03
Trichloroethene	0.5	3.26E+03	3.26E+03	3.29E+03	3.25E+03	3.25E+03	3.24E+03	3.28E+03	3.26E+03
Vinyl Chloride	0.11	7.17E+02	7.18E+02	7.23E+02	7.15E+02	7.15E+02	7.12E+02	7.21E+02	7.18E+02
cis 1,2 Dichloroethene	63	4.11E+05	4.11E+05	4.14E+05	4.09E+05	4.10E+05	4.08E+05	4.13E+05	4.11E+05
Benzene	0.13	8.48E+02	8.48E+02	8.55E+02	8.45E+02	8.45E+02	8.42E+02	8.52E+02	8.48E+02
Toluene	5,000	3.26E+07	3.26E+07	3.29E+07	3.25E+07	3.25E+07	3.24E+07	3.28E+07	3.26E+07
2-Hexanone	30	1.96E+05	1.96E+05	1.97E+05	1.95E+05	1.95E+05	1.94E+05	1.97E+05	1.96E+05
Trichlorofluoromethane (Freon 11)	5,000	3.26E+07	3.26E+07	3.29E+07	3.25E+07	3.25E+07	3.24E+07	3.28E+07	3.26E+07
Dichlorodifluoromethane (Freon 12)	12,000	7.83E+07	7.83E+07	7.89E+07	7.80E+07	7.80E+07	7.77E+07	7.86E+07	7.83E+07
Chlorodifluoromethane (Freon 22)	50,000	3.26E+08	3.26E+08	3.29E+08	3.25E+08	3.25E+08	3.24E+08	3.28E+08	3.26E+08

See notes on last page.

Table D-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Groundwater Interim Remedial Measure, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Compound	Percent of Maximum Allowable Stack Concentration ⁽⁴⁾							
	4/12/10	5/10/10	6/9/10	7/20/10	8/12/10	10/4/10	12/6/10	1/10/11
1,1,1 - Trichloroethane	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1 - Dichloroethane	0.00%	0.03%	0.11%	0.00%	0.08%	0.20%	0.03%	0.12%
1,1 - Dichloroethene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2-Butanone	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chloroform	0.00%	1.25%	2.37%	0.00%	1.72%	3.30%	1.67%	3.92%
Ethylbenzene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Xylenes (o)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Xylenes (m,p)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chloromethane	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Methylene Chloride	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
Tetrachloroethene	0.00%	0.00%	0.02%	0.00%	0.01%	0.01%	0.00%	0.00%
Trichloroethene	0.52%	0.16%	0.36%	0.30%	0.37%	0.40%	0.29%	1.35%
Vinyl Chloride	3.76%	0.00%	0.69%	2.38%	2.10%	1.97%	0.33%	10.17%
cis 1,2 Dichloroethene	0.02%	0.00%	0.01%	0.01%	0.01%	0.03%	0.01%	0.07%
Benzene	3.42%	0.92%	1.52%	2.01%	1.30%	1.31%	0.31%	0.97%
Toluene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2-Hexanone	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dichlorodifluoromethane (Freon 12)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chlorodifluoromethane (Freon 22)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Notes:

- (1) Actual effluent concentrations are analytical results from air samples collected on the dates shown. Data in this table corresponds to approximately the past year of system operation.
- (2) AGC refers to the compound-specific annual guideline concentration per the NYSDEC DAR-1 AGC/SGC tables, revised October 18, 2010.
- (3) Maximum allowable stack concentrations were calculated by dividing the product of the annual guideline concentration of a compound and the ratio of the SCREEN3 gas emission rate and the SCREEN 3 average concentration at receptor height by the air flow rate at the stack temperature and multiplying by the appropriate conversion factors.
- (4) Percent of MASC was calculated by dividing the actual effluent concentration by the MASC for a given monitoring event.

Acronyms\Key:

µg/m ³	Micrograms per cubic meter.
AGC	Annual guideline concentration.
MASC	Maximum allowable stack concentration.