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Operable Unit 3 - Operation, Maintenance and Monitoring Report

2008 Annual Summary Report

Operable Unit 3 – Soil Gas Interim Remedial Measure
Former Grumman Settling Ponds
Bethpage, New York

NYSDEC ID # 1-30-003A

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1. Introduction

This Operable Unit 3 (OU3) Soil Gas Interim Remedial Measure (soil gas IRM) Operation, Maintenance, and Monitoring (OM&M) 2008 Annual Summary Report was prepared by ARCADIS of New York, Inc. (ARCADIS) on behalf of Northrop Grumman Systems Corporation (Northrop Grumman). This report is being submitted pursuant to the Order On Consent (Consent Order or CO) Index # W1-0018-04-01 that was executed by the New York State Department of Environmental Conservation (NYSDEC) and Northrop Grumman, effective July 4, 2005 (NYSDEC 2005). The present day Bethpage Community Park property (Park), which the NYSDEC has termed the "Former Grumman Settling Ponds Area" and designated as OU3, is referred to herein as the Site. A Site location map is provided on Figure 1.

This report provides an annual summary of the results of OM&M for the soil gas IRM performed during 2008. An evaluation and engineering certification of the systems performance, with respect to the design objectives provided in the Soil Gas Interim Remedial Measure Work Plan (ARCADIS 2007a) and 95% Design Report (ARCADIS 2007b), are provided herein.

A description and evaluation of the soil gas IRM system OM&M completed during 2008 is provided below.

2. Soil Gas Interim Remedial Measure System Description

The OU3 soil gas IRM was constructed in accordance with the Soil Gas Interim Remedial Measure 95% Design Report and Design Drawings (ARCADIS 2007b), which was approved by the NYSDEC on September 19, 2007 (NYSDEC 2007b). A general site plan that shows the major process equipment, depressurization, and monitoring well locations is provided on Figure 2. A process flow diagram that shows sampling and monitoring locations is provided on Figure 3. A complete set of Record Drawings is provided in the OM&M Manual (ARCADIS 2009b). In summary, the soil gas IRM consists of the following major components:

- 18 depressurization wells and 47 associated induced vacuum monitoring wells at the locations shown on Figure 2.
- Two (2) "dry-van" type storage containers, which contain the following equipment:
  - Three (3) 52-gallon moisture separators to remove condensate from the influent vapor stream;

- Two (2) 20-horsepower(hp) and one (1) 30-hp regenerative type depressurization blowers;
- A programmable logic controller (PLC) based control system;
- An autodialer;
- Associated piping, valves, sample ports, gauges, electrical equipment, and other devices necessary to safely control, operate, and monitor the system.

- One (1) heat exchanger to condition the effluent vapor stream prior to treatment; and,
- As initially designed and constructed, one (1) 10,000 pound (lb) vapor phase granular activated carbon bed (VPGAC). As referenced below, the temporary VPGAC unit was removed from service on December 29, 2008 per NYSDEC approval (NYSDEC 2008c).
- One (1) 33-foot tall by 16-inch diameter stack and associated ductwork.

A detailed description of the system is provided in the OM&M Manual (ARCADIS 2009b). A description of the response action objectives for the soil gas IRM is provided below.

3. Response Action Objectives

The specific objectives of the soil gas IRM provided in the NYSDEC-approved Soil Gas Interim Remedial Measure Work Plan (ARCADIS 2007a) are:

- To mitigate the off-site migration of non-Freon 12 and non-Freon 22 Volatile Organic Compounds (VOCs) in the on-site soil gas through the implementation of a soil gas control system along the former Plant 24 access road south of the Park.
- To comply with applicable NYSDEC Standards, Criteria and Guidelines (SCGs).

Subsequent to submittal of the Soil Gas IRM Work Plan (ARCADIS 2007a), site-related VOCs were found along the southwestern Park boundary. Accordingly, an additional objective of the soil gas IRM as provided in the 95% Design Report (ARCADIS 2007b) is:

- To mitigate the off-site migration of non-Freon 12 and non-Freon 22 VOCs in the on-site soil gas through the implementation of a soil gas control system along the former Plant 24 access road west of the Park.

The following additional design objectives were provided in the 95% Design Report (ARCADIS 2007b) based on the response objectives provided above:

- To mitigate the offsite migration of soil gas, the system will be designed to maintain 0.1 inches of water column (iwc) of negative pressure within a negative pressure curtain (e.g., along the southern and western access roads) based on a twelve-month rolling average.

- Collected vapors will initially be treated until it is demonstrated that all VOCs in the influent (untreated) vapor stream are less than the NYSDEC Division of Air Resources Guide-1 (DAR-1) Annual Guidance Concentrations (AGCs) on a twelve-month rolling average and Short-Term Guidance Concentrations (SGCs) for any given grab sample (NYSDEC 2007a).

- Collected condensate will initially be transferred to the point of discharge under the existing approval for OU3 wells. The point of discharge, located near the Northrop Grumman Operable Unit 2 (OU2) Treatment Building 96, ultimately discharges to the Town of Oyster Bay's Cedar Creek treatment facility. The condensate may be transferred to the OU3 groundwater IRM following its construction, if appropriate.

A description of the OM&M activities completed in 2008 are provided below.

4. Operation and Maintenance Activities

During 2008, the soil gas IRM system OM&M was completed in accordance with the Operable Unit 3 Soil Gas Interim Remedial Measure OM&M Manual that was submitted to the NYSDEC on August 26, 2008 (ARCADIS 2008c). It should be noted that an updated OM&M Manual was submitted to the NYSDEC on January 23, 2009 (ARCADIS 2009b). Specifically, the OM&M Manual was updated to address verbal comments provided by the NYSDEC along with additional addenda that include the Record Drawings, a site-specific Health and Safety Plan (HASP), and grammatical edits.

Continuous operation of the soil gas IRM was initiated on February 18, 2008 following completion of initial system startup/shakedown. In general, routine maintenance activities completed during 2008 consisted of inspection of all piping, appurtenances, and mechanical equipment for leaks, defects, or other problems and maintenance of equipment in accordance with the manufacturers' specifications. In addition, the following non-routine

maintenance activities and/or modifications to system operation (i.e., when compared to the NYSDEC approved 95% design submittal [ARCADIS 2007b]) were completed in 2008:

- The average induced vacuum reading for compliance-related monitoring points was approximately three times greater than the design induced vacuum of -0.1 iwc at system startup. Accordingly, the system was rebalanced as part of an extended startup period between March 18, 2008 and May 19, 2008. As a result of the rebalancing activities, Blowers BL-200 and BL-400 were put on standby.

- Due to the lower heat generation caused by the reduced blower operation (as described in Section 6.1), Heat Exchanger HX-600 was put on standby.

- Supplemental site visits were completed on a weekly basis to monitor the physical condition of the temporary site controls (i.e., temporary fence) along the western access road. Permanent site controls are scheduled to be installed as part of groundwater IRM construction currently underway.

- A supplemental site visit was conducted on September 24, 2008 to resample the influent and effluent vapor stream as described in the September 2008 Monthly Monitoring Report (ARCADIS 2008g).

- Approximately 150-gallons of condensate water were transferred to the Nassau County Department of Public Works (NCDPW) intake located on Northrop Grumman property on August 25, 2008.

- The influent manifold control valves were adjusted to lower the vacuum and flow at Depressurization Wells DW-1S, DW-1D, and DW-2D. The control valve adjustments were completed in an effort to reduce the overall induced vacuum within respective compliance monitoring wells to obtain values closer to their design criteria during the November 2008 monitoring period (ARCADIS 2009c).

- Similarly, the influent manifold control valves were adjusted again to increase the vacuum and flow at Depressurization Wells DW-1D and DW-2D during the December 2008 monitoring period in an effort to return the overall induced vacuum within respective compliance monitoring wells to obtain values closer to their design criteria (ARCADIS 2009d).

- All individual depressurization well flow meters were replaced with acrylic "rotameter" type flow meters. The flow meters were replaced to better bracket the actual flow rate range observed at each individual well and to allow for easier monitoring of individual

flow rates by system operators. The flow meters were replaced during the week of December 22, 2008.

- The temporary 10,000-lb VPGAC unit was removed from service on December 29, 2008, as approved by the NYSDEC and described further in Section 7.0 below.

Additional detail of the maintenance activities described above is provided in the 2008/2009 monthly monitoring reports prepared by ARCADIS, for the maintenance activities respective completion date.

The soil gas IRM operated continuously during operating year 2008 with brief system shutdowns due to system alarms, routine maintenance or troubleshooting activities. The following system alarms and/or system maintenance activities resulted in brief system shutdowns during 2008:

- Periodic brief (<1 hour) system shutdowns were completed during the week of September 29, 2008 to allow for miscellaneous mechanical components to be upgraded/modified as part of the equipment vendor punch list completion.

- Periodic brief (up to 8-hrs) system shutdowns were completed during the week of October 12, 2008 to allow for configuration and testing of the system autodialer. In addition, control upgrades were completed on the Main Control Panel (MCP) as part of the equipment vendor punch list completion during this week.

- The system was down for approximately 12-hours beginning at 12:52 AM on November 14, 2008 due to inclement weather (i.e., power outage).

- The system was down for approximately 46-hours beginning at 11:09 AM on November 15, 2008 due to inclement weather (i.e., power outage).

- Individual depressurization wells were taken offline for approximately 2 to 4 hours each during the week of December 22, 2008 to allow for installation of the new flow meters described above.

- The system was down for approximately 2-hours on December 29, 2008 during permanent removal of the temporary VPGAC unit.

- The system was down for approximately 25-hours beginning at 9:30 AM on January 8, 2009 to allow for final piping of the effluent vapor to the stack.

A summary of the monitoring program that was implemented during 2008 is provided below. A summary of all monitoring program revisions that were requested, approved, and/or implemented in 2008 is also provided.

5. Monitoring Activities

During 2008, system monitoring was completed in accordance with the Sampling and Analysis Plan (SAP), which was provided to the NYSDEC as Appendix C of the 95% Design Report and Design Drawings dated September 7, 2007 (ARCADIS 2007b), the OM&M Manual dated August 26, 2008 (ARCADIS 2008c), and subsequent recommendations provided within the 2008/2009 monthly interim OM&M reports. The SAP (ARCADIS 2008a) was approved by the NYSDEC in a letter dated August 1, 2008 (NYSDEC 2008a). The following adjustments to the system monitoring program provided in the SAP (ARCADIS 2008a) were recommended, approved by the NYSDEC, and/or implemented during 2008, as noted below:

- The addition of Freon 12 to the laboratory vapor analytical list and Freon 22 as a temporary identified compound (TIC), as requested by the NYSDEC in a letter dated August 5, 2008 (NYSDEC 2008b). Freon 22 will be added to the list of quantitative analytes upon receipt of the calibration standard by the analytical laboratory (currently projected to be in June 2009).

- The collection of induced vacuum measurements from the list of compliance related induced vacuum monitoring wells only. Non-compliance related induced vacuum monitoring data shall only be collected when system troubleshooting is required, based on the results of compliance related induced vacuum data. This revision was implemented beginning in September 2008.

- The frequency of condensate discharge reporting to the NCDPW was adjusted from monthly to "within 45 calendar days following each discharge to the POTW" and the frequency of discharge monitoring was adjusted from monthly to "prior to each discharge to the POTW until a stable trend is established". This adjustment will allow for meeting the reporting and monitoring requirements at a frequency consistent with the actual water generation rate. This adjustment was approved by the NCDPW in a letter dated September 17, 2008 (NCDPW 2008).

- Except as needed for system troubleshooting, the frequency of system monitoring will be reduced from monthly to quarterly. This revision will begin during 2009 and was approved by the NYSDEC in a letter dated December 12, 2008 (NYSDEC 2008c).

A detailed description of the monitoring methodology implemented during each monthly monitoring event (or supplemental monitoring event) during 2008 is provided in each of the respective interim monthly OM&M reports.

A summary of the key monitoring results for 2008 is provided below. A detailed description of all monitoring results is provided in each of the respective interim monthly OM&M reports.

6. Monitoring Results

The following sections summarize the results of routine performance monitoring and routine compliance monitoring completed during 2008. An annual summary of applicable performance and routine compliance monitoring data is provided in the following tables and appendices:

- An annual summary of the performance monitoring system operating parameters including qualitative vapor analytical results (i.e., photoionization detector [PID] readings) is provided in Table 1.
- An annual summary of all performance monitoring and compliance-related induced vacuum measurements is provided in Table 2.
- A summary of individual well laboratory analytical results for detected compounds at system startup are provided in Table 3.
- An annual summary of the total influent (performance monitoring) and total effluent (compliance monitoring) laboratory analytical results for detected compounds are provided in Table 4.
- An annual summary of the condensate water laboratory analytical results is provided in Table 5.
- An annual summary of TICs for vapor samples is provided in Appendix A; and,
- An annual summary of TICs for condensate samples is provided in Appendix B.

A summary of system performance and compliance monitoring results is provided below.

6.1 System Performance Monitoring

System performance monitoring completed in 2008 consisted of the collection of system operating parameters and system performance vapor samples (i.e., influent vapor analytical

data and influent/effluent PID measurements) as referenced in Section 4.0 of this report. In general, the majority of system operating parameters (i.e., individual well flow rates, system vacuums, etc.) remained consistent following the extended system startup period referenced previously. A detailed description of changes in system operating parameters is included in each monitoring periods respective monthly OM&M report.

Key performance monitoring results from 2008 include the following:

- The overall combined total influent concentration was generally consistent with the design concentrations during the initial and extended startup/shakedown period.

- The total volatile organic compound (TVOC) concentration of influent vapor samples decreased, as anticipated, from a maximum of 20,622 micrograms per meter cubed (ug/m3) collected during Day 1 of system startup to a minimum of 1,966 ug/m3 collected during the December 2008 monitoring event. The influent TVOC concentration became asymptotic beginning in May 2008. Influent PID readings ranged between 0.0 and 4.6 parts per million by volume (ppmv).

- Freon 22 and Freon 142 were reported as TICs in the influent vapor samples during several of the monitoring events conducted in 2008.

- The majority of observed manifold vacuums increased between October 2008 and December 2008. The soil gas IRM continued to meet its' respective design objectives despite the increase in manifold vacuum. It is speculated that the increase in vacuum is a result of condensate or other obstructive material collecting within the subsurface vapor pipe at turns or "topographic low points" resulting in a higher vacuum at the manifold.

- Subsequent to the rebalancing completed during the extended system startup period, several minor system rebalancing activities (i.e., rebalancing of one to two individual depressurization wells) were performed in an effort to align induced vacuum levels to their respective design criteria.

- The heat exchanger influent temperature was lower than the design influent temperature of 150 degrees Fahrenheit during the initial and extended startup period. The lower observed temperature was the direct result of more efficient system operation (e.g., lower required vacuum, flow rate, and pressure to achieve the design capture zone). As mentioned in Section 4.0, the heat exchanger was put on standby (e.g., not operational) because the vapor stream did not require

additional conditioning prior to entering the VPGAC unit. The heat exchanger remained on standby for the remainder of 2008.

- Perched water was not encountered in Induced Vacuum Monitoring Wells VMWC-1C or VMWC-5B during 2008.

- Condensate water was generated at a rate lower than the anticipated design generation rate. Specifically, approximately 178 gallons of condensate water was generated from Condensate Knockout Tanks KO-200 (99 gallons), KO-300 (79 gallons), and KO-400 (0-gallons), respectively during the initial and extended startup/shakedown period. However, no water was generated between May 2008 and December 2008.

A summary of the key system compliance monitoring results for 2008 is provided below.

6.2 System Compliance Monitoring

System compliance monitoring completed in 2008 consisted of the collection of system compliance vapor samples and the collection of compliance-only induced vacuum readings as referenced in Section 4.0 of this report. A detailed description of the system compliance monitoring results is included in each monitoring period's respective monthly OM&M report.

Key compliance monitoring results from 2008 include the following:

- As referenced in Section 4.0 of this report, the average induced vacuum reading for compliance-related monitoring points was approximately three times greater than the design induced vacuum of -0.1 iwc at system startup. Accordingly, the system was rebalanced as part of an extended startup period between March 18, 2008 and May 19, 2008. Blowers BL-200 and BL-400 were put on standby as a result of the rebalancing activities.

- The time-weighted rolling average for all compliance related monitoring points was greater than or equal to -0.1 iwc as of December 18, 2008.

- Similarly, the average instantaneous induced vacuum for all compliance related monitoring points was greater than or equal to -0.1 for each respective monitoring period in 2008.

- The concentration of all environmentally "A" rated compounds ([i.e., vinyl chloride] as defined in DAR 1 AGC/SGC tables revised September 10, 2007 [NYSDEC 2007a]) was below the limits of detection. A summary of the air emissions model,

completed to confirm compliance with applicable air discharge standards, is discussed in Section 7 of this report.

- The TVOC concentration of the effluent vapor stream ranged from below the limits of detection at startup to 1,257 ug/m3 during the November 2008 monitoring event. The TVOC concentration had an increasing trend throughout the operating Year as a result of breakthrough of the VPGAC. All emissions were below applicable discharge criteria during all monitoring events as discussed in Section 7 of this report.

A summary of the air emissions model maintained during 2008 is provided below.

7. Air Emissions Model

Effluent vapor laboratory analytical results were compared to the NYSDEC DAR-1 SGCs during each monitoring event in 2008. In addition, effluent vapor laboratory analytical 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 a United States Environmental Protection Agency (USEPA) SCREEN 3 model in conjunction with the NYSDEC DAR-1 AGCs. Specifically, a scaling factor was calculated using the SCREEN 3 model with site-specific physical layout (e.g., building dimension, stack height, terrain, etc.) and operating data (e.g., discharge 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 annual MASC. An annual summary of the instantaneous percent (e.g., not time-weighted) of the site-specific annual MASC for detected compounds is provided in Table 6. An annual summary of the cumulative annual percent (i.e., time-weighted) of the site-specific MASC for detected compounds is also provided on Table 6. An annual summary of the model input, outputs, and backup calculations is provided in Appendix C.

In summary, the soil gas IRM effluent vapor met applicable air discharge criteria for 2008 based on the following:

- The actual concentrations of individual VOCs in the vapor effluent did not exceed their respective SGCs during all monitoring events (Table 4).

- The actual concentration of individual VOCs in the vapor effluent did not exceed their respective instantaneous MASCs during all monitoring events, as calculated using the USEPA SCREEN 3 Model (Table 6). Similarly, the time-weighted rolling average for all detected compounds is currently well below the MASCs during 2008.

Finally, in an effort to demonstrate that the temporary VPGAC unit was no longer required to treat influent vapor to meet applicable discharge criteria, and at the request of the NYSDEC, a detailed air emissions regulatory review summary and site status was submitted to the NYSDEC on December 4, 2008 (ARCADIS 2008f). The goal of the evaluation was to determine if the removal of trichloroethylene (TCE) or other site-related compounds in influent air emissions was required for the soil gas IRM system to meet applicable regulatory criteria and/or provide protection of human health and the environment. The regulatory evaluation demonstrated and concluded that the untreated soil gas IRM system air emissions meet applicable regulatory criteria and that the removal of the temporary VPGAC unit was appropriate. As referenced previously, the temporary VPGAC unit was removed from service on December 29, 2008 based on NYSDEC approval of the evaluation referenced above.

8. Conclusions and Recommendations

The following section summarizes the conclusions and recommendations based on the results of performance and compliance monitoring provided herein.

8.1 Conclusions

Based on the information provided herein, ARCADIS concludes that the soil gas IRM met or exceeded all design objectives referenced in Section 3.0 of this report as follows:

- The soil gas IRM maintained 0.1 iwc of negative pressure within all induced vacuum monitoring points based on a twelve-month rolling average.
- System emissions were maintained at or below all applicable regulatory discharge criteria for all monitoring events; and,
- System condensate was characterized, discharged, and reported as required under the existing approval from the NCDPW.

8.2 Recommendations

Based on the information provided herein, ARCADIS makes the following recommendations for 2009:

- Continue operating the soil gas IRM in accordance with system operating parameters recorded during the December 2008 reporting period.

- Continue to monitor the manifold vacuum of individual depressurization wells in conjunction with system operating parameters and induced vacuum measurements. If induced vacuum measurements decrease to below design criteria, evaluate if additional troubleshooting is warranted to determine the cause of the increase in manifold vacuums.

- Conduct future OM&M activities in accordance with the Final OM&M Manual dated January 23, 2009 (ARCADIS 2009b).

- Add Freon 22 and Freon 142 to the quantitative laboratory analyte list as soon as the standards become available (estimated to be prior to the June 2009 monitoring event).

9. Certification

Statement of Certification

On behalf of Northrop Grumman Systems Corporation, I hereby certify and attest that the Operable Unit 3 Soil Gas Interim Remedial Measure is operated in compliance with the remedial action objectives provided within the NYSDEC approved Soil Gas Interim Remedial Measure Work Plan dated February 16, 2007 which was prepared pursuant to NYSDEC Order on Consent Index # W1-0018-04-01 referencing the Former Grumman Settling Ponds Site and dated July 4, 2005.

Christina Tuohy

Christina Berardi Tuohy, P.E.
Principal Engineer

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Table 1. Annual Summary of General System Operating Parameters, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Date	Extraction Well DW-7S Parameters					Extraction Well DW-7D Parameters				
	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08[1]	58	-3.55	55.7	7.2	-2.0	76	-7.2	56.1	29.3	-2.5
02/19/08[1]	53	-3.80	NM	9.7	-2.0	78	-7.4	NM	26.7	-2.5
02/25/08[1]	55	-5.5	NM	4.2	-2.0	74	-13	NM	5.8	-2.7
03/03/08[1]	53	-6	NM	2.8	-2.0	84	-13.0	NM	0.8	-2.7
03/17/08[1]	76	-9	NM	2.6	-2.5	50	-8.00	NM	0.4	-2.0
04/16/08	84.97	-10.46	50.3	2.7	NM	41.10	-2	55.4	2.0	NM
05/19/08	72.43	-5.0	57.0	5.0	-4.0	19.76	-0.800	62.2	2.1	-1.5
06/02/08	86.01	-5.8	65.8	0.0	-1.8	23.40	-0.7	72.8	0.0	-0.9
07/07/08	49.33	-4.4	69.4	4.7	-2.2	18.04	-1.2	76.1	2.6	-1.0
08/06/08[5,8]	78.62	-4.5	76.3	NM	-2.5	19.49	-0.9[9]	80.6	NM	-1.7
09/18/08	95.06	-4.5	69.4	NM	-1.5	23.22	-0.8	68.7	NM	-0.7
10/27/08	84.98	-5.5	62.6	NM	-1.5	22.34	-0.8	62.6	NM	-0.9
11/25/08	NM	-10	53.6	NM	-1.4	20.49	-4.0	54.1	NM	-0.8
12/18/08	95.89	-9	50.9	NM	-1.4	20.08	-1.0	51.8	NM	-0.56

Date	Extraction Well DW-3S Parameters					Extraction Well DW-3D Parameters				
	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08[1]	80	-7.3	55.7	2.8	-2.5	113	-15.43	53.9	13.3	-4.5
02/19/08[1]	45	-2.5	NM	6.5	-1.75	108	-16.3	NM	16.4	-3.5
02/25/08[1]	37	-2.03	NM	2.1	-1.5	71	-26	NM	6.6	-2.7
03/03/08[1]	45	-2.5	NM	1.2	-1.5	88	-16	NM	1.9	-2.7
03/17/08[1]	45	-2.8	NM	1.1	-2.0	83	-16	NM	0.1	-2.7
04/16/08	15.48	-0.41	58.6	0.6	NM	28.56	-1.07	57.0	4.6	NM
05/19/08	14.98	-0.45	62.2	0.0	-2.0	23.35	-2.0	59.3	3.5	-3.0
06/02/08	16.09	-0.4	71.0	0.0	-1.1	26.95	-2.0	71.7	0.0	-1.3
07/07/08	17.56	-0.4	74.1	2.3	-1.2	17.63	-11	77.9	3.1	-2.2
08/06/08[5,8]	9.84	-2.0[6]	76.8	NM	-1.0	12.84	-11.5	80.0	NM	-1.1
09/18/08	13.29	-3.0	69.4	NM	-0.2	23.56	-2.1	68.8	NM	-1.0
10/27/08	13.25	-7.0[12]	62.4	NM	-0.8	23.31	-0.1	62.6	NM	-0.9
11/25/08	12.60	-12.0	58.2	NM	-0.4	30.20	-0.8	54.6	NM	-0.6
12/18/08	12.88	-13	57.3	NM	-0.27	26.36	-1.5	51.8	NM	-0.56

Date	Extraction Well DW-5S Parameters					Extraction Well DW-5D Parameters				
	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08[1]	100	-4.6	57.2	0.0	-3.0	52	-16.1	56.8	0.0	-13.5
02/19/08[1]	57	-2.5	NM	0.0	-2.0	52	-18	NM	0.0	-13.5
02/25/08[1]	20	-1.05	NM	0.4	-1.5	56	-24.1	NM	0.0	-17.5
03/03/08[1]	20	-1.4	NM	0.8	-1.5	66	-27	NM	0.0	-15.2
03/17/08[1]	20	-1.5	NM	0.0	-2.5	70	-32	NM	0.0	-25.0
04/16/08	34.44	-0.77	55.0	0.0	NM	32.13	-22.0	57.5	0.6	NM
05/19/08	77.92	-2.5	59.9	2.5	-2.5	19.73	-14.0	59.0	0.0	-10.5
06/02/08	86.18	-2.3	65.4	0.0	-2.8	16.56	-14.0	74.3	0.0	-10.0
07/07/08	121.21	-2.2	71.0	2.1	-2.7	15.22	-14.2	82.2	2.3	-10
08/06/08[5,8]	82.68	-2.1	75.1	NM	-2.0	4.62	-14.5	81.6	NM	-0.9
09/18/08	84.01	-2.2	69.6	NM	-0.80	6.91	-14.5	69.0	NM	-1.0
10/27/08	88.57	-2.2	62.6	NM	-1.4	18.42	-15.0	62.6	NM	-1.3
11/25/08	116.98	-3.6	55	NM	-1.4	29.89	-22.0	54.3	NM	-3.1
12/18/08	89.91	-4.0	52.5	NM	-1.5	67.85	-18.0	51.8	NM	-11.4

Notes and Abbreviations:

°F - Degrees Fahrenheit
DW- Depressurization well
ft bmp - Feet below measuring point
iwc - Inches of water column
NM -Not measured
scfm - Standard cubic feet per minute
ppmv - Parts per million by volume
VMWC - Vapor monitoring well cluster

1. Flow rate at manifold on associated dates quantified using venturi flow meter and associated flow chart. Remaining flow rates measured with a hotwire anemometer and calculated to standard conditions using the formula below.
2. Access point covered by insulation no measurement taken during this round.
3. Blowers BL-200 and BL-400 were taken off-line on April 10th during system rebalancing.
4. Field recording error suspected.
5. Temperature readings are erroneous due to field measurement error. July 7, 2008 temperature readings used for conversion of flow to scfm.
6. Data point is average of readings observed which fluctuated between -0.9 and -3.0 iwc.
7. Original parameter not collected on 8/6/08 or was erroneous, data point reported is second reading taken on 08/07/08.
8. Wellhead vacuum gauges replaced during reporting period with lower range/higher accuracy gauges.
9. Gauge vacuum at 0.0 iwc manometer reading used for table.
10. New gauge range too high to collect measurable reading.
11. Vacuum reading taken using digital manometer during this round of monitoring.
12. Data point is average of readings observed which fluctuated between -4.0 and -10 iwc.

Standard Conditions Calculation:

$$scfm = \text{Flow rate}*\text{Area}*(Ts/Tm)*(Pm/Ps)$$

Flow rate in feet per minute
Area in square feet
Ts - Standard Temperature in Rankine
Tm - Measured Temperature in Rankine
Pm - Measured Pressure in pounds per square inch
Ps - Standard Pressure in pounds per square inch

Table 1. Annual Summary of General System Operating Parameters, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Date	Extraction Well DW-6S Parameters: Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Extraction Well DW-6D Parameters: Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08(1)	170	-13.1	55.0	0.0	-6.0	44	-16.0	60.2	0.0	-14.0
02/19/08(1)	167	-13.6	NM	0.0	-6.0	48	-17.5	NM	0.0	-14.0
02/25/08(1)	167	-16.0	NM	0.0	-6.0	94	-23.5	NM	0.0	-20.5
03/03/08(1)	170	-16.0	NM	0.5	-5.5	55	-25.2	NM	0.0	-20
03/17/08(1)	185	-22	NM	0.0	-6.0	65	-31	NM	1.2	-22
04/16/08	49.50	-1.44	53.6	0.2	NM	10.55	-1.86	57.5	1.9	NM
05/19/08	42.93	-1.2	61.8	2.5	-1.3	11.47	-2.6	60.0	0.0	-2.0
06/02/08	48.18	-1.2	68.0	0.0	-1.2	14.88	-2.2	72.5	0.0	-2.5
07/07/08	52.63	-1.5	71.6	1.2	-2.0	14.89	-2.1	75.2	3.3	-2.2
08/06/08(5,8)	41.38	-1.2	75.4	NM	-1.0	11.75	-2.1	79.9	NM	-0.9(6)
09/18/08	41.91	-1.1	69.8	NM	-0.9	12.59	-2.1	69.6	NM	-1.5
10/27/08	41.72	-1.2	62.6	NM	-0.9	11.22	-2.0	62.2	NM	-0.2
11/25/07	52.72	-1.6	55.4	NM	-0.9	6.11	-1.0	55.7	NM	-0.788
12/18/08	47.97	-1.5	52.5	NM	-0.8	5.17	-1.0	53.7	NM	-0.7

Date	Extraction Well DW-1S Parameters: Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Extraction Well DW-1D Parameters: Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08(1)	160	-11.8	54.1	0.0	-5.0	20	-16.8	62.4	0.0	-15.0
02/19/08(1)	235	-19.78	NM	0.0	-8.0	20	-18	NM	0.0	-16.0
02/25/08(1)	228	-25.4	NM	NM	-7.2	28	-24.25	NM	0.0	-25.0
03/03/08(1)	208	-26.79	NM	0.1	-7.0	32	-26.5	NM	0.0	-25.0
03/17/08(1)	208	-29	NM	0.0	-7.5	32	-32.6	NM	0.0	-30
04/16/08	89.48	-3.31	52.3	0.0	NM	3.97	-0.79	61.3	0.0	NM
05/19/08	147.62	-10.5	55.5	0.0	-4.5	6.60	-1.8	64.4	0.3	-2.5
06/02/08	179.95	-10.3	61.3	0.0	-4.2	8.54	-1.8	74.1	0.0	-5.1
07/07/08	153.47	-6	68.5	2.3	-3.8	8.71	-1.3	77.3	2.2	-4.7
08/06/08(5,8)	137.92	-6.2	75	NM	-3.0	12.86	-1.2	80.7	NM	-1.1
09/18/08	152.30	-6.2	70.5	NM	-3.0	6.33	-1.5	69.6	NM	-1.5
10/27/08	154.64	-6.7	63.1	NM	-2.8	6.32	-1.5	62.7	NM	-1.8
11/25/07	62.57	-3	55.5	NM	-1.2	1.51	-0.1	61.7	NM	-0.258
12/18/08	53.68	-2.5	52.5	NM	-1.0	8.24	-1.5	53.2	NM	-1.4

Date	Extraction Well DW-4S Parameters: Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Extraction Well DW-4D Parameters: Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08(1)	170	-12.0	54.6	0.0	-2.0	8	-2.0	60.8	0.0	-3.0
02/19/08(1)	155	-13.5	NM	0.0	-5.5	8	-1.95	NM	0.0	-1.5
02/25/08(1)	160	-16.0	NM	0.0	-5.5	8	-1.1	NM	0.0	-2.0
03/03/08(1)	160	-16.0	NM	1.1	-5.70	8	-1.0	NM	0.0	-2.0
03/17/08(1)	176	-26	NM	0.0	-6.0	8	-1.25	NM	0.0	-1.75
04/16/08	48.16	-1.43	55.5	0.0	NM	9.27	-0.48	60.6	0.0	NM
05/19/08	32.14	-1.0	61.7	1.7	-2.7	15.01	-1.1	63.3	0.6	-2.2
06/02/08	30.98	-0.7	66.2	0.0	-2.1	17.44	-1.2	71.6	0.0	-2.7
07/07/08	38.23	-0.2	72.8	1.2	-2.1	18.41	-1.1	73	2.5	-1.8
08/06/08(5,8)	12.93	-0.8	87	NM	-0.6	12.97	-1.0	80.7	NM	0(10)
09/18/08	9.34	-11.5	70.3	NM	-0.5	14.47	-0.5	69.6	NM	-0.38(11)
10/27/08	30.65	-12.9	62.2	NM	-0.5	14.06	-0.6	62.6	NM	-0.4
11/25/07	54.57	-19	62.2	NM	-0.15	18.39	-0.7	54.6	NM	-0.5
12/18/08	17.91	-16.5	58.1	NM	-0.23	17.08	-0.75	51.8	NM	-0.40

Notes and Abbreviations:

°F - Degrees Fahrenheit
DW- Depressurization well
ft bmp - Feet below measuring point
iwc - Inches of water column
NM -Not measured
scfm - Standard cubic feet per minute
ppmv - Parts per million by volume
VMWC - Vapor monitoring well cluster

1. Flow rate at manifold on associated dates quantified using venturi flow meter and associated flow chart. Remaining flow rates measured with a hotwire anemometer and calculated to standard conditions using the formula below.
2. Access point covered by insulation no measurement taken during this round.
3. Blowers BL-200 and BL-400 were taken off-line on April 10th during system rebalancing.
4. Field recording error suspected.
5. Temperature readings are erroneous due to field measurement error. July 7, 2008 temperature readings used for conversion of flow to scfm.
6. Data point is average of readings observed which fluctuated between -0.9 and -3.0 iwc.
7. Original parameter not collected on 8/6/08 or was erroneous, data point reported is second reading taken on 08/07/08.
8. Wellhead vacuum gauges replaced during reporting period with lower range/higher accuracy gauges.
9. Gauge vacuum at 0.0 iwc manometer reading used for table.
10. New gauge range too high to collect measurable reading.
11. Vacuum reading taken using digital manometer during this round of monitoring.
12. Data point is average of readings observed which fluctuated between -4.0 and -10 iwc.

Standard Conditions Calculation:

$$scfm = flow\ rate \times Area \times (Ts/Tm) \times (Pm/Ps)$$

flow rate in feet per minute
Area in square feet
Ts - Standard Temperature in Rankine
Tm - Measured Temperature in Rankine
Pm - Measured Pressure in pounds per square inch
Ps - Standard Pressure in pounds per square inch

Table 1. Annual Summary of General System Operating Parameters, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Date	Extraction Well DW-8S Parameters					Extraction Well DW-9S Parameters					Extraction Well DW-2S Parameters				
	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08(1)	135	-9.1	55.0	0.0	-3.0	72	-10.0	57.3	0.0	-4.5	45	-5.1	61.1	0.0	-2.5
02/19/08(1)	140	-12.0	NM	0.0	-3.5	72	-10.4	NM	0.0	-4.5	65	-10	NM	0.0	-3.6
02/25/08(1)	138	-14.90	NM	0.3	-3.5	72	-12.3	NM	0.4	-4.7	67	-12.2	NM	0.4	-4.0
03/03/08(1)	140	-18.2	NM	0.9	-3.7	76	-13.4	NM	0.1	-5.0	67	-13.85	NM	0.0	-4.5
03/17/08(1)	140	-18	NM	0.2	-4.0	76	-12.0	NM	0.1	-5.5	65	-15.2	NM	0.0	-4.5
04/16/08	35.32	-2.13	55.4	0.2	NM	28.89	-1.47	56.1	0.2	NM	34.18	-2.2	56.8	0.1	NM
05/19/08	65.68	-9.0	59.1	2.2	-3.5	64.77	-6.8	59.0	0.8	-4.2	33.64	-3.5	61.7	0.8	-1.7
06/02/08	72.85	-9.2	62.0	0.0	-3.9	68.01	-6.8	62.4	0.0	-4.5	34.15	-4.1	67.6	0.0	-1.8
07/07/08	102.21	-9	70.5	2.5	-4.1	87.48	-7.0	70.1	0.7	-4.5	41.33	-3.7	71.7	2.0	-1.8
08/06/08(5,8)	94.43	-9.0	80.1	NM	-2.7	68.18	-7.1	80.9	NM	-2.5	30.27	-3.1	81.9	NM	-1.9
09/18/08	100.42	-9.0	70.7	NM	-2.3	75.43	-7.0	70.7	NM	-2.5	34.54	-3.5	70.7	NM	-1.5
10/27/08	92.13	-10.5	62.6	NM	-0.1	79.59	-8.0	62.6	NM	-2.5	32.94	-4.1	62.2	NM	-2.4
11/25/08	81.50	-15.5	55.4	NM	-2.8	85.93	-11.5	55.5	NM	-3.15	41.96	-7	55.4	NM	-2.13
12/18/08	70.52	-14.5	52.3	NM	-2.1	71.12	-11	52.5	NM	-2.9	28.13	-10	52.5	NM	-1.3

Date	Extraction Well DW-2D Parameters					Extraction Well DW-10S Parameters					Extraction Well DW-11S Parameters				
	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)	Flow Rate at Manifold (scfm)	Vacuum at Manifold (iwc)	Temperature at Manifold (°F)	PID Measured Concentration (ppmv)	Wellhead Vacuum (iwc)
02/18/08(1)	80	-11.9	55.2	0.0	-7.0	75	-13.5	57.5	0.0	-5.0	80	-1.5	55.2	0.0	-13.0
02/19/08(1)	82	-12.7	NM	0.0	-8.0	75	-13.7	NM	0.0	-5.2	70	-16.04	NM	0.0	-10
02/25/08(1)	40	-6.2	NM	0.0	-5.7	75	-16.0	NM	0.4	-5.5	77	-19.5	NM	0.3	-9.0
03/03/08(1)	40	-5.1	NM	0.0	-4.9	78	-17.16	NM	0.2	-5.5	72	-21	NM	0.0	-9.8
03/17/08(1)	50	-6	NM	0.0	-5.0	77	-17.6	NM	0.1	-5.5	77	-20	NM	0.0	-9.0
04/16/08	19.24	-0.8	58.6	0.0	NM	24.42	-1.64	57.3	0.0	NM	32.38	-3.14	55.2	0.4	NM
05/19/08	46.61	-4.3	59.3	1.2	-4.0	48.22	-7.2	59.0	0.7	-3.5	42.94	-6.0	59.9	1.1	-3.7
06/02/08	50.56	-4.4	66.3	0.0	-4.1	52.84	-9.0	65.8	0.0	-3.8	46.34	-6.0	66.3	0.0	-3.7
07/07/08	56.29	-4.4	71.0	2.1	-4.0	68.91	-7.9	70.5	2.1	-2.5	56.39	-6.2	71.2	1.9	-3.8
08/06/08(5,8)	50.43	-4.5	83.9	NM	-3.0	61.75	-7.8	80.8	NM	-3.5	47.67	-6.4	82.2	NM	-3.5
09/18/08	50.31	-4.5	70.1	NM	-3.0	56.60	-7.5	70.3	NM	-3.5	50.04	-6.5	70.3	NM	-3.5
10/27/08	51.69	-4.5	62.4	NM	-2.9	54.19	-10	62.0	NM	-3.5	43.20	-8.1	62.2	NM	-2.5
11/25/08	8.66	-0.5	55.5	NM	-0.5	55.91	-14	54.5	NM	-4.1	45.90	-11.0	54.3	NM	-3.49
12/18/08	60.09	-5.25	51.6	NM	-2.9	43.00	-14	51.8	NM	-2.4	35.52	NM	51.4	NM	-2.4

Notes and Abbreviations:

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ft bmp - Feet below measuring point
iwc - Inches of water column
NM -Not measured
scfm - Standard cubic feet per minute
ppmv - Parts per million by volume
VMWC - Vapor monitoring well cluster

1. Flow rate at manifold on associated dates quantified using venturi flow meter and associated flow chart. Remaining flow rates measured with a hotwire anemometer and calculated to standard conditions using the formula below.
2. Access point covered by insulation no measurement taken during this round.
3. Blowers BL-200 and BL-400 were taken off-line on April 10th during system rebalancing.
4. Field recording error suspected.
5. Temperature readings are erroneous due to field measurement error. July 7, 2008 temperature readings used for conversion of flow to scfm.
6. Data point is average of readings observed which fluctuated between -0.9 and -3.0 iwc.
7. Original parameter not collected on 8/6/08 or was erroneous, data point reported is second reading taken on 08/07/08.
8. Wellhead vacuum gauges replaced during reporting period with lower range/higher accuracy gauges.
9. Gauge vacuum at 0.0 iwc manometer reading used for table.
10. New gauge range too high to collect measurable reading.
11. Vacuum reading taken using digital manometer during this round of monitoring.
12. Data point is average of readings observed which fluctuated between -4.0 and -10 iwc.

Standard Conditions Calculation:

$$scfm = flow\ rate*Area*(Ts/Tm)*(Pm/Ps)$$

flow rate in feet per minute
Area in square feet
Ts - Standard Temperature in Rankine
Tm - Measured Temperature in Rankine
Pm - Measured Pressure in pounds per square inch
Ps - Standard Pressure in pounds per square inch

Table 1. Annual Summary of General System Operating Parameters, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

	Knock Out Tank Parameters						Blower Parameters[3] BL-200				Blower Parameters[3] BL-300				Blower Parameters[3] BL-400				Combined Blower Parameters VSP-601						Stack Parameters VSP-602		Water levels in Wells				
	Vacuum			Totalizer																										
Date	Influent KO-200	Influent KO-300	Influent KO-400	Effluent KO-200	Effluent KO-300	Effluent KO-400	Influent Vacuum	Effluent Pressure	Effluent Flow Rate	Effluent PID	Influent Vacuum	Effluent Pressure	Effluent Flow Rate	Effluent PID	Influent Vacuum	Effluent Pressure	Effluent Flow Rate	Effluent PID	Total Effluent Flow Rate	Total Influent PID	Heat Exchanger Influent Temp.	Total Effluent Pressure	VPGAC Influent Temperature	VPGAC Effluent PID	Discharge Temperature	Effluent Relative Humidity	VMWC-1D	VMWC-5D	B24MW-3	VMWC-1C	VMWC-5B
	(iwc)	(iwc)	(iwc)	(Gallons)	(Gallons)	(Gallons)	(iwc)	(iwc)	(scfm)	(ppmv)	(iwc)	(iwc)	(scfm)	(ppmv)	(iwc)	(iwc)	(scfm)	(ppmv)	(scfm)	(ppmv)	(°F)	(iwc)	(°F)	(ppmv)	(°F)	(%)	(ft bmp)	(ft bmp)	(ft bmp)	(ft bmp)	(ft bmp)
02/18/08[1]	-17.9	-37.9	-34.8	33.66	9,996,124	35.99	-19.5	6.2	499.59	6.4	-40	12.0	594.88	0.0	-38	11.5	643.39	0.0	1963.69	0.9	100	9.6	93	0.0	NM	NM	52.13	Dry	53.75	Dry	Dry
02/19/08[1]	-19.5	-39.5	-36.0	33.66	9,996,124	35.99	-20.5	9.0	432.20	2.7	-40.6	12.0	841.92	1.6	-38.5	10.0	604.74	1.3	1673.81	NM	95	9.8	84	NM	NM	NM	52.17	Dry	53.77	Dry	Dry
02/25/08[1]	-27.4	-42.0	-39.8	57.34	9,996,124	35.99	-28.3	8.2	433.60	NM	-42.9	10.4	821.99	NM	-42.1	10.2	653.35	NM	1678.65	2.4	94	9.0	94	0.0	NM	NM	52.19	49.12	53.89	38.20	Dry
03/03/08[1]	-26.5	-44.0	-42.0	128.57	9,996,124	35.99	-28.5	7.6	391.71	NM	-45.2	10.1	752.16	NM	-43.9	10.0	685.41	NM	1792.84	0.5	104	8.6	94	0.0	NM	NM	Dry	Dry	53.90	Dry	Dry
03/17/08[1]	-33	-43	-41	132.70	9,996,272.5[4]	35.99	-34.3	7.6	411.73	NM	-45.4	10.1	717.83	NM	-43.8	10.0	805.36	NM	1773.50	0.0	102.5	8.0	96	0.0	NM	NM	Dry	Dry	53.62	Dry	Dry
04/16/08	0	-32	0	132.67	9,996,202.72	35.94	0	0	0	NM	-35	1	641	1.0	0	0	0	NM	NM	1.0	90	0.9	82	0.7	NM	NM	51.55	48.47	53.25	Dry	Dry
05/19/08	0	-18	0	132.67	9,996,202.72	35.94	0	0	NM	NM	-19.5	1.5	666	3.1	0	0	NM	NM	NM[2]	4.6	85	1.4	74	1.7	NM	NM	51.53	48.50	53.20	Dry	Dry
06/02/08	0	-15.5	0	132.67	9,996,202.72	35.94	0	0	NM	NM	-19.5	1.2	746	0.0	0	0	NM	NM	NM[2]	0.0	85	1.6	85	0.0	NM	NM	51.71	50.55	53.33	Dry	Dry
07/07/08	0	-17	0	132.67	9,996,202.72	35.94	0	0	NM	NM	-19.8	1.5	829	0.9	0	0	NM	NM	NM[2]	0.7	85	1.5	90	0.0	NM	NM	52.25	Dry	53.9	Dry	Dry
08/06/08	0	-18	0	132.67	9,996,202.72	35.94	NM	NM	NM	NM	-20.0	1.5	640	NM	NM	NM	NM	NM	NM[2]	0.0	98	1.6	95	0.0	NM	NM	52.62[7]	Dry[7]	54.2	Dry	Dry
09/18/08	0	-18	0	132.67	9,996,202.72	35.94	0	0	NM	NM	-20	1.5	633	NM	0	0	NM	NM	583.44	0.4	95	1.6	91	0.1	NM	NM	52.78	Dry	54.36	Dry	Dry
10/27/08	0	-18	0	132.67	9,996,202.71	35.94	0	0	NM	NM	-20.1	1.5	552	NM	0	0	NM	NM	523.21	0.2	85	1.6	85	0.1	NM	NM	52.95	Dry	54.54	Dry	Dry
11/25/08	0	-23	0	132.67	9,996,202.71	35.94	NM	NM	NM	NM	-24.0	1	NM	NM	NM	NM	NM	NM	487.30	1.4	95	1.3	70	NM	NM	NM	53.03	Dry	54.70	Dry	Dry
12/18/08	0	-20	0	132.67	9,996,202.72	35.94	NM	NM	NM	NM	-23.5	1.2	NM	NM	NM	NM	NM	NM	539.73	0.0	80	1.4	74	0.0	NM	NM	NM	NM	NM	NM	NM

Notes and Abbreviations:

°F - Degrees Fahrenheit
DW- Depressurization well
ft bmp - Feet below measuring point
iwc - Inches of water column
NM -Not measured
scfm - Standard cubic feet per minute
ppmv - Parts per million by volume
VMWC - Vapor monitoring well cluster

1. Flow rate at manifold on associated dates quantified using venturi flow meter and associated flow chart. Remaining flow rates measured with a hotwire anemometer and calculated to standard conditions using the formula below.
2. Access point covered by insulation no measurement taken during this round.
3. Blowers BL-200 and BL-400 were taken off-line on April 10th during system rebalancing.
4. Field recording error suspected.
5. Temperature readings are erroneous due to field measurement error. July 7, 2008 temperature readings used for conversion of flow to scfm.
6. Data point is average of readings observed which fluctuated between -0.9 and -3.0 iwc.
7. Original parameter not collected on 8/6/08 or was erroneous, data point reported is second reading taken on 08/07/08.
8. Wellhead vacuum gauges replaced during reporting period with lower range/higher accuracy gauges.
9. Gauge vacuum at 0.0 iwc manometer reading used for table.
10. New gauge range too high to collect measurable reading.
11. Vacuum reading taken using digital manometer during this round of monitoring.
12. Data point is average of readings observed which fluctuated between -4.0 and -10 iwc.

Standard Conditions Calculation:

$$scfm = \text{flow rate} * \text{Area} * (Ts/Tm) * (Pm/Ps)$$

flow rate in feet per minute
Area in square feet
Ts - Standard Temperature in Rankine
Tm - Measured Temperature in Rankine
Pm - Measured Pressure in pounds per square inch
Ps - Standard Pressure in pounds per square inch

Table 2. Annual Summary of Induced Vacuum Readings, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[1]

Well ID:	DW-7S			DW-7D	DW-3S				DW-3D			DW-5S		DW-5D	DW-1S									
Date	VMWC-14A [4]	VMWC-14B [4]	VMWC-14D [4]	VMWC-9A	VMWC-9B	VMWC-10B	VMWC-11B [4]	VMWC-10D	VMWC-11D	VMWC-12D [4]	VMWC-15A [4]	VMWC-15B [4]	VMWC-15D [4]	VMWC-1A	VMWC-2A	VMWC-4A	VMWC-3A [4]	VMWC-1B	VMWC-4B	VMWC-3B [4]	VMWC-1C	VMWC-2C	VMWC-4C	VMWC-3C [4]
02/18/08	-0.05	-0.26	-0.31	-0.51	-0.67	-0.50	-0.41	-0.57	-0.43	-0.34	-0.52	-0.41	-0.35	-0.12	-0.10	-0.07	-0.07	-0.15	-0.08	-0.08	-0.11	-0.11	-0.09	-0.08
02/19/08	-0.09	-0.27	-0.30	-0.42	-0.53	-0.40	-0.33	-0.48	-0.40	-0.31	-0.30	-0.30	-0.35	-0.74	-0.61	-0.50	-0.42	-0.93	-0.58	-0.42	-0.78	-0.66	-0.61	-0.46
02/25/08	-0.09	-0.26	-0.31	-0.39	-0.49	-0.39	-0.34	-0.44	-0.36	-0.31	-0.23	-0.23	-0.27	-0.70	-0.58	-0.44	-0.40	-0.88	-0.54	-0.42	-0.74	-0.62	-0.55	-0.44
03/03/08	-0.11	-0.28	-0.31	-0.38	-0.44	-0.37	-0.31	-0.41	-0.33	-0.27	-0.19	-0.21	-0.25	-0.62	-0.48	-0.40	-0.32	-0.78	-0.46	-0.38	-0.66	-0.54	-0.49	-0.39
03/17/08	-0.11	-0.28	-0.31	-0.39	-0.50	-0.36	-0.29	-0.39	-0.36	-0.54	-0.25	-0.25	-0.28	-0.70	-0.60	-0.44	-0.38	-0.89	-0.50	-0.40	-0.68	-0.60	-0.52	-0.43
04/16/08	-0.11	-0.16	-0.18	-0.15	-0.17	-0.14	-0.13	-0.14	-0.13	-0.11	-0.09	-0.09	-0.08	-0.20	-0.16	-0.16	-0.11	-0.24	-0.16	-0.11	-0.19	-0.16	-0.16	-0.11
05/19/08	-0.099	-0.143	-0.163	-0.170	-0.199	-1.490	-0.154	-0.083	-0.219	-0.143	-0.159	-0.125	-0.159	-0.425	-0.369	-1.377	-0.221	-0.410	-0.299	-0.283	-0.423	-0.372	-0.333	-0.218
06/02/08	-0.095	-0.146	-0.148	-0.165	-0.171	-0.165	-0.165	-0.142	-0.135	-0.127	-0.150	-0.140	-0.133	-0.437	-0.339	-0.492	-0.200	-0.505	-0.299	-0.213	-0.408	-0.335	-0.313	-0.212
07/07/08	-0.097	-0.146	-0.149	-0.123	-0.135	-0.129	-0.122	-0.131	-0.129	-0.125	-0.127	-0.126	-0.133	-0.303	-0.258	-0.193	-0.152	-0.409	-0.227	-0.160	-0.331	-0.263	-0.219	-0.164
08/06/08	-0.10	-0.15	-0.15	-0.10	-0.16	-0.11	-0.146[5]	-0.11	-0.11	-0.11	-0.13	-0.13	-0.11	-0.34	-0.241[5]	-0.26	-1.14	-0.39	-0.30	-0.16	-0.32	-0.290[5]	-0.29	-0.16
09/18/08	-0.121	-0.186	-0.198	NM	NM	NM	-0.184	NM	NM	-0.255	-0.140	-0.144	-0.138	NM	NM	NM	-0.193	NM	NM	-0.204	NM	NM	NM	-0.207
10/27/08	-0.097	-0.139	-0.144	NM	NM	NM	-0.135	NM	NM	-0.143	-0.129	-0.127	-0.110	NM	NM	NM	-0.180	NM	NM	-0.180	NM	NM	NM	-0.182
11/25/08	-0.125	-0.194	-0.201	NM	NM	NM	-0.156	NM	NM	-0.162	-0.165	-0.155	-0.145	NM	NM	NM	-0.106	NM	NM	-0.109	NM	NM	NM	-0.109
12/18/08	-0.102	-0.171	-0.203	NM	NM	NM	-0.151	NM	NM	-0.165	-0.200	-0.199	-0.199	NM	NM	NM	-0.110	NM	NM	-0.116	NM	NM	NM	-0.089
Time Weighted[7] Rolling Average:	-0.11	-0.18	-0.19	NA	NA	NA	-0.180	NA	NA	-0.20	-0.16	-0.15	-0.15	NA	NA	NA	-0.34	NA	NA	-0.22	NA	NA	NA	-0.22

Gross Average Compliance Points

12/18/08 -0.15

Notes and Abbreviations:

DW Depressurization Well
NA Not Applicable
NM Not Measured
VMWC Vapor Monitoring Well Cluster

1. All induced vacuum measurements units in inches of water column (iwc).
2. Data point appears to be erroneous based on vacuum readings at further vapor point greater than that recorded at the closer location.
3. Data point is average of readings taken which fluctuated between -0.22 and -0.29 iwc.
4. Compliance vapor monitoring point.
5. Original parameter collected on 8/6/08 was erroneous, data point reported is second reading taken on 08/07/08.
6. Compliance goal is -0.1 iwc induced vacuum at all compliance monitoring points.
7. Non-compliance monitoring point measurements not taken as recommended in the February to June 2008 Operations Maintenance and Monitoring Report and Startup Summary.

Table 2. Annual Summary of Induced Vacuum Readings, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York. (1)

Well ID:	DW-1D					DW-4D	DW-8S	DW-2S								DW-2D							DW-11S
Date	VMWC-1D	VMWC-2D	VMWC-4D	VMWC-3D (4)	VMWC-16D (4)	VMWC-16A (4)	VMWC-16B (4)	VMWC-5A	VMWC-6A	VMWC-8A	VMWC-7A (4)	VMWC-5B	VMWC-6B	VMWC-8B	VMWC-7B (4)	VMWC-5D	VMWC-6D	VMWC-8D	VMWC-7D	VMWC-13D (4)	VMWC-17D (4)	VMWC-18A (4)	VMWC-16B (4)
02/18/08	-1.16	-0.99	-0.16	-0.90	-0.51	-0.04	-0.10	-0.07	-0.04	-0.40	-0.08	-0.10	-0.05	-0.02	-0.03	-1.91	-1.47	-0.03(2)	-1.03	-0.17	-0.39	-0.05	-0.07
02/19/08	-1.31	-1.08	-0.86	-0.96	-0.54	-0.26	-0.26	-0.62	-0.37	-0.29	-0.22	-0.74	-1.73	-0.33	-0.23	-2.19	-0.37(2)	-1.88	-1.4	-0.44	-0.53	-0.25	-0.26(3)
02/25/08	-1.56	-1.23	-0.97	-1.07	-0.39	-0.29	-0.30	-0.70	-0.42	-0.31	-0.28	-0.82	-0.46	-0.35	-0.29	-1.21	-1.09	-0.88	-0.89	-0.39	-0.22	-0.24	-0.3
03/03/08	-1.56	-1.20	-0.90	-0.98	-0.27	-0.26	-0.27	-0.68	-0.40	-0.31	-0.27	-0.83	-0.44	-0.35	-0.30	-0.90	-0.72	-0.65	-0.53	-0.24	-0.16	-0.24	-0.27
03/17/08	-1.72	-1.51	-0.96	-1.15	-0.43	-0.31	-0.35	-0.69	-0.41	-0.33	-0.25	-0.78	-0.42	-0.36	-0.28	-1.15	-0.92	-0.82	-0.65	NM	-0.25	-0.29	-0.34
04/16/08	-0.18	-0.15	-0.18	-0.13	-0.09	-0.08	-0.08	-0.26	-0.14	NM	-0.09	-0.22	-0.15	NM	-0.09	-0.23	-0.21	NM	-0.17	NM	-0.08	-0.08	-0.09
05/19/08	-0.424	-0.391	-0.309	-0.310	-0.147	-0.162	-0.170	-0.328	-0.209	-0.180	-0.157	-0.327	-0.213	-0.156	-0.164	-1.097	-0.879	-0.763	-0.694	-0.223	-0.237	-0.139	-0.163
06/02/08	-0.345	-0.283	-0.253	-0.227	-0.195	-0.159	-0.168	-0.310	-0.190	-0.148	-0.142	-0.311	-0.199	-0.169	-0.141	-1.047	-0.838	-0.730	-0.743	-0.180	NM	-0.129	-0.151
07/07/08	-0.366	-0.269	-0.238	-0.311	-0.170	-0.160	-0.171	-0.310	-0.185	-0.156	-0.136	-0.344	-0.201	-0.170	-0.148	-1.047	-0.846	-0.757	-0.501	-0.189	NM	-0.132	-0.160
08/06/08	-0.32	-0.27	-0.30	-0.22	-0.14	-0.14	-0.16	-0.24	-0.19	-0.19	-0.16	-0.34	-0.20	-0.19	-0.15	-0.95	-0.77	-0.75	-0.55	-0.19	-0.17	-0.13	-0.16
09/18/08	NM	NM	NM	-0.342	-0.259	-0.165	-0.181	NM	NM	NM	-0.217	NM	NM	NM	-0.168	NM	NM	NM	NM	-0.388	-0.217	-0.134	-0.161
10/27/08	NM	NM	NM	-0.240	-0.136	-0.148	-0.163	NM	NM	NM	-0.136	NM	NM	NM	-0.144	NM	NM	NM	NM	-0.227	-0.675	-0.127	-0.130
11/25/08	NM	NM	NM	-0.122	-0.120	-0.177	-0.192	NM	NM	NM	-0.187	NM	NM	NM	-0.193	NM	NM	NM	NM	-0.100	-0.166	-0.146	-0.176
12/18/08	NM	NM	NM	-0.111	-0.063	-0.153	-0.174	NM	NM	NM	-0.154	NM	NM	NM	-0.162	NM	NM	NM	NM	-0.136	-0.219	-0.126	-0.162
Time Weighted Rolling Average:	NA	NA	NA	-0.40	-0.21	-0.17	-0.19	NA	NA	NA	-0.17	NA	NA	NA	-0.17	NA	NA	NA	NA	-0.235	-0.225	-0.15	-0.18

Notes and Abbreviations:

DW	Depressurization Well
NA	Not Applicable
NM	Not Measured
VMWC	Vapor Monitoring Well Cluster

1. All induced vacuum measurements units in inches of water column (iwc).
2. Data point appears to be erroneous based on vacuum readings at further vapor point greater than that recorded at the closer location.
3. Data point is average of readings taken which fluctuated between -0.22 and -0.29 iwc.
4. Compliance vapor monitoring point.
5. Original parameter collected on 8/6/08 was erroneous, data point reported is second reading taken on 08/07/08.
6. Compliance goal is -0.1 iwc induced vacuum at all compliance monitoring points.
7. Non-compliance monitoring point measurements not taken as recommended in the February to June 2008 Operations Maintenance and Monitoring Report and Startup Summary.

Table 3. Summary of System Startup Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York[4].

Compound[2] (units in ug/m3)	Location ID: / Sample Date:	Well-7S 2/18/2008	Well-7D 2/18/2008	Well-3S[3] 2/25/2008
	CAS No.			
1,1,1-Trichloroethane	71-55-6	< 120	< 530	**16**
1,1-Dichloroethane	75-34-3	< 120	< 530	**4.6**
1,1-Dichloroethene	75-35-4	< 120	< 530	< 3.2
2-Butanone	78-93-3	< 120	< 530	**10**
Acetone	67-64-1	< 1200	< 5300	< 32
Benzene	71-43-2	< 120	< 530	< 3.2
Carbon Tetrachloride	56-23-5	< 120	< 530	< 3.2
CFC-11	75-69-4	< 120	< 530	< 3.2
Chlorobenzene	108-90-7	< 120	< 530	< 3.2
Chloroform	67-66-3	< 120	< 530	**6.7**
Chloromethane	74-87-3	< 120	< 530	< 3.2
cis-1,2-Dichloroethene	156-59-2	**18000**	**48000**	**320**
Freon 113	76-13-1	< 120	< 530	< 3.2
Freon 12	75-71-8	< 120	< 530	< 3.2
Tetrachloroethene	127-18-4	**1200**	**1700**	**33**
Toluene	108-88-3	< 120	< 530	**1600**
trans-1,2-Dichloroethene	156-60-5	**310**	**680**	**8.4**
Trichloroethylene	79-01-6	**25000**	**87000**	**1500**
Xylene-o	95-47-6	< 120	< 530	**250**
Xylenes - m,p	179601-23-1	< 250	< 1100	**95**
TVOC[1]		**44,510**	**137,380**	**3,844**

Notes and Abbreviations:

Bold - Compound detected above method detection limit
CAS No. - Chemical abstracts service list number
TVOC - Total volatile organic compounds
ug/m^3 - Micrograms per cubic meter

1. Total Volatile organic compounds determined by summing the individual detections and rounding to the nearest whole number.
2. Table summarizes detected compounds only.
3. Depressurization well 3S analytical sample was collected on 2/25 instead of 2/18 due to a sampling error.
4. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley,CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS,2008) . Data presented in this table corresponds to the period February - June 2008.

Table 3. Summary of System Startup Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York[4].

Compound[2] (units in ug/m3)	Location ID: / Sample Date:	Well-3D 2/18/2008	Well-5S 2/18/2008	Well-5D 2/18/2008
	CAS No.			
1,1,1-Trichloroethane	71-55-6	**360**	**23**	**150**
1,1-Dichloroethane	75-34-3	**160**	**2.3**	**16**
1,1-Dichloroethene	75-35-4	< 66	< 1.3	< 6.7
2-Butanone	78-93-3	< 66	**28**	**45**
Acetone	67-64-1	< 660	**68**	< 67
Benzene	71-43-2	**68**	**140**	**33**
Carbon Tetrachloride	56-23-5	< 66	< 1.3	< 6.7
CFC-11	75-69-4	< 66	**1.7**	< 6.7
Chlorobenzene	108-90-7	< 66	< 1.3	< 6.7
Chloroform	67-66-3	< 66	**16**	**66**
Chloromethane	74-87-3	< 66	**4.9**	< 6.7
cis-1,2-Dichloroethene	156-59-2	**16000**	< 1.3	**8.2**
Freon 113	76-13-1	< 66	**1.6**	< 6.7
Freon 12	75-71-8	< 66	**2.5**	< 6.7
Tetrachloroethene	127-18-4	**550**	**12**	**58**
Toluene	108-88-3	< 66	**1.3**	< 6.7
trans-1,2-Dichloroethene	156-60-5	**310**	< 1.3	< 6.7
Trichloroethylene	79-01-6	**57000**	**170**	**1300**
Xylene-o	95-47-6	< 66	< 1.3	< 6.7
Xylenes - m,p	179601-23-1	< 130	< 2.6	< 13
TVOC[1]		**74,448**	**471**	**1,676**

Notes and Abbreviations:

Bold - Compound detected above method detection limit
CAS No. - Chemical abstracts service list number
TVOC - Total volatile organic compounds
ug/m^3 - Micrograms per cubic meter

1. Total Volatile organic compounds determined by summing the individual detections and rounding to the nearest whole number.
2. Table summarizes detected compounds only.
3. Depressurization well 3S analytical sample was collected on 2/25 instead of 2/18 due to a sampling error.
4. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley,CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS,2008) . Data presented in this table corresponds to the period February - June 2008.

Table 3. Summary of System Startup Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York[4].

Compound[2] (units in ug/m3)	Location ID: / Sample Date:	Well-6S 2/18/2008	Well-6D 2/18/2008	Well-1S 2/18/2008
	CAS No.			
1,1,1-Trichloroethane	71-55-6	**37**	**100**	**25**
1,1-Dichloroethane	75-34-3	**21**	**72**	< 2.5
1,1-Dichloroethene	75-35-4	< 2.3	**25**	< 2.5
2-Butanone	78-93-3	**29**	**16**	**22**
Acetone	67-64-1	29	< 81	**87**
Benzene	71-43-2	**43**	**23**	**69**
Carbon Tetrachloride	56-23-5	< 2.3	< 8.1	**13**
CFC-11	75-69-4	< 2.3	< 8.1	< 2.5
Chlorobenzene	108-90-7	< 2.3	< 8.1	< 2.5
Chloroform	67-66-3	**9.3**	**30**	**11**
Chloromethane	74-87-3	< 2.3	< 8.1	**3.5**
cis-1,2-Dichloroethene	156-59-2	**3.8**	< 8.1	**6.7**
Freon 113	76-13-1	**3.4**	**42**	**3.3**
Freon 12	75-71-8	**5.8**	**12**	**2.8**
Tetrachloroethene	127-18-4	**23**	**61**	**25**
Toluene	108-88-3	< 2.3	**13**	< 2.5
trans-1,2-Dichloroethene	156-60-5	< 2.3	< 8.1	< 2.5
Trichloroethylene	79-01-6	**470**	**1600**	**510**
Xylene-o	95-47-6	< 2.3	< 8.1	< 2.5
Xylenes - m,p	179601-23-1	< 4.7	< 16	< 5.1
TVOC[1]		**674**	**1,994**	**778**

Notes and Abbreviations:

Bold - Compound detected above method detection limit
CAS No. - Chemical abstracts service list number
TVOC - Total volatile organic compounds
ug/m^3 - Micrograms per cubic meter

1. Total Volatile organic compounds determined by summing the individual detections and rounding to the nearest whole number.
2. Table summarizes detected compounds only.
3. Depressurization well 3S analytical sample was collected on 2/25 instead of 2/18 due to a sampling error.
4. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley,CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS,2008) . Data presented in this table corresponds to the period February - June 2008.

Table 3. Summary of System Startup Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York[4].

Compound[2] (units in ug/m3)	Location ID: / Sample Date:	Well-1D 2/18/2008	Well-4S 2/18/2008	Well-4D 2/18/2008
	CAS No.			
1,1,1-Trichloroethane	71-55-6	**69**	**99**	**170**
1,1-Dichloroethane	75-34-3	< 8.1	**22**	**29**
1,1-Dichloroethene	75-35-4	**8.6**	< 4.2	< 6.4
2-Butanone	78-93-3	**31**	**27**	**58**
Acetone	67-64-1	< 81	**130**	< 64
Benzene	71-43-2	**19**	**440**	**62**
Carbon Tetrachloride	56-23-5	**34**	< 4.2	< 6.4
CFC-11	75-69-4	< 8.1	< 4.2	< 6.4
Chlorobenzene	108-90-7	< 8.1	< 4.2	< 6.4
Chloroform	67-66-3	**28**	**6.5**	**9.4**
Chloromethane	74-87-3	< 8.1	< 4.2	< 6.4
cis-1,2-Dichloroethene	156-59-2	**29**	**14**	**17**
Freon 113	76-13-1	**20**	< 4.2	< 6.4
Freon 12	75-71-8	< 8.1	< 4.2	< 6.4
Tetrachloroethene	127-18-4	**68**	**42**	**79**
Toluene	108-88-3	< 8.1	< 4.2	< 6.4
trans-1,2-Dichloroethene	156-60-5	< 8.1	**8.8**	**7.6**
Trichloroethylene	79-01-6	**1600**	**880**	**1400**
Xylene-o	95-47-6	< 8.1	< 4.2	< 6.4
Xylenes - m,p	179601-23-1	< 16	< 8.4	< 13
TVOC[1]		**1,907**	**1,669**	**1,832**

Notes and Abbreviations:

Bold - Compound detected above method detection limit
CAS No. - Chemical abstracts service list number
TVOC - Total volatile organic compounds
ug/m^3 - Micrograms per cubic meter

1. Total Volatile organic compounds determined by summing the individual detections and rounding to the nearest whole number.
2. Table summarizes detected compounds only.
3. Depressurization well 3S analytical sample was collected on 2/25 instead of 2/18 due to a sampling error.
4. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley,CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS,2008) . Data presented in this table corresponds to the period February - June 2008.

Table 3. Summary of System Startup Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York[4].

Compound[2] (units in ug/m3)	Location ID: / Sample Date:	Well-8S 2/18/2008	Well-9S 2/18/2008	Well-2S 2/18/2008
	CAS No.			
1,1,1-Trichloroethane	71-55-6	**84**	**3.6**	< 4.6
1,1-Dichloroethane	75-34-3	**9.4**	< 1.7	< 4.6
1,1-Dichloroethene	75-35-4	< 3.3	< 1.7	< 4.6
2-Butanone	78-93-3	**33**	**32**	**45**
Acetone	67-64-1	**150**	**82**	**140**
Benzene	71-43-2	**470**	**210**	**580**
Carbon Tetrachloride	56-23-5	< 3.3	< 1.7	< 4.6
CFC-11	75-69-4	< 3.3	< 1.7	< 4.6
Chlorobenzene	108-90-7	< 3.3	**1.7**	< 4.6
Chloroform	67-66-3	< 3.3	< 1.7	< 4.6
Chloromethane	74-87-3	**4**	**3.2**	**5.5**
cis-1,2-Dichloroethene	156-59-2	**8.6**	< 1.7	**390**
Freon 113	76-13-1	< 3.3	< 1.7	< 4.6
Freon 12	75-71-8	< 3.3	**2.4**	< 4.6
Tetrachloroethene	127-18-4	**54**	**8.1**	**7.2**
Toluene	108-88-3	< 3.3	< 1.7	< 4.6
trans-1,2-Dichloroethene	156-60-5	**6.2**	< 1.7	< 4.6
Trichloroethylene	79-01-6	**370**	**6.2**	**160**
Xylene-o	95-47-6	< 3.3	< 1.7	< 4.6
Xylenes - m,p	179601-23-1	< 6.6	< 3.3	< 9.1
TVOC[1]		**1,189**	**349**	**1,328**

Notes and Abbreviations:

Bold - Compound detected above method detection limit
CAS No. - Chemical abstracts service list number
TVOC - Total volatile organic compounds
ug/m^3 - Micrograms per cubic meter

1. Total Volatile organic compounds determined by summing the individual detections and rounding to the nearest whole number.
2. Table summarizes detected compounds only.
3. Depressurization well 3S analytical sample was collected on 2/25 instead of 2/18 due to a sampling error.
4. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley,CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS,2008) . Data presented in this table corresponds to the period February - June 2008.

Table 3. Summary of System Startup Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York[4].

Compound[2] (units in ug/m3)	Location ID: / Sample Date:	Well-2D 2/18/2008	Well-10S 2/18/2008	Well-11S 2/18/2008
	CAS No.			
1,1,1-Trichloroethane	71-55-6	**93**	< 1.3	**1.2**
1,1-Dichloroethane	75-34-3	< 7.5	< 1.3	< 0.67
1,1-Dichloroethene	75-35-4	< 7.5	< 1.3	< 0.67
2-Butanone	78-93-3	**150**	**86**	**11**
Acetone	67-64-1	< 75	**66**	**43**
Benzene	71-43-2	**14**	**44**	**16**
Carbon Tetrachloride	56-23-5	< 7.5	< 1.3	< 0.67
CFC-11	75-69-4	**29**	< 1.3	**1.7**
Chlorobenzene	108-90-7	< 7.5	< 1.3	< 0.67
Chloroform	67-66-3	< 7.5	< 1.3	**1.2**
Chloromethane	74-87-3	< 7.5	< 1.3	< 0.67
cis-1,2-Dichloroethene	156-59-2	**360**	< 1.3	< 0.67
Freon 113	76-13-1	< 7.5	< 1.3	< 0.67
Freon 12	75-71-8	**37**	**2.3**	**2.7**
Tetrachloroethene	127-18-4	**24**	**10**	**25**
Toluene	108-88-3	< 7.5	**1.5**	**0.68**
trans-1,2-Dichloroethene	156-60-5	< 7.5	< 1.3	< 0.67
Trichloroethylene	79-01-6	**280**	**4**	**180**
Xylene-o	95-47-6	< 7.5	< 1.3	< 0.67
Xylenes - m,p	179601-23-1	< 15	< 2.6	< 1.3
TVOC[1]		**987**	**214**	**282**

Notes and Abbreviations:

Bold - Compound detected above method detection limit
CAS No. - Chemical abstracts service list number
TVOC - Total volatile organic compounds
ug/m^3 - Micrograms per cubic meter

1. Total Volatile organic compounds determined by summing the individual detections and rounding to the nearest whole number.
2. Table summarizes detected compounds only.
3. Depressurization well 3S analytical sample was collected on 2/25 instead of 2/18 due to a sampling error.
4. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley,CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS,2008) . Data presented in this table corresponds to the period February - June 2008.

Table 4. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3
Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Compound[3] (units in ug/m3)		Location ID:	VSP-601	VSP-602	VSP-601	VSP-602	VSP-601	VSP-602
		Sample Date:	2/18/2008	2/18/2008	2/19/2008	2/19/2008	2/25/2008	2/25/2008
	CAS No.	SGC						
1,1,1-Trichloroethane	71-55-6	68,000	**110**	< 0.62	**71**	< 0.61	**35**	< 0.63
1,1-Dichloroethane	75-34-3	NS	**43**	< 0.62	**33**	< 0.61	**45**	< 0.63
1,1-Dichloroethene	75-35-4	--	< 14	< 0.62	< 11	< 0.61	< 25	< 0.63
2-Butanone	78-93-3	13,000	**16**	< 0.62	< 11	< 0.61	< 25	< 0.63
Acetone	67-64-1	180,000	< 140	< 6.2	< 110	< 6.1	< 250	< 6.3
Benzene	71-43-2	1,300	**67**	< 0.62	**22**	< 0.61	< 25	< 0.63
Carbon Tetrachloride	56-23-5	--	**< 14**	< 0.62	**< 11**	< 0.61	< 25	< 0.63
Trichlorofluoromethane (CFC-11)	75-69-4	68,000	< 14	< 0.62	< 11	< 0.61	< 25	< 0.63
Chloroform	67-66-3	150	**34**	< 0.62	**24**	< 0.61	< 25	< 0.63
cis-1,2-Dichloroethene	156-59-2	190,000[1]	**5800**	< 0.62	**4600**	< 0.61	**2900**	< 0.63
Dichlorodifluoromethane (Freon 12)	75-71-8	NS	< 14	< 0.62	< 11	**0.71**	< 25	**5.7**
Tetrachloroethene	127-18-4	1,000	**340**	< 0.62	**200**	< 0.61	**82**	< 0.63
Toluene	108-88-3	37,000	**92**	< 0.62	**98**	< 0.61	**34**	< 0.63
trans-1,2-Dichloroethene	156-60-5	NS	**120**	< 0.62	**71**	< 0.61	< 25	< 0.63
Trichloroethylene	79-01-6	14,000	**14000**	< 0.62	**9400**	< 0.61	**5100**	< 0.63
Vinyl Chloride	75-01-4	180,000	< 14	< 0.62	< 11	< 0.61	< 25	**1.1**
TVOC			**20,622**	0.0	**14,519**	**0.71**	**8,196**	**6.8**

Notes and Abbreviations:

Bold Compound detected above method detection limit
CAS No. Chemical abstracts service list number
D Compound detected at a secondary dilution

NS Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
TVOC Total volatile organic compounds
ug/m^3 Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided 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 793,000 ug/m3 / 4.2 = 190,000 ug/m3.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley, CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period February - December 2008.
3. Table summarizes detected compounds only.

Table 4. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3
Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Compound[3] (units in ug/m3)		Location ID:	VSP-601	VSP-602	VSP-601	VSP-602	VSP-601	VSP-602
		Sample Date:	3/3/2008	3/3/2008	3/17/2008	3/17/2008	4/16/2008	4/16/2008
	CAS No.	SGC						
1,1,1-Trichloroethane	71-55-6	68,000	**26**	< 0.63	**35**	< 14	<25	< 15
1,1-Dichloroethane	75-34-3	NS	**47**	< 0.63	**59**	< 11	**31**	< 11
1,1-Dichloroethene	75-35-4	--	< 13	< 0.63	< 10	< 10	< 10	< 10
2-Butanone	78-93-3	13,000	< 13	< 0.63	< 16	< 16	< 16	< 16
Acetone	67-64-1	180,000	< 130	< 6.3	< 31	< 31	< 31	< 31
Benzene	71-43-2	1,300	< 13	< 0.63	< 8.4	< 8.4	< 8.4	< 8.4
Carbon Tetrachloride	56-23-5	--	< 13	< 0.63	< 3.3	< 3.3	< 3.3	< 3.3
Trichlorofluoromethane (CFC-11)	75-69-4	68,000	< 13	< 0.63	< 15	< 15	< 15	< 15
Chloroform	67-66-3	150	**27**	< 0.63	**35**	< 13	<22	< 13
cis-1,2-Dichloroethene	156-59-2	190,000[1]	**1600**	< 0.63	**1400 D**	< 10	**1100**	**78**
Dichlorodifluoromethane (Freon 12)	75-71-8	NS	**13**	**8.3**	**46**	< 26	<46	< 26
Tetrachloroethene	127-18-4	1,000	**45**	< 0.63	**39**	< 3.6	**54**	< 3.7
Toluene	108-88-3	37,000	**61**	< 0.63	**140**	< 10	**37**	< 10
trans-1,2-Dichloroethene	156-60-5	NS	< 13	< 0.63	**10**	< 10	<19	< 10
Trichloroethylene	79-01-6	14,000	**2500**	< 0.63	**1500 D**	< 2.8	**1300**	< 2.9
Vinyl Chloride	75-01-4	180,000	**200**	**40**	**980 D**	**920 D**	**120**	**710**
TVOC			**4,519**	**48.3**	**4,244**	**920**	**2,642**	**788**

Notes and Abbreviations:

Bold Compound detected above method detection limit
CAS No. Chemical abstracts service list number
D Compound detected at a secondary dilution

NS Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
TVOC Total volatile organic compounds
ug/m^3 Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided 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 793,000 ug/m3 / 4.2 = 190,000 ug/m3.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley, CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period February - December 2008.
3. Table summarizes detected compounds only.

Table 4. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Compound[3] (units in ug/m3)		Location ID:	VSP-601	VSP-602	VSP-601	VSP-602	VSP-601	VSP-602
		Sample Date:	5/19/2008	5/19/2008	6/2/2008	6/2/2008	7/7/2008	7/7/2008
	CAS No.	SGC						
1,1,1-Trichloroethane	71-55-6	68,000	**38**	< 2.7	**44**	< 2.5	**48**	< 6.5
1,1-Dichloroethane	75-34-3	NS	**25**	**5.8**	**27**	**7.6**	**28**	**11**
1,1-Dichloroethene	75-35-4	--	< 19	< 1.9	< 18	< 1.8	< 18	< 4.7
2-Butanone	78-93-3	13,000	< 28	< 2.9	**28**	< 2.7	**27**	< 7
Acetone	67-64-1	180,000	< 57	< 5.8	< 55	**8.4**	< 53	< 14
Benzene	71-43-2	1,300	**19**	< 1.6	< 15	< 1.5	**150**	< 3.8
Carbon Tetrachloride	56-23-5	--	**< 6.1**	< 0.62	< 5.8	< 0.58	< 5.6	< 1.5
Trichlorofluoromethane (CFC-11)	75-69-4	68,000	< 27	< 2.8	< 26	< 2.6	< 25	< 6.7
Chloroform	67-66-3	150	**44**	< 2.4	**55**	**3**	**88**	**8.4**
cis-1,2-Dichloroethene	156-59-2	190,000[1]	**950**	**180**	**930**	**230 D**	**1100**	**350**
Dichlorodifluoromethane (Freon 12)	75-71-8	NS	< 48	< 4.9	< 45	< 4.5	< 44	< 12
Tetrachloroethene	127-18-4	1,000	**42**	< 0.67	**48**	**2.2**	**61**	< 1.6
Toluene	108-88-3	37,000	< 18	< 1.8	< 17	< 1.7	< 17	< 4.5
trans-1,2-Dichloroethene	156-60-5	NS	< 19	< 1.9	< 18	**2.8**	< 18	< 4.7
Trichloroethylene	79-01-6	14,000	**1000**	**5.3**	**1100**	**6.5**	**1500**	**7.7**
Vinyl Chloride	75-01-4	180,000	< 12	**65**	< 12	**13**	< 11	**5.9**
TVOC			**2,118**	**256.1**	**2,232**	**273.5**	**3,002**	**383**

Notes and Abbreviations:

Bold Compound detected above method detection limit
CAS No. Chemical abstracts service list number
D Compound detected at a secondary dilution

NS Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
TVOC Total volatile organic compounds
ug/m^3 Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided 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 793,000 ug/m3 / 4.2 = 190,000 ug/m3.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley, CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period February - December 2008.
3. Table summarizes detected compounds only.

Table 4. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Compound[3] (units in ug/m3)		Location ID:	VSP-601	VSP-602	VSP-601	VSP-602	VSP-601	VSP-602
		Sample Date:	8/6/2008	8/6/2008	9/24/2008	9/24/2008	10/27/2008	10/27/2008
	CAS No.	SGC						
1,1,1-Trichloroethane	71-55-6	68,000	**47**	< 4.4	**77**	**9.7**	**61**	< 15
1,1-Dichloroethane	75-34-3	NS	**26**	**9.2**	**47**	**26**	**33**	**30**
1,1-Dichloroethene	75-35-4	--	< 22	< 3.2	< 21	**3.5**	< 14	< 11
2-Butanone	78-93-3	13,000	< 32	< 4.7	< 31	< 3.2	< 20	< 16
Acetone	67-64-1	180,000	< 65	< 9.6	< 63	< 6.3	< 41	< 32
Benzene	71-43-2	1,300	**22**	< 2.6	< 17	< 1.7	< 11	< 8.5
Carbon Tetrachloride	56-23-5	--	< 6.8	< 1	< 6.7	< 0.67	< 4.3	< 3.3
Trichlorofluoromethane (CFC-11)	75-69-4	68,000	< 31	**5.5**	< 30	**11**	< 19	< 15
Chloroform	67-66-3	150	**89**	**8.2**	**160**	**35**	**95**	**45**
cis-1,2-Dichloroethene	156-59-2	190,000[1]	**990**	**320 D**	**1500**	**620 D**	**1100**	**830**
Dichlorodifluoromethane (Freon 12)	75-71-8	NS	< 54	< 8	< 53	< 5.3	< 34	< 26
Tetrachloroethene	127-18-4	1,000	**56**	< 1.1	**64**	**0.88**	**32**	< 3.6
Toluene	108-88-3	37,000	< 20	< 3	< 20	< 2	< 13	< 10
trans-1,2-Dichloroethene	156-60-5	NS	< 22	**3.6**	< 21	**8.6**	< 14	< 11
Trichloroethylene	79-01-6	14,000	**1400**	**9.2**	**1500**	**120**	**1100**	**120**
Vinyl Chloride	75-01-4	180,000	< 14	**4.9**	< 14	**4.9**	< 8.8	< 6.8
TVOC			**2,630**	**361**	**3,348**	**829**	**2,421**	**1,025**

Notes and Abbreviations:

Bold Compound detected above method detection limit
CAS No. Chemical abstracts service list number
D Compound detected at a secondary dilution

NS Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
TVOC Total volatile organic compounds
ug/m^3 Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided 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 793,000 ug/m3 / 4.2 = 190,000 ug/m3.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley, CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period February - December 2008.
3. Table summarizes detected compounds only.

Table 4. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Compound[3] (units in ug/m3)		Location ID:	VSP-601	VSP-602	VSP-601	VSP-602
		Sample Date:	11/25/2008	11/25/2008	12/18/2008	12/18/2008
	CAS No.	SGC				
1,1,1-Trichloroethane	71-55-6	68,000	**68**	**23**	**75 J**	< 18
1,1-Dichloroethane	75-34-3	NS	**38**	**32**	**33 J**	**29**
1,1-Dichloroethene	75-35-4	--	< 20	< 13	< 12 J	< 13
2-Butanone	78-93-3	13,000	< 30	< 19	< 18 J	< 19
Acetone	67-64-1	180,000	< 60	< 38	< 36 J	< 39
Benzene	71-43-2	1,300	**43**	< 10	**63 J**	< 10
Carbon Tetrachloride	56-23-5	--	**8.4**	< 4	< 3.8 J	< 4.1
Trichlorofluoromethane (CFC-11)	75-69-4	68,000	< 29	< 18	< 17 J	< 18
Chloroform	67-66-3	150	< 25	**53**	**52 J**	**42**
cis-1,2-Dichloroethene	156-59-2	190,000[1]	**1200**	**770**	**1000 J**	**730**
Dichlorodifluoromethane (Freon 12)	75-71-8	NS	< 50	**69**	< 30 J	< 32
Tetrachloroethene	127-18-4	1,000	**31**	< 4.3	**21 J**	< 4.4
Toluene	108-88-3	37,000	< 19	< 12	**12 J**	< 12
trans-1,2-Dichloroethene	156-60-5	NS	< 20	< 13	< 12 J	< 13
Trichloroethylene	79-01-6	14,000	**960**	**310**	**710 J**	**130**
Vinyl Chloride	75-01-4	180,000	< 13	< 8.2	< 7.8 J	< 8.3
TVOC			**2,348**	**1,257**	**1,966 J**	**931**

Notes and Abbreviations:

Bold Compound detected above method detection limit
CAS No. Chemical abstracts service list number
D Compound detected at a secondary dilution
J Estimated
NS Guideline concentrations not specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
TVOC Total volatile organic compounds
ug/m^3 Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided 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 793,000 ug/m3 / 4.2 = 190,000 ug/m3.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Simi Valley, CA or Rochester, NY locations) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period February - December 2008.
3. Table summarizes detected compounds only.

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Table 5. Annual Summary of Condensate Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York. [2]

Compound[3] (units in ug/L)	Location ID: / Sample Date:	KO-200 3/17/2008	KO-300 3/17/2008	WSP-510 3/17/2008	Trip Blank 3/17/2008
	CAS No.				
1,1-Dichloroethane	75-34-3	1.4	< 1	<2.5	< 1
2-Butanone	78-93-3	**1000 D**	**1300 D**	**440 D**	< 5
Acetone	67-64-1	**17**	**40**	**44**	< 10
cis-1,2-Dichloroethene	156-59-2	**40**	**4**	**15**	< 1
Isopropylbenzene	98-82-8	< 1	< 1	**6.6**	< 1
Toluene	108-88-3	**2.2**	< 1	<2.5	< 1
trans-1,2-Dichloroethene	156-60-5	**1.1**	< 1	<2.5	< 1
Trichloroethylene	79-01-6	**22**	**3**	**9**	< 1
Vinyl Chloride	75-01-4	**4.8**	**1.7**	<2.5	< 1
TVOC [1]		**1089**	**1349**	**515**	0

Notes and Abbreviations:

Bold	Compound detected above method detection limit
CAS No.	Chemical abstracts service list number
D	Compound detected at a secondary dilution
TVOC	Total volatile organic compounds
ug/L	Micrograms per liter
NA	Not applicable

1. Total volatile organic compounds determined by summing individual detections and rounding to the nearest whole number.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Rochester, NY) for VOC analyses using Method 8260 in accordance with the project Sampling and Analysis Plan (ARCADIS 2008).
3. Table summarizes detected compounds only.

Table 6. Air Emissions Model Output Annual Summary, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound [1]	AGC [2]	Percent of MASC Per Event [3]							
	($\mu g/m^3$)	02/18/08	02/19/08	02/25/08	03/03/08	03/17/08	04/16/08	05/19/08	06/02/08
Vinyl chloride	0.11	0.00%	0.00%	0.04%	1.60%	36.84%	20.63%	1.91%	0.41%
1,1-Dichloroethane	0.63	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.04%
Trichloroethylene	0.5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.05%
Tetrachloroethylene	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%
cis-1,2-Dichloroethylene	63	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%
Dichlorodifluoromethane (Freon 12)	12,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	28,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chloroform	0.043	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.24%
trans-1,2-Dichloroethene	63	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	1,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1-Dichloroethene	70	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1,1-Trichloroethane	1,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

See notes last page.

Table 6. Air Emissions Model Output Annual Summary, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound [1]	AGC [2] ($\mu g/m^3$)	Percent of MASC Per Event [3]						Cumulative % MASC [4]
		07/07/08	08/06/08	09/24/08	10/27/08	11/25/08	12/18/08	
Vinyl chloride	0.11	0.20%	0.14%	0.14%	0.00%	0.00%	0.00%	3.87%
1,1-Dichloroethane	0.63	0.06%	0.05%	0.13%	0.14%	0.14%	0.13%	0.06%
Trichloroethylene	0.5	0.06%	0.06%	0.78%	0.71%	1.66%	0.73%	0.32%
Tetrachloroethylene	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
cis-1,2-Dichloroethylene	63	0.02%	0.02%	0.03%	0.04%	0.03%	0.03%	0.02%
Dichlorodifluoromethane (Freon 12)	12,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	28,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chloroform	0.043	0.68%	0.62%	2.63%	3.07%	3.29%	2.75%	1.16%
trans-1,2-Dichloroethene	63	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Trichlorofluoromethane (Freon 11)	1,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1-Dichloroethene	70	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1,1-Trichloroethane	1,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

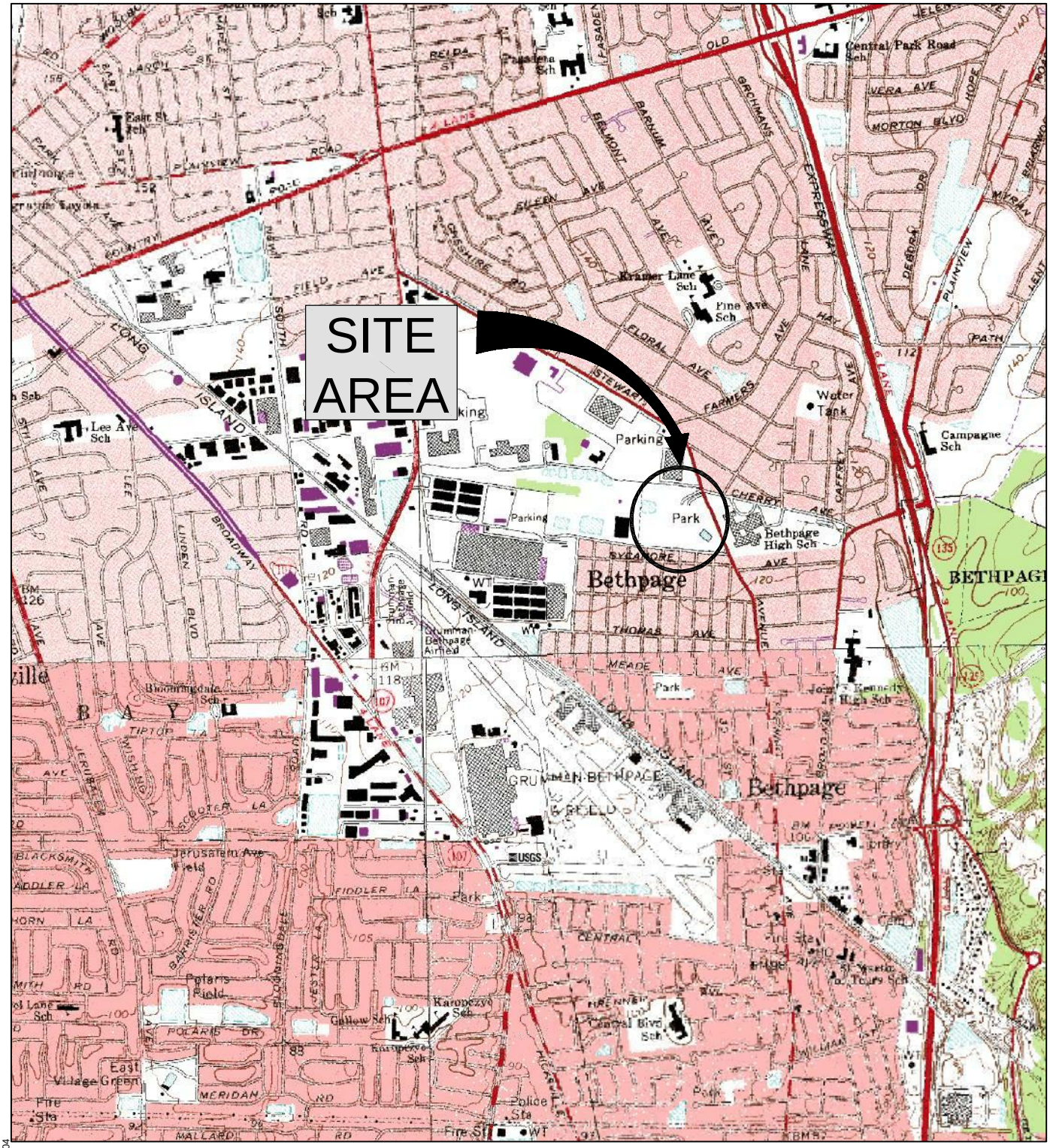
See notes last page.

Table 6. Air Emissions Model Output Annual Summary, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New

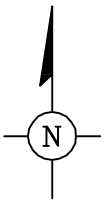
Notes:

1. Compounds listed include all compounds detected in the system effluent vapor stream.
2. AGC refers to the compound-specific annual guideline concentration per the NYSDEC DAR-1 AGC/SGC tables, revised September 10, 2007. NYSDEC DAR-1 AGCs were scaled using the results of a site-specific annual USEPA SCREEN 3 model to calculate the annual maximum allowable stack concentraction (MASC) per monitoring event.
3. Percent of AGC was calculated by dividing the actual effluent concentration by the site-specific annual MASC. Detailed calculations are included in Appendix C.
4. Cumulative percent of the MASC was calculated using a time-weighted average of the percent MASC per event.

$\mu g/m^3$ - Micrograms per cubic meter.
AGC - Annual guideline concentration.



QUADRANGLE LOCATION



0 2000' 4000'

SCALE IN FEET

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

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK

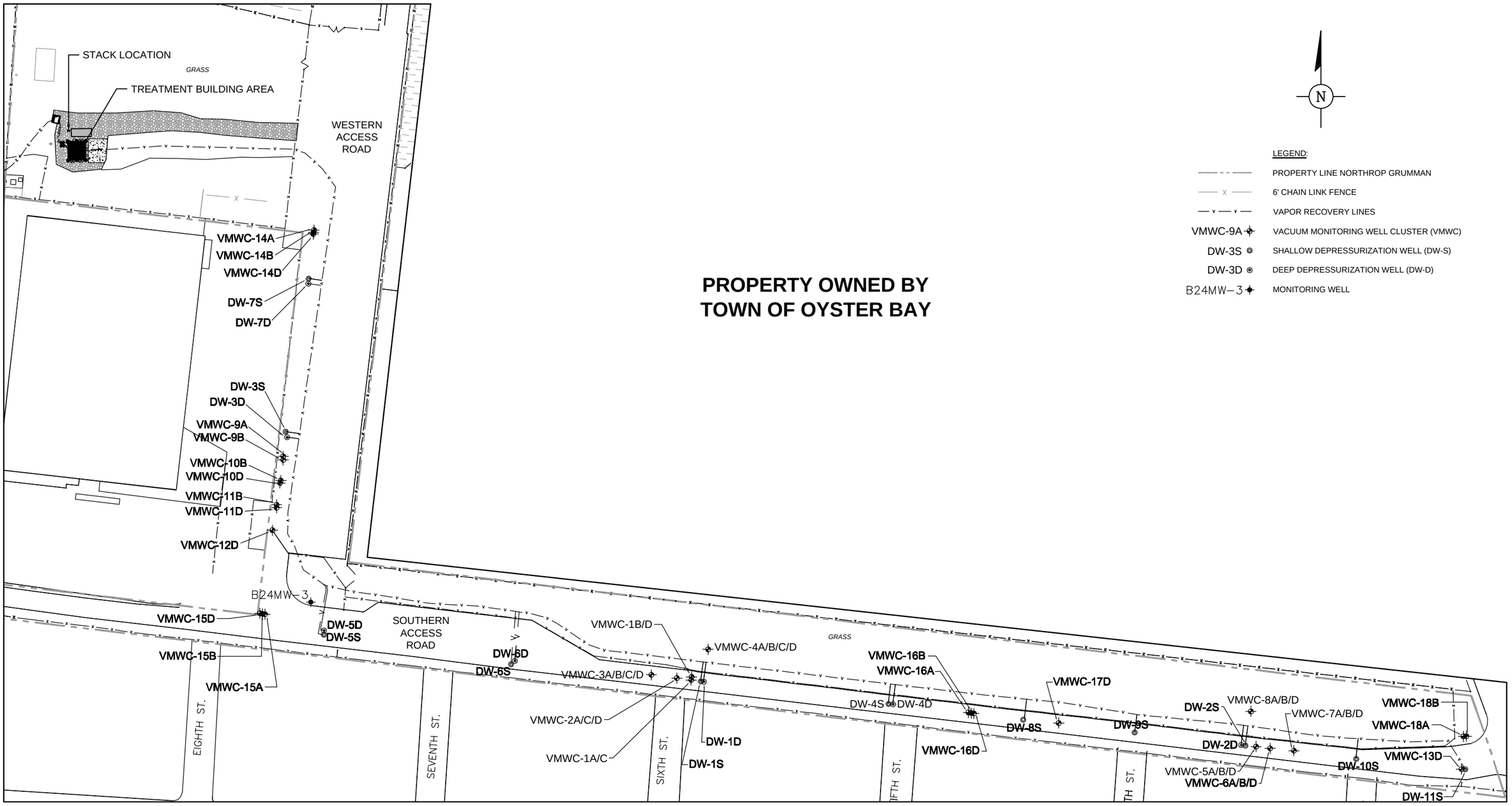
OPERABLE UNIT 3
FORMER GRUMMAN SETTLING PONDS

SITE LOCATION MAP
SOIL GAS INTERIM REMEDIAL MEASURE

ARCADIS

FIGURE
1

CITY:MELVILLE-NY DIV/GROUP:ENV cad DB:ALS LD: PIC: PM:CSG TM:KZ LYR:ON=*;OFF=*REF*
G:\ENVCAD\Melville-NY\NY001464\1407\0008\OM&M\01_Location Map.dwg LAYOUT: 1 SAVED: 2/6/2009 10:42 AM ACADVER: 17.1S (LMS TECH) PAGESETUP: ---PLOTSTYLETABLE: ARCADIS_MELVILLE.CTB PLOTTED: 2/16/2009 3:00 PM BY: SANCHEZ, ADRIAN
XREFS:
PROJECTNAME: NY001464.0908.00004



PROPERTY OWNED BY
TOWN OF OYSTER BAY

N

LEGEND:

- PROPERTY LINE NORTHROP GRUMMAN
- 6' CHAIN LINK FENCE
- VAPOR RECOVERY LINES
- VMWC-9A — VACUUM MONITORING WELL CLUSTER (VMWC)
- DW-3S — SHALLOW DEPRESSURIZATION WELL (DW-S)
- DW-3D — DEEP DEPRESSURIZATION WELL (DW-D)
- B24MW-3 — MONITORING WELL

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 3
FORMER GRUMMAN SETTLING PONDS

GENERAL SITE PLAN
SOIL GAS INTERIM REMEDIAL MEASURE

ARCADIS

FIGURE
2

DISCHARGE TO ATMOSPHERE

DISCHARGE TO ATMOSPHERE

VSP-602

V-27

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

AMBIENT AIR OUTLET

TI 602

TT 602

HEAT EXCHANGER HX-600

ON STANDBY

AMBIENT AIR INLET

PIT 601

PI 601

TI 601

FE

V-26

VSP-601

VSP-201

FE

PI 201

BLOWER BL-200 ON STANDBY

VI 202

VIT 202

VSP-301

FE

PI 301

BLOWER BL-300

VI 302

VIT 302

VSP-401

FE

PI 401

BLOWER BL-400 ON STANDBY

VI 402

VIT 402

WSP-510

SG 510

STORAGE TANK ST-510

VENT

LIMIT OF TREATMENT BUILDING 2

WSP-210

SG 200

AIR FILTER AF-200

KNOCK OUT TANK KO-200

VI 201

RECIRCULATION LINE (TYP. OF 3)

FE 210

FQI 210

TRANSFER PUMP TP-210

WSP-310

SG 300

AIR FILTER AF-300

KNOCK OUT TANK KO-300

VI 301

FE 310

FQI 310

TRANSFER PUMP TP-310

WSP-410

SG 400

AIR FILTER AF-400

KNOCK OUT TANK KO-400

VI 401

FE 410

FQI 410

TRANSFER PUMP TP-410

V-24

V-19

V-21

V-25

V-22

V-20

V-23

V-1

V-2

V-3

V-4

V-5

V-6

V-7

V-8

V-9

V-10

V-11

V-12

V-13

V-14

V-15

V-16

V-17

V-18

VI 119 VSP-101 FI 101

VI 120 VSP-102 FI 102

VI 121 VSP-103 FI 103

VI 122 VSP-104 FI 104

VI 123 VSP-105 FI 105

VI 124 VSP-106 FI 106

VI 125 VSP-107 FI 107

VI 126 VSP-108 FI 108

VI 127 VSP-109 FI 109

VI 128 VSP-110 FI 110

VI 129 VSP-111 FI 111

VI 130 VSP-112 FI 112

VI 131 VSP-113 FI 113

VI 132 VSP-114 FI 114

VI 133 VSP-115 FI 116

VI 134 VSP-116 FI 116

VI 135 VSP-117 FI 117

VI 136 VSP-118 FI 118

FE

FROM DW-7D

FROM DW-3D

FROM DW-5D

FROM DW-6D

FROM DW-1D

FROM DW-4D

FROM DW-2D

FROM DW-11S

FROM DW-10S

FROM DW-2S

FROM DW-9S

FROM DW-8S

FROM DW-4S

FROM DW-1S

FROM DW-6S

FROM DW-5S

FROM DW-3S

FROM DW-7S

VI 101

VI 108

DEPRESSURIZATION WELL (TYPICAL OF 7 DEEP)

DEPRESSURIZATION WELL (TYPICAL OF 11 SHALLOW)

LIMIT OF TREATMENT BUILDING 1

LEGEND:

- CONDENSATE LINE
- LIMITS OF TREATMENT BUILDING
- PROCESS VAPOR LINE
- BALL VALVE (NORMALLY OPEN)
- BALL VALVE (NORMALLY CLOSED)
- BUTTERFLY VALVE (NORMALLY OPEN)
- BUTTERFLY VALVE (NORMALLY CLOSED)
- CHECK VALVE
- UNION
- SAMPLE PORT/DRAIN
- REDUCER
- FERNCO
- FLEXIBLE HOSE
- FLANGE
- FE — FLOW ELEMENT ACCESS
- VI 109 — 1/4" BARB INDUCED VACUUM MONITORING CONNECTION
- INLINE INSTRUMENT
- ISOLATED INSTRUMENT CONNECTED TO PROCESS LINE
- INSTRUMENT CONNECTED TO PROCESS LINE
- FE — FLOW MONITORING ELEMENT
- FI — FLOW RATE INDICATOR
- FQI — FLOW TOTALIZER INDICATOR
- PI — PRESSURE INDICATOR
- PIT — PRESSURE INDICATING TRANSMITTER
- SG — SIGHT GLASS
- TT — TEMPERATURE TRANSMITTER
- VI — VACUUM INDICATOR
- VIT — VACUUM INDICATING TRANSMITTER
- VSP — VAPOR SAMPLE POINT
- WSP — WATER SAMPLE POINT

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 3
FORMER GRUMMAN SETTLING PONDS

PROCESS FLOW DIAGRAM
SOIL GAS INTERIM REMEDIAL MEASURE

ARCADIS

FIGURE
3

ARCADIS

Appendix A

Annual Summary of Vapor Sample Analytical Results Including Tentatively Identified Compounds

Appendix A-1. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Tentatively Identified Compounds, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Location ID: / Sample Date:	VSP-601 02/18/08	VSP-602 02/18/08	VSP-601 02/19/08	VSP-602 02/19/08	VSP-601 02/25/08	VSP-602 02/25/08	VSP-601 03/03/08	VSP-602 03/03/08
Hexamethylcyclotrisiloxane [1]	--	**0.60**	--	--	--	--	--	--
Chlorodifluoromethane (Freon 22)	NF	NF	NF	NF	NF	**5**	**30**	**20**
Methylcyclohexane	--	--	--	--	--	--	**20**	--
3-Methyl-Hexane	--	--	--	--	--	--	--	--
Heptane	--	--	--	--	--	--	--	--
Unknown aliphatic hydrocarbon	--	--	--	--	--	--	--	--
Ethane, 1-chloro-1,1-difluoro (Freon 142)[5]	--	--	--	--	--	--	--	--
Octamethylcyclotetrasiloxane (1)??	--	--	--	--	--	--	--	--
2-Methylpentane	--	--	--	--	--	--	--	--
Hexane	--	--	--	--	--	--	--	--
Unknown hydrocarbon	--	--	--	--	--	--	--	--
Unknown hydrocarbon	--	--	--	--	--	--	--	--
4-Methyl 1-heptene	--	--	--	--	--	--	--	--

Notes and Abbreviations:

--	Not Reported during this sampling event.
Bold	Detected
ppbv	Parts per billion by volume.
1.	Possible laboratory artifact.
2.	Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Rochester, NY) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) .
3.	Tentatively Identified Compounds (TICs) are identified based on review of mass spectrometry results via a comprehensive library search of all organic compounds.
4.	All results are estimated.

Appendix A-1. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Tentatively Identified Compounds, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Location ID: / Sample Date:	VSP-601 03/17/08 [5]	VSP-602 03/17/08 [6]	VSP-601 04/16/08	VSP-602 04/16/08	VSP-601 05/19/08	VSP-602 05/19/08	VSP-601 06/02/08 [5]	VSP-602 06/02/08 [6]
Hexamethylcyclotrisiloxane [1]	--	--	--	--	--	--	--	--
Chlorodifluoromethane (Freon 22)	**170**	**110**	**110**	**220**	**250**	**120**	**260**	**140**
Methylcyclohexane	**62**	--	--	--	--	--	--	--
3-Methyl-Hexane	**6**	--	--	--	--	--	--	--
Heptane	**11**	--	--	--	--	--	--	--
Unknown aliphatic hydrocarbon	**7**	--	--	--	--	--	--	--
Ethane, 1-chloro-1,1-difluoro (Freon 142)[5]	--	--	--	--	--	--	--	--
Octamethylcyclotetrasiloxane (1)??	--	--	--	--	--	--	--	--
2-Methylpentane	--	--	--	--	--	--	--	--
Hexane	--	--	--	--	--	--	--	--
Unknown hydrocarbon	--	--	--	--	--	--	--	--
Unknown hydrocarbon	--	--	--	--	--	--	--	--
4-Methyl 1-heptene	--	--	--	--	--	--	--	--

Notes and Abbreviations:

-- Not Reported during this sampling event.
Bold Detected
ppbv Parts per billion by volume.
1. Possible laboratory artifact.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Rochester, NY) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period
3. Tentatively Identified Compounds (TICs) are identified based on review of mass spectrometry results via a comprehensive library search of all organic compounds.
4. All results are estimated.

Appendix A-1. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Tentatively Identified Compounds, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Tentatively Identified Compounds [3] (units in ppbv)	Location ID: / Sample Date:	VSP-601 07/07/08	VSP-602 07/07/08	VSP-601 08/06/08	VSP-602 08/06/08	VSP-601 09/24/08	VSP-602 09/24/08	VSP-601 10/27/08	VSP-602 10/27/08
Hexamethylcyclotrisiloxane [1]		--	--	--	--	--	--	--	--
Chlorodifluoromethane (Freon 22)		**280**	**210**	**170**	**150**	**270**	**140**	**200**	**210**
Methylcyclohexane		--	--	--	--	--	--	--	--
3-Methyl-Hexane		--	--	--	--	--	--	--	--
Heptane		--	--	--	--	--	--	--	--
Unknown aliphatic hydrocarbon		--	--	--	--	--	--	--	--
Ethane, 1-chloro-1,1-difluoro (Freon 142)		--	--	**200**	**170**	**190**	**140**	**110**	**130**
Octamethylcyclotetrasiloxane		--	--	--	--	--	--	--	--
2-Methylpentane		--	--	--	--	--	--	--	--
Hexane		--	--	--	--	--	--	--	--
Unknown hydrocarbon		--	--	--	--	--	--	--	--
Unknown hydrocarbon		--	--	--	--	--	--	--	--
4-Methyl 1-heptene		--	--	--	--	--	--	--	--

Notes and Abbreviations:

--	Not Reported during this sampling event.
Bold	Detected
ppbv	Parts per billion by volume.
1.	Possible laboratory artifact.
2.	Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Rochester, NY) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period
3.	Tentatively Identified Compounds (TICs) are identified based on review of mass spectrometry results via a comprehensive library search of all organic compounds.
4.	All results are estimated.

Appendix A-1. Annual Summary of Total Influent and Effluent Vapor Sample Analytical Results, Tentatively Identified Compounds, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.[2]

Tentatively Identified Compounds [3] (units in ppbv)	Location ID: / Sample Date:	VSP-601 11/25/08	VSP-602 11/25/08	VSP-601 12/18/08	VSP-602 12/18/08
Hexamethylcyclotrisiloxane [1]		--	--	--	**23**
Chlorodifluoromethane (Freon 22)		--	--	**460**	**260**
Methylcyclohexane		--	--	**10**	--
3-Methyl-Hexane		--	--	**27**	--
Heptane		--	--	**12**	--
Unknown aliphatic hydrocarbon		--	--	**22**	--
Ethane, 1-chloro-1,1-difluoro (Freon 142)		**230**	**210**	**130**	**170**
Octamethylcyclotetrasiloxane		--	--	--	**9**
2-Methylpentane		--	--	**31**	--
Hexane		--	--	**29**	--
Unknown hydrocarbon		--	--	**21**	--
Unknown hydrocarbon		--	--	**18**	--
4-Methyl 1-heptene		--	--	**8**	--

Notes and Abbreviations:

--	Not Reported during this sampling event.
Bold	Detected
ppbv	Parts per billion by volume.
1.	Possible laboratory artifact.
2.	Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Rochester, NY) for VOC analyses using USEPA Method TO-15 modified in accordance with the project Sampling and Analysis Plan (ARCADIS 2008) . Data presented in this table corresponds to the period
3.	Tentatively Identified Compounds (TICs) are identified based on review of mass spectrometry results via a comprehensive library search of all organic compounds.
4.	All results are estimated.

ARCADIS

Appendix B

Annual Summary of Condensate Sample Analytical Results Including Tentatively Identified Compounds

Appendix B-1. Annual Summary of Condensate Sample Analytical Results, Tentatively Identified Compounds (TICs), Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York. [2]

Tentatively Identified Compounds [1,3] (units in ug/L)	Location ID:	WSP-200	WSP-300	WSP-510
	Sample Date:	3/17/2008	3/17/2008	3/17/2008
Unknown		--	--	**21**
Ethanol		--	--	**1200**
Furan, tetrahydro-		**130**	**140**	**73**
Unknown alcohol		--	**14**	**21**
Cyclohexanone		**17**	**13**	--
Isoproply Alcohol		--	**22**	--
Butanal		--	**5**	--
Heptanal		--	**9**	--
1-Hexanol, 2-ethyl-		--	**14**	--

Notes and Abbreviations:

--	Not Reported
Bold	Detected
J	Estimated value
N	Presumptive evidence of this constituent. Calibrations were not run for these constituents; therefore, the results should be used for qualitative purposes only.
ug/L	Micorgrams per liter

1. TICs are identified based on review of mass spectrometry results via a comprehensive library search of all organic compounds.
2. Samples were collected by O&M personnel on the dates shown and submitted to Columbia Analytical Services Laboratory (Rochester, NY) for VOC analyses using Method 8260 in accordance with the project Sampling and Analysis Plan (ARCADIS 2008).
3. All results are estimated.

ARCADIS

Appendix C

Annual Summary of Air Modeling Calculations

Table C-1. Annual Summary of SCREEN3 Model Input and Outputs, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Parameters	Date Sampled:	02/18/08	02/19/08	02/25/08	03/03/08	03/17/08	04/16/08	05/19/08
SCREEN3 Model Input								
Source Type		Point	Point	Point	Point	Point	Point	Point
Emission Rate (g/s)		1	1	1	1	1	1	1
Stack Height (ft)		33	33	33	33	33	33	33
Stack Height (m)		10.1	10.1	10.1	10.1	10.1	10.1	10.1
Stack Inside Diameter (m)		0.41	0.41	0.41	0.41	0.41	0.41	0.41
Air Flow Rate (scfm) [(1)]		1,964	1,674	1,679	1,793	1,774	641	666
Air Flow Rate (acfm @ stack temp) [(2)]		2,048	1,717	1,754	1,873	1,859	655	671
Stack Gas Exit Temperature (K) [(1)]		307	302	308	308	309	301	296
Ambient Air Temperature (K) [(3)]		283	275	274	275	276	281	284
Receptor Height (m) [(4)]		1.5	1.5	1.5	1.5	1.5	1.5	1.5
Urban/Rural		Urban	Urban	Urban	Urban	Urban	Urban	Urban
Building Height (m)		2.4	2.4	2.4	2.4	2.4	2.4	2.4
Min Horizontal Bldg Dim (m)		4.9	4.9	4.9	4.9	4.9	4.9	4.9
Max Horizontal Bldg Dim (m)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Consider Bldg Downwash?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simple/Complex Terrain Above Stack		Simple	Simple	Simple	Simple	Simple	Simple	Simple
Simple/Complex Terrain Above Stack Base		Simple	Simple	Simple	Simple	Simple	Simple	Simple
Meteorology		Full	Full	Full	Full	Full	Full	Full
Automated Distances Array		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terrain Height Above Stack Base		0	0	0	0	0	0	0
SCREEN3 Model Output								
1-HR Max		596.3	698.3	638.3	622.9	627.6	1,292	1,278
Annualization Factor [(6)]		0.08	0.08	0.08	0.08	0.08	0.08	0.08
Average Annual Concentration at Receptor Height (ug/m^3) [(7)]		47.7	55.9	51.1	49.8	50.2	103.4	102.2
Distance To Max Concentration (m) [(8)]		66	61	64	64	64	45	45

See notes last page.

Table C-1. Annual Summary of SCREEN3 Model Input and Outputs, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Parameters	Date Sampled:	06/02/08	07/07/08	08/06/08	09/24/08	10/27/08	11/25/08	12/18/08
SCREEN3 Model Input								
Source Type		Point	Point	Point	Point	Point	Point	Point
Emission Rate (g/s)		1	1	1	1	1	1	1
Stack Height (ft)		33	33	33	33	33	33	33
Stack Height (m)		10.1	10.1	10.1	10.1	10.1	10.1	10.1
Stack Inside Diameter (m)		0.41	0.41	0.41	0.41	0.41	0.41	0.41
Air Flow Rate (scfm) [1]		746	829	640	638	552	487	540
Air Flow Rate (acfm @ stack temp) [2]		766	860	670	668	567	487	543
Stack Gas Exit Temperature (K) [1]		303	305	308	308	303	294	296
Ambient Air Temperature (K) [3]		294	298	299	289	286	279	275
Receptor Height (m) [4]		1.5	1.5	1.5	1.5	1.5	1.5	1.5
Urban/Rural		Urban	Urban	Urban	Urban	Urban	Urban	Urban
Building Height (m)		2.4	2.4	2.4	2.4	2.4	2.4	2.4
Min Horizontal Bldg Dim (m)		4.9	4.9	4.9	4.9	4.9	4.9	4.9
Max Horizontal Bldg Dim (m)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Consider Bldg Downwash?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simple/Complex Terrain Above Stack		Simple	Simple	Simple	Simple	Simple	Simple	Simple
Simple/Complex Terrain Above Stack Base		Simple	Simple	Simple	Simple	Simple	Simple	Simple
Meteorology		Full	Full	Full	Full	Full	Full	Full
Automated Distances Array		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terrain Height Above Stack Base		0	0	0	0	0	0	0
SCREEN3 Model Output								
1-HR Max		1,200	1,129	1,279	1,281	1,373	1,454	1,374
Annualization Factor [6]		0.08	0.08	0.08	0.08	0.08	0.08	0.08
Average Annual Concentration at Receptor Height (ug/m^3) [7]		96	90.3	102.3	102.5	109.8	116.3	109.9
Distance To Max Concentration (m) [8]		47	48	45	45	43	42	43

See notes last page.

Table C-1. Annual Summary of SCREEN3 Model Input and Outputs, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Notes

1. The stack air flow rate (in scfm) and temperature were measured using a handheld thermo-anemometer. Values were measured immediately prior to where the effluent air stream enters the vapor-phase carbon unit.
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.

g/s - Grams per second
ft - Feet
m - Meters
scfm - Standard cubic feet per minute
acfm - Actual cubic feet per minute
K - Kelvin
$\mu g/m^3$ - Micrograms per cubic meter

Table C-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound	Actual Effluent Concentrations [1] (µg/m^3)						
	02/18/08	02/19/08	02/25/08	03/03/08	03/17/08	04/16/08	05/19/08
Vinyl chloride	0	0	1.1	40	920	710	65
1,1-Dichloroethane	0	0	0	0	0	0	5.8
Trichloroethylene	0	0	0	0	0	0	5.3
Tetrachloroethylene	0	0	0	0	0	0	0
cis-1,2-Dichloroethylene	0	0	0	0	0	78	180
Dichlorodifluoromethane (Freon 12)	0	0.71	5.7	8.3	0	0	0
Acetone	0	0	0	0	0	0	0
Chloroform	0	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0	0
Trichlorofluoromethane (Freon 11)	0	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0	0
1,1,1-Trichloroethane	0	0	0	0	0	0	0

Compound	AGC [2] (µg/m^3)	Annual Maximum Allowable Stack Concentration (µg/m^3)						
		02/18/08	02/19/08	02/25/08	03/03/08	03/17/08	04/16/08	05/19/08
Vinyl chloride	0.11	2.39E+03	2.43E+03	2.60E+03	2.50E+03	2.50E+03	3.44E+03	3.40E+03
1,1-Dichloroethane	0.63	1.37E+04	1.39E+04	1.49E+04	1.43E+04	1.43E+04	1.97E+04	1.95E+04
Trichloroethylene	0.5	1.08E+04	1.10E+04	1.18E+04	1.14E+04	1.14E+04	1.56E+04	1.54E+04
Tetrachloroethylene	1	2.17E+04	2.21E+04	2.36E+04	2.27E+04	2.27E+04	3.13E+04	3.09E+04
cis-1,2-Dichloroethylene	63	1.37E+06	1.39E+06	1.49E+06	1.43E+06	1.43E+06	1.97E+06	1.95E+06
Dichlorodifluoromethane (Freon 12)	12,000	2.60E+08	2.65E+08	2.84E+08	2.73E+08	2.72E+08	3.75E+08	3.71E+08
Acetone	28,000	6.07E+08	6.18E+08	6.62E+08	6.36E+08	6.36E+08	8.76E+08	8.65E+08
Chloroform	0.043	9.33E+02	9.49E+02	1.02E+03	9.77E+02	9.76E+02	1.35E+03	1.33E+03
trans-1,2-Dichloroethene	63	1.37E+06	1.39E+06	1.49E+06	1.43E+06	1.43E+06	1.97E+06	1.95E+06
Trichlorofluoromethane (Freon 11)	1,000	2.17E+07	2.21E+07	2.36E+07	2.27E+07	2.27E+07	3.13E+07	3.09E+07
1,1-Dichloroethene	70	1.52E+06	1.55E+06	1.65E+06	1.59E+06	1.59E+06	2.19E+06	2.16E+06
1,1,1-Trichloroethane	1,000	2.17E+07	2.21E+07	2.36E+07	2.27E+07	2.27E+07	3.13E+07	3.09E+07

See notes last page.

Table C-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound	Actual Effluent Concentrations [1] (µg/m^3)						
	06/02/08	07/07/08	08/06/07	09/24/08	10/27/08	11/25/08	12/18/08
Vinyl chloride	13	6	4.9	4.9	0	0	0
1,1-Dichloroethane	7.6	11	9.2	26	30	32	29
Trichloroethylene	6.5	7.7	9.2	120	120	310	130
Tetrachloroethylene	2.2	0	0	0.88	0	0	0
cis-1,2-Dichloroethylene	230	350	320	620	830	770	730
Dichlorodifluoromethane (Freon 12)	0	0	0	0	0	69	0
Acetone	8.4	0	0	0	0	0	0
Chloroform	3	8	8.2	35	45	53	42
trans-1,2-Dichloroethene	2.8	0	3.6	8.6	0	0	0
Trichlorofluoromethane (Freon 11)	0	0	5.5	11	0	0	0
1,1-Dichloroethene	0	0	0	3.5	0	0	0
1,1,1-Trichloroethane	0	0	0	9.7	0	23	0

Compound	AGC [2] (µg/m^3)	Annual Maximum Allowable Stack Concentration (µg/m^3)						
		06/02/08	07/07/08	08/06/08	09/24/08	10/27/08	11/25/08	12/18/08
Vinyl chloride	0.11	3.17E+03	3.00E+03	3.40E+03	3.40E+03	3.74E+03	4.12E+03	3.91E+03
1,1-Dichloroethane	0.63	1.82E+04	1.72E+04	1.95E+04	1.95E+04	2.14E+04	2.36E+04	2.24E+04
Trichloroethylene	0.5	1.44E+04	1.36E+04	1.55E+04	1.55E+04	1.70E+04	1.87E+04	1.78E+04
Tetrachloroethylene	1	2.88E+04	2.73E+04	3.09E+04	3.09E+04	3.40E+04	3.74E+04	3.55E+04
cis-1,2-Dichloroethylene	63	1.82E+06	1.72E+06	1.95E+06	1.95E+06	2.14E+06	2.36E+06	2.24E+06
Dichlorodifluoromethane (Freon 12)	12,000	3.46E+08	3.27E+08	3.71E+08	3.71E+08	4.08E+08	4.49E+08	4.26E+08
Acetone	28,000	8.07E+08	7.64E+08	8.66E+08	8.66E+08	9.53E+08	1.05E+09	9.94E+08
Chloroform	0.043	1.24E+03	1.17E+03	1.33E+03	1.33E+03	1.46E+03	1.61E+03	1.53E+03
trans-1,2-Dichloroethene	63	1.82E+06	1.72E+06	1.95E+06	1.95E+06	2.14E+06	2.36E+06	2.24E+06
Trichlorofluoromethane (Freon 11)	1,000	2.88E+07	2.73E+07	3.09E+07	3.09E+07	3.40E+07	3.74E+07	3.55E+07
1,1-Dichloroethene	70	2.02E+06	1.91E+06	2.16E+06	2.17E+06	2.38E+06	2.62E+06	2.49E+06
1,1,1-Trichloroethane	1,000	2.88E+07	2.73E+07	3.09E+07	3.09E+07	3.40E+07	3.74E+07	3.55E+07

See notes last page.

Table C-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound	Percent of Annual Maximum Allowable Stack Concentration [4]						
	02/18/08	02/19/08	02/25/08	03/03/08	03/17/08	04/16/08	05/19/08
Vinyl chloride	0.00%	0.00%	0.04%	1.60%	36.84%	20.63%	1.91%
1,1-Dichloroethane	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%
Trichloroethylene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%
Tetrachloroethylene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
cis-1,2-Dichloroethylene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%
Dichlorodifluoromethane (Freon 12)	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%
Chloroform	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
trans-1,2-Dichloroethene	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%
1,1-Dichloroethene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1,1-Trichloroethane	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

See notes last page.

Table C-2. Annual Summary of Maximum Allowable Stack Concentration Calculations, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound	Percent of Annual Maximum Allowable Stack Concentration [4]						
	06/02/08	07/07/08	08/06/08	09/24/08	10/27/08	11/25/08	12/18/08
Vinyl chloride	0.41%	0.20%	0.14%	0.14%	0.00%	0.00%	0.00%
1,1-Dichloroethane	0.04%	0.06%	0.05%	0.13%	0.14%	0.14%	0.13%
Trichloroethylene	0.05%	0.06%	0.06%	0.78%	0.71%	1.66%	0.73%
Tetrachloroethylene	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
cis-1,2-Dichloroethylene	0.01%	0.02%	0.02%	0.03%	0.04%	0.03%	0.03%
Dichlorodifluoromethane (Freon 12)	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%
Chloroform	0.24%	0.68%	0.62%	2.63%	3.07%	3.29%	2.75%
trans-1,2-Dichloroethene	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%
1,1-Dichloroethene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1,1,1-Trichloroethane	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.
2. AGC refers to the compound-specific annual guideline concentration per the NYSDEC DAR-1 AGC/SGC tables, revised September 10, 2007.
3. Annual 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 annual 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.

$\mu g/m^3$ - Micrograms per cubic meter
AGC - Annual guideline concentration