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ENVIRONMENT

Subject:
Operable Unit 3 - Interim Operation, Maintenance, and Monitoring Report for June 2008 to July 2008, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York, NYSDEC Site #1-30-003A.

Date:
September 5, 2008

Dear Steve:

Contact:
Carlo San Giovanni

Enclosed is one hard copy and one CD of the Operable Unit 3 – Interim Operation, Maintenance, and Monitoring Report for June 2008 to July 2008, Former Grumman Settling Ponds, Bethpage, New York, NYSDEC Site #1-30-003A.

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

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Sincerely,

Our ref:
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- Mike Hofgren, Dvirka & Bartilucci, w/o attachments

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Northrop Grumman Systems Corporation

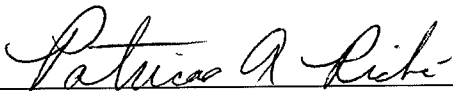
**Operable Unit 3- Interim Operation,
Maintenance and Monitoring Report**

June 2008 to July 2008

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

NYSDEC ID # 1-30-003A

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**Operable Unit 3 – Interim Operation,
Maintenance, and Monitoring Report**

June 2008 to July 2008

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	1
2. Soil Gas Interim Remedial Measure System Description	1
3. Operation and Maintenance Activities	2
4. Monitoring Activities	3
4.1 Routine Performance Monitoring	3
4.1.1 System Operating Parameters	3
4.1.2 Vapor Samples	3
4.2 Routine Compliance Monitoring	3
4.2.1 System Operating Parameters	4
4.2.2 Vapor Samples	4
4.2.3 Condensate Samples	4
5. Monitoring Results and Discussion	4
5.1 Routine Performance Monitoring	4
5.1.1 System Operating Parameters	4
5.1.2 Vapor Samples	5
5.2 Routine Compliance Monitoring	6
5.2.1 Induced Vacuum Measurements	6
5.2.2 Vapor Samples	6
5.2.3 Condensate Samples	7
6. Air Emissions Model	7
7. Conclusions and Recommendations	8
7.1 Conclusions	8
7.2 Recommendations	8
8. References	10

Tables

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

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

Table 3 Summary of Total Influent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

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

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

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

Figures

Figure 1 Site Location Map, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Figure 2 General Site Plan, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Figure 3 Process Flow Diagram, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Appendices

- A Summary of Vapor Sample Analytical Results Including Tentatively Identified Compounds
- B Summary of Condensate Sample Analytical Results Including Tentatively Identified Compounds
- C Air Modeling Calculations

June 2008 to July 2008

1. Introduction

This Operable Unit 3 (OU3) Soil Gas Interim Remedial Measure (soil gas IRM) Interim Operation, Maintenance, and Monitoring 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 summarizes the routine operation, maintenance and monitoring (OM&M) activities for the soil gas IRM performed from June 3, 2008 through July 7, 2008. System O&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 2008a). System monitoring was completed in accordance with the Sampling and Analysis Plan (SAP), which was provided to the NYSDEC as Appendix C of the Soil Gas Interim Remedial Measure 95% Design Report and Design Drawings dated September 7, 2007 (ARCADIS 2007) and the OM&M Manual. The Sampling and Analysis Plan (ARCADIS 2008b) was approved by the NYSDEC in a letter dated August 1, 2008 (NYSDEC 2008).

A description of the soil gas IRM system OM&M activities completed during the reporting period 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, which was approved by the NYSDEC on September 19, 2007. 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 as-built drawings is provided in the OM&M Manual.

In summary, the soil gas IRM consists of the following major components:

June 2008 to July 2008

- 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,
- One (1) 10,000 pound (lb) vapor phase granular activated carbon bed (VPGAC).

A detailed description of the system is provided in the OM&M Manual.

3. Operation and Maintenance Activities

The soil gas IRM operated continuously during the reporting period with only brief system shutdowns to perform routine maintenance or troubleshooting activities. The routine monthly O&M site visit was conducted on July 7, 2008. Routine monthly O&M activities included inspection of all piping, appurtenances, and mechanical equipment for leaks, defects, or other problems and maintenance of equipment in accordance with the manufacturers’ specifications and as described in the OM&M Manual. In addition to the routine O&M site visit, supplemental site visits were completed on a weekly basis to monitor the physical condition of the temporary site controls (i.e., temporary fence).

June 2008 to July 2008

Discussion of the routine OM&M monitoring program and results is provided in the subsequent sections of this report.

4. Monitoring Activities

The following sections summarize the methodology used for routine performance monitoring and routine compliance monitoring during the current reporting period.

4.1 Routine Performance Monitoring

Routine performance monitoring was completed on July 7, 2008, in accordance with Table C-1 of the SAP. A brief discussion of the routine performance monitoring methodology and/or deviations from the methodology described in the SAP is provided below.

4.1.1 System Operating Parameters

System operating parameters that fall under the performance monitoring program include the parameters listed in Attachments C-3.2 and C-3.3 of the SAP. There were no significant deviations from the recording of these parameters during the routine monitoring event.

4.1.2 Vapor Samples

One (1) routine performance monitoring vapor sample was collected for laboratory analysis from the total influent sample location (VSP-601) during the July 7, 2008 monitoring event. The sample was collected and submitted to the laboratory in accordance with the requirements set forth in the SAP. In addition, supplemental performance monitoring vapor samples were collected (using a PID) from all individual depressurization wells for qualitative analysis.

4.2 Routine Compliance Monitoring

Routine compliance monitoring was completed on July 7, 2008 in accordance with Table C-1 of the SAP. A brief discussion of the routine compliance monitoring methodology and/or deviations from the methodology described in the SAP is provided below.

June 2008 to July 2008

4.2.1 System Operating Parameters

System operating parameters that fall under the compliance monitoring program include the compliance-related induced vacuum measurements listed in Table 2 of the OM&M Manual. There were no significant deviations from the recording of these parameters during the routine monitoring event.

4.2.2 Vapor Samples

One (1) routine, compliance monitoring vapor sample was collected for laboratory analysis from the total effluent sample location (VSP-602) during the July 7, 2008 monitoring event. The sample was collected and submitted for laboratory analysis in accordance with the requirements set forth in the SAP.

4.2.3 Condensate Samples

A compliance monitoring condensate sample was not collected for laboratory analysis during the reporting period due to the lack of condensate generation.

5. Monitoring Results and Discussion

The following sections summarize and briefly discuss the results for routine performance monitoring and routine compliance monitoring during the current reporting period.

5.1 Routine Performance Monitoring

This following section summarizes the results of the routine system performance monitoring event completed on July 7, 2008.

5.1.1 System Operating Parameters

A summary of the performance monitoring system operating parameters for the July 7, 2008 monitoring event is provided in Table 1. A summary of non-compliance (e.g., performance monitoring) induced vacuum measurements is provided in Table 2.

As shown in Table 1, system operating parameters recorded in July 2008 remained consistent with operating parameters recorded during June 2008. These data indicate that the system is running as designed and is maintaining a negative pressure curtain

June 2008 to July 2008

along the southern and western property boundaries. Additional key data and observations are as follows:

- The observed wellhead vacuum and extraction flowrate are generally consistent in all depressurization wells, when comparing June 2, 2008 monitoring data to July 7, 2008 monitoring data.
- The average induced vacuum reading at non-compliance monitoring points was approximately -0.317 iwc for all monitoring points measured during the July 2008 monitoring event, which is consistent with data obtained during the June 2008 monitoring event (i.e., -0.312 iwc).
- Condensate water was not generated between June 2, 2008 and July 7, 2008.
- Perched water was not encountered in induced vacuum monitoring wells VMWC-1C or VMWC-5B.
- The heat exchanger influent temperature (85 deg F) remained lower than the design influent temperature of 150 degrees. Accordingly, the heat exchanger was kept on standby between June 2, 2008 and July 7, 2008.

5.1.2 Vapor Samples

A summary of the July 2008 qualitative vapor sample analytical results is provided in Table 1. A summary of the July 2008 total influent vapor sample laboratory analytical results for detected compounds is provided in Table 3. A summary of all vapor sample analytical results (including detected, non-detect, and tentatively identified compounds [TICs]) is provided in Appendix A.

Qualitative vapor analyses (i.e., PID readings) were consistent with startup/shutdown and June 2008 data and were generally below the limits of detection to less than 5 parts per million by volume (ppmv) for all samples collected. Total influent (VSP-601) laboratory analytical results for the July 7, 2008 monitoring event were generally consistent with analytical results from June 2, 2008. Specifically, TVOC concentrations were 3,002 ug/m³ during the July 2008 monitoring event, and the VC concentration was below the limits of detection.

Chlorodifluoromethane and an unknown CFC were reported as TICs by the laboratory during the July 2008 monitoring event. As requested by the NYSDEC,

June 2008 to July 2008

chlorodifluoromethane will be added to the quantitative laboratory compound list during Fall 2008 as soon as the calibration standard is received by the laboratory.

5.2 Routine Compliance Monitoring

This following section summarizes the results of the routine system compliance monitoring event completed on July 7, 2008.

5.2.1 Induced Vacuum Measurements

Induced vacuum measurements collected during the July 7, 2008 monitoring event are summarized in Table 2. As referenced in the 95% Design Report, the soil gas IRM was designed to maintain a negative pressure of -0.1 iwc on a time-weighted rolling average within all monitoring points. Accordingly, the time-weighted rolling average for all induced vacuum monitoring points has been provided in Table 2. As shown on Table 2, the rolling average for all individual monitoring points was greater than -0.1 iwc as of July 7, 2008. In addition, the average induced vacuum for compliance monitoring wells during the July 7, 2008 monitoring event was -0.140 iwc, which indicate that the soil gas IRM is operating as designed. These data are consistent with data from the June 2, 2008 monitoring event.

5.2.2 Vapor Samples

A summary of the July 2008 qualitative vapor sample analytical results is provided in Table 1. A summary of the July 2008 total effluent vapor sample laboratory analytical results for detected compounds is provided in Table 4. A summary of all vapor sample analytical results (including detected, non-detect, and tentatively identified compounds [TICs]) is provided in Appendix A.

Qualitative vapor analyses (i.e., PID readings) were consistent with startup/shakedown and June 2, 2008 data and were below the limits of detection. Total effluent (VSP-602) laboratory analytical results for the July 7, 2008 monitoring event, and were consistent with analytical results from June 2, 2008. Specifically, the TVOC concentration was 383 ug/m³ during the July 2008 monitoring event. VC was detected at a concentration (5.9 ug/m³) that is slightly above the limits of detection. A summary of the air emissions model, completed to confirm compliance with applicable air discharge standards, is discussed in Section 6 of this report.

June 2008 to July 2008

5.2.3 Condensate Samples

As discussed previously, a condensate sample was not collected from Storage Tank ST-510 for laboratory analysis during the reporting period due to the lack of condensate water generation. Nonetheless, a table that indicates no samples were collected during the reporting period is provided as Table 5. A similar appendix table has been provided in Appendix B.

6. Air Emissions Model

Effluent vapor laboratory analytical results were compared to the NYSDEC Division of Air Resources Air Guide-1 (DAR-1) Short-term Guideline Concentrations (SGCs). In addition, effluent vapor laboratory analytical results were compared to a site-specific modeled annual maximum allowable stack concentration. The annual maximum allowable stack concentration (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 Annual Guideline Concentrations (AGCs). Specifically, a scaling factor was calculated using the SCREEN3 model with site-specific physical layout (e.g., building dimension, stack height, terrain, etc.) and operating data (e.g., discharge flowrate, 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. A summary of the instantaneous percent (e.g., not time-weighted) of the site-specific annual MASC for detected compounds is provided in Table 6. A summary of the cumulative annual percent (e.g., time-weighted) of the site-specific MASC for detected compounds is also provided on Table 6. A 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 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 3). It should also be noted that all influent (i.e., prior to treatment) individual VOC concentrations were also below their respective SGCs.
- The actual concentration of individual VOCs in the vapor effluent did not exceed their respective instantaneous MASCs as calculated using the USEPA SCREEN 3

June 2008 to July 2008

Model (Table 6). Similarly, the time-weighted rolling average for all detected compounds is currently well below the MASCs.

7. Conclusions and Recommendations

Based on the information provided herein, ARCADIS makes the following conclusions:

7.1 Conclusions

- VPGAC effluent data indicate that the VPGAC unit is removing trichloroethylene from the influent vapor stream as designed.
- July 2008 compliance monitoring results indicate that the system continues to operate as designed. Specifically, a time-weight average induced vacuum of greater than -0.1 iwc was achieved in all induced vacuum monitoring points.
- The actual concentrations of individual VOCs in the vapor effluent did not exceed their respective SGCs during the reporting period.
- The actual concentration of individual VOCs in the vapor effluent did not exceed their respective MASCs as calculated using the USEPA SCREEN 3 model. In addition, the instantaneous percent of the site-specific annual MASC for all detected compounds was less than 1-percent during the July 2008 monitoring event.

7.2 Recommendations

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

- Continue operating the system in accordance with system operating parameters recorded in July 2008.
- Continue to collect system operational data and influent and effluent vapor samples for laboratory analysis on a monthly basis for the next operating month (e.g., August 2008). If data is favorable and continue to indicate a stable trend for all operating parameters and vapor analytical data, perform performance and compliance monitoring on a quarterly basis thereafter.

ARCADIS

Operable Unit 3 - Interim
Operation, Maintenance, and
Monitoring Report

June 2008 to July 2008

- Collect induced vacuum measurements from the list of compliance related induced vacuum monitoring wells only during future monitoring events. 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.

June 2008 to July 2008

8. References

ARCADIS of New York, Inc. 2007. 95% Design Report, Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York, Site #1-30-003A September 7, 2007.

ARCADIS of New York, Inc. 2008. Operable Unit 3 – Interim Operation, Maintenance, and Monitoring Report and Startup Summary, Operable Unit 3, Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York, Site #1-30-003A August 7, 2008.

ARCADIS of New York, Inc. 2008a. Operable Unit 3 –Operation, Maintenance, and Monitoring Manual, Operable Unit 3, Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York, Site #1-30-003A August 26, 2008.

ARCADIS of New York, Inc. 2008b. 95% Design Report, Appendix C, Sampling and Analysis Plan, Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York, Site #1-30-003A February 8, 2008.

ARCADIS of New York, Inc. 2008c. 95% Design Report, Attachment C-2, System Startup Plan, Operable Unit 3, Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York, Site #1-30-003A January 29, 2008.

New York State Department of Environmental Conservation (NYSDEC), 2008, Approval Letter regarding Former Grumman Settling Ponds, NYSDEC Nassau County Site No. 1-30-003A OU3 (Bethpage Community Park), August 1, 2008.

New York State Department of Environmental Conservation (NYSDEC), 2005, Order on Consent Index #WI-0018-04-01, Site # 1-30-003A, July 4, 2005.

New York State Department of Environmental Conservation, Division of Air Resources-1 (DAR-1) Guidelines for the Control of Toxic Ambient Air Contaminants dated 1991 and the AGC/SGC Tables dated December 22, 2003.

Town of Oyster Bay Letter, Discharge IRM Condensate Water Northrop, Grumman, OU3 Site, Bethpage, New York. October 16, 2007.

Table 1. 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					Extraction Well DW-3S Parameters					Extraction Well DW-3D Parameters					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)	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)	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	80	-7.3	55.7	2.8	-2.5	113	-15.43	53.9	13.3	-4.5	100	-4.6	57.2	0.0	-3.0	52	-16.1	56.8	0.0	-13.5
02/19/08 ⁽¹⁾	53	-3.80	NM	9.7	-2.0	78	-7.4	NM	26.7	-2.5	45	-2.5	NM	6.5	-1.75	108	-16.3	NM	16.4	-3.5	57	-2.5	NM	0.0	-2.0	52	-18	NM	0.0	-13.5
02/25/08 ⁽¹⁾	55	-5.5	NM	4.2	-2.0	74	-13	NM	5.8	-2.7	37	-2.03	NM	2.1	-1.5	71	-26	NM	6.6	-2.7	20	-1.05	NM	0.4	-1.5	56	-24.1	NM	0.0	-17.5
03/03/08 ⁽¹⁾	53	-6	NM	2.8	-2.0	84	-13.0	NM	0.8	-2.7	45	-2.5	NM	1.2	-1.5	88	-16	NM	1.9	-2.7	20	-1.4	NM	0.8	-1.5	66	-27	NM	0.0	-15.2
03/17/08 ⁽¹⁾	76	-9	NM	2.6	-2.5	50	-8.00	NM	0.4	-2.0	45	-2.8	NM	1.1	-2.0	83	-16	NM	0.1	-2.7	20	-1.5	NM	0.0	-2.5	70	-32	NM	0.0	-25.0
04/16/08	84.97	-10.46	50.3	2.7	NM	41.10	-2	55.4	2.0	NM	15.48	-0.41	58.6	0.6	NM	28.56	-1.07	57.0	4.6	NM	34.44	-0.77	55.0	0.0	NM	33.95	-0.22	57.5	0.6	NM
05/19/08	72.43	-5.0	57.0	5.0	-4.0	19.76	-0.800	62.2	2.1	-1.5	14.98	-0.45	62.2	0.0	-2.0	23.35	-2.0	59.3	3.5	-3.0	77.92	-2.5	59.9	2.5	-2.5	19.73	-14.0	59.0	0.0	-10.5
06/02/08	86.01	-5.8	65.8	0.0	-1.8	23.40	-0.7	72.8	0.0	-0.9	16.09	-0.4	71.0	0.0	-1.1	26.95	-2.0	71.7	0.0	-1.3	86.18	-2.3	65.4	0.0	-2.8	16.56	-14.0	74.3	0.0	-10.0
07/07/08	49.33	-4.4	69.4	4.7	-2.2	18.04	-1.2	76.1	2.6	-1.0	17.56	-0.4	74.1	2.3	-1.2	17.63	-11	77.9	3.1	-2.2	121.21	-2.2	71.0	2.1	-2.7	15.22	-14.2	82.2	2.3	-10

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.

Standard Conditions Calculation:

$$scfm = Flowrate * Area * (Ts/Tm) * (Pm/Ps)$$

- Flowrate 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. 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					Extraction Well DW-6D Parameters					Extraction Well DW-1S Parameters					Extraction Well DW-1D Parameters					Extraction Well DW-4S Parameters					Extraction Well DW-4D Parameters					
	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	
	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(fpm)	(iwc)	(°F)	(ppmv)	(iwc)
02/18/08 ⁽¹⁾	170	-13.1	55.0	0.0	-6.0	44	-16.0	60.2	0.0	-14.0	160	-11.8	54.1	0.0	-5.0	20	-16.8	62.4	0.0	-15.0	170	-12.0	54.6	0.0	-2.0	8	268	-2.0	60.8	0.0	-3.0
02/19/08 ⁽¹⁾	167	-13.6	NM	0.0	-6.0	48	-17.5	NM	0.0	-14.0	235	-19.78	NM	0.0	-8.0	20	-18	NM	0.0	-16.0	155	-13.5	NM	0.0	-5.5	8	253	-1.95	NM	0.0	-1.5
02/25/08 ⁽¹⁾	167	-16.0	NM	0.0	-6.0	94	-23.5	NM	0.0	-20.5	228	-25.4	NM	NM	-7.2	28	-24.25	NM	0.0	-25.0	160	-16.0	NM	0.0	-5.5	8	160	-1.1	NM	0.0	-2.0
03/03/08 ⁽¹⁾	170	-16.0	NM	0.5	-5.5	55	-25.2	NM	0.0	-20	208	-26.79	NM	0.1	-7.0	32	-26.5	NM	0.0	-25.0	160	-16.0	NM	1.1	-5.70	8	110	-1.0	NM	0.0	-2.0
03/17/08 ⁽¹⁾	185	-22	NM	0.0	-6.0	65	-31	NM	1.2	-22	208	-29	NM	0.0	-7.5	32	-32.6	NM	0.0	-30	176	-26	NM	0.0	-6.0	8	124	-1.25	NM	0.0	-1.75
04/16/08	49.50	-1.44	53.6	0.2	NM	10.55	-1.86	57.5	1.9	NM	89.48	-3.31	52.3	0.0	NM	3.97	-0.79	61.3	0.0	NM	48.16	-1.43	55.5	0.0	NM	9.27	214	-0.48	60.6	0.0	NM
05/19/08	42.93	-1.2	61.8	2.5	-1.3	11.47	-2.6	60.0	0.0	-2.0	147.62	-10.5	55.5	0.0	-4.5	6.60	-1.8	64.4	0.3	-2.5	32.14	-1.0	61.7	1.7	-2.7	15.01	349	-1.1	63.3	0.6	-2.2
06/02/08	48.18	-1.2	68.0	0.0	-1.2	14.88	-2.2	72.5	0.0	-2.5	179.95	-10.3	61.3	0.0	-4.2	8.54	-1.8	74.1	0.0	-5.1	30.98	-0.7	66.2	0.0	-2.1	17.44	412	-1.2	71.6	0.0	-2.7
07/07/08	52.63	-1.5	71.6	1.2	-2.0	14.89	-2.1	75.2	3.3	-2.2	153.47	-6	68.5	2.3	-3.8	8.71	-1.3	77.3	2.2	-4.7	38.23	-0.2	72.8	1.2	-2.1	18.41	436	-1.1	73	2.5	-1.8

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.

Standard Conditions Calculation:

$$\text{scfm} = \text{Flowrate} \cdot \text{Area} \cdot \left(\frac{T_s}{T_m}\right) \cdot \left(\frac{P_m}{P_s}\right)$$

- Flowrate 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. 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					Extraction Well DW-2D Parameters					Extraction Well DW-10S Parameters					Extraction Well DW-11S Parameters				
	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum	Flow Rate at Manifold	Vacuum at Manifold	Temperature at Manifold	PID Measured Concentration	Wellhead Vacuum
	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(iwc)	(scfm)	(iwc)	(°F)	(ppmv)	(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	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⁾	140	-12.0	NM	0.0	-3.5	72	-10.4	NM	0.0	-4.5	65	-10	NM	0.0	-3.6	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⁾	138	-14.90	NM	0.3	-3.5	72	-12.3	NM	0.4	-4.7	67	-12.2	NM	0.4	-4.0	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⁾	140	-18.2	NM	0.9	-3.7	76	-13.4	NM	0.1	-5.0	67	-13.85	NM	0.0	-4.5	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⁾	140	-18	NM	0.2	-4.0	76	-12.0	NM	0.1	-5.5	65	-15.2	NM	0.0	-4.5	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	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	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	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	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	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	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	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	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

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.

Standard Conditions Calculation:

$$scfm = Flowrate * Area * (Ts/Tm) * (Pm/Ps)$$

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

Date	Knock Out Tank Parameters						Blower Parameters ⁽³⁾ BL-200				Blower Parameters ⁽³⁾ BL-300				Blower Parameters ⁽³⁾ BL-400				Combined Effluent Parameters VSP-601						Stack Parameters VSP-602			Water levels in Wells				
	Vacuum			Totalizer			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 Effluent 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	
	Influent KO-200	Influent KO-300	Influent KO-400	Effluent KO-200	Effluent KO-300	Effluent KO-400																										(iwc)
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	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	

Notes and Abbreviations:

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- 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.

Standard Conditions Calculation:

$$scfm = Flowrate * Area * (Ts/Tm) * (Pm/Ps)$$

- Flowrate 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. 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	

Time Weighted

Rolling Average: -0.104 -0.204 -0.225 -0.257 -0.307 -0.379 -0.215 -0.249 -0.236 -0.247 -0.176 -0.171 -0.185 -0.481 -0.394 -0.478 -0.251 -0.580 -0.350 -0.272 -0.474 -0.403 -0.366 -0.275

Gross Average Non Compliance points

07/07/08 -0.317

Gross Average Compliance Points

07/07/08 -0.140

Notes and Abbreviations:

- DW Depressurization Well
- NM Not measured due to temporary inaccessibility
- 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.

Table 2. 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-18B ⁽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
Time Weighted Rolling Average:	-1.006	-0.847	-0.610	-0.678	-0.270	-0.206	-0.221	-0.499	-0.294	-0.306	-0.190	-0.547	-0.386	-0.327	-0.204	-0.901	-0.658	-0.854	-0.559	-0.260	-0.200	-0.191	-0.220

Notes & Abbreviations:

- DW Depressurization Well
- NM Not measured due to temporary inaccessibility
- 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.

Table 3. Summary of Total Influent 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: Sample Date:	VSP-601 2/18/2008	VSP-601 2/19/2008	VSP-601 2/25/2008	VSP-601 3/3/2008	VSP-601 3/17/2008	VSP-601 4/16/2008	
	CAS No.	SGC						
1,1,1-Trichloroethane	71-55-6	6,800	110	71	35	26	35	<25
1,1-Dichloroethane	75-34-3	NS	43	33	45	47	59	31
2-Butanone	78-93-3	59,000	16	< 11	< 25	< 13	< 16	< 16
Acetone	67-64-1	180,000	< 140	< 110	< 250	< 130	< 31	< 31
Benzene	71-43-2	1,300	67	22	< 25	< 13	< 8.4	< 8.4
Chloroform	67-66-3	150	34	24	< 25	27	35	<22
cis-1,2-Dichloroethene	156-59-2	190,000 ⁽¹⁾	5800	4600	2900	1600	1400 D	1100
Freon 12	75-71-8	NS	< 14	< 11	< 25	13	46	<46
Tetrachloroethene	127-18-4	1,000	340	200	82	45	39	54
Toluene	108-88-3	37,000	92	98	34	61	140	37
Trans-1,2-Dichloroethene	156-60-5	NS	120	71	< 25	< 13	10	<19
Trichloroethylene	79-01-6	54,000	14000	9400	5100	2500	1500 D	1300
Vinyl Chloride	75-01-4	180,000	< 14	< 11	< 25	200	980 D	120
TVOC			20,622	14,519	8,196	4,519	4,244	2,642

Notes and abbreviations on last page

- 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 December 22, 2005.
- SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised December 22, 2005.
- TVOC Total volatile organic compounds
- ug/m³ Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated December 22, 2003. 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 - July 2008.
3. Table summarizes detected compounds only.

Table 3. Summary of Total Influent 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: Sample Date:	VSP-601 5/19/2008	VSP-601 6/2/2008	VSP-601 7/7/2008
	CAS No.	SGC		
1,1,1-Trichloroethane	71-55-6	6,800	38	44
1,1-Dichloroethane	75-34-3	NS	25	27
2-Butanone	78-93-3	59,000	< 28	28
Acetone	67-64-1	180,000	< 57	< 55
Benzene	71-43-2	1,300	19	< 15
Chloroform	67-66-3	150	44	55
cis-1,2-Dichloroethene	156-59-2	190,000 ⁽¹⁾	950	930
Freon 12	75-71-8	NS	< 48	< 45
Tetrachloroethene	127-18-4	1,000	42	48
Toluene	108-88-3	37,000	< 18	< 17
Trans-1,2-Dichloroethene	156-60-5	NS	< 19	< 18
Trichloroethylene	79-01-6	54,000	1000	1100
Vinyl Chloride	75-01-4	180,000	< 12	< 12
TVOC			2,118	2,232
				3,002

Notes and abbreviations on last page

- 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 December 22, 2005.
- SGC Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised December 22, 2005.
- TVOC Total volatile organic compounds
- ug/m³ Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated December 22, 2003. 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 - July 2008.
3. Table summarizes detected compounds only.

Table 4. Summary of Total 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: Sample Date:	VSP-602 2/18/2008	VSP-602 2/19/2008	VSP-602 2/25/2008	VSP-602 3/3/2008	VSP-602 3/17/2008	VSP-602 4/16/2008
	CAS No.	SGC					
1,1,1-Trichloroethane	71-55-6	6,800	< 0.62	< 0.61	< 0.63	< 0.63	< 14
1,1-Dichloroethane	75-34-3	NS	< 0.62	< 0.61	< 0.63	< 0.63	< 11
2-Butanone	78-93-3	59,000	< 0.62	< 0.61	< 0.63	< 0.63	< 16
Acetone	67-64-1	180,000	< 6.2	< 6.1	< 6.3	< 6.3	< 31
Benzene	71-43-2	1,300	< 0.62	< 0.61	< 0.63	< 0.63	< 8.4
Chloroform	67-66-3	150	< 0.62	< 0.61	< 0.63	< 0.63	< 13
cis-1,2-Dichloroethene	156-59-2	190,000 ⁽¹⁾	< 0.62	< 0.61	< 0.63	< 0.63	< 10
Freon 12	75-71-8	NS	< 0.62	0.71	5.7	8.3	< 26
Tetrachloroethene	127-18-4	1,000	< 0.62	< 0.61	< 0.63	< 0.63	< 3.6
Toluene	108-88-3	37,000	< 0.62	< 0.61	< 0.63	< 0.63	< 10
Trans-1,2-Dichloroethene	156-60-5	NS	< 0.62	< 0.61	< 0.63	< 0.63	< 10
Trichloroethylene	79-01-6	54,000	< 0.62	< 0.61	< 0.63	< 0.63	< 2.8
Vinyl Chloride	75-01-4	180,000	< 0.62	< 0.61	1.1	40	920 D
TVOC			0.0	0.71	6.8	48.3	920
							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 December 22, 2005.
- SGC** Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised December 22, 2005.
- TVOC** Total volatile organic compounds
- ug/m³** Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated December 22, 2003. 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 - July 2008.
3. Table summarizes detected compounds only.

Table 4. Summary of Total 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: Sample Date:	VSP-602 5/19/2008	VSP-602 6/2/2008	VSP-602 7/7/2008
	CAS No.	SGC		
1,1,1-Trichloroethane	71-55-6	6,800	< 2.7	< 2.5
1,1-Dichloroethane	75-34-3	NS	5.8	7.6
2-Butanone	78-93-3	59,000	< 2.9	< 2.7
Acetone	67-64-1	180,000	< 5.8	8.4
Benzene	71-43-2	1,300	< 1.6	< 1.5
Chloroform	67-66-3	150	< 2.4	3
cis-1,2-Dichloroethene	156-59-2	190,000 ⁽¹⁾	180	230 D
Freon 12	75-71-8	NS	< 4.9	< 4.5
Tetrachloroethene	127-18-4	1,000	< 0.67	2.2
Toluene	108-88-3	37,000	< 1.8	< 1.7
Trans-1,2-Dichloroethene	156-60-5	NS	< 1.9	2.8
Trichloroethylene	79-01-6	54,000	5.3	6.5
Vinyl Chloride	75-01-4	180,000	65	13
TVOC			256.1	273.5
				383

Notes and Abbreviations:

- 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 December 22, 2005.
- SGC** Short-term guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised December 22, 2005.
- TVOC** Total volatile organic compounds
- ug/m³** Micrograms per cubic meter

1. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated December 22, 2003. 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 - July 2008.
3. Table summarizes detected compounds only.

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Table 5. 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:	NA NA
	CAS No.	
1,1-Dichloroethane	75-34-3	
2-Butanone	78-93-3	
Acetone	67-64-1	
cis-1,2-Dichloroethene	156-59-2	No Sampling Performed During The Report Period
Isopropylbenzene	98-82-8	
Toluene	108-88-3	
trans-1,2-Dichloroethene	156-60-5	
Trichloroethylene	79-01-6	
Vinyl Chloride	75-01-4	
TVOC ⁽¹⁾		NA

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	Micograms 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). Data presented in this table corresponds to the period June - July 2008.
3. Table summarizes detected compounds only.

ARCADIS

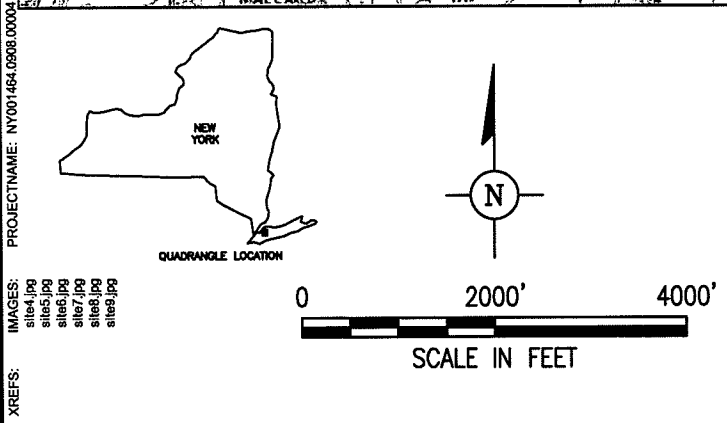
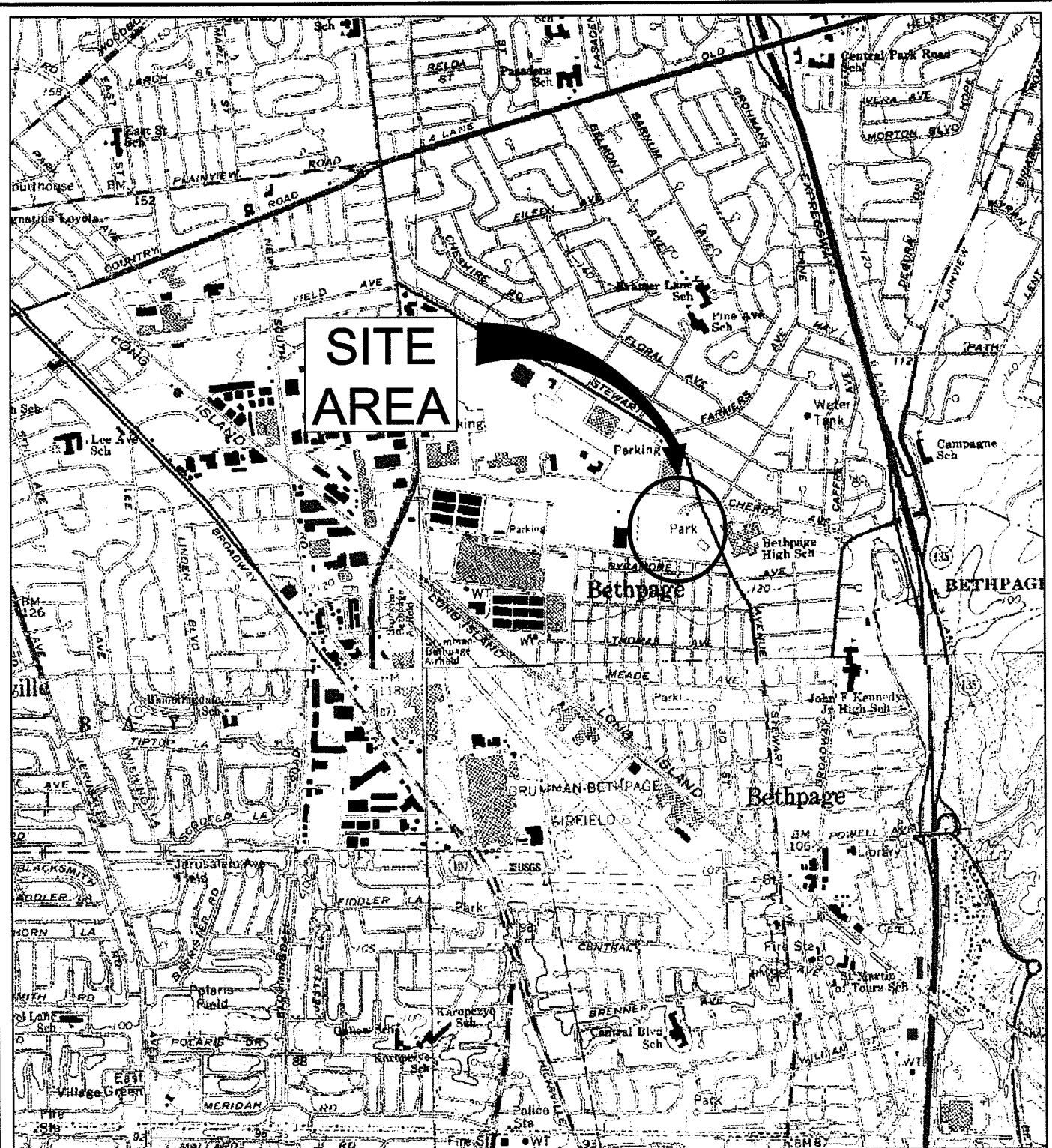
Table 6. Air Emissions Model Output Summary, Northrop Grumman Operable Unit 3 Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.

Compound ⁽¹⁾	AGC ⁽²⁾ (µg/m ³)	Percent of MASC Per Event ⁽³⁾									Cumulative % MASC ⁽⁴⁾
		2/18/2008	2/19/2008	2/25/2008	3/3/2008	3/17/2008	4/16/2008	5/19/2008	6/2/2008	7/7/2008	
Vinyl chloride	0.11	0.00%	0.00%	0.04%	1.60%	36.84%	20.63%	1.91%	0.41%	0.20%	8.33%
1,1-Dichloroethene	0.63	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.04%	0.06%	0.02%
Trichloroethylene	0.5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.05%	0.06%	0.02%
Tetrachloroethylene	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
cis-1,2-Dichloroethylene	1,900	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dichlorodifluoromethane (Freon 12)	12,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	28,000	0.00%	0.00%	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%	0.68%	0.10%
trans-1,2-Dichloroethene	1,900	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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 December 22, 2003. 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 concentration (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.

µg/m³ - Micrograms per cubic meter.
 AGC - Annual guideline concentration.



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 1978
 USGS 7.5 MIN. HUNTINGTON QUADRANGLE, HUNTINGTON, NY, 1967, PHOTOREVISED 1978

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

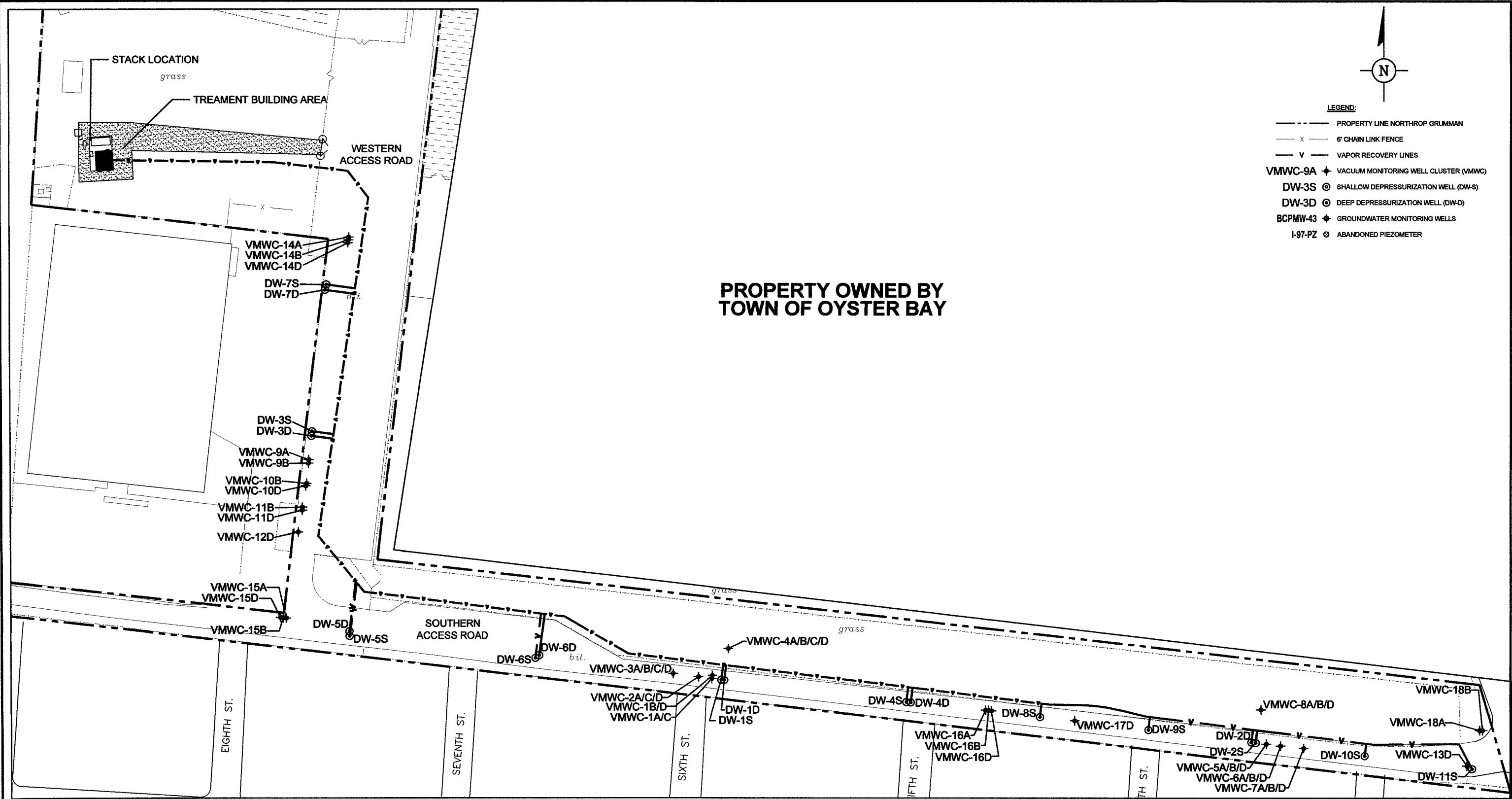
**SITE LOCATION MAP
 SOIL GAS INTERIM REMEDIAL MEASURE**

ARCADIS

FIGURE
1

IMAGES: NY001464.0908.00001
 site4.jpg
 site5.jpg
 site6.jpg
 site7.jpg
 site8.jpg
 site9.jpg

CITY/REG: DIV/GRP/REP: DB/REG/LD/OP: PIC/OP: PM/REG: TM/OP: LVR/OP/ON/OFF-REF: CLARIFICATION: Northrop Grumman Corporation/Supplemental/2008/03/13/001464.0008 Nitro Report/OMM Reports/July 2008 Monthly Report/Figures/080722_1464.02.dwg LAYOUT: 2 SAVED: 8/1/2008 10:28 AM ACADVER: 17.1S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: ARCADIS_MELVILLE.CTB PLOTTED: 8/2/2008 4:47 PM BY: SANCHEZ, ADRIAN



PROPERTY OWNED BY
TOWN OF OYSTER BAY

- LEGEND:**
- PROPERTY LINE NORTHROP GRUMMAN
 - x- 6' CHAIN LINK FENCE
 - v- VAPOR RECOVERY LINES
 - VMWC-9A ◆ VACUUM MONITORING WELL CLUSTER (VMWC)
 - DW-3S ⊙ SHALLOW DEPRESSURIZATION WELL (DW-S)
 - DW-3D ⊙ DEEP DEPRESSURIZATION WELL (DW-D)
 - BCPMW-43 ◆ GROUNDWATER MONITORING WELLS
 - I-97-PZ ⊙ ABANDONED PIEZOMETER



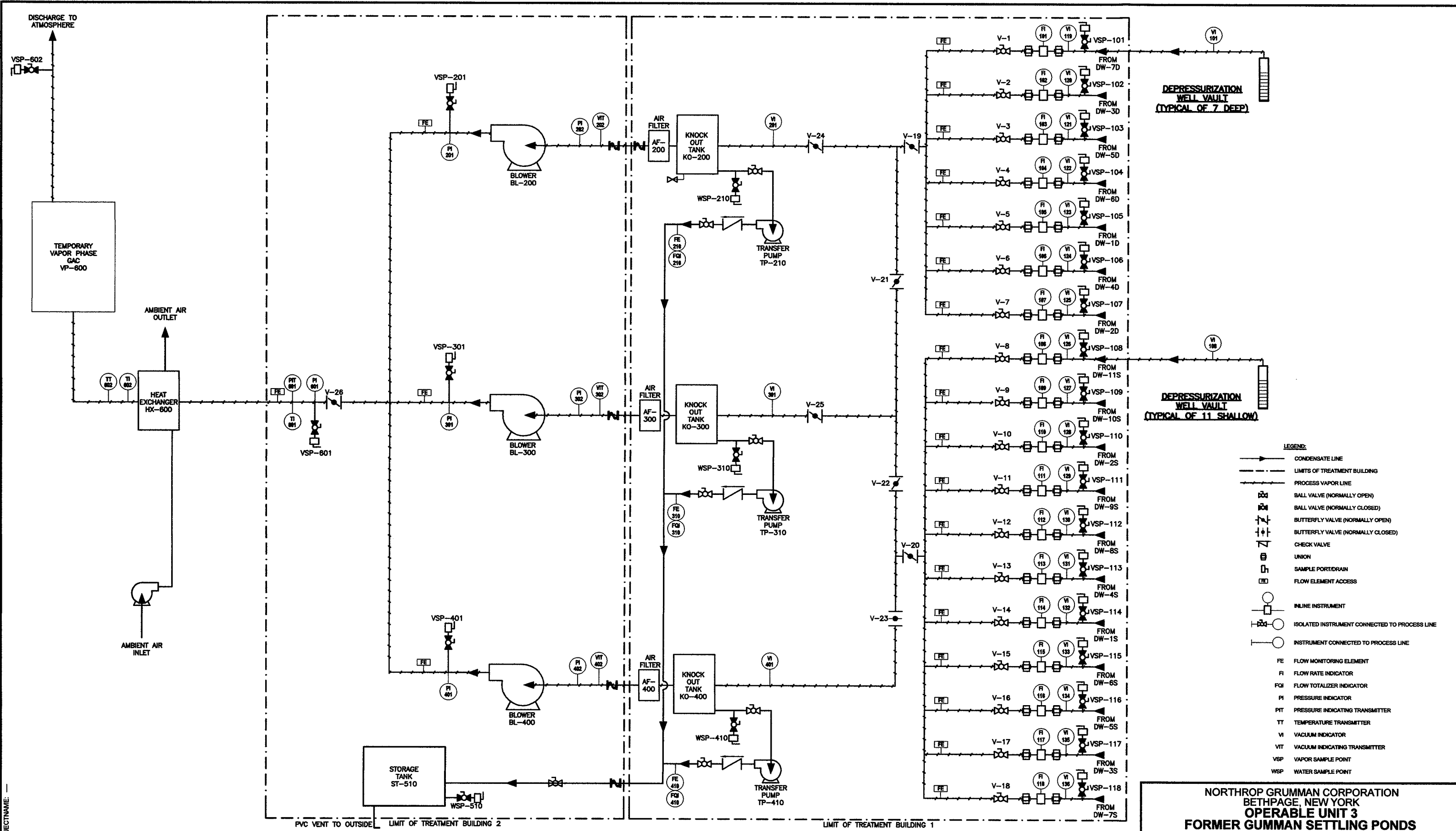
NORTHROP GRUMMAN CORPORATION
BETHPAGE, NEW YORK
OPERABLE UNIT 3
FORMER GRUMMAN SETTLING PONDS

GENERAL SITE PLAN
SOIL GAS INTERIM REMEDIAL MEASURE

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FIGURE
2

CITY: (Rev) DIV/GRUP: (Rev) DB: (Rev) LD: (Rev) PIC: (Rev) TIK: (Rev) LVL: (Rev) OFF: (Rev) REF: G:\PROJECTS\Northrop\020808\03\NY1001464\0808 Mtg Report\03\Figures\080722_1464_03.dwg LAYOUT: 3 SAVED: 7/28/2008 2:21 PM ACADVER: 17.1S (LMS TECH) PAGES: 17 PLOTTED: 9/5/2008 4:46 PM BY: SANCHEZ, ADRIAN XREFS: IMAGES: PROJECTNAME:



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

PROCESS FLOW DIAGRAM
SOIL GAS INTERIM REMEDIAL MEASURE

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FIGURE
3

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Appendix A

Summary of Vapor Sample
Analytical Results Including
Tentatively Identified Compounds

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Appendix A-1. Summary of Total Influent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3
Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.⁽¹⁾

Compound (units in ug/m3)	Location ID: Sample Date:	VSP-601 7/7/2008
1,1,1-Trichloroethane		48
1,1,2,2-Tetrachloroethane		< 6.1
1,1,2-Trichloroethane		< 24
1,1-Dichloroethane		28
1,1-Dichloroethene		< 18
1,2-Dichloroethane		< 18
1,2-Dichloropropane		< 21
1,3-Butadiene		< 20
2-Butanone		27
2-Hexanone		< 18
4-Methyl-2-Pentanone		< 36
Acetone		< 53
Benzene		150
Bromodichloromethane		< 6
Bromoform		< 46
Bromomethane		< 17
Carbon Disulfide		< 14
Carbon Tetrachloride		< 5.6
CFC-11		< 25
Chlorobenzene		< 20
Chlorodibromomethane		< 7.6
Chloroethane		< 23
Chloroform		88
Chloromethane		< 18
cis-1,2-Dichloroethene		1100
cis-1,3-Dichloropropene		< 40
Ethylbenzene		< 39
Freon 113		< 6.8
Freon 12		< 44
Methyl Tert-Butyl Ether		< 32
Methylene Chloride		< 15
Styrene		< 38
Tetrachloroethene		61
Toluene		< 17
Trans-1,2-Dichloroethene		< 18
Trans-1,3-Dichloropropene		< 20
Trichloroethylene		1500
Vinyl Chloride		< 11
Xylene-o		< 39
Xylenes - m,p		< 77
TVOC		3,002

Notes and Abbreviations on Next Page

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Appendix A-1. Summary of Total Influent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3
Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.⁽¹⁾

Notes and Abbreviations:

Bold	Compound detected above method detection limit
D	Compound detected at a secondary dilution
TVOC	Total volatile organic compounds
ug/m ³	Micrograms per cubic meter

1. 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 June - July 2008.

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Appendix A-2. Summary of Total Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3
Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.⁽¹⁾

Compound (units in ug/m3)	Location ID: Sample Date:	VSP-602 7/7/2008
1,1,1-Trichloroethane		< 6.5
1,1,2,2-Tetrachloroethane		< 1.6
1,1,2-Trichloroethane		< 6.5
1,1-Dichloroethane		11
1,1-Dichloroethene		< 4.7
1,2-Dichloroethane		< 4.8
1,2-Dichloropropane		< 5.5
1,3-Butadiene		< 5.3
2-Butanone		< 7
2-Hexanone		< 4.9
4-Methyl-2-Pentanone		< 9.7
Acetone		< 14
Benzene		< 3.8
Bromodichloromethane		< 1.6
Bromoform		< 12
Bromomethane		< 4.6
Carbon Disulfide		< 3.7
Carbon Tetrachloride		< 1.5
CFC-11		< 6.7
Chlorobenzene		< 5.5
Chlorodibromomethane		< 2
Chloroethane		< 6.3
Chloroform		8.4
Chloromethane		< 4.9
cis-1,2-Dichloroethene		350
cis-1,3-Dichloropropene		< 11
Ethylbenzene		< 10
Freon 113		< 1.8
Freon 12		< 12
Methyl Tert-Butyl Ether		< 8.6
Methylene Chloride		< 4.1
Styrene		< 10
Tetrachloroethene		< 1.6
Toluene		< 4.5
Trans-1,2-Dichloroethene		< 4.7
Trans-1,3-Dichloropropene		< 5.4
Trichloroethylene		7.7
Vinyl Chloride		5.9
Xylene-O		< 10
Xylenes - M,P		< 21
TVOC		383

Notes and Abbreviations on Last Page

Appendix A-2. Summary of Total Effluent Vapor Sample Analytical Results, Northrop Grumman Operable Unit 3
Soil Gas Interim Remedial Measure, Former Grumman Settling Ponds, Bethpage, New York.⁽¹⁾

Notes and Abbreviations:

Bold	Compound detected above method detection limit
D	Compound detected at a secondary dilution
TVOC	Total volatile organic compounds
ug/m ³	Micrograms per cubic meter

1. 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 June - July 2008.

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Appendix A-3. Summary of Total Influent 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 ^(3,4)	Location ID: VSP-601
	Sample Date: 07/07/08
	(ppbv)
Chlorodifluoromethane + Propene + Propane	--
Hexamethylcyclotrisiloxane ⁽¹⁾	--
2-Ethyl-1-hexanol	--
n-Nonanal	--
Chlorodifluoromethane (Freon 22)	280
Ethanol	--
Acetophenone	--
alpha-Cumyl Alcohol	--
Chloroethene	--
Methylcyclohexane	--
Propane	--
Acetaldehyde	--
Unknown CFC	290
3-Methyl-Hexane	--
Heptane	--
Unknown cyclic hydrocarbon	--
1,2,4-trimethylcyclopentane	--
Unknown aliphatic hydrocarbon	--
Unknown aliphatic hydrocarbon	--
1,3-dimethyl-cis-cyclohexane	--

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 June - July 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.

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Appendix A-4. Summary of Total 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 ^(3,4)	Location ID: VSP-602
	Sample Date: 07/07/08
	(ppbv)
Chlorodifluoromethane + Propene + Propane	--
Hexamethylcyclotrisiloxane ⁽¹⁾	--
2-Ethyl-1-hexanol	--
n-Nonanal	--
Chlorodifluoromethane (Freon 22)	210
Ethanol	--
Acetophenone	--
alpha-Cumyl Alcohol	--
Chloroethene	--
Methylcyclohexane	--
Propane	--
Acetaldehyde	--
Unknown CFC	250
3-Methyl-Hexane	--
Heptane	--
Unknown cyclic hydrocarbon	--
1,2,4-trimethylcyclopentane	--
Unknown aliphatic hydrocarbon	--
Unknown aliphatic hydrocarbon	--
1,3-dimethyl-cis-cyclohexane	--

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 June - July 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.

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Appendix B

Summary of Condensate Sample
Analytical Results Including
Tentatively Identified Compounds

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Appendix B-1. 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 (units in ug/L)	Location ID: Sample Date:	NA NA
	CAS No.	
1,1,1-Trichloroethane	71-55-6	
1,1,2,2-Tetrachloroethane	79-34-5	
1,1,2-Trichloroethane	79-00-5	
1,1-Dichloroethane	75-34-3	
1,1-Dichloroethene	75-35-4	
1,2,4-Trichlorobenzene	120-82-1	
1,2-Dibromo-3-Chloropropane (DBCP)	96-12-8	
1,2-Dibromoethane (EDB)	106-93-4	
1,2-Dichlorobenzene	95-50-1	
1,2-Dichloroethane	107-06-2	
1,2-Dichloropropane	78-87-5	
1,4-Dichlorobenzene	106-46-7	
2-Butanone	78-93-3	
2-Hexanone	591-78-6	
4-Methyl-2-Pentanone	108-10-1	
Acetone	67-64-1	
Benzene	71-43-2	
Bromodichloromethane	75-27-4	
Bromoform	75-25-2	
Bromomethane	74-83-9	
Carbon Disulfide	75-15-0	
Carbon Tetrachloride	56-23-5	No Sampling Performed During The Report Period
CFC-11	75-69-4	
Chlorobenzene	108-90-7	
Chlorodibromomethane	124-48-1	
Chloroethane	75-00-3	
Chloroform	67-66-3	
Chloromethane	74-87-3	
cis-1,2-Dichloroethene	156-59-2	
cis-1,3-Dichloropropene	10061-01-5	
Cyclohexane	110-82-7	
Ethylbenzene	100-41-4	
Freon 113	76-13-1	
Freon 12	75-71-8	
Isopropylbenzene	98-82-8	
m-Dichlorobenzene	541-73-1	
Methyl Acetate	79-20-9	
Methyl tert-butyl ether	1634-04-4	
Methylcyclohexane	108-87-2	
Methylene Chloride	75-09-2	
Styrene	100-42-5	
Tetrachloroethene	127-18-4	
Toluene	108-88-3	
trans-1,2-Dichloroethene	156-60-5	
trans-1,3-Dichloropropene	10061-02-6	
Trichloroethylene	79-01-6	
Vinyl Chloride	75-01-4	
Xylene-o	95-47-6	
Xylenes - m,p	179601-23-1	
TVOC		NA

Notes and abbreviations on next page

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

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	Micorgrams 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) . Data presented in this table corresponds to the period June - July 2008.

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Appendix B-2. 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)	Sample ID: Date:	NA NA
Unknown Ethanol Furan, tetrahydro- Unknown alcohol Cyclohexanone Isopropyl Alcohol Butanal Heptanal 1-Hexanol, 2-ethyl-	No Sampling Performed During The Report Period	

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.
 - NA Not applicable
 - ug/L Micograms 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). Data presented in this table corresponds to the period June - July 2008.
 3. All results are estimated.

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Appendix C

Air Modeling Calculations

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

Parameter	Date Sampled:	2/18/2008	2/19/2008	2/25/2008	3/3/2008	3/17/2008	4/16/2008	5/19/2008	6/2/2008	7/7/2008
SCREEN3 Model Input										
Source Type		Point	Point	Point	Point	Point	Point	Point	Point	Point
Emission Rate (g/s)		1	1	1	1	1	1	1	1	1
Stack Height (ft)		33	33	33	33	33	33	33	33	33
Stack Height (m)		10.1	10.1	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	0.41	0.41
Air Flow Rate (scfm) ⁽¹⁾		1,964	1,674	1,679	1,793	1,774	641	666	746	829
Air Flow Rate (acfm @ stack temp) ⁽²⁾		2,048	1,717	1,754	1,873	1,859	655	671	766	860
Stack Gas Exit Temperature (K) ⁽¹⁾		307	302	308	308	309	301	296	303	305
Ambient Air Temperature (K) ⁽³⁾		283	275	274	275	276	281	284	294	298
Receptor Height (m) ⁽⁴⁾		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Urban/Rural		Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban
Building Height (m)		2.4	2.4	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	4.9	4.9
Max Horizontal Bldg Dim (m)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Consider Bldg Downwash?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simple/Complex Terrain Above Stack		Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple
Simple/Complex Terrain Above Stack Base		Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple
Meteorology		Full	Full	Full	Full	Full	Full	Full	Full	Full
Automated Distances Array		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terrain Height Above Stack Base		0	0	0	0	0	0	0	0	0
SCREEN3 Model Output										
1-HR Max		596.3	698.3	638.3	622.9	627.6	1,292	1,278	1,200	1,129
Annualization Factor ⁽⁶⁾		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Average Annual Concentration at Receptor Height (ug/m)		47.7	55.9	51.1	49.8	50.2	103.4	102.2	96	90.3
Distance To Max Concentration (m) ⁽⁶⁾		66	61	64	64	64	45	45	47	48

See notes last page.

Table C-1. 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

$\mu\text{g}/\text{m}^3$ - Micrograms per cubic meter

Table C-2. Summary of Annual 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)								
	2/18/2008	2/19/2008	2/25/2008	3/3/2008	3/17/2008	4/16/2008	5/19/2008	6/2/2008	7/7/2008
Vinyl chloride	0	0	1.1	40	920	710	65	13	6
1,1-Dichloroethane	0	0	0	0	0	0	5.8	7.6	11
Trichloroethylene	0	0	0	0	0	0	5.3	6.5	7.7
Tetrachloroethylene	0	0	0	0	0	0	0	2.2	0
cis-1,2-Dichloroethylene	0	0	0	0	0	78	180	230	350
Dichlorodifluoromethane (Freon 12)	0	0.71	5.7	8.3	0	0	0	0	0
Acetone	0	0	0	0	0	0	0	8.4	0
Chloroform	0	0	0	0	0	0	0	3	8
trans-1,2-Dichloroethene	0	0	0	0	0	0	0	2.8	0

Compound	AGC ⁽²⁾ (µg/m ³)	Annual Maximum Allowable Stack Concentration (µg/m ³)								
		2/18/2008	2/19/2008	2/25/2008	3/3/2008	3/17/2008	4/16/2008	5/19/2008	6/2/2008	7/7/2008
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	3.17E+03	3.00E+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	1.82E+04	1.72E+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	1.44E+04	1.36E+04
Tetrachloroethylene	1	2.17E+04	2.21E+04	2.36E+04	2.27E+04	2.27E+04	3.13E+04	3.09E+04	2.88E+04	2.73E+04
cis-1,2-Dichloroethylene	1,900	4.12E+07	4.19E+07	4.49E+07	4.32E+07	4.31E+07	5.94E+07	5.87E+07	5.47E+07	5.18E+07
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	3.46E+08	3.27E+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	8.07E+08	7.64E+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	1.24E+03	1.17E+03
trans-1,2-Dichloroethene	1,900	4.12E+07	4.19E+07	4.49E+07	4.32E+07	4.31E+07	5.94E+07	5.87E+07	5.47E+07	5.18E+07

See notes last page.

Table C-2. Summary of Annual 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⁾								
	2/18/2008	2/19/2008	2/25/2008	3/3/2008	3/17/2008	4/16/2008	5/19/2008	6/2/2008	7/7/2008
Vinyl chloride	0.00%	0.00%	0.04%	1.60%	36.84%	20.63%	1.91%	0.41%	0.20%
1,1-Dichloroethane	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.04%	0.06%
Trichloroethylene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.05%	0.06%
Tetrachloroethylene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%
cis-1,2-Dichloroethylene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dichlorodifluoromethane (Freon 12)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acetone	0.00%	0.00%	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%	0.24%	0.68%
trans-1,2-Dichloroethene	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Notes:

1. Actual effluent concentrations are analytical results from air samples collected on the dates shown.
2. AGC refers to the compound-specific annual guideline concentration per the NYSDEC DAR-1 AGC/SGC tables, revised December 22, 2003.
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.

µg/m³ - Micrograms per cubic meter
 AGC - Annual guideline concentration