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Infrastructure, environment, facilities

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ENVIRONMENT

Nathan Putnam
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Date:
8 November 2006

Contact:
Doug Smolensky

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Email:
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Our ref:
NY001422.0002.00002

Subject:
October, 2006 System Status Report
Soil Vapor Recovery System
United Stellar Industries Property,
131 Sunnyside Boulevard Site, Plainview, New York.

Dear Mr. Putnam:

ARCADIS G&M, Inc. in conjunction with ARCADIS Engineers & Architects of New York, P.C. has prepared this system status report for the Vapor Recovery System (VRS), on behalf of 131 Sunnyside, LLC (Sunnyside) and Gertrude Discount (Discount), at the United Stellar Industries Property located at 131 Sunnyside Blvd. in Plainview, New York. A letter report, summarizing the results of the VRS pilot test was submitted to the NYSDEC by ARCADIS on May 11, 2005. The VRS was restarted and is being operated in accordance with the VRS pilot test extension letter originally submitted to the New York State Department of Environmental Protection (NYSDEC) on September 7, 2005, with NYSDEC comments, dated October 11, 2005, then revised and submitted by ARCADIS on November 18, 2005, with NYSDEC comments, dated February 2, 2006 and ARCADIS responses, dated May 15, 2006.

The following report provides documentation of all monitoring activities completed during the month of October, 2006. During this reporting period the system was operated and one performance monitoring event was performed (October 5, 2006). Operational and volatile organic compound (VOC) data collected during the monitoring events are in Tables 1, 2, and 3. A brief analysis of performance monitoring data is provided below.

Vapor Recovery System Operation

The VRS consists of three vacuum extraction locations (SVE-1, SVE-2 and SVE-3), six induced vacuum/vapor monitoring points (MP-1 through MP-6), a 5-horsepower regenerative blower, a moisture separator and two 400-pound vapor phase granular activated carbon units (VPGACs). Control valves, monitoring gauges, and sample ports were installed as necessary to adjust system operation and provide a means for collecting the data provided within this report. All vapor samples were submitted to Air Toxics Laboratory in Folsom, CA for laboratory analysis via Method TO-14 (Direct Inject).

Results

Operational measurements including applied vacuum levels at each extraction point, extracted air flow rates, and Photo-ionization detector (PID) readings are summarized in Table 1. In summary, the VRS is operating as designed. Key observations are as follows:

- Air flow rates at the vacuum extraction points measured during the October, 2006 operational period ranged from approximately 40 to 68 cubic feet per minute (cfm).
- VRS wellhead vacuum measurements during October, 2006 operation ranged from -34 inches water column (i.w.c.) to -36 i.w.c.
- PID measurements during October, 2006 operation were non-detect.
- Negative vacuum levels were measured in all of the monitoring points (MP-1 through MP-6) during each monitoring event.

Vapor sample analytical results are summarized in Tables 2 and 3. During October, 2006 operation, the following VOCs were detected: trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), cis-1,2-dichloroethene (1,2-DCE), Freon 12, Freon 113, and 2-proponol. In all extraction points, VOC concentrations were less than levels observed during the last monitoring event of the pilot test (June 1, 2005). A summary of VOC analytical results is as follows:

- During the October, 2006 operational period, extraction point SVE-1 had a TCE concentration of 3,000 ug/m^3. Total volatile organic compound (TVOC)

concentration for SVE-1 was 3,507 ug/m^3. Under continued operation during October, 2006, TCE and TVOC concentrations increased from the previous sampling round conducted in September, 2006 but are well below June, 2006 levels.

- During the October, 2006 operational period, extraction point SVE-2 had a TCE concentration of 5,500 ug/m^3. Total volatile organic compound (TVOC) concentration for SVE-1 was 6,056 ug/m^3. Under continued operation during October, 2006, TCE and TVOC concentrations decreased from the previous sampling round conducted in September, 2006 and are below June, 2006 levels.

- During the October, 2006 operational period, extraction point SVE-3 had a TCE concentrations of 450 ug/m^3. Total volatile organic compound (TVOC) concentration for SVE-1 was 743 ug/m^3. Under continued operation during October, 2006, TCE and TVOC concentrations decreased from the previous sampling round conducted in September, 2006 and are below June, 2006 levels.

- During the October, 2006 reporting period, the lead VPGAC vessel had an effluent TVOC concentration of 378 ug/m^3. The stack had a total effluent TVOC concentration of 94 ug/m^3.

- In addition to the field and laboratory analytical results provided herein, ARCADIS calculated and is providing air modeling results for the last four monitoring events (August 11 through October 5, 2006) since the June system restart. Air modeling calculations were performed using the influent concentrations and the NYSDEC DAR-1 Annual Guidance Concentration (AGC) model. Modeling results are provided in Tables A1 through A4. As shown on the Tables A1 through A4, modeling results indicate that the influent (i.e., untreated) vapor stream has been well below NYSDEC AGCs during the last four monitoring events.

Conclusions

ARCADIS G&M has drawn the following conclusions based on the results provided herein:

- The VRS operated as intended (i.e., a negative vacuum was maintained throughout the entire building footprint and contaminant mass was removed).

- TCE and TVOC concentrations are stable to decreasing in each of the three VRS extraction points.
- The highest VOC concentrations were observed in SVE-2 with lower concentrations present at SVE-1 and SVE-3.
- NYSDEC DAR-1 AGC emissions calculations indicate that the influent vapor stream has been below the NYSDEC AGC limits for the last four monitoring events.

Recommendations

ARCADIS G&M recommends the following based on the results provided herein:

- Continued operation of the VRS.
- Discontinuing the use of the two VPGAC units for the following reasons:
    - Influent (untreated) vapor emissions are well below NYSDEC emission guidelines; and,
    - The existing treatment shed is located away from any potential human or environmental receptors (including building HVAC intakes).
- Preparing and submitting system status reports on a quarterly basis for the following reasons:
    - The system monitoring frequency has been reduced to monthly (from bimonthly); and,
    - Influent vapor emissions are currently well below NYSDEC emission guidelines.

Please call if you have questions or require additional information. If our recommendations are acceptable, please indicate in writing to ARCADIS as soon as possible so the system operation and reporting can be modified accordingly.

Sincerely,

ARCADIS G&M, Inc.

Douglas A. Smolensky
Associate Vice President

ARCADIS Engineers & Architects of New York, P.C.

Christina Berardi Tuohy

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Table 1. System Operational Data, Vapor Recovery System, United Stellar Industris, Plainview, New York.

		SVE - 1 Extraction Well Parameters				SVE - 2 Extraction Well Parameters				SVE - 3 Extraction Well Parameters			
Date	Time	Wellhead Vacuum (in.W.C.)	Air Velocity (fpm)	Air Flow Rate (1) (cfm)	PID Measured Concentration (ppmv)	Wellhead Vacuum (in.W.C.)	Air Velocity (fpm)	Air Flow Rate (1) (cfm)	PID Measured Concentration (ppmv)	Wellhead Vacuum (in.W.C.)	Air Velocity (fpm)	Air Flow Rate (1) (cfm)	PID Measured Concentration (ppmv)
6/8/06	1:40 PM [2]	0.0	--	--	--	--	--	--	--	--	--	--	--
	2:45PM[3]	-40.0	--	--	0.0	-39.0	--	--	0.0	-41.0	--	--	0.0
	4:45 PM	-40.0	--	--	0.0	-39.0	--	--	0.0	-42.0	--	--	0.0
	6:10 PM	-40.0	3,600.0	82.4	0.0	-39.0	2600	59.5	0.0	-42.0	3400	77.9	0.0
6/9/06	11:30:00 AM[4]	-56.0	--	--	--	-56.0	--	--	--	0.0	--	--	--
6/12/06	10:00 AM	-56.00	--	--	--	-56.0	--	--	--	0.0	--	--	--
6/16/06	2:30 PM	-39.0	4,400.0	100.8	0.0	-38.0	3800	87.0	0.0	40.0[7]	3200	73.3	0.0
6/30/06	12:10PM	-38.0	4,650.0	106.5	0.0	-38.0	4520	103.5	0.0	-40.0	4,800.0	109.9	0.0
7/14/06	2:14PM	-42.0	2,517.0	57.6	0.0	-42.5	2730	62.5	0.0	-51.0	1882	43.1	0.0
7/28/06	11:57 AM	-36.0	2,637.0	60.4	0.0	-35.8	1950	44.7	0.0	-37.9	2678	61.3	0.0
8/11/06	4:00 PM	-36.0	--	--	0.0	-37.0	--	--	0.0	-37.0	--	--	0.0
8/25/06	1:35 PM	-34.5	4,441.0	101.7	--	-34.0	3081	70.5	--	-36.1	3521	80.6	--
9/8/06	12:00AM	-34.0	3,756.0	86.0	0.0	-34.0	3467	79.4	0.0	-36.0	4232	96.9	0.0
10/5/06	2:30 PM	-34.0	2,788.0	63.8	0.0	-34.0	1729	39.6	0.0	-36.0	2950	67.5	0.0

1. Air flow rate was calculated by multiplying measured air velocity by cross sectional area of the pipe.
2. The Soil Vapor Extraction System baseline reading was taken @ 1:45PM June 8, 2006.
3. The system was started at 2:30 PM. First reading was taken at 15 minutes after start-up.
4. SVE-3 was valved off after leak was discovered in well head.
5. Temperature taken with handheld infra red thermometer
6. GAC 500 was temporarily removed until replacement vessel arrived
7. SVE-3 Well sealed and well brought on line
8. The MP-6 remote monitoring location was inoperational during the 8/25/06 O&M site visit.
9. This reading was taken at the wellhead

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Table 1. System Operational Data, Vapor Recovery System, United Stellar Industris, Plainview, New York.

		Blower Parameters		GAC 500 Parameters					GAC 600 Parameters				
Date	Time	Influent Vacuum (in.W.C.)	Effluent Pressure (in.W.C.)	Discharge Pressure (in.W.C.)	Discharge Temperature (Degrees F)	Air Velocity (fpm)	Air Flow Rate (1) (cfm)	PID Measured Concentration (ppmv)	Discharge Pressure (in.W.C.)	Discharge Temperature (Degrees F)	Air Velocity (fpm)	Air Flow Rate (1) (cfm)	PID Measured Concentration (ppmv)
6/8/06	1:40:00 PM [2]	--	--	--	--	--	--	--	--	--	--	--	--
	2:45:00 PM[3]	-52.0	5.0	2.0	--	--	--	14.0	--	--	--	--	0.0
	4:45 PM	-51.0	6.0	2.0	--	--	--	10.5	--	--	--	--	--
	6:10 PM	-51.0	6.0	2.0	--	--	--	4.4	--	--	3000	268.2	--
6/9/06	11:30 AM	-64.0	4.0	1.0	115.0[5]	--	--	--	--	100.0(5)	0	--	--
6/12/2006	10:00 AM	-65.0	4.0	1.0	--	--	--	--	--	--	--	--	--
6/16/2006	2:30 PM	-50.0	4.0	--[6]	--	--	--	--	--	120.0	3800	339.8	0.0
6/30/06	12:10PM	-50.0	8.0	--	--	--	--	--	0.0	100.0	4250	380.0	0.0
7/14/06	2:14PM	-51.0	8.0	7.0	--	--	--	0.0	0.0	108.8	1883	168.4	0.0
7/28/06	11:57 AM	-49.8	8.5	7.0	115 [5]	--	--	0.0	0.0	107 [5]	1530	136.8	0.0
8/11/06	4:00 PM	-49.0	9.0	--	--	--	--	--	--	--	--	--	--
8/25/06	1:35 PM	-48.5	9.0	7.5	--	--	--	--	0.0	98.6	5204	465.3	--
9/8/06	12:00AM	-48.0	9.5	--	--	--	--	--	0.0	107.7	3130	279.9	0.0
10/5/06	2:30 PM	-48.0	10.0	--	120.0	3,040.0	271.8	0.0	0.0	97.8	2150	192.2	0.0

1. Air flow rate was calculated by multiplying measured air velocity by cross sectional area of the pipe.
2. The Soil Vapor Extraction System baseline reading was taken @ 1:45PM June 8, 2006.
3. The system was started at 2:30 PM. First reading was taken at 15 minutes after start-up.
4. SVE-3 was valved off after leak was discovered in well head.
5. Temperature taken with handheld infra red thermometer
6. GAC 500 was temporarily removed until replacement vessel arrived
7. SVE-3 Well sealed and well brought on line
8. The MP-6 remote monitoring location was inoperational during the 8/25/06 O&M site visit.
9. This reading was taken at the wellhead

Table 1. System Operational Data, Vapor Recovery System, United Stellar Industris, Plainview, New York.

Date	Time	Induced Vacuum Measurements					
		MP-1 (in.W.C.)	MP-2 (in.W.C.)	MP-3 (in.W.C.)	MP-4 (in.W.C.)	MP-5 (in.W.C.)	MP-6 (in.W.C.)
6/8/06	1:40:00 PM [2]	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00 PM[3]	-0.14	-0.11	-0.08	-0.16	-0.09	-0.13
	4:45 PM	-0.11	-0.09	-0.07	-0.16	-0.07	-0.11
	6:10 PM	-0.13	-0.09	-0.07	-0.16	-0.07	-0.11
6/9/06	11:30 AM	-0.14	-0.12	-0.08	0.00	-0.01	-0.13
6/12/2006	10:00 AM	--	--	--	--	--	
6/16/2006	2:30 PM	-0.09	-0.09	-0.08	-0.17	-0.05	-0.10
6/30/06	12:10PM	--	--	--	--	--	--
7/14/06	2:14PM	-0.10	-0.10	-0.15	-0.18	-0.08	-0.12
7/28/06	11:57 AM	-0.07	-0.10	-0.09	-0.16	-0.07	-0.01
8/11/06	4:00 PM	-0.045	-0.045	-0.04	-0.075	-0.042	-0.08
8/25/06	1:35 PM	-0.03	-0.037	-0.03	-0.065	-0.025	0.00[8]
9/8/06	12:00AM	-0.04	-0.04	-0.04	-0.08	-0.05	-0.07
10/5/06	2:30 PM	-0.05	-0.04	-0.04	-0.04[9]	-0.05	-0.05[9]

1. Air flow rate was calculated by multiplying measured air velocity by cross sectional area of the pipe.
2. The Soil Vapor Extraction System baseline reading was taken @ 1:45PM June 8, 2006.
3. The system was started at 2:30 PM. First reading was taken at 15 minutes after start-up.
4. SVE-3 was valved off after leak was discovered in well head.
5. Temperature taken with handheld infra red thermometer
6. GAC 500 was temporarily removed until replacement vessel arrived
7. SVE-3 Well sealed and well brought on line
8. The MP-6 remote monitoring location was inoperational during the 8/25/06 O&M site visit.
9. This reading was taken at the wellhead

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Table 2. Summary of Extraction Well Vapor Sample Analytical Results, Vapor Recovery System, United Stellar Industries, Plainview, New York.

Constituents (units in ug/m^3)	Sample ID:	SVE-1 [1]	SVE-1 [1]	SVE-1 [1]	SVE-1 [1]	SVE-1 [1]	SVE-1 [1]	SVE-1 [1]	SVE-1 [1]	SVE-2 [1]	SVE-2 [1]	SVE-2 [1]
	Date:	6/16/2006[3]	6/30/2006	7/14/2006	7/28/2006	8/11/2006	8/25/2006	9/8/2006	10/5/2006	6/30/2006	7/14/2006	7/28/2006
Freon 12		ND	ND	ND	ND	29	ND	ND	25	ND	ND	ND
Freon 113		280J	410	61	70	100	44	52	67	580	190	180
Chloroform		51J	160	ND	ND	33	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		150J	1100	220	210	340	87	98	110	52	ND	ND
Trichloroethene		5200J	5900	840	1400	3200	980	1700	3000	16000	3300	3200
Tetrachloroethene		210J	220	ND	46	140	ND	60	130	190	46	39
trans-1,2-Dichloroethene		NDJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene		140J	160	42	80	180	71	90	130	290	88	84
1,1-Dichloroethane		NDJ	ND	ND	20	32	ND	ND	ND	ND	ND	ND
Toluene		32J	ND	ND	ND	ND	24	ND	ND	ND	ND	ND
2-Propanol		200J	130	ND	ND	14	ND	100	45	130	ND	ND
Total VOCs [2]		**6,263**	**8080**	**1163**	**1826**	**4068**	**1206**	**2100**	**3507**	**17242**	**3624**	**3503**

ug/m^3 micrograms per cubic meter

ND analyte not detected at, or above its laboratory quantification limit

1. Samples collected by ARCADIS personnel during the periods shown and submitted to Air Toxics Laboratories., Folsom, CA. for volatile organic compound (VOC) analyses using Direct Inject Method TO-14.
   Only VOCs detected at any time during the pilot test at any location are presented on this table.
2. Total VOCs calculated by summing individual analytes.
3. Due to laboratory error, samples SVE-1, SVE-2, SVE-2 duplicate and SVE-3 were analyzed outside of the recommended hold time. Although subsequent laboratory testing indicating the results are representative, these results are nonetheless considered estimated and are noted with a J qualifier.

Table 2. Summary of Extraction Well Vapor Sample Analytical Results, Vapor Recovery System, United Stellar Industries, Plainview, New York.

Constituents (units in ug/m^3)	Sample ID:	SVE-2 [1]	SVE-2 [1]	SVE-2 [1]	SVE-2 [1]	SVE-3 [1]	SVE-3 [1]	SVE-3 [1]	SVE-3 [1]	SVE-3 [1]	SVE-3 [1]	SVE-3 [1]
	Date:	8/11/2006	8/25/2006	9/8/2006	10/5/2006	6/30/2006	7/14/2006	7/28/2006	8/11/2006	8/25/2006	9/8/2006	10/5/2006
Freon 12		ND	170	280	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113		310	ND	ND	250	320	110	73	79	93	110	91
Chloroform		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		46	ND	39	35	ND	ND	ND	ND	ND	ND	ND
Trichloroethene		8100	3400	6700	5500	1000	290	180	310	270	480	450
Tetrachloroethene		140	45	120	130	49	ND	ND	ND	ND	34	ND
trans-1,2-Dichloroethene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene		160	82	140	100	150	71	38	60	76	140	170
1,1-Dichloroethane		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Propanol		27	12	120	41	150	ND	26	ND	ND	72	32
Total VOCs [2]		**8783**	**3709**	**7399**	**6056**	**1669**	**471**	**317**	**449**	**439**	**836**	**743**

ug/m^3 micrograms per cubic meter

ND analyte not detected at, or above its laboratory quantification limit

1. Samples collected by ARCADIS personnel during the periods shown and submitted to Air Toxics Laboratories., Folsom, CA. for volatile organic compound (VOC) analyses using Direct Inject Method TO-14. Only VOCs detected at any time during the pilot test at any location are presented on this table.
2. Total VOCs calculated by summing individual analytes.
3. Due to laboratory error, samples SVE-1, SVE-2, SVE-2 duplicate and SVE-3 were analyzed outside of the recommended hold time. Although subsequent laboratory testing indicating the results are representative, these results are nonetheless considered estimated and are noted with a J qualifier.

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Table 3. Summary of Extraction Well Vapor Sample Analytical Results, Vapor Recovery System, United Stellar Industries, Plainview, New York.

Constituents (units in ug/m^3)	Sample ID: / Date:	EFF-1[(1)] 6/30/2006	EFF-1[(1)] 7/28/2006	EFF-1[(1)] 8/11/2006	EFF-1[(1)] 8/25/2006	EFF-1[(1)] 9/8/2006	EFF-1[(1)] 10/5/2006	EFF-2[(1)] 6/30/2006
Freon 113		ND	ND	ND	ND	49	72	ND
Chloroform		ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		ND	ND	ND	ND	ND	ND	ND
Trichloroethene		140	54	ND	ND	ND	120	340
Tetrachloroethene		ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene		ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene		ND	21	79	110	140	140	ND
1,1-Dichloroethane		ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	48
2-Propanol		170	58	27	ND	70	46	51
Benzene		18	ND	ND	ND	ND	ND	ND
MTBE		ND	ND	ND	ND	ND	ND	ND
1,1 DCE		ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		ND	ND	ND	ND	ND	ND	ND
Total VOCs [(2)]		**328**	**133**	**106**	**110**	**259**	**378**	**439**

ug/m^3 micrograms per cubic meter

ND analyte not detected at, or above its laboratory quantification limit

(1) Samples collected by ARCADIS personnel during the periods shown and submitted to Air Toxics Laboratories., Folsom CA for volatile organic compound (VOC) analyses using Direct Inject Method TO-14.
Only VOCs detected at any time during the pilot test at any location are presented on this table.

Notes:

Total VOCs calculated by summing individual analytes.

Table 3. Summary of Extraction Well Vapor Sample Analytical Results, Vapor Recovery System, United Stellar Industries, Plainview, New York.

Constituents (units in ug/m^3)	Sample ID: / Date:	EFF-2[1] 7/28/2006	EFF-2[1] 8/11/2006	EFF-2[1] 8/25/2006	EFF-2[1] 9/8/2006	EFF-2[1] 10/5/2006
Freon 113		ND	ND	ND	ND	ND
Chloroform		ND	ND	ND	ND	ND
1,1,1-Trichloroethane		ND	ND	ND	ND	ND
Trichloroethene		51	ND	ND	ND	29
Tetrachloroethene		ND	ND	ND	ND	ND
trans-1,2-Dichloroethene		ND	ND	ND	ND	ND
cis-1,2-Dichloroethene		ND	ND	ND	ND	ND
1,1-Dichloroethane		ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND
2-Propanol		32	29	13	140	65
Benzene		ND	ND	ND	ND	ND
MTBE		53	ND	ND	ND	ND
1,1 DCE		29	ND	ND	ND	ND
Methylene Chloride		24	ND	ND	ND	ND
Total VOCs [2]		**189**	**29**	**13**	**140**	**94**

ug/m^3 micrograms per cubic meter

ND analyte not detected at, or above its laboratory quantification limit

(1) Samples collected by ARCADIS personnel during the periods shown and submitted to Air Toxics Laboratories., Folsom CA for volatile organic compound (VOC) analyses using Direct Inject Method TO-14.
Only VOCs detected at any time during the pilot test at any location are presented on this table.

Notes:

Total VOCs calculated by summing individual analytes.

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Table A1. NYSDEC DAR-1 August 11, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Mass Balance

Measured Effluent Flowrate = 136.80 ACFM

		% of Total Flow
SVE-1 Measured Flowrate (ACFM) =	60.38	0.36
SVE-2 Measured Flowrate (ACFM) =	44.65	0.27
SVE-3 Measured Flowrate (ACFM) =	61.32	0.37
Sum of Individual Flows (ACFM) =	166.35	

	Lab Data (ug/m3)			Mass Balance Concentration
	SVE-1	SVE-2	SVE-3	(ug/m3)
Freon 12	29	0	0	10.53
Freon 113	100	310	79	148.63
1,1,1-Trichloroethane	340	46	0	135.76
Trichloroethene	3200	8100	310	3449.91
Tetrachloroethene	140	140	0	88.39
cis-1,2-Dichloroethene	180	160	60	130.40
2-Propanol	14	27	0	12.33

Notes/Assumptions:

1. Mass balance concentration = Lab Data Concentration SVE-1 x SVE-1 % of Total Flow + Lab Data Concentration SVE-2 x SVE-2 % of Total Flow + Lab Data Concentration SVE-3 x SVE-3 % of Total Flow.

Table A1. NYSDEC DAR-1 August 11, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Parameters for 8/11/2006 Sampling Event			
Discharge Temperature	T	567	°R
Ambient Temperature	Ta	541	°R
Stack Diameter	D	4	in
Stack Radius	R	0.167	ft
Stack Area	A	0.09	ft^2
Exit Velocity	V	25.5	fps
Exit Flow	Q	134	acfm
Exit Flow	Q	124	scfm
Stack Height	h_s	12	ft
Building Height	h_b	10	ft
Ratio of Heights	h_s/h_b	1.20	
Plume rise credit? $h_s/h_b > 1.5$?	(If no, $h_e=h_s$)	(If Yes, $h_e = h_s + 1.1 (F_m)^{1/3}$)	
Momentum Flux	Fm = Ta/T * V2 * R2	n/a	ft^4/s^2
Effective Stack Height	h_e	17.0	ft
Reduction Factor? $2.5 > h_s/h_b > 1.5$?		No, do not reduce impact	
Actual Annual Impact	C_a	$RF*6*Q_a/h_e^{2.25}$	
Mass Flow	Q_a	S lbs emitted for last 12 months	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. Air flow rates and discharge temperature were not measured during this sampling event. As a result, field measurements from the 7/28/2006 sampling event were used for calculations.

Table A1. NYSDEC DAR-1 August 11, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Calculation of AGC based on 8/11/2006 Sampling Event

Compounds	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Actual Emissions C_a ug/m^3	Actual Mass Flow per Hour lb/hr	Actual Mass Flow per Year lb/yr	**Percent of Annual %**
Freon 12	12,000.00	1,173,653.96	10.53	4.90E-06	0.04612	**0.00**
Freon 113	180,000.00	17,604,809.41	148.63	6.92E-05	0.65113	**0.00**
1,1,1-Trichloroethane	1,000	97,804.50	135.76	6.32E-05	0.59475	**0.00**
Trichloroethene	0.5	48.90	3449.91	1.61E-03	15.11402	**30.91**
Tetrachloroethene	1.0	97.80	88.39	4.12E-05	0.38725	**0.40**
cis-1,2-Dichloroethene	1,900.0	185,828.54	130.40	6.07E-05	0.57127	**0.00**
2-Propanol	7000	684631.4772	12.33	5.74E-06	0.05401	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. Air flow rates and discharge temperature were not measured during this sampling event. As a result, field measurements from the 7/28/2006 sampling event were used for calculations.

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Table A2. NYSDEC DAR-1 August 25, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Mass Balance

Measured Effluent Flowrate = 465.32 ACFM

		% of Total Flow
SVE-1 Measured Flowrate (ACFM) =	101.69	0.40
SVE-2 Measured Flowrate (ACFM) =	70.55	0.28
SVE-3 Measured Flowrate (ACFM) =	80.62	0.32
Sum of Individual Flows (ACFM) =	252.86	

	Lab Data (ug/m3)			Mass Balance Concentration
	SVE-1	SVE-2	SVE-3	(ug/m3)
Freon 12	0	170	0	47.43
Freon 113	44	0	93	47.35
1,1,1-Trichloroethane	87	0	0	34.99
Trichloroethene	980	3400	270	1428.80
Tetrachloroethene	0	45	0	12.56
cis-1,2-Dichloroethene	71	82	76	75.66
2-Propanol	0	12	0	3.35

Notes/Assumptions:

1. Mass balance concentration = Lab Data Concentration SVE-1 x SVE-1 % of Total Flow + Lab Data Concentration SVE-2 x SVE-2 % of Total Flow + Lab Data Concentration SVE-3 x SVE-3 % of Total Flow.

Table A2. NYSDEC DAR-1 August 25, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Parameters for 8/25/2006 Sampling Event			
Discharge Temperature	T	558	°R
Ambient Temperature	Ta	539	°R
Stack Diameter	D	4	in
Stack Radius	R	0.167	ft
Stack Area	A	0.09	ft^2
Exit Velocity	V	86.7	fps
Exit Flow	Q	454	acfm
Exit Flow	Q	429	scfm
Stack Height	h_s	12	ft
Building Height	h_b	10	ft
Ratio of Heights	h_s/h_b	1.20	
Plume rise credit? $h_s/h_b > 1.5$?	(If no, $h_e=h_s$)	(If Yes, $h_e = h_s + 1.1 (F_m)^{1/3}$)	
Momentum Flux	Fm = Ta/T * V2 * R2	n/a	ft^4/s^2
Effective Stack Height	h_e	17.0	ft
Reduction Factor? $2.5 > h_s/h_b > 1.5$?		No, do not reduce impact	
Actual Annual Impact	C_a	$RF*6*Q_a/h_e^{2.25}$	
Mass Flow	Q_a	S lbs emitted for last 12 months	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.

Table A2. NYSDEC DAR-1 August 25, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Calculation of AGC based on 8/25/2006 Sampling Event

Compounds	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Actual Emissions C_a ug/m^3	Actual Mass Flow per Hour lb/hr	Actual Mass Flow per Year lb/yr	**Percent of Annual %**
Freon 12	12,000.00	1,173,653.96	47.43	7.63E-05	0.70676	**0.00**
Freon 113	180,000.00	17,604,809.41	47.35	7.61E-05	0.70553	**0.00**
1,1,1-Trichloroethane	1,000	97,804.50	34.99	5.63E-05	0.52135	**0.00**
Trichloroethene	0.5	48.90	1428.80	2.30E-03	21.29071	**43.54**
Tetrachloroethene	1.0	97.80	12.56	2.02E-05	0.18708	**0.19**
cis-1,2-Dichloroethene	1,900.0	185,828.54	75.66	1.22E-04	1.12747	**0.00**
2-Propanol	7000	684631.4772	3.35	5.38E-06	0.04989	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.

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Table A3. NYSDEC DAR-1 September 8, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Mass Balance

Measured Effluent Flowrate = 279.87 ACFM

		% of Total Flow
SVE-1 Measured Flowrate (ACFM) =	86.01	0.33
SVE-2 Measured Flowrate (ACFM) =	79.39	0.30
SVE-3 Measured Flowrate (ACFM) =	96.90	0.37
Sum of Individual Flows (ACFM) =	262.30	

	Lab Data (ug/m3)			Mass Balance Concentration
	SVE-1	SVE-2	SVE-3	(ug/m3)
Freon 12	0	280	0	84.75
Freon 113	52	0	110	57.69
1,1,1-Trichloroethane	98	39	0	43.94
Trichloroethene	1700	6700	480	2762.59
Tetrachloroethene	60	120	34	68.55
cis-1,2-Dichloroethene	90	140	140	123.61
2-Propanol	100	120	72	95.71

Notes/Assumptions:

1. Mass balance concentration = Lab Data Concentration SVE-1 x SVE-1 % of Total Flow + Lab Data Concentration SVE-2 x SVE-2 % of Total Flow + Lab Data Concentration SVE-3 x SVE-3 % of Total Flow.

Table A3. NYSDEC DAR-1 September 8, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Parameters for 9/8/2006 Sampling Event			
Discharge Temperature	T	567	°R
Ambient Temperature	Ta	535	°R
Stack Diameter	D	4	in
Stack Radius	R	0.167	ft
Stack Area	A	0.09	ft^2
Exit Velocity	V	52.2	fps
Exit Flow	Q	273	acfm
Exit Flow	Q	254	scfm
Stack Height	h_s	12	ft
Building Height	h_b	10	ft
Ratio of Heights	h_s/h_b	1.20	
Plume rise credit? $h_s/h_b > 1.5$?	(If no, $h_e=h_s$)	(If Yes, $h_e = h_s + 1.1 (F_m)^{1/3}$)	
Momentum Flux	Fm = Ta/T * V2 * R2	n/a	ft^4/s^2
Effective Stack Height	h_e	17.0	ft
Reduction Factor? $2.5 > h_s/h_b > 1.5$?		No, do not reduce impact	
Actual Annual Impact	C_a	$RF*6*Q_a/h_e^{2.25}$	
Mass Flow	Q_a	S lbs emitted for last 12 months	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.

Table A3. NYSDEC DAR-1 September 8, 2006 Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Calculation of AGC based on 9/8/2006 Sampling Event

Compounds	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Actual Emissions C_a ug/m^3	Actual Mass Flow per Hour lb/hr	Actual Mass Flow per Year lb/yr	**Percent of Annual %**
Freon 12	12,000.00	1,173,653.96	84.75	8.06E-05	0.75953	**0.00**
Freon 113	180,000.00	17,604,809.41	57.69	5.49E-05	0.51704	**0.00**
1,1,1-Trichloroethane	1,000	97,804.50	43.94	4.18E-05	0.39378	**0.00**
Trichloroethene	0.5	48.90	2762.59	2.63E-03	24.75950	**50.63**
Tetrachloroethene	1.0	97.80	68.55	6.52E-05	0.61441	**0.63**
cis-1,2-Dichloroethene	1,900.0	185,828.54	123.61	1.18E-04	1.10780	**0.00**
2-Propanol	7000	684631.4772	95.71	9.11E-05	0.85778	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.

Table A4. NYSDEC DAR-1 October 5, 2006, Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Mass Balance

Measured Effluent Flowrate = 192.24 ACFM

		% of Total Flow
SVE-1 Measured Flowrate (ACFM) =	63.84	0.37
SVE-2 Measured Flowrate (ACFM) =	39.59	0.23
SVE-3 Measured Flowrate (ACFM) =	67.55	0.40
Sum of Individual Flows (ACFM) =	170.98	

	Lab Data (ug/m3)			Mass Balance Concentration
	SVE-1	SVE-2	SVE-3	(ug/m3)
Freon 12	25	0	0	9.33
Freon 113	67	250	91	118.86
1,1,1-Trichloroethane	110	35	0	49.18
Trichloroethene	3000	5500	450	2571.45
Tetrachloroethene	130	130	0	78.64
cis-1,2-Dichloroethene	130	100	170	138.86
2-Propanol	45	41	32	38.94

Notes/Assumptions:

1. Mass balance concentration = Lab Data Concentration SVE-1 x SVE-1 % of Total Flow + Lab Data Concentration SVE-2 x SVE-2 % of Total Flow + Lab Data Concentration SVE-3 x SVE-3 % of Total Flow.

Table A4. NYSDEC DAR-1 October 5, 2006, Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Parameters for 10/5/2006 Sampling Event			
Discharge Temperature	T	557	°R
Ambient Temperature	Ta	527	°R
Stack Diameter	D	4	in
Stack Radius	R	0.167	ft
Stack Area	A	0.09	ft^2
Exit Velocity	V	35.8	fps
Exit Flow	Q	188	acfm
Exit Flow	Q	178	scfm
Stack Height	h_s	12	ft
Building Height	h_b	10	ft
Ratio of Heights	h_s/h_b	1.20	
Plume rise credit? $h_s/h_b > 1.5$?	(If no, $h_e=h_s$)	(If Yes, $h_e = h_s + 1.1 (F_m)^{1/3}$)	
Momentum Flux	Fm = Ta/T * V2 * R2	n/a	ft^4/s^2
Effective Stack Height	h_e	17.0	ft
Reduction Factor? $2.5 > h_s/h_b > 1.5$?		No, do not reduce impact	
Actual Annual Impact	C_a	$RF*6*Q_a/h_e^{2.25}$	
Mass Flow	Q_a	S lbs emitted for last 12 months	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.

Table A4. NYSDEC DAR-1 October 5, 2006, Air Modeling Estimate for Vapor Recovery System, Spiegel, Plainview, NY.

Calculation of AGC based on 10/5/2006 Sampling Event

Compounds	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Actual Emissions C_a ug/m^3	Actual Mass Flow per Hour lb/hr	Actual Mass Flow per Year lb/yr	**Percent of Annual %**
Freon 12	12,000.00	1,173,653.96	9.33	6.21E-06	0.05747	**0.00**
Freon 113	180,000.00	17,604,809.41	118.86	7.91E-05	0.73171	**0.00**
1,1,1-Trichloroethane	1,000	97,804.50	49.18	3.27E-05	0.30274	**0.00**
Trichloroethene	0.5	48.90	2571.45	1.71E-03	15.83060	**32.37**
Tetrachloroethene	1.0	97.80	78.64	5.23E-05	0.48414	**0.50**
cis-1,2-Dichloroethene	1,900.0	185,828.54	138.86	9.24E-05	0.85484	**0.00**
2-Propanol	7000	684631.4772	38.94	2.59E-05	0.23971	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is based on recorded parameters.
2. The ambient temperature based on www.weather.com historic temperatures.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.