

Derenzo and Associates, Inc.

Environmental Consultants

November 4, 2010

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**BUREAU OF
AIR REGULATION**

Ms. Trina Vielhauer, Bureau Chief
Bureau of Air Regulation
Department of Environmental Protection
STATE OF FLORIDA
2600 Blair Stone Road, MS 5505
Tallahassee, FL 32399-2400

Subject: Trail Ridge Energy, LLC
DEP File No. 0310358-011-AC (PSD-FL-374B)
LFG Monitoring Sulfur and Chlorine Contents

Dear Ms Vielhauer:

Condition 3.C. of Section III – Emission Unit(s) Specific Conditions of Air Construction Permit 0310358-011-AC (PSD-FL-374B) issued Trail Ridge Energy, LLC (Trail Ridge Energy) specifies that *The permittee shall comply with the following requirements to monitor the sulfur and chlorine content of the landfill gas:*

... the permittee shall sample and analyze the landfill gas for sulfur and chlorine content. The gas sample collected for the analyses shall be a composite sample and collected under normal operating conditions ... The gas sample collection and analyses for sulfur and chlorine content shall be done semi-annually ... Results shall be reported as SO₂ and HCl emission factors in terms of lb/MMscf of landfill gas.

The initial gas sample collection and analyses were completed in February 2007. Therefore, Derenzo and Associates, Inc. (Derenzo and Associates), on behalf of Trail Ridge Energy, is submitting to the Florida Department of Environmental Protection, Division of Air Resource Management (FDEP-DARM) results of sulfur and chlorine analyses that were performed on a sample of landfill gas (LFG) obtained from the Trail Ridge Landfill in October 2010 (semi-annual collection and analyses). The required SO₂ and HCl emission factors (in terms of lb/MMscf of landfill gas) and supporting analytical data are provided in the attached documents.

The air permit application for Trail Ridge Energy developed (based on USEPA AP-42 default LFG composition data) a:

1. SO₂ emission factor of 27.5 lb/MMscf of LFG; and
2. HCl emission factor of 11.95 lb/MMscf of LFG.

Derenzo and Associates, Inc.

Ms. Trina Vielhauer
FDEP-DARM

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The SO₂ emission factor developed from analyses of the October 19, 2010 sample of gas obtained from the Trail Ridge Landfill is 6.901 lb/MMscf of LFG (<8.065 lb/MMscf of LFG with the incorporation of all non-measured chemicals at its reporting limit).

The HCl emission factor developed from analyses of the October 19, 2010 sample of gas obtained from the Trail Ridge Landfill is 0.86 lb/MMscf of landfill gas (<1.10 lb/MMscf of landfill gas with the incorporation of all non-measured chemicals at its reporting limit).

Please contact us if you have questions or require clarifications

Sincerely,

DERENZO AND ASSOCIATES, INC.



Charles Scamp
Environmental Consultant

attachments

c: Mike Laframboise, Landfill Energy Systems
Christopher L. Kirts, Northeast District Office
Jacksonville Environmental Quality Division

Trail Ridge Energy, LLC (October 19, 2010 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Analytical Report Concentrations ^A (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content ^B as H ₂ S (ppmv)	Resulting SO ₂ Emission Rate (lb./MMcf)
Hydrogen sulfide	27.0	H ₂ S	1	27.0	4.489 *
Carbonyl sulfide	0.51	CSO	1	0.51	0.085
Methyl mercaptan	4.00	CH ₄ S	1	4.00	0.665
Ethyl mercaptan	<0.40	C ₂ H ₆ S	1	<0.40	<0.067
Dimethyl sulfide	9.0	C ₂ H ₆ S	1	9.0	1.496
Carbon disulfide	<0.50	CS ₂	2	<1.00	<0.166
Isopropyl mercaptan	0.50	C ₃ H ₆ S	1	0.50	0.083
tert-Butyl mercaptan	<0.40	C ₄ H ₁₀ S	1	<0.40	<0.067
n-Propyl mercaptan	<0.40	C ₃ H ₈ S	1	<0.40	<0.067
Ethyl methyl sulfide	<0.40	C ₃ H ₈ S	1	<0.40	<0.067
Thiophene	0.50	C ₄ H ₄ S	1	0.50	0.083
Isobutyl mercaptan	<0.40	C ₄ H ₁₀ S	1	<0.40	<0.067
Diethyl sulfide	<0.40	CH ₃ CH ₂ SCH ₂ CH ₃	1	<0.40	<0.067
n-Butyl mercaptan	<0.40	C ₄ H ₁₀ S	1	<0.40	<0.067
3-Methyl Thiophene	<0.40	C ₅ H ₆ S	1	<0.40	<0.067
Dimethyl disulfide	<0.40	CH ₃ SSCH ₃	2	<0.80	<0.133
Tetrahydrothiophene	<0.40	C ₄ H ₈ O ₂ S	1	<0.40	<0.067
2-Ethylthiophene	<0.40	C ₆ H ₈ S	1	<0.40	<0.067
2,5-Dimethylthiophene	<0.40	C ₆ H ₈ S	1	<0.40	<0.067
Diethyl disulfide	<0.40	CH ₃ SSCH ₃	2	<0.80	<0.133
Total				<48.5	<8.065^C

Notes

- A. October 20, 2010 LFG sample laboratory analytical results (see Attachment)
- B. Determined by multiplying concentration by number of sulfur atoms in the molecule.
- C. Calculation of SO₂ emission factor from sulfur content, as H₂S:

$$(48.5 \text{ scf H}_2\text{S/MMcf LFG}) (1 \text{ scf SO}_2\text{/scf H}_2\text{S}) (64.06 \text{ lb. SO}_2\text{/mol}) / (385.3 \text{ ft}^3\text{/mol})$$

$$8.07 \text{ lb SO}_2\text{/MMcf LFG}$$
- * Sample calculation: SO₂ generation from hydrogen sulfide (H₂S):

Trail Ridge Energy, LLC (October 19, 2010 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Measured Concentrations ^A (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content ^B as H ₂ S (ppmv)	Resulting SO ₂ Emission Rate (lb./MMcf)
Hydrogen sulfide	27.0	H ₂ S	1	27.0	4.489
Carbonyl sulfide	0.51	CSO	1	0.51	0.085
Methyl mercaptan	4.00	CH ₄ S	1	4.00	0.665
Dimethyl sulfide	9.0	C ₂ H ₆ S	1	9.0	1.496
Isopropyl mercaptan	0.50	C ₃ H ₆ S	1	0.50	0.083
Thiophene	0.50	C ₄ H ₄ S	1	0.50	0.083
Total				41.5	6.901

Notes

A. October 20, 2010 LFG sample laboratory analytical results (see Attachment)

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

* Sample calculation: SO₂ generation from hydrogen sulfide (H₂S):

$$(27.0 \text{ scf H}_2\text{S/MMcf LFG}) (1 \text{ scf SO}_2\text{/scf H}_2\text{S}) (64.06 \text{ lb. SO}_2\text{/mol}) / (385.3 \text{ ft}^3\text{/mol})$$

$$= 4.49 \text{ lb SO}_2\text{/MMcf LFG}$$

Trail Ridge Energy, LLC (October 19, 2010 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds	Analytical Report Concentration ¹ (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.820	CCl ₂ F ₂	2	0.155 *
Freon 114 (Dichlorotetrafluoroethane)	0.067	C ₂ Cl ₂ F ₄	2	0.013
Chloromethane	1.000	CH ₃ Cl	1	0.094
Vinyl Chloride	0.130	C ₂ HCl	1	0.012
Chloroethane	0.440	C ₂ H ₅ Cl	1	0.041
Freon 11 (Fluorotrichloromethane)	0.042	CFCl ₃	3	0.012
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	<0.035	C ₂ Cl ₂ F ₃	2	<0.007
3-Chloropropene	<0.140	C ₃ H ₅ Cl	1	<0.013
Methylene Chloride (Dichloromethane)	0.110	CH ₂ Cl ₂	2	0.021
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.550	C ₂ H ₂ Cl ₂	2	0.104
1,2-Dichloroethene (as trans-1,2-Dichloroethene)	<0.035	C ₂ H ₂ Cl ₂	2	<0.007
1,1-Dichloroethane	0.039	C ₂ H ₄ Cl ₂	2	0.007
1,1-Dichloroethene	<0.035	C ₂ H ₂ Cl ₂	2	<0.007
Chloroform	<0.035	CHCl ₃	3	<0.010
1,1,1-Trichloroethane	<0.035	C ₂ H ₃ Cl ₃	3	<0.010
Carbon Tetrachloride	<0.035	CCl ₄	4	<0.013
1,2-Dichloroethane	0.260	C ₂ H ₄ Cl ₂	2	0.049
Trichloroethene	0.270	C ₂ HCl ₃	3	0.076
1,2-dichloropropane	0.057	C ₃ H ₆ Cl ₂	2	0.011
Bromodichloromethane	<0.035	CBrCl ₂	2	<0.007
1,3-Dichloropropene (as cis-1,3-Dichloropropene)	<0.035	C ₃ H ₄ Cl ₂	2	<0.007
1,3-Dichloropropene (as trans-1,3-Dichloropropene)	<0.035	C ₃ H ₄ Cl ₂	2	<0.007
1,1,2-Trichloroethane	<0.035	C ₂ H ₃ Cl ₃	3	<0.010
Tetrachloroethene (Perchloroethene)	0.550	C ₂ Cl ₄	4	0.207
Dibromochloromethane	<0.035	CHBr ₂ Cl	1	<0.003
Chlorobenzene	0.097	C ₆ H ₅ Cl	1	0.009
1,1,2,2-Tetrachloroethane	<0.035	C ₂ H ₂ Cl ₄	4	<0.013
1,3-Dichlorobenzene	<0.035	C ₆ H ₄ Cl ₂	2	<0.007
1,4-Dichlorobenzene	0.240	C ₆ H ₄ Cl ₂	2	0.045
alpha-Chlorotoluene	<0.035	C ₇ H ₇ Cl	1	<0.003
1,2-Dichlorobenzene	<0.035	C ₆ H ₄ Cl ₂	2	<0.007
1,2,4-Trichlorobenzene	<0.140	C ₆ H ₃ Cl ₃	3	<0.040
Hexachlorobutadiene	<0.140	C ₄ Cl ₆	6	<0.079
Total hydrogen chloride emission factor (lb./MMcf)				<1.10

Notes

1. October 29, 2010 LFG sample laboratory analytical results (see Attachment)

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl

$$(0.820 \text{ ft}^3 \text{ Freon 12/MMcf LFG}) (2 \text{ mol HCl/mol Freon 12}) (36.46 \text{ lb. HCl/mol}) / (387 \text{ ft}^3/\text{mol})$$

$$= 0.155 \text{ lb. HCl/MMcf LFG}$$

Trail Ridge Energy, LLC (October 19, 2010 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds	Measured Concentration ¹ (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.820	CCl ₂ F ₂	2	0.155 *
Freon 114 (Dichlorotetrafluoroethane)	0.067	C ₂ Cl ₂ F ₄	2	0.013
Chloromethane	1.000	CH ₃ Cl	1	0.094
Vinyl Chloride	0.130	C ₂ HCl	1	0.012
Chloroethane	0.440	C ₂ H ₅ Cl	1	0.041
Freon 11 (Fluorotrichloromethane)	0.042	CFCl ₃	3	0.012
Methylene Chloride (Dichloromethane)	0.110	CH ₂ Cl ₂	2	0.021
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.550	C ₂ H ₂ Cl ₂	2	0.104
1,1-Dichloroethane	0.039	C ₂ H ₄ Cl ₂	2	0.007
1,2-Dichloroethane	0.260	C ₂ H ₄ Cl ₂	2	0.049
Trichloroethene	0.270	C ₂ HCl ₃	3	0.076
1,2-dichloropropane	0.057	C ₃ H ₆ Cl ₂	2	0.011
Tetrachloroethene (Perchloroethene)	0.550	C ₂ Cl ₄	4	0.207
Chlorobenzene	0.097	C ₆ H ₅ Cl	1	0.009
1,4-Dichlorobenzene	0.240	C ₆ H ₄ Cl ₂	2	0.045
Total hydrogen chloride emission factor (lb./MMcf)				0.86

Notes

1. October 29, 2010 LFG sample laboratory analytical results (see Attachment)

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl

(0.820 ft³ Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft³/mol)

**LABORATORY NARRATIVE
ASTM D-5504
Derenzo & Associates
Workorder# 1010405B**

Two 1 Liter Tedlar Bag samples were received on October 20, 2010. The laboratory performed the analysis of sulfur compounds via ASTM D-5504 using GC/SCD. The method involves direct injection of the air sample into the GC via a fixed 2.0 mL sampling loop. See the data sheets for the reporting limits for each compound.

Receiving Notes

Sample TRE 2 was placed on hold per the client's request.

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided by the field sampler.

Sample collection date was not provided on the Chain of Custody for samples TRE 1 and TRE 2. The client was contacted and a date of 10/19/2010 was provided.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit.

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the detection limit.

M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue



Summary of Detected Compounds
SULFUR GASES BY ASTM D-5504 GC/SCD

Client Sample ID: TRE 1

Lab ID#: 1010405B-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	400	27000
Carbonyl Sulfide	400	510
Methyl Mercaptan	400	4000
Dimethyl Sulfide	400	9000
Isopropyl Mercaptan	400	500
Thiophene	400	500



Client Sample ID: TRE 1

Lab ID#: 1010405B-01A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	k102008	Date of Collection:	10/19/10 4:00:00 PM
Dil. Factor:	100	Date of Analysis:	10/20/10 10:47 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	400	27000
Carbonyl Sulfide	400	510
Methyl Mercaptan	400	4000
Ethyl Mercaptan	400	Not Detected
Dimethyl Sulfide	400	9000
Carbon Disulfide	500	Not Detected
Isopropyl Mercaptan	400	500
tert-Butyl Mercaptan	400	Not Detected
n-Propyl Mercaptan	400	Not Detected
Ethyl Methyl Sulfide	400	Not Detected
Thiophene	400	500
Isobutyl Mercaptan	400	Not Detected
Diethyl Sulfide	400	Not Detected
n-Butyl Mercaptan	400	Not Detected
Dimethyl Disulfide	400	Not Detected
3-Methylthiophene	400	Not Detected
Tetrahydrothiophene	400	Not Detected
2-Ethylthiophene	400	Not Detected
2,5-Dimethylthiophene	400	Not Detected
Diethyl Disulfide	400	Not Detected

Container Type: 1 Liter Tedlar Bag



Client Sample ID: Lab Blank

Lab ID#: 1010405B-03A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	k102004	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/19/10 09:21 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	4.0	Not Detected
Carbonyl Sulfide	4.0	Not Detected
Methyl Mercaptan	4.0	Not Detected
Ethyl Mercaptan	4.0	Not Detected
Dimethyl Sulfide	4.0	Not Detected
Carbon Disulfide	5.0	Not Detected
Isopropyl Mercaptan	4.0	Not Detected
tert-Butyl Mercaptan	4.0	Not Detected
n-Propyl Mercaptan	4.0	Not Detected
Ethyl Methyl Sulfide	4.0	Not Detected
Thiophene	4.0	Not Detected
Isobutyl Mercaptan	4.0	Not Detected
Diethyl Sulfide	4.0	Not Detected
n-Butyl Mercaptan	4.0	Not Detected
Dimethyl Disulfide	4.0	Not Detected
3-Methylthiophene	4.0	Not Detected
Tetrahydrothiophene	4.0	Not Detected
2-Ethylthiophene	4.0	Not Detected
2,5-Dimethylthiophene	4.0	Not Detected
Diethyl Disulfide	4.0	Not Detected

Container Type: NA - Not Applicable



Client Sample ID: LCS

Lab ID#: 1010405B-04A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	k102002	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/19/10 08:38 PM

Compound	%Recovery
Hydrogen Sulfide	101
Carbonyl Sulfide	111
Methyl Mercaptan	112
Ethyl Mercaptan	128
Dimethyl Sulfide	117
Carbon Disulfide	105
Isopropyl Mercaptan	115
tert-Butyl Mercaptan	114
n-Propyl Mercaptan	108
Ethyl Methyl Sulfide	114
Thiophene	104
Isobutyl Mercaptan	122
Diethyl Sulfide	119
n-Butyl Mercaptan	96
Dimethyl Disulfide	112
3-Methylthiophene	114
Tetrahydrothiophene	103
2-Ethylthiophene	112
2,5-Dimethylthiophene	109
Diethyl Disulfide	112

Container Type: NA - Not Applicable



Client Sample ID: LCSD

Lab ID#: 1010405B-04AA

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	k102003	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/19/10 08:59 PM

Compound	%Recovery
Hydrogen Sulfide	106
Carbonyl Sulfide	112
Methyl Mercaptan	112
Ethyl Mercaptan	125
Dimethyl Sulfide	115
Carbon Disulfide	104
Isopropyl Mercaptan	113
tert-Butyl Mercaptan	114
n-Propyl Mercaptan	111
Ethyl Methyl Sulfide	115
Thiophene	105
Isobutyl Mercaptan	121
Diethyl Sulfide	118
n-Butyl Mercaptan	94
Dimethyl Disulfide	114
3-Methylthiophene	114
Tetrahydrothiophene	101
2-Ethylthiophene	113
2,5-Dimethylthiophene	111
Diethyl Disulfide	111

Container Type: NA - Not Applicable

**LABORATORY NARRATIVE
EPA Method TO-15
Derenzo & Associates
Workorder# 1010405A**

Two 1 Liter Tedlar Bag samples were received on October 20, 2010. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

Sample TRE 2 was placed on hold per the client's request.

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided by the field sampler.

Sample collection date was not provided on the Chain of Custody for samples TRE 1 and TRE 2. The client was contacted and a date of 10/19/2010 was provided.

Analytical Notes

All Quality Control Limit exceedences and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

Method TO-15 is validated for samples collected in specially treated canisters. As such, the use of Tedlar bags for sample collection is outside the scope of the method and not recommended for ambient or indoor air samples. It is the responsibility of the data user to determine the usability of TO-15 results generated from Tedlar bags.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue



**Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS**

Client Sample ID: TRE 1

Lab ID#: 1010405A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	35	820	170	4000
Freon 114	35	67	250	470
Chloromethane	140	1000	290	2100
Vinyl Chloride	35	130	90	330
1,3-Butadiene	35	280	78	620
Chloroethane	35	440	93	1200
Freon 11	35	42	200	240
Ethanol	140	180000 E	260	340000 E
Acetone	140	26000	330	62000
2-Propanol	140	42000 E	350	100000 E
Carbon Disulfide	35	44	110	140
Methylene Chloride	35	110	120	390
Methyl tert-butyl ether	35	38	130	140
Hexane	35	1200	120	4100
1,1-Dichloroethane	35	39	140	160
2-Butanone (Methyl Ethyl Ketone)	35	34000	100	100000
cis-1,2-Dichloroethene	35	550	140	2200
Tetrahydrofuran	35	6600	100	19000
Cyclohexane	35	600	120	2000
2,2,4-Trimethylpentane	35	300	160	1400
Benzene	35	7900	110	25000
1,2-Dichloroethane	35	260	140	1000
Heptane	35	1400	140	6000
Trichloroethene	35	270	190	1400
1,2-Dichloropropane	35	57	160	260
4-Methyl-2-pentanone	35	1700	140	7200
Toluene	35	19000	130	73000
Tetrachloroethene	35	550	240	3700
Chlorobenzene	35	97	160	450
Ethyl Benzene	35	11000	150	49000
m,p-Xylene	35	14000	150	63000
o-Xylene	35	4500	150	20000

**Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS**

Client Sample ID: TRE 1

Lab ID#: 1010405A-01A

Styrene	35	1100	150	4800
Cumene	35	1300	170	6200
Propylbenzene	35	740	170	3700
4-Ethyltoluene	35	2800	170	14000
1,3,5-Trimethylbenzene	35	1100	170	5400
1,2,4-Trimethylbenzene	35	2400	170	12000
1,4-Dichlorobenzene	35	240	210	1400



Client Sample ID: TRE 1

Lab ID#: 1010405A-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b102919	Date of Collection:	10/19/10 4:00:00 PM
Dil. Factor:	7.05	Date of Analysis:	10/29/10 05:50 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	35	820	170	4000
Freon 114	35	67	250	470
Chloromethane	140	1000	290	2100
Vinyl Chloride	35	130	90	330
1,3-Butadiene	35	280	78	620
Bromomethane	35	Not Detected	140	Not Detected
Chloroethane	35	440	93	1200
Freon 11	35	42	200	240
Ethanol	140	180000 E	260	340000 E
Freon 113	35	Not Detected	270	Not Detected
1,1-Dichloroethene	35	Not Detected	140	Not Detected
Acetone	140	26000	330	62000
2-Propanol	140	42000 E	350	100000 E
Carbon Disulfide	35	44	110	140
3-Chloropropene	140	Not Detected	440	Not Detected
Methylene Chloride	35	110	120	390
Methyl tert-butyl ether	35	38	130	140
trans-1,2-Dichloroethene	35	Not Detected	140	Not Detected
Hexane	35	1200	120	4100
1,1-Dichloroethane	35	39	140	160
2-Butanone (Methyl Ethyl Ketone)	35	34000	100	100000
cis-1,2-Dichloroethene	35	550	140	2200
Tetrahydrofuran	35	6600	100	19000
Chloroform	35	Not Detected	170	Not Detected
1,1,1-Trichloroethane	35	Not Detected	190	Not Detected
Cyclohexane	35	600	120	2000
Carbon Tetrachloride	35	Not Detected	220	Not Detected
2,2,4-Trimethylpentane	35	300	160	1400
Benzene	35	7900	110	25000
1,2-Dichloroethane	35	260	140	1000
Heptane	35	1400	140	6000
Trichloroethene	35	270	190	1400
1,2-Dichloropropane	35	57	160	260
1,4-Dioxane	140	Not Detected	510	Not Detected
Bromodichloromethane	35	Not Detected	240	Not Detected
cis-1,3-Dichloropropene	35	Not Detected	160	Not Detected
4-Methyl-2-pentanone	35	1700	140	7200
Toluene	35	19000	130	73000
trans-1,3-Dichloropropene	35	Not Detected	160	Not Detected
1,1,2-Trichloroethane	35	Not Detected	190	Not Detected
Tetrachloroethene	35	550	240	3700



Client Sample ID: TRE 1

Lab ID#: 1010405A-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b102919	Date of Collection:	10/19/10 4:00:00 PM
Dil. Factor:	7.05	Date of Analysis:	10/29/10 05:50 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Hexanone	140	Not Detected	580	Not Detected
Dibromochloromethane	35	Not Detected	300	Not Detected
1,2-Dibromoethane (EDB)	35	Not Detected	270	Not Detected
Chlorobenzene	35	97	160	450
Ethyl Benzene	35	11000	150	49000
m,p-Xylene	35	14000	150	63000
o-Xylene	35	4500	150	20000
Styrene	35	1100	150	4800
Bromoform	35	Not Detected	360	Not Detected.
Cumene	35	1300	170	6200
1,1,2,2-Tetrachloroethane	35	Not Detected	240	Not Detected
Propylbenzene	35	740	170	3700
4-Ethyltoluene	35	2800	170	14000
1,3,5-Trimethylbenzene	35	1100	170	5400
1,2,4-Trimethylbenzene	35	2400	170	12000
1,3-Dichlorobenzene	35	Not Detected	210	Not Detected
1,4-Dichlorobenzene	35	240	210	1400
alpha-Chlorotoluene	35	Not Detected	180	Not Detected
1,2-Dichlorobenzene	35	Not Detected	210	Not Detected
1,2,4-Trichlorobenzene	140	Not Detected UJ	1000	Not Detected UJ
Hexachlorobutadiene	140	Not Detected	1500	Not Detected

E = Exceeds instrument calibration range.

UJ = Non-detected compound associated with low bias in the CCV

Container Type: 1 Liter Tedlar Bag

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

Client Sample ID: Lab Blank

Lab ID#: 1010405A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102905	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 10:51 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	2.0	Not Detected	4.1	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.50	Not Detected	1.9	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected



Client Sample ID: Lab Blank

Lab ID#: 1010405A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102905	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	10/29/10 10:51 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Hexanone	2.0	Not Detected	8.2	Not Detected
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected UJ	15	Not Detected UJ
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

UJ = Non-detected compound associated with low bias in the CCV

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	105	70-130
4-Bromofluorobenzene	100	70-130

Client Sample ID: CCV

Lab ID#: 1010405A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102902	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 08:57 AM

Compound	%Recovery
Freon 12	94
Freon 114	101
Chloromethane	99
Vinyl Chloride	91
1,3-Butadiene	87
Bromomethane	92
Chloroethane	92
Freon 11	104
Ethanol	75
Freon 113	102
1,1-Dichloroethene	99
Acetone	87
2-Propanol	70
Carbon Disulfide	96
3-Chloropropene	92
Methylene Chloride	88
Methyl tert-butyl ether	72
trans-1,2-Dichloroethene	97
Hexane	88
1,1-Dichloroethane	97
2-Butanone (Methyl Ethyl Ketone)	88
cis-1,2-Dichloroethene	96
Tetrahydrofuran	82
Chloroform	100
1,1,1-Trichloroethane	96
Cyclohexane	91
Carbon Tetrachloride	103
2,2,4-Trimethylpentane	92
Benzene	98
1,2-Dichloroethane	111
Heptane	95
Trichloroethene	101
1,2-Dichloropropane	97
1,4-Dioxane	90
Bromodichloromethane	105
cis-1,3-Dichloropropene	89
4-Methyl-2-pentanone	82
Toluene	98
trans-1,3-Dichloropropene	87
1,1,2-Trichloroethane	102
Tetrachloroethene	107



Client Sample ID: CCV

Lab ID#: 1010405A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102902	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 08:57 AM

Compound	%Recovery
2-Hexanone	76
Dibromochloromethane	105
1,2-Dibromoethane (EDB)	101
Chlorobenzene	103
Ethyl Benzene	99
m,p-Xylene	94
o-Xylene	94
Styrene	99
Bromoform	106
Cumene	99
1,1,2,2-Tetrachloroethane	103
Propylbenzene	98
4-Ethyltoluene	97
1,3,5-Trimethylbenzene	102
1,2,4-Trimethylbenzene	94
1,3-Dichlorobenzene	101
1,4-Dichlorobenzene	101
alpha-Chlorotoluene	85
1,2-Dichlorobenzene	100
1,2,4-Trichlorobenzene	69 Q
Hexachlorobutadiene	76

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	103	70-130



Client Sample ID: LCS

Lab ID#: 1010405A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102903	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 09:43 AM

Compound	%Recovery
Freon 12	104
Freon 114	110
Chloromethane	112
Vinyl Chloride	99
1,3-Butadiene	97
Bromomethane	102
Chloroethane	102
Freon 11	113
Ethanol	82
Freon 113	101
1,1-Dichloroethene	97
Acetone	89
2-Propanol	77
Carbon Disulfide	104
3-Chloropropene	96
Methylene Chloride	86
Methyl tert-butyl ether	79
trans-1,2-Dichloroethene	105
Hexane	95
1,1-Dichloroethane	102
2-Butanone (Methyl Ethyl Ketone)	93
cis-1,2-Dichloroethene	102
Tetrahydrofuran	90
Chloroform	105
1,1,1-Trichloroethane	104
Cyclohexane	100
Carbon Tetrachloride	112
2,2,4-Trimethylpentane	101
Benzene	104
1,2-Dichloroethane	116
Heptane	101
Trichloroethene	106
1,2-Dichloropropane	104
1,4-Dioxane	98
Bromodichloromethane	112
cis-1,3-Dichloropropene	97
4-Methyl-2-pentanone	82
Toluene	99
trans-1,3-Dichloropropene	95
1,1,2-Trichloroethane	110
Tetrachloroethene	112



Client Sample ID: LCS

Lab ID#: 1010405A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102903	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 09:43 AM

Compound	%Recovery
2-Hexanone	86
Dibromochloromethane	114
1,2-Dibromoethane (EDB)	112
Chlorobenzene	110
Ethyl Benzene	107
m,p-Xylene	105
o-Xylene	103
Styrene	112
Bromoform	115
Cumene	104
1,1,2,2-Tetrachloroethane	115
Propylbenzene	106
4-Ethyltoluene	107
1,3,5-Trimethylbenzene	110
1,2,4-Trimethylbenzene	102
1,3-Dichlorobenzene	109
1,4-Dichlorobenzene	112
alpha-Chlorotoluene	93
1,2-Dichlorobenzene	109
1,2,4-Trichlorobenzene	64 Q
Hexachlorobutadiene	70

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	103	70-130
4-Bromofluorobenzene	105	70-130



Client Sample ID: LCSD

Lab ID#: 1010405A-05AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102904	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 10:18 AM

Compound	%Recovery
Freon 12	103
Freon 114	110
Chloromethane	111
Vinyl Chloride	97
1,3-Butadiene	96
Bromomethane	101
Chloroethane	98
Freon 11	112
Ethanol	80
Freon 113	100
1,1-Dichloroethene	96
Acetone	90
2-Propanol	77
Carbon Disulfide	101
3-Chloropropene	98
Methylene Chloride	87
Methyl tert-butyl ether	78
trans-1,2-Dichloroethene	106
Hexane	94
1,1-Dichloroethane	100
2-Butanone (Methyl Ethyl Ketone)	95
cis-1,2-Dichloroethene	101
Tetrahydrofuran	92
Chloroform	105
1,1,1-Trichloroethane	103
Cyclohexane	100
Carbon Tetrachloride	110
2,2,4-Trimethylpentane	100
Benzene	102
1,2-Dichloroethane	112
Heptane	102
Trichloroethene	106
1,2-Dichloropropane	104
1,4-Dioxane	101
Bromodichloromethane	110
cis-1,3-Dichloropropene	97
4-Methyl-2-pentanone	87
Toluene	99
trans-1,3-Dichloropropene	98
1,1,2-Trichloroethane	111
Tetrachloroethene	115



Client Sample ID: LCSD

Lab ID#: 1010405A-05AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	b102904	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 10/29/10 10:18 AM

Compound	%Recovery
2-Hexanone	89
Dibromochloromethane	115
1,2-Dibromoethane (EDB)	113
Chlorobenzene	111
Ethyl Benzene	109
m,p-Xylene	106
o-Xylene	106
Styrene	111
Bromoform	116
Cumene	106
1,1,2,2-Tetrachloroethane	114
Propylbenzene	106
4-Ethyltoluene	108
1,3,5-Trimethylbenzene	111
1,2,4-Trimethylbenzene	102
1,3-Dichlorobenzene	110
1,4-Dichlorobenzene	112
alpha-Chlorotoluene	92
1,2-Dichlorobenzene	108
1,2,4-Trichlorobenzene	65 Q
Hexachlorobutadiene	74

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	105	70-130