

**Derenzo and Associates, Inc.**

*Environmental Consultants*

April 22, 2011

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

RECEIVED  
APR 27 2011  
BUREAU OF  
AIR REGULATION

Subject: Trail Ridge Energy, LLC  
DEP File No. 0310358-011-AC (PSD-FL-374B)  
LFG Monitoring 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 SO<sub>2</sub> 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 the chlorine analysis that was performed on a sample of landfill gas (LFG) obtained from the Trail Ridge Landfill in March 2011 (semi-annual collection and analyses). The required HCl emission factor (in terms of lb/MMscf of landfill gas) and supporting analytical data are provided in the attached documents. The required SO<sub>2</sub> analysis and emission factors will be provided at a later date in a subsequent report.

The air permit application for Trail Ridge Energy developed (based on USEPA AP-42 default LFG composition data) an HCl emission factor of 11.95 lb/MMscf of LFG.

The HCl emission factor developed from analysis of the March 16, 2011 sample of gas obtained from the Trail Ridge Landfill is 0.43 lb/MMscf of landfill gas (<1.47 lb/MMscf of landfill gas with the incorporation of all non-measured chemicals at its reporting limit).

**Derenzo and Associates, Inc.**

Ms. Trina Vielhauer  
FDEP-DARM

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April 22, 2011

Please contact us if you have questions or require clarifications

Sincerely,

DERENZO AND ASSOCIATES, INC.

A handwritten signature in cursive script, appearing to read "Charles Scamp".

Charles Scamp  
Environmental Consultant

attachments

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

## LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds	Analytical Report Concentration <sup>1</sup> (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.357	CCl <sub>2</sub> F <sub>2</sub>	2	0.067
Freon 114 (Dichlorotetrafluoroethane)	<0.118	C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	2	<0.022
Chloromethane	<0.470	CH <sub>3</sub> Cl	1	0.044
Vinyl Chloride	0.120	C <sub>2</sub> HCl	1	0.011
Chloroethane	<0.470	C <sub>2</sub> H <sub>5</sub> Cl	1	<0.044
Freon 11 (Fluorotrichloromethane)	<0.118	CFCl <sub>3</sub>	3	<0.033
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	<0.118	C <sub>2</sub> Cl <sub>2</sub> F <sub>3</sub>	2	<0.022
3-Chloropropene	<0.470	C <sub>3</sub> H <sub>5</sub> Cl	1	<0.044
Methylene Chloride (Dichloromethane)	0.133	CH <sub>2</sub> Cl <sub>2</sub>	2	0.025
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.333	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	2	0.063
1,2-Dichloroethene (as trans-1,2-Dichloroethene)	<0.118	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	2	<0.022
1,1-Dichloroethane	<0.118	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	2	<0.022
1,1-Dichloroethene	<0.118	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	2	<0.022
Chloroform	<0.118	CHCl <sub>3</sub>	3	<0.033
1,1,1-Trichloroethane	<0.118	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	3	<0.033
Carbon Tetrachloride	<0.118	CCl <sub>4</sub>	4	<0.044
1,2-Dichloroethane	0.157	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	2	0.030
Trichloroethene	0.140	C <sub>2</sub> HCl <sub>3</sub>	3	0.040
1,2-dichloropropane	<0.118	C <sub>3</sub> H <sub>6</sub> Cl <sub>2</sub>	2	<0.022
Bromodichloromethane	<0.118	CBrCl <sub>2</sub>	2	<0.022
1,3-Dichloropropene (as cis-1,3-Dichloropropene)	<0.118	C <sub>3</sub> H <sub>4</sub> Cl <sub>2</sub>	2	<0.022
1,3-Dichloropropene (as trans-1,3-Dichloropropene)	<0.118	C <sub>3</sub> H <sub>4</sub> Cl <sub>2</sub>	2	<0.022
1,1,2-Trichloroethane	<0.118	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	3	<0.033
Tetrachloroethene (Perchloroethene)	0.330	C <sub>2</sub> Cl <sub>4</sub>	4	0.124
Dibromochloromethane	<0.118	CHBr <sub>2</sub> Cl	1	<0.011
Chlorobenzene	<0.118	C <sub>6</sub> H <sub>5</sub> Cl	1	<0.011
1,1,2,2-Tetrachloroethane	<0.118	C <sub>2</sub> H <sub>2</sub> Cl <sub>4</sub>	4	<0.044
1,3-Dichlorobenzene	<0.118	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	2	<0.022
1,4-Dichlorobenzene	0.397	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	2	0.075
alpha-Chlorotoluene	<0.118	C <sub>7</sub> H <sub>7</sub> Cl	1	<0.011
1,2-Dichlorobenzene	<0.118	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	2	<0.022
1,2,4-Trichlorobenzene	<0.470	C <sub>6</sub> H <sub>3</sub> Cl <sub>3</sub>	3	<0.133
Hexachlorobutadiene	<0.470	C <sub>4</sub> Cl <sub>6</sub>	6	<0.266
<b>Total hydrogen chloride emission factor (lb./MMcf)</b>				<b>&lt;1.47</b>

## Notes

1. April 2, 2011 LFG sample laboratory analytical results. Average of three samples (see Attachment).

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

$$(0.357 \text{ ft}^3 \text{ Freon 12/MMcf LFG}) (2 \text{ mol HCl/mol Freon 12}) (36.46 \text{ lb. HCl/mol}) / (387 \text{ ft}^3/\text{mol})$$

$$= 0.067 \text{ lb. HCl/MMcf LFG}$$

Trail Ridge Energy, LLC (March 16, 2011 Sample)

**LFG Combustion Hydrogen Chloride Emission Factor**

LFG Influent Chlorine Compounds	Measured Concentration <sup>1</sup> (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.357	CCl <sub>2</sub> F <sub>2</sub>	2	0.067 *
Vinyl Chloride	0.120	C <sub>2</sub> HCl	1	0.011
Methylene Chloride (Dichloromethane)	0.133	CH <sub>2</sub> Cl <sub>2</sub>	2	0.025
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.333	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	2	0.063
1,2-Dichloroethane	0.157	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	2	0.030
Trichloroethene	0.140	C <sub>2</sub> HCl <sub>3</sub>	3	0.040
Tetrachloroethene (Perchloroethene)	0.330	C <sub>2</sub> Cl <sub>4</sub>	4	0.124
1,4-Dichlorobenzene	0.397	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	2	0.075
<b>Total hydrogen chloride emission factor (lb./MMcf)</b>				<b>0.43</b>

Notes

1. April 2, 2011 LFG sample laboratory analytical results. Average of three samples (see Attachment).

\* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl  
 $(0.357 \text{ ft}^3 \text{ Freon 12/MMcf LFG}) (2 \text{ mol HCl/mol Freon 12}) (36.46 \text{ lb. HCl/mol}) / (387 \text{ ft}^3/\text{mol})$

**LABORATORY NARRATIVE  
EPA Method TO-15 - URS  
Derenzo & Associates  
Workorder# 1103546**

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**

Despite the use of flow controllers for sample collection, the final canister vacuums for sample TRE-3 was measured at ambient pressure in the field. These ambient pressure readings were confirmed by the laboratory upon sample receipt.

**Analytical Notes**

The canisters in this work order were pressurized with Helium prior to sampling, per client request. Dilution factors have been adjusted accordingly.

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.

Dilution was performed on samples TRE-1, TRE-2, and TRE-3 due to the presence of high level target species.

**Definition of Data Qualifying Flags**

Qualifying flags may have been used in this report and are defined on each sample page, if applicable.

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**  
**EPA METHOD TO-15 GC/MS FULL SCAN**

Client Sample ID: TRE-1

Lab ID#: 1103546-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	94	330	460	1600
Vinyl Chloride	94	100	240	260
1,3-Butadiene	94	120	210	260
Ethanol	370	120000 E	700	220000 E
Acetone	370	16000	890	39000
2-Propanol	370	20000	920	48000
Methylene Chloride	94	130	320	450
Hexane	94	680	330	2400
2-Butanone (Methyl Ethyl Ketone)	370	20000	1100	58000
cis-1,2-Dichloroethene	94	330	370	1300
Tetrahydrofuran	94	2800	280	8300
Cyclohexane	94	340	320	1200
2,2,4-Trimethylpentane	94	150	440	680
Benzene	94	3000	300	9700
1,2-Dichloroethane	94	150	380	610
Heptane	94	780	380	3200
Trichloroethene	94	150	500	810
4-Methyl-2-pentanone	94	840	380	3400
Toluene	94	11000	350	41000
Tetrachloroethene	94	320	630	2200
Ethyl Benzene	94	6000	400	26000
m,p-Xylene	94	11000	410	47000
o-Xylene	94	2900	410	13000
Styrene	94	680	400	2900
Cumene	94	580	460	2800
Propylbenzene	94	480	460	2300
4-Ethyltoluene	94	2100	460	10000
1,3,5-Trimethylbenzene	94	820	460	4000
1,2,4-Trimethylbenzene	94	1700	460	8400
1,4-Dichlorobenzene	94	370	560	2200

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

**Client Sample ID: TRE-2**

**Lab ID#: 1103546-02A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Freon 12	130	390	650	1900
Ethanol	530	120000 E	990	220000 E
Acetone	530	15000	1200	37000
2-Propanol	530	18000	1300	45000
Methylene Chloride	130	140	460	500
Hexane	130	650	460	2300
2-Butanone (Methyl Ethyl Ketone)	530	18000	1600	53000
cis-1,2-Dichloroethene	130	320	520	1300
Tetrahydrofuran	130	2700	390	7900
Cyclohexane	130	280	450	980
2,2,4-Trimethylpentane	130	160	610	730
Benzene	130	3000	420	9500
1,2-Dichloroethane	130	150	530	610
Heptane	130	700	540	2800
Trichloroethene	130	140	710	780
4-Methyl-2-pentanone	130	760	540	3100
Toluene	130	11000	500	40000
Tetrachloroethene	130	320	890	2100
Ethyl Benzene	130	5800	570	25000
m,p-Xylene	130	10000	570	45000
o-Xylene	130	2800	570	12000
Styrene	130	620	560	2600
Cumene	130	510	650	2500
Propylbenzene	130	440	650	2200
4-Ethyltoluene	130	2100	650	10000
1,3,5-Trimethylbenzene	130	800	650	3900
1,2,4-Trimethylbenzene	130	1600	650	8000
1,4-Dichlorobenzene	130	360	790	2200

**Client Sample ID: TRE-3**

**Lab ID#: 1103546-03A**



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

Client Sample ID: TRE-3

Lab ID#: 1103546-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	130	350	630	1700
Ethanol	510	120000 E	960	220000 E
Acetone	510	16000	1200	38000
2-Propanol	510	18000	1200	45000
Hexane	130	600	450	2100
2-Butanone (Methyl Ethyl Ketone)	510	18000	1500	54000
cis-1,2-Dichloroethene	130	350	500	1400
Tetrahydrofuran	130	2800	380	8200
Cyclohexane	130	290	440	990
2,2,4-Trimethylpentane	130	150	600	700
Benzene	130	3200	410	10000
1,2-Dichloroethane	130	170	520	670
Heptane	130	740	520	3000
4-Methyl-2-pentanone	130	910	520	3700
Toluene	130	12000	480	44000
Tetrachloroethene	130	350	860	2400
Ethyl Benzene	130	6300	550	27000
m,p-Xylene	130	12000	550	52000
o-Xylene	130	3200	550	14000
Styrene	130	720	540	3100
Cumene	130	610	630	3000
Propylbenzene	130	590	630	2900
1,3,5-Trimethylbenzene	130	870	630	4300
1,2,4-Trimethylbenzene	130	2000	630	9700
1,4-Dichlorobenzene	130	460	770	2800





Client Sample ID: TRE-1

Lab ID#: 1103546-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040221	Date of Collection:	3/16/11 2:30:00 PM
Dil. Factor:	187	Date of Analysis:	4/2/11 07:05 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	94	330	460	1600
Freon 114	94	Not Detected	650	Not Detected
Chloromethane	370	Not Detected	770	Not Detected
Vinyl Chloride	94	100	240	260
1,3-Butadiene	94	120	210	260
Bromomethane	94	Not Detected	360	Not Detected
Chloroethane	370	Not Detected	990	Not Detected
Freon 11	94	Not Detected	520	Not Detected
Ethanol	370	120000 E	700	220000 E
Freon 113	94	Not Detected	720	Not Detected
1,1-Dichloroethene	94	Not Detected	370	Not Detected
Acetone	370	16000	890	39000
2-Propanol	370	20000	920	48000
Carbon Disulfide	370	Not Detected	1200	Not Detected
3-Chloropropene	370	Not Detected	1200	Not Detected
Methylene Chloride	94	130	320	450
Methyl tert-butyl ether	94	Not Detected	340	Not Detected
trans-1,2-Dichloroethene	94	Not Detected	370	Not Detected
Hexane	94	680	330	2400
1,1-Dichloroethane	94	Not Detected	380	Not Detected
2-Butanone (Methyl Ethyl Ketone)	370	20000	1100	58000
cis-1,2-Dichloroethene	94	330	370	1300
Tetrahydrofuran	94	2800	280	8300
Chloroform	94	Not Detected	460	Not Detected
1,1,1-Trichloroethane	94	Not Detected	510	Not Detected
Cyclohexane	94	340	320	1200
Carbon Tetrachloride	94	Not Detected	590	Not Detected
2,2,4-Trimethylpentane	94	150	440	680
Benzene	94	3000	300	9700
1,2-Dichloroethane	94	150	380	610
Heptane	94	780	380	3200
Trichloroethene	94	150	500	810
1,2-Dichloropropane	94	Not Detected	430	Not Detected
1,4-Dioxane	370	Not Detected	1300	Not Detected
Bromodichloromethane	94	Not Detected	630	Not Detected
cis-1,3-Dichloropropene	94	Not Detected	420	Not Detected
4-Methyl-2-pentanone	94	840	380	3400
Toluene	94	11000	350	41000
trans-1,3-Dichloropropene	94	Not Detected	420	Not Detected
1,1,2-Trichloroethane	94	Not Detected	510	Not Detected
Tetrachloroethene	94	320	630	2200



Client Sample ID: TRE-1

Lab ID#: 1103546-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040221	Date of Collection:	3/16/11 2:30:00 PM
Dil. Factor:	187	Date of Analysis:	4/2/11 07:05 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Hexanone	370	Not Detected	1500	Not Detected
Dibromochloromethane	94	Not Detected	800	Not Detected
1,2-Dibromoethane (EDB)	94	Not Detected	720	Not Detected
Chlorobenzene	94	Not Detected	430	Not Detected
Ethyl Benzene	94	6000	400	26000
m,p-Xylene	94	11000	410	47000
o-Xylene	94	2900	410	13000
Styrene	94	680	400	2900
Bromoform	94	Not Detected	970	Not Detected
Cumene	94	580	460	2800
1,1,2,2-Tetrachloroethane	94	Not Detected	640	Not Detected
Propylbenzene	94	480	460	2300
4-Ethyltoluene	94	2100	460	10000
1,3,5-Trimethylbenzene	94	820	460	4000
1,2,4-Trimethylbenzene	94	1700	460	8400
1,3-Dichlorobenzene	94	Not Detected	560	Not Detected
1,4-Dichlorobenzene	94	370	560	2200
alpha-Chlorotoluene	94	Not Detected	480	Not Detected
1,2-Dichlorobenzene	94	Not Detected	560	Not Detected
1,2,4-Trichlorobenzene	370	Not Detected	2800	Not Detected
Hexachlorobutadiene	370	Not Detected	4000	Not Detected

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	92	70-130
4-Bromofluorobenzene	121	70-130



Client Sample ID: TRE-2

Lab ID#: 1103546-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040220	Date of Collection:	3/16/11 4:28:00 PM
Dil. Factor:	263	Date of Analysis:	4/2/11 06:44 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	130	390	650	1900
Freon 114	130	Not Detected	920	Not Detected
Chloromethane	530	Not Detected	1100	Not Detected
Vinyl Chloride	130	Not Detected	340	Not Detected
1,3-Butadiene	130	Not Detected	290	Not Detected
Bromomethane	130	Not Detected	510	Not Detected
Chloroethane	530	Not Detected	1400	Not Detected
Freon 11	130	Not Detected	740	Not Detected
Ethanol	530	120000 E	990	220000 E
Freon 113	130	Not Detected	1000	Not Detected
1,1-Dichloroethene	130	Not Detected	520	Not Detected
Acetone	530	15000	1200	37000
2-Propanol	530	18000	1300	45000
Carbon Disulfide	530	Not Detected	1600	Not Detected
3-Chloropropene	530	Not Detected	1600	Not Detected
Methylene Chloride	130	140	460	500
Methyl tert-butyl ether	130	Not Detected	470	Not Detected
trans-1,2-Dichloroethene	130	Not Detected	520	Not Detected
Hexane	130	650	460	2300
1,1-Dichloroethane	130	Not Detected	530	Not Detected
2-Butanone (Methyl Ethyl Ketone)	530	18000	1600	53000
cis-1,2-Dichloroethene	130	320	520	1300
Tetrahydrofuran	130	2700	390	7900
Chloroform	130	Not Detected	640	Not Detected
1,1,1-Trichloroethane	130	Not Detected	720	Not Detected
Cyclohexane	130	280	450	980
Carbon Tetrachloride	130	Not Detected	830	Not Detected
2,2,4-Trimethylpentane	130	160	610	730
Benzene	130	3000	420	9500
1,2-Dichloroethane	130	150	530	610
Heptane	130	700	540	2800
Trichloroethene	130	140	710	780
1,2-Dichloropropane	130	Not Detected	610	Not Detected
1,4-Dioxane	530	Not Detected	1900	Not Detected
Bromodichloromethane	130	Not Detected	880	Not Detected
cis-1,3-Dichloropropene	130	Not Detected	600	Not Detected
4-Methyl-2-pentanone	130	760	540	3100
Toluene	130	11000	500	40000
trans-1,3-Dichloropropene	130	Not Detected	600	Not Detected
1,1,2-Trichloroethane	130	Not Detected	720	Not Detected
Tetrachloroethene	130	320	890	2100



Client Sample ID: TRE-2

Lab ID#: 1103546-02A

**EPA METHOD TO-15 GC/MS FULL SCAN**

File Name:	3040220	Date of Collection:	3/16/11 4:28:00 PM
Dil. Factor:	263	Date of Analysis:	4/2/11 06:44 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Hexanone	530	Not Detected	2200	Not Detected
Dibromochloromethane	130	Not Detected	1100	Not Detected
1,2-Dibromoethane (EDB)	130	Not Detected	1000	Not Detected
Chlorobenzene	130	Not Detected	600	Not Detected
Ethyl Benzene	130	5800	570	25000
m,p-Xylene	130	10000	570	45000
o-Xylene	130	2800	570	12000
Styrene	130	620	560	2600
Bromoform	130	Not Detected	1400	Not Detected.
Cumene	130	510	650	2500
1,1,2,2-Tetrachloroethane	130	Not Detected	900	Not Detected
Propylbenzene	130	440	650	2200
4-Ethyltoluene	130	2100	650	10000
1,3,5-Trimethylbenzene	130	800	650	3900
1,2,4-Trimethylbenzene	130	1600	650	8000
1,3-Dichlorobenzene	130	Not Detected	790	Not Detected
1,4-Dichlorobenzene	130	360	790	2200
alpha-Chlorotoluene	130	Not Detected	680	Not Detected
1,2-Dichlorobenzene	130	Not Detected	790	Not Detected
1,2,4-Trichlorobenzene	530	Not Detected	3900	Not Detected
Hexachlorobutadiene	530	Not Detected	5600	Not Detected

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	93	70-130
4-Bromofluorobenzene	120	70-130

Client Sample ID: TRE-3

Lab ID#: 1103546-03A

**EPA METHOD TO-15 GC/MS FULL SCAN**

File Name:	3040219	Date of Collection:	3/16/11 5:48:00 PM
Dil. Factor:	255	Date of Analysis:	4/2/11 06:27 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	130	350	630	1700
Freon 114	130	Not Detected	890	Not Detected
Chloromethane	510	Not Detected	1000	Not Detected
Vinyl Chloride	130	Not Detected	320	Not Detected
1,3-Butadiene	130	Not Detected	280	Not Detected
Bromomethane	130	Not Detected	500	Not Detected
Chloroethane	510	Not Detected	1300	Not Detected
Freon 11	130	Not Detected	720	Not Detected
Ethanol	510	120000 E	960	220000 E
Freon 113	130	Not Detected	980	Not Detected
1,1-Dichloroethene	130	Not Detected	500	Not Detected
Acetone	510	16000	1200	38000
2-Propanol	510	18000	1200	45000
Carbon Disulfide	510	Not Detected	1600	Not Detected
3-Chloropropene	510	Not Detected	1600	Not Detected
Methylene Chloride	130	Not Detected	440	Not Detected
Methyl tert-butyl ether	130	Not Detected	460	Not Detected
trans-1,2-Dichloroethene	130	Not Detected	500	Not Detected
Hexane	130	600	450	2100
1,1-Dichloroethane	130	Not Detected	520	Not Detected
2-Butanone (Methyl Ethyl Ketone)	510	18000	1500	54000
cis-1,2-Dichloroethene	130	350	500	1400
Tetrahydrofuran	130	2800	380	8200
Chloroform	130	Not Detected	620	Not Detected
1,1,1-Trichloroethane	130	Not Detected	700	Not Detected
Cyclohexane	130	290	440	990
Carbon Tetrachloride	130	Not Detected	800	Not Detected
2,2,4-Trimethylpentane	130	150	600	700
Benzene	130	3200	410	10000
1,2-Dichloroethane	130	170	520	670
Heptane	130	740	520	3000
Trichloroethene	130	Not Detected	680	Not Detected
1,2-Dichloropropane	130	Not Detected	590	Not Detected
1,4-Dioxane	510	Not Detected	1800	Not Detected
Bromodichloromethane	130	Not Detected	850	Not Detected
cis-1,3-Dichloropropene	130	Not Detected	580	Not Detected
4-Methyl-2-pentanone	130	910	520	3700
Toluene	130	12000	480	44000
trans-1,3-Dichloropropene	130	Not Detected	580	Not Detected
1,1,2-Trichloroethane	130	Not Detected	700	Not Detected
Tetrachloroethene	130	350	860	2400



Client Sample ID: TRE-3

Lab ID#: 1103546-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040219	Date of Collection:	3/16/11 5:48:00 PM
Dil. Factor:	255	Date of Analysis:	4/2/11 06:27 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Hexanone	510	Not Detected	2100	Not Detected
Dibromochloromethane	130	Not Detected	1100	Not Detected
1,2-Dibromoethane (EDB)	130	Not Detected	980	Not Detected
Chlorobenzene	130	Not Detected	590	Not Detected
Ethyl Benzene	130	6300	550	27000
m,p-Xylene	130	12000	550	52000
o-Xylene	130	3200	550	14000
Styrene	130	720	540	3100
Bromoform	130	Not Detected	1300	Not Detected
Cumene	130	610	630	3000
1,1,2,2-Tetrachloroethane	130	Not Detected	880	Not Detected
Propylbenzene	130	590	630	2900
4-Ethyltoluene	130	Not Detected	630	Not Detected
1,3,5-Trimethylbenzene	130	870	630	4300
1,2,4-Trimethylbenzene	130	2000	630	9700
1,3-Dichlorobenzene	130	Not Detected	770	Not Detected
1,4-Dichlorobenzene	130	460	770	2800
alpha-Chlorotoluene	130	Not Detected	660	Not Detected
1,2-Dichlorobenzene	130	Not Detected	770	Not Detected
1,2,4-Trichlorobenzene	510	Not Detected	3800	Not Detected
Hexachlorobutadiene	510	Not Detected	5400	Not Detected

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	94	70-130
4-Bromofluorobenzene	126	70-130



Client Sample ID: Lab Blank

Lab ID#: 1103546-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040208	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 12:09 PM

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	2.0	Not Detected	5.3	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	2.0	Not Detected	6.2	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)	2.0	Not Detected	5.9	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#: 1103546-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040208	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 12:09 PM

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	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	93	70-130
4-Bromofluorobenzene	112	70-130





Client Sample ID: CCV

Lab ID#: 1103546-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040204	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 10:18 AM

Compound	%Recovery
Freon 12	98
Freon 114	101
Chloromethane	133 Q
Vinyl Chloride	110
1,3-Butadiene	94
Bromomethane	98
Chloroethane	91
Freon 11	92
Ethanol	95
Freon 113	94
1,1-Dichloroethene	97
Acetone	94
2-Propanol	89
Carbon Disulfide	97
3-Chloropropene	95
Methylene Chloride	92
Methyl tert-butyl ether	87
trans-1,2-Dichloroethene	92
Hexane	93
1,1-Dichloroethane	91
2-Butanone (Methyl Ethyl Ketone)	91
cis-1,2-Dichloroethene	92
Tetrahydrofuran	92
Chloroform	92
1,1,1-Trichloroethane	86
Cyclohexane	92
Carbon Tetrachloride	89
2,2,4-Trimethylpentane	88
Benzene	96
1,2-Dichloroethane	91
Heptane	95
Trichloroethene	94
1,2-Dichloropropane	88
1,4-Dioxane	92
Bromodichloromethane	94
cis-1,3-Dichloropropene	93
4-Methyl-2-pentanone	86
Toluene	94
trans-1,3-Dichloropropene	97
1,1,2-Trichloroethane	96
Tetrachloroethene	105



Client Sample ID: CCV

Lab ID#: 1103546-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040204	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 10:18 AM

Compound	%Recovery
2-Hexanone	97
Dibromochloromethane	98
1,2-Dibromoethane (EDB)	98
Chlorobenzene	99
Ethyl Benzene	96
m,p-Xylene	97
o-Xylene	91
Styrene	94
Bromoform	102
Cumene	98
1,1,2,2-Tetrachloroethane	92
Propylbenzene	97
4-Ethyltoluene	97
1,3,5-Trimethylbenzene	99
1,2,4-Trimethylbenzene	98
1,3-Dichlorobenzene	95
1,4-Dichlorobenzene	102
alpha-Chlorotoluene	88
1,2-Dichlorobenzene	98
1,2,4-Trichlorobenzene	94
Hexachlorobutadiene	100

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	94	70-130
4-Bromofluorobenzene	112	70-130

Client Sample ID: LCS

Lab ID#: 1103546-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040205	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 10:59 AM

Compound	%Recovery
Freon 12	95
Freon 114	102
Chloromethane	129
Vinyl Chloride	107
1,3-Butadiene	91
Bromomethane	93
Chloroethane	89
Freon 11	89
Ethanol	87
Freon 113	94
1,1-Dichloroethene	101
Acetone	93
2-Propanol	87
Carbon Disulfide	115
3-Chloropropene	105
Methylene Chloride	88
Methyl tert-butyl ether	86
trans-1,2-Dichloroethene	99
Hexane	90
1,1-Dichloroethane	86
2-Butanone (Methyl Ethyl Ketone)	91
cis-1,2-Dichloroethene	87
Tetrahydrofuran	83
Chloroform	90
1,1,1-Trichloroethane	83
Cyclohexane	87
Carbon Tetrachloride	87
2,2,4-Trimethylpentane	84
Benzene	88
1,2-Dichloroethane	82
Heptane	85
Trichloroethene	87
1,2-Dichloropropane	80
1,4-Dioxane	82
Bromodichloromethane	85
cis-1,3-Dichloropropene	83
4-Methyl-2-pentanone	75
Toluene	85
trans-1,3-Dichloropropene	89
1,1,2-Trichloroethane	87
Tetrachloroethene	96



Client Sample ID: LCS

Lab ID#: 1103546-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040205	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 10:59 AM

Compound	%Recovery
2-Hexanone	85
Dibromochloromethane	88
1,2-Dibromoethane (EDB)	92
Chlorobenzene	91
Ethyl Benzene	90
m,p-Xylene	91
o-Xylene	86
Styrene	90
Bromoform	92
Cumene	93
1,1,2,2-Tetrachloroethane	87
Propylbenzene	90
4-Ethyltoluene	86
1,3,5-Trimethylbenzene	91
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	91
1,4-Dichlorobenzene	94
alpha-Chlorotoluene	80
1,2-Dichlorobenzene	91
1,2,4-Trichlorobenzene	92
Hexachlorobutadiene	91

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	94	70-130
4-Bromofluorobenzene	114	70-130



Client Sample ID: LCSD

Lab ID#: 1103546-06AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040206	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 11:25 AM

Compound	%Recovery
Freon 12	97
Freon 114	103
Chloromethane	126
Vinyl Chloride	105
1,3-Butadiene	90
Bromomethane	94
Chloroethane	101
Freon 11	90
Ethanol	91
Freon 113	93
1,1-Dichloroethene	100
Acetone	92
2-Propanol	88
Carbon Disulfide	116
3-Chloropropene	105
Methylene Chloride	90
Methyl tert-butyl ether	86
trans-1,2-Dichloroethene	99
Hexane	89
1,1-Dichloroethane	88
2-Butanone (Methyl Ethyl Ketone)	88
cis-1,2-Dichloroethene	88
Tetrahydrofuran	84
Chloroform	90
1,1,1-Trichloroethane	83
Cyclohexane	90
Carbon Tetrachloride	88
2,2,4-Trimethylpentane	86
Benzene	89
1,2-Dichloroethane	83
Heptane	85
Trichloroethene	85
1,2-Dichloropropane	80
1,4-Dioxane	83
Bromodichloromethane	85
cis-1,3-Dichloropropene	85
4-Methyl-2-pentanone	77
Toluene	85
trans-1,3-Dichloropropene	94
1,1,2-Trichloroethane	93
Tetrachloroethene	104



Client Sample ID: LCSD

Lab ID#: 1103546-06AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3040206	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/2/11 11:25 AM

Compound	%Recovery
2-Hexanone	91
Dibromochloromethane	96
1,2-Dibromoethane (EDB)	98
Chlorobenzene	86
Ethyl Benzene	86
m,p-Xylene	89
o-Xylene	92
Styrene	97
Bromoform	99
Cumene	100
1,1,2,2-Tetrachloroethane	96
Propylbenzene	99
4-Ethyltoluene	93
1,3,5-Trimethylbenzene	99
1,2,4-Trimethylbenzene	98
1,3-Dichlorobenzene	98
1,4-Dichlorobenzene	101
alpha-Chlorotoluene	88
1,2-Dichlorobenzene	100
1,2,4-Trichlorobenzene	100
Hexachlorobutadiene	99

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	96	70-130
4-Bromofluorobenzene	122	70-130



**CHAIN-OF-CUSTODY RECORD**

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Page 1 of 1

Project Manager Michael Brack  
 Collected by: (Print and Sign) M. Brack M. Brack  
 Company Derevco Assoc. Email mbrack@derevco.com  
 Address 39395 Schorleraff City Livonia State MI Zip 48150  
 Phone 734-464-3880 Fax \_\_\_\_\_

Project Info:	Turn Around Time:	Lab Use Only
	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush <small>specify</small>	Pressurized by: Date: Pressurization Gas: N <sub>2</sub> He
P.O. # <u>1358</u>		
Project # <u>1101067</u>		
Project Name <u>Trail Ridge Energy</u>		

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum			
						Initial	Final	Receipt	Final (psi)
01A	TRE-1	2991	3/16/11	1430	T0-15	25	1		
02A	TRE-2	3474	↓	1628	↓	25	2		
03A	TRE-3	2378	↓	1748	↓	25	1		

Relinquished by: (signature) <u>M. Brack</u> Date/Time <u>3/21/11</u>	Received by: (signature) <u>B. W. ...</u> Date/Time <u>3/21/11 08:00</u>	Notes:
Relinquished by: (signature) _____ Date/Time _____	Received by: (signature) _____ Date/Time _____	
Relinquished by: (signature) _____ Date/Time _____	Received by: (signature) _____ Date/Time _____	

Lab Use Only	Shipper Name <u>Fedex</u>	Air Bill # _____	Temp (°C) <u>N/A</u>	Condition <u>Good</u>	Custody Seals Intact? Yes No <u>None</u>	Work Order # <u>1103546</u>
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