

Derenzo and Associates, Inc.

Environmental Consultants

RECEIVED

June 4, 2010

**JUN 11 2010
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: Seminole Energy, LLC
DEP File No. 1170084-008-AC (PSD-FL-376A)
LFG Monitoring Sulfur and Chlorine Contents

Dear Ms. Vielhauer:

Condition 3.C. of Section III – Emission Unit(s) Specific Conditions of Air Construction Permit 1170084-008-AC (PSD-FL-376A) issued Seminole Energy, LLC (Seminole 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 Seminole 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 Osceola Road Solid Waste Management Facility in April 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 Seminole 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

Page 2
June 4, 2010

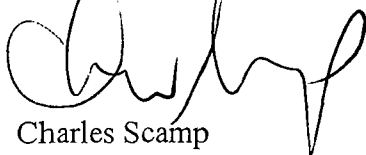
The SO₂ emission factor developed from analyses of the April 28, 2010 sample of LFG obtained from the Osceola Road Solid Waste Management Facility is 19.79 lb/MMscf of LFG (<19.87 lb/MMscf of LFG with the incorporation of all non-measured chemicals at its reporting limit).

The HCl emission factor developed from analyses of the April 28, 2010 sample of LFG obtained from the Osceola Road Solid Waste Management Facility is 0.43 lb/MMscf of LFG (<2.23 lb/MMscf of LFG 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
- Gary Kuberski, FDEP Central District Office
- Kimberly Russell, Seminole County Solid Waste Management Division

Sulfur Dioxide Emission Factor for LFG Combustion

| LFG Influent Sulfur Compound | Analytical Report | | No. Sulfur Atoms | Sulfur Content ^B as H ₂ S (ppmv) | Resulting SO ₂ Emission Rate (lb./MMcf) |
|------------------------------|---------------------------------------|--|------------------|--|--|
| | Concentrations ^A (ppmv) | Molecular Formula | | | |
| Hydrogen sulfide | 96.5 | H ₂ S | 1 | 96.5 | 16.04 * |
| Carbonyl sulfide | 0.28 | CSO | 1 | 0.28 | 0.05 |
| Methyl mercaptan | 8.15 | CH ₄ S | 1 | 8.15 | 1.36 |
| Ethyl mercaptan | 0.06 | C ₂ H ₆ S | 1 | 0.06 | 0.01 |
| Dimethyl sulfide | 13.5 | C ₂ H ₆ S | 1 | 13.5 | 2.24 |
| Carbon disulfide | 0.04 | CS ₂ | 2 | 0.08 | 0.01 |
| Isopropyl mercaptan | 0.13 | C ₃ H ₆ S | 1 | 0.13 | 0.02 |
| tert-Butyl mercaptan | 0.07 | C ₄ H ₁₀ S | 1 | 0.07 | 0.01 |
| n-Propyl mercaptan | <0.05 | C ₃ H ₈ S | 1 | <0.05 | <0.01 |
| Ethyl methyl sulfide | <0.05 | C ₃ H ₈ S | 1 | <0.05 | <0.01 |
| Thiophene | 0.19 | C ₄ H ₄ S | 1 | 0.19 | 0.03 |
| Isobutyl mercaptan | <0.05 | C ₄ H ₁₀ S | 1 | <0.05 | <0.01 |
| Diethyl sulfide | <0.05 | CH ₃ CH ₂ SCH ₂ CH ₃ | 1 | <0.05 | <0.01 |
| n-Butyl mercaptan | <0.05 | C ₄ H ₁₀ S | 1 | <0.05 | <0.01 |
| 3-Methyl Thiophene | <0.05 | C ₅ H ₆ S | 1 | <0.05 | <0.01 |
| Dimethyl disulfide | 0.04 | CH ₃ SSCH ₃ | 2 | 0.08 | 0.01 |
| Tetrahydrothiophene | <0.05 | C ₄ H ₈ O ₂ S | 1 | <0.05 | <0.01 |
| 2-Ethylthiophene | <0.05 | C ₆ H ₈ S | 1 | <0.05 | <0.01 |
| 2,5-Dimethylthiophene | <0.05 | C ₆ H ₈ S | 1 | <0.05 | <0.01 |
| Diethyl disulfide | <0.03 | CH ₃ SSCH ₃ | 2 | <0.05 | <0.01 |
| Total | | | | <119.5 | <19.87^C |

Notes

A. April 29, 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:

$$\begin{aligned} & (119.5 \text{ scf H}_2\text{S/MMcf LFG}) (1 \text{ scf SO}_2\text{/scf H}_2\text{S}) (64.06 \text{ lb. SO}_2\text{/mol}) / (385.3 \text{ ft}^3\text{/mol}) \\ & = 19.9 \text{ lb SO}_2\text{/MMcf LFG} \end{aligned}$$

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

$$\begin{aligned} & (96.5 \text{ scf H}_2\text{S/MMcf LFG}) (1 \text{ scf SO}_2\text{/scf H}_2\text{S}) (64.06 \text{ lb. SO}_2\text{/mol}) / (385.3 \text{ ft}^3\text{/mol}) \\ & = 16.04 \text{ lb SO}_2\text{/MMcf LFG} \end{aligned}$$

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 | 96.5 | H ₂ S | 1 | 96.5 | 16.04 * |
| Carbonyl sulfide | 0.28 | CSO | 1 | 0.28 | 0.05 |
| Methyl mercaptan | 8.15 | CH ₄ S | 1 | 8.15 | 1.36 |
| Ethyl mercaptan | 0.06 | C ₂ H ₆ S | 1 | 0.06 | 0.01 |
| Dimethyl sulfide | 13.5 | C ₂ H ₆ S | 1 | 13.5 | 2.24 |
| Carbon disulfide | 0.04 | CS ₂ | 2 | 0.08 | 0.01 |
| Isopropyl mercaptan | 0.13 | C ₃ H ₆ S | 1 | 0.13 | 0.02 |
| tert-Butyl mercaptan | 0.07 | C ₄ H ₁₀ S | 1 | 0.07 | 0.01 |
| Thiophene | 0.19 | C ₄ H ₄ S | 1 | 0.19 | 0.03 |
| Dimethyl disulfide | 0.04 | CH ₃ SSCH ₃ | 2 | 0.08 | 0.01 |
| Total | | | | 119.0 | 19.79 |

Notes

A. April 29, 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):
 $(96.5 \text{ scf H}_2\text{S/MMcf LFG}) (1 \text{ scf SO}_2/\text{scf H}_2\text{S}) (64.06 \text{ lb.SO}_2/\text{mol}) / (385.3 \text{ ft}^3/\text{mol})$
 = 16.04 lb SO₂/MMcf LFG

LFG Combustion Hydrogen Chloride Emission Factor

| LFG Influent Chlorine Compounds | Analytical Report | | No. Chlorine Atoms | HCl Emission Factor (lb./MMcf) |
|---|----------------------------------|---|--------------------|--------------------------------|
| | Concentration ¹ (ppm) | Molecular Formula | | |
| Freon 12 (Dichlorodifluoromethane) | 0.520 | CCl ₂ F ₂ | 2 | 0.098 [*] |
| Freon 114 (Dichlorotetrafluoroethane) | <0.200 | C ₂ Cl ₂ F ₄ | 2 | <0.038 |
| Chloromethane | <0.790 | CH ₃ Cl | 1 | <0.074 |
| Vinyl Chloride | <0.200 | C ₂ HCl | 1 | <0.019 |
| Chloroethane | <0.200 | C ₂ H ₅ Cl | 1 | <0.019 |
| Freon 11 (Fluorotrichloromethane) | <0.200 | CFCl ₃ | 3 | <0.057 |
| Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane) | <0.200 | C ₂ Cl ₂ F ₃ | 2 | <0.038 |
| 3-Chloropropene | <0.790 | C ₃ H ₅ Cl | 1 | <0.074 |
| Methylene Chloride (Dichloromethane) | 0.230 | CH ₂ Cl ₂ | 2 | 0.043 |
| 1,2-Dichloroethene (as cis-1,2-Dichloroethene) | 0.310 | C ₂ H ₂ Cl ₂ | 2 | 0.058 |
| 1,2-Dichloroethene (as trans-1,2-Dichloroethene) | <0.200 | C ₂ H ₂ Cl ₂ | 2 | <0.038 |
| 1,1-Dichloroethane | <0.200 | C ₂ H ₄ Cl ₂ | 2 | <0.038 |
| 1,1-Dichloroethene | <0.200 | C ₂ H ₂ Cl ₂ | 2 | <0.038 |
| Chloroform | <0.200 | CHCl ₃ | 3 | <0.057 |
| 1,1,1-Trichloroethane | <0.200 | C ₂ H ₃ Cl ₃ | 3 | <0.057 |
| Carbon Tetrachloride | <0.200 | CCl ₄ | 4 | <0.075 |
| 1,2-Dichloroethane | <0.200 | C ₂ H ₄ Cl ₂ | 2 | <0.038 |
| Trichloroethene | <0.200 | C ₂ HCl ₃ | 3 | <0.057 |
| 1,2-dichloropropane | <0.200 | C ₃ H ₆ Cl ₂ | 2 | <0.038 |
| Bromodichloromethane | <0.200 | CBrCl ₂ | 2 | <0.038 |
| 1,3-Dichloropropene (as cis-1,3-Dichloropropene) | <0.200 | C ₃ H ₄ Cl ₂ | 2 | <0.038 |
| 1,3-Dichloropropene (as trans-1,3-Dichloropropene) | <0.200 | C ₃ H ₄ Cl ₂ | 2 | <0.038 |
| 1,1,2-Trichloroethane | <0.200 | C ₂ H ₃ Cl ₃ | 3 | <0.057 |
| Tetrachloroethene (Perchloroethene) | 0.360 | C ₂ Cl ₄ | 4 | 0.136 |
| Dibromochloromethane | <0.200 | CHBr ₂ Cl | 1 | <0.019 |
| Chlorobenzene | <0.200 | C ₆ H ₅ Cl | 1 | <0.019 |
| 1,1,2,2-Tetrachloroethane | <0.200 | C ₂ H ₂ Cl ₄ | 4 | <0.075 |
| 1,3-Dichlorobenzene | <0.200 | C ₆ H ₄ Cl ₂ | 2 | <0.038 |
| 1,4-Dichlorobenzene | 0.500 | C ₆ H ₄ Cl ₂ | 2 | 0.094 |
| alpha-Chlorotoluene | <0.200 | C ₇ H ₇ Cl | 1 | <0.019 |
| 1,2-Dichlorobenzene | <0.200 | C ₆ H ₄ Cl ₂ | 2 | <0.038 |
| 1,2,4-Trichlorobenzene | <0.790 | C ₆ H ₃ Cl ₃ | 3 | <0.223 |
| Hexachlorobutadiene | <0.790 | C ₄ Cl ₆ | 6 | <0.447 |
| Total hydrogen chloride emission factor (lb./MMcf) | | | | <2.23 |

Notes

1. May 19, 2010 LFG sample laboratory analytical results (see Attachment)

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

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

= 0.10 lb. HCl/MMcf LFG

LFG Combustion Hydrogen Chloride Emission Factor

| LFG Influent Chlorine Compounds ¹ | Measured Concentration (ppm) | Molecular Formula | No. Chlorine Atoms | HCl Emission Factor (lb./MMcf) |
|---|------------------------------|---|--------------------|--------------------------------|
| Freon 12 (Dichlorodifluoromethane) | 0.52 | CCl ₂ F ₂ | 2 | 0.10 * |
| Methylene Chloride (Dichloromethane) | 0.23 | CH ₂ Cl ₂ | 2 | 0.04 |
| 1,2-Dichloroethene (as cis-1,2-Dichloroethene) | 0.31 | C ₂ H ₂ Cl ₂ | 2 | 0.06 |
| Tetrachloroethene (Perchloroethene) | 0.36 | C ₂ Cl ₄ | 4 | 0.14 |
| 1,4-Dichlorobenzene | 0.50 | C ₆ H ₄ Cl ₂ | 2 | 0.09 |
| Total hydrogen chloride emission factor (lb./MMcf) | | | | 0.43 |

Notes

1. May 19, 2010 LFG sample laboratory analytical results (see Attachment)

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

$$(0.52 \text{ ft}^3 \text{ Freon 12/MMcf LFG}) (2 \text{ mol HCl/mol Freon 12}) (36.46 \text{ lb. HCl/mol}) / (387 \text{ ft}^3/\text{mol})$$

$$= 0.10 \text{ lb. HCl/MMcf LFG}$$

Client: Derenzo and Associates, Inc.
Project: Seminole Energy / 1001025A

CAS Project No: P1001496

CASE NARRATIVE

The samples were received intact under chain of custody on April 29, 2010 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-08 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

Client: Derenzo and Associates, Inc.
Project: Seminole Energy/1001025A

Service Request: P1001496

SAMPLE CROSS-REFERENCE

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>DATE</u> | <u>TIME</u> |
|-----------------|-------------------------|-------------|-------------|
| P1001496-001 | SE-1 | 4/28/10 | 16:50 |
| P1001496-002 | SE-2 | 4/28/10 | 16:45 |

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Derenzo and Associates, Inc. Work order: P1001496
 Project: Seminole Energy / 1001025A
 Sample(s) received on: 4/29/2010 Date opened: 4/29/2010 by: ADAVID

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- | | Yes | No | N/A |
|--|-------------------------------------|-------------------------------------|-------------------------------------|
| 1 Were sample containers properly marked with client sample ID? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Container(s) supplied by CAS ? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3 Did sample containers arrive in good condition? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Was a chain-of-custody provided? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Was the chain-of-custody properly completed? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Did sample container labels and/or tags agree with custody papers? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Was sample volume received adequate for analysis? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Are samples within specified holding times? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Was proper temperature (thermal preservation) of cooler at receipt adhered to? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Cooler Temperature _____ °C Blank Temperature _____ °C | | | |
| 10 Was a trip blank received? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Trip blank supplied by CAS: _____ | | | |
| 11 Were custody seals on outside of cooler/Box? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Location of seal(s) _____ Sealing Lid? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were signature and date included? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were seals intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were custody seals on outside of sample container? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Location of seal(s) _____ Sealing Lid? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were signature and date included? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were seals intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 12 Do containers have appropriate preservation , according to method/SOP or Client specified information? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is there a client indication that the submitted samples are pH preserved? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were VOA vials checked for presence/absence of air bubbles? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 13 Tubes: Are the tubes capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Do they contain moisture? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 14 Badges: Are the badges properly capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are dual bed badges separated and individually capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| Lab Sample ID | Container Description | Required pH * | Received pH | Adjusted pH | VOA Headspace (Presence/Absence) | Receipt / Preservation Comments |
|-----------------|-----------------------|---------------|-------------|-------------|----------------------------------|---------------------------------|
| P1001496-001.01 | 1.0 L Tedlar Bag | | | | | |
| P1001496-002.01 | 1.0 L Tedlar Bag | | | | | |
| | | | | | | |
| | | | | | | |

Explain any discrepancies: (include lab sample ID numbers): _____
 The COC was not relinquished.
 The sample collection times were taken from the bag labels.

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TRN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Page 1 of 1

Client: Derenzo and Associates, Inc.

Client Sample ID: SE-1

Client Project ID: Seminole Energy / 1001025A

CAS Project ID: P1001496

CAS Sample ID: P1001496-001

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Zheng Wang
Sampling Media: 1.0 L Tedlar Bag
Test Notes:

Date Collected: 4/28/10
Time Collected: 16:50
Date Received: 4/29/10
Date Analyzed: 4/29/10
Time Analyzed: 10:43
Volume(s) Analyzed: 0.10 ml(s)

| CAS # | Compound | Result µg/m ³ | MRL µg/m ³ | Result ppbV | MRL ppbV | Data Qualifier |
|-----------|-----------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide | 130,000 | 70 | 94,000 | 50 | |
| 463-58-1 | Carbonyl Sulfide | 670 | 120 | 270 | 50 | |
| 74-93-1 | Methyl Mercaptan | 15,000 | 98 | 7,500 | 50 | |
| 75-08-1 | Ethyl Mercaptan | ND | 130 | ND | 50 | |
| 75-18-3 | Dimethyl Sulfide | 33,000 | 130 | 13,000 | 50 | |
| 75-15-0 | Carbon Disulfide | 120 | 78 | 37 | 25 | |
| 75-33-2 | Isopropyl Mercaptan | 220 | 160 | 72 | 50 | |
| 75-66-1 | tert-Butyl Mercaptan | ND | 180 | ND | 50 | |
| 107-03-9 | n-Propyl Mercaptan | ND | 160 | ND | 50 | |
| 624-89-5 | Ethyl Methyl Sulfide | ND | 160 | ND | 50 | |
| 110-02-1 | Thiophene | 540 | 170 | 160 | 50 | |
| 513-44-0 | Isobutyl Mercaptan | ND | 180 | ND | 50 | |
| 352-93-2 | Diethyl Sulfide | ND | 180 | ND | 50 | |
| 109-79-5 | n-Butyl Mercaptan | ND | 180 | ND | 50 | |
| 624-92-0 | Dimethyl Disulfide | 140 | 96 | 37 | 25 | |
| 616-44-4 | 3-Methylthiophene | ND | 200 | ND | 50 | |
| 110-01-0 | Tetrahydrothiophene | ND | 180 | ND | 50 | |
| 638-02-8 | 2,5-Dimethylthiophene | ND | 230 | ND | 50 | |
| 872-55-9 | 2-Ethylthiophene | ND | 230 | ND | 50 | |
| 110-81-6 | Diethyl Disulfide | ND | 120 | ND | 25 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Page 1 of 1

Client: **Derenzo and Associates, Inc.**
 Client Sample ID: **SE-2**
 Client Project ID: **Seminole Energy / 1001025A**

CAS Project ID: P1001496
 CAS Sample ID: P1001496-002

Test Code: ASTM D 5504-08
 Instrument ID: Agilent 7890A/GC22/SCD
 Analyst: Zheng Wang
 Sampling Media: 1.0 L Tedlar Bag
 Test Notes:

Date Collected: 4/28/10
 Time Collected: 16:45
 Date Received: 4/29/10
 Date Analyzed: 4/29/10
 Time Analyzed: 11:02
 Volume(s) Analyzed: 0.10 ml(s)

| CAS # | Compound | Result µg/m ³ | MRL µg/m ³ | Result ppbV | MRL ppbV | Data Qualifier |
|-----------|-----------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide | 140,000 | 70 | 99,000 | 50 | |
| 463-58-1 | Carbonyl Sulfide | 700 | 120 | 290 | 50 | |
| 74-93-1 | Methyl Mercaptan | 17,000 | 98 | 8,800 | 50 | |
| 75-08-1 | Ethyl Mercaptan | 170 | 130 | 67 | 50 | |
| 75-18-3 | Dimethyl Sulfide | 35,000 | 130 | 14,000 | 50 | |
| 75-15-0 | Carbon Disulfide | 140 | 78 | 45 | 25 | |
| 75-33-2 | Isopropyl Mercaptan | 590 | 160 | 190 | 50 | |
| 75-66-1 | tert-Butyl Mercaptan | 310 | 180 | 85 | 50 | |
| 107-03-9 | n-Propyl Mercaptan | ND | 160 | ND | 50 | |
| 624-89-5 | Ethyl Methyl Sulfide | ND | 160 | ND | 50 | |
| 110-02-1 | Thiophene | 730 | 170 | 210 | 50 | |
| 513-44-0 | Isobutyl Mercaptan | ND | 180 | ND | 50 | |
| 352-93-2 | Diethyl Sulfide | ND | 180 | ND | 50 | |
| 109-79-5 | n-Butyl Mercaptan | ND | 180 | ND | 50 | |
| 624-92-0 | Dimethyl Disulfide | 150 | 96 | 38 | 25 | |
| 616-44-4 | 3-Methylthiophene | ND | 200 | ND | 50 | |
| 110-01-0 | Tetrahydrothiophene | ND | 180 | ND | 50 | |
| 638-02-8 | 2,5-Dimethylthiophene | ND | 230 | ND | 50 | |
| 872-55-9 | 2-Ethylthiophene | ND | 230 | ND | 50 | |
| 110-81-6 | Diethyl Disulfide | ND | 120 | ND | 25 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

[Signature]

5/1/10

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Page 1 of 1

Client: Derenzo and Associates, Inc.
Client Sample ID: Method Blank
Client Project ID: Seminole Energy / 1001025A

CAS Project ID: P1001496
 CAS Sample ID: P100429-MB

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Zheng Wang
Sampling Media: 1.0 L Tedlar Bag
Test Notes:

Date Collected: NA
 Time Collected: NA
 Date Received: NA
 Date Analyzed: 4/29/10
 Time Analyzed: 09:01
 Volume(s) Analyzed: 1.0 ml(s)

| CAS # | Compound | Result µg/m ³ | MRL µg/m ³ | Result ppbV | MRL ppbV | Data Qualifier |
|-----------|-----------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide | ND | 7.0 | ND | 5.0 | |
| 463-58-1 | Carbonyl Sulfide | ND | 12 | ND | 5.0 | |
| 74-93-1 | Methyl Mercaptan | ND | 9.8 | ND | 5.0 | |
| 75-08-1 | Ethyl Mercaptan | ND | 13 | ND | 5.0 | |
| 75-18-3 | Dimethyl Sulfide | ND | 13 | ND | 5.0 | |
| 75-15-0 | Carbon Disulfide | ND | 7.8 | ND | 2.5 | |
| 75-33-2 | Isopropyl Mercaptan | ND | 16 | ND | 5.0 | |
| 75-66-1 | tert-Butyl Mercaptan | ND | 18 | ND | 5.0 | |
| 107-03-9 | n-Propyl Mercaptan | ND | 16 | ND | 5.0 | |
| 624-89-5 | Ethyl Methyl Sulfide | ND | 16 | ND | 5.0 | |
| 110-02-1 | Thiophene | ND | 17 | ND | 5.0 | |
| 513-44-0 | Isobutyl Mercaptan | ND | 18 | ND | 5.0 | |
| 352-93-2 | Diethyl Sulfide | ND | 18 | ND | 5.0 | |
| 109-79-5 | n-Butyl Mercaptan | ND | 18 | ND | 5.0 | |
| 624-92-0 | Dimethyl Disulfide | ND | 9.6 | ND | 2.5 | |
| 616-44-4 | 3-Methylthiophene | ND | 20 | ND | 5.0 | |
| 110-01-0 | Tetrahydrothiophene | ND | 18 | ND | 5.0 | |
| 638-02-8 | 2,5-Dimethylthiophene | ND | 23 | ND | 5.0 | |
| 872-55-9 | 2-Ethylthiophene | ND | 23 | ND | 5.0 | |
| 110-81-6 | Diethyl Disulfide | ND | 12 | ND | 2.5 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Verified By: _____

Date: _____

**LABORATORY NARRATIVE
Modified TO-15 Soil Gas
Derenzo & Associates
Workorder# 1005307**

One 6 Liter Summa Canister sample was received on May 13, 2010. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 50 mLs of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

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.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

| <i>Requirement</i> | <i>TO-15</i> | <i>ATL Modifications</i> |
|-------------------------|----------------------------|---|
| Daily CCV | +/- 30% Difference | <= 30% Difference with two allowed out up to <=40%.; flag and narrate outliers |
| Sample collection media | Summa canister | ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request |
| Method Detection Limit | Follow 40CFR Pt.136 App. B | The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases |

Receiving Notes

Despite the use of flow controller for sample collection, the final canister vacuum for sample SE-1 were measured at ambient pressure in the field. This ambient pressure reading was confirmed by the laboratory upon sample receipt.

Analytical Notes

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

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: SE-1

Lab ID#: 1005307-01A

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|----------------------------------|----------------------|------------------|-----------------------|-------------------|
| Freon 12 | 200 | 520 | 980 | 2600 |
| Ethanol | 790 | 140000 E | 1500 | 270000 E |
| Acetone | 790 | 23000 | 1900 | 55000 |
| 2-Propanol | 790 | 20000 | 1900 | 48000 |
| Methylene Chloride | 200 | 230 | 690 | 810 |
| Hexane | 200 | 260 | 700 | 920 |
| 2-Butanone (Methyl Ethyl Ketone) | 200 | 25000 | 580 | 74000 |
| cis-1,2-Dichloroethene | 200 | 310 | 780 | 1200 |
| Tetrahydrofuran | 200 | 4300 | 580 | 13000 |
| Cyclohexane | 200 | 330 | 680 | 1100 |
| Benzene | 200 | 1100 | 630 | 3600 |
| Heptane | 200 | 500 | 810 | 2000 |
| 4-Methyl-2-pentanone | 200 | 1400 | 810 | 5900 |
| Toluene | 200 | 11000 | 740 | 41000 |
| Tetrachloroethene | 200 | 360 | 1300 | 2400 |
| Ethyl Benzene | 200 | 4700 | 860 | 20000 |
| m,p-Xylene | 200 | 9300 | 860 | 40000 |
| o-Xylene | 200 | 2900 | 860 | 12000 |
| Styrene | 200 | 800 | 840 | 3400 |
| Cumene | 200 | 430 | 970 | 2100 |
| Propylbenzene | 200 | 420 | 970 | 2100 |
| 4-Ethyltoluene | 200 | 1700 | 970 | 8500 |
| 1,3,5-Trimethylbenzene | 200 | 710 | 970 | 3500 |
| 1,2,4-Trimethylbenzene | 200 | 1800 | 970 | 8700 |
| 1,4-Dichlorobenzene | 200 | 500 | 1200 | 3000 |



Client Sample ID: SE-1

Lab ID#: 1005307-01A

MODIFIED EPA METHOD TO-15 GC/MS

| | | | |
|--------------|---------|---------------------|--------------------|
| File Name: | b051818 | Date of Collection: | 4/29/10 4:00:00 PM |
| Dil. Factor: | 39.5 | Date of Analysis: | 5/18/10 05:26 PM |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|----------------------------------|-------------------|---------------|--------------------|----------------|
| Freon 12 | 200 | 520 | 980 | 2600 |
| Freon 114 | 200 | Not Detected | 1400 | Not Detected |
| Chloromethane | 790 | Not Detected | 1600 | Not Detected |
| Vinyl Chloride | 200 | Not Detected | 500 | Not Detected |
| 1,3-Butadiene | 200 | Not Detected | 440 | Not Detected |
| Bromomethane | 200 | Not Detected | 770 | Not Detected |
| Chloroethane | 200 | Not Detected | 520 | Not Detected |
| Freon 11 | 200 | Not Detected | 1100 | Not Detected |
| Ethanol | 790 | 140000 E | 1500 | 270000 E |
| Freon 113 | 200 | Not Detected | 1500 | Not Detected |
| 1,1-Dichloroethene | 200 | Not Detected | 780 | Not Detected |
| Acetone | 790 | 23000 | 1900 | 55000 |
| 2-Propanol | 790 | 20000 | 1900 | 48000 |
| Carbon Disulfide | 200 | Not Detected | 620 | Not Detected |
| 3-Chloropropene | 790 | Not Detected | 2500 | Not Detected |
| Methylene Chloride | 200 | 230 | 690 | 810 |
| Methyl tert-butyl ether | 200 | Not Detected | 710 | Not Detected |
| trans-1,2-Dichloroethene | 200 | Not Detected | 780 | Not Detected |
| Hexane | 200 | 260 | 700 | 920 |
| 1,1-Dichloroethane | 200 | Not Detected | 800 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 200 | 25000 | 580 | 74000 |
| cis-1,2-Dichloroethene | 200 | 310 | 780 | 1200 |
| Tetrahydrofuran | 200 | 4300 | 580 | 13000 |
| Chloroform | 200 | Not Detected | 960 | Not Detected |
| 1,1,1-Trichloroethane | 200 | Not Detected | 1100 | Not Detected |
| Cyclohexane | 200 | 330 | 680 | 1100 |
| Carbon Tetrachloride | 200 | Not Detected | 1200 | Not Detected |
| 2,2,4-Trimethylpentane | 200 | Not Detected | 920 | Not Detected |
| Benzene | 200 | 1100 | 630 | 3600 |
| 1,2-Dichloroethane | 200 | Not Detected | 800 | Not Detected |
| Heptane | 200 | 500 | 810 | 2000 |
| Trichloroethene | 200 | Not Detected | 1100 | Not Detected |
| 1,2-Dichloropropane | 200 | Not Detected | 910 | Not Detected |
| 1,4-Dioxane | 790 | Not Detected | 2800 | Not Detected |
| Bromodichloromethane | 200 | Not Detected | 1300 | Not Detected |
| cis-1,3-Dichloropropene | 200 | Not Detected | 900 | Not Detected |
| 4-Methyl-2-pentanone | 200 | 1400 | 810 | 5900 |
| Toluene | 200 | 11000 | 740 | 41000 |
| trans-1,3-Dichloropropene | 200 | Not Detected | 900 | Not Detected |



Client Sample ID: SE-1

Lab ID#: 1005307-01A

MODIFIED EPA METHOD TO-15 GC/MS

| | | | |
|--------------|---------|---------------------|--------------------|
| File Name: | b051818 | Date of Collection: | 4/29/10 4:00:00 PM |
| Dil. Factor: | 39.5 | Date of Analysis: | 5/18/10 05:26 PM |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---------------------------|-------------------|---------------|--------------------|----------------|
| 1,1,2-Trichloroethane | 200 | Not Detected | 1100 | Not Detected |
| Tetrachloroethene | 200 | 360 | 1300 | 2400 |
| 2-Hexanone | 790 | Not Detected | 3200 | Not Detected |
| Dibromochloromethane | 200 | Not Detected | 1700 | Not Detected |
| 1,2-Dibromoethane (EDB) | 200 | Not Detected | 1500 | Not Detected |
| Chlorobenzene | 200 | Not Detected | 910 | Not Detected |
| Ethyl Benzene | 200 | 4700 | 860 | 20000 |
| m,p-Xylene | 200 | 9300 | 860 | 40000 |
| o-Xylene | 200 | 2900 | 860 | 12000 |
| Styrene | 200 | 800 | 840 | 3400 |
| Bromoform | 200 | Not Detected | 2000 | Not Detected |
| Cumene | 200 | 430 | 970 | 2100 |
| 1,1,2,2-Tetrachloroethane | 200 | Not Detected | 1400 | Not Detected |
| Propylbenzene | 200 | 420 | 970 | 2100 |
| 4-Ethyltoluene | 200 | 1700 | 970 | 8500 |
| 1,3,5-Trimethylbenzene | 200 | 710 | 970 | 3500 |
| 1,2,4-Trimethylbenzene | 200 | 1800 | 970 | 8700 |
| 1,3-Dichlorobenzene | 200 | Not Detected | 1200 | Not Detected |
| 1,4-Dichlorobenzene | 200 | 500 | 1200 | 3000 |
| alpha-Chlorotoluene | 200 | Not Detected | 1000 | Not Detected |
| 1,2-Dichlorobenzene | 200 | Not Detected | 1200 | Not Detected |
| 1,2,4-Trichlorobenzene | 790 | Not Detected | 5900 | Not Detected |
| Hexachlorobutadiene | 790 | Not Detected | 8400 | Not Detected |

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister

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

Client Sample ID: Lab Blank

Lab ID#: 1005307-02A

MODIFIED EPA METHOD TO-15 GC/MS

| | | |
|--------------|---------|------------------------------------|
| File Name: | b051809 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 5/18/10 11:16 AM |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|----------------------------------|----------------------|------------------|-----------------------|-------------------|
| Freon 12 | 5.0 | Not Detected | 25 | Not Detected |
| Freon 114 | 5.0 | Not Detected | 35 | Not Detected |
| Chloromethane | 20 | Not Detected | 41 | Not Detected |
| Vinyl Chloride | 5.0 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.0 | Not Detected | 11 | Not Detected |
| Bromomethane | 5.0 | Not Detected | 19 | Not Detected |
| Chloroethane | 5.0 | Not Detected | 13 | Not Detected |
| Freon 11 | 5.0 | Not Detected | 28 | Not Detected |
| Ethanol | 20 | Not Detected | 38 | Not Detected |
| Freon 113 | 5.0 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Acetone | 20 | Not Detected | 48 | Not Detected |
| 2-Propanol | 20 | Not Detected | 49 | Not Detected |
| Carbon Disulfide | 5.0 | Not Detected | 16 | Not Detected |
| 3-Chloropropene | 20 | Not Detected | 63 | Not Detected |
| Methylene Chloride | 5.0 | Not Detected | 17 | Not Detected |
| Methyl tert-butyl ether | 5.0 | Not Detected | 18 | Not Detected |
| trans-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Hexane | 5.0 | Not Detected | 18 | Not Detected |
| 1,1-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 5.0 | Not Detected | 15 | Not Detected |
| cis-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Tetrahydrofuran | 5.0 | Not Detected | 15 | Not Detected |
| Chloroform | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,1-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Cyclohexane | 5.0 | Not Detected | 17 | Not Detected |
| Carbon Tetrachloride | 5.0 | Not Detected | 31 | Not Detected |
| 2,2,4-Trimethylpentane | 5.0 | Not Detected | 23 | Not Detected |
| Benzene | 5.0 | Not Detected | 16 | Not Detected |
| 1,2-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| Heptane | 5.0 | Not Detected | 20 | Not Detected |
| Trichloroethene | 5.0 | Not Detected | 27 | Not Detected |
| 1,2-Dichloropropane | 5.0 | Not Detected | 23 | Not Detected |
| 1,4-Dioxane | 20 | Not Detected | 72 | Not Detected |
| Bromodichloromethane | 5.0 | Not Detected | 34 | Not Detected |
| cis-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 4-Methyl-2-pentanone | 5.0 | Not Detected | 20 | Not Detected |
| Toluene | 5.0 | Not Detected | 19 | Not Detected |
| trans-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |

Client Sample ID: Lab Blank

Lab ID#: 1005307-02A

MODIFIED EPA METHOD TO-15 GC/MS

| | | |
|--------------|---------|------------------------------------|
| File Name: | b051809 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 5/18/10 11:16 AM |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---------------------------|----------------------|------------------|-----------------------|-------------------|
| 1,1,2-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Tetrachloroethene | 5.0 | Not Detected | 34 | Not Detected |
| 2-Hexanone | 20 | Not Detected | 82 | Not Detected |
| Dibromochloromethane | 5.0 | Not Detected | 42 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.0 | Not Detected | 38 | Not Detected |
| Chlorobenzene | 5.0 | Not Detected | 23 | Not Detected |
| Ethyl Benzene | 5.0 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| Styrene | 5.0 | Not Detected | 21 | Not Detected |
| Bromoform | 5.0 | Not Detected | 52 | Not Detected |
| Cumene | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.0 | Not Detected | 34 | Not Detected |
| Propylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 4-Ethyltoluene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,4-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| alpha-Chlorotoluene | 5.0 | Not Detected | 26 | Not Detected |
| 1,2-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,2,4-Trichlorobenzene | 20 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 20 | Not Detected | 210 | Not Detected |

Container Type: NA - Not Applicable

| Surrogates | %Recovery | Method Limits |
|-----------------------|-----------|------------------|
| 1,2-Dichloroethane-d4 | 98 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |



Client Sample ID: CCV

Lab ID#: 1005307-03A

MODIFIED EPA METHOD TO-15 GC/MS

| | | |
|--------------|---------|------------------------------------|
| File Name: | b051803 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 5/18/10 08:09 AM |

| Compound | %Recovery |
|----------------------------------|-----------|
| Freon 12 | 104 |
| Freon 114 | 105 |
| Chloromethane | 104 |
| Vinyl Chloride | 115 |
| 1,3-Butadiene | 119 |
| Bromomethane | 109 |
| Chloroethane | 98 |
| Freon 11 | 102 |
| Ethanol | 116 |
| Freon 113 | 107 |
| 1,1-Dichloroethene | 106 |
| Acetone | 105 |
| 2-Propanol | 106 |
| Carbon Disulfide | 103 |
| 3-Chloropropene | 106 |
| Methylene Chloride | 95 |
| Methyl tert-butyl ether | 110 |
| trans-1,2-Dichloroethene | 105 |
| Hexane | 105 |
| 1,1-Dichloroethane | 106 |
| 2-Butanone (Methyl Ethyl Ketone) | 108 |
| cis-1,2-Dichloroethene | 105 |
| Tetrahydrofuran | 109 |
| Chloroform | 102 |
| 1,1,1-Trichloroethane | 106 |
| Cyclohexane | 102 |
| Carbon Tetrachloride | 104 |
| 2,2,4-Trimethylpentane | 106 |
| Benzene | 104 |
| 1,2-Dichloroethane | 105 |
| Heptane | 107 |
| Trichloroethene | 104 |
| 1,2-Dichloropropane | 103 |
| 1,4-Dioxane | 107 |
| Bromodichloromethane | 101 |
| cis-1,3-Dichloropropene | 106 |
| 4-Methyl-2-pentanone | 112 |
| Toluene | 104 |
| trans-1,3-Dichloropropene | 108 |



Client Sample ID: CCV

Lab ID#: 1005307-03A

MODIFIED EPA METHOD TO-15 GC/MS

| | | |
|--------------|---------|------------------------------------|
| File Name: | b051803 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 5/18/10 08:09 AM |

| Compound | %Recovery |
|---------------------------|-----------|
| 1,1,2-Trichloroethane | 104 |
| Tetrachloroethene | 104 |
| 2-Hexanone | 108 |
| Dibromochloromethane | 106 |
| 1,2-Dibromoethane (EDB) | 105 |
| Chlorobenzene | 102 |
| Ethyl Benzene | 106 |
| m,p-Xylene | 104 |
| o-Xylene | 103 |
| Styrene | 112 |
| Bromoform | 107 |
| Cumene | 106 |
| 1,1,2,2-Tetrachloroethane | 101 |
| Propylbenzene | 103 |
| 4-Ethyltoluene | 104 |
| 1,3,5-Trimethylbenzene | 106 |
| 1,2,4-Trimethylbenzene | 99 |
| 1,3-Dichlorobenzene | 100 |
| 1,4-Dichlorobenzene | 101 |
| alpha-Chlorotoluene | 123 |
| 1,2-Dichlorobenzene | 101 |
| 1,2,4-Trichlorobenzene | 85 |
| Hexachlorobutadiene | 89 |

Container Type: NA - Not Applicable

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



Client Sample ID: LCS

Lab ID#: 1005307-04A

MODIFIED EPA METHOD TO-15 GC/MS

| | | |
|--------------|---------|------------------------------------|
| File Name: | b051804 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 5/18/10 08:33 AM |

| Compound | %Recovery |
|----------------------------------|-----------|
| Freon 12 | 102 |
| Freon 114 | 107 |
| Chloromethane | 104 |
| Vinyl Chloride | 115 |
| 1,3-Butadiene | 115 |
| Bromomethane | 113 |
| Chloroethane | 102 |
| Freon 11 | 104 |
| Ethanol | 120 |
| Freon 113 | 97 |
| 1,1-Dichloroethene | 96 |
| Acetone | 104 |
| 2-Propanol | 106 |
| Carbon Disulfide | 106 |
| 3-Chloropropene | 109 |
| Methylene Chloride | 89 |
| Methyl tert-butyl ether | 111 |
| trans-1,2-Dichloroethene | 105 |
| Hexane | 107 |
| 1,1-Dichloroethane | 101 |
| 2-Butanone (Methyl Ethyl Ketone) | 108 |
| cis-1,2-Dichloroethene | 104 |
| Tetrahydrofuran | 110 |
| Chloroform | 102 |
| 1,1,1-Trichloroethane | 105 |
| Cyclohexane | 102 |
| Carbon Tetrachloride | 106 |
| 2,2,4-Trimethylpentane | 107 |
| Benzene | 105 |
| 1,2-Dichloroethane | 103 |
| Heptane | 109 |
| Trichloroethene | 108 |
| 1,2-Dichloropropane | 106 |
| 1,4-Dioxane | 110 |
| Bromodichloromethane | 104 |
| cis-1,3-Dichloropropene | 112 |
| 4-Methyl-2-pentanone | 112 |
| Toluene | 101 |
| trans-1,3-Dichloropropene | 111 |



Client Sample ID: LCS

Lab ID#: 1005307-04A

MODIFIED EPA METHOD TO-15 GC/MS

| | | |
|--------------|---------|------------------------------------|
| File Name: | b051804 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 5/18/10 08:33 AM |

| Compound | %Recovery |
|---------------------------|-----------|
| 1,1,2-Trichloroethane | 104 |
| Tetrachloroethene | 104 |
| 2-Hexanone | 113 |
| Dibromochloromethane | 107 |
| 1,2-Dibromoethane (EDB) | 108 |
| Chlorobenzene | 105 |
| Ethyl Benzene | 107 |
| m,p-Xylene | 107 |
| o-Xylene | 106 |
| Styrene | 115 |
| Bromoform | 108 |
| Cumene | 104 |
| 1,1,2,2-Tetrachloroethane | 104 |
| Propylbenzene | 104 |
| 4-Ethyltoluene | 106 |
| 1,3,5-Trimethylbenzene | 109 |
| 1,2,4-Trimethylbenzene | 103 |
| 1,3-Dichlorobenzene | 104 |
| 1,4-Dichlorobenzene | 106 |
| alpha-Chlorotoluene | 123 |
| 1,2-Dichlorobenzene | 103 |
| 1,2,4-Trichlorobenzene | 92 |
| Hexachlorobutadiene | 90 |

Container Type: NA - Not Applicable

| Surrogates | %Recovery | Method Limits |
|-----------------------|-----------|---------------|
| 1,2-Dichloroethane-d4 | 99 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 103 | 70-130 |