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TESTING, INC.
DENVER, SALT LAKE CITY

UTAH DEPARTMENT OF
ENVIRONMENTAL QUALITY
MAR 2 1 2013
DIVISION OF AIR QUALITY

March 19th, 2013

Mr. Rob Leishman
Air Quality Engineer
Utah Department of Air Quality
195 North 1950 West
Salt Lake City, Utah 84116

Dear Mr. Leishman:

Air Pollution Testing, Inc. is pleased to submit the following emissions report copy for emissions testing services conducted January 22nd-25th, 2013 at the North Salt Lake Medical Waste Facility located in Davis County, Utah.

One (1) copy of the test report has been sent to this address in the form of one shipment containing (1) report. Please feel free to call with any questions or comments.

Regards,

Dan Dobbins
Technical Writer

Enclosure

APT Projects: STE2357

Document Date 3/19/2013
DAQ-2013-005409

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Source Emissions Testing Report
Stericycle Incorporated

UDAQ Title V Operating Permit 1100055002
HMIWI
Emissions Compliance

North Salt Lake Medical Waste Disposal Facility
Davis County, Utah

Test Dates: January 22, 2013 – January 25, 2013

Report prepared for:
Stericycle, Inc.
90 North 11 West
North Salt Lake, Utah 84054

Report prepared by:
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APT Project: STE2357

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Certification

Team Leader Certification:

I certify that all of the sampling and analytical procedures and data presented in this report are authentic and accurate.

Danny Stumbras
Field Team Leader / Project Manager

Reviewer Certification:

I certify that all of the testing details and conclusions are accurate and valid.

Dan Dobbins
Reviewer / Technical Writer

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1. Introduction

Air Pollution Testing, Inc. (APT) was contracted by Stericycle Incorporated for emission testing services at the Medical Waste Disposal Facility located in North Salt Lake, Utah.

The Medical Waste Disposal facility operates a hospital/medical/infectious waste incinerator (HMIWI). The HMIWI is equipped with a waste heat boiler, carbon injection, electrostatic precipitator (ESP), and wet gas absorber.

The purpose of the testing program was to quantify the concentrations of nitrogen oxides (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM), various heavy metals (mercury - Hg, cadmium - Cd, lead - Pb), hydrogen chloride (HCl), and dioxin/furans (PCDD/PCDF) from one (1) HMIWI in service at the facility. Concurrent volumetric flow rates were measured to determine mass emission rates.

The data were used to determine the compliance status of the source with respect to the Title V Operating Permit 1100055002.

Table 1.1 provides contact information for key personnel involved in the test program. Table 1.2 provides a summary of the emission parameters and limits required for the testing program.

Stericycle Inc.: Medical Waste Disposal Facility Emissions Testing Program Contact Personnel		
Name, Title	*Company Address*	*Phone, Fax, email*
Mr. Steve McComber, Environmental Specialist	Stericycle, Inc. 90 North 11 West North Salt Lake, Utah 84054	(801) 330-1758, smccomber@stericycle.com
Mr. Rob Leishman, Air Quality Engineer	Utah DAQ 195 North 1950 West Salt Lake City, Utah 84116	(801) 536-4173, (801) 536-4099 fax
Mr. Dave Maiers, Operations Director	Air Pollution Testing, Inc. 5530 Marshall Street Arvada, Colorado 80002	(303) 420-5949 ext. 33, (303) 420-5920 fax dmaiers@airtest.net

Table 1.1: Testing Program Contact Personnel

Stericycle Inc.: Medical Waste Disposal Facility Source and Emission Parameter Summary	
Source Type, Identification	*Emission Limits*
Incinerator (HMIWI) Capacity : 2,500 lb/hr	NO_X : 250 ppmvd CO : 40 ppmvd SO_2 : 55 ppmvd HCl : 100 ppmvd PM : 34 mg/dscm, 0.015 gr/dscf dioxin/furans : 125 ng/dscm total, 55 gr/MMMdscf **OR** 2.3 ng/dscm TEQ, 1.0 gr/MMMdscf TEQ Pb : 1.2 mg/dscm, 0.52 gr/dscf Cd : 0.16 mg/dscm, 0.07 gr/dscf Hg : 0.55 mg/dscm, 0.24 gr/dscf
Emissions are corrected to 7% oxygen content, ppmvd – parts per million dry volume basis, gr/dscf – grains per dry standard cubic foot, gr/MMMdscf – grains per billion dry standard cubic feet, ng/dscm – nanograms per dry standard cubic meter, mg/dscm – milligrams per dry standard cubic meter, TEQ – toxic equivalents	

Table 1.2: Source and Emission Parameter Summary

2. Test Results Summary

The results of the testing are presented in Tables 2.1 through 2.4. Any testing parameters not found in the tables may be found in *Appendix 1 – Testing Parameters / Sample Calculations.*

The following terms and abbreviations are used in the tables.

- mg/dscm – milligrams per dry standard cubic meter
- ppmvw – parts per million, wet volume based
- ppmvd – parts per million, dry basis
- ppmvd @ 7% O_2 – parts per million corrected to 7 percent oxygen, dry basis
- gr/dscf – grains per dry standard cubic feet
- gr/MMMdscf – grains per billion dry standard cubic feet
- ng/dscm – nanograms per dry standard cubic meter
- %vd – percent, dry volume basis
- ºF – degrees Fahrenheit
- dscfm – stack gas flow rate, dry standard cubic feet per minute
- %vw – percent, wet volume basis
- TEQ – toxic equivalents

Stericycle Inc.: Medical Waste Disposal Facility Test Results Summary – HMIWI: Methods 6C, 10, 26A January 22, 2013							
Reference Method Data							
Run #	**1**	**2**	**3**	**4**	**5**	**Average**	
date	1/22/2013	1/22/2013	1/22/2013	1/22/2013	1/23/2013		
start time	13:31	16:23	18:16	20:19	16:50		
stop time	14:43	17:31	19:26	21:28	17:59		
sampling time (minutes)	60.0	60.0	60.0	60.0	60.0		
stack temp. (°F)	142	153	154	150	143	149	
oxygen (%vd)	13.0	12.9	12.5	13.2	12.3	12.8	
carbon dioxide (%vd)	6.1	6.1	6.3	5.8	6.5	6.2	
sample volume (dscf)	41.131	40.214	45.601	35.239	40.361	40.509	
sample volume (dscm)	1.165	1.139	1.291	0.998	1.143	1.147	
moisture content (%)	19.1	18.1	17.0	19.4	17.0	18.1	
gas flow (dscfm)	4,836	5,829	6,568	5,122	5,953	5,662	
% isokinetic (3)	89.7	90.6	91.2	107.5	100.4	99.7	
Laboratory Data							
Run #	**1**	**2**	**3**	**4**	**5**	**Average**	
HCl (µg)	497,416.3	238,637.8	106,424.3	252,214.0	42,001.7	133,546.7	
Emission Data							
Run #	**1**	**2**	**3**	**4**	**5**	**Average**	**Permit Limit**
CO (ppmvd)(1)	9.0	0.6	0.3	0.8	N/A	3.3	
CO (ppmvd @ 7% O_2)	15.7	1.1	0.6	1.5	N/A	5.8	***40.0***
SO_2 (ppmvd)(2)	6.3	5.8	4.7	5.6	N/A	5.6	
SO_2 (ppmvd @ 7% O_2)	11.0	10.0	7.8	10.0	N/A	9.6	***55.0***
HCl (ppmvd)	281.6	138.2	54.3	166.7	24.2	81.7	
HCl (ppmvd @ 7% O_2)	495.5	240.1	89.9	300.9	39.2	143.3	***100***
HCl (mg/dscm)	427.1	209.6	82.4	252.8	36.8	124.0	
HCl (mg/dscm @ 7% O_2)	751.5	364.1	136.4	456.3	59.4	217.4	

(1) Runs 1-3 were used for Method 10, CO averages reflect these three runs only
(2) Runs 1-3 were used for Method 6C, SO_2 averages reflect these three runs only
(3) Runs 3-5 were used for Method 26A, see section 4 of the report, M26A and isokinetic percent averages reflect these three runs only

Table 2.1: Test Results Summary – Methods 6C, 10 & 26A

Stericycle Inc.: Medical Waste Disposal Facility Test Results Summary – HMIWI: Method 7E January 25, 2013					
Field Reference Method Data					
Run #	**1**	**2**	**3**	**Average**	
start time	9:26	19:00	20:15		
stop time	10:26	20:00	21:15		
sample duration (minutes)	60	60	60		
O_2 (%vd)	12.5	12.3	12.7	12.5	
CO_2 (%vd)	6.3	6.4	6.2	6.3	
Emission Data					
Run #	**1**	**2**	**3**	**Average**	**Permit Limit**
NO_X (ppmvd)	53.5	76.8	90.5	73.6	
NO_X (ppmvd @ 7% O_2)	88.8	123.9	153.0	121.9	***250.0***

Table 2.2: Test Results Summary – Method 7E

Stericycle Inc.: Medical Waste Disposal Facility Test Results Summary – HMIWI: Method 23 January 24, 2013					
Field Reference Method Data					
Run #	**1**	**2**	**3**	**Average**	
start time	9:02	13:08	16:41		
stop time	12:43	16:15	20:12		
sample duration (minutes)	222	151	212		
stack temperature (°F)	136	138	149	141	
O_2 (%vd)	12.4	12.8	12.7	12.7	
CO_2 (%vd)	6.4	6.1	6.2	6.2	
sample volume (dscf)	104.263	103.510	104.774	104.182	
moisture content (%)	19.2	20.1	19.5	19.6	
gas flow (dscfm)	5,363	5,198	5,321	5,294	
% isokinetic	101.5	103.4	102.5	102.4	
Emission Data: Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans					
Run #	**1**	**2**	**3**	**Average**	**Permit Limit**
Total (ng/dscm @ 7% O_2)	6.2	6.6	4.1	5.6	**125**
Toxic Equivalents (ng/dscm @ 7% O_2)	0.326	0.350	0.269	0.315	**2.3**

Table 2.3: Test Results Summary – Method 23

Stericycle Inc. : Medical Waste Disposal Facility Test Results Summary – HMIWI: Method 29 January 23, 2013					
Field Reference Method Data					
Run #	**1**	**2**	**3**	**Average**	
start time	11:06	13:05	14:58		
stop time	12:06	14:05	15:58		
sample duration (minutes)	60	60	60		
stack temperature (°F)	132	145	145	141	
O_2 (%vd)	12.5	11.7	12.9	12.4	
CO_2 (%vd)	6.2	6.9	6.1	6.4	
moisture content (%)	18.6	18.2	17.3	18.0	
gas flow (dscfm)	1,176	1,414	1,428	1,340	
sample volume (dscf)	29.765	36.632	37.040	34.479	
Laboratory Data					
Run #	**1**	**2**	**3**	**Average**	
mass particulate front half (g)	0.02065	0.00400	0.00480	0.00982	
mass particulate filter (g)	0.00000	0.00075	0.00085	0.00053	
mass cadmium (µg)	1.7	1.5	1.7	1.6	
mass lead (µg)	6.9	23.8	3.6	11.4	
mass mercury (Frac 1B) (µg)	0.7	0.4	0.4	0.5	
mass mercury (Frac 2B) (µg)	0.4	0.4	0.6	0.5	
mass mercury (Frac 3A) (µg)	0.2	0.2	0.2	0.2	
mass mercury (Frac 3B) (µg)	0.4	0.5	0.4	0.4	
mass mercury (Frac 3C) (µg)	1.6	1.0	1.0	1.2	
Emission Calculations					
Run #	**1**	**2**	**3**	**Average**	**Permit Limit**
total PM (gr/dscf)	0.0107	0.0020	0.0024	0.0050	***0.015***
cadmium (mg/dscm @ 7%O_2)	0.0033	0.0022	0.0028	0.0028	***0.16***
lead (mg/dscm @ 7%O_2)	0.0135	0.0346	0.0060	0.0180	***1.2***
mercury (mg/dscm @ 7%O_2)	0.0065	0.0036	0.0043	0.0048	***0.55***

Table 2.4: Test Results Summary – Method 29

3. Methods

All testing was conducted in accordance with the following U.S. EPA source emissions test methods promulgated in 40 CFR Part 60, Appendix A.

Method 1 – Sample and Velocity Traverses for Stationary Sources

Method 2 – Determination of Stack Gas Velocity and Volumetric Flow Rate (Type-S Pitot Tube)

Method 3A – Determination of Oxygen and Carbon Dioxide Concentrations in Emissions

from Stationary Sources (Instrumental Analyzer Procedure)

Method 6C – Determination of Sulfur Dioxide Emissions from Stationary Sources

Method 7 – Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)

Method 9 – Determination of Visible Emissions

Method 10 – Determination of Carbon Monoxide Emissions from Stationary Sources

Method 23 – Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Municipal Waste Combustors.

Method 26A – Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources (Isokinetic Method)

Method 29 – Determination of Metals Emissions from Stationary Sources

4. Test Program Summary

The test program provided all equipment and labor necessary for the determination of all emissions parameters listed in Table 4.1. All on-site gas analyzers were housed in a mobile, analytical trailer to provide a temperature-controlled environment for stable, accurate analyzer response.

Three, 1-hour sample runs were conducted at the HMIWI exhaust stack to determine NO_X, CO, SO_2, PM, Hg, Pb, Cd, and HCl concentrations. Three, 3-hour sample runs, with an average volume of 2.9 dry standard cubic meters collected, were conducted to determine dioxans/furans concentrations. Concurrently collected O_2 content was used to report emission concentrations in the correct units. The source was operating under normal conditions during testing.

Initial Method 7E data was voided due to plant operations (aqueous ammonia injections). Runs one and two during the Method 26A testing were thrown out due to isokinetic percents being outside the acceptable range. The particulate testing during Method 26A was also voided due to an unfavorable chemical reaction which rendered the gravimetric results invalid; see section 5.3 of the report.

All QA/QC requirements detailed in the appropriate reference test methods were strictly followed. All field data were recorded on appropriate data sheets. All pre-test / post-test equipment calibration / preparations were conducted as required in the applicable reference test methods. In accordance with Utah DAQ regulatory requirements, all isokinetics were calculated on a point-by-point basis.

The unit's operating and control equipment parameters were recorded throughout the test

program by Stericycle Inc. personnel for inclusion in the test report, including;

- Charge Rate
- Secondary Chamber Temperature
- Reactor Inlet Temperature
- Scrubber Liquor Flow Rate
- Scrubber Liquor pH

Stericycle Inc.: Medical Waste Disposal Facility Sampling and Analytical Methods			
Gas Parameter	*Sampling Method*	*Analytical Method*	*Laboratory*
gas flow	Methods 1, 2	draft gauge, thermocouple, pitot tube	APT, on-site
O_2, CO_2	Method 3A	paramagnetic / non-dispersive infrared analyzers	
SO_2	Method 6C	ultraviolet analyzer	
NO_X	Method 7E	chemiluminescent analyzer	
CO	Method 10	gas filter correlation analyzer	
PM	Methods 26A, 29	gravimetric	APT, off-site
HCl	Method 26A	ion chromatography (IC)	
Hg	Method 29	cold-vapor atomic absorption spectroscopy (CVAAS)	
Dioxin/furan	Method 23	gas chromatography / mass spectroscopy (GC/MS)	Data Analysis Technologies, Inc.
Cd and Pb	Method 29	inductively coupled plasma mass spectroscopy (ICP-MS)	First Analytical Laboratories

Table 4.1: Sampling and Analytical Methods Summary

5. Test Method Details

5.1. Particulate Matter (PM) and Metals

Emission concentrations of particulate matter (PM), lead (Pb), cadmium (Cd) and mercury (Hg) were determined in accordance with EPA Method 29. Sampling periods were one-hour in duration.

Each sampling period consisted of conducting a temperature and differential pressure traverse of the stack using a K-type thermocouple and an S-type pitot tube. Concurrent with each traverse, a gas sample was extracted from the stack along a grid of points at an isokinetic flow rate. The gas passed through an in-stack glass nozzle, a heated glass

probe, a low-residue heated quartz fiber filter, a series of seven (7) chilled glass impingers, and a calibrated dry gas meter. Please see *Appendix 5 – Schematics* for a diagram of the EPA Method 29 sampling train.

At the start of sampling, the first and fourth impingers were left empty. Impingers two and three were filled with 100 ml of 10% hydrogen peroxide and 5% nitric acid solution. The fifth and sixth impingers contained 100 ml of 4% potassium permanganate and 10% sulfuric acid solution. The seventh impinger contained 250 grams of dried silica gel.

Following each sampling period, the filter, a series of acetone and dilute nitric acid rinses of the probe and nozzle, and the contents of the impingers were recovered for subsequent gravimetric and metals analysis. Cd and Pb were analyzed using inductively coupled plasma mass spectroscopy (ICPMS) at the First Analytical lab. Hg was analyzed using cold vapor atomic absorption spectroscopy (CVAAS) at the APT lab. The front half and back half sample fractions were combined for Cd and Pb, but all fractions were analyzed separately for Hg. The laboratory data were combined with field data to calculate the PM and metals (on an elemental basis) emissions in units of milligrams per dry standard (1 atmosphere and 68°F) cubic meter corrected to 7% oxygen (mg/dscm @ 7% O_2).

5.1.1. Supplemental QA/QC Procedures – PM and Metals

As required by the method, a sample of unexposed impinger solutions and a set of three filters were analyzed along with the emission samples. Additionally, a field blank was acquired during the test program. The field blank train was assembled at the sampling location, leak checked three times, and recovered. The field blank samples were archived for possible analysis pending review of the laboratory data. Reagent blanks were analyzed like a regulatory sample to quantify background concentrations.

5.2. Dioxins and Furans (PCDD and PCDF)

Dioxin and furan emissions were determined in accordance with EPA Method 23. Sampling periods were three-hours in duration.

Each sampling period consisted of conducting a temperature and differential pressure traverse of the stack using a K-type thermocouple and an S-type pitot tube. Concurrent with each traverse, a gas sample was extracted from the stack along a grid of points at an isokinetic flow rate. The gas passed through an in-stack glass nozzle, a heated glass probe, a heated glass fiber filter, a chilled glass condenser, a sorbent trap, a series of four (4) chilled glass impingers to remove residual water, and a calibrated dry gas meter. Please see *Appendix 5 – Schematics* for a diagram of the EPA Method 23 sampling train.

Prior to sampling, the sorbent trap was cleaned, packed with XAD-2 resin, and spiked with isotopically labeled PCDD and PCDF congeners by Test America personnel. The first two impingers each contained 100 milliliters of high performance liquid chromatography (HPLC)

grade water. The third impinger was left empty. The fourth impinger contained 250 grams of dried silica gel.

Following each sampling period, the probe filter, the sorbent trap, and a series of solvent rinses (acetone and methylene chloride in one container, toluene in a separate container) of the probe, nozzle, and condenser were recovered for subsequent GC/MS analysis for the Method 23 PCDD and PCDF target analytes by EPA Method 8290. The acetone / methylene chloride combined rinses were analyzed along with the filters and sorbent traps for each sampling run (for a total of three sampling runs). The laboratory data were combined with field data to calculate emissions in units of ng/dscm @ 7% O_2.

5.2.1. Supplemental QA/QC Procedures – Dioxins and Furans

As required by the method, the sorbent spike recoveries were determined for all isotopically labeled congeners, and the DB225 2,3,7,8-TCDF quantification column procedures were used.

Additionally, a true sample train blank was collected concurrent with the emission samples. Field blank collection procedures were identical to those detailed in Section 4.1.1 for PM / Metals. The field blank and, additionally, a reagent blank (acetone, methylene chloride, toluene, and quartz fiber filter) were archived for possible analysis pending review of the laboratory data.

5.3 Hydrogen Chloride (HCl)

HCl emissions were determined in accordance with EPA Method 26A. PM emissions were also determined using the particulate catch from the EPA Method 26A sampling train to confirm the EPA Method 29 PM results. These particulate results, however, were compromised due to a chemical reaction that took place with the aluminum media in which the samples were evaporated. A green patina was noted on the media upon investigation, suggesting that some HCl was retained from the particulate rinse and was allowed to react with the aluminum media upon evaporation. The dramatic increase in observed weight shown in the Method 26A particulate measurements is believed to be the result of an aluminum chloride product. The permit requires the use of either Method 5 or Method 29 in demonstrating applicable particulate matter limit compliance. The Method 29 particulate measurements did not involve aluminum media and are believed to accurately represent the particulate emissions during testing.

Each sampling period consisted of conducting a temperature and differential pressure traverse of the stack using a K-type thermocouple and an S-type pitot tube. Concurrent with each traverse, a gas sample was extracted from the stack along a grid of points at an isokinetic flow rate. The gas passed through an in-stack glass nozzle, through a heated glass probe, through a low-residue heated quartz fiber filter, through a series of five (5) chilled glass impingers, and through a calibrated dry gas meter. Please see *Appendix 5* –

Schematics for a diagram of the EPA Method 26A sampling train.

Prior to sampling, the first two impingers contained 100 ml of 0.1 N sulfuric acid solution. The third was left empty. The fourth and fifth impingers each contained 100 ml of 0.1 N sodium hydroxide solution. The sixth impinger contained dried silica gel.

Following each sampling period, the filter, along with a series of acetone rinses of the sampling probe and front half connecting glassware, were recovered for offsite gravimetric analysis to determine the PM content of the stack gas. Additionally, the contents of the first two impingers were recovered for subsequent ion chromatography (IC) analysis at the APT lab for chloride ions to determine the HCl content of the stack gas. The contents of the fourth and fifth impingers were recovered for disposal at the APT lab. The laboratory data were combined with field data to calculate emissions in units of mg/dscm @ 7% O_2.

5.3.1. Supplemental QA/QC Procedures – HCl

As required by the method, a sample of unexposed impinger solutions was analyzed along with the emission samples. Additionally, a true sample train blank was collected concurrent with the emissions samples. Field blank collection procedures were identical to those detailed in Section 4.1.1 for PM / Metals. The field blank samples were archived for possible analysis pending review of the laboratory data.

5.4. Diluent (O_2 and CO_2), Sulfur Dioxide, Nitrogen Oxides and Carbon Monoxide

O_2, CO_2, SO_2, NO_X and CO emission concentrations were measured in accordance with EPA Methods 3A (O_2 and CO_2), 6C (SO_2), 7E (NO_X) and 10 (CO). Each sampling period consisted of extracting a gas sample from the exhaust stack at a constant flow rate of approximately three liters per minute (lpm).

The sample passed through a refrigeration-type gas conditioner to remove moisture and into the sampling port of a Servomex Series 1400 paramagnetic O_2 / non-dispersive infrared CO_2 analyzer. When necessary, the gas sample was directed to a Thermo Environmental Instruments TECO Model 48 gas filter correlation infrared CO analyzer, a Western Research Model 721AT2 ultraviolet SO_2 analyzer and a TECO Model 42iHL chemiluminescent NO_X analyzer. The gas concentrations were displayed on the analyzers' front panel in units of either parts per million, dry volume basis (ppmvd – SO_2, NO_X and CO) or percent, dry volume basis (%vd – O_2 and CO_2) and logged to a computerized data acquisition system (CDAS). Please see *Appendix 5 – Schematics* for a diagram of the EPA Methods 3A, 6C, 7E and 10 sampling train.

The stratification test procedures outlined in Section 8.1.2 of Method 7E were conducted to determine the appropriate sampling points. A stratification test was conducted using a single analyte of interest along three (3) points (16.7%, 50.0%, and 83.3% of the stack diameter) passing through the centroidal area of the stack. The stack gas was not stratified (concentrations were within +/- 5% of mean concentration or +/- 0.5 ppm), thus a

single measurement point was selected for subsequent sampling.

Before and after each sampling period, the analyzers were challenged with calibration gases to calibrate the instruments, to verify linearity of response, and to quantify zero and span drift for the previous sampling period. The calibration gases were prepared and certified in accordance with EPA Protocol 1. To ensure no system bias, the analyzer calibrations were conducted by introducing all gases to the analyzers at the sampling probe at stack pressure.

Following sampling, the CDAS data were averaged in one-minute increments, corrected for instrumental drift, and reported as average O_2, CO_2, SO_2, NO_X and CO emission concentrations for each sampling period in units of %vd or ppmvd @ 7% O_2.

5.5 Visible Emissions Observation

A visual observation of emissions was performed following all procedures outlined in the Method. The observation consisted of a consecutive set of 240 readings every 15 seconds totaling one hour in duration by a qualified individual. The average reading was found to be 1.5 percent opacity.

6. Conclusions

The results of the testing program conducted by APT from January 22, 2013 to January 25, 2013 at the North Salt Lake Medical Waste Disposal Facility demonstrate that the HMIWI is operating in compliance with all applicable limits set forth in Utah Division of Air Quality (UDAQ) Title V Operating Permit 1100055002 save the HCl emissions limit of 100 ppm @ 7% oxygen.

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Appendix One: Testing Parameters / Sample Calculations

Methods 6C, 10, & 26A

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/22/2013 - 1/23/2013

EPA Methods 6C, 10, 26A

Field Reference Method Data							
	Run #	**1**	**2**	**3**	**4**	**5**	**Average**
	date	1/22/2013	1/22/2013	1/22/2013	1/22/2013	1/23/2013	
	start time	13:31	16:23	18:16	20:19	16:50	
	stop time	14:43	17:31	19:26	21:28	17:59	
	sampling time (minutes)	60.0	60.0	60.0	60.0	60.0	
D_S	stack diameter (inches)	24.5	24.5	24.5	24.5	24.5	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)^{½} (" H_2O)^{½}	0.6136	0.7389	0.8240	0.6559	0.7414	0.7148
C_P	pitot tube constant (unitless)	0.826	0.826	0.826	0.826	0.826	0.826
T_S	stack temp. (°F)	142	153	154	150	143	149
P_{bar}	barometric pressure (mbar)	882	882	882	882	880	882
P_{bar}	barometric pressure (" Hg)	26.05	26.05	26.05	26.05	25.99	26.0
Ps	stack pressure (" H_2O)	0.03	0.03	0.03	0.03	0.04	0.03
Y_d	meter box Y_d (unitless)	0.998	0.998	0.998	0.998	0.998	0.998
T_m	meter temp. (°F)	74	78	78	75	77	76
V_m	sample volume (ft^3)	47.621	46.978	53.190	40.989	47.194	47.194
ΔH	orifice setting delta H (" H_2O)	2.0	1.6	2.1	1.1	1.6	1.7
V_{lc}	moisture (g)	205.8	189.1	198.3	180.3	175.4	189.8
O_2%vd	oxygen (%vd)	13.0	12.9	12.5	13.2	12.3	12.8
CO_2%vd	carbon dioxide (%vd)	6.1	6.1	6.3	5.8	6.5	6.2
inches	nozzle diameter (inches)	0.308	0.276	0.276	0.253	0.260	0.263
N_2%vd	N_2 (%vd)	81.0	81.0	81.1	81.1	81.2	81.1
dry	NO_X (ppmvd)[1]	~~84.1~~	~~115.2~~	~~90.3~~	~~92.4~~	N/A	VOID
dry	CO (ppmvd)[2]	9.0	0.6	0.3	0.8	N/A	3.3
dry	SO_2 (ppmvd)[3]	6.3	5.8	4.7	5.6	N/A	5.6

Laboratory Data								
	Run #	**1**	**2**	**3**	**4**	**5**	**Average**	
	mass particulate front half (g) [5]	~~0.08685~~	~~0.01135~~	~~0.00560~~	~~0.19895~~	~~0.00265~~	~~0.06907~~	
	mass particulate filter (g)	~~0.01095~~	~~0.01760~~	~~0.01370~~	~~0.01535~~	~~0.00965~~	~~0.01290~~	
	HCl (µg)	497,416.3	238,637.8	106,424.3	252,214.0	42,001.7	133,546.7	

Reference Method Calculations								
	Run #	**1**	**2**	**3**	**4**	**5**	**Average**	**Permit**
V_{mstd}	sample volume (dscf)	41.131	40.214	45.601	35.239	40.361	40.509	
	sample volume (dscm)	1.165	1.139	1.291	0.998	1.143	1.147	
V_{wstd}	moisture volume (dscf)	9.703	8.916	9.350	8.501	8.270	8.948	
B_{ws}	measured moisture content (%/100)	0.191	0.181	0.170	0.194	0.170	0.181	
	saturated moisture content (%/100)	0.240	0.313	0.321	0.291	0.247	0.282	
	actual moisture content (%/100)	0.191	0.181	0.170	0.194	0.170	0.181	
M_D	molecular weight (dry)	29.50	29.49	29.51	29.46	29.53	29.50	
M_A	molecular weight (actual)	27.30	27.41	27.55	27.23	27.57	27.41	
V_S	gas velocity (ft/sec)	39.9	48.4	53.8	43.0	48.0	46.6	
F_{ACFM}	gas flow (acfm)	7,833	9,498	10,572	8,437	9,437	9,156	
F_{DSCFM}	gas flow (dscfm)	4,836	5,829	6,568	5,122	5,953	5,662	
lb/hr	gas flow (lb/hr)	25,392	30,370	33,928	26,937	30,771	29,480	
%	% isokinetic[4]	89.7	90.6	91.2	107.5	100.4	99.7	
7	NO_X (ppmvd @ 7% O_2)	~~147.1~~	~~199.5~~	~~149.9~~	~~165.7~~	N/A	VOID[1]	***250.0***
7	CO (ppmvd @ 7% O_2)	15.7	1.1	0.6	1.5	N/A	5.8	***40.0***
7	SO_2 (ppmvd @ 7% O_2)	11.0	10.0	7.8	10.0	N/A	9.6	***55.0***
	HCl (ppmvd)	281.6	138.2	54.3	166.7	24.2	81.7	
	HCl (ppmvd @ 7% O_2)	495.5	240.1	89.9	300.9	39.2	143.3	***100***
	HCl (mg/dscm)	427.1	209.6	82.4	252.8	36.8	124.0	
	HCl (mg/dscm @ 7% O_2)	751.5	364.1	136.4	456.3	59.4	217.4	
	Total PM (gr/dscf)	~~0.037~~	~~0.011~~	~~0.007~~	~~0.094~~	~~0.005~~	~~0.035~~	~~**0.015**~~

(1) NO_x runs were voided due to site operations, see section 4 of the report
(2) Runs 1-3 were used for Method 10, averages for CO reflect these three runs only
(3) Runs 1-3 were used for Method 6C, averages for SO_2 reflect these three runs only
(4) Runs 3-5 were used for Method 26A because of low isokinetic percents in Runs 1-2, all exclusive M26A averages reflect these three runs only
(5) The Method 26A particulate data was voided; see section 5.3 of the report

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Linearity Information					
Gas	O_2	CO_2	NO_X	CO	SO_2
Span Gas Value/Range	21.2	10.1	199	15.7	19.6
Bias Gas Value	10.0	5.07	89.9	8.24	10.2
Bias Check (Zero)	0.0	0.0	0.4	0.0	0.6
Bias Check (Span)	10.0	5.2	89.9	8.1	9.8
Linearity Bias (Zero)	0.0	0.0	0.1	0.1	0.1
Linearity Bias (Span)	10.1	5.2	91.0	8.1	10.2
Gas Concentration	%	%	(ppm)	(ppm)	(ppm)
1	0.0	0.0	0.0	0.0	0.0
2	10.0	5.07	89.9	8.24	10.2
3	21.2	10.1	199	15.7	19.6
4					
Response					
1	0.0	0.0	0.1	0.1	0.1
2	10.1	5.2	91.0	8.1	10.2
3	21.2	10.0	199.4	15.7	19.5
4					
Difference					
1	0.0	0.0	0.1	0.1	0.1
2	0.1	0.1	1.1	0.1	0.0
3	0.0	0.1	0.4	0.0	0.1
4	0.0	0.0	0.0	0.0	0.0
Results					
Zero Bias	0.00%	0.00%	0.15%	0.64%	2.55%
Span Bias	0.47%	0.00%	0.55%	0.00%	2.04%
Max Calibration Error	0.47%	1.29%	0.55%	0.89%	0.51%

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Linearity Information		
Gas	O_2	CO_2
Span Gas Value/Range	21.2	10.1
Bias Gas Value	10.00	5.07
Bias Check (Zero)	0.1	0.0
Bias Check (Span)	10.2	5.2
Linearity Bias (Zero)	0.0	0.0
Linearity Bias (Span)	10.1	5.2
Gas Concentration	%	%
1	0.00	0.00
2	10.00	5.07
3	21.20	10.10
Response		
1	0.0	0.0
2	10.1	5.2
3	21.2	10.1
Difference		
1	0.0	0.0
2	0.1	0.1
3	0.0	0.0
Results		
Zero Bias	0.47%	0.00%
Span Bias	0.47%	0.00%
Max Calibration Error	0.47%	1.29%

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Run 1

Start Time	13:31
Run Length	60
Stop Time	14:43

Calibration Information					
Gas	O_2	CO_2	NO_x	CO	SO_2
Instrument Range	21.2	10.1	199	15.7	19.6
Span Gas Value	10.0	5.07	89.9	8.2	10.2
Calibration					
Pretest Calibration					
Zero%	0.0	0.0	0.4	0.0	0.6
Span%	10.0	5.2	89.9	8.1	9.8
Post Test Calibration					
Zero%	0.0	0.0	1.1	0.1	0.3
Span%	10.0	5.2	94.2	8.2	9.8
Results					
Absolute Bias (Zero)	0.0%	0.0%	0.5%	0.0%	1.0%
Absolute Bias (Span)	0.5%	0.0%	1.6%	0.6%	2.0%
Absolute Drift (Zero)	0.0%	0.0%	0.4%	0.6%	1.5%
Absolute Drift (Span)	0.0%	0.0%	2.2%	0.6%	0.0%

		Corrected O_2 %	Corrected CO_2 %	Corrected NO_x ppm	Corrected CO ppm	Corrected SO_2 ppm
		13.0	*6.1*	*84.1*	*9.0*	*6.3*
Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %	Uncorrected NO_x ppm	Uncorrected CO ppm	Uncorrected SO_2 ppm
		13.0	6.2	86.2	8.9	6.2
1	13:31	12.2	6.7	59.9	0.7	9.4
2	13:32	12.4	6.9	62.5	0.5	7.9
3	13:33	15.0	4.9	55.1	0.8	5.1
4	13:34	14.5	5.0	38.6	0.7	5.9
5	13:35	13.6	5.7	52.6	0.6	7.4
6	13:36	13.1	6.2	65.4	0.7	8.2
7	13:37	12.1	6.9	71.5	0.7	9.5
8	13:38	11.5	7.4	69.2	0.7	10.4
9	13:39	12.4	6.9	75.7	0.7	8.8
10	13:40	12.3	6.8	66.0	0.7	7.8
11	13:41	11.9	7.2	65.5	0.7	8.1
12	13:42	11.7	7.3	74.2	0.7	9.2
13	13:43	11.5	7.5	81.2	0.8	9.3
14	13:44	11.6	7.4	87.9	0.7	10.1
15	13:45	12.2	7.1	90.8	0.6	9.6
16	13:46	12.7	6.5	79.2	0.6	7.8
17	13:47	13.3	6.2	79.3	0.5	7.5
18	13:48	13.2	6.1	70.8	0.4	7.4
19	13:49	13.1	6.2	64.0	0.5	7.2
20	13:50	13.1	6.2	79.0	0.5	6.8
21	13:51	12.5	6.4	88.8	3.6	8.3
22	13:52	10.0	8.3	80.7	20.0	25.5
23	13:53	10.9	8.0	130.3	389.2	25.6
24	13:54	12.1	7.0	165.2	66.0	20.9
25	13:55	13.2	6.2	150.4	17.6	17.1
26	13:56	13.5	5.9	119.5	7.1	14.1
27	13:57	13.3	5.9	122.5	3.3	12.7
28	13:58	12.5	6.5	189.9	2.1	16.9
29	13:59	12.9	8.3	197.2	1.3	19.3
30	14:00	13.6	5.8	168.7	1.3	16.5
31	14:01	13.7	5.6	150.5	0.8	14.1
32	14:02	13.8	5.6	144.4	0.2	13.1
33	14:12	12.4	6.6	76.5	0.4	-9.2
34	14:13	12.6	6.5	78.9	0.5	-6.7
35	14:14	12.9	6.2	81.7	0.2	-5.0
36	14:15	13.1	6.1	82.3	0.2	-3.8
37	14:16	13.9	5.5	80.9	0.5	-3.2
38	14:17	14.1	5.3	71.3	0.4	-2.7
39	14:18	14.0	5.4	69.1	0.2	-2.2
40	14:19	13.6	5.6	71.1	0.2	-1.9
41	14:20	13.4	5.8	73.9	0.2	-1.9
42	14:21	13.5	5.8	73.3	0.2	-1.3
43	14:22	13.7	5.6	71.2	0.2	-1.1
44	14:23	13.4	5.7	73.4	0.2	-0.4
45	14:24	13.4	5.8	70.6	0.2	0.4
46	14:25	13.3	5.8	71.7	0.2	0.3
47	14:26	12.9	6.0	71.8	0.2	0.2
48	14:27	12.9	6.2	74.7	0.2	1.2
49	14:28	13.5	5.7	72.9	0.2	0.8
50	14:29	13.1	5.9	69.9	0.2	0.8
51	14:30	13.7	5.6	74.3	0.5	1.4
52	14:31	13.8	5.4	71.2	0.2	2.1
53	14:32	13.3	5.8	69.1	0.3	3.3
54	14:33	13.4	5.6	68.7	0.7	3.9
55	14:34	13.3	5.8	76.0	0.5	3.8
56	14:35	12.5	6.3	73.5	0.2	5.5
57	14:36	12.4	6.5	79.8	0.7	6.3
58	14:37	13.0	6.1	73.3	0.3	4.9
59	14:38	13.3	5.9	76.3	0.9	4.7
60	14:39	13.6	5.6	77.9	0.3	4.0

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Run 2

Start Time	16:23
Run Length	60
Stop Time	17:31

Calibration Information

Gas	O_2	CO_2	NO_x	CO	SO_2
Instrument Range	21.2	10.1	199	15.7	19.6
Span Gas Value	10.0	5.07	89.9	8.2	10.2
Calibration					
Pretest Calibration					
Zero%	0.0	0.0	1.1	0.1	0.3
Span%	10.0	5.2	94.2	8.2	9.8
Post Test Calibration					
Zero%	0.0	0.0	0.8	0.2	0.3
Span%	10.0	5.1	92.3	8.3	9.8
Results					
Absolute Bias (Zero)	0.0%	0.0%	0.4%	0.6%	1.0%
Absolute Bias (Span)	0.5%	1.0%	0.7%	1.3%	2.0%
Absolute Drift (Zero)	0.0%	0.0%	0.2%	0.6%	0.0%
Absolute Drift (Span)	0.0%	1.0%	1.0%	0.6%	0.0%
	Corrected O_2 %	Corrected CO_2 %	Corrected NO_x ppm	Corrected CO ppm	Corrected SO_2 ppm
	12.9	*6.1*	*115.2*	*0.6*	*5.8*

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %	Uncorrected NO_x ppm	Uncorrected CO ppm	Uncorrected SO_2 ppm
		12.9	6.2	119.2	0.8	5.7
1	16:23	13.4	5.7	90.6	0.2	5.3
2	16:24	12.5	6.4	95.5	0.2	6.4
3	16:25	11.9	6.9	105.2	1.1	7.0
4	16:26	12.2	6.8	112.4	0.8	7.0
5	16:27	12.6	6.5	122.5	1.4	7.2
6	16:28	12.1	6.7	113.3	0.6	7.1
7	16:29	11.6	7.2	111.9	0.6	7.6
8	16:30	12.5	6.6	117.6	1.4	7.7
9	16:31	12.5	6.4	118.8	1.0	5.7
10	16:32	12.8	6.3	118.2	0.3	5.4
11	16:33	13.8	5.6	115.7	0.8	4.5
12	16:34	13.8	5.5	112.9	0.3	4.6
13	16:35	13.8	5.5	111.3	0.2	5.3
14	16:36	13.4	5.8	112.5	0.2	5.5
15	16:37	12.9	6.1	113.1	0.4	6.1
16	16:38	12.9	6.2	112.8	0.8	6.6
17	16:39	12.6	6.4	119.6	0.8	6.4
18	16:40	12.6	6.4	126.0	1.4	8.2
19	16:41	12.6	6.4	126.0	1.2	9.2
20	16:42	12.4	6.5	127.6	0.5	8.3
21	16:43	12.5	6.6	124.5	0.6	7.9
22	16:44	12.8	6.3	123.7	0.8	7.7
23	16:45	13.2	6.0	121.7	0.8	7.6
24	16:46	13.5	6.0	113.8	1.0	7.1
25	16:47	13.7	5.7	108.0	0.5	6.2
26	16:48	13.4	5.9	107.4	0.3	6.2
27	16:49	13.6	5.8	108.5	0.3	6.0
28	16:50	13.2	6.0	109.8	0.5	6.0
29	16:51	12.7	6.4	112.7	0.3	6.4
30	16:52	13.8	5.7	106.0	1.4	5.0
31	16:53	14.1	5.2	91.5	1.4	3.1
32	16:54	13.6	5.6	94.8	0.8	3.5
33	16:55	13.5	5.7	102.9	0.5	4.0
34	16:56	13.6	5.7	106.2	0.5	4.4
35	17:00	13.1	6.0	109.8	0.5	3.8
36	17:01	13.2	6.0	111.9	0.3	4.1
37	17:02	13.3	5.9	113.0	1.0	4.5
38	17:03	12.8	6.2	117.3	0.7	3.6
39	17:04	12.7	6.3	115.9	0.3	3.2
40	17:05	12.9	6.2	118.6	0.3	3.3
41	17:06	12.8	6.1	109.4	0.8	2.7
42	17:07	11.8	6.9	120.4	0.3	4.5
43	17:08	11.2	7.4	134.5	0.3	5.7
44	17:09	11.5	7.3	138.9	1.0	6.1
45	17:10	11.8	6.9	142.7	1.4	5.7
46	17:11	12.4	6.5	139.8	1.4	5.0
47	17:12	12.7	6.3	136.9	1.4	5.7
48	17:13	13.1	6.0	136.0	1.4	6.0
49	17:14	12.5	6.3	137.5	1.4	6.6
50	17:15	12.3	6.5	137.8	1.4	5.9
51	17:16	12.3	6.5	139.6	1.4	6.1
52	17:17	12.9	6.3	138.9	1.4	6.2
53	17:18	12.9	6.1	132.8	1.4	5.4
54	17:19	13.1	6.0	132.3	1.0	5.4
55	17:20	13.2	5.9	133.9	1.0	5.7
56	17:21	13.4	5.7	130.3	0.6	5.2
57	17:22	13.2	5.8	132.2	0.4	5.7
58	17:23	13.2	5.9	134.2	0.4	5.6
59	17:24	13.7	5.5	129.6	1.2	3.7
60	17:25	12.7	6.1	115.2	1.2	2.5

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Run 3

Start Time	18:16
Run Length	60
Stop Time	19:26

Calibration Information

Gas	O_2	CO_2	NO_x	CO	SO_2
Instrument Range	21.2	10.1	199	15.7	19.6
Span Gas Value	10.0	5.07	89.9	8.2	10.2
Calibration					
Pretest Calibration					
Zero%	0.0	0.0	0.8	0.2	0.3
Span%	10.0	5.1	92.3	8.3	9.8
Post Test Calibration					
Zero%	0.0	0.0	0.5	0.3	0.2
Span%	10.0	5.2	88.8	8.3	9.8
Results					
Absolute Bias (Zero)	0.0%	0.0%	0.2%	1.3%	0.5%
Absolute Bias (Span)	0.5%	0.0%	1.1%	1.3%	2.0%
Absolute Drift (Zero)	0.0%	0.0%	0.2%	0.6%	0.5%
Absolute Drift (Span)	0.0%	1.0%	1.8%	0.0%	0.0%

		Corrected O_2 %	Corrected CO_2 %	Corrected NO_x ppm	Corrected CO ppm	Corrected SO_2 ppm
		12.5	*6.3*	*90.3*	*0.3*	*4.7*
Run Length (Minutes)	**Time**	**Uncorrected O_2 %**	**Uncorrected CO_2 %**	**Uncorrected NO_x ppm**	**Uncorrected CO ppm**	**Uncorrected SO_2 ppm**
		12.5	6.4	90.9	0.6	4.6
1	18:16	13.0	6.1	67.2	1.2	2.0
2	18:17	13.2	6.0	68.2	1.2	2.7
3	18:18	13.8	5.5	67.1	1.4	3.6
4	18:19	13.2	5.9	64.5	1.2	2.5
5	18:20	13.1	5.9	67.8	0.3	2.8
6	18:21	12.6	6.3	69.0	0.6	3.0
7	18:22	12.6	6.3	72.6	1.2	3.3
8	18:23	12.6	6.3	78.6	1.2	3.1
9	18:24	13.5	5.8	75.6	0.8	2.7
10	18:25	13.1	5.8	66.0	0.5	2.6
11	18:26	12.5	6.3	69.6	0.3	2.9
12	18:27	12.3	6.6	75.1	0.3	3.2
13	18:28	12.2	6.6	81.0	0.3	3.5
14	18:29	11.8	6.8	84.0	0.3	3.6
15	18:30	12.7	6.5	84.2	0.6	2.7
16	18:31	13.3	5.8	72.4	0.3	2.1
17	18:32	12.7	6.2	75.3	0.3	2.5
18	18:33	12.4	6.5	81.9	0.3	3.1
19	18:34	12.3	6.6	86.9	0.8	3.2
20	18:35	12.1	6.8	87.6	1.4	3.8
21	18:36	12.4	6.6	86.2	1.4	3.6
22	18:37	13.1	6.1	79.5	1.1	3.8
23	18:38	13.0	6.1	69.5	1.0	3.2
24	18:39	13.0	6.0	72.9	0.9	3.8
25	18:40	12.5	6.3	83.9	0.7	5.2
26	18:41	12.4	6.6	89.0	0.4	5.7
27	18:42	12.3	6.6	90.2	0.7	5.9
28	18:43	12.8	6.3	92.1	0.7	5.9
29	18:44	12.8	6.2	82.3	0.5	7.3
30	18:45	12.1	6.7	83.5	0.3	8.1
31	18:46	11.5	7.2	95.4	0.3	8.9
32	18:47	11.2	7.5	99.1	0.3	9.5
33	18:48	11.5	7.3	103.5	0.6	8.6
34	18:49	11.7	7.3	105.2	0.9	7.7
35	18:54	11.3	7.3	105.1	0.3	4.5
36	18:55	11.4	7.5	104.3	0.3	4.4
37	18:56	12.1	6.8	102.9	0.3	4.9
38	18:57	12.0	6.8	111.4	0.3	6.1
39	18:58	12.2	6.7	108.8	0.7	5.8
40	18:59	12.1	6.7	105.9	0.3	5.1
41	19:00	11.9	6.9	108.4	0.3	5.1
42	19:01	11.7	7.1	113.2	0.6	5.2
43	19:02	12.6	6.5	111.1	0.5	5.2
44	19:03	11.5	7.1	108.1	0.4	5.5
45	19:04	11.5	7.4	109.7	0.7	5.5
46	19:05	12.2	6.8	109.2	0.7	5.6
47	19:06	11.9	6.9	107.1	0.3	5.8
48	19:07	11.7	7.2	109.2	0.3	6.4
49	19:08	12.4	6.7	104.1	0.5	6.0
50	19:09	12.6	6.4	101.6	0.6	5.4
51	19:10	12.6	6.4	106.7	0.7	4.6
52	19:11	12.7	6.4	109.8	0.3	5.0
53	19:12	12.8	6.4	111.4	0.3	5.2
54	19:13	13.0	6.2	111.8	0.3	5.0
55	19:14	13.1	6.1	110.6	0.3	4.5
56	19:15	14.0	5.5	102.0	0.8	4.9
57	19:16	14.0	5.3	84.9	0.5	3.4
58	19:17	13.7	5.5	87.3	0.4	3.8
59	19:18	14.1	5.4	91.0	0.3	4.4
60	19:19	14.3	5.2	92.9	0.3	5.5

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Run 4

Start Time	20:19
Run Length	60
Stop Time	21:28

Calibration Information

Gas	O_2	CO_2	NO_x	CO	SO_2
Instrument Range	21.2	10.1	199	15.7	19.6
Span Gas Value	10.0	5.07	89.9	8.2	10.2
Calibration					
Pretest Calibration					
Zero%	0.0	0.0	0.5	0.3	0.2
Span%	10.0	5.2	88.8	8.3	9.8
Post Test Calibration					
Zero%	0.0	0.0	0.1	0.3	0.3
Span%	10.1	5.2	86.7	8.3	9.7
Results					
Absolute Bias (Zero)	0.0%	0.0%	0.0%	1.3%	1.0%
Absolute Bias (Span)	0.0%	0.0%	2.2%	1.3%	2.6%
Absolute Drift (Zero)	0.0%	0.0%	0.2%	0.0%	0.5%
Absolute Drift (Span)	0.5%	0.0%	1.1%	0.0%	0.5%

		Corrected O_2 %	Corrected CO_2 %	Corrected NO_x ppm	Corrected CO ppm	Corrected SO_2 ppm
		13.2	*5.8*	*92.4*	*0.8*	*5.6*
Run Length (Minutes)	**Time**	**Uncorrected O_2 %**	**Uncorrected CO_2 %**	**Uncorrected NO_x ppm**	**Uncorrected CO ppm**	**Uncorrected SO_2 ppm**
		13.2	5.9	90.1	1.1	5.4
1	20:19	14.5	5.0	103.6	0.9	3.9
2	20:20	14.0	5.3	103.9	0.5	4.5
3	20:21	14.2	5.2	106.7	1.0	4.4
4	20:22	14.1	5.2	108.7	1.3	4.5
5	20:23	13.9	5.5	118.2	0.7	4.9
6	20:24	13.9	5.4	119.3	0.5	5.1
7	20:25	13.9	5.3	111.1	1.1	3.2
8	20:26	13.0	6.0	104.4	1.1	4.2
9	20:27	12.7	6.3	109.0	1.2	5.4
10	20:28	12.5	6.4	96.1	1.4	6.2
11	20:29	12.5	6.5	114.6	1.4	6.6
12	20:30	12.5	6.5	69.0	1.6	6.9
13	20:31	12.5	6.5	72.8	1.5	6.4
14	20:32	12.4	6.5	59.2	1.5	5.0
15	20:33	12.7	6.3	49.4	1.5	4.8
16	20:34	12.3	6.5	55.3	1.3	5.5
17	20:35	11.9	7.0	61.5	1.4	6.2
18	20:36	12.2	6.7	66.5	1.4	6.2
19	20:37	12.3	6.6	82.8	1.4	6.4
20	20:38	12.2	6.7	82.6	1.4	5.2
21	20:39	12.6	6.4	68.7	1.1	3.8
22	20:40	12.0	6.8	72.8	1.2	4.1
23	20:41	12.5	6.5	82.7	1.3	4.2
24	20:42	12.8	6.2	91.7	0.3	3.9
25	20:43	13.5	5.8	97.7	0.7	4.1
26	20:44	13.3	5.9	106.6	0.4	5.5
27	20:45	13.1	6.0	114.8	0.5	7.2
28	20:46	12.6	6.4	114.2	0.3	7.5
29	20:47	12.8	6.3	116.3	0.3	7.2
30	20:48	13.0	6.2	126.6	0.5	7.6
31	20:49	14.0	5.5	120.8	0.4	6.8
32	20:50	13.4	5.7	109.0	0.3	5.7
33	20:51	13.4	5.8	113.6	0.3	5.5
34	20:52	13.9	5.5	108.1	0.5	5.1
35	20:53	16.3	4.6	99.9	0.3	4.2
36	20:54	15.0	3.7	48.8	1.1	2.1
37	20:55	14.2	5.2	99.8	0.5	3.9
38	20:56	14.1	5.2	95.9	1.4	4.8
39	20:57	13.8	5.6	104.4	1.5	6.9
40	20:58	13.7	5.6	102.3	1.3	6.8
41	20:59	13.5	5.7	100.1	1.4	6.8
42	21:00	13.7	5.6	102.3	1.4	7.1
43	21:01	13.7	5.6	104.9	1.3	6.9
44	21:02	13.2	5.8	116.2	1.4	6.8
45	21:03	13.3	6.0	120.1	1.4	7.1
46	21:04	13.3	5.9	92.7	1.5	6.1
47	21:05	13.3	5.9	84.2	1.4	5.5
48	21:06	13.4	5.9	85.1	1.4	5.0
49	21:07	13.4	5.8	83.1	1.5	4.5
50	21:08	13.5	5.8	81.0	0.9	4.5
51	21:09	14.0	5.4	84.3	1.4	4.3
52	21:10	14.4	5.2	63.9	1.5	3.6
53	21:11	13.9	5.3	51.2	1.3	3.7
54	21:12	14.1	5.3	52.1	1.5	3.9
55	21:13	13.4	5.7	51.5	1.5	4.6
56	21:14	12.4	6.4	57.6	1.5	6.0
57	21:15	12.2	6.7	73.8	1.5	7.3
58	21:16	12.0	6.8	72.2	1.5	6.5
59	21:17	11.4	7.4	74.9	1.5	7.2
60	21:18	11.5	7.3	68.3	1.5	7.2

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Run 5

Start Time	16:50
Run Length	60
Stop Time	17:59

Calibration Information		
Gas	O_2	CO_2
Instrument Range	21.2	10.1
Span Gas Value	10.0	5.07
Calibration		
Pretest Calibration		
Zero%	0.1	0.0
Span%	10.0	5.0
Post Test Calibration		
Zero%	0.1	0.0
Span%	10.0	5.0
Results		
Absolute Bias (Zero)	0.5%	0.0%
Absolute Bias (Span)	0.5%	2.0%
Absolute Drift (Zero)	0.0%	0.0%
Absolute Drift (Span)	0.0%	0.0%
	Corrected O_2 %	Corrected CO_2 %
	12.3	6.5

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %
		12.2	6.4
1	16:50	12.6	6.2
2	16:51	12.8	6.1
3	16:52	13.1	5.9
4	16:53	13.0	6.0
5	16:54	13.3	5.7
6	16:55	13.2	5.7
7	16:56	12.8	6.0
8	16:57	12.9	6.0
9	16:58	12.1	6.3
10	16:59	11.6	6.8
11	17:00	11.3	7.1
12	17:01	11.2	7.2
13	17:02	11.4	7.1
14	17:03	11.6	6.9
15	17:04	13.0	6.3
16	17:05	12.6	5.9
17	17:06	11.7	6.7
18	17:07	11.4	7.0
19	17:08	11.5	7.0
20	17:09	11.6	6.9
21	17:10	11.5	7.0
22	17:11	11.8	6.9
23	17:12	11.8	6.7
24	17:13	11.5	6.9
25	17:14	11.5	7.0
26	17:15	11.2	7.1
27	17:16	11.3	7.3
28	17:17	11.6	7.0
29	17:18	11.4	7.0
30	17:19	11.3	7.1
31	17:20	11.1	7.2
32	17:21	11.0	7.4
33	17:22	11.3	7.2
34	17:23	11.0	7.3
35	17:24	11.3	7.2
36	17:25	11.3	7.2
37	17:26	17.4	4.4
38	17:27	11.9	5.1
39	17:28	11.9	6.8
40	17:29	12.1	6.5
41	17:30	12.2	6.5
42	17:31	12.2	6.5
43	17:32	12.1	6.4
44	17:33	12.1	6.5
45	17:34	12.2	6.4
46	17:35	12.5	6.2
47	17:36	12.2	6.4
48	17:37	12.3	6.4
49	17:38	12.3	6.4
50	17:39	12.7	6.2
51	17:40	12.8	6.0
52	17:41	12.7	6.1
53	17:42	13.5	5.7
54	17:43	13.7	5.3
55	17:44	13.5	5.5
56	17:45	13.4	5.6
57	17:46	13.1	5.7
58	17:47	13.0	5.9
59	17:48	13.3	5.7
60	17:49	13.0	5.7

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Stratification Test		
Time	**Port # / Point #**	**O_2 (%vd)**
1/22/13 11:00	1-1	12.1
1/22/13 11:01	2	12.0
1/22/13 11:02	3	12.2
1/22/13 11:03	2-1	12.1
1/22/13 11:04	2	12.1
1/22/13 11:05	3	12.3
1/22/13 11:06	3-1	12.9
1/22/13 11:07	2	12.8
1/22/13 11:08	3	12.7
Average		12.3
5%		0.6
Max. Allowable (Avg. + 5%)		13.0
Min. Allowable (Avg. - 5%)		11.7
Max. Recorded		12.9
Min. Recorded		12.0
	Strat Test Acceptable?	**yes**

Method 7E

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Field Reference Method Data					
	Run #	**1**	**2**	**3**	**Average**
	Start Time	9:26	19:00	20:15	
	Stop Time	10:26	20:00	21:15	
	Sample Duration (minutes)	60	60	60	
D_S	Stack Diameter (inches)	24.5	24.5	24.5	24.5
P_{bar}	Barometric Pressure (mbar)	878	878	878	878
P_{bar}	Barometric Pressure (" Hg)	25.93	25.93	25.93	25.93
O_2%vd	O_2 (%vd)	12.5	12.3	12.7	12.5
CO_2%vd	CO_2 (%vd)	6.3	6.4	6.2	6.3
N_2%vd	N_2 (%vd)	81.1	81.3	81.1	81.2
dry	NO_X (ppmvd)	53.5	76.8	90.5	73.6

Reference Method Calculations						
	Run #	**1**	**2**	**3**	**Average**	
7	NO_X (ppmvd @ 7% O_2)	88.8	123.9	153.0	121.9	***250.0***

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Linearity Information			
Gas	O_2	CO_2	NO_X
Span Gas Value/Range	21.2	10.1	199
Bias Gas Value	10.0	5.07	89.9
Bias Check (Zero)	0.0	0.0	0.1
Bias Check (Span)	10.0	5.2	90.7
Linearity Bias (Zero)	0.0	0.0	0.1
Linearity Bias (Span)	10.0	5.2	90.7
Gas Concentration	%	%	(ppm)
1	0.0	0.0	0.0
2	10.0	5.07	89.9
3	21.2	10.1	199
4			
Response			
1	0.0	0.0	0.1
2	10.0	5.2	90.7
3	21.2	10.1	199.7
4			
Difference			
1	0.0	0.0	0.1
2	0.0	0.1	0.8
3	0.0	0.0	0.7
4	0.0	0.0	0.0
Results			
Zero Bias	0.00%	0.00%	0.00%
Span Bias	0.00%	0.00%	0.00%
Max Calibration Error	0.00%	1.29%	0.40%

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Run 1

Start Time	1/25/2013
Run Length	60
Stop Time	10:26

Calibration Information			
Gas	O_2	CO_2	NO_x
Instrument Range	21.2	10.1	199
Span Gas Value	10.0	5.07	89.9
Calibration			
Pretest Calibration			
Zero%	0.0	0.0	0.1
Span%	10.0	5.2	90.7
Post Test Calibration			
Zero%	0.0	0.1	0.4
Span%	10.0	5.2	88.7
Results			
Absolute Bias (Zero)	0.0%	1.0%	0.2%
Absolute Bias (Span)	0.0%	0.0%	1.0%
Absolute Drift (Zero)	0.0%	1.0%	0.2%
Absolute Drift (Span)	0.0%	0.0%	1.0%

		Corrected O_2 %	Corrected CO_2 %	Corrected NO_x ppm
		12.5	6.3	53.5
Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %	Uncorrected NO_x ppm
		12.5	6.5	53.4
1	9:26	12.6	6.5	74.1
2	9:27	13.0	6.2	79.8
3	9:28	12.9	6.2	81.5
4	9:29	12.2	6.6	80.4
5	9:30	11.9	7.1	81.3
6	9:31	12.7	6.4	74.0
7	9:32	12.6	6.4	71.7
8	9:33	13.0	6.3	77.8
9	9:34	12.9	6.2	67.8
10	9:35	13.0	6.1	64.4
11	9:36	13.1	6.1	63.6
12	9:37	12.8	6.2	59.9
13	9:38	12.3	6.6	65.5
14	9:39	12.5	6.5	69.0
15	9:40	12.8	6.3	69.0
16	9:41	12.7	6.4	61.2
17	9:42	12.7	6.4	57.9
18	9:43	12.6	6.4	57.1
19	9:44	12.3	6.7	57.1
20	9:45	12.3	6.7	59.2
21	9:46	12.9	6.3	62.7
22	9:47	13.2	6.0	54.6
23	9:48	13.0	6.2	48.8
24	9:49	13.3	5.9	41.2
25	9:50	12.8	6.3	42.4
26	9:51	12.3	6.6	45.1
27	9:52	12.6	6.5	51.5
28	9:53	13.0	6.2	48.6
29	9:54	12.6	6.4	44.5
30	9:55	12.1	6.8	44.7
31	9:56	12.3	6.7	48.6
32	9:57	12.0	6.8	52.3
33	9:58	11.6	7.4	60.3
34	9:59	13.1	6.2	61.4
35	10:00	13.1	6.0	49.4
36	10:01	12.4	6.6	46.4
37	10:02	12.1	6.8	47.3
38	10:03	11.8	7.0	49.6
39	10:04	11.9	7.1	52.4
40	10:05	12.4	6.6	55.3
41	10:06	11.8	7.0	61.3
42	10:07	12.8	6.4	63.1
43	10:08	13.1	6.1	54.3
44	10:09	13.7	5.7	49.3
45	10:10	13.8	5.5	41.7
46	10:11	13.4	5.8	38.0
47	10:12	12.8	6.2	36.1
48	10:13	12.8	6.3	36.6
49	10:14	13.4	5.9	31.3
50	10:15	14.1	5.3	24.5
51	10:16	13.5	5.6	22.5
52	10:17	12.3	6.4	26.6
53	10:18	10.7	7.6	32.3
54	10:19	9.9	8.4	38.0
55	10:20	10.1	8.3	43.6
56	10:21	10.9	7.9	38.1
57	10:22	11.9	7.0	41.6
58	10:23	12.0	6.9	48.3
59	10:24	13.0	6.3	51.6
60	10:25	13.1	6.0	48.1

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Run 2

Start Time	1/25/2013
Run Length	60
Stop Time	20:00

Calibration Information

Gas	O_2	CO_2	NO_x
Instrument Range	21.2	10.1	199
Span Gas Value	10.0	5.07	89.9
Calibration			
Pretest Calibration			
Zero%	0.0	0.1	0.4
Span%	10.0	5.2	88.7
Post Test Calibration			
Zero%	0.0	0.0	0.5
Span%	9.9	5.1	88.5
Results			
Absolute Bias (Zero)	0.0%	0.0%	0.2%
Absolute Bias (Span)	0.5%	1.0%	1.1%
Absolute Drift (Zero)	0.0%	1.0%	0.1%
Absolute Drift (Span)	0.5%	1.0%	0.1%
	Corrected O_2 %	***Corrected CO_2 %***	***Corrected NO_X ppm***
	12.3	***6.4***	***76.8***

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %	Uncorrected NO_X ppm
		12.2	6.5	75.8
1	19:00	12.5	6.5	101.0
2	19:01	12.4	6.4	88.9
3	19:02	11.7	6.8	105.4
4	19:03	10.9	7.4	117.0
5	19:04	10.7	7.6	124.8
6	19:05	11.5	7.0	130.5
7	19:06	12.0	6.7	130.1
8	19:07	12.3	6.4	116.1
9	19:08	12.2	6.4	139.1
10	19:09	12.2	6.6	148.0
11	19:10	12.4	6.4	149.6
12	19:11	12.6	6.1	146.3
13	19:12	12.8	6.1	140.2
14	19:13	13.8	5.4	114.7
15	19:14	13.9	5.2	101.9
16	19:15	13.4	5.5	108.8
17	19:16	12.7	6.0	120.3
18	19:17	12.2	6.4	106.9
19	19:18	11.4	6.8	39.3
20	19:19	12.0	6.6	26.2
21	19:20	10.9	7.2	29.8
22	19:21	10.5	7.7	44.1
23	19:22	11.3	7.3	56.8
24	19:23	11.5	6.9	60.6
25	19:24	12.0	6.6	56.1
26	19:25	12.3	6.3	52.1
27	19:26	12.6	6.1	51.6
28	19:27	12.6	6.2	54.3
29	19:28	12.7	6.1	56.4
30	19:29	12.7	6.1	57.1
31	19:30	12.9	6.1	56.4
32	19:31	13.0	6.0	56.5
33	19:32	13.4	5.7	52.0
34	19:33	13.5	5.7	49.4
35	19:34	13.2	5.8	53.3
36	19:35	12.6	6.2	59.8
37	19:36	12.5	6.4	63.0
38	19:37	12.1	6.6	57.7
39	19:38	12.8	6.2	54.2
40	19:39	12.3	6.4	41.8
41	19:40	11.3	7.2	56.0
42	19:41	11.3	7.3	58.4
43	19:42	11.6	7.1	61.3
44	19:43	11.5	7.1	62.5
45	19:44	12.0	6.8	65.3
46	19:45	11.7	6.8	52.3
47	19:46	11.4	7.2	62.9
48	19:47	11.5	7.1	69.2
49	19:48	11.7	7.0	71.6
50	19:49	12.2	6.6	69.1
51	19:50	12.6	6.4	66.5
52	19:51	13.0	6.0	68.7
53	19:52	12.7	6.2	67.2
54	19:53	12.5	6.4	68.0
55	19:54	12.2	6.6	64.8
56	19:55	12.2	6.6	67.6
57	19:56	12.3	6.6	65.3
58	19:57	13.0	6.0	54.6
59	19:58	12.4	6.3	37.6
60	19:59	11.7	6.9	39.4

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
01/25/13

Run 3

Start Time	1/25/2013
Run Length	60
Stop Time	21:15

Calibration Information

Gas	O_2	CO_2	NO_x
Instrument Range	21.2	10.1	199
Span Gas Value	10.0	5.07	89.9
Calibration			
Pretest Calibration			
Zero%	0.0	0.0	0.5
Span%	9.9	5.1	88.5
Post Test Calibration			
Zero%	0.0	0.1	0.5
Span%	10.0	5.1	87.6
Results			
Absolute Bias (Zero)	0.0%	1.0%	0.2%
Absolute Bias (Span)	0.0%	1.0%	1.6%
Absolute Drift (Zero)	0.0%	1.0%	0.0%
Absolute Drift (Span)	0.5%	0.0%	0.5%
	Corrected O_2 %	**Corrected CO_2 %**	**Corrected NO_x ppm**
	12.7	**6.2**	**90.5**

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %	Uncorrected NO_x ppm
		12.6	6.3	88.7
1	20:15	12.9	6.1	97.2
2	20:16	13.0	6.0	90.9
3	20:17	12.7	6.3	96.8
4	20:18	12.7	6.3	90.3
5	20:19	13.1	6.0	83.1
6	20:20	13.2	5.9	79.6
7	20:21	13.1	5.9	82.1
8	20:22	12.8	6.1	85.9
9	20:23	12.9	6.1	86.0
10	20:24	13.1	6.0	76.3
11	20:25	12.9	6.0	69.7
12	20:26	12.6	6.2	68.6
13	20:27	11.9	6.7	70.0
14	20:28	11.6	7.1	74.6
15	20:29	11.5	7.0	75.2
16	20:30	11.8	6.9	77.7
17	20:31	12.4	6.5	70.5
18	20:32	12.5	6.3	70.4
19	20:33	12.3	6.5	76.4
20	20:34	12.5	6.4	82.0
21	20:35	12.3	6.5	82.2
22	20:36	12.9	6.1	85.4
23	20:37	13.3	5.8	74.0
24	20:38	13.2	5.8	70.9
25	20:39	13.1	5.9	74.4
26	20:40	13.2	5.8	73.0
27	20:41	12.7	6.1	73.3
28	20:42	12.9	6.1	86.7
29	20:43	12.9	6.0	70.5
30	20:44	12.5	6.3	65.0
31	20:45	12.2	6.5	70.1
32	20:46	12.3	6.4	74.3
33	20:47	12.4	6.5	77.2
34	20:48	12.6	6.3	81.5
35	20:49	13.0	6.0	74.4
36	20:50	12.6	6.2	70.6
37	20:51	12.6	6.2	74.1
38	20:52	12.7	6.2	72.8
39	20:53	12.9	6.1	69.3
40	20:54	12.8	6.1	66.3
41	20:55	12.2	6.3	62.4
42	20:56	10.3	7.8	87.2
43	20:57	10.3	8.0	111.2
44	20:58	10.2	8.1	123.5
45	20:59	10.6	7.9	126.1
46	21:00	11.1	7.5	131.1
47	21:01	11.8	7.0	132.2
48	21:02	12.0	6.7	131.5
49	21:03	12.1	6.7	132.3
50	21:04	12.5	6.4	130.0
51	21:05	12.9	6.1	128.1
52	21:06	13.4	5.8	123.4
53	21:07	14.1	5.2	103.3
54	21:08	13.9	5.3	102.3
55	21:09	13.8	5.3	105.2
56	21:10	13.7	5.5	110.5
57	21:11	13.7	5.4	109.5
58	21:12	13.7	5.4	104.8
59	21:13	14.4	5.1	98.8
60	21:14	13.7	5.3	77.4

Method 23

Stericycle Incorporated

Davis County, UT
Waste Incinerator
1/24/2013

EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Results (ng/dscm @ 7% O_2)				
Run #	R1	R2	R3	Average
Total Cl4-Dibenzofurans	5.9E-02	5.9E-02	5.7E-02	5.8E-02
Total Cl5-Dibenzofurans	3.2E-01	3.5E-01	3.1E-01	3.3E-01
Total Cl6-Dibenzofurans	1.3E+00	1.4E+00	1.0E+00	1.3E+00
Total Cl7-Dibenzofurans	1.7E+00	1.7E+00	1.0E+00	1.5E+00
Cl8-Dibenzofuran	9.0E-01	9.7E-01	4.4E-01	7.7E-01
Total Cl4-Dibenzo-p-dioxins	1.2E-02	1.1E-02	1.0E-02	1.1E-02
Total Cl5-Dibenzo-p-dioxins	4.3E-02	4.5E-02	4.1E-02	4.3E-02
Total Cl6-Dibenzo-p-dioxins	2.9E-01	3.0E-01	2.3E-01	2.7E-01
Total Cl7-Dibenxo-p-dioxins	5.4E-01	5.7E-01	3.9E-01	5.0E-01
Cl8-Dibenzo-p-dioxin	1.0E+00	1.1E+00	6.1E-01	9.0E-01
Total =	6.2E+00	6.6E+00	4.1E+00	5.6E+00
2,3,7,8-Cl4-Dibenzofuran	5.9E-02	5.9E-02	5.7E-02	5.8E-02
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.2E-02	1.1E-02	1.0E-02	1.1E-02
1,2,3,7,8-Cl5-Dibenzofuran	1.3E-01	1.5E-01	1.3E-01	1.4E-01
2,3,4,7,8-Cl5-Dibenzofuran	1.9E-01	2.1E-01	1.7E-01	1.9E-01
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	4.3E-02	4.5E-02	4.1E-02	4.3E-02
1,2,3,4,7,8-Cl6-Dibenzofuran	6.2E-01	7.0E-01	5.0E-01	6.1E-01
1,2,3,6,7,8-Cl6-Dibenzofuran	3.1E-01	3.3E-01	2.4E-01	2.9E-01
2,3,4,6,7,8-Cl6-Dibenzofuran	3.8E-01	3.9E-01	2.5E-01	3.4E-01
1,2,3,7,8,9-Cl6-Dibenzofuran	1.7E-02	2.0E-02	1.4E-02	1.7E-02
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.7E-02	5.8E-02	4.8E-02	5.4E-02
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.1E-01	1.2E-01	9.0E-02	1.1E-01
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.1E-01	1.2E-01	9.0E-02	1.1E-01
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.5E+00	1.5E+00	9.1E-01	1.3E+00
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.0E-01	2.1E-01	1.3E-01	1.8E-01
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	5.4E-01	5.7E-01	3.9E-01	5.0E-01
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	9.0E-01	9.7E-01	4.4E-01	7.7E-01
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.0E+00	1.1E+00	6.1E-01	9.0E-01
Total =	6.2E+00	6.6E+00	4.1E+00	5.6E+00

Results (lb/hr)				
Run #	R1	R2	R3	Average
Total Cl4-Dibenzofurans	7.2E-10	6.7E-10	6.6E-10	6.8E-10
Total Cl5-Dibenzofurans	3.9E-09	4.0E-09	3.6E-09	3.9E-09
Total Cl6-Dibenzofurans	1.6E-08	1.6E-08	1.2E-08	1.5E-08
Total Cl7-Dibenzofurans	2.0E-08	2.0E-08	1.2E-08	1.7E-08
Cl8-Dibenzofuran	1.1E-08	1.1E-08	5.2E-09	9.1E-09
Total Cl4-Dibenzo-p-dioxins	1.4E-10	1.3E-10	1.2E-10	1.3E-10
Total Cl5-Dibenzo-p-dioxins	5.3E-10	5.1E-10	4.8E-10	5.1E-10
Total Cl6-Dibenzo-p-dioxins	3.5E-09	3.5E-09	2.7E-09	3.2E-09
Total Cl7-Dibenxo-p-dioxins	6.7E-09	6.4E-09	4.5E-09	5.9E-09
Cl8-Dibenzo-p-dioxin	1.3E-08	1.2E-08	7.1E-09	1.1E-08
Total =	7.6E-08	7.5E-08	4.8E-08	6.6E-08
2,3,7,8-Cl4-Dibenzofuran	7.2E-10	6.7E-10	6.6E-10	6.8E-10
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.4E-10	1.3E-10	1.2E-10	1.3E-10
1,2,3,7,8-Cl5-Dibenzofuran	1.6E-09	1.7E-09	1.6E-09	1.6E-09
2,3,4,7,8-Cl5-Dibenzofuran	2.3E-09	2.3E-09	2.0E-09	2.2E-09
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	5.3E-10	5.1E-10	4.8E-10	5.1E-10
1,2,3,4,7,8-Cl6-Dibenzofuran	7.6E-09	8.0E-09	5.9E-09	7.1E-09
1,2,3,6,7,8-Cl6-Dibenzofuran	3.8E-09	3.8E-09	2.8E-09	3.4E-09
2,3,4,6,7,8-Cl6-Dibenzofuran	4.6E-09	4.5E-09	3.0E-09	4.0E-09
1,2,3,7,8,9-Cl6-Dibenzofuran	2.1E-10	2.3E-10	1.6E-10	2.0E-10
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	7.0E-10	6.6E-10	5.6E-10	6.4E-10
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.4E-09	1.4E-09	1.1E-09	1.3E-09
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.4E-09	1.4E-09	1.1E-09	1.3E-09
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.8E-08	1.7E-08	1.1E-08	1.5E-08
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.4E-09	2.4E-09	1.5E-09	2.1E-09
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	6.7E-09	6.4E-09	4.5E-09	5.9E-09
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	1.1E-08	1.1E-08	5.2E-09	9.1E-09
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.3E-08	1.2E-08	7.1E-09	1.1E-08
Total =	7.6E-08	7.5E-08	4.8E-08	6.6E-08

Laboratory Data - pg				
Run #	R1	R2	R3	Average
2,3,7,8-Cl4-Dibenzo-p-dioxin	20.97	19.18	18.25	19.47
Total Cl4-Dibenzo-p-dioxins	20.97	19.18	18.25	19.47
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	77.52	78.60	71.95	75.36
Total Cl5-Dibenzo-p-dioxins	77.52	78.60	71.95	75.36
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	103.63	98.78	83.20	95.20
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	205.83	210.87	156.21	190.97
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	206.49	208.25	156.22	190.32
Total Cl6-Dibenzo-p-dioxins	515.95	517.91	395.63	476.50
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	981.56	965.39	672.50	873.15
Total Cl7-Dibenzo-p-dioxins	981.56	965.39	672.50	873.15
Cl8-Dibenzo-p-dioxin	1850.98	1839.17	1059.10	1583.08
2,3,7,8-Cl4-Dibenzofuran	105.65	101.04	98.69	101.79
Total Cl4-Dibenzofurans	105.65	101.04	98.69	101.79
1,2,3,7,8-Cl5-Dibenzofuran	236.79	254.65	232.25	241.23
2,3,4,7,8-Cl5-Dibenzofuran	344.45	349.53	301.54	331.84
Total Cl5-Dibenzofurans	581.24	604.18	533.79	573.07
1,2,3,4,7,8-Cl6-Dibenzofuran	1119.25	1194.06	873.29	1062.20
1,2,3,6,7,8-Cl6-Dibenzofuran	555.95	565.98	413.46	511.80
2,3,4,6,7,8-Cl6-Dibenzofuran	683.33	671.37	440.09	598.26
1,2,3,7,8,9-Cl6-Dibenzofuran	31.58	33.94	23.62	29.71
Total Cl6-Dibenzofurans	2390.11	2465.35	1750.46	2201.97
1,2,3,4,6,7,8-Cl7-Dibenzofuran	2648.19	2609.55	1587.25	2281.66
1,2,3,4,7,8,9-Cl7-Dibenzofuran	359.46	360.35	217.93	312.58
Total Cl7-Dibenzofurans	3007.65	2969.90	1805.18	2594.24
Cl8-Dibenzofuran	1633.71	1644.62	770.84	1349.72
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	1633.71	1644.62	770.84	1349.72
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1850.98	1839.17	1059.10	1583.08

Toxic Equivalents (ng/dscm @ 7% O_2)					
Run #	R1	R2	R3	Average	*Relative Toxicity*
2,3,7,8-Cl4-Dibenzofuran	5.9E-03	5.9E-03	5.7E-03	5.8E-03	*0.1*
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.2E-02	1.1E-02	1.0E-02	1.1E-02	*1*
1,2,3,7,8-Cl5-Dibenzofuran	6.6E-03	7.5E-03	6.7E-03	6.9E-03	*0.05*
2,3,4,7,8-Cl5-Dibenzofuran	9.5E-02	1.0E-01	8.7E-02	9.5E-02	*0.500*
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	2.1E-02	2.2E-02	2.1E-02	2.2E-02	*0.500*
1,2,3,4,7,8-Cl6-Dibenzofuran	6.2E-02	7.0E-02	5.0E-02	6.1E-02	*0.100*
1,2,3,6,7,8-Cl6-Dibenzofuran	3.1E-02	3.3E-02	2.4E-02	2.9E-02	*0.1*
2,3,4,6,7,8-Cl6-Dibenzofuran	3.8E-02	3.9E-02	2.5E-02	3.4E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzofuran	1.7E-03	2.0E-03	1.4E-03	1.7E-03	*0.1*
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.7E-03	5.8E-03	4.8E-03	5.4E-03	*0.1*
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.1E-02	1.2E-02	9.0E-03	1.1E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.1E-02	1.2E-02	9.0E-03	1.1E-02	*0.1*
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.5E-02	1.5E-02	9.1E-03	1.3E-02	*0.01*
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.0E-03	2.1E-03	1.3E-03	1.8E-03	*0.01*
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	5.4E-03	5.7E-03	3.9E-03	5.0E-03	*0.01*
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	9.0E-04	9.7E-04	4.4E-04	7.7E-04	*0.001*
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.0E-03	1.1E-03	6.1E-04	9.0E-04	*0.001*
Total =	0.326	0.350	0.269	0.315	

Stericycle Incorporated
Waste Incinerator
Davis County, UT
1/24/2013
M23

EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Field Reference Method Data		
	Run #	1
	date	1/24/2013
	start time	9:02
	stop time	12:43
	sampling time (minutes)	180.0
D_S	stack diameter (inches)	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)$^{1/2}$ (" H_2O)$^{1/2}$	0.6798
C_P	pitot tube constant (unitless)	0.826
T_S	stack temp. (°F)	136
P_{bar}	barometric pressure (mbar)	877
P_{bar}	barometric pressure (" Hg)	25.90
Ps	stack pressure (" H_2O)	0.04
Y_d	meter box Y_d (unitless)	0.998
T_m	meter temp. (°F)	80
V_m	sample volume (ft^3)	122.957
ΔH	orifice setting delta H (" H_2O)	1.2
V_{lc}	moisture (g)	530.4
O_2%vd	oxygen (%vd)	12.4
CO_2%vd	carbon dioxide (%vd)	6.4
inches	nozzle diameter (inches)	0.253

Reference Method Calculations		
	Run #	1
V_{mstd}	sample volume (dscf)	104.263
	sample volume (dscm)	2.952
V_{wstd}	moisture volume (dscf)	25.008
B_{wa}	measured moisture content (%/100)	0.193
	saturated moisture content (%/100)	0.206
	actual moisture content (%/100)	0.193
M_D	molecular weight (dry)	29.52
M_A	molecular weight (actual)	27.29
V_s	gas velocity (ft/sec)	44.1
F_{ACFM}	gas flow (acfm)	8,660
F_{DSCFM}	gas flow (dscfm)	5,355
lb/hr	gas flow (lb/hr)	28,192
%	% isokinetic	101.5

Saturation Calculations		
	Run #	1
	Stack temp. (°C)	58
	Ambient pressure (mmHg)	658
	Stack Pressure (mmHg)	0.07
	"Stack Pressure" (Amb + Stack)	658
	Antoine's Constants	0-60C	60-150C
	A	8.10765	7.96681
	B	1750.286	1668.21
	C	235	228
		R1
	Saturation (%/100) (0-60 C)	0.206
	Saturation (%/100) (60-150 C)	0.206
	Moisture (g) collectable at saturation	574.2

Stericycle Incorporated
Waste Incinerator
Davis County, UT
1/24/2013
M23

EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Laboratory Data - pg		
Run #		1
2,3,7,8-Cl4-Dibenzo-p-dioxin		20.97
Total Cl4-Dibenzo-p-dioxins		20.97
1,2,3,7,8-Cl5-Dibenzo-p-dioxin		77.52
Total Cl5-Dibenzo-p-dioxins		77.52
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	Q	103.63
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin		205.83
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin		206.49
Total Cl6-Dibenzo-p-dioxins		515.95
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin		981.56
Total Cl7-Dibenzo-p-dioxins		981.56
Cl8-Dibenzo-p-dioxin	B	1850.98
2,3,7,8-Cl4-Dibenzofuran		105.65
Total Cl4-Dibenzofurans		105.65
1,2,3,7,8-Cl5-Dibenzofuran		236.79
2,3,4,7,8-Cl5-Dibenzofuran	B	344.45
Total Cl5-Dibenzofurans		581.24
1,2,3,4,7,8-Cl6-Dibenzofuran		1119.25
1,2,3,6,7,8-Cl6-Dibenzofuran		555.95
2,3,4,6,7,8-Cl6-Dibenzofuran		683.33
1,2,3,7,8,9-Cl6-Dibenzofuran		31.58
Total Cl6-Dibenzofurans		2390.11
1,2,3,4,6,7,8-Cl7-Dibenzofuran		2648.19
1,2,3,4,7,8,9-Cl7-Dibenzofuran		359.46
Total Cl7-Dibenzofurans		3007.65
Cl8-Dibenzofuran	B	1633.71
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran		1633.71
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin		1850.98

Bold results were detected
B = Method Blank Contamination. The associated method blank contains the target analyte at a reportable level
J = Estimated Result
Q = Estimated maximum possible concentration
All other values are non-detected with the estimated detection limit substituted.

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M23

EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Results (ng/dscm @ 7% O_2)	
Run #	1
Total Cl4-Dibenzofurans	5.9E-02
Total Cl5-Dibenzofurans	3.2E-01
Total Cl6-Dibenzofurans	1.3E+00
Total Cl7-Dibenzofurans	1.7E+00
Cl8-Dibenzofuran	9.0E-01
Total Cl4-Dibenzo-p-dioxins	1.2E-02
Total Cl5-Dibenzo-p-dioxins	4.3E-02
Total Cl6-Dibenzo-p-dioxins	2.9E-01
Total Cl7-Dibenxo-p-dioxins	5.4E-01
Cl8-Dibenzo-p-dioxin	1.0E+00
Total =	6.2E+00
2,3,7,8-Cl4-Dibenzofuran	5.9E-02
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.2E-02
1,2,3,7,8-Cl5-Dibenzofuran	1.3E-01
2,3,4,7,8-Cl5-Dibenzofuran	1.9E-01
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	4.3E-02
1,2,3,4,7,8-Cl6-Dibenzofuran	6.2E-01
1,2,3,6,7,8-Cl6-Dibenzofuran	3.1E-01
2,3,4,6,7,8-Cl6-Dibenzofuran	3.8E-01
1,2,3,7,8,9-Cl6-Dibenzofuran	1.7E-02
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.7E-02
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.1E-01
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.1E-01
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.5E+00
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.0E-01
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	5.4E-01
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	9.0E-01
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.0E+00
Total =	6.2E+00

Results (lb/hr)	
Run #	1
Total Cl4-Dibenzofurans	7.2E-10
Total Cl5-Dibenzofurans	3.9E-09
Total Cl6-Dibenzofurans	1.6E-08
Total Cl7-Dibenzofurans	2.0E-08
Cl8-Dibenzofuran	1.1E-08
Total Cl4-Dibenzo-p-dioxins	1.4E-10
Total Cl5-Dibenzo-p-dioxins	5.3E-10
Total Cl6-Dibenzo-p-dioxins	3.5E-09
Total Cl7-Dibenxo-p-dioxins	6.7E-09
Cl8-Dibenzo-p-dioxin	1.3E-08
Total =	7.6E-08
2,3,7,8-Cl4-Dibenzofuran	7.2E-10
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.4E-10
1,2,3,7,8-Cl5-Dibenzofuran	1.6E-09
2,3,4,7,8-Cl5-Dibenzofuran	2.3E-09
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	5.3E-10
1,2,3,4,7,8-Cl6-Dibenzofuran	7.6E-09
1,2,3,6,7,8-Cl6-Dibenzofuran	3.8E-09
2,3,4,6,7,8-Cl6-Dibenzofuran	4.6E-09
1,2,3,7,8,9-Cl6-Dibenzofuran	2.1E-10
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	7.0E-10
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.4E-09
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.4E-09
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.8E-08
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.4E-09
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	6.7E-09
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	1.1E-08
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.3E-08
Total =	7.6E-08

Toxic Equivalents (ng/dscm @ 7% O_2)		
Run #	1	*Relative Toxicity*
2,3,7,8-Cl4-Dibenzofuran	5.9E-03	*0.1*
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.2E-02	*1*
1,2,3,7,8-Cl5-Dibenzofuran	6.6E-03	*0.05*
2,3,4,7,8-Cl5-Dibenzofuran	9.5E-02	*0.500*
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	2.1E-02	*0.500*
1,2,3,4,7,8-Cl6-Dibenzofuran	6.2E-02	*0.100*
1,2,3,6,7,8-Cl6-Dibenzofuran	3.1E-02	*0.1*
2,3,4,6,7,8-Cl6-Dibenzofuran	3.8E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzofuran	1.7E-03	*0.1*
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.7E-03	*0.1*
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.1E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.1E-02	*0.1*
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.5E-02	*0.01*
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.0E-03	*0.01*
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	5.4E-03	*0.01*
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	9.0E-04	*0.001*
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.0E-03	*0.001*
Total =	0.326	

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EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Field Reference Method Data		
	Run #	2
	date	1/24/2013
	start time	13:08
	stop time	16:15
	sampling time (minutes)	180.0
D_s	stack diameter (inches)	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)$^{1/2}$ (" H_2O)$^{1/2}$	0.6676
C_P	pitot tube constant (unitless)	0.826
T_S	stack temp. (°F)	139
P_{bar}	barometric pressure (mbar)	877
P_{bar}	barometric pressure (" Hg)	25.90
Ps	stack pressure (" H_2O)	0.04
Y_d	meter box Y_d (unitless)	0.996
T_m	meter temp. (°F)	82
V_m	sample volume (ft^3)	122.290
ΔH	orifice setting delta H (" H_2O)	1.16
V_{lc}	moisture (g)	556.9
O_2%vd	oxygen (%vd)	12.8
CO_2%vd	carbon dioxide (%vd)	6.1
inches	nozzle diameter (inches)	0.253

Reference Method Calculations		
	Run #	2
V_{mstd}	sample volume (dscf)	103.227
	sample volume (dscm)	2.923
V_{wstd}	moisture volume (dscf)	26.258
B_{wo}	measured moisture content (%/100)	0.203
	saturated moisture content (%/100)	0.219
	actual moisture content (%/100)	0.203
M_D	molecular weight (dry)	29.49
M_A	molecular weight (actual)	27.16
V_s	gas velocity (ft/sec)	43.5
F_{ACFM}	gas flow (acfm)	8,542
F_{DSCFM}	gas flow (dscfm)	5,200
lb/hr	gas flow (lb/hr)	27,566
%	% isokinetic	103.4

Saturation Calculations		
Run #	2	
Stack temp. (°C)	59	
Ambient pressure (mmHg)	658	
Stack Pressure (mmHg)	0.07	
"Stack Pressure" (Amb + Stack)	658	
Antoine's Constants	0-60C	60-150C
A	8.10765	7.96681
B	1750.286	1668.21
C	235	228
	R2	
Saturation (%/100) (0-60 C)	0.219	
Saturation (%/100) (60-150 C)	0.219	
Moisture (g) collectable at saturation	613.3	

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EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Laboratory Data - pg		
Run #		2
2,3,7,8-Cl4-Dibenzo-p-dioxin		19.18
Total Cl4-Dibenzo-p-dioxins		19.18
1,2,3,7,8-Cl5-Dibenzo-p-dioxin		76.60
Total Cl5-Dibenzo-p-dioxins		76.60
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin		98.78
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin		**210.87**
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin		**208.26**
Total Cl6-Dibenzo-p-dioxins		517.91
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin		965.39
Total Cl7-Dibenzo-p-dioxins		965.39
Cl8-Dibenzo-p-dioxin	B	1839.17
2,3,7,8-Cl4-Dibenzofuran		101.04
Total Cl4-Dibenzofurans		101.04
1,2,3,7,8-Cl5-Dibenzofuran		254.65
2,3,4,7,8-Cl5-Dibenzofuran	B	349.53
Total Cl5-Dibenzofurans		604.18
1,2,3,4,7,8-Cl6-Dibenzofuran		**1194.06**
1,2,3,6,7,8-Cl6-Dibenzofuran		**565.98**
2,3,4,6,7,8-Cl6-Dibenzofuran		**671.37**
1,2,3,7,8,9-Cl6-Dibenzofuran	Q	33.94
Total Cl6-Dibenzofurans		2465.35
1,2,3,4,6,7,8-Cl7-Dibenzofuran		2609.55
1,2,3,4,7,8,9-Cl7-Dibenzofuran		360.35
Total Cl7-Dibenzofurans		2969.90
Cl8-Dibenzofuran	B	1644.62
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran		**1644.62**
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin		**1839.17**

Bold results were detected
B = Method Blank Contamination. The associated method blank contains the target analyte at a reportable level
J = Estimated Result
Q = Estimated maximum possible concentration
All other values are non-detected with the estimated detection limit subsituted.

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EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Results (ng/dscm @ 7% O_2)	
Run #	2
Total Cl4-Dibenzofurans	5.9E-02
Total Cl5-Dibenzofurans	3.5E-01
Total Cl6-Dibenzofurans	1.4E+00
Total Cl7-Dibenzofurans	1.7E+00
Cl8-Dibenzofuran	9.7E-01
Total Cl4-Dibenzo-p-dioxins	1.1E-02
Total Cl5-Dibenzo-p-dioxins	4.5E-02
Total Cl6-Dibenzo-p-dioxins	3.0E-01
Total Cl7-Dibenxo-p-dioxins	5.7E-01
Cl8-Dibenzo-p-dioxin	1.1E+00
Total =	6.6E+00
2,3,7,8-Cl4-Dibenzofuran	5.9E-02
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.1E-02
1,2,3,7,8-Cl5-Dibenzofuran	1.5E-01
2,3,4,7,8-Cl5-Dibenzofuran	2.1E-01
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	4.5E-02
1,2,3,4,7,8-Cl6-Dibenzofuran	7.0E-01
1,2,3,6,7,8-Cl6-Dibenzofuran	3.3E-01
2,3,4,6,7,8-Cl6-Dibenzofuran	3.9E-01
1,2,3,7,8,9-Cl6-Dibenzofuran	2.0E-02
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.8E-02
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.2E-01
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.2E-01
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.5E+00
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.1E-01
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	5.7E-01
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	9.7E-01
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.1E+00
Total =	6.6E+00

Results (lb/hr)	
Run #	2
Total Cl4-Dibenzofurans	6.7E-10
Total Cl5-Dibenzofurans	4.0E-09
Total Cl6-Dibenzofurans	1.6E-08
Total Cl7-Dibenzofurans	2.0E-08
Cl8-Dibenzofuran	1.1E-08
Total Cl4-Dibenzo-p-dioxins	1.3E-10
Total Cl5-Dibenzo-p-dioxins	5.1E-10
Total Cl6-Dibenzo-p-dioxins	3.5E-09
Total Cl7-Dibenxo-p-dioxins	6.4E-09
Cl8-Dibenzo-p-dioxin	1.2E-08
Total =	7.5E-08
2,3,7,8-Cl4-Dibenzofuran	6.7E-10
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.3E-10
1,2,3,7,8-Cl5-Dibenzofuran	1.7E-09
2,3,4,7,8-Cl5-Dibenzofuran	2.3E-09
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	5.1E-10
1,2,3,4,7,8-Cl6-Dibenzofuran	8.0E-09
1,2,3,6,7,8-Cl6-Dibenzofuran	3.8E-09
2,3,4,6,7,8-Cl6-Dibenzofuran	4.5E-09
1,2,3,7,8,9-Cl6-Dibenzofuran	2.3E-10
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	6.6E-10
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.4E-09
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.4E-09
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.7E-08
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.4E-09
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	6.4E-09
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	1.1E-08
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.2E-08
Total =	7.5E-08

Toxic Equivalents (ng/dscm @ 7% O_2)		
Run #	2	*Relative Toxicity*
2,3,7,8-Cl4-Dibenzofuran	5.9E-03	*0.1*
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.1E-02	*1*
1,2,3,7,8-Cl5-Dibenzofuran	7.5E-03	*0.05*
2,3,4,7,8-Cl5-Dibenzofuran	1.0E-01	*0.500*
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	2.2E-02	*0.500*
1,2,3,4,7,8-Cl6-Dibenzofuran	7.0E-02	*0.100*
1,2,3,6,7,8-Cl6-Dibenzofuran	3.3E-02	*0.1*
2,3,4,6,7,8-Cl6-Dibenzofuran	3.9E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzofuran	2.0E-03	*0.1*
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.8E-03	*0.1*
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.2E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.2E-02	*0.1*
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.5E-02	*0.01*
1,2,3,4,7,8,9-Cl7-Dibenzofuran	2.1E-03	*0.01*
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	5.7E-03	*0.01*
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	9.7E-04	*0.001*
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	1.1E-03	*0.001*
Total =	0.350	

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EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Field Reference Method Data		
	Run #	**3**
	date	1/24/2013
	start time	16:41
	stop time	20:12
	sampling time (minutes)	180.0
D_s	stack diameter (inches)	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)$^{1/2}$ (" H_2O)$^{1/2}$	0.6821
C_p	pitot tube constant (unitless)	0.826
T_s	stack temp. (°F)	149
P_{bar}	barometric pressure (mbar)	877
P_{bar}	barometric pressure (" Hg)	25.90
Ps	stack pressure (" H_2O)	0.04
Y_d	meter box Y_d (unitless)	0.998
T_m	meter temp. (°F)	82
V_m	sample volume (ft^3)	123.255
ΔH	orifice setting delta H (" H_2O)	1.20
V_{lc}	moisture (g)	544.1
O_2%vd	oxygen (%vd)	12.7
CO_2%vd	carbon dioxide (%vd)	6.2
inches	nozzle diameter (inches)	0.253

Reference Method Calculations		
	Run #	**3**
V_{mstd}	sample volume (dscf)	104.111
	sample volume (dscm)	2.948
V_{wstd}	moisture volume (dscf)	25.654
B_{ws}	measured moisture content (%/100)	0.198
	saturated moisture content (%/100)	0.286
	actual moisture content (%/100)	0.198
M_D	molecular weight (dry)	29.50
M_A	molecular weight (actual)	27.23
V_S	gas velocity (ft/sec)	44.8
F_{ACFM}	gas flow (acfm)	8,793
F_{DSCFM}	gas flow (dscfm)	5,294
lb/hr	gas flow (lb/hr)	27,953
%	% isokinetic	102.5

Saturation Calculations			
	Run #	**3**	
	Stack temp. (°C)	65	
	Ambient pressure (mmHg)	658	
	Stack Pressure (mmHg)	0.07	
	"Stack Pressure" (Amb + Stack)	658	
	Antoine's Constants	**0-60C**	**60-150C**
	A	8.10765	7.96681
	B	1750.286	1668.21
	C	235	228
		R3	
	Saturation (%/100) (0-60 C)	0.286	
	Saturation (%/100) (60-150 C)	0.286	
	Moisture (g) collectable at saturation	885.5	

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Laboratory Data - pg		
Run #		3
2,3,7,8-Cl4-Dibenzo-p-dioxin		18.25
Total Cl4-Dibenzo-p-dioxins		18.25
1,2,3,7,8-Cl5-Dibenzo-p-dioxin		71.95
Total Cl5-Dibenzo-p-dioxins		71.95
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin		83.20
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin		156.21
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin		156.22
Total Cl6-Dibenzo-p-dioxins		395.63
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin		672.50
Total Cl7-Dibenxo-p-dioxins		672.50
Cl8-Dibenzo-p-dioxin	B	1059.10
2,3,7,8-Cl4-Dibenzofuran		98.69
Total Cl4-Dibenzofurans		98.69
1,2,3,7,8-Cl5-Dibenzofuran		232.25
2,3,4,7,8-Cl5-Dibenzofuran	B	301.54
Total Cl5-Dibenzofurans		533.79
1,2,3,4,7,8-Cl6-Dibenzofuran		873.29
1,2,3,6,7,8-Cl6-Dibenzofuran		413.46
2,3,4,6,7,8-Cl6-Dibenzofuran		440.09
1,2,3,7,8,9-Cl6-Dibenzofuran	Q	23.62
Total Cl6-Dibenzofurans		1750.46
1,2,3,4,6,7,8-Cl7-Dibenzofuran		1587.25
1,2,3,4,7,8,9-Cl7-Dibenzofuran		217.93
Total Cl7-Dibenzofurans		1805.18
Cl8-Dibenzofuran	B	770.84
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran		770.84
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin		1059.10

Bold results were detected
B = Method Blank Contamination. The associated method blank contains the target analyte at a reportable level
J = Estimated Result
Q = Estimated maximum possible concentration
All other values are non-detected with the estimated detection limit subsituted.

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1/24/2013

EPA Method 23A: Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Results (ng/dscm @ 7% O_2)	
Run #	3
Total Cl4-Dibenzofurans	5.7E-02
Total Cl5-Dibenzofurans	3.1E-01
Total Cl6-Dibenzofurans	1.0E+00
Total Cl7-Dibenzofurans	1.0E+00
Cl8-Dibenzofuran	4.4E-01
Total Cl4-Dibenzo-p-dioxins	1.0E-02
Total Cl5-Dibenzo-p-dioxins	4.1E-02
Total Cl6-Dibenzo-p-dioxins	2.3E-01
Total Cl7-Dibenxo-p-dioxins	3.9E-01
Cl8-Dibenzo-p-dioxin	6.1E-01
Total =	4.1E+00
2,3,7,8-Cl4-Dibenzofuran	5.7E-02
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.0E-02
1,2,3,7,8-Cl5-Dibenzofuran	1.3E-01
2,3,4,7,8-Cl5-Dibenzofuran	1.7E-01
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	4.1E-02
1,2,3,4,7,8-Cl6-Dibenzofuran	5.0E-01
1,2,3,6,7,8-Cl6-Dibenzofuran	2.4E-01
2,3,4,6,7,8-Cl6-Dibenzofuran	2.5E-01
1,2,3,7,8,9-Cl6-Dibenzofuran	1.4E-02
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	4.8E-02
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	9.0E-02
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	9.0E-02
1,2,3,4,6,7,8-Cl7-Dibenzofuran	9.1E-01
1,2,3,4,7,8,9-Cl7-Dibenzofuran	1.3E-01
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	3.9E-01
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	4.4E-01
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dibxin	6.1E-01
Total =	4.1E+00

Results (lb/hr)	
Run #	3
Total Cl4-Dibenzofurans	6.6E-10
Total Cl5-Dibenzofurans	3.6E-09
Total Cl6-Dibenzofurans	1.2E-08
Total Cl7-Dibenzofurans	1.2E-08
Cl8-Dibenzofuran	5.2E-09
Total Cl4-Dibenzo-p-dioxins	1.2E-10
Total Cl5-Dibenzo-p-dioxins	4.8E-10
Total Cl6-Dibenzo-p-dioxins	2.7E-09
Total Cl7-Dibenxo-p-dioxins	4.5E-09
Cl8-Dibenzo-p-dioxin	7.1E-09
Total =	4.8E-08
2,3,7,8-Cl4-Dibenzofuran	6.6E-10
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.2E-10
1,2,3,7,8-Cl5-Dibenzofuran	1.6E-09
2,3,4,7,8-Cl5-Dibenzofuran	2.0E-09
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	4.8E-10
1,2,3,4,7,8-Cl6-Dibenzofuran	5.9E-09
1,2,3,6,7,8-Cl6-Dibenzofuran	2.8E-09
2,3,4,6,7,8-Cl6-Dibenzofuran	3.0E-09
1,2,3,7,8,9-Cl6-Dibenzofuran	1.6E-10
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	5.6E-10
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	1.1E-09
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	1.1E-09
1,2,3,4,6,7,8-Cl7-Dibenzofuran	1.1E-08
1,2,3,4,7,8,9-Cl7-Dibenzofuran	1.5E-09
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	4.5E-09
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	5.2E-09
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	7.1E-09
Total =	4.8E-08

Toxic Equivalents (ng/dscm @ 7% O_2)		
Run #	3	*Relative Toxicity*
2,3,7,8-Cl4-Dibenzofuran	5.7E-03	*0.1*
2,3,7,8-Cl4-Dibenzo-p-dioxin	1.0E-02	*1*
1,2,3,7,8-Cl5-Dibenzofuran	6.7E-03	*0.05*
2,3,4,7,8-Cl5-Dibenzofuran	8.7E-02	*0.500*
1,2,3,7,8-Cl5-Dibenzo-p-dioxin	2.1E-02	*0.500*
1,2,3,4,7,8-Cl6-Dibenzofuran	5.0E-02	*0.100*
1,2,3,6,7,8-Cl6-Dibenzofuran	2.4E-02	*0.1*
2,3,4,6,7,8-Cl6-Dibenzofuran	2.5E-02	*0.1*
1,2,3,7,8,9-Cl6-Dibenzofuran	1.4E-03	*0.1*
1,2,3,4,7,8-Cl6-Dibenzo-p-dioxin	4.8E-03	*0.1*
1,2,3,6,7,8-Cl6-Dibenzo-p-dioxin	9.0E-03	*0.1*
1,2,3,7,8,9-Cl6-Dibenzo-p-dioxin	9.0E-03	*0.1*
1,2,3,4,6,7,8-Cl7-Dibenzofuran	9.1E-03	*0.01*
1,2,3,4,7,8,9-Cl7-Dibenzofuran	1.3E-03	*0.01*
1,2,3,4,6,7,8-Cl7-Dibenzo-p-dioxin	3.9E-03	*0.01*
1,2,3,4,6,7,8,9-Cl8-Dibenzofuran	4.4E-04	*0.001*
1,2,3,4,6,7,8,9-Cl8-dibenzo-p-dioxin	6.1E-04	*0.001*
Total =	0.269	

Stericycle Incorporated

Davis County, UT
Waste Incinerator
01/24/13

Linearity Information		
Gas	O_2	CO_2
Span Gas Value/Range	21.2	10.1
Bias Gas Value	10.00	5.07
Bias Check (Zero)	0.0	0.0
Bias Check (Span)	10.1	5.1
Linearity Bias (Zero)	0.0	0.0
Linearity Bias (Span)	10.1	5.1
Gas Concentration	%	%
1	0.00	0.00
2	10.00	5.07
3	21.20	10.10
Response		
1	0.0	0.0
2	10.1	5.1
3	21.2	10.1
Difference		
1	0.0	0.0
2	0.1	0.0
3	0.0	0.0
Results		
Zero Bias	0.00%	0.00%
Span Bias	0.00%	0.00%
Max Calibration Error	0.47%	0.30%

Stericycle Incorporated **Run 1**

Davis County, UT	**Start Time**	1/24/2013 9:02
Waste Incinerator	**Run Length**	222
01/24/13	**Stop Time**	12:43

Calibration Information		
Gas	O_2	CO_2
Instrument Range	21.2	10.1
Span Gas Value	10.00	5.07
Calibration		
Pretest Calibration		
Zero%	0.0	0.0
Span%	10.1	5.1
Post Test Calibration		
Zero%	0.0	0.1
Span%	10.0	5.0
Results		
Absolute Bias (Zero)	0.0%	1.0%
Absolute Bias (Span)	0.5%	1.0%
Absolute Drift (Zero)	0.0%	1.0%
Absolute Drift (Span)	0.5%	1.0%
	Corrected O_2 %	**Corrected CO_2 %**
	12.4	***6.4***

Run Length (Minutes)	**Time**	**Uncorrected O_2 %**	**Uncorrected CO_2 %**
		12.5	6.3
1	9:02	11.2	7.3
2	9:03	11.4	7.2
3	9:04	11.5	7.2
4	9:05	12.1	6.6
5	9:06	11.2	7.1
6	9:07	11.1	7.4
7	9:08	11.4	7.1
8	9:09	11.0	7.3
9	9:10	11.4	7.2
10	9:11	11.9	6.8
11	9:12	12.0	6.6
12	9:13	11.4	7.1
13	9:14	11.7	7.0
14	9:15	12.3	6.6
15	9:16	13.1	5.9
16	9:17	13.0	5.9
17	9:18	13.6	5.6
18	9:19	13.5	5.6
19	9:20	12.8	6.0
20	9:21	12.9	6.1
21	9:22	12.9	6.1
22	9:23	12.9	6.0
23	9:24	13.1	6.0
24	9:25	13.1	5.9
25	9:26	12.8	6.2
26	9:27	13.1	6.0
27	9:28	13.0	6.0
28	9:29	12.5	6.3
29	9:30	12.7	6.3
30	9:31	12.5	6.2
31	9:32	12.3	6.5
32	9:33	12.2	6.5
33	9:34	12.0	6.6
34	9:35	12.0	6.6
35	9:36	12.3	6.7
36	9:37	13.2	5.8
37	9:38	13.0	6.0
38	9:39	12.3	6.3
39	9:40	11.7	6.8
40	9:41	11.6	7.0
41	9:42	11.6	7.0
42	9:43	11.8	6.9
43	9:44	11.9	6.8
44	9:45	11.7	6.9
45	9:46	11.8	6.9
46	9:47	12.5	6.4
47	9:48	12.6	6.3
48	9:49	12.8	6.1
49	9:50	12.5	6.2
50	9:51	12.2	6.5
51	9:52	12.2	6.6
52	9:53	12.4	6.5
53	9:54	12.3	6.4
54	9:55	12.3	6.5
55	9:56	12.6	6.2

56	9:57	12.4	6.4
57	9:58	12.4	6.5
58	9:59	12.6	6.3
59	10:00	12.6	6.2
60	10:01	13.5	5.8
61	10:02	14.1	5.2
62	10:03	14.2	5.1
63	10:04	13.8	5.2
64	10:05	13.3	5.6
65	10:06	12.8	6.0
66	10:07	12.5	6.4
67	10:08	13.0	6.0
68	10:09	13.3	5.7
69	10:10	13.0	5.8
70	10:11	12.5	6.2
71	10:12	12.4	6.4
72	10:13	12.2	6.5
73	10:14	12.4	6.4
74	10:15	12.3	6.4
75	10:16	11.8	6.7
76	10:17	11.4	7.1
77	10:18	11.6	7.0
78	10:19	11.1	7.3
79	10:20	10.8	7.6
80	10:21	10.1	8.0
81	10:22	10.6	8.0
82	10:23	11.2	7.5
83	10:24	11.2	7.3
84	10:25	11.3	7.3
85	10:26	11.7	7.1
86	10:27	12.4	6.5
87	10:28	12.5	6.3
88	10:29	13.0	6.1
89	10:30	13.1	6.0
90	10:31	13.1	6.0
91	10:32	13.1	5.9
92	10:33	13.4	5.7
93	10:34	13.2	5.8
94	10:35	12.5	6.2
95	10:36	13.0	6.7
96	10:37	19.9	1.4
97	10:38	12.5	5.2
98	10:39	13.0	6.3
99	10:40	13.6	5.6
100	10:41	13.4	5.6
101	10:42	13.0	5.9
102	10:43	12.9	6.1
103	10:44	13.1	5.9
104	10:45	12.7	6.2
105	10:46	13.2	5.9
106	10:47	13.3	5.7
107	10:48	12.9	5.9
108	10:49	12.3	6.3
109	10:50	12.1	6.6
110	10:51	11.8	6.8
111	10:52	11.4	7.1
112	10:53	10.8	7.5
113	10:54	11.4	7.4
114	10:55	11.2	7.2
115	10:56	10.9	7.5
116	10:57	10.7	7.6
117	10:58	10.8	7.7
118	10:59	11.4	7.2
119	11:00	11.1	7.1
120	11:01	11.2	7.6
121	11:02	11.7	7.1
122	11:03	10.6	7.6
123	11:04	9.5	8.6
124	11:05	9.5	8.7
125	11:06	9.8	8.6
126	11:07	11.4	7.6
127	11:08	12.4	6.6
128	11:09	13.0	6.1
129	11:10	13.2	5.9
130	11:11	12.9	6.1
131	11:12	12.8	6.1
132	11:13	13.2	5.9
133	11:14	13.5	5.7
134	11:15	13.4	5.5
135	11:16	13.1	5.7
136	11:17	13.1	5.8
137	11:18	13.0	5.9
138	11:19	12.5	6.1
139	11:20	12.5	6.3

140	11:21	13.2	5.8
141	11:22	13.5	5.6
142	11:23	13.6	5.4
143	11:24	13.4	5.5
144	11:25	13.1	5.7
145	11:26	12.8	5.9
146	11:27	13.1	5.9
147	11:28	12.9	5.9
148	11:29	13.0	5.9
149	11:30	13.0	5.9
150	11:31	12.7	6.1
151	11:32	12.8	6.0
152	11:33	13.0	5.9
153	11:34	12.7	6.1
154	11:35	12.9	6.0
155	11:36	12.5	6.1
156	11:37	12.4	6.4
157	11:38	12.7	6.1
158	11:39	12.4	6.3
159	11:40	12.6	6.3
160	11:41	12.6	6.2
161	11:42	12.4	6.3
162	11:43	12.6	6.2
163	11:44	12.9	6.1
164	11:45	13.0	6.0
165	11:46	13.2	5.8
166	11:47	13.3	5.7
167	11:48	13.2	5.8
168	11:49	13.5	5.6
169	11:50	13.5	5.5
170	11:51	13.5	5.6
171	11:52	13.6	5.4
172	11:53	13.2	5.6
173	11:54	13.1	5.8
174	11:55	13.1	5.7
175	11:56	12.5	6.2
176	11:57	12.0	6.5
177	11:58	11.9	6.8
178	11:59	12.1	6.6
179	12:00	12.1	6.6
180	12:01	12.0	6.7
181	12:02	11.9	6.7
182	12:03	12.0	6.6
183	12:04	11.8	6.8
184	12:05	11.3	7.2
185	12:06	12.1	6.7
186	12:07	12.0	6.6
187	12:08	12.0	6.8
188	12:09	12.5	6.4
189	12:10	12.6	6.3
190	12:11	13.1	6.1
191	12:12	12.9	6.0
192	12:13	12.5	6.3
193	12:14	12.3	6.5
194	12:15	12.0	6.7
195	12:16	11.9	6.8
196	12:17	12.6	6.4
197	12:18	12.8	6.1
198	12:19	12.4	6.4
199	12:20	13.0	6.1
200	12:21	12.8	6.1
201	12:22	12.9	6.3
202	12:23	13.1	5.9
203	12:24	12.5	6.2
204	12:25	12.5	6.5
205	12:26	12.4	6.4
206	12:27	12.0	6.6
207	12:28	12.5	6.6
208	12:29	13.7	5.5
209	12:30	13.1	5.8
210	12:31	13.3	5.8
211	12:32	13.1	5.9
212	12:33	12.8	6.1
213	12:34	12.9	6.1
214	12:35	13.4	5.8
215	12:36	13.3	5.8
216	12:37	13.5	5.5
217	12:38	13.1	5.8
218	12:39	12.6	6.2
219	12:40	12.7	6.2
220	12:41	13.2	6.0
221	12:42	13.7	5.4
222	12:43	12.9	5.8

Stericycle Incorporated **Run 2**

Davis County, UT	**Start Time**	1/24/2013 13:08
Waste Incinerator	**Run Length**	151
01/24/13	**Stop Time**	16:15

Calibration Information		
Gas	O_2	CO_2
Instrument Range	21.2	10.1
Span Gas Value	10.00	5.07
Calibration		
Pretest Calibration		
Zero%	0.0	0.1
Span%	10.0	5.0
Post Test Calibration		
Zero%	-0.1	0.1
Span%	9.9	5.0
Results		
Absolute Bias (Zero)	0.5%	1.0%
Absolute Bias (Span)	0.9%	1.0%
Absolute Drift (Zero)	0.5%	0.0%
Absolute Drift (Span)	0.5%	0.0%
	Corrected O_2 %	**Corrected CO_2 %**
	12.8	***6.1***

Run Length (Minutes)	**Time**	**Uncorrected O_2 %**	**Uncorrected CO_2 %**
		12.8	6.0
1	13:08	13.5	5.4
2	13:09	13.0	5.9
3	13:10	12.8	6.0
4	13:11	12.5	6.2
5	13:12	12.4	6.4
6	13:13	11.9	6.7
7	13:14	11.6	7.0
8	13:15	11.8	6.9
9	13:16	12.2	6.5
10	13:17	12.4	6.4
11	13:18	13.1	5.9
12	13:19	12.8	6.0
13	13:20	12.8	6.1
14	13:21	12.9	6.0
15	13:22	12.8	6.0
16	13:23	12.7	6.1
17	13:24	13.1	5.9
18	13:25	14.4	5.1
19	13:26	14.5	4.8
20	13:27	13.9	5.2
21	13:28	13.1	5.7
22	13:29	12.7	6.2
23	13:30	12.3	6.4
24	13:31	12.1	6.7
25	13:32	13.1	5.9
26	13:33	12.5	6.1
27	14:11	11.8	6.0
28	14:12	12.4	5.7
29	14:13	12.7	5.6
30	14:14	13.0	5.6
31	14:15	13.0	5.7

32	14:16	13.5	5.6
33	14:17	13.6	5.6
34	14:18	13.6	5.6
35	14:19	13.5	5.6
36	14:20	13.5	5.7
37	14:21	13.3	5.8
38	14:22	13.5	5.7
39	14:23	13.3	5.7
40	14:24	12.8	6.1
41	14:25	12.4	6.3
42	14:26	12.4	6.4
43	14:27	12.2	6.5
44	14:28	12.2	6.5
45	14:29	13.0	6.0
46	14:30	12.9	6.0
47	14:31	13.1	5.9
48	14:32	13.2	5.8
49	14:33	13.2	5.7
50	14:34	12.9	5.9
51	14:35	13.0	5.9
52	14:36	12.4	6.3
53	14:37	11.6	6.9
54	14:38	12.0	6.7
55	14:39	12.4	6.3
56	14:40	12.3	6.4
57	14:41	15.6	4.8
58	14:42	16.8	2.4
59	14:43	12.5	6.2
60	14:44	12.4	6.4
61	14:45	12.3	6.4
62	14:46	12.3	6.4
63	14:47	13.2	5.9
64	14:48	13.6	5.5
65	14:49	13.5	5.5
66	14:50	13.2	5.6
67	14:51	12.8	5.9
68	14:52	12.7	6.1
69	14:53	12.4	6.2
70	14:54	12.3	6.4
71	14:55	13.0	5.9
72	14:56	12.8	6.0
73	14:57	12.8	6.0
74	14:58	12.4	6.3
75	14:59	12.1	6.4
76	15:00	12.0	6.7
77	15:01	12.5	6.3
78	15:02	12.6	6.1
79	15:03	12.7	6.1
80	15:04	12.5	6.2
81	15:05	12.5	6.2
82	15:06	12.2	6.4
83	15:07	12.8	6.2
84	15:08	13.0	5.9
85	15:09	13.0	5.9
86	15:10	12.9	5.9
87	15:11	12.5	6.1
88	15:12	12.0	6.5
89	15:13	11.8	6.9
90	15:14	12.5	6.4
91	15:15	12.5	6.3

92	15:16	12.3	6.4
93	15:17	11.8	6.7
94	15:18	11.5	7.0
95	15:19	12.1	6.7
96	15:20	12.8	6.1
97	15:21	12.9	6.0
98	15:22	12.6	6.1
99	15:23	12.0	6.5
100	15:24	12.0	6.5
101	15:25	11.6	6.9
102	15:26	11.6	6.9
103	15:27	12.5	6.2
104	15:28	12.4	6.3
105	15:29	12.6	6.2
106	15:30	12.5	6.2
107	15:31	12.5	6.2
108	15:32	12.7	6.0
109	15:33	12.7	6.0
110	15:34	11.9	6.7
111	15:35	11.9	6.7
112	15:36	11.9	6.6
113	15:37	12.6	6.4
114	15:38	13.3	5.6
115	15:39	13.1	5.8
116	15:40	13.1	5.8
117	15:41	13.0	5.9
118	15:42	13.0	5.9
119	15:43	12.7	6.1
120	15:44	12.7	6.1
121	15:45	13.1	5.8
122	15:46	13.4	5.7
123	15:47	13.4	5.6
124	15:48	13.3	5.6
125	15:49	13.3	5.6
126	15:50	13.0	5.8
127	15:51	13.0	5.8
128	15:52	14.0	5.1
129	15:53	14.0	5.1
130	15:54	13.3	5.6
131	15:55	13.2	5.7
132	15:56	13.2	5.7
133	15:57	12.9	5.9
134	15:58	12.9	5.9
135	15:59	13.4	5.5
136	16:00	13.4	5.5
137	16:01	12.8	5.9
138	16:02	12.8	5.9
139	16:03	12.7	6.0
140	16:04	12.8	6.0
141	16:05	12.8	6.0
142	16:06	12.6	6.1
143	16:07	12.6	6.1
144	16:08	12.9	6.0
145	16:09	12.9	6.0
146	16:10	12.7	5.9
147	16:11	12.7	5.9
148	16:12	13.0	5.9
149	16:13	12.9	5.9
150	16:14	12.9	5.9
151	16:15	12.8	6.0

Stericycle Incorporated

Run 3

Davis County, UT
Waste Incinerator
01/24/13

Start Time	1/24/2013 16:41
Run Length	212
Stop Time	20:12

Calibration Information		
Gas	O_2	CO_2
Instrument Range	21.2	10.1
Span Gas Value	10.00	5.07
Calibration		
Pretest Calibration		
Zero%	-0.1	0.1
Span%	9.9	5.0
Post Test Calibration		
Zero%	0.0	0.1
Span%	10.0	5.1
Results		
Absolute Bias (Zero)	0.0%	1.0%
Absolute Bias (Span)	0.5%	0.0%
Absolute Drift (Zero)	0.5%	0.0%
Absolute Drift (Span)	0.5%	1.0%
	Corrected O_2 %	Corrected CO_2 %
	12.7	6.2

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %
		12.7	6.1
1	16:41	11.1	7.1
2	16:42	11.1	7.3
3	16:43	11.6	7.0
4	16:44	11.9	6.8
5	16:45	12.5	6.4
6	16:46	13.0	6.0
7	16:47	13.3	5.7
8	16:48	13.4	5.6
9	16:49	13.2	5.7
10	16:50	12.7	6.0
11	16:51	13.4	5.7
12	16:52	13.5	5.5
13	16:53	13.2	5.7
14	16:54	13.3	5.7
15	16:55	13.2	5.7
16	16:56	13.1	5.9
17	16:57	13.4	5.5
18	16:58	13.2	5.6
19	16:59	13.0	5.9
20	17:00	13.4	5.6
21	17:01	13.1	5.7
22	17:02	12.9	6.0
23	17:03	13.0	5.8
24	17:04	12.6	6.1
25	17:05	12.3	6.4
26	17:06	12.0	6.5
27	17:07	12.5	6.3
28	17:08	12.7	6.1
29	17:09	12.7	6.1
30	17:10	12.5	6.3
31	17:11	12.7	6.1
32	17:12	12.6	6.1
33	17:13	12.6	6.2
34	17:14	13.0	5.9
35	17:15	12.7	6.1
36	17:16	12.8	6.1
37	17:17	12.8	6.1
38	17:18	12.7	6.1
39	17:19	13.3	5.9
40	17:20	14.0	5.2
41	17:21	13.7	5.4
42	17:22	13.4	5.6
43	17:23	12.9	5.9
44	17:24	12.6	6.2
45	17:25	13.5	5.6
46	17:26	13.4	5.6
47	17:27	12.8	6.1
48	17:28	13.4	5.7
49	17:29	13.0	5.8
50	17:30	12.3	6.4
51	17:31	12.6	6.3
52	17:32	12.3	6.3
53	17:33	12.1	6.6
54	17:34	12.2	6.5

55	17:35	12.4	6.5
56	17:36	12.5	6.3
57	17:37	12.4	6.3
58	17:38	12.6	6.2
59	17:39	12.9	6.0
60	17:40	12.8	6.1
61	17:41	12.4	6.4
62	17:42	12.7	6.1
63	17:43	12.3	6.4
64	17:44	12.5	6.4
65	17:45	13.1	5.9
66	17:46	12.9	6.0
67	17:47	12.6	6.3
68	17:48	12.9	6.0
69	17:49	12.7	6.1
70	17:50	12.7	6.2
71	17:51	13.2	5.8
72	17:52	12.9	5.9
73	17:53	12.9	6.1
74	17:54	12.9	6.0
75	17:55	12.5	6.3
76	17:56	12.8	6.2
77	17:57	13.5	5.7
78	17:58	13.1	5.8
79	17:59	12.9	6.0
80	18:00	11.4	7.2
81	18:01	13.5	5.9
82	18:02	13.4	5.5
83	18:03	11.4	7.1
84	18:04	13.5	6.0
85	18:05	14.9	4.6
86	18:06	14.1	5.0
87	18:07	13.5	5.6
88	18:08	13.3	5.6
89	18:09	12.4	6.2
90	18:10	12.2	6.6
91	18:11	12.0	6.6
92	18:12	11.9	6.6
93	18:13	11.9	6.7
94	18:14	11.7	6.7
95	18:15	11.3	7.1
96	18:16	12.0	6.7
97	18:17	12.4	6.3
98	18:18	11.7	6.8
99	18:19	12.5	6.6
100	18:20	20.4	1.4
101	18:21	15.8	2.7
102	18:22	12.6	6.2
103	18:23	13.0	5.9
104	18:24	12.9	6.0
105	18:25	12.7	6.1
106	18:26	12.8	6.1
107	18:27	12.8	6.1
108	18:28	12.8	6.1
109	18:29	13.3	5.9
110	18:30	13.8	5.3
111	18:31	13.4	5.5
112	18:32	12.8	5.9
113	18:33	12.4	6.2
114	18:34	11.8	6.6
115	18:35	10.8	7.4
116	18:36	11.5	7.2
117	18:37	12.0	6.7
118	18:38	11.8	6.8
119	18:39	12.2	6.5
120	18:40	12.4	6.3
121	18:41	12.4	6.4
122	18:42	13.3	5.8
123	18:43	12.9	5.8
124	18:44	12.8	6.1
125	18:45	12.5	6.2
126	18:46	12.1	6.5
127	18:47	12.0	6.6
128	18:48	13.0	6.1
129	18:49	13.8	5.3
130	18:50	13.8	5.3
131	18:51	13.1	5.7
132	18:52	12.5	6.2
133	18:53	12.6	6.2
134	18:54	12.4	6.3
135	18:55	12.4	6.4
136	18:56	12.6	6.2
137	18:57	12.3	6.3

138	18:58	12.1	6.5
139	18:59	12.1	6.5
140	19:00	12.2	6.4
141	19:01	12.5	6.3
142	19:02	12.4	6.3
143	19:03	12.2	6.4
144	19:04	12.5	6.3
145	19:05	12.5	6.2
146	19:06	12.2	6.4
147	19:07	12.5	6.3
148	19:08	13.5	5.7
149	19:09	13.2	5.6
150	19:10	13.0	5.9
151	19:11	12.9	6.0
152	19:12	12.6	6.2
153	19:13	12.6	6.2
154	19:14	12.6	6.1
155	19:15	12.3	6.3
156	19:16	12.3	6.2
157	19:17	11.8	6.7
158	19:18	12.2	6.7
159	19:19	12.7	6.2
160	19:20	12.2	6.3
161	19:21	12.1	6.6
162	19:22	12.2	6.5
163	19:23	12.4	6.4
164	19:24	12.9	6.1
165	19:25	12.9	5.9
166	19:26	12.5	6.2
167	19:27	12.4	6.3
168	19:28	12.4	6.3
169	19:29	12.4	6.5
170	19:30	13.0	6.1
171	19:31	12.7	6.2
172	19:32	12.5	6.4
173	19:33	12.5	6.4
174	19:34	12.3	6.4
175	19:35	12.2	6.6
176	19:36	12.3	6.5
177	19:37	12.4	6.4
178	19:38	13.2	5.9
179	19:39	13.7	5.5
180	19:40	13.1	5.8
181	19:41	12.9	5.9
182	19:42	12.4	6.3
183	19:43	12.1	6.6
184	19:44	12.4	6.3
185	19:45	12.8	6.2
186	19:46	13.0	5.9
187	19:47	12.9	6.0
188	19:48	12.2	6.3
189	19:49	12.2	6.3
190	19:50	12.2	6.3
191	19:51	12.2	6.3
192	19:52	12.2	6.3
193	19:53	12.2	6.3
194	19:54	12.2	6.3
195	19:55	12.2	6.3
196	19:56	12.2	6.3
197	19:57	12.2	6.3
198	19:58	12.2	6.3
199	19:59	12.2	6.3
200	20:00	12.2	6.3
201	20:01	12.2	6.3
202	20:02	12.2	6.3
203	20:03	12.2	6.3
204	20:04	12.2	6.3
205	20:05	12.2	6.3
206	20:06	13.1	5.8
207	20:07	12.9	5.9
208	20:08	12.7	6.2
209	20:09	13.3	5.7
210	20:10	13.1	5.8
211	20:11	13.2	5.8
212	20:12	12.8	6.0

Method 29

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/23/2013

EPA Method 29: Determination of Metals Emissions from Stationary Sources
Front Half Emissions

Laboratory Data - µg				
Run #	**R1 - Total**	**R2 - Total**	**R3 - Total**	**Average**
mass cadmium	1.7	1.5	1.7	1.6
mass lead	6.9	23.8	3.6	11.4
mass mercury (Frac 1B)	0.7	0.4	0.4	0.5
mass mercury (Frac 2B)	0.4	0.4	0.6	0.5
mass mercury (Frac 3A)	0.2	0.2	0.2	0.2
mass mercury (Frac 3B)	0.4	0.5	0.4	0.4
mass mercury (Frac 3C)	1.6	1.0	1.0	1.2

Emission Calculations - mg/dscm @ 7%O_2				
Run #	**R1 - Total**	**R2 - Total**	**R3 - Total**	**Average**
cadmium	0.0033	0.0022	0.0028	0.0028
lead	0.0135	0.0346	0.0060	0.0180
mercury	0.0065	0.0036	0.0043	0.0048

Emission Calculations - lb/hr				
Run #	**R1 - Total**	**R2 - Total**	**R3 - Total**	**Average**
cadmium	3.4E-05	2.9E-05	3.3E-05	3.2E-05
lead	1.4E-04	4.7E-04	7.0E-05	2.3E-04
mercury	6.6E-05	4.9E-05	5.1E-05	5.5E-05
Total Metals (lb/hr)	2.4E-04	5.4E-04	1.5E-04	3.1E-04

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis county, UT
Incinerator
1/23/13

EPA Method 29 Determination of Particulate Emissions From Stationary Sources

Field Reference Method Data					
	Run #	**1**	**2**	**3**	**Average**
	date	**1/23/13**	**1/23/13**	**1/23/13**	
	start time	11:06	13:05	14:58	
	stop time	12:06	14:05	15:58	
	sampling time (minutes)	60	60	60	
D_S	stack diameter (inches)	24.5	24.5	24.5	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)^{½} (" H_2O)^{½}	0.567	0.686	0.686	0.646
C_P	pitot tube constant (unitless)	0.826	0.826	0.826	0.83
T_S	stack temp. (°F)	132	145	145	141
P_{bar}	barometric pressure (mbar)	880	880	880	880
P_{bar}	barometric pressure (" Hg)	25.99	25.99	25.99	25.99
Ps	stack pressure (" H_2O)	0.04	0.04	0.04	0.04
Y_d	meter box Y_d (unitless)	0.998	0.998	0.998	0.998
T_m	meter temp. (°F)	61	70	75	68
V_m	sample volume (ft^3)	33.808	42.331	43.174	39.771
ΔH	orifice setting delta H (" H_2O)	0.83	1.34	1.34	1.17
V_{lc}	moisture (g)	144.5	172.8	164.2	160.5
O_2%vd	oxygen (%vd)	12.5	11.7	12.9	12.4
CO_2%vd	carbon dioxide (%vd)	6.2	6.9	6.1	6.4
D_N	nozzle diameter (inches)	0.253	0.260	0.260	0.258

Laboratory Data					
	Run #	**1**	**2**	**3**	**Average**
grams	mass particulate front half (g)	0.02065	0.00400	0.00480	0.00982
grams	mass particulate filter (g)	0.00000	0.00075	0.00085	0.00053

Reference Method Calculations						
	Run #	**1**	**2**	**3**	**Average**	**Permit Limits**
V_{mstd}	sample volume (dscf)	29.765	36.685	37.093	34.514	
	sample volume (dscm)	0.843	1.039	1.050	0.977	
V_{wstd}	moisture volume (dscf)	6.813	8.148	7.742	7.568	
B_{ws}	measured moisture content (%/100)	0.186	0.182	0.173	0.180	
	saturated moisture content (%/100)	0.185	0.260	0.259	0.235	
	actual moisture content (%/100)	0.185	0.182	0.173	0.180	
M_D	molecular weight (dry)	29.50	29.57	29.49	29.52	
M_A	molecular weight (actual)	27.37	27.47	27.50	27.45	
V_S	gas velocity (ft/sec)	36.5	44.6	44.6	41.9	
F_{ACFM}	gas flow (acfm)	7,171	8,765	8,756	8,231	
F_{DSCFM}	gas flow (dscfm)	4,524	5,434	5,489	5,149	
lb/hr	gas flow (lb/hr)	23,644	28,380	28,393	26,805	
%	% isokinetic	102.9	99.9	100.0	100.9	
lb/hr	F½ PM (lb/hr)	0.42	0.09	0.11	0.21	
gr/dscf	F½ PM (gr/dscf)	0.0107	0.0020	0.0024	0.0050	
lb/hr	Total PM (lb/hr)	0.42	0.09	0.11	0.21	
gr/dscf	Total PM (gr/dscf)	0.0107	0.0020	0.0024	0.0050	**0.015**

Particulate filter masses found to be slightly negative values are reported as a zero value

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/23/2013

EPA Method 29: Determination of Metals Emissions from Stationary Sources
Front Half Emissions

Field Reference Method Data		
	Run #	1
	date	1/23/2013
	start time	11:06
	stop time	12:13
	sampling time (minutes)	60.0
D_s	stack diameter (inches)	24.5
$\sqrt{\Delta P_{Avg}}$	average (delta P)^{½} (" H_2O)^{½}	0.567
C_P	pitot tube constant (unitless)	0.828
T_s	stack temp. (°F)	132.3
P_{bar}	barometric pressure (mbar)	880
P_{bar}	barometric pressure (" Hg)	25.99
Ps	stack pressure (" H_2O)	0.04
Y_d	meter box Y_d (unitless)	0.998
T_m	meter temp. (°F)	60.85
V_m	sample volume (ft^3)	33.808
ΔH	orifice setting delta H (" H_2O)	0.83
V_{lc}	moisture (g)	144.5
O_2%vd	oxygen (%vd)	12.5
CO_2%vd	carbon dioxide (%vd)	6.2
inches	nozzle diameter (inches)	0.253

Reference Method Calculations		
	Run #	1
V_{std}	sample volume (dscf)	29.765
	sample volume (dscm)	0.843
V_{wstd}	moisture volume (dscf)	6.813
B_{ws}	measured moisture content (%/100)	0.186
	saturated moisture content (%/100)	0.185
	actual moisture content (%/100)	0.185
M_D	molecular weight (dry)	29.49
M_s	molecular weight (actual)	27.36
V_s	gas velocity (ft/sec)	36.5
F_{ACFM}	gas flow (acfm)	7,171
F_{DSCFM}	gas flow (dscfm)	4,525
lb/hr	gas flow (lb/hr)	23,642
%	% isokinetic	102.9

Saturation Calculations			
	Run #	1	
	Stack temp. (°C)	56	
	Ambient pressure (mmHg)	660	
	Stack Pressure (mmHg)	0.07	
	"Stack Pressure" (Amb + Stack)	660	
	Antoine's Constants	0-60C	60-150C
	A	8.10765	7.96681
	B	1750.286	1668.21
	C	235	228
		R2	
	Saturation (%/100) (0-60 C)	0.185	
	Saturation (%/100) (60-150 C)	0.185	
	Moisture (g) collectable at saturation	143.7	

Laboratory Data - µg	
Run #	1
mass cadmium	**1.7**
mass lead	**6.9**
mass mercury (Frac 1B)	**0.7**
mass mercury (Frac 2B)	**0.4**
mass mercury (Frac 3A)	0.2
mass mercury (Frac 3B)	0.4
mass mercury (Frac 3C)	**1.6**

Emission Calculations - mg/dscm @ 7%O_2	
Run #	1
cadmium	0.0033
lead	0.0135
mercury	0.0065

Emission Calculations - lb/hr	
Run #	1
cadmium	3.4E-05
lead	1.4E-04
mercury	6.6E-05
Total Metals (lb/hr)	2.4E-04

Bold-face results are detected and quantifiable.
All other values are non-detected with the detection limit being substituted.

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/23/2013

EPA Method 29: Determination of Metals Emissions from Stationary Sources
Front Half Emissions

Field Reference Method Data		
	Run #	**2**
	date	1/23/2013
	start time	13:05
	stop time	14:13
	sampling time (minutes)	60.0
D_s	stack diameter (inches)	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)$^{\frac{1}{2}}$ (" H_2O)$^{\frac{1}{2}}$	0.666
C_P	pitot tube constant (unitless)	0.826
T_s	stack temp. (°F)	145.4
P_{bar}	barometric pressure (mbar)	880
P_{bar}	barometric pressure (" Hg)	25.99
Ps	stack pressure (" H_2O)	0.04
Y_d	meter box Y_d (unitless)	0.998
T_m	meter temp. (°F)	69.9
V_m	sample volume (ft^3)	42.331
ΔH	orifice setting delta H (" H_2O)	1.34
V_{lc}	moisture (g)	172.6
O_2%vd	oxygen (%vd)	11.7
CO_2%vd	carbon dioxide (%vd)	6.9
inches	nozzle diameter (inches)	0.26

Reference Method Calculations		
	Run #	**2**
V_{mstd}	sample volume (dscf)	36.685
	sample volume (dscm)	1.039
V_{wstd}	moisture volume (dscf)	8.148
B_{ws}	measured moisture content (%/100)	0.182
	saturated moisture content (%/100)	0.260
	actual moisture content (%/100)	0.182
M_D	molecular weight (dry)	29.57
M_A	molecular weight (actual)	27.47
V_s	gas velocity (ft/sec)	44.8
F_{ACFM}	gas flow (acfm)	8,785
F_{DSCFM}	gas flow (dscfm)	5,433
lb/hr	gas flow (lb/hr)	28,381
%	% isokinetic	99.9

Saturation Calculations		
Run #	**2**	
Stack temp. (°C)	63	
Ambient pressure (mmHg)	660	
Stack Pressure (mmHg)	0.07	
"Stack Pressure" (Amb + Stack)	660	
Antoine's Constants	**0-60C**	**60-150C**
A	8.10765	7.96681
B	1750.286	1668.21
C	235	228
	R1	
Saturation (%/100) (0-60 C)	0.260	
Saturation (%/100) (60-150 C)	0.260	
Moisture (g) collectable at saturation	273.4	

Laboratory Data - µg	
Run #	**2**
mass cadmium	1.5
mass lead	23.8
mass mercury (Frac 1B)	0.4
mass mercury (Frac 2B)	0.4
mass mercury (Frac 3A)	0.2
mass mercury (Frac 3B)	0.5
mass mercury (Frac 3C)	1.0

Emission Calculations - mg/dscm @ 7%O_2	
Run #	**2**
cadmium	0.0022
lead	0.0346
mercury	0.0036

Emission Calculations - lb/hr	
Run #	**2**
cadmium	2.9E-05
lead	4.7E-04
mercury	4.9E-05
Total Metals (lb/hr)	5.4E-04

Bold-face results are detected and quantifiable.
All other values are non-detected with the detection limit being subsituted.

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/23/2013

EPA Method 29: Determination of Metals Emissions from Stationary Sources
Front Half Emissions

Field Reference Method Data		
	Run #	**3**
	date	1/23/2013
	start time	14:58
	stop time	16:07
	sampling time (minutes)	60.0
D_s	stack diameter (inches)	24.5
$\sqrt{\Delta P_{AVG}}$	average (delta P)^{½} (" H_2O)^{½}	0.686
C_P	pitot tube constant (unitless)	0.828
T_s	stack temp. (°F)	145.3
P_{bar}	barometric pressure (mbar)	880
P_{bar}	barometric pressure (" Hg)	25.99
Ps	stack pressure (" H_2O)	0.04
Y_d	meter box Y_d (unitless)	0.998
T_m	meter temp. (°F)	74.5
V_m	sample volume (ft^3)	43.174
ΔH	orifice setting delta H (" H_2O)	1.34
V_{lc}	moisture (g)	164.2
O_2%vd	oxygen (%vd)	12.9
CO_2%vd	carbon dioxide (%vd)	6.1
inches	nozzle diameter (inches)	0.26

Reference Method Calculations		
	Run #	**3**
V_{mstd}	sample volume (dscf)	37.093
	sample volume (dscm)	1.050
V_{wstd}	moisture volume (dscf)	7.742
B_{ws}	measured moisture content (%/100)	0.173
	saturated moisture content (%/100)	0.259
	actual moisture content (%/100)	0.173
M_D	molecular weight (dry)	29.49
M_A	molecular weight (actual)	27.51
V_s	gas velocity (ft/sec)	44.6
F_{ACFM}	gas flow (acfm)	8,758
F_{DSCFM}	gas flow (dscfm)	5,468
lb/hr	gas flow (lb/hr)	28,395
%	% isokinetic	100.0

Saturation Calculations		
Run #	**3**	
Stack temp. (°C)	63	
Ambient pressure (mmHg)	660	
Stack Pressure (mmHg)	0.07	
"Stack Pressure" (Amb + Stack)	660	
Antoine's Constants	0-60C	60-150C
A	8.10765	7.96681
B	1750.286	1668.21
C	235	228
	R3	
Saturation (%/100) (0-60 C)	0.259	
Saturation (%/100) (60-150 C)	0.259	
Moisture (g) collectable at saturation	275.5	

Laboratory Data - µg	
Run #	**3**
mass cadmium	1.7
mass lead	3.6
mass mercury (Frac 1B)	0.4
mass mercury (Frac 2B)	0.6
mass mercury (Frac 3A)	0.2
mass mercury (Frac 3B)	0.4
mass mercury (Frac 3C)	1.0

Emission Calculations - mg/dscm @ 7%O_2	
Run #	**3**
cadmium	0.0028
lead	0.0060
mercury	0.0043

Emission Calculations - lb/hr	
Run #	**3**
cadmium	3.3E-05
lead	7.0E-05
mercury	5.1E-05
Total Metals (lb/hr)	1.5E-04

Bold-face results are detected and quantifiable.
All other values are non-detected with the detection limit being substituted.

Stericycle Incorporated

Davis County, UT
Waste Incinerator
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Linearity Information		
Gas	O_2	CO_2
Span Gas Value/Range	21.2	10.1
Bias Gas Value	10.00	5.07
Bias Check (Zero)	0.1	0.0
Bias Check (Span)	10.2	5.2
Linearity Bias (Zero)	0.0	0.0
Linearity Bias (Span)	10.1	5.2
Gas Concentration	%	%
1	0.00	0.00
2	10.00	5.07
3	21.20	10.10
Response		
1	0.0	0.0
2	10.1	5.2
3	21.2	10.1
Difference		
1	0.0	0.0
2	0.1	0.1
3	0.0	0.0
Results		
Zero Bias	0.47%	0.00%
Span Bias	0.47%	0.00%
Max Calibration Error	0.47%	1.29%

Stericycle Incorporated **Run 1**

Davis County, UT
Waste Incinerator
01/23/13

Start Time	1/23/2013 11:06
Run Length	60
Stop Time	12:06

Calibration Information		
Gas	O_2	CO_2
Instrument Range	21.2	10.1
Span Gas Value	10.00	5.07
Calibration		
Pretest Calibration		
Zero%	0.1	0.0
Span%	10.2	5.2
Post Test Calibration		
Zero%	0.1	0.0
Span%	10.1	5.0
Results		
Absolute Bias (Zero)	0.5%	0.0%
Absolute Bias (Span)	0.0%	2.0%
Absolute Drift (Zero)	0.0%	0.0%
Absolute Drift (Span)	0.5%	2.0%
	Corrected O_2 %	Corrected CO_2 %
	12.5	6.2

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %
		12.7	6.2
1	11:06	14.8	4.7
2	11:07	14.3	5.0
3	11:08	13.5	5.6
4	11:09	13.2	5.9
5	11:10	12.8	6.1
6	11:11	12.9	6.1
7	11:12	12.8	6.1
8	11:13	12.8	6.1
9	11:14	12.6	6.3
10	11:15	12.6	6.3
11	11:16	12.4	6.4
12	11:17	13.4	5.8
13	11:18	12.8	6.0
14	11:19	11.7	6.9
15	11:20	11.5	7.1
16	11:21	11.4	7.2
17	11:22	11.3	7.3
18	11:23	11.6	7.2
19	11:24	12.8	6.3
20	11:25	12.6	6.3
21	11:26	12.2	6.6
22	11:27	12.2	6.7
23	11:28	12.1	6.7
24	11:29	12.2	6.7
25	11:30	12.4	6.6
26	11:31	12.2	6.5
27	11:32	11.8	7.0
28	11:33	12.1	6.9
29	11:34	12.2	6.8
30	11:35	12.6	6.5
31	11:36	12.9	6.2
32	11:37	13.7	5.7
33	11:38	13.7	5.5
34	11:41	13.8	5.4
35	11:42	13.9	5.3
36	11:43	14.3	5.1
37	11:44	13.7	5.4
38	11:45	13.0	5.9
39	11:46	12.1	6.6
40	11:47	11.9	6.8
41	11:48	11.3	7.1
42	11:49	10.3	7.8
43	11:50	9.9	8.5
44	11:51	11.1	7.6
45	11:52	11.7	7.1
46	11:53	12.4	6.6
47	11:54	12.7	6.3
48	11:55	12.8	6.2
49	11:56	12.9	6.1
50	11:57	13.3	5.9
51	11:58	13.5	5.7
52	11:59	13.6	5.5
53	12:00	14.1	5.4
54	12:01	14.1	5.1
55	12:02	13.7	5.4
56	12:03	13.8	5.3
57	12:04	13.2	5.8
58	12:05	12.8	6.1
59	12:06	12.8	6.1
60	12:07	13.1	6.0

Stericycle Incorporated **Run 2**

Davis County, UT
Waste Incinerator
01/23/13

Start Time	1/23/2013 13:05
Run Length	60
Stop Time	14:05

Calibration Information		
Gas	O_2	CO_2
Instrument Range	21.2	10.1
Span Gas Value	10.00	5.07
Calibration		
Pretest Calibration		
Zero%	0.1	0.0
Span%	10.1	5.0
Post Test Calibration		
Zero%	0.0	0.0
Span%	10.0	5.0
Results		
Absolute Bias (Zero)	0.0%	0.0%
Absolute Bias (Span)	0.5%	2.0%
Absolute Drift (Zero)	0.5%	0.0%
Absolute Drift (Span)	0.5%	0.0%
	Corrected O_2 %	Corrected CO_2 %
	11.7	*6.9*

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %
		11.7	6.8
1	13:05	12.9	6.1
2	13:06	13.9	5.2
3	13:07	13.3	5.6
4	13:08	12.4	6.1
5	13:09	11.0	7.2
6	13:10	11.6	7.1
7	13:11	12.1	6.6
8	13:12	13.3	5.8
9	13:13	13.0	5.9
10	13:14	11.9	6.6
11	13:15	11.9	6.8
12	13:16	12.4	6.3
13	13:17	12.4	6.3
14	13:18	14.0	5.6
15	13:19	13.9	5.1
16	13:20	12.7	5.9
17	13:21	12.4	6.3
18	13:22	12.2	6.5
19	13:23	12.3	6.4
20	13:24	12.7	6.3
21	13:25	13.9	5.4
22	13:26	14.0	5.2
23	13:27	13.5	5.4
24	13:28	12.8	5.9
25	13:29	12.5	6.2
26	13:30	12.6	6.2
27	13:31	12.8	6.2
28	13:32	12.8	6.0
29	13:33	12.1	6.4
30	13:34	11.7	6.8
31	13:35	11.7	6.8
32	13:36	11.6	6.9
33	13:37	12.4	6.8
34	13:41	11.9	6.7
35	13:42	12.1	6.6
36	13:43	12.0	6.6
37	13:44	12.3	6.5
38	13:45	12.2	6.5
39	13:46	12.0	6.5
40	13:47	11.6	6.9
41	13:48	12.0	6.6
42	13:49	11.7	6.7
43	13:50	11.1	7.4
44	13:51	11.7	7.0
45	13:52	12.0	6.6
46	13:53	12.0	6.6
47	13:54	11.1	6.9
48	13:55	9.7	8.4
49	13:56	11.5	7.3
50	13:57	10.0	7.7
51	13:58	8.5	9.0
52	13:59	8.5	9.1
53	14:00	8.5	9.0
54	14:01	8.1	9.3
55	14:02	8.6	9.0
56	14:03	8.9	8.8
57	14:04	9.2	8.5
58	14:05	9.4	8.4
59	14:06	10.0	8.0
60	14:07	10.4	7.6

Stericycle Incorporated **Run 3**

Davis County, UT
Waste Incinerator
01/23/13

Start Time	1/23/2013 14:58
Run Length	60
Stop Time	15:58

Calibration Information		
Gas	**O_2**	**CO_2**
Instrument Range	21.2	10.1
Span Gas Value	10.00	5.07
Calibration		
Pretest Calibration		
Zero%	0.0	0.0
Span%	10.0	5.0
Post Test Calibration		
Zero%	0.1	0.0
Span%	10.0	5.0
Results		
Absolute Bias (Zero)	0.5%	0.0%
Absolute Bias (Span)	0.5%	2.0%
Absolute Drift (Zero)	0.5%	0.0%
Absolute Drift (Span)	0.0%	0.0%
	Corrected O_2 %	**Corrected CO_2 %**
	12.9	**6.1**

Run Length (Minutes)	Time	Uncorrected O_2 %	Uncorrected CO_2 %
		12.9	6.0
1	14:58	7.3	9.8
2	14:59	7.2	9.9
3	15:00	7.4	9.8
4	15:01	9.7	8.6
5	15:02	11.2	7.3
6	15:03	11.9	6.7
7	15:04	12.3	6.4
8	15:05	12.5	6.2
9	15:06	12.9	6.0
10	15:07	13.1	5.8
11	15:08	13.5	5.5
12	15:09	13.8	5.3
13	15:10	13.9	5.2
14	15:11	13.9	5.2
15	15:12	14.1	5.1
16	15:13	14.2	5.0
17	15:14	14.4	4.8
18	15:15	14.3	4.9
19	15:16	14.7	4.7
20	15:17	14.5	4.8
21	15:18	14.4	4.9
22	15:19	14.6	4.8
23	15:20	15.0	4.5
24	15:21	15.1	4.4
25	15:22	15.3	4.3
26	15:23	14.8	4.6
27	15:24	14.5	4.9
28	15:25	14.5	4.9
29	15:26	15.2	4.4
30	15:27	14.2	4.9
31	15:28	13.7	5.3
32	15:29	13.2	5.8
33	15:30	13.3	5.8
34	15:31	13.6	5.4
35	15:35	13.8	5.6
36	15:36	13.5	5.6
37	15:37	12.7	6.1
38	15:38	11.7	6.8
39	15:39	11.6	7.0
40	15:40	11.8	6.8
41	15:41	11.8	7.0
42	15:42	12.3	6.6
43	15:43	11.6	6.8
44	15:44	10.9	7.4
45	15:45	11.2	7.3
46	15:46	11.8	6.9
47	15:47	12.0	6.7
48	15:48	12.0	6.8
49	15:49	12.0	6.7
50	15:50	12.2	6.6
51	15:51	12.6	6.3
52	15:52	12.8	6.1
53	15:53	12.9	6.0
54	15:54	13.5	5.7
55	15:55	13.8	5.4
56	15:56	13.7	5.5
57	15:57	13.7	5.4
58	15:58	13.6	5.4
59	15:59	13.5	5.6
60	16:00	13.6	5.6

Sample Calculations

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator Run 1
1/22/2013

EPA Methods 1-4: Determination of Stack Gas Velocity and Volumetric Flow Rate

Sample Calculations

sample volume (scf)

$$= \frac{17.64 * V_M * Y_D * \{P_B + \Delta H/13.6\}}{T_M + 460}$$

$$= \frac{17.64 * 47.621 * 0.998 * \{26.05 + 2.0 / 13.6\}}{74 + 460}$$

$$= 41.131$$

moisture volume (scf)

$$= 0.04715 * V_{LC}$$

$$= 0.04715 * 205.8$$

$$= 9.70$$

moisture content (% / 100)

$$= \frac{V_{W(STD)}}{(V_{M(STD)} + V_{W(STD)})}$$

$$= \frac{9.70}{(41.131 + 9.70)}$$

$$= 0.191$$

molecular weight, dry (grams/mol)

$$= (0.440) * (\%CO_2) + (0.320) * (\%O_2) + (0.280) * (\%N_2 + \%CO)$$

$$= (0.440) * 6.1 + (0.320) * 13.0 + (0.280) * (81.0 + 0.0)$$

$$= 29.49$$

molecular weight, actual (grams/mol)

$$= M_D * (1 - B_{WS}) + (18.0) * B_{WS}$$

$$= 29.49 * (1 - 0.191) + (18 * 0.191)$$

$$= 27.29$$

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/22/2013

Run 1

EPA Methods 1-4: Determination of Stack Gas Velocity and Volumetric Flow Rate

Sample Calculations (continued)

gas velocity (ft/sec)

$$= 85.49 * C_P * \sqrt{\Delta P_{AVG}} * \sqrt{\frac{T_S + 460}{[P_B + P_S / 13.6] * M_A}}$$

$$= (85.49) * 0.826 * 0.6136 * \sqrt{\frac{142 + 460}{\left[26.05 + \frac{0.03}{13.6}\right] * 27.29}}$$

$$= 39.9$$

gas flow (acfm)

$$= 60 * \frac{\pi * (D_S / 12)^2}{4} * V_S$$

$$= 60 * \frac{\pi * (24.5 / 12)^2}{4.0} * 39.9$$

$$= 7{,}835$$

gas flow (dscfm)

$$= 60 * V_S * (1 - B_{WS}) * \frac{\pi * (D_S / 12)^2}{4} * \frac{T_{STD} * [P_B + P_S / 13.6]}{(T_S + 460) * P_{STD}}$$

$$= 60 * 39.9 * (1 - 0.191) * \frac{\pi * (24.5 / 12)^2}{4} * \frac{528 * [26.05 + 0.03 / 13.6]}{(142 + 460) * 29.92}$$

$$= 4{,}837$$

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Davis County, UT
Waste Incinerator
1/22/2013

EPA Methods 1-4: Determination of Stack Gas Velocity and Volumetric Flow Rate

Variables and Abbreviations

B_{WS} - moisture content of the gas (wet volume percent/100)

%CO - carbon monoxide content of the gas (dry volume percent)

$\%CO_2$ - carbon dioxide content of the gas (dry volume percent)

C_P - pitot tube constant (unitless)

D_S - diameter of the stack (inches)

ΔH - pressure differential at dry gas meter exit orifice (inches water)

M_D - molecular weight of the dry gas (grams per mol)

M_A - molecular weight of the wet gas (grams per mol)

$\%N_2$ - nitrogen content of the gas (dry volume percent)

$\%O_2$ - oxygen content of the gas (dry volume percent)

P_{AVG} - average square root of the stack gas pitot differential pressure (inches water)

P_B - barometric pressure (inches mercury)

P_S - stack pressure relative to barometric presure (inches water)

P_{STD} - standard pressure (29.92 inches mercury)

T_M - average dry gas meter temperature (^oF)

T_S - average stack temperature (^oF)

T_{STD} - standard temperature (528 ^oR)

V_{LC} - volume of moisture collected as a liquid (milliliters)

V_M - volume indicated on dry gas meter (uncorrected actual cubic feet)

V_{MSTD} - volume of gas through dry gas meter (corrected dry standard cubic feet)

V_S - stack gas velocity (feet per second)

V_{WSTD} - volume of moisture collected as a gas at standard conditions (standard cubic feet)

Y_D - dry gas meter calibration factor (unitless)

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Davis County, UT
Waste Incinerator Run 1
1/22/2013

EPA Method 3A: Determination of O_2 / CO_2 Concentrations in Emissions from Stationary Sources (*Instrumental Analyzer Procedure*)

Sample Calculations

$$CO_2 \text{ conc, drift cal (\%vd)} = \frac{(\%FS_{STACK} - \%FS_0) * [\text{Span Gas Conc (\%vd)}]}{(\%FS_{SPAN} - \%FS_0)}$$

$$= \frac{(6.2 - 0.0) * (5.07)}{(5.2) - (0.0)}$$

$$= 6.1$$

$$O_2 \text{ conc, drift cal (\%vd)} = \frac{(\%FS_{STACK} - \%FS_0) * [\text{Span Gas Conc (\%vd)}]}{(\%FS_{SPAN} - \%FS_0)}$$

$$= \frac{(13.0 - 0.0) * (10.0)}{(10.0) - (0.0)}$$

$$= 13.0$$

Variables and Abbreviations

cal - calibrated

conc - concentration

CO_2 - Carbon Dioxide

O_2 - Oxygen

$\%FS_{SPAN}$ - average analyzer reading for span gas (percent of full scale)

$\%FS_{STACK}$ - average analyzer reading for stack gas (percent of full scale)

$\%FS_0$ - average analyzer reading for zero gas (percent of full scale)

%vd- dry volume percent

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Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
1/22/2013 Run 1

EPA Method 6C: Determination of Sulfur Dioxide Emissions from Stationary Sources (*Instrumental Analyzer Procedure*)

Sample Calculations

$$SO_2 \text{ conc, drift cal (ppmvd)} = \frac{(\%FS_{STACK} - \%FS_0) * [\text{Span Gas Conc (ppmvd)}]}{(\%FS_{SPAN} - \%FS_0)}$$

$$= \frac{(6.2 - 0.45) * (10.2)}{(9.8) - (0.45)}$$

$$= 6.3$$

$$SO_2 \text{ emissions (ppmvd @ 7\% } O_2) = [SO_2 \text{ emissions (ppmvd)}] * \frac{[20.9 - 7]}{20.9 - [O_2 (\%vd)]}$$

$$= 6.3 * \frac{13.9}{20.9 - 13.0}$$

$$= 11.0$$

Variables and Abbreviations

SO_2 - Sulfur dioxide

O_2 - Oxygen

$\%FS_{SPAN}$ - average analyzer reading for span gas at probe tip (percent of full scale)

$\%FS_{STACK}$ - average analyzer reading for stack gas (percent of full scale)

$\%FS_0$ - average analyzer reading for zero gas at probe tip (percent of full scale)

ppmvd - parts per million, dry volume basis

ppmvd @ 7% O_2 - parts per million, dry volume basis, corrected to 7% O_2

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Davis County, UT
Waste Incinerator Run 1
1/25/2013

EPA Method 7E: Determination of Nitrogen Oxides Emissions from Stationary Sources (*Instrumental Analyzer Procedure*)

Sample Calculations

$$NO_X \text{ conc, drift cal (ppmvd)} = \frac{(\%FS_{STACK} - \%FS_0) * [\text{Span Gas Conc (ppmvd)}]}{(\%FS_{SPAN} - \%FS_0)}$$

$$= \frac{(53.4 - 0.25) * (89.9)}{(89.7) - (0.25)}$$

$$= 53.5$$

$$NO_X \text{ (ppmvd @ 7\% } O_2) = \frac{NO_X \text{ (ppmvd)} * (20.9 - 7)}{(20.9 - O2 \text{ (\%vd)})}$$

$$= \frac{(53.5) * (20.9 - 7)}{(20.9 - 12.5)}$$

$$= 88.8$$

Variables and Abbreviations

cal - calibrated

conc - concentration

F_{DSCFM} - gas flow (dry standard cubic feet per minute, where standard = 29.92 inches Hg and 68°F)

$\%FS_{SPAN}$ - average analyzer reading for span gas at probe tip (percent of full scale)

$\%FS_{STACK}$ - average analyzer reading for stack gas (percent of full scale)

$\%FS_0$ - average analyzer reading for zero gas at probe tip (percent of full scale)

ppmvd - parts per million, dry volume basis

ppmvd @ 7% O_2 - parts per million, dry volume basis corrected to 15% oxygen

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator Run 1
01/22/13

EPA Method 10: Determination of Carbon Monoxide Emissions from Stationary Sources (*Instrumental Analyzer Procedure*)

Sample Calculations

$$\text{CO conc, drift cal (ppmvd)} = \frac{(\%FS_{STACK} - \%FS_0) * [\text{Span Gas Conc (ppmvd)}]}{(\%FS_{SPAN} - \%FS_0)}$$

$$= \frac{(8.9 - 0.05) * (8.24)}{(8.15) - (0.05)}$$

$$= 9.0$$

$$\text{CO conc (ppmvd @ 7\% } O_2) = \text{CO (ppmvd)} * \left| \frac{(20.9 - 7)}{[20.9 - O_2\,(\%vd)]} \right|$$

$$= (9.0) * \frac{(13.9)}{(20.9 - 13.0)}$$

$$= 15.7$$

Variables and Abbreviations

cal - calibrated

conc - concentration

F_{DSCFM} - gas flow (dry standard cubic feet per minute, where standard = 29.92 inches Hg and 68oF)

$\%FS_{SPAN}$ - average analyzer reading for span gas at probe tip (percent of full scale)

$\%FS_{STACK}$ - average analyzer reading for stack gas (percent of full scale)

$\%FS_0$ - average analyzer reading for zero gas at probe tip (percent of full scale)

ppmvd - parts per million, dry volume basis

ppmvd @ 7% O_2 - parts per million, dry volume basis corrected to 15% oxygen

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
1/22/2013

Run 3

EPA Method 26A: Determination of Hydrogen Halide and Halogen Emissions From Stationary Sources Isokinetic Method

Sample Calculations

Sample Volume (dscf)

$$= \frac{[17.64] * V_M * Y_D * [P_B + (\Delta H/13.6)]}{[T_M + 460]}$$

$$= \frac{[17.64] * 53.190 * 0.998 * [26.05 + (2.1 / 13.6)]}{[78 + 460]}$$

$$= 45.601$$

HCl conc. (ppmvd)

$$= \frac{[\text{mass HCl (mg)}]}{[\text{sample vol.}_c\text{ (dscf)}]} * \left[\frac{1000\text{ ug}}{\text{mg}}\right] * \left[\frac{24.055\text{ uL}}{36.46\text{ ug HCl}}\right] * \left[\frac{0.035315\text{ cf}}{\text{L}}\right]$$

$$= \frac{[106.4]}{[45.601]} * \left[\frac{1000\text{ ug}}{\text{mg}}\right] * \left[\frac{24.055\text{ uL}}{36.46\text{ ug HCl}}\right] * \left[\frac{0.035315\text{ cf}}{\text{L}}\right]$$

$$= 54.3$$

HCl conc (ppmvd @ 7% O_2)

$$= \text{HCl (ppmvd)} * \left|\frac{(20.9 - 7)}{[20.9 - O_2\text{ (\%vd)}]}\right|$$

$$= (54.3) * \frac{(13.9)}{(20.9 - 12.5)}$$

$$= 89.9$$

Variables and Abbreviations

conc. - concentration

dscf - dry standard cubic foot

mg - milligram

ppmv, dry - parts per million, dry volume basis

P_B - barometric pressure (inches mercury)

T_M - average dry gas meter temperature (oF)

V_M - volume indicated on dry gas meter (uncorrected actual cubic feet)

Y_D - dry gas meter calibration factor (unitless)

F_{dscfm} - flow rate in dry standard cubic feet per minute

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility Run 1
Davis County, UT
Waste Incinerator
01/23/13

EPA Method 29: Determination of Metals Emissions From Stationary Sources

Sample Calculations

sample volume (scf)

$$= \frac{17.64 * V_M * Y_D * \{P_B + \Delta H/13.6\}}{T_M + 460}$$

$$= \frac{17.64 * 33.808 * 0.998 * \{25.99 + 0.83 / 13.6\}}{61 + 460}$$

$$= 29.765$$

moisture volume (scf)

$$= 0.04715 * V_{LC}$$

$$= 0.04715 * 144.5$$

$$= 6.813$$

moisture content (% / 100)

$$= \frac{V_{W(STD)}}{(V_{M(STD)} + V_{W(STD)})}$$

$$= \frac{6.813}{(29.765 + 6.813)}$$

$$= 0.186$$

molecular weight, dry (grams/mol)

$$= (0.440) * (\%CO_2) + (0.320) * (\%O_2) + (0.280) * (\%N_2 + \%CO)$$

$$= (0.440) * 6.2 + (0.320) + 12.5 + (0.280) * (81.3 + 0.0)$$

$$= 29.49$$

molecular weight, actual (grams/mol)

$$= M_D * (1 - B_{WS}) + (18.0) * B_{WS}$$

$$= 29.49 * (1 - 0.186) + (18 * 0.186)$$

$$= 27.35$$

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, UT
Waste Incinerator
01/23/13

Run 1

EPA Method 29: Determination of Metals Emissions From Stationary Sources

Sample Calculations (continued)

gas velocity (ft/sec)

$$= 85.49 * C_P * \sqrt{\Delta P_{AVG}} * \sqrt{\frac{T_S + 460}{[P_B + P_S / 13.6] * M_A}}$$

$$= (85.49) * 0.826 * 0.5665 * \sqrt{\frac{132 + 460}{\left[25.99 + \frac{0.04}{13.6}\right] * 27.35}}$$

$$= 36.5$$

gas flow (acfm)

$$= 60 * \frac{\pi * (D_S / 12)^2}{4} * V_S$$

$$= 60 * \frac{\pi * (24.5 / 12)^2}{4} * 36.5$$

$$= 7{,}171$$

gas flow (dscfm)

$$= 60 * V_S * (1 - B_{WS}) * \frac{\pi * (D_S / 12)^2}{4} * \frac{T_{STD} * [P_B + P_S / 13.6]}{(T_S + 460) * P_{STD}}$$

$$= 60 * 36.5 * (1 - 0.186) * \frac{\pi * (24.5 / 12)^2}{4} * \frac{528 * [25.99 + 0.04 / 13.6]}{(132 + 460) * 29.92}$$

$$= 4{,}525$$

F 1/2 particulate emissions (lb/hr)

$$= \frac{M_T * F_{DSCFM} * 60 \text{ (min/hr)}}{V_{M(STD)} * 453.592 \text{ (g/lb)}}$$

$$= \frac{0.02065 * 4{,}520 * 60}{29.765 * 453.592}$$

$$= 0.42$$

F 1/2 particulate emissions (gr/dscf)

$$= \frac{M_T}{V_{M(STD)}} * 15.43 \text{ (grains/gram)}$$

$$= \frac{0.02065}{29.765} * 15.43$$

$$= 0.011$$

Stericycle Incorporated
Stericycle Medical Waste Disposal Facility Run 1
Davis County, UT
Waste Incinerator
01/23/13

EPA Method 29: Determination of Metals Emissions From Stationary Sources

Sample Calculations (continued)

Hg emissions (mg/dscm) @ 7% O_2

$$= \frac{\text{Hg } (\mu g) * (35.315 \text{ dscf/dscm})}{V_{M(std)}} * (0.001 \text{ mg/ } 1\ \mu g) * (20.9 - 7) / (20.9 - O_2\ \%vd)$$

$$= \frac{3.3 * 35.315}{29.765} * 0.001 * 13.9 / (20.9 - 12.5)$$

$$= 0.0065$$

% isokenetic

$$= \frac{100) * (T_S + 460) \left[(0.002669) * V_{LC} + \left(\frac{V_M * Y_D}{(T_M + 460)} \right) * \left(P_B + \frac{\Delta H}{13.6} \right) \right]}{(60) * \Theta * V_S * \left(P_B + \frac{P_S}{13.6} \right) * \frac{\left[\pi * \left(\frac{D_N}{12} \right)^2 \right]}{4}}$$

$$= \frac{100 * (132 + 460) * [(0.002669) * (144.5) + \left(\frac{33.808}{61}\right) * \left(\frac{0.998}{460}\right) * (25.99) + \left(\frac{0.83}{13.6}\right)]}{60 * 60 * 36.5 * \left(25.99 + \frac{0.04}{13.6}\right) * \left(\frac{\pi * \left(\frac{0.253}{12}\right)^2}{4}\right)}$$

$$= 102.9$$

EPA Method 29: Determination of Metals Emissions From Stationary Sources

Variables and Abbreviations

B_{WS} - moisture content of the gas (wet volume percent/100)

%CO - carbon monoxide content of the gas (dry volume percent)

$\%CO_2$ - carbon dioxide content of the gas (dry volume percent)

D_S - diameter of the stack (inches)

F_{ACFM} - gas flow (actual cubic feet per minute)

F_{DSCFM} - gas flow (dry standard cubic feet per minute, where standard = 29.92 inches Hg and 68oF)

H - pressure differential at dry gas meter exit orifice (inches water)

M_A - molecular weight of the wet gas (grams per mole)

M_D - molecular weight of the dry gas (grams per mole)

M_T - total mass particulate recovered (grams)

$\%N_2$ - nitrogen content of the gas (dry volume percent)

$\%O_2$ - oxygen content of the gas (dry volume percent)

P_{AVG} - average square root of the stack gas pitot differential pressure (inches water)

P_B - barometric pressure (inches mercury)

P_S - stack pressure relative to barometric pressure (inches water)

P_{STD} - standard pressure (29.92 inches mercury)

Θ - total sampling time (minutes)

T_M - average dry gas meter temperature (oF)

T_S - average stack temperature (oF)

T_{STD} - standard temperature (528 oR)

V_{LC} - volume of moisture collected as a liquid (milliliters)

V_M - volume indicated on dry gas meter (uncorrected actual cubic feet)

V_{MSTD} - volume of gas through dry gas meter (corrected dry standard cubic feet)

V_S - stack gas velocity (feet per second)

V_{WSTD} - volume of moisture collected as a gas at standard conditions (standard cubic feet)

Y_D - dry gas meter calibration factor (unitless)

ppmvd @ 7 % O_2 - parts per million corrected to 7 percent oxygen, dry volume basis

AIR
POLLUTION
TESTING, INC.

Appendix Two: Field Data

Methods 6C, 10, & 26A

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated	Date : 1.22.13
Location : Davis County, UT	APT Job # : STE 2357
Unit : Waste Incinerator	Page # : 1

Analyzer Information

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2
Analyzer ID #	1420C-9	1415C-7	42i HL-1	48-1	721AT2-1
Analyzer Scale	0-25	0-20	0-500	0-20	0-500
Calibration Range	0-21.2	0-10.1	0-199.0	0-15.7	0-19.6

Calibration Gas Cylinder Information
(Cylinder ID#/Expiration date and Concentration)

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2
Zero					
CC#					
Expiration date					
Low		5.07 'A'			
CC#		ALM 058421			
Expiration date		9.20.13			
Mid	10.0	10.1	89.9	8.24	10.2 'A'
CC#	148642	148642	ALL 069515	C261602	ALM 004208
Expiration date	1.25.14	1.25.14	11.20.13	11.15.14	7.27.13
High	21.2 'A'	20.0 'A'	199.0	15.7 'B'	19.6 'A'
CC#	ALM 057190	ALM 059190	148625	120155	ALM 020939
Expiration date	11.27.14	11.27.14	7.31.13	11.15.14	7.26.13

Calibration Error

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2
Zero	0.0	0.0	0.1	0.1	-0.0
Low					
Mid	10.1	5.2	91.9	8.1	10.2
High	21.2	10.0	200.6	15.7	19.5

Initial Bias Check Post - Strat cal

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2	RELIN NO_x
Zero	0.0	0.0	0.5	0.0	0.6	0.1
Low						
Mid	10.0	5.2	FAIL (RELIN)	8.1	9.8	91.0
High						199.4
system response time	40 sec	30 sec	90 sec	60 sec	40 sec	

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Steriagle Incorporated Date : 1-22-13

Location : Davis County, UT APT Job # : STE 2357

Unit : Waste Incinerator Page # :

Run # : **Start Time :** **Stop Time :**

Calibration Results

RELIN

Analyzer Type	NO_x Bias		SO_2			
Zero	0.4		0.1			
Low						
Mid	89.9		10.2			
High			19.5			

Run # : 1 **Start Time :** 13:31 **Stop Time :** 14:43

PORT CHANGE 14:03 - 14:11

Calibration Results

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2	
Zero	0.0	0.0	1.1	0.1	0.3	
Low						
Mid	10.0	5.2	94.2	8.2	9.8	
High						

Run # : 2 **Start Time :** 16:23 **Stop Time :** 17:31

Calibration Results Port Change 16:57 - 17:00

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2	
Zero	0.0	0.0	0.8	0.2	0.3	
Low						
Mid	10.0	5.1	92.3	8.3	9.8	
High						

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated Date : 1.22.13

Location : Davis County, UT APT Job # : STE 2357

Unit : Waste Incinerator Page # :

Run # : 3 **Start Time :** 18:16 **Stop Time :** 19:26

Calibration Results Port Change 18:50 - 18:54

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2	
Zero	0.0	0.0	0.5	0.3	0.2	
Low						
Mid	10.0	5.2	88.8	8.3	9.8	
High						

Run # : 4 **Start Time :** 20:19 **Stop Time :** 21:28

Calibration Results

Analyzer Type	O_2	CO_2	NO_x	CO	SO_2	
Zero	0.0	0.0	0.1	0.3	0.3	
Low						
Mid	10.1	5.2	86.7	8.3	9.7	
High						

Run # : **Start Time :** **Stop Time :**

Calibration Results

Analyzer Type						
Zero						
Low						
Mid						
High						

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility: Stericycle Incorporated	Date: 1-23-13
Location: Davis County, UT	APT Job #: STE 2357
Unit: Waste Incinerator	Page #: 1

Analyzer Information

Analyzer Type	O_2	CO_2				
Analyzer ID #	1420C-9	1415C-7				
Analyzer Scale	0-25	0-20				
Calibration Range	0-21.2	0-10.1				

Calibration Gas Cylinder Information
(Cylinder ID#/Expiration date and Concentration)

Analyzer Type	O_2	CO_2		CO_2		
Zero						
CC#						
Expiration date						
Low						
CC#						
Expiration date						
Mid	10.0	5.07 'A'		10.1		
CC#	148642	ALM 05542		~~ALM 05542~~ CC148642		
Expiration date	1-25-14	9-20-13		~~9-20-13~~	1-25-14	
High	21.2 'A'	10.1		20.0 'A'		
CC#	ALM 057190	148642		ALM 057190		
Expiration date	11-27-14	1-25-14		~~1-25-14~~ 11-27-14		

Calibration Error

(Higher Range) RELIN CO_2 NOTHING ADJUSTED

Analyzer Type	O_2	CO_2		CO_2		
Zero	0.0	0.0		0.0		
Low						
Mid	10.1	5.2				
High	21.2	10.1		20.0		

Initial Bias Check

Analyzer Type	O_2	CO_2				
Zero	0.1	0.0				
Low						
Mid	10.2	5.2				
High						
system response time						

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated Date : 1.23.13

Location : Davis County, UT APT Job # : STE 2357

Unit : Waste Incinerator Page # : 3

Run # : 4 **Start Time :** 16:50 **Stop Time :** 17:59

Calibration Results (For Run 5 Method 26A)

Analyzer Type	O_2	CO_2				
Zero	0.1	0.0				
Low						
Mid	10.0	5.0				
High						

Run # : **Start Time :** **Stop Time :**

Calibration Results

Analyzer Type						
Zero						
Low						
Mid						
High						

Run # : **Start Time :** **Stop Time :**

Calibration Results

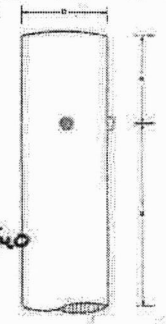
Analyzer Type						
Zero						
Low						
Mid						
High						

(K1)

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job #: STE 2357	Date: 1.22.13	CO_2 (%): COAS	O_2 (%): COAS		
Sample Location: WASTE INCINERATOR	Operator: CK	Assumed Moisture (%): 20	Barometric Pressure (mbar): 892		
Run #: 1	Pitot ID: P-734	Ambient Temperature (°F): 50	Probe Material: GLASS		
Meter Box Yd: .998	Pitot Tube Coefficient: .826	Probe Length (ft): 4ft	Filter Temperature (°F): 250		
Sample Box ID: —	Meter Box ID: 5-23	Probe Temperature (°F): 250	Moisture (grams): 205.8		
Meter ΔH@: 1.67	K Factor: 5.5	Nozzle Diameter (in): .308	Start Time: 13:31		
Pre-Test Pitot Leak Check: 0 @ 4 Hg	Post-Test Pitot Leak Check: 0 @ 4 Hg	Static Pressure (" H_2O): .03	Stop Time: 14:43		
Pre-Test Pump Leak Check: 0 @ 10 "Hg	Post-Test Pump Leak Check: 0 @ 10 "Hg	Filter ID: 054561	Method: 26A		

3.4
3.2
3.48
3.7 - 133 to 135
3.625 × $\sqrt{\Delta h}$ = Ki → 139 139 to 140



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume: 034.625	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.10	.55 ~~.10~~	139	39.682	258	250	68	67	40		1.15	39.775
2	5	1	.11	.60	137	40.8	257	250	68	67	40		1.20	40.95
3	7.5	1	.2	1.1	140	42.3	258	250	68	70	40		1.62	42.59
4	10	1	.17	.9	139	43.5	258	250	71	70	40		1.49	44.0
5	12.5	1	.17	~~.9~~	138	45.56	258	250	71	70	40		1.49	46.57
6	15	1	.25	~~.9~~	137	47.00	258	250	72	68	39		2.75	48.32
7	17.5	1	.22	1.2	137	48.6	258	250	72	68	39		1.7	50.02
8	20	1	.18	.99	136	50.4	257	250	74	70	39		1.5	51.52
9	22.5	1	.21	1.15	136	51.9	258	250	74	69	46		1.66	53.14
10	25	1	.26	1.4	134	53.4	258	250	75	69	45		1.85	55.03
11	27.5	1	.34	1.9	134	55.5	257	250	76	70	44		2.11	57.14
12	30	1	.35	1.9	133	57.3	260	250	73	70	43		2.19	59.33
2-1	32.5	2	~~.36~~	2.9	147	59.5	258	249	76	72	40		2.43	61.76
2	35	2	.56	2.7	151	62.2	257	246	77	72	40		2.6	64.36
3	37.5	2	.54	2.3	151	65.5	257	248	78	72	40		2.35	66.71
4	40	2	.6	2.5	148	67.9	257	247	80	73	41		2.48	69.19
5	42.5	2	.65	2.4	146	69.9	257	246	80	73	42		2.88	72.07
6	45	5	.84	3.6	148	71.7	257	248	81	74	42		2.93	75
7	47.5	4	.64	2.7	146	74.2	256	249	81	73	42		2.56	77.56
8	50	4	.55	2.6	149	76.66	257	249	81	74	43		2.52	80.06
9	52.5	5	.69	3.2	149	79.0	257	249	81	74	43		2.48	82.54
10	55	2	.54	2.5	147	81.5	257	250	82	75	43		2.50	85.39
11	57.5	2	.54	2.5	146	83.9	257	249	82	75	44		2.5	87.84
12	60	4	.56	2.6	148	86.246	257	249	82	75	44		2.54	90.42
number	total	maximum	average not	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	5	.64	1.93	142.4	48 (42.62)	257	246	73.8		46			
			.6136	1.95										

Stack ID (inches) (D):
Upstream Disturbance (inches) (A):
Downstream Disturbance (inches) (B):
# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

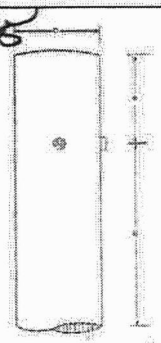
Notes:
K_i = 5.5
4.7 cfm 5.7 → 25 minute change
4.97 → 32.5
4.27 - 37.5
PREV: 1.45 1.28
1.48 1.35
1.39
Volume = 47.8
45.54
42.25

(22)

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job # STE 2357	Date: 1.22.13	CO_2 (%): GAS	O_2 (%): GAS
Sample Location: WASTE WATER	Operator: CH	Assumed Moisture (%): 35	Barometric Pressure (mbar): 882
Run # 2	Pitot ID: P-734	Ambient Temperature (°F): 60	Probe Material: GLASS
Meter Box Yd: .9998	Pitot Tube Coefficient: .826	Probe Length (ft): 4ft	Filter Temperature (°F): 250
Sample Box ID: —	Meter Box ID: 5-23	Probe Temperature (°F): 250	Moisture (grams): 89.1
Meter ΔH@: 1.67	K Factor: 3.1584	Nozzle Diameter (in): ~~.308~~ .276	Start Time: 16:23
Pre-Test Pitot Leak Check: 0@4Hg	Post-Test Pitot Leak Check: 0@4Hg	Static Pressure (" H_2O): .03	Stop Time: 17:31
Pre-Test Pump Leak Check: 0@11 "Hg	Post-Test Pump Leak Check: 0@11 "Hg	Filter ID: 054517	Method: 26A

Pre 2.775-2.625
$\sqrt{\Delta p}$ · 2.775 = Ki
Δp · 3.1584 = ΔH
2.839
2.631



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume: 087.722	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.31	.98	157	88.6	256	249	75	75	48		1.54	88.6
2	5	1	.30	.94	155	90.4	260	248	75	75	46		1.52	90.1
3	7.5	1	.35	1.1	155	91.8	262	248	76	75	41		1.64	91.74
4	10	1	.42	1.3	157	93.54	260	250	77	75	41		1.80	93.54
5	12.5	2	.5	1.6	157	95.4	259	250	79	75	40		1.96	95.5
6	15	2	.51	1.6	155	97.2	258	250	80	76	41		1.96	97.48
7	17.5	5	.7	2.2	157	99.7	258	250	80	76	41		2.32	99.8
8	20	5	.7	2.2	155	101.9	257	250	80	75	41		2.32	102.12
9	22.5	6	.7	2.2	150	104.1	257	250	80	75	41		2.32	104.48
10	25	2	.65	2.0	150	106.3	257	250	80	75	41		2.12	106.6
11	27.5	2	.61	1.7	150	108.7	258	249	81	77	41		2.05	108.85
12	30	2	.6	1.7	150	110.6	258	249	81	77	41		2.03	110.88
2-1	32.5	1	.54	1.5	157 ~~249~~	112.7	258	249	81	77	41		1.93	112.81
2	35	2	.50	1.4	153	114.5	258	249	82	78	41		1.86	114.67
3	37.5	1	.31	.8	156	116.0	257	249	81	76	41		1.46	116.13
4	40	2	.63	1.8	155	118.2	257	249	81	76	41		2.06	119.21
5	42.5	2	.64	1.8	154	120.37	257	249	81	76	40		2.16	120.37
6	45	5	.74	1.9	153	122.4	257	249	81	77	40		2.25	122.67
7	47.5	4	.77	2.0	151	124.6	257	249	81	77	40		2.3	124.97
8	50	5	.6	1.7	150	126.7	257	249	81	77	41		2.03	126.9
9	52.5	5	.62	1.6	150	128.9	254	249	81	77	41		2.07	129.07
10	55	2	.54	1.4	149	130.8	257	249	81	77	40		1.93	130.9
11	57.5	2	.54	1.4	149	132.6	254	250	82	77	41		1.93	132.83
12	60	2	.54	1.4	150	134.7	258	250	82	77	41		1.93	134.76
number	total	maximum	average	average	average	difference	minimum	minimum	average	minimum	maximum		Reviewers Signiture	
24	60	8	.738	1.592	153	46.978	256	249	78.06	46				

157 MOISTURE = 35

Stack ID (inches) (D):
Upstream Disturbance (inches) (A):
Downstream Disturbance (inches) (B):
# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes :
Ki ~~3.732~~ 3.1584
Pre = ~~1.20~~ 1.11
1.05, 1.012
Vi = ~~39.47~~ 40.47
48.78
47.05

288

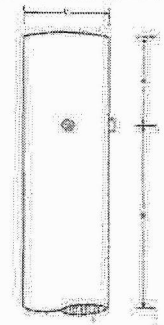
Run #3

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job #	STE 2357	Date	1.22.13
Sample Location	Waste Incinerator	Operator	CH
Run #	3	Pitot ID	P-234
Meter Box Y@	.998	Pitot Tube Coefficient	.826
Sample Box ID	—	Meter Box ID	5-23
Meter ΔH@	1.67	K Factor	2.49
Pre-Test Pitot Leak Check	0@4 Hg	Post-Test Pitot Leak Check	0@4 Hg
Pre-Test Pump Leak Check	0@11 "Hg	Post-Test Pump Leak Check	0@11 "Hg

CO_2 (%)	CDAS	O_2 (%)	CDAS
Assumed Moisture (%)	19	Barometric Pressure (mbar)	882
Ambient Temperature (°F)	60	Probe Material	Glass
Probe Length (ft)	4ft	Filter Temperature (°F)	250
Probe Temperature (°F)	250	Moisture (grams)	198.3
Nozzle Diameter (in)	.276	Start Time	18:16
Static Pressure (" H_2O)	.03	Stop Time	19:36
Filter ID	054547	Method	26A

2.462
2.6
2.917



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume: 135.710	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.50	1.25	157	137.45	251	260	75	74	40		1.74	137.45
2	5	1	.6	1.5	158	139.2	259	251	75	74	41		1.90	139.35
3	7.5	1	.68	1.7	157	141.1	257	257	75	74	41		2.03	141.38
4	10	1	.68	1.7	158	143.2	257	250	77	75	41		2.03	143.9
5	12.5	2	.7	1.7	158	145.2	258	250	78	75	41		2.05	145.46
6	15	2	.72	1.8	156	147.3	257	249	79	77	41		2.09	147.55
7	17.5	2	.82	2.0	156	149.5	257	249	79	75	41		2.23	149.78
8	20	2	.85	2.1	155	151.9	257	249	79	75	41		2.27	152.05
9	22.5	2	.69	1.7	151	154.0	257	249	80	76	41		2.04	154.09
10	25	2	.61	1.5	151	156.2	257	249	81	76	41		1.92	156.01
11	27.5	2	.56	1.4	151	157.9	257	249	81	76	41		1.84	157.85
12	30	2	.58	1.6	152	159.9	257	249	81	76	41		1.88	159.83
2-1	32.5	1	~~.48~~ .58	1.6	151	162.0	258	250	81	76	40		~~1.88~~ 2.03	161.85
2	35	1	.46	1.6	158	164.0	258	249	78	83	40		1.98	163.83
3	37.5	1	.60	2.1	158	166.0	258	250	78	78	40		2.26	166.11
4	40	1	.69	2.4	157	168.3	258	250	79	76	40		2.42	168.53
5	42.5	2	.77	2.7	156	171.0	258	250	79	76	40		2.56	171.09
6	45	2	.93	3.6	154	173.7	258	250	79	76	40		2.81	173.9
7	47.5	5	.82	2.9	151	176.7	257	249	82	76	41		2.64	176.54
8	50	2	.83	2.9	150	179.5	257	249	82	76	41		2.66	179.2
9	52.5	2	.77	2.7	151	181.9	257	249	82	76	41		2.56	181.76
10	55	1	.74	2.6	150	184.2	259	249	83	77	41		2.51	184.27
11	57.5	1	.65	2.3	148	186.7	259	249	83	77	41		2.35	186.62
12	60	1	.62	2.7	149	188.9	259	249	83	77	41		2.3	188.92
number	time	maximum	average-root	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	2	.924	2.409	153.9	53.190	251	249	77.54		41			
				2.09	153.9				77.8					

Stack ID (inches) (D):
Upstream Disturbance (inches) (A):
Downstream Disturbance (inches) (B):
# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:
K = 2.49
2.78
3.50
P = .985
1.04
1.167
V = 41.39
50.31
55.16

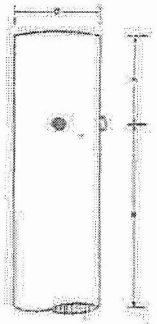
Page Of

RUN # 4

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job #: STE 2357	Date: 1.22.13	CO_2 (%): COAS	O_2 (%): COAS
Sample Location: WASTE INCINERATOR	Operator: CA	Assumed Moisture (%): 19	Barometric Pressure (mbar): 842
Run #: 4	Pitot ID: P-234	Ambient Temperature (°F): 60	Probe Material: Glass
Meter Box Yd: .998	Pitot Tube Coefficient: .826	Probe Length (ft): 4 ft	Filter Temperature (°F): 250
Sample Box ID: —	Meter Box ID: 5-23	Probe Temperature (°F): 250	Moisture (grams): ~~198.3~~ 180.3 AG
Meter ΔH@: 1.67	K Factor: 2.47	Nozzle Diameter (in): .253	Start Time: 20:19
Pre-Test Pitot Leak Check: 0 @ 4" Hg	Post-Test Pitot Leak Check: 0 @ 4" Hg	Static Pressure (" H_2O): .03	Stop Time: 21:28
Pre-Test Pump Leak Check: 0 @ 12 "Hg	Post-Test Pump Leak Check: 0 @ 15 "Hg	Filter ID: ~~0545470545044~~ AG	Method: 26A

2453



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) initial Volume: 191.411	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-1	2.5	2	.45	1.1	152	193.1	259	250	74	75	41		1.65	193.061
2	5	1	.36	.9	151	194.6	259	250	74	75	41		1.47	194.531
3	7.5	2	.35	.86	151	196.1	259	250	74	75	41		1.45	195.86
4	10	2	.36	.89	149	197.6	257	250	74	75	40		1.47	197.451
5	12.5	2	.55	1.4	153	199.3	259	250	74	75	40		1.82	199.271
6	15	2	.40	.98	147	200.9	257	~~245~~	75	74	40		1.55	200.821
7	17.5	2	.40	.98	147	202.4	257	249	75	74	40		1.55	202.371
8	20	5	.60	1.5	147	204.1	259	252	76	74	40		1.70	204.271
9	22.5	5	.73	1.6	145	206.1	259	252	76	74	40		2.10	206.371
10	25	5	.7	1.7	149	208.2	257	250	77	75	40		2.05	208.421
11	27.5	5	.7	1.7	150	210.2	257	250	78	75	40		2.05	210.471
12	30	5	.7	1.7	150	212.3	256	250	78	75	40		2.05	212.521
2-1	32.5	2	.55	1.4	151	214.1	256	250	74	75	40		1.82	214.360
2	35	5	.66	1.6	157	216.1	258	249	75	74	40		1.99	216.559
3	37.5	5	.45	1.11	158	218.5	258	249	75	74	40		1.65	218.0
4	40	3	.45	1.1	156	219.9	258	249	75	74	40		1.65	219.65
5	42.5	2	.45	1.1	156	221.5	258	251	76	74	40		1.65	221.3
6	45	2	.41	1.0	158	222.9	258	251	76	74	40		1.57	222.87
7	47.5	2	.35	.86	154	224.5	258	251	76	74	40		1.45	224.32
8	50	1	.3	.74	151	225.6	259	249	76	74	40		1.34	225.66
9	52.5	1	.2	.50	149	227.6	259	249	76	74	40		1.23	227.39
10	55	2	.2	.50	141	229.8	258	251	76	73	40		1.23	229.12
11	57.5	2	.2	.50	139	230.7	258	251	76	73	40		1.23	230.65
12	60	1	.2	.50	139	232.4	257	249	77	74	40		1.23	232.58
number	time	maximum	~~average~~	~~average~~	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	5	.6558	1.10	150	40.949	256	249	75		41			

Stack ID (inches) (D):

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:

Ki = 2.47

P_{rE} .9812

U_i = 47.465

K5 26A

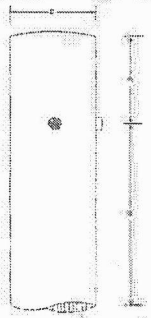
Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job # STE2357	Date 11/23/13	CO_2 (%): CDAS	O_2 (%): CDAS
Sample Location Incinerator	Operator: JC	Assumed Moisture (%): 19	Barometric Pressure (mbar): 880
Run # 5	Pitot ID: P-234	Ambient Temperature (°F) 50	Probe Material: glass
Meter Box Yd: .998	Pitot Tube Coefficient .826	Probe Length (ft): 4	Filter Temperature (°F): 250
Sample Box ID: -	Meter Box ID: MS-23	Probe Temperature (°F): 250	Moisture (grams): 175.4
Meter ΔH@: 1.62	K Factor: 2.84	Nozzle Diameter (in): .260	Start Time: 1650
Pre-Test Pilot Leak Check: 0.00 @ 3"	Post-Test Pilot Leak Check: 0.00 @ 3"	Static Pressure (" H_2O): -.04	Stop Time: 1759
Pre-Test Pump Leak Check: 0.00 @ 11 "Hg	Post-Test Pump Leak Check: 0.00 @ 10 "Hg	Filter ID: 54544	Method: 26A

P-1.06

V-44.89

2.65



Traverse Point	Sampling Time (minutes)	Vacuum ("Hg)	Velocity Head ("H_2O)	ΔH Orifice Setting ("H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) initial volume: 357.906	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Kl (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.40	1.14	143	359.512	261	257	76	76	53		1.68	359.58
2	5	1	.34	.97	142	361.122	263	256	75	76	49		1.55	361.13
3	7.5	1	.42	1.19	142	362.710	265	252	75	76	43		1.72	362.85
4	10	1	.42	1.19	142	364.482	259	251	76	76	41		1.72	364.57
5	12.5	2	.62	1.76	144	366.461	258	252	76	77	42		2.09	366.66
6	15	3	.80	2.27	144	369.649	258	250	77	76	42		2.37	369.03
7	17.5	3	.73	2.07	144	370.952	257	250	78	75	42		2.28	371.31
8	20	3	.64	1.82	142	373.321	260	250	78	75	43		2.12	373.43
9	22.5	3	.60	1.71	142	375.500	257	249	79	75	43		2.05	375.93
10	25	2	.53	1.51	141	377.621	258	248	80	77	44		1.93	377.41
11	27.5	1	.58	1.65	142	379.613	258	250	80	77	44		2.02	379.43
12	30	1	.56	1.59	142	381.591	258	250	80	75	44		1.98	381.41
2-1	32.5	2	.50	1.42	141	383.231	254	250	80	74	44		1.87	383.28
2	35	2	.56	1.59	149	385.123	260	251	78	75	45		1.98	385.20
3	37.5	4	.61	2.22	150	387.231	258	250	79	75	44		2.07	387.33
4	40	3	.60	1.71	150	389.371	257	249	80	75	43		2.05	389.38
5	42.5	4	.77	2.19	146	391.600	258	248	80	75	42		2.33	391.71
6	45	4	.73	2.07	145	393.891	258	250	81	75	44		2.28	393.99
7	47.5	4	.64	1.82	144	396.087	258	250	81	75	45		2.12	396.11
8	50	3	.59	1.68	143	398.123	258	250	82	75	46		2.04	398.15
9	52.5	2	.45	1.28	143	399.821	258	249	82	76	47		1.78	399.93
10	55	2	.42	1.19	140	401.781	258	250	82	76	47		1.72	401.65
11	57.5	2	.46	1.31	140	403.471	258	250	82	76	47		1.80	403.45
12	60	2	.39	1.11	141	405.100	258	251	82	76	46		1.65	405.10
number	total	maximum	average root	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	4	.7414	1.60	143.4	47.194	257	248	77.35		53			

Stack ID (inches) (D): 24.5

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points: 12×2=24

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes :

26A

Air Pollution Testing, Inc. : Laboratory Impinger Weight Gain Datasheet

APT Job #: STE 2357 Barometric Pressure: 882 Date: 1.22.13

Facility: Greencycle Inc. Orsat ID: Operator: DS/AG

Stack ID: Waste Incinerator Leak Check:

Run #: 1 Method: 26A Sample Box ID: M5-23

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	691.4	~~716.4~~ 847.2	~~25~~ 155.8	Filter # 054561
2	758.6	~~702.0~~ 788.9	~~-56.6~~ 30.3	
3	708.5	~~708.7~~ 715.3	~~0.2~~ 6.8	
4	756.9	~~784.7~~ 758.5	~~27.8~~ 1.6	
5	741.5	~~720.2~~ 742.1	~~-21.3~~ 0.6	
6	852.7	~~882.6~~ 863.4	~~29.9~~ 10.7	
7				
8		(AG)	(AG)	
Total	4509.6	~~4514.6~~ 4715.4	~~5.0~~ 205.8	

Run #: 2 Method: 26A Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	716.3	846.3	130.0	Filter # 054517
2	701.9	733.5	31.6	
3	708.7	719.1	10.4	
4	784.5	788.2	3.7	
5	720.1	722.0	1.9	
6	882.5	894.0	11.5	
7				
8				
Total	4514.0	4703.1	189.1	

Run #: 3 Method: 26A Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	689.2	850.3	161.1	Filter # 054547
2	759.1	781.4	22.3	
3	707.8	712.3	4.5	
4	756.2	757.5	1.3	
5	741.9	742.3	0.4	
6	863.4	872.1	8.7	
7				
8				
Total	4517.6	4715.9	198.3	

26A

Air Pollution Testing, Inc. : Laboratory Impinger Weight Gain Datasheet

APT Job #: STE 2357 Barometric Pressure: 882 Date: 1·22·13

Facility: Stericycle Inc. Orsat ID: Operator: DS/AG

Stack ID: Waste Incinerator Leak Check:

Run #: 4 Method: 26A Sample Box ID: M5-23

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	713.2	862.3	149.1	Filter # 054504
2	707.2	725.8	18.6	
3	714.8	718.1	3.3	
4	788.1	789.1	1.0	
5	722.3	723.1	0.8	
6	893.8	901.3	7.5	
7				
8				
Total	4539.4	4719.7	180.3	

Run #: 4 5AG Method: 26A Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	711.5	845.0	133.5	Date: 1·23·13
2	704.1	727.6	23.5	Filter # 54544
3	716.2	721.8	5.6	
4	726.2	728.5	2.3	
5	724.1	725.1	1.0	
6	852.1	861.6	9.5	
7				
8				
Total	4434.2	4609.6	175.4	

Run #: Method: Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1				
2				
3				
4				
5				
6				
7				
8				
Total				

Air Pollution Testing Inc. : EPA Method 2 - Verification of Absence of Cyclonic Flow Datasheet

Job # : STE 2357
Facility : STERICYCLE
Date : 1/22/13
Probe ID : P-722
Pitot Constant : .83

Operator : CW / JC
Site : WASTE INCINERATOR

Points :
1 7.5
2 8.1
3 9.4
4 10.8
5 ~~15.2~~ 17.6
6 19.2
7 22.3
8 24.9
9 26.7
10 28.1
11 29.4
12 30

Stack Diameter (inches) : 24.5
Upstream Disturbance (inches) :
Downstream Disturbance (inches) :
Schematic of Sampling Location :

Post Test Pitot Leak Check Good? : Ø @ 4" Hg

Point #	Delta P at 0 degrees	Angle at 0.0 Delta P	Point #	Delta P at 0 degrees	Angle at 0.0 Delta P	Point #	Delta P at 0 degrees	Angle at 0.0 Delta P
1-1	.02	4						
2	Ø	Ø						
3	Ø	Ø						
4	.01	1						
5	Ø	Ø						
6	.02	2						
7	Ø	Ø						
8	Ø	Ø						
9	Ø	Ø						
10	.01	2						
11	Ø	Ø						
12	.02	2						
2-1	.01	1						
2	Ø	Ø						
3	Ø	Ø						
4	Ø	Ø						
5	.01	2						
6	.02	3						
7	Ø	Ø						
8	Ø	Ø						
9	.02	2						
10	.01	1						
11	Ø	Ø						
12	Ø	Ø						
Average Absolute Angle =		0.83	Average Absolute Angle =			Average Absolute Angle =		

* If the absolute average angle is greater then 20 degrees, the flow is considered non-laminar and an alternative method must be used.

Method 7E

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated	Date : 1·25·13
Location : Davis County, UT	APT Job # : STE 2357
Unit : Waste Incinerator	Page # : 1

Analyzer Information

Analyzer Type	O_2	CO_2	NO_x			
Analyzer ID #	1420C-9	1415C-7	42i HL-1			
Analyzer Scale	0-25	0-20	0-500			
Calibration Range	0-21.2	0-10.1	0-199.0			

Calibration Gas Cylinder Information
(Cylinder ID#/Expiration date and Concentration)

Analyzer Type	O_2	CO_2	NO_x			
Zero						
CC#						
Expiration date						
Low						
CC#						
Expiration date						
Mid	10.0	5.07 'A'	89.9			
CC#	CC148642	ALM 055421	AAL 069565			
Expiration date	1·25·14	9.20.13	11·20·13			
High	21.2 'A'	~~20.0 'A'~~	199.0			
CC#	ALM 057190	~~ALM 057190~~	CC148625			
Expiration date	11.27.14	~~11.27.14~~	7·31·13			

10.1
CC148642
1-25-14

Calibration Error

Analyzer Type	O_2	CO_2	NO_x			
Zero	0.0	0.0	0.1			
Low						
Mid	10.0 ~~21.2~~	~~10~~ 5.2	90.7			
High	21.2	10.1	199.7			

Initial Bias Check

None performed Calibrated through System (AG)

Analyzer Type						
Zero						
Low						
Mid						
High						
system response time						

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated Date : 1·25·13

Location : Davis County, UT APT Job # : STE 2357

Unit : Waste Incinerator Page # : 2

Run # : 1 Start Time : 9:26 Stop Time : 10:26

Calibration Results

Analyzer Type	O_2	CO_2	NO_x			
Zero	0.0	0.1	0.4			
Low						
Mid	10.0	5.2	88.7			
High						

Run # : 2 Start Time : ~~10:41~~ 19:00 DS Stop Time : ~~11:41~~ 20:00 DS

Calibration Results

Analyzer Type	O_2	CO_2	NO_x			
Zero	0.0	0.0	0.5			
Low						
Mid	9.9	5.1	88.5			
High						

Run # : 3 Start Time : 20:15 Stop Time : 21:15

Calibration Results

Analyzer Type	O_2	CO_2	NO_x			
Zero	0.0	0.1	0.5			
Low						
Mid	10.0	5.1	87.6			
High						

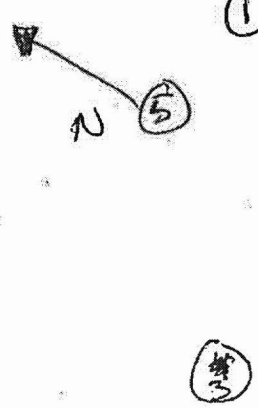
Method 9

AIR POLLUTION TESTING, INC.
VISIBLE EMISSIONS OBSERVATION FORM

Page No. 1 of 2

Source Name: Waste Incinerator
Type of Source: Incinerator
Address:
City: Davis County State: UT Zip:
Phone (Key Contact):
Source ID Number:
Process Equipment:
Operating Mode:
Control Equipment:
Operating Mode:
Describe Emission Point: Round Stack
Height Above Ground Level: 75'
Height Relative To Observer: 75'
Inclinometer Reading:
Distance From Observer: 250'
Direction From Observer: Start ENE End ENE
Describe Emissions & Color: Start End
Visible Water Vapor Present? No Yes — If yes, determine approximate distance from the stack exit to where the Plume was read
Point In Plume at Which Opacity Was Determined: Above H_2O
Describe Plume Background: Start Overcast Sky End
Background Color: Start White/Grey End
Sky Conditions: Start Overcast End
Wind Speed: 3-5mph
Wind Direction From: Start N End
Ambient Temperature: 35°F
Wet Bulb Temp:
RH percent:

NOTES: 1 Stack or Point Being Read 2 Wind Direction From 3 Observer Location 4 Sun Location 5 North Arrow 6 Other Stacks



Observation Date: Start Time 15:09 End Time 16:09

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	So cold & H_2O
2	0	0	0	0	condensing very
3	0	0	0	0	high in air.
4	0	0	0	0	-VERY SATURATED-
5	0	0	0	0	
6	0	0	5	0	- Background same
7	0	0	0	0	color as sky -
8	5	5	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	5	0	0	5	
12	0	0	5	0	
13	0	0	0	0	
14	0	5	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	5	5	5	0	
18	0	5	0	0	
19	5	0	0	0	
20	0	0	10	5	
21	0	5	0	0	
22	0	5	0	0	
23	5	5	5	5	
24	5	10	0	0	
25	5	0	5	5	
26	5	0	0	10	
27	0	0	0	0	
28	0	0	5	0	
29	0	0	0	0	
30	0	0	0	0	

Range of Opacity: Minimum 0 Maximum 10

I have received a copy of these opacity observations
Print Name:
Signature:
Title Date

Print Observer's Name: Danny Stumbras
Observer's Signature: [signature] Date
Organization
Certified By: Date

veo-frm 2/14/01

AIR POLLUTION TESTING, INC.
VISIBLE EMISSIONS OBSERVATION FORM

Page No. 2 of 2

Source Name | Type of Source

Address

City | State | Zip

Phone (Key Contact) | Source ID Number

Process Equipment | Operating Mode

Control Equipment | Operating Mode

Describe Emission Point

Height Above Ground Level / Height Relative To Observer | Inclinometer Reading

Distance From Observer | Direction From Observer Start End

Describe Emissions & Color Start End

Visible Water Vapor Present? If yes, determine approximate distance from the stack exit to where the Plume was read
No Yes

Point in Plume at Which Opacity Was Determined

Describe Plume Background Start End | Background Color Start End

Sky Conditions: Start End

Wind Speed | Wind Direction From Start End

Ambient Temperature | Wet Bulb Temp | RH percent

NOTES: 1 Stack or Point Being Read 2 Wind Direction From 3 Observer Location 4 Sun Location 5 North Arrow 6 Other Stacks

Observation Date | Start Time | End Time

Min \ Sec	0	15	30	45	Comments
1	0	0	5	0	
2	0	0	0	0	
3	5	10	10	0	
4	5	0	5	5	
5	0	5	5	5	
6	5	0	0	0	
7	5	5	0	5	
8	10	10	5	10	
9	0	0	0	0	
10	0	5	0	0	
11	10	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	5	5	10	
16	10	0	0	0	
17	0	0	0	5	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	5	5	5	0	
22	0	0	0	0	
23	0	5	5	5	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	5	0	5	0	
30	0	0	0	0	

Range of Opacity
Minimum Maximum

Print Observer's Name

Observer's Signature Date

Organization

Certified By: Date

I have received a copy of these opacity observations

Print Name:

Signature:

Title Date

Veo-frm 2/14/01

Method 23

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated	Date : 1.24.13
Location : Davis County, UT	APT Job # : STE 2357
Unit : Waste Incinerator	Page # : 1

Analyzer Information

Analyzer Type	O_2	CO_2				
Analyzer ID #	1420C-9	1415C-7				
Analyzer Scale	0-25	0-20				
Calibration Range	0 - 21.2	0-10.1				

Calibration Gas Cylinder Information
(Cylinder ID#/Expiration date and Concentration)

Analyzer Type	O_2	CO_2				
Zero						
CC#						
Expiration date						
Low						
CC#						
Expiration date						
Mid	10.0	5.07 'A'				
CC#	148642	ALM059421				
Expiration date	1.25.14	9.20.13				
High	21.2 'A'	10.1				
CC#	ALM057190	148642				
Expiration date	11.27.14	1.25.14				

Calibration Error

Analyzer Type	O_2	CO_2				
Zero	0.0	0.0				
Low	10.1	5.1				
Mid	21.2	10.1				
High						

Initial Bias Check

None performed through calibrated system.

Analyzer Type						
Zero						
Low						
Mid						
High						
system response time						

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated Date : 1.24.13

Location : Waste Incinerator APT Job # : STE 2357

Unit : Davis County, UT Page # :

Run # : 1 Start Time : 9:02 Stop Time : 12:43

Calibration Results

Analyzer Type	O_2	CO_2				
Zero	0.0	0.1				
Low						
Mid	10.0	5.0				
High						

Run # : 2 Start Time : 13:08 Stop Time : 16:15

Calibration Results

Analyzer Type	O_2	CO_2				
Zero	-0.1	0.1				
Low						
Mid	9.9	5.0				
High						

Run # : 3 Start Time : 16:41 Stop Time : 20:12

Calibration Results

Analyzer Type	O_2	CO_2				
Zero	0.0	0.1				
Low						
Mid	10.0	5.1				
High						

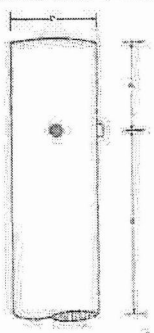
(K1) M23

Page Of

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job #: STE 2357	Date: 1/24/13	CO_2 (%): COAS	O_2 (%): COAS
Sample Location: Incinerator	Operator: JL	Assumed Moisture (%): 19	Barometric Pressure (mbar): 877
Run #: 1	Pitot ID: P-734	Ambient Temperature (°F): 78	Probe Material: Glass
Meter Box Yd: .998	Pitot Tube Coefficient: .826	Probe Length (ft): 4	Filter Temperature (°F): 250
Sample Box ID: –	Meter Box ID: M5-23	Probe Temperature (°F): 256	Moisture (grams): ~~505.4~~ 524
Meter ΔH@: 1.67	K Factor: ~~2.53~~ 2.585	Nozzle Diameter (in): .253	Start Time: 9:02
Pre-Test Pitot Leak Check: 0.00 @ 4" Hg	Post-Test Pitot Leak Check: 0.00 @ 3" Hg	Static Pressure (" H_2O): -.04	Stop Time: 12:43
Pre-Test Pump Leak Check: 0.00 @ 11 "Hg	Post-Test Pump Leak Check: 0.00 @ 16 "Hg	Filter ID: ~~apt~~ 011713-5	Method: 23

① P - .997
② P - 1.01
③ V - 126.91
④ V - 122.33
⑤ 7.4775
⑥ 7.575



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume 406.384	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-1	7.5	1	.17	.43	136	409.421	264	255	77	75	53	30	3.07	409.45
2	15	1	.28	.71	136	413.378	259	251	80	75	41	32	3.96	413.41
3	22.5	7	.45	1.14	134	418.521	259	250	82	77	39	33	5.02	418.43
4	30	7	.44	1.11	139	423.700	258	250	83	77	40	33	4.96	423.34
5	37.5	5	.37	.94	137	428.099	258	250	83	78	41	34	4.55	427.94
6	45	6	.53	1.39	136	432.991	259	251	83	78	42	34	5.44	433.38
7	52.5	7	.47	1.19	137	438.104	258	248	83	79	43	35	5.13	433.51
8	60	8	.51	1.29	134	443.981	257	249	83	79	43	36	5.34	443.35
9	67.5	8	.49	1.24	134	449.599	258	249	82	78	44	38	5.23	449.08
10	75	6	.40	1.01	134	454.100	259	249	82	78	45	39	4.73	453.81
11	82.5	5	.37	.96	136	458.352	258	249	81	78	46	40	4.61	458.42
12	90	8	.50	1.29	135	463.550	258	249	81	77	46	41	5.36	463.78
2-1	97.5	9	.59	1.53	135	470.892	257	249	78	77	53	44	5.02	471.02
2	105	8	.54	1.40	137	476.631	257	252	81	77	51	38	5.57	476.57
3	112.5	8	.51	1.32	137	481.931	258	249	82	77	48	37	5.41	481.98
4	120	9	.54	1.40	136	487.249	259	250	81	77	46	36	5.57	487.55
5	127.5	9	.56	1.45	132	493.179	257	249	82	77	45	37	5.67	493.22
6	135	9	.56	1.45	137	498.936	258	250	82	77	46	38	5.67	498.89
7	142.5	5	.40	1.03	134	503.742	259	248	82	77	47	40	4.79	503.68
8	150	5	.39	1.01	133	508.381	258	248	82	77	48	41	4.73	508.41
9	157.5	7	.48	1.24	137	513.501	257	248	83	77	50	43	5.25	513.66
10	165	9	.60	1.55	138	519.394	257	249	83	78	52	47	5.87	519.53
11	172.5	9	.59	1.53	143	525.232	258	249	83	78	56	51	5.82	525.35
12	180	9	.51	1.32	140	530.991	258	250	83	78	59	54	5.40	530.76
number	total	maximum	average root	average	average	difference	minimum	minimum	average	maximum	maximum	Reviewers Signiture		
24	180	9	.6798	1.20	136.2	122.957	257	248	79.5	59	54			

Stack ID (inches) (D): 25
Upstream Disturbance (inches) (A):
Downstream Disturbance (inches) (B):
# of points: 12 x 2 = 24

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

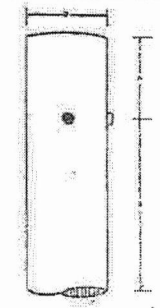
Notes:
New K factor due to lower stack temps and lower Delta P's. = @ 95 min.
Port change leak check 465.200 → 463.550
97.5 min -1.65
530.991 - 406.384 - 1.65 = 122.957

Page 97

Run #2 M23

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job #:	STE 2357	Date:	1.24.13	CO_2 (%):	CDAS
Sample Location	Waste Incinerator	Operator:	[illegible]	O_2 (%):	CDAS
Run #	2	Pitot ID:	P-374	Assumed Moisture (%):	19
Meter Box Yd:	.996	Pitot Tube Coefficient:	.826	Barometric Pressure (mbar):	827
Sample Box ID:	—	Meter Box ID:	5-23	Ambient Temperature (°F):	65
Meter ΔH@:	1.67	K Factor:	2.59 / 2.57	Probe Material:	Glass
Pre-Test Pitot Leak Check:	0.00 0.04" Hg	Post-Test Pitot Leak Check:	0.04" Hg	Probe Length (ft):	4
Pre-Test Pump Leak Check	@ 10 "Hg	Post-Test Pump Leak Check:	~~0.005~~ .003 @ 15 "Hg	Probe Temperature (°F):	250
				Nozzle Diameter (in):	253
				Static Pressure (" H_2O):	.04
				Filter ID:	spot 011713-4
				Filter Temperature (°F):	250
				Moisture (grams):	550.8
				Start Time:	13:08
				Stop Time:	16:15
				Method:	23



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	Stack Temp (°F)	Meter Volume (ft³) Initial Volume: 531.710	Probe Temp. (°F)	Filter Temp. (°F)	Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft³/min)	Pv (ft³)
1-1	7.5	3	.40	1.01	136	536.3	245	256	77	77	50	41	4.99	536.5
2	15	5	.5	1.3	141	541.8	24	29	80	77	47	41	5.37	541.87
3	22.5	5	.57	1.47	143	547.4	259	250	82	77	45	37	5.22	547.69
4	30	4	.40	1.0	139	552.5	254	249	83	79	41	35	4.99	552.36
5	37.5	3	.40	1.0	137	557.2	258	250	84	79	48 ~~43~~	34	4.99	557.37
6	45	5	.42	1.0	138	562.2	258	249	84	79	39	34	4.91	562.26
7	52.5	3	.35	.90	136	566.7	258	248	85	79	39	34	4.48	566.76
8	60	3	.30	.77	138	570.9	258	249	85	80	39	35	4.15	570.91
9	7.5	4	.40	1.0	139	575.7	258	249	85	80	39	35	4.99	575.70
10	15	5	.45	1.2	137	580.8	258	249	86	80	39	37	5.08	580.78
11	22.5	3	.35	.91	139	585.3	258	249	85	81	41	37	4.48	585.26
12	30	3	.35	.91	141	589.8	258	249	85	81	41	36	4.48	589.74
2-1	37.5	4	.45	1.2	136	594.8	257	249	83	80	42	34	5.08	594.88
2	45	3	.30	.77	142	598.9	258	249	84	80	40	35	4.15	598.97
3	52.5	4	.35	.91	136	603.6	258	249	85	80	41	35	4.48	603.45
4	60	4	.35	.89	137	607.9	258	250	85	80	41	36	4.48	607.93
5	7.5	5	.50	1.3	137	613.1	258	249	85	81	42	37	5.36	613.29
6	15	5	.55	1.4	137	618.8	258	249	85	81	43	38	5.62	618.91
7	22.5	7	.80	2.1	136	625.5	257	249	86	81	45	41	6.78	625.69
8	30	7	.73	1.9	138	632.0	258	249	86	81	47	42	6.47	632.16
9	37.5	7	.63	1.6	139	638.0	258	250	86	80	44	43	6.01	~~643.5~~ 638.17
10	45	5	.5	1.3	140	643.3	258	249	85	80	50	44	5.37	643.54
11	52.5	5	.47	1.1	142	648.5	258	250	85	80	51	46	4.87	648.51
12	60	5	.4	1.01	140	654.0	257	249	85	80	53	47	4.79	654.3
number 24	initial 140	maximum 7	average .422 .6657	average 1.126	average 139.4	difference 122.29	minimum 245	maximum 249	average 80.479		maximum 53	maximum 47	Reviewers Signature	

Stack ID (Inches) (D): 24.25

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:

K = 2.59

Pre 1.01

Post LEAK CHECK WAS .003 NOT 00.5 2/19/13

V_c 124.07

α 115.143

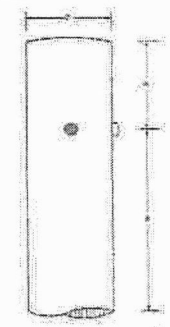
2/19/13

R3 M23

Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job #	STE 2357	Date:	1.24.13	CO_2 (%)	CDAS	O_2 (%):	CDAS
Sample Location	Waste Incinerator	Operator:	CV	Assumed Moisture (%):	19	Barometric Pressure (mbar):	677
Run #	3	Pitot ID:	P-374	Ambient Temperature (°F):	65	Probe Material:	Glass
Meter Box Yd	.994	Pitot Tube Coefficient:	.826	Probe Length (ft):	4	Filter Temperature (°F):	250
Sample Box ID:	—	Meter Box ID:	S-23	Probe Temperature (°F):	250	Moisture (grams):	539.5 544.1
Meter ΔH@	1.67	K Factor:	2.57 / 2.55	Nozzle Diameter (in):	.253	Start Time:	16:41
Pre-Test Pitot Leak Check:	0 ea" Hg	Post-Test Pitot Leak Check:	0 ea" Hg	Static Pressure (" H_2O):	.04	Stop Time:	20:12
Pre-Test Pump Leak Chec	0.00 @ 11 "Hg	Post-Test Pump Leak Check:	0.00 @ 11 "Hg	Filter ID:	aptor1713-3	Method:	23

2.575/2.5



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume: 654.227	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-2	7.5	3	.40	1.0	143	659.10	260	256	79	79	52	49	4.79	659.02
3	15	7	.54	1.4	144	664.6	259	250	83	78	47	40	5.57	664.9
4	22.5	5	.50	1.3	150	669.9	254	250	82	78	44	38	5.36	669.9
5	30	7	.65	1.66	153	675.7	255	250	83	78	47	38	6.05	675.95
6	37.5	5	.65	1.6	153	682.0	258	249	84	79	48	39	6.05	682.00
7	45	4	.64	1.63	149	688.2	258	250	84	79	48	39	6.00	688.00
8	52.5	5	.52	1.3	148	693.4	254	249	85	79	48	37	5.41	693.41
9	60	7	.59	1.5	149	699.0	253	247	85	79	47	38	5.76	699.17
10	7.5	7	.68	1.7	146	705.0	257	249	86	80	48	37	6.18	705.35
11	15	7	.54	1.4	146	710.9	258	248	86	80	50	41	5.57	710.92
12	22.5	5	.42	1.1	146	715.5	257	248	85	80	51	42	4.86	715.77
1-12	30	5	.46	1.1	148	720.9	258	250	86	81	52	43	5.03	720.80
24	37.5	3	.30	.77	148	725.1	257	249	81	80	53	47	4.11	725.51
1	45	4	.32	.82	150	729.3	258	249	84	80	53	38	4.24	729.79
2	52.5	4	.30	.77	150	733.9	257	248	84	80	52	37	4.11	733.90
3	60	4	.30	.77	151	737.9	257	249	84	80	50	39	4.11	737.97
4	7.5	5	.41	1.0	152	742.6	258	249	84	79	50	40	4.80	742.74
5	15	5	.45	1.1	151	747.7	257	249	85	80	50	42	5.03	747.77
6	22.5	5	.41	1.0	151	752.5	259	249	84	79	51	45	4.80	752.51
7	30	4	.34	.97	152	757.2	254	249	84	80	54	49	4.62	757.13
8	37.5	5	.33	.84	151	761.6	257	249	84	79	55	50	4.31	761.41
9	45	5	.45	1.15	150	766.4	257	249	84	79	55	50	5.03	766.47
10	52.5	5	.49	1.25	149	771.5	257	249	84	79	61	57	5.25	771.72
11	60	7	.62	1.6	149	777.482	257	249	84	79	61	57	5.90	777.62
12														
number	total	maximum	average root	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	180	5	.6821	1.19	149	123.255	257	247	78.17		61	57		
			.6821	1.20	149.1		253		81.6					

Stack ID (inches) (D): 24.5

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:

K = 2.57/2.55

Pre -1.01/1.00

721.4 - .5

U 121.779

122.637

M23

Air Pollution Testing, Inc. : Laboratory Impinger Weight Gain Datasheet

APT Job #: STE 2357 Barometric Pressure: 877 Date: 1-24-13

Facility: Stericycle Inc. Orsat ID: Operator: DS/AG

Stack ID: Waste Incinerator Leak Check:

Run #: 1 Method: 23 Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	489.5	986.9	497.4	Trap Pre - 339.1
2	754.7	754.2	-0.5	Trap Post - 344.1
3	707.2	705.5	~~-1.3~~ -1.7	Apt 011713-5
4	829.5	859.7	30.2	
5				344.1
6				-339.1
7				5.0
8				
Total	2780.9	3306.3	525.4	525.4 + 5.0 = 530.4

Run #: Method: Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	529.1	1050.8	521.7	Trap pre - 330.9
2	722.0	721.9	-0.1	Trap post - 337.0
3	728.8	729.0	0.2	apt 011713-4
4	884.3	913.3	29	
5				337.0
6				-330.9
7				6.1
8				
Total	2864.2	2864.2	550.8	550.8 + 6.1 = 556.9

Run #: Method: Sample Box ID:

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	490.0	1000.5	510.5	Trap pre - 324.4
2	754.1	752.8	-1.3	Trap post - 329.0
3	705.5	705.1	-0.4	apt 011713-3
4	841.2	871.9	30.7	
5				329.0
6				324.4
7				4.6
8				
Total	2790.8	3330.3	539.5	539.5 + 4.6 = 544.1

Method 29

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility :	Stericycle Incorporated	Date :	1.23.13
Location :	Davis County, UT	APT Job # :	STE 2357
Unit :	Waste Incinerator	Page # :	1

Analyzer Information

Analyzer Type	O_2	CO_2				
Analyzer ID #	1420C-9	1415C-7				
Analyzer Scale	0-25	0-20				
Calibration Range	0-21.2	0-10.1				

Calibration Gas Cylinder Information
(Cylinder ID#/Expiration date and Concentration)

Analyzer Type	O_2	CO_2		CO_2		
Zero						
CC#						
Expiration date						
Low						
CC#						
Expiration date						
Mid	10.0	5.07 'A'		10.1		
CC#	148642	ALM 055421		ALM 055421	C148642	
Expiration date	1.25.14	9.20.13		9.20.13	1.25.14	
High	21.2 'A'	10.1		20.0 'A'		
CC#	ALM 057190	148642		ALM 057190		
Expiration date	11.27.14	1.25.14		1.25.14 11.27.14		

Calibration Error

Analyzer Type	O_2	CO_2		CO_2 (Higher Range) RELIN CO_2	NOTHING Adjusted	
Zero	0.0	0.0		0.0		
Low						
Mid	10.1	5.2				
High	21.2	10.1		20.0		

Initial Bias Check

Analyzer Type	O_2	CO_2				
Zero	0.1	0.0				
Low						
Mid	10.2	5.2				
High						
system response time						

Air Pollution Testing, Inc. : Analyzer Calibration Datasheet

Facility : Stericycle Incorporated Date : 1-23-13

Location : Davis County, UT APT Job # : STE 2357

Unit : Waste Incinerator Page # : 2

Run # : 1 **Start Time :** 11:06 **Stop Time :** 12:13

Calibration Results Port Change 11:39 - 11:40

Analyzer Type	O_2	CO_2				
Zero	0.1	0.0				
Low						
Mid	10.1	5.0				
High						

Run # : 2 **Start Time :** 13:05 **Stop Time :** 14:13

Calibration Results Port Change 13:38 - 13:40

Analyzer Type	O_2	CO_2				
Zero	0.0	0.0				
Low						
Mid	10.0	5.0				
High						

Run # : 3 **Start Time :** 14:58 **Stop Time :** 16:07

Calibration Results Port Change 15:32 - 15:34

Analyzer Type	O_2	CO_2				
Zero	0.1	0.0				
Low						
Mid	10.0	5.0				
High						

(F1) M29

Page Of

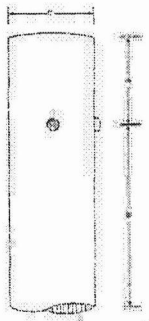
Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job # STC 2357	Date: 1.23.13	CO_2 (%): CDAS	O_2 (%): CDAS
Sample Location: White Incinerator	Operator: [illegible] / JL	Assumed Moisture (%): 19	Barometric Pressure (mbar): 880.
Run # 1	Pitot ID: P-734	Ambient Temperature (°F): 50	Probe Material: glass
Meter Box Yd ~~MS-23~~ .998	Pitot Tube Coefficient: .826	Probe Length (ft): 4	Filter Temperature (°F): 250
Sample Box ID: ~~MS~~	Meter Box ID: MS-23	Probe Temperature (°F): 250	Moisture (grams): 144.5
Meter ΔH@ 1.67	K Factor: 2.54	Nozzle Diameter (in): .253	Start Time: 11:06
Pre-Test Pitot Leak Check: 0.0 @ 3" H	Post-Test Pitot Leak Check: 0.0	Static Pressure (" H_2O): .04	Stop Time: 12:13
Pre-Test Pump Leak Check: 0.0 @ 10" Hg	Post-Test Pump Leak Check: 0.0 @ 10 "Hg	Filter ID: 8166	Method: 29

P-.988

V-~~41.88~~ 3C 41.92

2.47



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume: 237.558	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (1.41) (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.33	.84	133	238.8	254	251	57	57	41		~~2.47~~	~~240.028~~ 238.9
2	5	1	.31	.78	137	240.312	258	250	57	57	41		1.37	240.3
3	7.5	1	.33	.84	133	241.641	257	249	57	57	41		1.41	241.7
4	10	1	.30	.76	133	243.099	257	250	58	57	38		1.35	243.1
5	12.5	1	.35	.88	130	244.532	258	252	58	58	38		1.46	244.6
6	15	1	.30	.76	130	246.001	258	250	59	57	39		1.35	245.9
7	17.5	1	.31	.78	131	247.402	258	250	59	57	39		1.37	247.3
8	20	1	.25	.64	131	248.772	258	244	60	58	39		1.24	248.5
9	22.5	1	.23	.58	131	249.851	258	249	60	58	40		1.18	249.7
10	25	1	.22	.56	131	250.978	258	250	61	58	40		1.16	250.9
11	27.5	1	.24	.61	131	252.215	258	250	61	58	40		1.21	252.1
12	30	1	.25	.64	132	253.475	257	250	62	58	41		1.24	253.4
2-1	32.5	1	.15	.38	128	254.310	258	250	63	59	45		.96	254.4
2	35	1	.17	.43	128	255.358	262	249	62	60	43		1.02	255.4
3	37.5	1	.32	.81	131	256.750	262	249	63	60	42		1.40	256.8
4	40	1	.35	.88	134	258.249	259	248	64	60	41		1.46	258.3
5	42.5	1	.52	1.3	131	260.081	258	248	65	60	40		1.78	260.1
6	45	1	.59	1.5	131	261.941	258	251	66	61	40		1.90	262.0
7	47.5	1	.52	1.3	131	263.851	258	249	67	61	40		1.78	263.8
8	50	1	.55	1.4	133	265.682	258	248	68	61	41		1.83	265.6
9	52.5	1	.40	1.0	136	267.300	258	252	68	62	41		1.56	267.2
10	55	1	.37	.94	139	268.732	254	244	68	62	42		1.50	268.7
11	57.5	1	.28	.71	137	270.082	254	244	68	62	42		1.31	270.0
12	60	1	.28	.71	132	271.366	260	250	69	63	42		1.31	271.3
number	total	maximum	average (cor)	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	1	.5665	.83	132.3	33.808	257	248	60.85		45			

Stack ID (inches) (D): 24.5

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points: 12 x 2 = 24

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:

R2 M29

Page Of

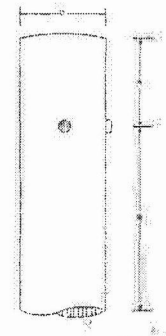
Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job # STE2357	Date 1/23/13	CO_2 (%): CDAS	O_2 (%): CDAS
Sample Location Incinerator	Operator: JC	Assumed Moisture (%): 19	Barometric Pressure (mbar): 880
Run # 2	Pitot ID: P-734	Ambient Temperature (°F): 62	Probe Material: glass
Meter Box Yd: ~~M5-3~~ .998	Pitot Tube Coefficient: .826	Probe Length (ft): 4	Filter Temperature (°F): 250
Sample Box ID: ~	Meter Box ID: M5-23	Probe Temperature (°F): 250	Moisture (grams): 172.8
Meter ΔH@: 1.67	K Factor: ~~2.81~~ 2.77	Nozzle Diameter (in): .260	Start Time: 1305
Pre-Test Pitot Leak Check: 0.00 @ 3"	Post-Test Pitot Leak Check: 0.00 @ 3" Hg	Static Pressure (" H_2O): .04	Stop Time: 1415
Pre-Test Pump Leak Check: 0.00 @ 12 "Hg	Post-Test Pump Leak Check: 0.02 @ 11 "Hg	Filter ID: 8150	Method: 29

P- 1.03

V- 46.05

2-575



Traverse Point	Sampling Time (minutes)	Vacuum (" Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) Initial Volume: 271.698	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Meter Temp. Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Kl (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.29	.80	145	273.087	261	250	66	45	48		1.39	273.12
2	5	1	.18	.50	146	274.225	259	250	67	65	49		1.09	274.21
3	7.5	1	.32	.89	147	275.710	258	250	68	66	44		1.46	275.67
4	10	1	.30	.83	147	277.102	258	250	69	66	43		1.41	277.08
5	12.5	1	.50	1.39	146	278.845	258	250	69	66	42		1.82	278.90
6	15	1	.53	1.47	145	280.643	258	249	70	66	42		1.87	280.77
7	17.5	1	.50	1.39	143	282.461	258	251	70	67	42		1.82	282.60
8	20	1	.71	1.97	144	284.431	257	251	72	67	42		2.17	284.77
9	22.5	1	.45	1.25	144	286.312	257	249	73	67	44		1.73	286.50
10	25	1	.42	1.16	142	288.201	260	250	73	67	45		1.67	288.17
11	27.5	1	.39	1.08	143	290.012	258	250	74	67	45		1.61	289.78
12	30	1	.35	.97	143	291.475	258	250	74	68	46		1.52	291.30
2-1	32.5	1	.30	.83	146	292.899	259	250	70	64	48		1.41	292.71
2	35	1	.35	.97	147	294.151	259	255	72	64	49		1.52	294.23
3	37.5	2	.64	1.77	148	296.001	257	251	71	64	48		2.06	296.29
4	40	1	.53	1.47	149	297.813	257	249	72	69	47		1.87	298.16
5	42.5	2	.57	1.58	148	299.8	257	248	73	69	47		1.94	300.10
6	45	4	.74	2.04	147	301.994	258	249	73	64	47		2.22	302.32
7	47.5	4	.75	2.08	147	304.213	258	249	74	69	47		2.23	304.55
8	50	4	.70	1.94	147	306.461	259	249	75	70	47		2.15	306.70
9	52.5	4	.60	1.66	147	308.732	258	250	75	70	48		1.99	308.69
10	55	2	.51	1.41	145	310.198	258	247	75	70	49		1.84	310.53
11	57.5	2	.48	1.33	142	312.298	258	249	75	70	49		1.78	312.31
12	60	2	.50	1.39	142	314.029	258	257	75	70	49		1.82	314.13
number	total	maximum	average root	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	4	.6862	~~1.32~~ 1.34	145.4	42.331	257	247	69.9		49			

Stack ID (inches) (D): 24.5

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points: 12x2=24

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:

(R3) M29

Page Of

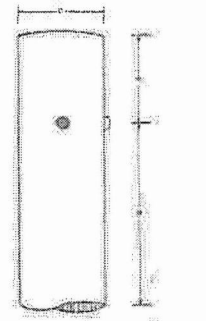
Air Pollution Testing Inc. : Isokinetic Sampling Train

APT Job # 5E2357	Date: 1/23/13	CO_2 (%): CO.5	O_2 (%): CO.5
Sample Location: Incinerator	Operator: JC	Assumed Moisture (%): 19	Barometric Pressure (mbar): 880
Run # 3	Pitot ID: P-734	Ambient Temperature (°F):	Probe Material: glass
Meter Box Yd: .998	Pitot Tube Coefficient: .826	Probe Length (ft): 4	Filter Temperature (°F): 250
Sample Box ID: —	Meter Box ID: M5-23	Probe Temperature (°F): 250	Moisture (grams): 164.2
Meter ΔH@: 1.67	K Factor: 2.77/2.80	Nozzle Diameter (in): .260	Start Time: 1458
Pre-Test Pitot Leak Check: 0.00 @ 4 1/4"	Post-Test Pitot Leak Check: 0.00 @ 3 1/4"	Static Pressure (" H_2O): .04	Stop Time: 1607
Pre-Test Pump Leak Check: 0.00 @ 12 "Hg	Post-Test Pump Leak Check: 0.05 @ 12 "Hg	Filter ID: 8128	Method: 29

1P - 1.04
2P - 1.04

1V - 46-25
2V - 46-48

2.6



Traverse Point	Sampling Time (minutes)	Vacuum ("Hg)	Velocity Head (" H_2O)	ΔH Orifice Setting (" H_2O)	T_s Stack Temp. (°F)	Meter Volume (ft^3) initial Volume: 314.442	Probe Temp. (°F)	Filter Temp. (°F)	T_m Meter Temp. Inlet (°F)	Outlet (°F)	Condenser Temp. (°F)	XAD Temp. (°F)	Ki (ft^3/min)	Pv (ft^3)
1-1	2.5	1	.60	1.66	157	316.759	261	254	70	69	52		2.01	316.46
2	5	1	.58	1.61	157	318.249	262	254	70	70	51		1.98	318.41
3	7.5	1	.62	1.72	152	320.261	260	252	70	70	44		2.05	320.45
4	10	2	.65	1.80	151	322.401	258	250	70	70	44		2.10	322.55
5	12.5	2	.72	1.99	149	324.572	258	250	72	70	44		2.21	324.76
6	15	3	.91	2.52	150	326.800	257	249	74	70	45		2.48	327.24
7	17.5	3	.70	1.93	147	329.191	257	250	74	70	46		2.18	329.42
8	20	2	.65	1.80	146	331.491	257	250	75	70	46		2.10	331.52
9	22.5	2	.59	1.63	144	333.610	257	249	76	71	46		2.00	333.52
10	25	1	.49	1.36	145	335.451	259	249	77	71	47		1.82	335.34
11	27.5	1	.42	1.16	140	337.141	259	250	77	71	47		1.68	337.02
12	30	1	.35	.97	144	338.701	259	252	78	72	47		1.54	338.56
2-1	32.5	1	.16	.44	143	339.682	259	250	78	72	47		1.04	339.61
2	35	1	.29	.81	144	340.802	259	250	76	74	50		1.10	341.00
3	37.5	1	.22	.62	147	342.213	258	249	78	73	47		1.22	342.22
4	40	1	.26	.73	144	343.601	258	249	78	73	46		1.33	343.55
5	42.5	1	.35	.97	144	345.121	258	250	79	74	47		1.54	345.09
6	45	1	.42	1.16	142	346.671	258	249	80	74	46		1.68	346.77
7	47.5	2	.51	1.43	140	348.900	259	250	80	74	46		1.86	348.63
8	50	2	.54	1.51	140	350.522	258	250	81	75	46		1.91	350.54
9	52.5	1	.46	1.29	139	352.361	258	249	82	75	46		1.76	352.30
10	55	2	.51	1.43	141	354.201	259	249	82	75	47		1.86	354.16
11	57.5	1	.35	.97	141	356.10	264	249	83	75	47		1.54	355.70
12	60	1	.35	.97	141	357.616	258	249	83	75	48		1.54	357.24
number	total	maximum	average root	average	average	difference	minimum	minimum	average		maximum	maximum	Reviewers Signiture	
24	60	3	.6860	~~1.35~~ 1.34	145.3	43.174	257	249	74.5		51			

Stack ID (inches) (D): 24.5

Upstream Disturbance (inches) (A):

Downstream Disturbance (inches) (B):

# of points:

Moisture Determination

Imp. #	Tare	Final	Gain
1			
2			
3			
4			
Total			

Notes:
Changed K-factor at 32:50 due to dropping stack temps.

Air Pollution Testing, Inc. : Laboratory Impinger Weight Gain Datasheet

APT Job #: STE 2357 | Barometric Pressure: 880 | Date: 1·23·13

Facility: Stericycle Inc. | Orsat ID: | Operator: DS/AG

Stack ID: Waste Incinerator | Leak Check:

Run #: 1 | Method: 29 | Sample Box ID: M5-23

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	638.7	755.7	117.0	Filter # 8116
2	763.5	781.6	18.1	
3	715.1	717.9	2.8	
4	655.7	655.7	0.0	
5	753.2	753.1	-0.1	
6	749.5	749.8	0.3	
7	825.8	AG ~~843~~ 832.2	6.4	
8				
Total	5101.5	5246.0	144.5	

Run #: 2 | Method: 29 | Sample Box ID: M5-23

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	662.3	789.1	126.8	Filter # 8150
2	711.6	739.8	28.2	
3	723.4	730.4	7.0	
4	686.4	687.9	1.5	
5	733.3	733.9	0.6	
6	730.5	730.4	-0.1	
7	843.4	852.2	8.8	
8				
Total	5090.~~6~~9 AG	5263.7	~~173.1~~ 172.8 AG	

Run #: 3 | Method: 29 | Sample Box ID: M5-23

Impinger # and Contents	Inital Mass (grams)	Final Mass (grams)	Gain / Loss (grams)	Notes
1	638.3	755.9		Filter # 8128
2	763.2	793.3		
3	713.5	720.8		
4	655.6	656.6		
5	753.5	753.2		
6	751.6	751.3		
7	832.3	841.1		
8				
Total	5108.0	5272.2	164.2	

Operating Data

1/22-1/25	13:30:00				
	21:15:00	1963	328.47	105	9.29

Charge Rates

1.22.13		
	Average	1898.375
	Max	1938
	Min	1451.5

1.23.13		
	Average	1946.441176
	Max	2491
	Min	1678.5

1.24.13		
	Average	1909.4375
	Max	2064.5
	Min	1462

1.25.13		
	Average	1929.2
	Max	2035
	Min	1815

The Date	Time	Sec Temp	RxtrTemp	Abs Flow	Abs PH
1/22/13	13:31:00				
	14:43:00	1939	331.5	105	7.99
1/22/13	16:23:00				
	17:31:00	1966	352	105	7.98
1/22/13	18:16:00				
	19:26:00	1983	350	105	7.95
1/22/13	20:19:00				
	21:28:00	2011	349.9	105	7.95
1/23/13	11:06:00				
	12:06:00	2027	252.6	105	8.48
1/23/13	13:05:00				
	14:05:00	1971	306	105	10.2
1/23/13	14:58:00				
	15:58:00	2078	332	105	10.17
1/23/13	16:50:00				
	17:59:00	2050	328	105	10.13
1/24/13	9:02:00				
	12:43:00	1951	326	105	9.9
1/24/13	13:08:00				
	16:15:00	1952	339	105	8.6
1/24/13	16:41:00				
	20:12:00	1954	343	105	6.72
1/25/13	9:26:00				
	10:26:00	1952	322.6	105	9.7
1/25/13	19:00:00				
	20:00:00	1950	341	105	9.91
1/25/13	20:15:00				
	21:15:00	1951	343	105	9.85
1/22-1/25	13:30:00				
	21:15:00	1963	328.47	105	9.29

Charge Rates

1.22.13

6:00	1932.5
7:00	1919
8:00	1910
9:00	1938
10:00	1931.5
11:00	1935.5
12:00	1451.5
13:00	1928.5
14:00	1916
15:00	1917
16:00	1934.5
17:00	1934
18:00	1927
19:00	1934
20:00	1933
21:00	1932
22:00	DN
23:00	DN
0:00	DN
1:00	DN
2:00	DN
3:00	DN
4:00	DN
5:00	DN

1.23.13

6:00	800
7:00	1936
8:00	1937
9:00	1933.5
10:00	1965
11:00	2491
12:00	1926.5
13:00	1935.5
14:00	1678.5
15:00	1832
16:00	1929
17:00	1938.5
18:00	1931
19:00	1926
20:00	1946
21:00	1924.5
22:00	1926.5
23:00	1933
0:00	NA
1:00	NA
2:00	NA
3:00	NA
4:00	NA
5:00	NA

1.22.13

Average	1898.375
Max	1938
Min	1451.5

1.23.13

Average	1946.441
Max	2491
Min	1678.5

1.24.13

6:00	1936
7:00	1931
8:00	1934.5
9:00	1928.5
10:00	1932
11:00	1930.5
12:00	1937
13:00	1934.5
14:00	1938
15:00	1922.5
16:00	1931.5
17:00	1934
18:00	1939
19:00	1927.5
20:00	2064.5
21:00	1933.5
22:00	1876.5
23:00	1462
0:00	1928.5
1:00	1786.5
2:00	1939
3:00	1939
4:00	1904
5:00	1936.5

1.24.13

Average	1909.438
Max	2064.5
Min	1462

1.25.13

6:00	1928
7:00	1927
8:00	2035
9:00	1933
10:00	1815
11:00	233
12:00	DN
13:00	DN
14:00	DN
15:00	DN
16:00	1929.5
17:00	1933.5
18:00	1931
19:00	1928.5
20:00	1931.5
21:00	Testing Complete
22:00	
23:00	
0:00	
1:00	
2:00	
3:00	
4:00	
5:00	

1.25.13

Average	1929.2
Max	2035
Min	1815

AIR
POLLUTION
TESTING, INC.

Appendix Three: Laboratory Data

Method 23

AIR
POLLUTION
TESTING, INC.
DENVER, SALT LAKE CITY

1/28/2013

To: Ron Mitchum
DAT Laboratory
7715 Corporate Blvd.
Plain City, OH 43064

From: Jim Davidson
Air Pollution Testing, Inc.
5530 Marshall St.
Arvada, Colorado 80002

RE: Samples for Method 23
APT Project Code:STE2357

Packages: 2 (The cooler has traps and filters)

Samples:
Total Samples: 12 (3 runs that include a trap, filter, acetone/methylene chloride rinse, and a toluene rinse.)

Analysis:
- Method 23 – PCDD and PCDF (No separate analysis of the toluene rinse.)

The data package goes to Paul Ottenstein (POttenstein@airtest.net). Please do not hesitate to contact Paul (303.420.5949 ext. 23) or me if you have any questions.
The return address for the traps:
Test America
880 Riverside Parkway
Sacramento, CA 95605
Regards,

Jim Davidson
Lab Technician
Air Pollution Testing Inc.
303.420.5949 x58

DENVER OFFICE
5530 Marshall Street
Arvada, CO 80002
(303) 420-5949
FAX (303) 420-5920
(800) 268-6213

Method 23 Pre-spike standard HRM23SU00001

each trap spiked with 40uL of (2X) level

Analytes	Concentration ng/mL)
13C-1,2,3,4,7,8,9-HpCDF	100
13C-1,2,3,4,7,8-HxCDD	100
13C-1,2,3,4,7,8-HxCDF	100
13C-2,3,4,7,8-PeCDF	100
37CL4-2,3,7,8,-TCDD	100

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stumbras	CHAIN OF CUSTODY #:
CLIENT NAME: Sterigycle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 6 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County; STATE: UT; ZIP CODE:	SITE CONTACT: Steve McCowber; LAB CONTACT: M. Pearson; LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M23 Incinerator PCDD/PCDF Trap	TB	apt 011713-1	1.24.13	PCDD/PCDF TRAP	M23	
" " PCDD/PCDF Trap	1	apt011713-5				
" " PCDD/PCDF Trap	2	apt011713-4				
" " PCDD/PCDF Trap	3	apt011713-3				
M23 Incinerator Ace+Meth cont.2	TB			Methylene Chloride + acetone		
" " cont.2	1					
" " cont.2	2					
" " cont.2	3					
M23 Incinerator Toluene cont.3	TB			Toluene		
" " cont.3	1					
" " cont.3	2					
" " cont.3	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER

	Date	Time		Date	Time
1. Relinquished By: [signature]	1-25-13	22:45	1. Received By: Carolina Smith	1/26/13	10:30
2. Relinquished By: [signature]	1-26-13	18:40	2. Received By: Jim Dodson	1-28-13	10:19
3. Relinquished By:			3. Received By:		

Comments:

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stumbras	CHAIN OF CUSTODY #:
CLIENT NAME: Steriaycle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 7 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County / STATE: UT / ZIP CODE:	SITE CONTACT: Steve McLaughlin / LAB CONTACT: M. Pearson / LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M23 Incinerator Filter cont. 1	TB	N/A	1.24.13	Filter	23	
" " cont. 1	1					
" " cont. 1	2					
" " cont. 1	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER ____

	Date	Time		Date	Time
1. Relinquished By: [signature]	1.25.13	22:45	1. Received By: Camden Belt	1/26/13	10:30
2. Relinquished By: Camden Belt	1-26-13	18:40	2. Received By: [signature]	1.28.13	10:17
3. Relinquished By:			3. Received By:		

Comments:

DAT Reports®

Data Analysis Technologies, Inc.
7715 Corporate Blvd.
Plain City, OH 43064
800-733-8644

Sample Analysis Certificate

Client:	Air Pollution Testing	Date:	2/8/2013
Address:	Unit 1 Wheat Ridge, CO 80033	DAT Project ID:	0113030
		Date Received:	1/29/2013

Attn: Paul Ottenstein
Client Project: Stericycle
Analysis: Method 23

The following samples were received on 1/29/2013:

DAT Sample ID	Client Sample ID	Date Sampled	Matrix
0113030-01	M23 Incinerator Filter Run 1 Cont 1	1/24/2013	Filter
0113030-02	M23 Incinerator Ace + Meth Run 1 Cont 2	1/24/2013	Liquid
0113030-03	M23 Incinerator Toluene Run 1 Cont 3	1/24/2013	Liquid
0113030-04	M23 Incinerator PCDD/PCDF Trap Run 1 apt011713-5	1/24/2013	Solid
0113030-05	M23 Incinerator Filter Run 2 Cont 1	1/24/2013	Filter
0113030-06	M23 Incinerator Ace + Meth Run 2 Cont 2	1/24/2013	Liquid
0113030-07	M23 Incinerator Toluene Run 2 Cont 3	1/24/2013	Liquid
0113030-08	M23 Incinerator PCDD/PCDF Trap Run 2 apt011713-4	1/24/2013	Solid
0113030-09	M23 Incinerator Filter Run 3 Cont 1	1/24/2013	Filter
0113030-10	M23 Incinerator Ace + Meth Run 3 Cont 2	1/24/2013	Liquid

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0113030-11	M23 Incinerator Toluene Run 3 Cont 3	1/24/2013	Liquid
0113030-12	M23 Incinerator PCDD/PCDF Trap Run 3 apt011713-3	1/24/2013	Solid

Results: See attached summary.

QC: Met the criteria for the method.

Reviewed and approved for release by: R.K. Mitchum Date: 2/8/2013

Ronald K. Mitchum, Ph.D.
President, DAT

PCDD/PCDF – Method 23/Method 8290A

Method 8290A

Method 8290A extends minimum levels of quantitation of CDDs/CDFs into the low pg total amount in the Method 23 train. The method specifies the use of HRGC/HRMS for detection and quantitation of CDDs/CDFs. The method's use of isotope dilution techniques, internal standard calibration results in improved sensitivity, precision, and accuracy. 2,3,7,8-TCDF was confirmed when present in the primary column results.

Data Flags

"EMPC", represents the estimated maximum possible concentration, is reported for GC/MS signals eluting within the PCDD/PCDF retention time windows established with the daily GC performance analysis, and are characterized by a signal-to-noise ratio in excess of 2.5:1 but do not meet the ion abundance ratio criteria (identification criteria listed in Section 2.5). The "EMPC" is calculated by using the same expression used for reporting the identified analyte concentrations except that the summed area is adjusted using the theoretical ion abundance ratio for the appropriate chlorination level. The "DL" and "EMPC" are reported in the same units used to report detected analytes.

EMPC flags are due to co-eluting interferences which do not have the correct chlorine isotope ratios.

Polychlorinaterd Diphenylether Interferences: A review of the data was performed to determine if polychlorinated diphenylethers, PCDPE, were present at the same retention time of any total PCDF response and the value for that response was disregarded if present. In the totals summary these values are qualified with an "X". If a PCDPE was present as interference for any named analyte that response was flagged with an "X".

US EPA - Method 8290A

1DFA - Form I-HR CDD-1
CDD/CDF SAMPLE DATA SUMMARY
HIGH RESOLUTION

Sample No.: Run_1

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-1

QC Code: N

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:10

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20.00 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (uL) % Solids/Lipids 100.0% Date Analyzed: 2/5/2013 17:39

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

ISRC No

CONCENTRATION UNITS: (pg/L, ng/Kg, pg) pg

TARGET ANALYTE		PEAK RT	ION RATIO	#	CONCENTRATION	Q	EMPC/EDL	
2,3,7,8-TCDF	C	34:34	0.81		105.65		1.72	
1,2,3,7,8-PeCDF		32:36	1.40		236.79		7.49	
2,3,4,7,8-PeCDF		33:27	1.45		344.45	B	7.49	
1,2,3,4,7,8-HxCDF		37:34	1.15		1119.25		8.08	
1,2,3,6,7,8-HxCDF		37:45	1.14		555.95		7.04	
2,3,4,6,7,8-HxCDF		38:29	1.14		683.33		7.82	
1,2,3,7,8,9-HxCDF		39:28	1.18		31.58		8.80	
1,2,3,4,6,7,8-HpCDF		41:17	0.99		2648.19		6.45	
1,2,3,4,7,8,9-HpCDF		42:38	1.01		359.46		7.62	
OCDF		45:10	0.89		1633.71	B	9.13	
2,3,7,8-TCDD		29:04	0.70		20.97		3.08	
1,2,3,7,8-PeCDD		33:54	1.43		77.52		4.60	
1,2,3,4,7,8-HxCDD		38:40	1.49	*			103.63	EMPC
1,2,3,6,7,8-HxCDD		38:47	1.24		205.83		5.54	
1,2,3,7,8,9-HxCDD		39:11	1.31		206.49		6.07	
1,2,3,4,6,7,8-HpCDD		42:15	1.04		981.56		7.43	
OCDD		45:02	0.84		1850.98	B	6.00	

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Levels (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids).

LABELED COMPOUNDS	Type	PEAK RT	ION RATIO	#	ION RATIO LIMITS LOW	HIGH	% REC	#	RECOVERY LIMITS LOW	HIGH
13C-2,3,7,8-TCDF	IS	28:17	0.75		0.65	0.89	74		40	135
13C-1,2,3,7,8-PeCDF	IS	32:35	1.47		1.32	1.78	71		40	135
13C-1,2,3,6,7,8-HxCDF	IS	37:44	0.51		0.43	0.59	78		40	135
13C-1,2,3,4,6,7,8-HpCDF	IS	41:17	0.44		0.37	0.51	69		40	135
13C-2,3,7,8-TCDD	IS	29:04	0.76		0.65	0.89	81		40	135
13C-1,2,3,7,8-PeCDD	IS	33:53	1.62		1.32	1.78	77		40	135
13C-1,2,3,6,7,8-HxCDD	IS	38:47	1.26		1.05	1.43	69		40	135
13C-1,2,3,4,6,7,8-HpCDD	IS	42:14	1.05		0.88	1.2	79		40	135
13C-OCDD	IS	45:01	0.91		0.76	1.02	57		40	135
37C12-2,3,7,8-TCDD	Surr	29:05	1.00		1	1	50		40	135
13C-2,3,4,7,8-PeCDF	Surr	33:26	1.50		1.32	1.78	89		40	135
13C-1,2,3,4,7,8-HxCDF	Surr	37:34	0.52		0.43	0.59	93		40	135
13C-1,2,3,4,7,8-HxCDD	Surr	38:39	1.25		1.05	1.43	112		40	135
13C-1,2,3,4,7,8,9-HpCDF	Surr	42:37	0.47		0.37	0.51	88		40	135
13C12-1,2,3,7,8,9-HxCDF	Alt	39:27	0.53		0.43	0.59	75		40	135
13C-1,2,3,4-TCDD	RS	28:51	0.76		0.65	0.89	NA		NA	NA
13C-1,2,3,7,8,9-HxCDD	RS	39:10	1.24		1.05	1.43	NA		NA	NA

Column to be used to flag values outside QC limits. B= In Blank X=DPE Interference ISRC=IS Recovery Corrected Results

C = 2,3,7,8-TCDF second column confirmation result was entered U= not found

frm18290Arev2

US EPA - Method 8290A

1DFB - Form I-HR CDD-2

CDD/CDF TOXICITY EQUIVALENCE SUMMARY
HIGH RESOLUTION

Sample No.: Run_1

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-1

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:10

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100.0% Date Analyzed: 02/05/2013

% Lipids

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

ISRC No

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

TARGET ANALYTE	CONCENTRATION		TEF*			TEF-ADJUSTED CONCENTRATIONS
2,3,7,8-TCDF	105.65	C	x	0.10	=	10.56
1,2,3,7,8-PeCDF	236.79		x	0.05	=	11.84
2,3,4,7,8-PeCDF	344.45		x	0.50	=	172.23
1,2,3,4,7,8-HxCDF	1119.25		x	0.10	=	111.92
1,2,3,6,7,8-HxCDF	555.95		x	0.10	=	55.60
2,3,4,6,7,8-HxCDF	683.33		x	0.10	=	68.33
1,2,3,7,8,9-HxCDF	31.58		x	0.10	=	3.16
1,2,3,4,6,7,8-HpCDF	2648.19		x	0.01	=	26.48
1,2,3,4,7,8,9-HpCDF	359.46		x	0.01	=	3.59
OCDF	1633.71		x	0.001	=	1.63
2,3,7,8-TCDD	20.97		x	1.00	=	20.97
1,2,3,7,8-PeCDD	77.52		x	0.50	=	38.76
1,2,3,4,7,8-HxCDD			x	0.10	=	
1,2,3,6,7,8-HxCDD	205.83		x	0.10	=	20.58
1,2,3,7,8,9-HxCDD	206.49		x	0.10	=	20.65
1,2,3,4,6,7,8-HpCDD	981.56		x	0.01	=	9.82
OCDD	1850.98		x	0.001	=	1.85
			Total		=	577.98

TEF* - Toxicity Equivalent Factors from EPA/625/3-89/016 March 1989 - Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans (CDDs and CDFs) and 1989 Update.
X=DPE interference C= TCDF confirmation value used in calculation of TEF

frm18290Arev2

US EPA - Method 8290A

2DF - Form II HR CDD
CDD/CDF TOTAL HOMOLOGUE CONCENTRATION SUMMARY
HIGH RESOLUTION

Sample No.
Run_1

Lab Name: Data/Analysis Technologies Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-1

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:10

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100% Date Analyzed: 02/05/2013

% Lipids

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

ISRC No

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

HOMOLOGUE	PEAKS	#DPE	CONCENTRATION	Q	EMPC/EDL
DIOXINS					
Total TCDD	9		494.42		3.08
Total PeCDD	9		1077.84		4.60
Total HxCDD	5		1212.37		103.63
Total HpCDD	2		1800.70		7.29
FURANS					
Total TCDF	17	0	4258.69 C		3.67
Total PeCDF	14	0	4807.20		7.35
Total HxCDF	11	0	5227.55		7.88
Total HpCDF	4	0	4324.30		6.96

Note: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Limits (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids). The total homologue concentrations do not affect the TEF (Toxicity Equivalent Factor) calculations.
X= DPE interference corrected value C= TCDF confirmation value used for total TCDF concentration

frm18290Arev2

US EPA - Method 8290A

1DFA - Form I-HR CDD-1
CDD/CDF SAMPLE DATA SUMMARY
HIGH RESOLUTION

Sample No.: Run_2

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-5

QC Code: N

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:11

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20.00 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (uL) % Solids/Lipids 100.0% Date Analyzed: 2/5/2013 18:30

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

ISRC No

CONCENTRATION UNITS: (pg/L, ng/Kg, pg) pg

TARGET ANALYTE		PEAK RT	ION RATIO	#	CONCENTRATION	Q	EMPC/EDL	
2,3,7,8-TCDF	C	34:33	0.70		101.04		1.79	
1,2,3,7,8-PeCDF		32:36	1.40		254.65		5.96	
2,3,4,7,8-PeCDF		33:28	1.40		349.53	B	5.95	
1,2,3,4,7,8-HxCDF		37:34	1.14		1194.06		8.86	
1,2,3,6,7,8-HxCDF		37:45	1.21		565.98		7.72	
2,3,4,6,7,8-HxCDF		38:29	1.13		671.37		8.57	
1,2,3,7,8,9-HxCDF		39:28	0.88	*			33.94	EMPC
1,2,3,4,6,7,8-HpCDF		41:17	1.01		2609.55		6.29	
1,2,3,4,7,8,9-HpCDF		42:38	1.01		360.35		7.43	
OCDF		45:10	0.89		1644.62	B	6.43	
2,3,7,8-TCDD		29:06	0.82		19.18		2.29	
1,2,3,7,8-PeCDD		33:54	1.47		76.60		3.39	
1,2,3,4,7,8-HxCDD		38:40	1.30		98.78		5.84	
1,2,3,6,7,8-HxCDD		38:46	1.14		210.87		4.90	
1,2,3,7,8,9-HxCDD		39:10	1.36		208.26		5.37	
1,2,3,4,6,7,8-HpCDD		42:14	0.96		965.39		5.68	
OCDD		45:01	0.82		1839.17	B	6.62	

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Levels (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids).

LABELED COMPOUNDS	Type	PEAK RT	ION RATIO	#	ION RATIO LIMITS LOW	HIGH	% REC	#	RECOVERY LIMITS LOW	HIGH
13C-2,3,7,8-TCDF	IS	28:17	0.73		0.65	0.89	63		40	135
13C-1,2,3,7,8-PeCDF	IS	32:35	1.51		1.32	1.78	64		40	135
13C-1,2,3,6,7,8-HxCDF	IS	37:44	0.51		0.43	0.59	65		40	135
13C-1,2,3,4,6,7,8-HpCDF	IS	41:17	0.44		0.37	0.51	59		40	135
13C-2,3,7,8-TCDD	IS	29:03	0.75		0.65	0.89	69		40	135
13C-1,2,3,7,8-PeCDD	IS	33:53	1.61		1.32	1.78	69		40	135
13C-1,2,3,6,7,8-HxCDD	IS	38:45	1.25		1.05	1.43	59		40	135
13C-1,2,3,4,6,7,8-HpCDD	IS	42:13	1.07		0.88	1.2	68		40	135
13C-OCDD	IS	45:01	0.93		0.76	1.02	47		40	135
37C12-2,3,7,8-TCDD	Surr	29:05	1.00		1	1	51		40	135
13C-2,3,4,7,8-PeCDF	Surr	33:26	1.49		1.32	1.78	89		40	135
13C-1,2,3,4,7,8-HxCDF	Surr	37:34	0.51		0.43	0.59	93		40	135
13C-1,2,3,4,7,8-HxCDD	Surr	38:39	1.28		1.05	1.43	113		40	135
13C-1,2,3,4,7,8,9-HpCDF	Surr	42:37	0.44		0.37	0.51	87		40	135
13C12-1,2,3,7,8,9-HxCDF	Alt	39:27	0.51		0.43	0.59	65		40	135
13C-1,2,3,4-TCDD	RS	28:51	0.76		0.65	0.89	NA		NA	NA
13C-1,2,3,7,8,9-HxCDD	RS	39:10	1.26		1.05	1.43	NA		NA	NA

Column to be used to flag values outside QC limits. B= In Blank X=DPE Interference ISRC=IS Recovery Corrected Results

C = 2,3,7,8-TCDF second column confirmation result was entered U= not found

frm18290Arev2

US EPA - Method 8290A

1DFB - Form I-HR CDD-2

CDD/CDF TOXICITY EQUIVALENCE SUMMARY
HIGH RESOLUTION

Sample No.: Run_2

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-5

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:11

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100.0% Date Analyzed: 02/05/2013

% Lipids _____

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

ISRC No

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

TARGET ANALYTE	CONCENTRATION		TEF*			TEF-ADJUSTED CONCENTRATIONS
2,3,7,8-TCDF	101.04	C	x	0.10	=	10.10
1,2,3,7,8-PeCDF	254.65		x	0.05	=	12.73
2,3,4,7,8-PeCDF	349.53		x	0.50	=	174.77
1,2,3,4,7,8-HxCDF	1194.06		x	0.10	=	119.41
1,2,3,6,7,8-HxCDF	565.98		x	0.10	=	56.60
2,3,4,6,7,8-HxCDF	671.37		x	0.10	=	67.14
1,2,3,7,8,9-HxCDF			x	0.10	=	
1,2,3,4,6,7,8-HpCDF	2609.55		x	0.01	=	26.10
1,2,3,4,7,8,9-HpCDF	360.35		x	0.01	=	3.60
OCDF	1644.62		x	0.001	=	1.64
2,3,7,8-TCDD	19.18		x	1.00	=	19.18
1,2,3,7,8-PeCDD	76.60		x	0.50	=	38.30
1,2,3,4,7,8-HxCDD	98.78		x	0.10	=	9.88
1,2,3,6,7,8-HxCDD	210.87		x	0.10	=	21.09
1,2,3,7,8,9-HxCDD	208.26		x	0.10	=	20.83
1,2,3,4,6,7,8-HpCDD	965.39		x	0.01	=	9.65
OCDD	1839.17		x	0.001	=	1.84
			Total		=	592.85

TEF* - Toxicity Equivalent Factors from EPA/625/3-89/016 March 1989 - Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans (CDDs and CDFs) and 1989 Update.
X=DPE interference C= TCDF confirmation value used in calculation of TEF

frm16290Arev2

US EPA - Method 8290A

2DF - Form II HR CDD
CDD/CDF TOTAL HOMOLOGUE CONCENTRATION SUMMARY
HIGH RESOLUTION

Sample No.
Run_2

Lab Name: Data/Analysis Technologies Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-5

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:11

Water Sample Prep: (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100% Date Analyzed: 02/05/2013
% Lipids

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1
ISRC No

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

HOMOLOGUE	PEAKS	#DPE	CONCENTRATION	Q	EMPC/EDL
DIOXINS					
Total TCDD	9		609.77		2.29
Total PeCDD	9		1285.95		3.39
Total HxCDD	6		1488.51		3.55
Total HpCDD	3	Check	1796.58		5.57
FURANS					
Total TCDF	17	0	4765.66 C		3.18
Total PeCDF	15	0	5065.78		5.84
Total HxCDF	10	0	5116.11		33.94
Total HpCDF	4	0	4264.92		6.78

Note: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Limits (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids). The total homologue concentrations do not affect the TEF (Toxicity Equivalent Factor) calculations.
X= DPE interference corrected value C= TCDF confirmation value used for total TCDF concentration

frm18290Arev2

US EPA - Method 8290A

1DFA - Form I-HR CDD-1
CDD/CDF SAMPLE DATA SUMMARY
HIGH RESOLUTION

Sample No.: Run_3

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-9
QC Code: N
Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:12

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20.00 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (uL) % Solids/Lipids 100.0% Date Analyzed: 2/5/2013 19:20

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1
ISRC No

CONCENTRATION UNITS: (pg/L, ng/Kg, pg) pg

TARGET ANALYTE		PEAK RT	ION RATIO	#	CONCENTRATION	Q	EMPC/EDL	
2,3,7,8-TCDF	C	34:33	0.74		98.69		1.66	
1,2,3,7,8-PeCDF		32:36	1.49		232.25		6.41	
2,3,4,7,8-PeCDF		33:28	1.54		301.54	B	6.41	
1,2,3,4,7,8-HxCDF		37:36	1.15		873.29		6.07	
1,2,3,6,7,8-HxCDF		37:45	1.09		413.46		5.29	
2,3,4,6,7,8-HxCDF		38:30	1.17		440.09		5.87	
1,2,3,7,8,9-HxCDF		39:30	0.84	*			23.62	EMPC
1,2,3,4,6,7,8-HpCDF		41:18	1.02		1587.25		3.22	
1,2,3,4,7,8,9-HpCDF		42:38	1.05		217.93		3.60	
OCDF		45:11	0.88		770.84	B	4.38	
2,3,7,8-TCDD		29:05	0.69		18.25		1.78	
1,2,3,7,8-PeCDD		33:54	1.40		71.95		2.91	
1,2,3,4,7,8-HxCDD		38:41	1.26		83.20		3.86	
1,2,3,6,7,8-HxCDD		38:48	1.31		156.21		3.24	
1,2,3,7,8,9-HxCDD		39:11	1.25		156.22		3.54	
1,2,3,4,6,7,8-HpCDD		42:16	1.00		672.50		4.05	
OCDD		45:03	0.88		1059.10	B	4.90	

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Levels (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids).

LABELED COMPOUNDS	Type	PEAK RT	ION RATIO	#	ION RATIO LIMITS LOW	HIGH	% REC	#	RECOVERY LIMITS LOW	HIGH
13C-2,3,7,8-TCDF	IS	28:18	0.77		0.65	0.89	69		40	135
13C-1,2,3,7,8-PeCDF	IS	32:35	1.49		1.32	1.78	74		40	135
13C-1,2,3,6,7,8-HxCDF	IS	37:44	0.51		0.43	0.59	72		40	135
13C-1,2,3,4,6,7,8-HpCDF	IS	41:17	0.45		0.37	0.51	66		40	135
13C-2,3,7,8-TCDD	IS	29:05	0.73		0.65	0.89	81		40	135
13C-1,2,3,7,8-PeCDD	IS	33:53	1.59		1.32	1.78	80		40	135
13C-1,2,3,6,7,8-HxCDD	IS	38:47	1.27		1.05	1.43	65		40	135
13C-1,2,3,4,6,7,8-HpCDD	IS	42:15	1.07		0.88	1.2	77		40	135
13C-OCDD	IS	45:03	0.94		0.76	1.02	58		40	135
37C12-2,3,7,8-TCDD	Surr	29:06	1.00		1	1	52		40	135
13C-2,3,4,7,8-PeCDF	Surr	33:27	1.48		1.32	1.78	91		40	135
13C-1,2,3,4,7,8-HxCDF	Surr	37:35	0.52		0.43	0.59	97		40	135
13C-1,2,3,4,7,8-HxCDD	Surr	38:39	1.28		1.05	1.43	116		40	135
13C-1,2,3,4,7,8,9-HpCDF	Surr	42:37	0.43		0.37	0.51	91		40	135
13C12-1,2,3,7,8,9-HxCDF	Alt	39:28	0.52		0.43	0.59	72		40	135
13C-1,2,3,4-TCDD	RS	28:53	0.75		0.65	0.89	NA		NA	NA
13C-1,2,3,7,8,9-HxCDD	RS	39:10	1.26		1.05	1.43	NA		NA	NA

# Column to be used to flag values outside QC limits. B= In Blank X=DPE Interference ISRC=IS Recovery Corrected Results
C = 2,3,7,8-TCDF second column confirmation result was entered U= not found

lrm18290Arev2

US EPA - Method 8290A

1DFB - Form I-HR CDD-2

CDD/CDF TOXICITY EQUIVALENCE SUMMARY
HIGH RESOLUTION

Sample No.: Run_3

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-9

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:12

Water Sample Prep: (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100.0% Date Analyzed: 02/05/2013

% Lipids

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

ISRC No

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

TARGET ANALYTE	CONCENTRATION		TEF*			TEF-ADJUSTED CONCENTRATIONS
2,3,7,8-TCDF	98.69	C	x	0.10	=	9.87
1,2,3,7,8-PeCDF	232.25		x	0.05	=	11.61
2,3,4,7,8-PeCDF	301.54		x	0.50	=	150.77
1,2,3,4,7,8-HxCDF	873.29		x	0.10	=	87.33
1,2,3,6,7,8-HxCDF	413.46		x	0.10	=	41.35
2,3,4,6,7,8-HxCDF	440.09		x	0.10	=	44.01
1,2,3,7,8,9-HxCDF			x	0.10	=	
1,2,3,4,6,7,8-HpCDF	1587.25		x	0.01	=	15.87
1,2,3,4,7,8,9-HpCDF	217.93		x	0.01	=	2.18
OCDF	770.84		x	0.001	=	0.77
2,3,7,8-TCDD	18.25		x	1.00	=	18.25
1,2,3,7,8-PeCDD	71.95		x	0.50	=	35.98
1,2,3,4,7,8-HxCDD	83.20		x	0.10	=	8.32
1,2,3,6,7,8-HxCDD	156.21		x	0.10	=	15.62
1,2,3,7,8,9-HxCDD	156.22		x	0.10	=	15.62
1,2,3,4,6,7,8-HpCDD	672.50		x	0.01	=	6.73
OCDD	1059.10		x	0.001	=	1.06
			Total		=	465.33

TEF* - Toxicity Equivalent Factors from EPA/625/3-89/016 March 1989 - Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans (CDDs and CDFs) and 1989 Update.
X=DPE interference C= TCDF confirmation value used in calculation of TEF

frm18290Arev2

US EPA - Method 8290A

2DF - Form II HR CDD
CDD/CDF TOTAL HOMOLOGUE CONCENTRATION SUMMARY
HIGH RESOLUTION

Sample No.
Run_3

Lab Name: Data/Analysis Technologies Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-9

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:12

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100% Date Analyzed: 02/05/2013
% Lipids

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1
ISRC No

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

HOMOLOGUE	PEAKS	#DPE	CONCENTRATION	Q	EMPC/EDL
DIOXINS					
Total TCDD	12		657.00		1.78
Total PeCDD	3		138.03		2.91
Total HxCDD	6		1149.23		2.35
Total HpCDD	2		1221.41		3.97
FURANS					
Total TCDF	17	0	5207.45 C		2.60
Total PeCDF	15	0	4748.84		6.29
Total HxCDF	9	0	3902.60		23.62
Total HpCDF	4	0	2533.49		3.47

Note: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Limits (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids). The total homologue concentrations do not affect the TEF (Toxicity Equivalent Factor) calculations.
X= DPE Interference corrected value C= TCDF confirmation value used for total TCDF concentration

frm18290Arev2

QC Summary

PCDD/PCDF – Method 23/Method 8290

Method 8290

Method Blank

Laboratory Spike
Laboratory Spike Duplicate

US EPA - Method 8290A

1DFA - Form I-HR CDD-1
CDD/CDF SAMPLE DATA SUMMARY
HIGH RESOLUTION

Sample No.: Method_Blank

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-MB
QC Code: 0

Sample wt/vol: 1.0 g / L NA Lab File ID: 0113030BS:9

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20.00 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (uL) % Solids/Lipids 100.0% Date Analyzed: 02/05/2013 16:49

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

CONCENTRATION UNITS: (pg/L, ng/Kg, pg) pg

TARGET ANALYTE		PEAK RT	ION RATIO #	CONCENTRATION	Q	EMPC/EDL
2,3,7,8-TCDF					U	2.13
1,2,3,7,8-PeCDF					U	3.55
2,3,4,7,8-PeCDF		33:28	1.11 *			16.02
1,2,3,4,7,8-HxCDF					U	5.21
1,2,3,6,7,8-HxCDF					U	4.54
2,3,4,6,7,8-HxCDF					U	5.04
1,2,3,7,8,9-HxCDF					U	5.67
1,2,3,4,6,7,8-HpCDF					U	5.16
1,2,3,4,7,8,9-HpCDF					U	6.09
OCDF		45:11	0.52 *			20.78
2,3,7,8-TCDD					U	2.10
1,2,3,7,8-PeCDD					U	4.00
1,2,3,4,7,8-HxCDD					U	6.21
1,2,3,6,7,8-HxCDD					U	5.22
1,2,3,7,8,9-HxCDD					U	5.71
1,2,3,4,6,7,8-HpCDD					U	5.35
OCDD		45:02	1.82 *			24.94

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Levels (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids).

LABELED COMPOUNDS	Type	PEAK RT	ION RATIO #	ION RATIO LIMITS LOW	HIGH	% REC #	RECOVERY LIMITS LOW	HIGH
13C-2,3,7,8-TCDF	IS	28:18	0.73	0.65	0.89	76	40	135
13C-1,2,3,7,8-PeCDF	IS	32:35	1.48	1.32	1.78	69	40	135
13C-1,2,3,6,7,8-HxCDF	IS	37:45	0.51	0.43	0.59	87	40	135
13C-1,2,3,4,6,7,8-HpCDF	IS	41:18	0.44	0.37	0.51	67	40	135
13C-2,3,7,8-TCDD	IS	29:04	0.76	0.65	0.89	85	40	135
13C-1,2,3,7,8-PeCDD	IS	33:54	1.64	1.32	1.78	78	40	135
13C-1,2,3,6,7,8-HxCDD	IS	38:46	1.27	1.05	1.43	79	40	135
13C-1,2,3,4,6,7,8-HpCDD	IS	42:14	1.11	0.88	1.2	74	40	135
13C-OCDD	IS	45:01	0.97	0.76	1.02	49	40	135
37C12-2,3,7,8-TCDD	Surr	29:05	1.00	1	1	89	40	135
13C-2,3,4,7,8-PeCDF	Surr	33:27	1.49	1.32	1.78	100	40	135
13C-1,2,3,4,7,8-HxCDF	Surr	37:35	0.52	0.43	0.59	95	40	135
13C-1,2,3,4,7,8-HxCDD	Surr	38:40	1.24	1.05	1.43	114	40	135
13C-1,2,3,4,7,8,9-HpCDF	Surr	42:38	0.44	0.37	0.51	95	40	135
13C12-1,2,3,7,8,9-HxCDF	Alt	39:28	0.50	0.43	0.59	76	40	135
13C-1,2,3,4-TCDD	RS	28:52	0.75	0.65	0.89	NA	NA	NA
13C-1,2,3,7,8,9-HxCDD	RS	39:10	1.26	1.05	1.43	NA	NA	NA

Column to be used to flag values outside QC limits.

frm18290Arev2

USEPA - Method 8290A

1DFB - Form I-HR CDD-2

CDD/CDF TOXICITY EQUIVALENCE SUMMARY
HIGH RESOLUTION

Sample No.: Method_Blank

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-MB

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:9

Water Sample Prep: _____ (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100.0% Date Analyzed: 02/05/2013

% Lipids _____

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

TARGET ANALYTE	CONCENTRATION	TEF*	TEF-ADJUSTED CONCENTRATIONS
2,3,7,8-TCDF		x 0.10 =	
1,2,3,7,8-PeCDF		x 0.05 =	
2,3,4,7,8-PeCDF		x 0.50 =	
1,2,3,4,7,8-HxCDF		x 0.10 =	
1,2,3,6,7,8-HxCDF		x 0.10 =	
2,3,4,6,7,8-HxCDF		x 0.10 =	
1,2,3,7,8,9-HxCDF		x 0.10 =	
1,2,3,4,6,7,8-HpCDF		x 0.01 =	
1,2,3,4,7,8,9-HpCDF		x 0.01 =	
OCDF		x 0.001 =	
2,3,7,8-TCDD		x 1.00 =	
1,2,3,7,8-PeCDD		x 0.50 =	
1,2,3,4,7,8-HxCDD		x 0.10 =	
1,2,3,6,7,8-HxCDD		x 0.10 =	
1,2,3,7,8,9-HxCDD		x 0.10 =	
1,2,3,4,6,7,8-HpCDD		x 0.01 =	
OCDD		x 0.001 =	
		Total =	0.00

TEF* - Toxicity Equivalent Factors from EPA/625/3-89/016 March 1989 - Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans (CDDs and CDFs) and 1989 Update.

Irm18290Arev2

USEPA - Method 8290A

2DF - Form II HR CDD
CDD/CDF TOTAL HOMOLOGUE CONCENTRATION SUMMARY
HIGH RESOLUTION

Sample No.
Method_Blank

Lab Name: Data/Analysis Technologies Contract:

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: Train Lab Sample ID: 0113030-MB

Sample wt/vol: 1.00 g / L NA Lab File ID: 0113030BS:9

Water Sample Prep: (SEPF/SPE) Date Received: 1/29/2013

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (ul) % Solids: 100% Date Analyzed: 02/05/2013
% Lipids

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

HOMOLOGUE	PEAKS	CONCENTRATION	Q	EMPC/EDL
DIOXINS				
Total TCDD	0		U	2.09
Total PeCDD	0		U	4.00
Total HxCDD	0		U	3.78
Total HpCDD	0		U	5.25
FURANS				
Total TCDF	0		U	2.13
Total PeCDF	0		U	16.02
Total HxCDF	0		U	5.08
Total HpCDF	0		U	5.56

Note: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Limits (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids). The total homologue concentrations do not affect the TEF (Toxicity Equivalent Factor) calculations.

frm18290Arev2

USEPA

3dfa-Form III-HR CDD
CDD/CDF LAB CONTROL SAMPLE SUMMARY
HIGH RESOLUTION

Sample No.
Lab_Spike

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: (SOIL/WATER/ASH/TISSUE/OIL) Train Lab Sample ID: 0113030-LS

Sample wt/vol: NA g / L NA Lab File ID: 0113030BS:13

Water Sample Prep: _____ (SEPF/SPE) Date Received: _____

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (uL) % Solids/Lipids 100 Date Analyzed: 02/05/2013

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

SPIKE ANALYTE	SPIKE ADDED	AMOUNT RECOVERED		PERCENT RECOVERY	#	QC LIMITS LOW	QC LIMITS HIGH
2,3,7,8-TCDF	400	375		94		86	135
1,2,3,7,8-PeCDF	2000	1986		99		86	133
2,3,4,7,8-PeCDF	2000	1932		97		89	138
1,2,3,4,7,8-HxCDF	2000	2096		105		64	140
1,2,3,6,7,8-HxCDF	2000	1952		98		78	134
2,3,4,6,7,8-HxCDF	2000	1895		95		72	140
1,2,3,7,8,9-HxCDF	2000	2008		100		21	200
1,2,3,4,6,7,8-HpCDF	2000	1917		96		78	148
1,2,3,4,7,8,9-HpCDF	2000	2092		105		76	158
OCDF	4000	3987		100		96	153
2,3,7,8-TCDD	400	349		87		60	140
1,2,3,7,8-PeCDD	2000	1761		88		67	131
1,2,3,4,7,8-HxCDD	2000	2296		115		68	140
1,2,3,6,7,8-HxCDD	2000	2006		100		73	155
1,2,3,7,8,9-HxCDD	2000	2217		111		56	166
1,2,3,4,6,7,8-HpCDD	2000	1807		90		74	131
OCDD	4000	3932		98		81	146

Column to be used to flag values outside Quality Control (QC) Limits.

Laboratory Control Sample Recovery: 0 Outside limits out of 17 total.

frm3diox040505

USEPA

3dfa-Form III-HR CDD
CDD/CDF LAB CONTROL SAMPLE SUMMARY
HIGH RESOLUTION

Sample No.
LAb_Spike_Dup.

Lab Name: DATA/ANALYSIS TECHNOLOGIES Contract: Air Pollution Testing

Lab Code: OH01241 Case No.: Stericycle TO No.: STE 2357 SDG No.: NA

Matrix: (SOIL/WATER/ASH/TISSUE/OIL) Train Lab Sample ID: 0113030-LSD

Sample wt/vol: NA g / L NA Lab File ID: 0113030BS:14

Water Sample Prep: _____ (SEPF/SPE) Date Received: _____

Concentrated Extract Volume: 20 (ul) Date Extracted: 1/29/2013

Injection Volume: 1 (uL) % Solids/Lipids 100 Date Analyzed: 02/05/2013

GC Column: JWS-DB-5 ID: 0.25 (mm) Dilution Factor: 1

CONCENTRATION UNITS: (pg/L or ng/Kg) pg

SPIKE ANALYTE	SPIKE ADDED	AMOUNT RECOVERED		PERCENT RECOVERY	#	QC LIMITS LOW	QC LIMITS HIGH
2,3,7,8-TCDF	400	362		90		86	135
1,2,3,7,8-PeCDF	2000	1871		94		86	133
2,3,4,7,8-PeCDF	2000	1791		90		89	138
1,2,3,4,7,8-HxCDF	2000	1819		91		64	140
1,2,3,6,7,8-HxCDF	2000	1767		88		78	134
2,3,4,6,7,8-HxCDF	2000	1701		85		72	140
1,2,3,7,8,9-HxCDF	2000	1719		86		21	200
1,2,3,4,6,7,8-HpCDF	2000	1792		90		78	148
1,2,3,4,7,8,9-HpCDF	2000	1933		97		76	158
OCDF	4000	3715		93	*	96	153
2,3,7,8-TCDD	400	335		84		60	140
1,2,3,7,8-PeCDD	2000	1635		82		67	131
1,2,3,4,7,8-HxCDD	2000	2089		104		68	140
1,2,3,6,7,8-HxCDD	2000	1837		92		73	155
1,2,3,7,8,9-HxCDD	2000	1972		99		56	166
1,2,3,4,6,7,8-HpCDD	2000	1737		87		74	131
OCDD	4000	3732		93		81	146

Column to be used to flag values outside Quality Control (QC) Limits.

Laboratory Control Sample Recovery: 1 Outside limits out of 17 total.

frm3dfox040505

Documentation

Chain of Custody
Login Information

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE	STE 2357
PROJECT MANAGER	Danny Stumbras
CHAIN OF CUSTODY #	
CLIENT NAME	Stericycle Incorporated
TELEPHONE # / FAX #	860.830-4565
ADDRESS	
DATE	1.25.13
Page 6 of 7	
CITY	Davis County
STATE	UT
ZIP CODE	
SITE CONTACT	Steve McCombes
LAB CONTACT	M. Pearson
LAB NUMBER	
CONTRACT/PURCHASE/QUOTE #	
CARRIER / WAYBILL #	

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M23 Incinerator PCDD/PCDF Trap	TB	apt011713-1	1.24.13	PCDD/PCDF TRAP	M23	
" " PCDD/PCDF Trap	1	apt011713-5				
" " PCDD/PCDF Trap	2	apt011713-4				
" " PCDD/PCDF Trap	3	apt011713-3				
M23 Incinerator Ace+Meth cont.2	TB			Methylene chloride + acetone		
" " cont.2	1					
" " cont.2	2					
" " cont.2	3					
M23 Incinerator Toluene cont.3	TB			Toluene		
" " cont.3	1					
" " cont.3	2					
" " cont.3	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER

	Date	Time		Date	Time
1. Relinquished By [signature]	1.25.13	22:45	1. Received By Candace Smith	1/26/13	10:30
2. Relinquished By [signature]	1-26-13	18:40	2. Received By Jim Dodson	1-28-13	10:19
3. Relinquished By			3. Received By Linda Cail	1-29-13	0910

Comments:

0113030

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-6949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stambras	CHAIN OF CUSTODY #:
CLIENT NAME: Steriaycle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 7 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County; STATE: UT; ZIP CODE:	SITE CONTACT: Steve McCoubrey; LAB CONTACT: M. Pearson; LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M23 Incinerator Filter cont. 1	TB	N/A	1.24.13	Filter	23	
" " cont. 1	1					
" " cont. 1	2					
" " cont. 1	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER ____

	Date	Time		Date	Time
1. Relinquished By: [signature]	1.25.13	22:45	1. Received By: [signature]	1/26/13	10:30
2. Relinquished By: [signature]	1-26-13	18:40	2. Received By: [signature]	1-28-13	10:17
3. Relinquished By:			3. Received By: Linda Gil	1-29-13	0910

Comments:

0113030

DAT SAMPLE RECEIVING

7715 Corporate Blvd. Plain City,OH 43064.

Project Number: 0113030

Date Received:	1/29/2013	**Carrier:**	Fed-X overnight
Client Name:	Air Polution Testing	**Analysis:**	M23
Tracking number:	492310276940	**Package Temp:**	8.8°C (IcePak-Cooler)
Custody Seals ?:	No	**COC:** ☑	check if COC from client

Sample Information

Client ID:	Laboratory ID	Date	Matrix:	Container:	Comment:
M23 Incinerator Filter Run 1 Cont 1	0113030-01	1/24/2013	Filter	Petri Dish Small	
M23 Incinerator Ace + Meth Run 1 Cont 2	0113030-02	1/24/2013	Liquid	250mL Amber WM Bottle	
M23 Incinerator Toluene Run 1 Cont 3	0113030-03	1/24/2013	Liquid	250mL Amber WM Bottle	
M23 Incinerator PCDD/PCDF Trap Run 1 apt011713-5	0113030-04	1/24/2013	Solid	M23 Trap	
M23 Incinerator Filter Run 2 Cont 1	0113030-05	1/24/2013	Filter	Petri Dish Small	
M23 Incinerator Ace + Meth Run 2 Cont 2	0113030-06	1/24/2013	Liquid	250mL Amber WM Bottle	
M23 Incinerator Toluene Run 2 Cont 3	0113030-07	1/24/2013	Liquid	250mL Amber WM Bottle	

Laboratory Receiving Initials

0113030

1/29/2013 9:43:34 AM

DAT SAMPLE RECEIVING

7715 Corporate Blvd. Plain City,OH 43064.

Project Number: 0113030

Client ID:	Laboratory ID	Date	Matrix:	Container:	Comment:
M23 Incinerator PCDD/PCDF Trap Run 2 apt011713-4	0113030-08	1/24/2013	Solid	M23 Trap	
M23 Incinerator Filter Run 3 Cont 1	0113030-09	1/24/2013	Filter	Petri Dish Small	
M23 Incinerator Ace + Meth Run 3 Cont 2	0113030-10	1/24/2013	Liquid	250mL Amber WM Bottle	
M23 Incinerator Toluene Run 3 Cont 3	0113030-11	1/24/2013	Liquid	250mL Amber WM Bottle	
M23 Incinerator PCDD/PCDF Trap Run 3 apt011713-3	0113030-12	1/24/2013	Solid	M23 Trap	

Laboratory Receiving Initials

0113030

1/29/2013 9:43:34 AM

Method 26A

Stericycle Incorporated
Incinerator
Davis County, UT
1/22/2013

Method 26A - Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method

Sample Calculations - 0.1N H_2SO_4 Matrix

Train Blank

Ion	Inj. 1 RT (min)	Inj. 1 Area (µS*min)	Inj. 2 RT (min)	Inj. 2 Area (µS*min)	Average RT (min)	Average Area (µS*min)	OK?	Dilution	Conc. (µg/mL)	Sample Volume (mL)	Hydrogen Halide Mass (µg)
Chloride	4.544	0.0071	4.547	0.0075	4.546	0.0073	Y	1	0.0477	322	15.8

Run 1

Ion	Inj. 1 RT (min)	Inj. 1 Area (µS*min)	Inj. 2 RT (min)	Inj. 2 Area (µS*min)	Average RT (min)	Average Area (µS*min)	OK?	Dilution	Conc. (µg/mL)	Sample Volume (mL)	Hydrogen Halide Mass (µg)
Chloride	4.537	1.0490	4.540	1.0553	4.539	1.0522	Y	100	646.0187	749	497416.3

Run 2

Ion	Inj. 1 RT (min)	Inj. 1 Area (µS*min)	Inj. 2 RT (min)	Inj. 2 Area (µS*min)	Average RT (min)	Average Area (µS*min)	OK?	Dilution	Conc. (µg/mL)	Sample Volume (mL)	Hydrogen Halide Mass (µg)
Chloride	4.534	0.5820	4.537	0.5859	4.536	0.5840	Y	100	368.4729	650	238637.8

Run 3

Ion	Inj. 1 RT (min)	Inj. 1 Area (µS*min)	Inj. 2 RT (min)	Inj. 2 Area (µS*min)	Average RT (min)	Average Area (µS*min)	OK?	Dilution	Conc. (µg/mL)	Sample Volume (mL)	Hydrogen Halide Mass (µg)
Chloride	4.537	0.2324	4.537	0.2351	4.537	0.2338	Y	100	150.4732	658	106424.3

Run 4

Ion	Inj. 1 RT (min)	Inj. 1 Area (µS*min)	Inj. 2 RT (min)	Inj. 2 Area (µS*min)	Average RT (min)	Average Area (µS*min)	OK?	Dilution	Conc. (µg/mL)	Sample Volume (mL)	Hydrogen Halide Mass (µg)
Chloride	4.537	0.5399	4.537	0.5420	4.537	0.5409	Y	100	342.1818	717	252214.0

Run 5

Ion	Inj. 1 RT (min)	Inj. 1 Area (µS*min)	Inj. 2 RT (min)	Inj. 2 Area (µS*min)	Average RT (min)	Average Area (µS*min)	OK?	Dilution	Conc. (µg/mL)	Sample Volume (mL)	Hydrogen Halide Mass (µg)
Chloride	4.533	0.0958	4.537	0.0957	4.535	0.0957	Y	100	62.0938	658	42001.7

Stericycle Incorporated
Incinerator
Davis County, UT
1/22/2013

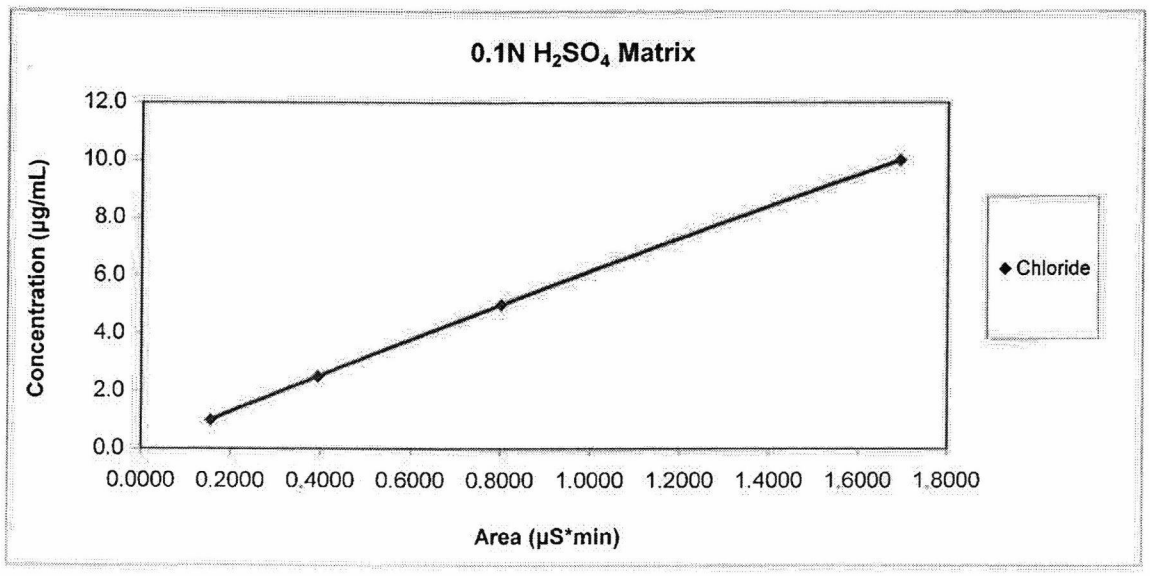
Method 26A - Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method

Calibration and Quality Control							
Chloride - 0.1N H_2SO_4 Matrix							
Standard Conc. (µg/mL)	Initial Cal.		Post-Test Check		Average		
	RT (min)	Area (µS*min)	RT (min)	Area (µS*min)	RT (min)	Area (µS*min)	OK?
1.0	4.544	0.1565	4.544	0.1617	4.544	0.1591	Y
2.5	4.543	0.3928	4.54	0.4084	4.542	0.4006	Y
5.0	4.54	0.8011	4.541	0.8128	4.541	0.8069	Y
10.0	4.544	1.6931	4.541	1.7131	4.543	1.7031	Y

Stericycle Incorporated
Incinerator
Davis County, UT
1/22/2013

Method 26A - Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method

Regression Calculations					
Chloride - 0.1N H_2SO_4 Matrix					
Standard Conc. (µg/mL)	Area (µS*min)	Constants ($y = ax^2 + bx$) a	b	Curve Conc. (µg/mL)	R^2
1.0	0.1565	-0.3633	6.5221	1.0	1.0000
2.5	0.3928			2.5	
5.0	0.8011			5.0	
10.0	1.6931			10.0	



M5 Filters

Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	TB	Test Date:	1/22/2013	9-Jun-12	10:10 AM	0.3645	29-Jan-13	1:54 PM	0.3650	0.00050
Description:	M26A			11-Jun-12	10:13 AM	0.3647	30-Jan-13	10:16 AM	0.3652	
APT Sample ID:	filter									
Identification:			54539	avg tare mass (gm):		0.36460	avg final mass(gm):		0.36510	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	1	Test Date:	1/22/2013	11-Jun-12	10:36 AM	0.3611	29-Jan-13	1:57 PM	0.3720	0.01095
Description:	M26A			13-Jun-12	4:12 PM	0.3607	30-Jan-13	10:11 AM	0.3717	
APT Sample ID:	filter									
Identification:			54561	avg tare mass (gm):		0.36090	avg final mass(gm):		0.37185	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	2	Test Date:	1/22/2013	8-Jun-12	3:03 PM	0.3669	29-Jan-13	2:04 PM	0.3844	0.01760
Description:	M26A			9-Jun-12	9:50 AM	0.3664	30-Jan-13	10:08 AM	0.3841	
APT Sample ID:	filter									
Identification:			54517	avg tare mass (gm):		0.36665	avg final mass(gm):		0.38425	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	3	Test Date:	1/22/2013	8-Jun-12	3:13 PM	0.3587	29-Jan-13	2:00 PM	0.3724	0.01370
Description:	M26A			9-Jun-12	9:45 AM	0.3585	30-Jan-13	10:12 AM	0.3722	
APT Sample ID:	filter									
Identification:			54547	avg tare mass (gm):		0.35860	avg final mass(gm):		0.37230	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	4	Test Date:	1/22/2013	11-Jun-12	10:58 AM	0.3654	29-Jan-13	1:58 PM	0.3807	0.01535
Description:	M26A			13-Jun-12	3:34 PM	0.3649	30-Jan-13	10:14 AM	0.3803	
APT Sample ID:	filter									
Identification:			54504	avg tare mass (gm):		0.36515	avg final mass(gm):		0.38050	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	5	Test Date:	1/23/2013	8-Jun-12	3:12 PM	0.3647	29-Jan-13	1:55 PM	0.3743	0.00965
Description:	M26A			9-Jun-12	9:45 AM	0.3646	30-Jan-13	10:18 AM	0.3743	
APT Sample ID:	filter									
Identification:			54544	avg tare mass (gm):		0.36465	avg final mass(gm):		0.37430	

Acetone Rinse

Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	TB	Test Date:	1/22/2013	3-Dec-12	9:32 AM	5.7823	30-Jan-13	8:29 AM	5.7837	0.00115
Description:	M26A			4-Dec-12	3:45 PM	5.7826	31-Jan-13	8:41 AM	5.7835	
APT Sample ID:	filter									
Identification:			17821	avg tare mass (gm):		5.78245	avg final mass(gm):		5.78360	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	1	Test Date:	1/22/2013	3-Dec-12	9:41 AM	5.9069	30-Jan-13	8:27 AM	5.9941	0.08685
Description:	M26A			4-Dec-12	3:47 PM	5.9072	31-Jan-13	8:39 AM	5.9937	
APT Sample ID:	filter									
Identification:			17816	avg tare mass (gm):		5.90705	avg final mass(gm):		5.99390	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	2	Test Date:	1/22/2013	3-Dec-12	9:30 AM	5.7397	30-Jan-13	8:30 AM	5.7510	0.01135
Description:	M26A			4-Dec-12	3:43 PM	5.7399	31-Jan-13	8:43 AM	5.7513	
APT Sample ID:	filter									
Identification:			17834	avg tare mass (gm):		5.73980	avg final mass(gm):		5.75115	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	3	Test Date:	1/22/2013	3-Dec-12	9:30 AM	5.7960	30-Jan-13	8:32 AM	5.8015	0.00560
Description:	M26A			4-Dec-12	3:42 PM	5.7960	31-Jan-13	8:44 AM	5.8017	
APT Sample ID:	filter									
Identification:			17835	avg tare mass (gm):		5.79600	avg final mass(gm):		5.80160	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	4	Test Date:	1/22/2013	3-Dec-13	9:33 AM	5.7017	30-Jan-13	8:30 AM	5.9010	0.19895
Description:	M26A			4-Dec-13	3:47 PM	5.7022	31-Jan-13	8:42 AM	5.9008	
APT Sample ID:	filter									
Identification:			17828	avg tare mass (gm):		5.70195	avg final mass(gm):		5.90090	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	5	Test Date:	1/23/2013	3-Dec-13	9:44 AM	5.8834	30-Jan-13	8:26 AM	5.8860	0.00265
Description:	M26A			4-Dec-13	3:44 PM	5.8835	31-Jan-13	8:41 AM	5.8862	
APT Sample ID:	filter									
Identification:			17806	avg tare mass (gm):		5.88345	avg final mass(gm):		5.88610	

Chloride	Chloride	min Chloride ECD_1	µS*min Chloride ECD_1	% Chloride ECD_1	µS Chloride ECD_1	% Chloride ECD_1	mg/L Chloride ECD_1
1	Pre Cal 1.0 mg/L Chloride Standard in H2SO4	4.544	0.15650	100.00	1.03	100.00	1.0973
2	Pre Cal 2.5 mg/L Chloride Standard in H2SO4	4.543	0.39282	100.00	2.59	100.00	2.4767
3	Pre Cal 5.0 mg/L Chloride Standard in H2SO4	4.540	0.80110	100.00	5.37	100.00	4.8598
4	Pre Cal 10.0 mg/L Chloride Standard in H2SO4	4.544	1.69312	100.00	11.64	100.00	10.0662
5	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
6	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
7	Pre Cal 0.5 mg/L Fluoride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
8	Pre Cal 1.0 mg/L Fluoride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
9	Pre Cal 2.5 mg/L Fluoride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10	Pre Cal 5.0 mg/L Fluoride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
13	TB H2SO4 inj #1	4.544	0.00710	47.79	0.04	100.00	0.2254
14	TB H2SO4 inj #2	4.547	0.00753	48.95	0.05	45.77	0.2278
15	Run 1 H2SO4 inj #1 100X	4.537	1.04900	95.81	7.27	95.36	630.6677
16	Run 1 H2SO4 inj #2 100X	4.540	1.05532	95.73	7.23	95.34	634.3552
17	Run 2 H2SO4 inj #1 100X	4.534	0.58202	93.99	3.98	93.42	358.0998
18	Run 2 H2SO4 inj #2 100X	4.537	0.58588	94.05	3.98	93.44	360.3531
19	Run 3 H2SO4 inj #1 100X	4.537	0.23239	91.79	1.56	90.77	154.0304
20	Run 3 H2SO4 inj #2 100X	4.537	0.23512	91.54	1.57	90.63	155.6250
21	Run 4 H2SO4 inj #1 100X	4.537	0.53992	94.06	3.66	93.56	333.5299
22	Run 4 H2SO4 inj #2 100X	4.537	0.54197	94.28	3.66	93.64	334.7255
23	Run 5 H2SO4 inj #1 100X	4.533	0.09575	98.46	0.64	98.36	74.2810
24	Run 5 H2SO4 inj #2 100X	4.537	0.09568	98.90	0.64	98.61	74.2381
25	Run 1 H2SO4 inj #1 10X	4.581	14.37624	96.61	100.39	96.43	840.9440
26	Run 1 H2SO4 inj #2 10X	4.581	14.41014	96.60	100.46	96.42	842.9226
27	Run 2 H2SO4 inj #1 10X	4.560	7.77896	95.16	55.00	94.85	455.8773
28	Run 2 H2SO4 inj #2 10X	4.560	7.78226	95.14	55.46	94.87	456.0701
29	Run 3 H2SO4 inj #1 10X	4.544	2.73569	92.39	19.16	91.87	161.5144
30	Run 3 H2SO4 inj #2 10X	4.544	2.74559	92.40	19.07	91.86	162.0924
31	Run 4 H2SO4 inj #1 10X	4.557	6.97057	95.19	49.55	94.91	408.6935
32	Run 4 H2SO4 inj #2 10X	4.560	7.00137	95.22	49.84	94.93	410.4912
33	Run 5 H2SO4 inj #1	4.584	13.81092	98.86	95.00	99.06	80.7947
34	Run 5 H2SO4 inj #2	4.580	13.85329	98.87	95.48	99.06	81.0421
35	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
36	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
37	Post Cal 1.0 mg/L Chloride Standard in H2SO4	4.544	0.16167	100.00	1.02	100.00	1.1276
38	Post Cal 2.5 mg/L Chloride Standard in H2SO4	4.540	0.40843	100.00	2.62	100.00	2.5678
39	Post Cal 5.0 mg/L Chloride Standard in H2SO4	4.541	0.81279	100.00	5.28	100.00	4.9280
40	Post Cal 10.0 mg/L Chloride Standard in H2SO4	4.541	1.71306	100.00	11.42	100.00	10.1826
41	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
42	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
43	Post Cal 0.5 mg/L Flouride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
44	Post Cal 1.0 mg/L Flouride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
45	Post Cal 2.5 mg/L Flouride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
46	Post Cal 5.0 mg/L Flouride Standard in H2SO4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
47	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
48	DI H2O	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
49	Stop	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Sum:	136.443	102.632	2801.792	714.659	2843.151	7048.107
	Average:	4.548	3.421	93.393	23.822	94.772	234.937
	Rel.Std.Dev:	0.333 %	142.650 %	13.449 %	142.810 %	10.321 %	109.505 %

26A Analysis Worksheet

Analyst	Dan W
Date	1-28-13
Job Code	ST E2357
Matrix	H_2SO_4
Notes	M26A

Sample	Sample Decription	Run #	Volume (mL)
		TB	322
		1	749
		2	630
		3	688
		4	717
		5	658

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE2357	PROJECT MANAGER: Danny Stumbras		CHAIN OF CUSTODY #
CLIENT NAME: Stericycle Incorporated	TELEPHONE # / FAX #: 860.830.4565		Page 1 of 7
ADDRESS	DATE: 1.25.13		CONTRACT/PURCHASE/QUOTE #
CITY: Davis County / STATE: UT / ZIP CODE:	SITE CONTACT: Steve McCombs	LAB CONTACT: M. Pearson / LAB NUMBER:	CARRIER / WAYBILL #

SAMPLE I.D	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M26A Incinerator Filter Cont1	TB	54539	1.22.13	Filter	26A	
" " cont.1	1	054561				
" " cont. 1	2	054517				
" " cont.1	3	054547				
" " cont.1	4	054504				
" " cont.1	5	54544	1.23.13			
M26A Incinerator F½ Ace cont2	TB	17821	1.22.13	Acetone		
" " cont.2	1	17816				
" " cont.2	2	17834				
" " cont.2	3	17835				
" " cont.2	4	17828				
" " cont.2	5	17806	1.23.13			

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE)
NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE)
RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR _____ MONTHS

TURN AROUND TIME: (CIRCLE)
24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER_____

1. Relinquished By: [signature]	Date: 1.25.13	Time: 22:45	1. Received By: [signature]	Date: 1/26/13	Time: 10:30
2. Relinquished By: [signature]	Date: 1/26/13	Time: 15:40	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments:

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stumbras		CHAIN OF CUSTODY #:
CLIENT NAME: Stericycle Incorporated	TELEPHONE # / FAX #: 860.830.4565		Page 2 of 7
ADDRESS:	DATE: 1·25·13		CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County / STATE: UT / ZIP CODE:	SITE CONTACT: Steve McCombar	LAB CONTACT: M. Pearson / LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M26A Incinerator 0.1N H_2SO_4 cont.3	TB		1·22·13	0.1N H_2SO_4	26A	
" " cont.3	1					
" " cont.3	2					
" " cont.3	3					
" " cont.3	4					
" " cont.3	5		1·23·13			
M26A Incinerator 0.1N NaOH cont.4	TB		1·22·13	0.1N NaOH		
cont.4	1					
cont.4	2					
cont.4	3					
cont.4	4					
cont.4	5		1·23·13			

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE)
NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE)
RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR _____ MONTHS

TURN AROUND TIME: (CIRCLE)
24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER_____

1. Relinquished By: [signature]	Date: 1·25·13	Time: 22:45	1. Received By: [signature]	Date: 1/26/13	Time: 10:30
2. Relinquished By: [signature]	Date: 1-26-13	Time: 15:40	2. Received By:	Date:	Time:
3. Relinquished By:	Date:	Time:	3. Received By:	Date:	Time:

Comments:

Method 29

AIR
POLLUTION
TESTING, INC.
DENVER, SALT LAKE CITY

1/30/2013

To: Tom Lockhart
First Analytical Lab
7517 Precision Dr
Suite 101
Raleigh, NC 27617

From: Jim Davidson
Air Pollution Testing, Inc.
5530 Marshall St.
Arvada, Colorado 80002

RE: Samples for Method 29
APT Project Code:STE2357

Packages: 2

Samples: 28 (3 runs and a set of reagent blanks)

Analysis:

- Method 29 – Mercury CVAAS (All fractions analyzed separately), Cadmium and Lead ICPMS (Combine front and back half sample fractions)

The data package goes to Paul Ottenstein (POttenstein@airtest.net). Please do not hesitate to contact Paul (303.420.5949 ext. 58) or me if you have any questions.

Regards,

Jim Davidson
Lab Technician
Air Pollution Testing Inc.
303.420.5949 x58

DENVER OFFICE
5530 Marshall Street
Arvada, CO 80002
(303) 420-5949
FAX (303) 420-5920
(800) 268-6213

Air Pollution Testing, Inc.
Gravimetric Laboratory Data Sheet

STE2357

Metals Filters

Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	TB	Test Date:	1/23/2013	14-Jun-12	11:41 AM	0.4406	29-Jan-13	1:51 PM	0.4407	-0.00015
Description:	M29			18-Jun-12	11:29 AM	0.4406	30-Jan-13	9:57 AM	0.4402	
APT Sample ID:	filter									
Identification:			8149	avg tare mass (gm):		0.44060	avg final mass(gm):		0.44045	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	RB	Test Date:	1/23/2013	14-Jun-12	11:45 AM	0.4620	29-Jan-13	1:46 PM	0.4627	0.00070
Description:	M29			18-Jun-12	11:23 AM	0.4619	30-Jan-13	9:55 AM	0.4626	
APT Sample ID:	filter									
Identification:			8124	avg tare mass (gm):		0.46195	avg final mass(gm):		0.46265	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	1	Test Date:	1/23/2013	14-Jun-12	11:55 AM	0.4664	29-Jan-13	1:49 PM	0.4662	-0.00020
Description:	M29			18-Jun-12	11:21 AM	0.4669	30-Jan-13	9:53 AM	0.4667	
APT Sample ID:	filter									
Identification:			8116	avg tare mass (gm):		0.46665	avg final mass(gm):		0.46645	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	2	Test Date:	1/23/2013	14-Jun-12	11:52 AM	0.4382	29-Jan-13	1:48 PM	0.4391	0.00075
Description:	M29			18-Jun-12	11:22 AM	0.4383	30-Jan-13	9:58 AM	0.4389	
APT Sample ID:	filter									
Identification:			8150	avg tare mass (gm):		0.43825	avg final mass(gm):		0.43900	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	3	Test Date:	1/23/2013	14-Jun-12	11:56 AM	0.4564	29-Jan-13	1:50 PM	0.4577	0.00085
Description:	M29			18-Jun-12	11:18 AM	0.4568	30-Jan-13	9:56 AM	0.4572	
APT Sample ID:	filter									
Identification:			8128	avg tare mass (gm):		0.45660	avg final mass(gm):		0.45745	

Acetone Rinse

Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	TB	Test Date:	1/23/2013	2-Jul-12	10:15 AM	71.4641	30-Jan-13	8:41 AM	71.4671	0.00340
Description:	M29			3-Jul-12	10:35 AM	71.4638	30-Jan-13	5:04 PM	71.4676	
APT Sample ID:	filter									
Identification:			23250	avg tare mass (gm):		71.46395	avg final mass(gm):		71.46735	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	RB	Test Date:	1/23/2013	17-Jul-12	9:13 AM	71.5483	30-Jan-13	8:48 AM	71.5503	0.00200
Description:	M29			18-Jul-12	9:11 AM	71.5478	30-Jan-13	5:05 PM	71.5498	
APT Sample ID:	filter									
Identification:			23370	avg tare mass (gm):		71.54805	avg final mass(gm):		71.55005	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	1	Test Date:	1/23/2013	2-Jul-12	10:11 AM	72.3837	30-Jan-13	8:36 AM	72.4039	0.02065
Description:	M29			3-Jul-12	10:54 AM	72.3833	30-Jan-13	5:03 PM	72.4044	
APT Sample ID:	filter									
Identification:			23249	avg tare mass (gm):		72.38350	avg final mass(gm):		72.40415	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	2	Test Date:	1/23/2013	2-Jul-12	10:24 AM	71.1901	30-Jan-13	8:44 AM	71.1940	0.00400
Description:	M29			3-Jul-12	10:11 AM	71.1904	30-Jan-13	5:08 PM	71.1945	
APT Sample ID:	filter									
Identification:			23273	avg tare mass (gm):		71.19025	avg final mass(gm):		71.19425	
Project Code:	STE2357	Stack ID:		Date	Time	Tare	Date	Time	Final	Net
Run #:	3	Test Date:	1/23/2013	18-Jul-12	8:19 AM	72.7935	30-Jan-13	8:46 AM	72.7980	0.00480
Description:	M29			18-Jul-12	3:34 PM	72.7934	30-Jan-13	5:07 PM	72.7985	
APT Sample ID:	filter									
Identification:			23335	avg tare mass (gm):		72.79345	avg final mass(gm):		72.79825	

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE	PROJECT MANAGER	CHAIN OF CUSTODY #
STE 2357	Danny Stumbras	
CLIENT NAME: Stericycle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 3 of 7
ADDRESS	DATE: 1-25-13	CONTRACT/PURCHASE/QUOTE #
CITY: Davis County; STATE: UT; ZIP CODE	SITE CONTACT: Steve McCombes; LAB CONTACT: M. Pearson; LAB NUMBER	CARRIER / WAYBILL #

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M29 Incinerator Filter cont. 12	RB	8124	1.23.12	Metals Filters	29	
100ml Ace. cont. 7		23370		Acetone		
300ml 0.1 HNO_3 cont. 8A				0.1N HNO_3		
100ml H_2O cont. 8B				D.I. H_2O		
200ml 5% HNO_3/10% H_2O_2 cont. 9				5% HNO_3/10% H_2O_2		
100ml $KMnO_4$ cont. 10				$KMnO_4$		
25ml 8N HCl cont. 11				8N HCl		
M29 Incinerator Metals Filter cont. 1	TB	8149		Metals Filter		
" " cont. 1	1	8116				
" " cont. 1	2	8150				
" " cont. 1	3	8128				

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER

	Date	Time		Date	Time
1. Relinquished By	1.25.13	22:45	1. Received By: Carlen Benlit	1/26/13	10:30
2. Relinquished By	1-26-13	18:40	2. Received By		
3. Relinquished By			3. Received By		

Comments:

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stumbras	CHAIN OF CUSTODY #:
CLIENT NAME: Steigle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 4 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County; STATE: UT; ZIP CODE:	SITE CONTACT: Steve McCombes; LAB CONTACT: M. Pearson; LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M29 Incinerator F½ Ace cont. 2	TB	23250 ~~23238~~	1.23.12	Acetone	29	
" " cont. 2	1	23249				
" " cont. 2	2	23273				
" " cont. 2	3	23335				
M29 Incinerator F½ 0.1N HNO3 Cont. 3	TB			0.1N HNO3		
" " cont. 3	1					
" " cont. 3	2					
" " cont. 3	3					
M29 Incinerator 5% HNO3/10% H2O2 cont. 4	TB			5% HNO3/10% H2O2		
" " cont. 4	1					
" " cont. 4	2					
" " cont. 4	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER ____

	Date	Time		Date	Time
1. Relinquished By: [signature]	1.25.13	22:45	1. Received By: Carolan Bennett	1/26/13	10:30
2. Relinquished By: [signature]	1-26-13	18:40	2. Received By:		
3. Relinquished By:			3. Received By:		

Comments:

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Scumbras	CHAIN OF CUSTODY #:
CLIENT NAME: Stericycle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 5 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County / STATE: UT / ZIP CODE:	SITE CONTACT: Steve McCombs / LAB CONTACT: M. Pearson / LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE I.D.	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M29 Incinerator 0.1N HNO_3 cont. 5A	TB		1.23.13	0.1N HNO_3	29	
" " cont. 5A	1					
" " cont. 5A	2					
" " cont. 5A	3					
M29 Incinerator $KMnO_4$ cont. 5b	TB			$KMnO_4$		
" " cont. 5b	1					
" " cont. 5b	2					
" " cont. 5b	3					
M29 Incinerator 8N HCl cont. 5c	TB					
cont. 5c	1					
cont. 5c	2					
cont. 5c	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER

	Date	Time		Date	Time
1. Relinquished By: [signature]	1.25.13	22:45	1. Received By: [signature]	1-26-13	10:30
2. Relinquished By: [signature]	1-26-13	18:40	2. Received By:		
3. Relinquished By:			3. Received By:		

Comments:

FAL FIRST ANALYTICAL

ANALYSIS REPORT

NELAP Cert. No. 04053

Method 29: Multi-metals

Project ID: STE 2357

Prepared for:

Air Pollution Testing, Inc.
5530 Marshall Street
Arvada, CO 80002

FAL FIRST ANALYTICAL

Reviewed by:

Thomas Lockhart
Laboratory Manager

February 08, 2013

Do not reproduce this report except in whole without permission of the laboratory.
This report meets the requirements of LAC33/NELAP.

CASE NARRATIVE

FAL Project #: 130201 **Report Date:** 08-Feb-13
Client: Air Pollution Testing, Inc.
Client Project ID: STE 2357

Samples:

Four sets of Method 29 samples, including one blank set, were submitted for analysis. The target elements were cadmium, lead and mercury. The samples were received in good condition with no apparent leakage or damage. All of the remaining amounts of the samples and digestates will be retained by the laboratory for six months and then discarded.

Preparation & Analysis:

The Method 29 samples were prepared and analyzed according to EPA Method 29, *Determination of Metals Emissions from Stationary Sources*. The front and back halves were analyzed separately, and the results combined per customer request.

Cadmium and lead were determined by Inductively Coupled Plasma – Mass Spectrometry (ICP-MS).

Mercury was determined by Cold Vapor Atomic Absorption Spectrometry (CVAA)

Results:

The Method 29 metals results are presented as total micrograms of each element present in the whole analytical fraction indicated.

Quality Control:

There were no analytes of interest detected in the Laboratory Blank. All of the elements for the Laboratory Control Spikes were within the acceptance limits of 80% to 120%. All of the Matrix Spike QC samples were within the acceptance limits of 75% to 125%, unless otherwise noted. All of the required duplicate samples had a relative percent difference of 20% or less, or did not have an applicable calculation due to the result being less than five times the detection limit. All of the samples were analyzed at least in duplicate.

FIRST ANALYTICAL LABORATORIES
billing: PO Box 110372 - Research Triangle Park, NC 27709
shipping: 7517 Precision Drive, Suite 101 - Raleigh, NC 27617
TEL: 919 942 8607
FAX: 919 882 1603
www.firstanalyticallabs.com

ANALYSIS REPORT

FAL Project #: 130201
Client: Air Pollution Testing Inc.
Client Project ID: STE 2357

Report Date: 08-Feb-13
Date Received: 01-Feb-13

Total Micrograms in Sample

Sample	Cd	Pb
	µg	µg
M29 Run 1 Total	1.7	6.9
M29 Run 2 Total	1.5	23.8
M29 Run 3 Total	1.7	3.6
M29 Blank Front	0.6	<0.5

QC SUMMARY

	Cd	Pb
Spike, %Rec. Front	101%	108%
Spike, %Rec. Back	101%	110%
Duplicate, %RPD Front	N/A	3%
Duplicate, %RPD Back	N/A	N/A

FIRST ANALYTICAL LABORATORIES
billing PO Box 110372 - Research Triangle Park, NC 27709
shipping 7517 Precision Drive, Suite 101 - Raleigh, NC 27617
TEL 919 942 8607
FAX 919 882 1603
www.firstanalyticallabs.com

ANALYSIS REPORT

FAL Project #: 130201
Client: Air Pollution Testing, Inc.
Client Project ID: STE 2357

Report Date: 08-Feb-13
Date Received: 01-Feb-13

Total Micrograms of Mercury in Sample

Sample	Frac 1B µg	Frac2B µg	Frac3A µg	Frac3B µg	Frac3C µg
Method 29 Run 1	0.7	0.4	< 0.2	< 0.4	1.6
Method 29 Run 2	0.4	0.4	< 0.2	0.5	< 1.0
Method 29 Run 3	< 0.4	0.6	< 0.2	< 0.4	< 1.0
Blank	< 0.4	< 0.3	< 0.1	< 0.1	< 1.0

QC SUMMARY

Duplicate, %RPD	N/A
Matrix Spike, % Recovery	102%

AIR
POLLUTION
TESTING, INC.
DENVER, SALT LAKE CITY

130201

1/30/2013

To: Tom Lockhart
First Analytical Lab
7517 Precision Dr
Suite 101
Raleigh, NC 27617

From: Jim Davidson
Air Pollution Testing, Inc.
5530 Marshall St.
Arvada, Colorado 80002

RE: Samples for Method 29
APT Project Code:STE2357

Packages: 2

Samples: 28 (3 runs and a set of reagent blanks)

Analysis:

- Method 29 – Mercury CVAAS (All fractions analyzed separately), Cadmium and Lead ICPMS (Combine front and back half sample fractions)

The data package goes to Paul Ottenstein (POttenstein@airtest.net). Please do not hesitate to contact Paul (303.420.5949 ext. 58) or me if you have any questions.

Regards,

Jim Davidson
Lab Technician
Air Pollution Testing Inc.
303.420.5949 x58

DENVER OFFICE
5530 Marshall Street
Arvada, CO 80002
(303) 420-5949
FAX (303) 420-5920
(800) 268-6213

2/1/13 - 5 day TAT (ie [illegible])
per client phone call - SA

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

130201

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stumbras	CHAIN OF CUSTODY #:
CLIENT NAME: Stericycle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 3 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County; STATE: UT; ZIP CODE:	SITE CONTACT: Steve McCombes; LAB CONTACT: M. Pearson; LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE ID	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M29 Incinerator Filter cont. 12	RB	8124	1.23.12	Metals Filters	29	
100ml Ace. cont. 7		~~23370~~		~~Acetone~~ Conc. HNO_3		
300ml 0.1 HNO_3 cont. 8A				0.1N HNO_3		
100ml H_2O cont. 8B				D.I. H_2O		
200ml 5% HNO_3/10% H_2O_2 cont. 9				5% HNO_3/10% H_2O_2		
100ml $KMnO_4$ cont. 10				$KMnO_4$		
25ml 8N HCl cont. 11				8N HCl		
M29 Incinerator Metals Filter cont. 1	TB	8149		Metals Filter		
" " cont. 1	1	8116				
" " cont. 1	2	8150				
" " cont. 1	3	8128				

POSSIBLE HAZARD IDENTIFICATION (CIRCLE): NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL (CIRCLE): RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ___ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER ___

	Date	Time		Date	Time
1. Relinquished By: [signature]	1.25.13	22:45	1. Received By: [signature]	1/26/13	10:30
2. Relinquished By: [signature]	1-26-13	19:40	2. Received By: [signature]	2/1/13	11:30
3. Relinquished By:			3. Received By:		

Conditions:

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

130201

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357	PROJECT MANAGER: Danny Stumbras	CHAIN OF CUSTODY #:
CLIENT NAME: Steigle Incorporated	TELEPHONE # / FAX #: 860.830.4565	Page 4 of 7
ADDRESS:	DATE: 1.25.13	CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County; STATE: UT; ZIP CODE:	SITE CONTACT: Steve McCombes; LAB CONTACT: M. Pearson; LAB NUMBER:	CARRIER / WAYBILL #:

SAMPLE ID	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M29 Incinerator F½ Acc cont. 2	TB	~~23250~~ ~~17828~~	1.23.13	~~Acetone~~ Conc. HNO_3	29	
" " cont. 2	1	~~23249~~				
" " cont. 2	2	~~23273~~				
" " cont. 2	3	~~23335~~				
M29 Incinerator F½ 0.1N HNO_3 Cont. 3	TB			0.1N HNO_3		
" " cont. 3	1					
" " cont. 3	2					
" " cont. 3	3					
M29 Incinerator 5% HNO_3/10% H_2O_2 cont. 4	TB			5% HNO_3/10% H_2O_2		
" " cont. 4	1					
" " cont. 4	2					
" " cont. 4	3					

POSSIBLE HAZARD IDENTIFICATION: (CIRCLE) NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ____ MONTHS

TURN AROUND TIME: (CIRCLE) 24HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER

	Date	Time		Date	Time
1. Relinquished By: [signature]	1.25.13	22:45	1. Received By: Carlos Bernal	1/26/13	10:30
2. Relinquished By: [signature]	1-26-13	18:40	2. Received By: [signature]	2/1/13	11:30
3. Relinquished By:			3. Received By:		

Comments:

130201

CHAIN OF CUSTODY RECORD

Temperature on Receipt _____

AIR POLLUTION TESTING
5530 MARSHALL ST.
ARVADA, CO 80002
T: (303) 420-5949
F: (303) 420-5920

PROJECT CODE: STE 2357
PROJECT MANAGER: Danny Snumbras
CHAIN OF CUSTODY #:
CLIENT NAME: Stericycle Incorporated
TELEPHONE # / FAX #: 860.830.4565
Page 5 of 7
ADDRESS:
DATE: 1.25.13
CONTRACT/PURCHASE/QUOTE #:
CITY: Davis County
STATE: UT
ZIP CODE:
SITE CONTACT: Steve McConnon
LAB CONTACT: M. Beason
LAB NUMBER:
CARRIER / WAYBILL #:

SAMPLE ID	RUN	FILTER/BEAKER ID	DATE COLLECTED	MATRIX	ANALYSIS	SPECIAL CONDITIONS
M29 Incinerator 0.1N HNO_3 cont. 5A	TB		1.23.13	0.1N HNO_3	29	
" " cont. 5A	1					
" " cont. 5A	2					
" " cont. 5A	3					
M29 Incinerator $KMnO_4$ cont. 5b	TB			$KMnO_4$		
" " cont. 5b	1					
" " cont. 5b	2					
" " cont. 5b	3					
M29 Incinerator 8N HCl cont. 5c	TB					
cont. 5c	1					
cont. 5c	2					
cont. 5c	3					

POSSIBLE HAZARD IDENTIFICATION (CIRCLE): NON HAZARD FLAMMABLE SKIN IRRITANT POISON B UNKNOWN

SAMPLE DISPOSAL: (CIRCLE) RETURN TO CLIENT DISPOSAL BY LAB ARCHIVE FOR ___ MONTHS

TURN AROUND TIME: (CIRCLE) 24-HRS 48HRS 7 DAYS 14 DAYS 21DAYS OTHER

Relinquished By	Date	Time	Received By	Date	Time
1. [signature]	1.25.13	22:45	1. [signature]	1-26-13	10:30
2. [signature]	1-26-13	18:40	2. [signature]	2/1/13	11:30
3.			3.		

Comments:

AIR POLLUTION TESTING, INC.

Appendix Four: Calibration Information

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE OF ACCURACY: Interference Free™ Multi-Component EPA Protocol Gas

Assay Laboratory
AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: ALEX MONGOLD
Document # : 40357633-022

Customer
AIR POLLUTION TESTING
DOCUMENT #40339425
1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC148642 **Certification Date:** 26Jan2011 **Exp. Date:** 25Jan2014
Cylinder Pressure*:** 2015 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
CARBON DIOXIDE	10.1	%	+/- 1%	Direct NIST and VSL
OXYGEN	10.0	%	+/- 1%	
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1675	02Oct2012	K008042	13.93 %	CARBON DIOXIDE
NTRM 2658	01Feb2016	K012175	10.03 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0929062	20Jan2011	FTIR
OXYMAT/6E/W5-951	03Jan2011	PARAMAGNETIC

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis **Second Triad Analysis** **Calibration Curve**

CARBON DIOXIDE
Date: 24Jan2011 Response Unit:%
Z1 = -0.00126 R1 = 13.89519 T1 = 10.02541
R2 = 13.91872 Z2 = -0.00089 T2 = 10.03893
Z3 = 0.00224 T3 = 10.04378 R3 = 13.92530
Avg. Concentration: 10.05 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 9.99996E-1
Constants: A = 0.00000E+0
B = 7.82576E-1 C = 9.21200E-3
D = 0.00000E+0 E = 0.00000E+0

OXYGEN
Date: 26Jan2011 Response Unit:VOLTS
Z1 = 0.00000 R1 = 10.06000 T1 = 10.04000
R2 = 10.07000 Z2 = 0.00000 T2 = 10.04000
Z3 = 0.00000 T3 = 10.04000 R3 = 10.07000
Avg. Concentration: 10.00 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999999
Constants: A = 0.00196901
B = 0.995310479 C =
D = E =

APPROVED BY: ADAM HANLEY

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott

RATA CLASS

Dual-Analyzed Calibration Standard

8832 DICE ROAD, SANTA FE SPRINGS, CA 90670-2516 Phone: 800-323-2212 Fax: 562-464-5262

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A52011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
8832 DICE ROAD
SANTA FE SPRINGS, CA 90670-2516

P.O. No.: ALEX
Document # : 43901637-003

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

A

ANALYTICAL INFORMATION Gas Type : OC2

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM057190 **Certification Date:** 28Nov2011 **Exp. Date:** 27Nov2014
Cylinder Pressure*:** 2000 PSIG **Batch No:** SBO0045711

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
CARBON DIOXIDE	20.0	%	+/- 1%	Direct NIST and VSL
OXYGEN	21.2	%	+/- 1%	Direct NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1800	01Mar2013	KO21824	17.87 %	CARBON DIOXIDE
NTRM 2350	01Dec2011	KO21316	23.20 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN B/3400/2806	11Nov2011	FID & TCD
VARIAN B/3400/2806	14Nov2011	FID & TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis **Second Triad Analysis** **Calibration Curve**

CARBON DIOXIDE

Date: 28Nov2011 Response Unit: AREA
Z1 = 0.00000 R1 = 10790329 T1 = 12112198
R2 = 10782467 Z2 = 0.00000 T2 = 12086777
Z3 = 0.00000 T3 = 12072709 R3 = 10761707
Avg. Concentration: 20.04 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999997 1800
Constants: A = 0.023482995
B = 0.0000016631 C =
D = E =

OXYGEN

Date: 28Nov2011 Response Unit: AREA
Z1 = 0.00000 R1 = 11709907 T1 = 10691387
R2 = 11701255 Z2 = 0.00000 T2 = 10682068
Z3 = 0.00000 T3 = 10674657 R3 = 11705834
Avg. Concentration: 21.17 %

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999999 2350
Constants: A = 0.005324257
B = 0.0000019839 C =
D = E =

APPROVED BY: DC

RATA CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 A Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE™ OF ACCURACY: Interference Free Multi-Component EPA Protocol Gas

Assay Laboratory

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: CODE & GO
Project No.: 08-93221-001

Customer
AIR LIQUIDE

1676 SOUTH 700 WEST
SALT LAKE CITY UT 84104

ANALYTICAL INFORMATION Gas Type : OC2

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM056421
Cylinder Pressure*:** 2015 PSIG
Certification Date: 22Sep2010
Exp. Date: 20Sep2013
Batch No: LGM0006539

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON DIOXIDE	5.07 %	+/- 1%	Direct NIST and VSL
OXYGEN	5.05 %	+/- 1%	
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2000	15Dec2011	K001817	4.954 %	CARBON DIOXIDE
NTRM 2658	02Oct2010	ALM065029	9.930 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0929062	20Sep2010	FTIR
OXYMAT/6E/W5-951	30Aug2010	PARAMAGNETIC

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

	First Triad Analysis	Second Triad Analysis	Calibration Curve
CARBON DIOXIDE			
Date: 20Sep2010	Response Unit: %		Concentration = A + Bx + Cx2 + Dx3 + Ex4
Z1 = 0.00054	R1 = 4.94722 T1 = 5.05907		r = 9.99998E-1
R2 = 4.95422	Z2 = 0.00084 T2 = 5.06818		Constants: A = 0.00000E+0
Z3 = 0.00105	T3 = 5.06989 R3 = 4.95645		B = 9.22910E-1 C = 5.02780E-2
Avg. Concentration:	5.067 %		D = 1.40000E-3 E = 0.00000E+0
OXYGEN			
Date: 22Sep2010	Response Unit: VOLTS		Concentration = A + Bx + Cx2 + Dx3 + Ex4
Z1 = 0.00000	R1 = 9.93500 T1 = 5.06500		r = 0.999999
R2 = 9.93400	Z2 = 0.00000 T2 = 5.05800		Constants: A = -0.01312411
Z3 = 0.00000	T3 = 5.05400 R3 = 9.93800		B = 1.001680155 C =
Avg. Concentration:	5.050 %		D = E =

APPROVED BY: ADAM HANLEY

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

8832 DICE ROAD, SANTA FE SPRINGS, CA 90670-2516 Phone: 800-323-2212 Fax: 562-464-5262

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A52011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
8832 DICE ROAD
SANTA FE SPRINGS, CA 90670-2516

P.O. No.: ALEX
Document # : 43901637-007

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION Gas Type : NO

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: AAL069565 **Certification Date:** 21Nov2011 **Exp. Date:** 20Nov2013
Cylinder Pressure*:** 2015 PSIG **Batch No:** SB00045182

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
NITRIC OXIDE	89.9	PPM	+/- 1%	Direct NIST and VSL
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	89.9	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1684	19May2016	KAL003513	96.91 PPM	

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//001785245	10Nov2011	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis

NITRIC OXIDE
Date: 14Nov2011 Response Unit: PPM
Z1=0.02090 R1=97.04202 T1=90.01076
R2=97.19729 Z2=0.05282 T2=90.06907
Z3=0.09167 T3=90.19193 R3=97.24314
Avg. Concentration: 89.65 PPM

Second Triad Analysis

Date: 21Nov2011 Response Unit: PPM
Z1=-0.03933 R1=96.75943 T1=89.81357
R2=96.85427 Z2=0.01806 T2=89.90531
Z3=0.05985 T3=89.95915 R3=96.88658
Avg. Concentration: 89.96 PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99981E-1
Constants: A=0.00000E+0
B=9.24548E-1 C=2.47000E-4
D=0.00000E+0 E=0.00000E+0

Special Notes: DO NOT USE SCANDINA CAPS BOTTLES TO BE ANALYZED TO 3 DECIMAL SPOTS

APPROVED BY: Tan Ngo

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A42011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: ALEXMONGOLD 6211
Document # : 42621490-002

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION Gas Type : NO

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC148625 **Certification Date:** 01Aug2011 **Exp. Date:** 31Jul2013
Cylinder Pressure*:** 2000 PSIG **Batch No:** LGM0031896

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
NITRIC OXIDE	198	PPM	+/- 1%	Direct NIST and VSL
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	199.	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1685	01Jun2012	KAL004396	242.0 PPM	NITRIC OXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0929062	05Jul2011	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis

NITRIC OXIDE
Date: 25Jul2011 Response Unit:PPM
Z1=-0.14635 R1=241.3654 T1=197.7908
R2=241.5315 Z2=-0.14447 T2=198.6544
Z3=-0.00893 T3=198.6608 R3=242.2123
Avg. Concentration: 198.6 PPM

Second Triad Analysis

Date: 01Aug2011 Response Unit: PPM
Z1=0.04565 R1=243.0955 T1=198.3898
R2=243.2160 Z2=0.07985 T2=199.0790
Z3=0.11657 T3=199.5736 R3=243.2363
Avg. Concentration: 198.0 PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99991E-1
Constants: A=0.00000E+0
B=9.53054E-1 C=1.69000E-4
D=0.00000E+0 E=0.00000E+0

Special Notes: DO NOT USE SCANDINA CAPS BOTTLES TO BE ANALYZED TO 3 DECIMAL SPOTS

APPROVED BY: for
Jon Witzak

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

8832 DICE ROAD, SANTA FE SPRINGS, CA 90670-2516 Phone: 800-323-2212 Fax: 562-464-5262

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A52011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
8832 DICE ROAD
SANTA FE SPRINGS, CA 90670-2516

P.O. No.: ALEX
Document # : 43901637-010

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION Gas Type : NONE

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC261602
Cylinder Pressure*:** 2000 PSIG
Certification Date: 16Nov2011
Exp. Date: 15Nov2014
Batch No: SB00045214

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON MONOXIDE	8.24 PPM	+/- 1%	Direct NIST and VSL
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1677	01Jun2012	KAL004074	9.855 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
LOW CO ANALY/APMA-360CE/42898860031	17Oct2011	NDIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

CARBON MONOXIDE

Date: 09Nov2011 Response Unit: PPM

Z1 = 0.00000	R1 = 9.82000	T1 = 8.20100
R2 = 9.81000	Z2 = 0.00000	T2 = 8.20400
Z3 = 0.00000	T3 = 8.21000	R3 = 9.80900

Avg. Concentration: 8.232 PPM

Second Triad Analysis

Date: 16Nov2011 Response Unit: PPM

Z1 = 0.00000	R1 = 9.79600	T1 = 8.19400
R2 = 9.79000	Z2 = 0.00000	T2 = 8.20100
Z3 = 0.00000	T3 = 8.20000	R3 = 9.79500

Avg. Concentration: 8.242 PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.9999902

Constants:	A = -0.049199
B = 1.005070	C = 0
D = 0	E = 0

Special Notes: DO NOT USE SCANDINA CAPS BOTTLES TO BE ANALYZED TO 3 DECIMAL SPOTS PLEASE KEEP ABOVE 8PPM

APPROVED BY: MT

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

8832 DICE ROAD, SANTA FE SPRINGS, CA 90670-2516 Phone: 800-323-2212 Fax: 562-464-5262

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A52011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
8832 DICE ROAD
SANTA FE SPRINGS, CA 90670-2516

P.O. No.: ALEX
Document # : 43901637-011

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION Gas Type : NONE

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC20155 **Certification Date:** 16Nov2011 **Exp. Date:** 15Nov2014
Cylinder Pressure*:** 2000 PSIG **Batch No:** SB00045205

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
CARBON MONOXIDE	15.7	PPM	+/- 1%	Direct NIST and VSL
NITROGEN	B	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2635	05May2016	KAL003101	25.21 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//001785245	03Nov2011	FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

CARBON MONOXIDE
Date: 09Nov2011 Response Unit: PPM

Z1 = -0.01511	R1 = 25.22670	T1 = 15.72754
R2 = 25.23697	Z2 = -0.00328	T2 = 15.72920
Z3 = 0.01203	T3 = 15.77778	R3 = 25.26147

Avg. Concentration: 15.73 PPM

Second Triad Analysis

Date: 16Nov2011 Response Unit: PPM

Z1 = -0.01505	R1 = 25.26849	T1 = 15.69135
R2 = 25.27570	Z2 = 0.01309	T2 = 15.70815
Z3 = 0.01390	T3 = 15.70951	R3 = 25.30698

Avg. Concentration: 15.65 PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 9.99999E-1
Constants: A = 0.00000E+0
B = 8.94136E-1 C = 5.23000E-4
D = 1.00000E-6 E = 0.00000E+0

Special Notes: DO NOT USE SCANDINA CAPS BOTTLES TO BE ANALYZED TO 3 DECIMAL SPOTS

APPROVED BY: Thuan Tran

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 A Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A42012

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: ALEX MONGOLD 62111
Document # : 42653327-001

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION **Gas Type : SO2**

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM004208 **Certification Date:** 27Jul2011 **Exp. Date:** 27Jul2013
Cylinder Pressure*:** 2000 PSIG **Prev Certification Date:** 28Jan2011 **Batch No:** LGM0031795

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	10.2	PPM	+/- 2%	NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1693	01Dec2011	KAL004069	50.20 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0929062	10Jul2011	FTIR

APPROVED BY: JW
Jon Witzak

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A42011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: ALEX MONGOLD 62111
Document # : 42653327-002

Customer
AIR POLLUTION TESTING

1959 SOUTH 4130 WEST
UNIT B
SALT LAKE CITY UT 84104
US

ANALYTICAL INFORMATION Gas Type : SO2

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM020939 **Certification Date:** 27Jul2011 **Exp. Date:** 26Jul2013
Cylinder Pressure*:** 2000 PSIG **Prev Certification Date:** 28Jan2011 **Batch No:** LGM0031799

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	19.6	PPM	+/- 1%	Direct NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1693	01Dec2011	KAL004069	50.20 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0929062	10Jul2011	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis

SULFUR DIOXIDE *
Date: 28Jan2011 Response Unit:PPM
Z1=-0.02052 R1=50.03051 T1=19.53189
R2=50.03581 Z2=-0.01230 T2=19.57746
Z3=-0.00816 T3=19.59595 R3=50.08461
Avg. Concentration: 19.63 PPM

Second Triad Analysis

Date: 27Jul2011 Response Unit: PPM
Z1=-0.01275 R1=50.08249 T1=19.66113
R2=50.11676 Z2=0.00298 T2=19.69426
Z3=0.02271 T3=19.70038 R3=50.13115
Avg. Concentration: 19.72 PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99999E-1
Constants: A=0.00000E+0
B=1.00208E+0 C=-3.60000E-5
D=0.00000E+0 E=0.00000E+0

APPROVED BY: Jon Witzak

AIR POLLUTION TESTING, INC.
THERMOCOUPLE AND DRY GAS METER CALIBRATION DATA

GAS METER ID :	M5-23
DATE :	25-Jan-13
JOB CODE:	STE2357
BARO. PRESS. (MBAR) :	874

GAS METER CALIBRATION

Run #1	DH	Vmet	Tin	Tout	Vref	Tref	DP	Vac	Time
Start	1.5	787.709	62	60	751.075	67.7	0.15	4	10:40 AM
Stop	1.5	795.087	65	62	758.468	67.3	0.15	4	10:50 AM
Avg.	**1.5**	**7.378**	**64**	**61**	**7.393**	**68**	**0.15**	**4**	**10.0**

Run #2	DH	Vmet	Tin	Tout	Vref	Tref	DP	Vac	Time
Start	1.5	795.087	64	62	758.468	68	0.14	4	10:53 AM
	1.5	802.544	67	63	765.952	67.7	0.14	4	11:03 AM
Avg.	**1.5**	**7.457**	**66**	**63**	**7.484**	**68**	**0.14**	**4**	**10.0**

Run #3	DH	Vmet	Tin	Tout	Vref	Tref	DP	Vac	Time
Start	1.5	802.544	66	64	765.952	68	0.14	4	11:07 AM
Stop	1.5	809.998	68	65	773.419	67.4	0.14	4	11:17 AM
Avg.	**1.5**	**7.454**	**67**	**65**	**7.467**	**68**	**0.14**	**4**	**10.0**

	Run #1	Run #2	Run #3	*Average*
Yref	1.0030	1.0030	1.0030	***1.003***
Yd	0.990	0.995	0.997	***0.994***
DH@	1.80	1.75	1.75	***1.77***

Insert M5 Box Pre Yd in Blue Cell	
0.998	**0.4%**

Ref. Meter Yd =	1.003
SLC Reference Meter S/N: 6077490	
Calibrated May 2012	
(Recert May 2013)	

THERMOCOUPLE CALIBRATION

Calibration Temperature Reading (F)	Pyrometer Reading (F)	ABS (Relative Difference) % R
0	-3	0.7
50	45	1.0
100	95	0.9
150	145	0.8
250	247	0.4
500	495	0.5
800	798	0.2
1500	1498	0.1
Max Absolute Difference %		1.0

Omega Temp Calibrator S/N: T-197207
Calibrated March 2012
(Recert March 2013)

PITOT LEAK CHECK

0.00 @ 3" H2O Positive
0.00 @ 3" H2O Negative

Technician: JC

AIR POLLUTION TESTING, INC.
THERMOCOUPLE AND DRY GAS METER CALIBRATION DATA

GAS METER ID :	m5-23
DATE :	17-Dec-12
JOB CODE:	PRECAL
BARO. PRESS. (MBAR) :	858

GAS METER CALIBRATION

Run #1	DH	Vmet	Tin	Tout	Vref	Tref	DP	Vac	Time
Start	0.5	3.385	59	61	659.328	60	0.13	1	11:12 AM
Stop	0.5	14.443	59	62	670.337	59	0.13	1	11:37 AM
Avg.	**0.5**	**11.058**	**59**	**62**	**11.009**	**60**	**0.13**	**1**	**25.0**

Run #2	DH	Vmet	Tin	Tout	Vref	Tref	DP	Vac	Time
Start	1.5	14.443	59	62	670.337	59	0.20	1	11:38 AM
	1.5	25.958	61	59	681.819	57	0.2	1	11:53 AM
Avg.	**1.5**	**11.515**	**60**	**61**	**11.482**	**58**	**0.20**	**1**	**15.0**

Run #3	DH	Vmet	Tin	Tout	Vref	Tref	DP	Vac	Time
Start	3.0	25.958	61	59	681.819	57	0.30	1	11:55 AM
Stop	3.0	36.677	63	60	692.513	58	0.3	1	12:05 PM
Avg.	**3.0**	**10.719**	**62**	**60**	**10.694**	**58**	**0.30**	**1**	**10.0**

	Run #1	Run #2	Run #3	*Average*
Yref	1.0030	1.0030	1.0030	***1.003***
Yd	0.998	1.000	0.997	***0.998***
DH@	1.67	1.65	1.69	***1.67***

Ref. Meter Yd =	1.003

SLC Reference Meter S/N: 6077490
Calibrated May 2012
(Recert May 2013)

THERMOCOUPLE CALIBRATION

Calibration Temperature Reading (F)	Pyrometer Reading (F)	ABS (Relative Difference) % R
0	-2	0.4
50	45	1.0
100	95	0.9
150	146	0.7
250	248	0.3
500	495	0.5
800	798	0.2
1500	1498	0.1
Max Absolute Difference %		1.0

Omega Temp Calibrator S/N: T-197207
Calibrated March 2012
(Recert March 2013)

PITOT LEAK CHECK

0.00 @ 3" H2O Positive
0.00 @ 3" H2O Negative

Technician: MT

Environmental Supply Company, Inc.

Quality Source Sampling Systems & Accessories

Wind Tunnel Pitot Calibration

S-type Pitot ID:	P-734	Date:	26-Apr-12
Standard Pitot ID:	001	Personnel:	DH
Cp(std):	0.99	Cp(actual):	0.826
Part Number:	PPS12-Y-007.5	P(bar):	29.29
Test Velocity (fps):	50	T(°F):	62

A-SIDE

ΔP_{std} (in. H_2O)	ΔP_s (in. H_2O)	Cp(s)	Deviation*
0.551	0.796	0.823	-0.003
0.554	0.794	0.826	0.000
0.551	0.791	0.826	0.000
0.556	0.792	0.830	0.003
	AVERAGE	0.826	0.002
		Std deviation	0.002

B-SIDE

ΔP_{std} (in. H_2O)	ΔP_s (in. H_2O)	Cp(s)	Deviation*
0.551	0.792	0.826	0.000
0.554	0.800	0.824	-0.003
0.553	0.792	0.828	0.001
0.554	0.793	0.828	0.001
	AVERAGE	0.826	0.001
		Std deviation	0.002

$$Cp(s) = Cp(std)\sqrt{\frac{\Delta P(std)}{\Delta P(s)}}$$

Cp(A) - Cp(B) = 0.000 {must be <0.010}

*Deviation = {Cp(s) - *AVG* Cp(s)} {must be <0.010}

Standard deviation of the deviations must be less than 0.02 for both sides.

Pitot tube S/N P-734 was calibrated in accordance with the CFR 40, Part 60 Appendix A, Method 2, Section 10.

Signature

4/26/12
Date

2142 E. Geer Street, Durham, North Carolina 27704 www.environsupply.com 919-956-9688 FAX: 919-682-0333

Environmental Supply Company, Inc.
Quality Source Sampling Systems & Accessories

Wind Tunnel Pitot Calibration

S-type Pitot ID:	**P-722**	Date:	**15-Feb-12**
Standard Pitot ID:	**001**	Personnel:	**DH**
Cp(std):	**0.99**	Cp(actual):	**0.832**
Part Number:	**PPS12-Y-007.5**	P(bar):	**29.71**
Test Velocity (fps):	**50**	T(°F):	**52**

A-SIDE

[illegible]	[illegible]	[illegible]	Deviation
0.580	**0.822**	**0.832**	0.003
0.580	**0.824**	**0.831**	0.002
0.576	**0.826**	**0.826**	-0.002
0.576	**0.830**	**0.825**	-0.004
	AVERAGE	**0.829**	0.003
		Std deviation	0.003

B-SIDE

[illegible]	[illegible]	[illegible]	Deviation
0.576	**0.803**	**0.839**	0.002
0.579	**0.815**	**0.835**	-0.002
0.577	**0.810**	**0.836**	-0.001
0.576	**0.808**	**0.836**	0.000
	AVERAGE	**0.836**	0.001
		Std deviation	0.002

$$Cp(s) = Cp(std)\sqrt{\frac{\Delta P(std)}{\Delta P(s)}}$$

Cp(A) - Cp(B) = 0.008 {must be <0.010}

*Deviation = {Cp(s) - *AVG* Cp(s)} {must be <0.010}

Standard deviation of the deviations must be less than 0.02 for both sides.

Pitot tube S/N P-722 was calibrated in accordance with the CFR 40, Part 60 Appendix A, Method 2, Section 10.

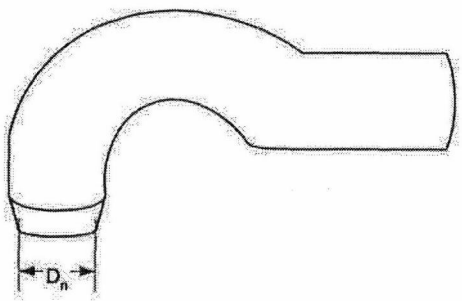
Signature

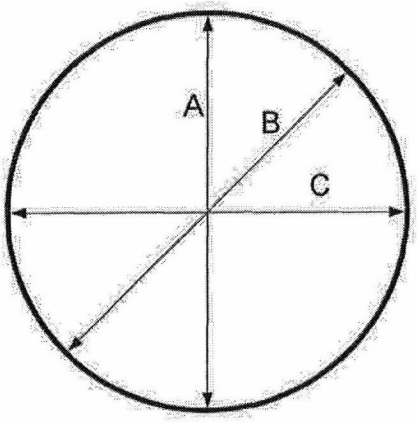
2/15/12
Date

2142 E. Geer Street, Durham, North Carolina 27704 www.environsupply.com 919-956-9688 FAX: 919-682-0333

AIR POLLUTION TESTING, INC.

Geometric Nozzle Calibration Form





	Nozzle ID	Diameter A	Diameter B	Diameter C	Average	Condition?
26A	Run 1 26A	0.308	0.308	0.308	0.308	~~0.3~~ NEW
	Run 2-3	0.276	0.276	0.276	0.276	NEW
	Run 4	0.253	0.253	0.253	0.253	GOOD
	Run 1 (29)	" ↑	↑	↑	0.253	" "
	Run 2-3 (29)	0.260	0.260	0.260	0.260	GOOD
	Run 5 26A	↑	↑	↑	0.260	" "
	Run 1-3 (23)	0.253	0.253	0.253	0.253	GOOD

Note: Highest/lowest diameter must agree within <0.004" (0.1mm).

(see 40 CFR Part 60 Appendix A-3, Method 5, Section 10.1)

Converter Efficiency Test

40 CFR Part. 60, Appendix A, Method 7E, Section 16.2

16.2 - Alternative NO_2 to NO Conversion Efficiency Procedures.

16.2.2 – Add gas from the mid-level NO in N_2 calibration gas cylinder to a clean, evacuated, leak-tight Tedlar bag. Dilute this gas approximately 1:1 with 20.9% O_2, purified air. Immediately attach the bag outlet to the calibration valve assembly and begin operation of the sampling system. Operate the sampling system, recording the NO_X response, for at least 30 minutes. If the NO_2 to NO conversion is 100%, the instrument response will be stable at the highest peak value observed. If the response at the end of 30 minutes decreases more than 2.0% of the highest peak value, the system is not acceptable and corrections must be made before repeating the check.

Date of Test: 1·23·13

Analyzer Type: THERMO

Analyzer S/N: 42:HL-1

Span Value: 0-500

Mid-Level Gas Concentration: 89.9

Start of Test:		After 30 Minutes:	
Time:	8:19	Time:	8:49
NO_x High Peak Response:	37.07	NO_x Final Response:	36.60
NO Response:	32.66	NO Response:	29.93
		NO_X % Decrease:	1.27 %

40 CFR Part. 60, Appendix A, Method 7E, Section 12.9, Equation 7E-9

$$\% \text{ Decrease} = 100 \times \frac{NO_X \text{ Peak} - NO_X \text{ Final}}{NO_X \text{ Peak}}$$

Converter Efficiency Test

40 CFR Part. 60, Appendix A, Method 7E, Section 16.2

16.2 - Alternative NO_2 to NO Conversion Efficiency Procedures.

16.2.2 – Add gas from the mid-level NO in N_2 calibration gas cylinder to a clean, evacuated, leak-tight Tedlar bag. Dilute this gas approximately 1:1 with 20.9% O_2, purified air. Immediately attach the bag outlet to the calibration valve assembly and begin operation of the sampling system. Operate the sampling system, recording the NO_X response, for at least 30 minutes. If the NO_2 to NO conversion is 100%, the instrument response will be stable at the highest peak value observed. If the response at the end of 30 minutes decreases more than 2.0% of the highest peak value, the system is not acceptable and corrections must be made before repeating the check.

Date of Test: 1.25.13

Analyzer Type: THERMO

Analyzer S/N: 42iHL-1

Span Value: 0-500

Mid-Level Gas Concentration: 89.9

Start of Test:		After 30 Minutes:	
Time:	21:31	Time:	22:01
NO_x High Peak Response:	47.47	NO_x Final Response:	46.56
NO Response:	38.00	NO Response:	33.11
		NO_X % Decrease:	1.9%

40 CFR Part. 60, Appendix A, Method 7E, Section 12.9, Equation 7E-9

$$\% \text{ Decrease} = 100 \times \frac{NO_X \text{ Peak} - NO_X \text{ Final}}{NO_X \text{ Peak}}$$

9153

OPACITEK

Environmental Services

Awards this Certificate to

[illegible]

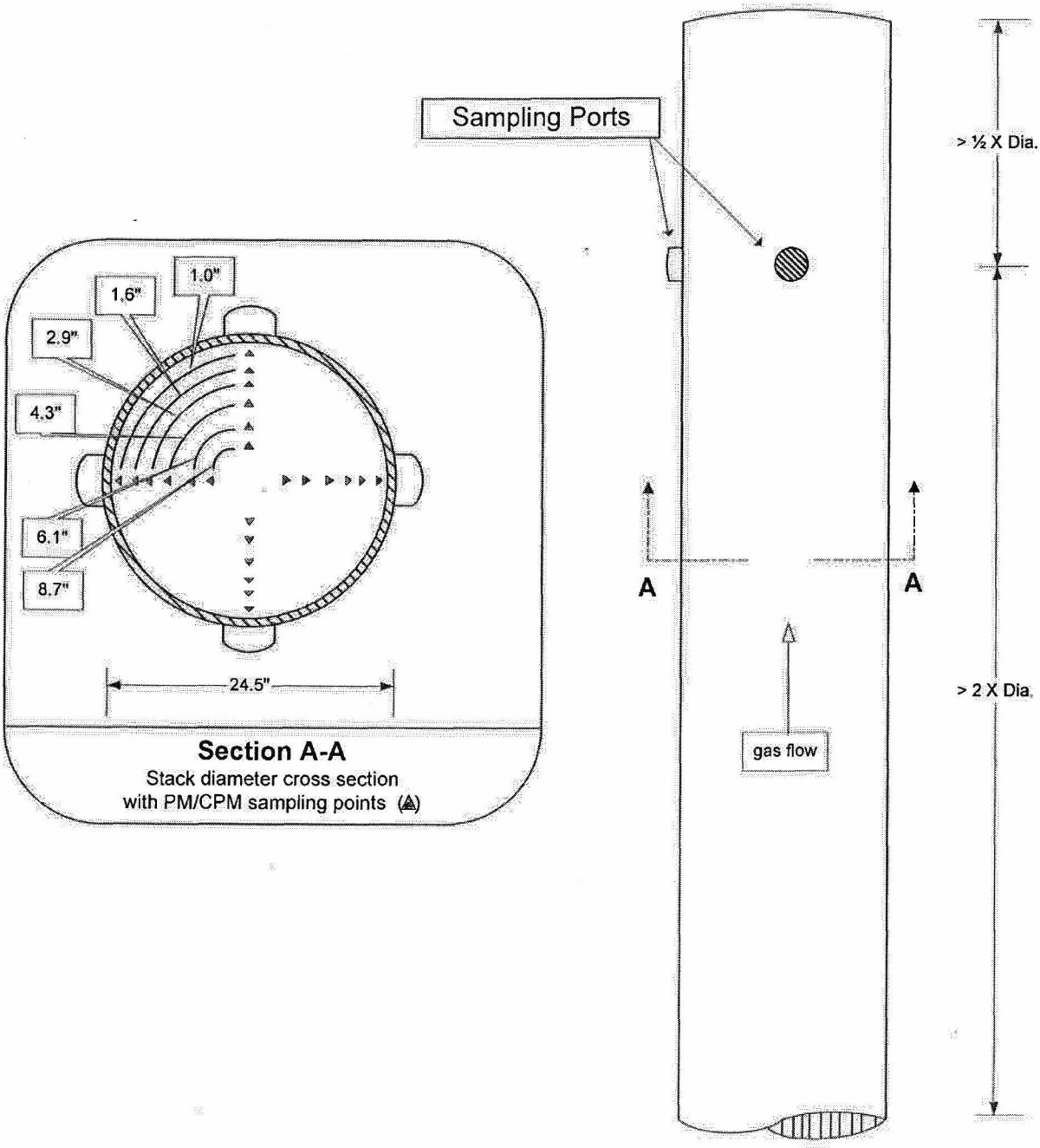
For Successfully Completing the
Federal [illegible] Method
Visible Emissions Evaluation [illegible]

[illegible]
Manager

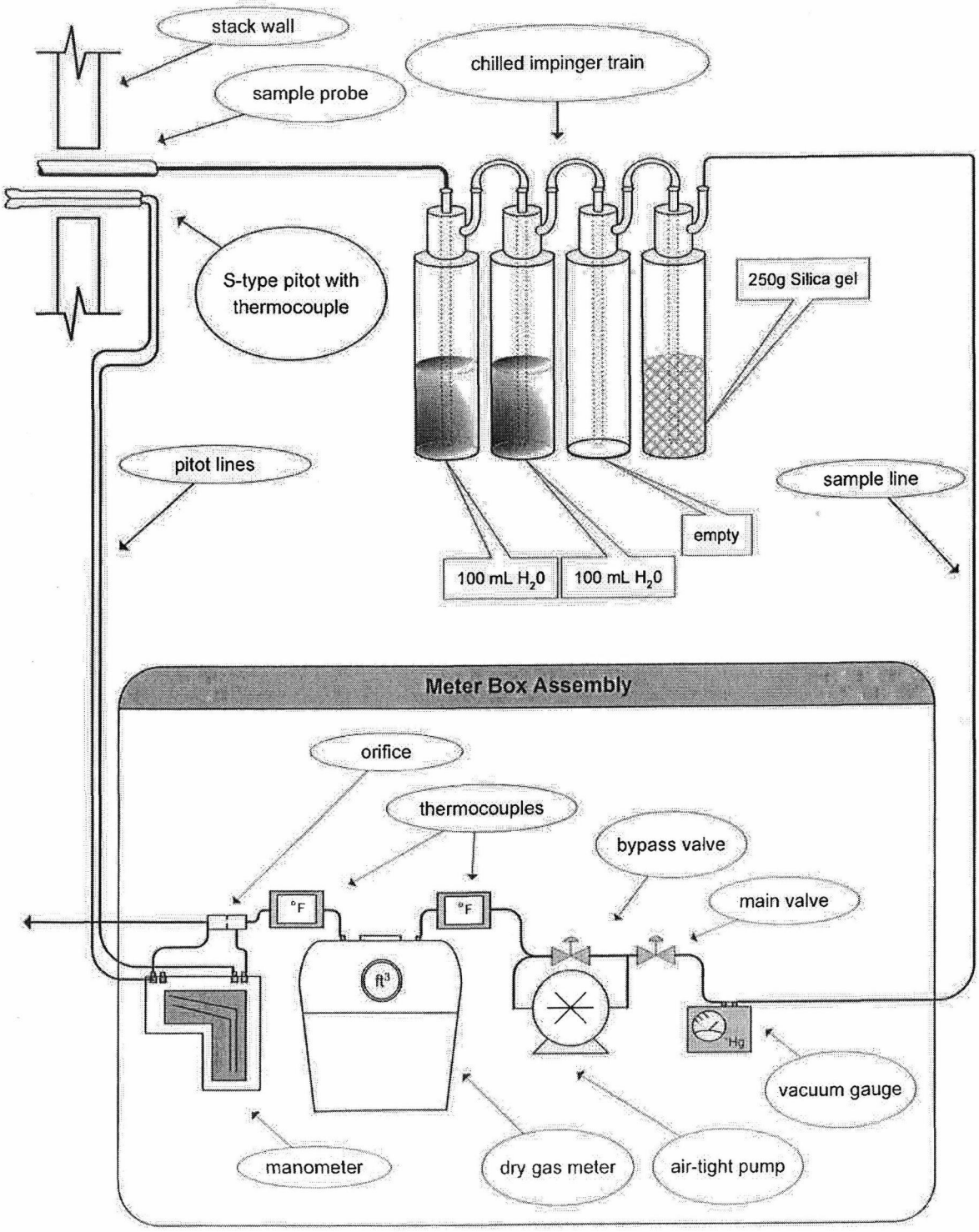
SEP 14 2010
Date of Certification

AIR
POLLUTION
TESTING, INC.

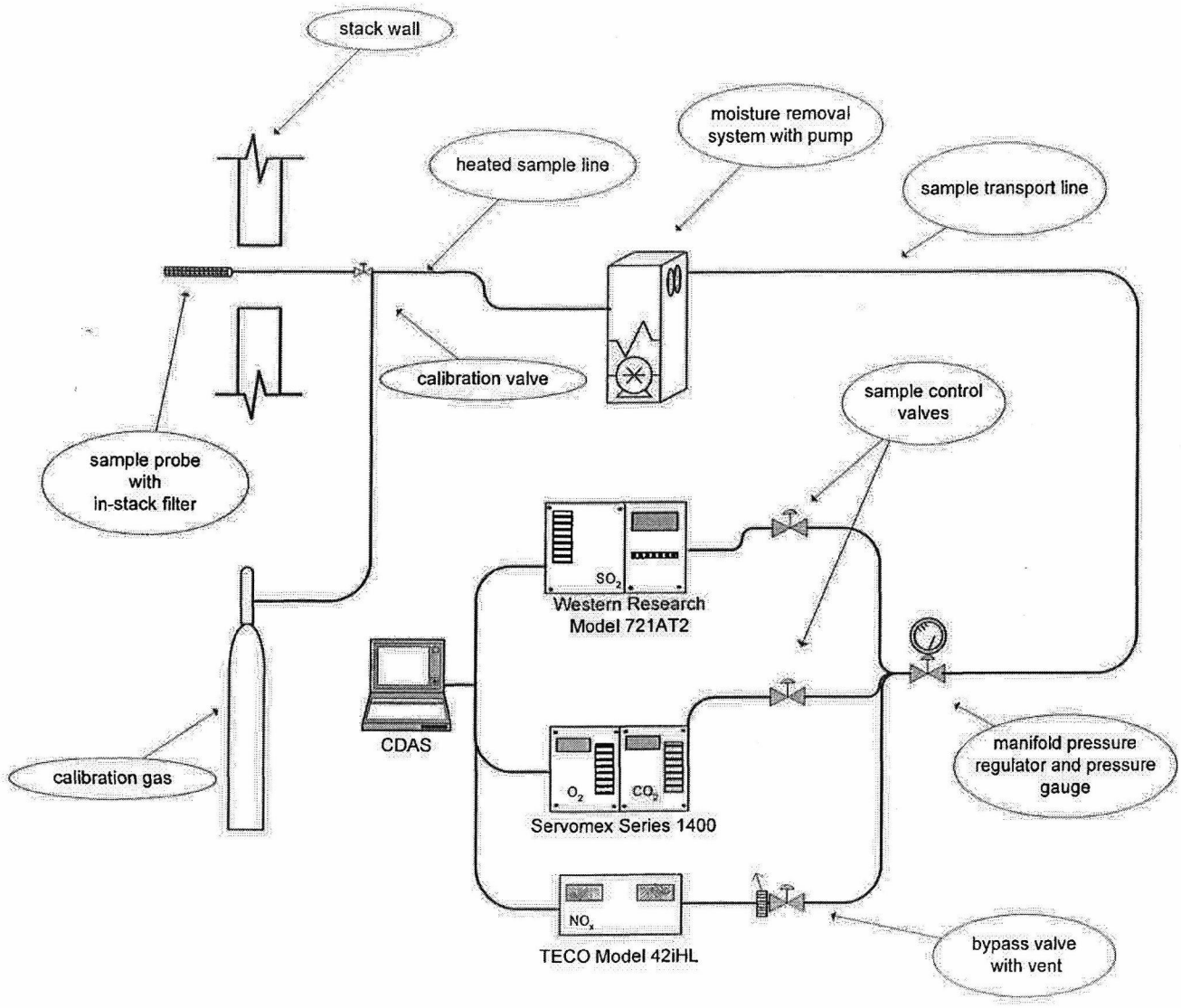
Appendix Five: Schematics



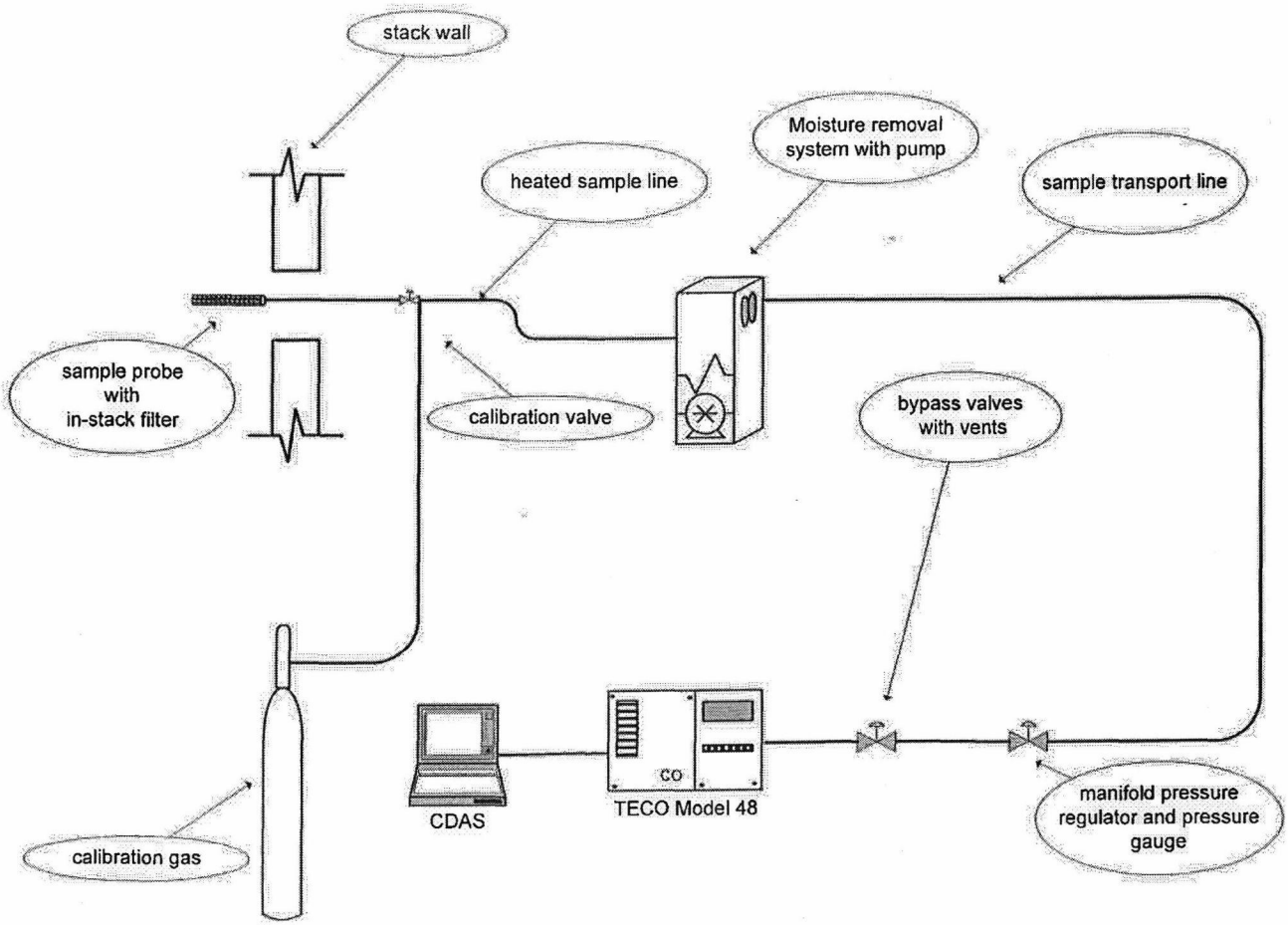
Stericycle Incorporated
Stericycle Medical Waste Disposal Facility
Davis County, Utah
Waste Incinerator
Stack Sampling Location Schematic
(not to scale)



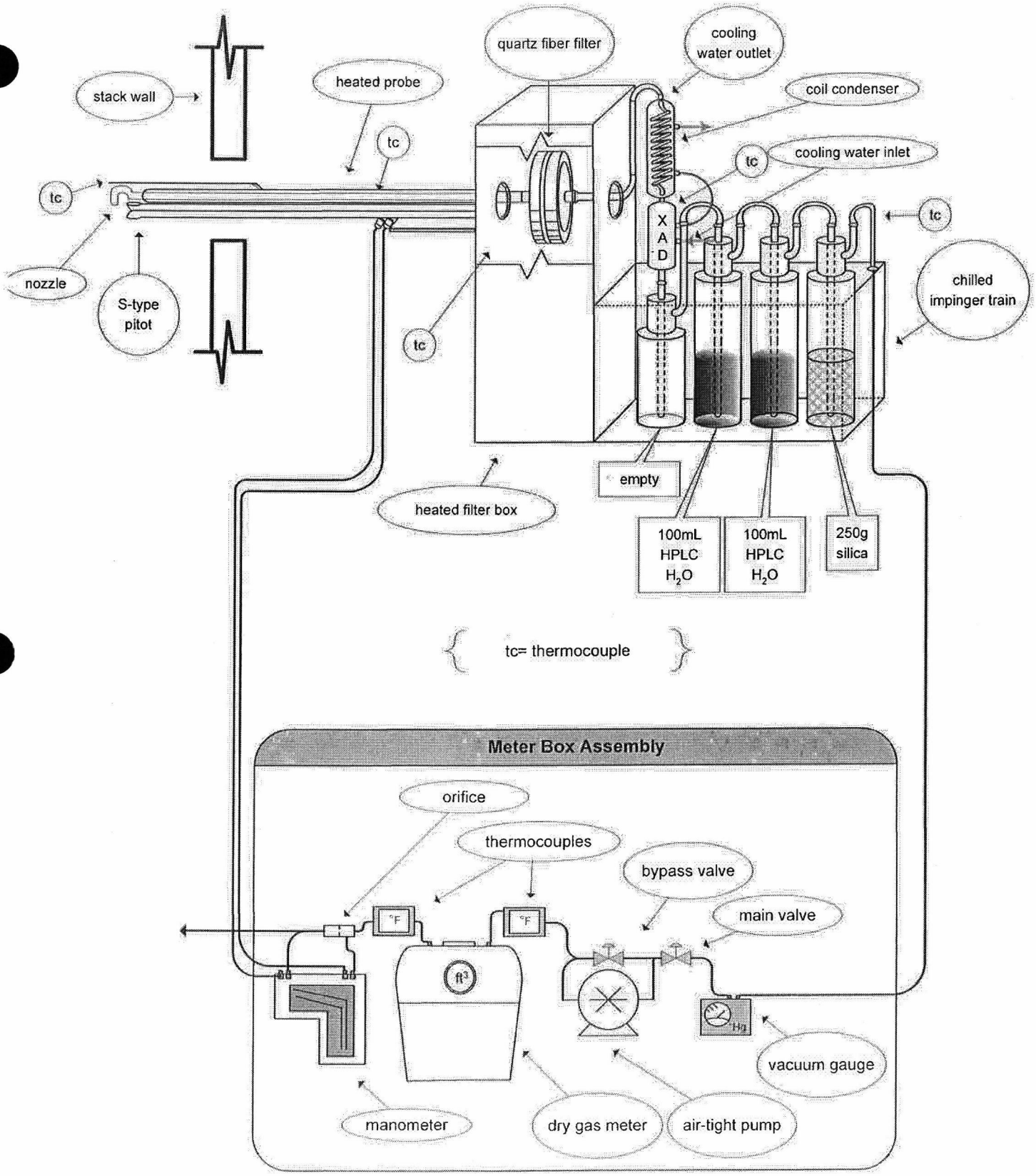
EPA Methods 1,2, & 4
sampling train schematic



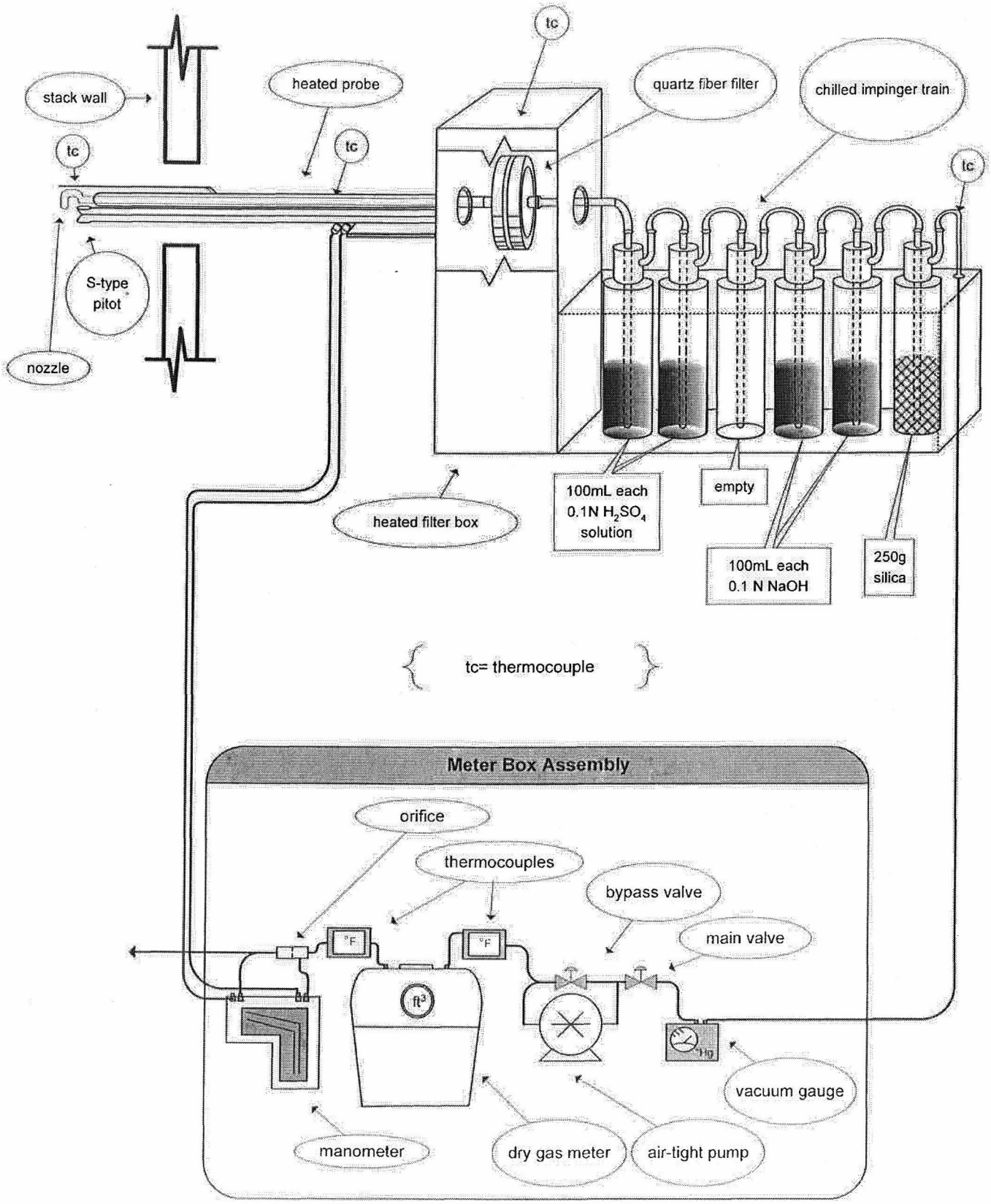
EPA Methods 3A, 6C and 7E sampling train schematic



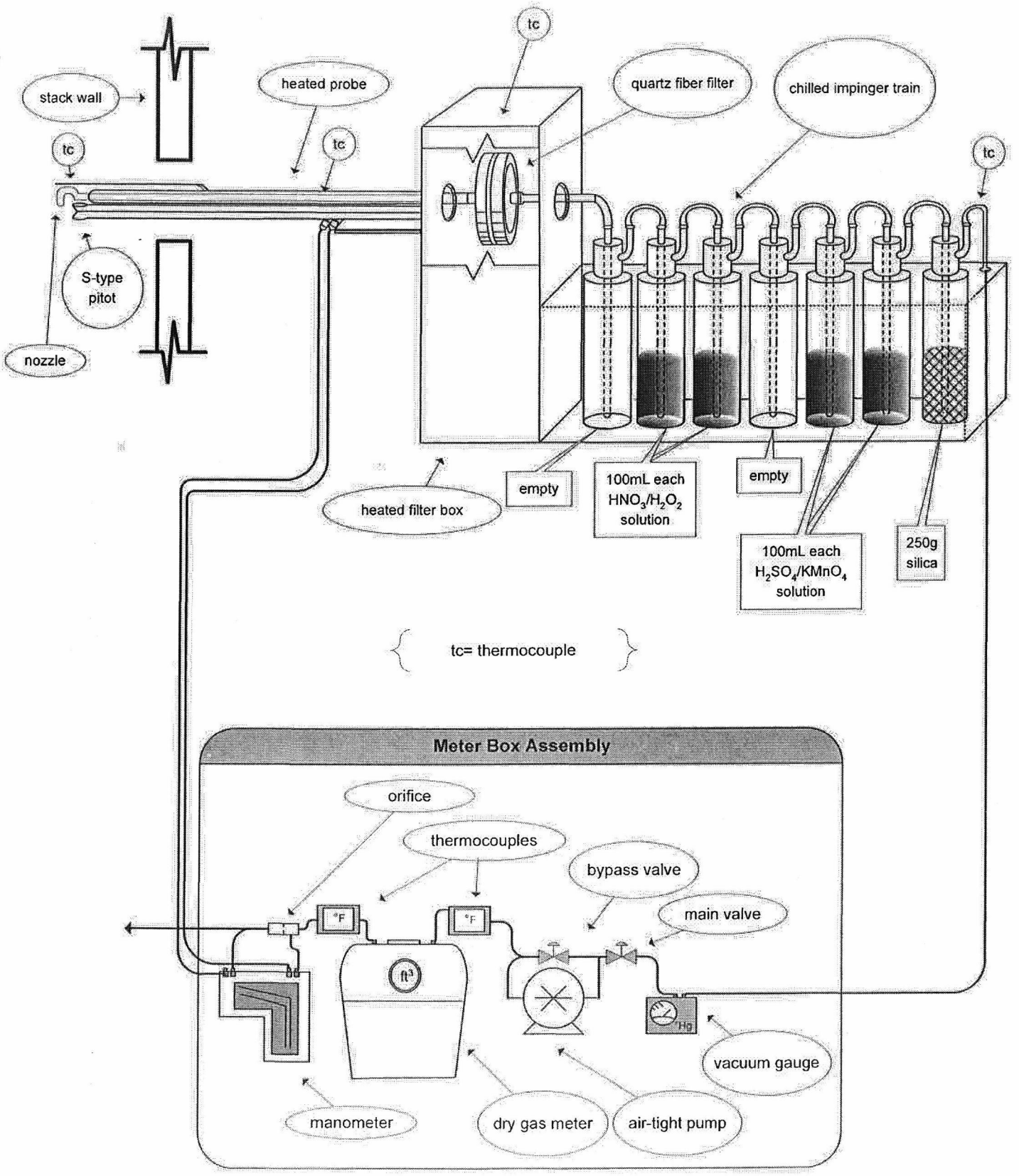
EPA Method 10
sampling train schematic



Method 23
sampling train schematic



EPA Method 26A
sampling train schematic



EPA Method 29
sampling train schematic