

### Wheelabrator South Broward Inc.

Waste Management Company

4400 South State Road 7 Ft. Lauderdale, FL 33314 (954) 581-6606 (954) 581-6705 Fax

April 30, 2009

UPS# 1Z2AW7390196131219

RECEIVED

MAY 01 2009

BUREAU OF AIR REGULATION

Mr. Lennon Anderson
Air Program Administrator
Florida Department of Environmental Protection
Southeast District
400 North Congress Ave., Suite 200
West Palm Beach, FL 33401

Re:

Wheelabrator South Broward

2009 Annual Compliance Stack Test and RATA Reports

Dear Mr. Anderson:

Please find enclosed a copy of the final compliance stack test report and the continuous emissions monitoring system certification RATA report for testing conducted on March 17-19 of this year by Clean Air Engineering, Inc.

I, the undersigned, am a responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this submittal. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements and information in this document are true, accurate and complete.

If there are any questions, please contact this office at (954) 581-6606.

Sincerely,

Jairaj Gosine

Plant Manager

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section (with) UPS# 1Z2AW7390195843176

FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, (with) UPS# 1Z2AW7390196779995

Broward County Department of Planning and Environmental Protection, Air Quality Division (with) UPS# 1Z2AW7390198352227

Chuck Faller (with)
Ram Tewari – BCWRS (without)
Tim Porter (without)
Rob French – MPI (with)

JG/YR090430



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Wheelabrator South Broward, Inc. 4400 South State Road 7 Ft. Lauderdale, FL 33314



MAY 01 2009

PLANEAU OF AM REGULATION

#### REPORT ON COMPLIANCE TESTING

Performed for:

WHEELABRATOR SOUTH BROWARD, INC.
ASH HANDLING SYSTEM, LIME SILO VENTS,
UNITS 1, 2 AND 3 SDA INLETS, FF OUTLETS AND STACKS
FT. LAUDERDALE, FL
VOLUME I OF II

CleanAir Project No: 10735-4 Revision 0: April 28, 2009

To the best of our knowledge, the data presented in this report are accurate, complete, error free, legible and representative of the actual emissions during the test program.

Submitted by,

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Project Manager

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Reviewed by,

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## WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

CleanAir Project No: 10735-4

### **REVISION HISTORY**

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### **REPORT ON COMPLIANCE TESTING**

#### DRAFT REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
D0a	04/20/09	All	Draft version of original document.

#### FINAL REPORT REVISION HISTORY

Revision:	Date	Pages	Comments  Final version of original document.	
0	04/28/09	All		

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#### **PROJECT OVERVIEW**

#### INTRODUCTION

Wheelabrator South Broward, Inc. operates a Refuse to Energy facility, located in Ft. Lauderdale, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection (FDEP). Clean Air Engineering (CleanAir) was contracted to perform a compliance test program at its municipal waste combustor (MWC) facility, located in Ft. Lauderdale, Florida.

The visual emissions were determined by the facility's continuous opacity monitor system (COMS) data, as allowed under Title V Conditions B.53(6), B.76 and B.81. The lime silo fabric filter vent was observed for visual emissions (VEs) and the ash handling system was observed for fugitive emissions. Testing was conducted in accordance with the Wheelabrator North and South Broward Protocol on Compliance, dated February 5, 2009, 40 CFR 60 Subpart Cb, and applicable sections of the facility's Title V Permit No. 0112119-009-AV.

All testing was conducted in accordance with the regulations set-forth by the United States Environmental Protection Agency (EPA) and the FDEP.

### Key Project Participants

Individuals responsible for coordinating and conducting the test program were:

C. Faller – Wheelabrator South Broward

S. Brown - CleanAir

Patty Tampas of the FDEP was present for portions of the test program.

The CleanAir test crew consisted of the following individuals:

B. Wiltse

R. Vicere

P. Bihun

C. Slimp

P. Collins

S. Joint

I. Lopez

K. Kirchner

WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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#### **PROJECT OVERVIEW**

### Test Program Parameters

The sampling conducted at the Units 1, 2 and 3 Spray Dry Absorption (SDA) Inlet and Fabric Filter (FF) Outlets from March 16 through 18, 2009, included the following emissions measurements:

- beryllium;
- · cadmium;
- lead;
- mercury;
- PCDDs and PCDFs (Unit 1 only);
- total suspended particulate (TSP);
- hydrogen chloride;
- fluoride:
- visual emissions;
- fugitive emissions.

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### **PROJECT OVERVIEW**

### TEST PROGRAM SYNOPSIS

#### Test Schedule

The on-site schedule followed during the test program is outlined in Table 1-1.

Table 1-1: Schedule of Activities

Run					Start	End
Number	Location	Method	Analyte	Date	Time	Time
1	Unit 1 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/16/09	06:44	07:44
1	Unit 2 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/16/09	06:56	09:20
1	Unit 2 SDA Inlet	USEPA Method 29	Mercury	03/16/09	06:58	09:20
1	Unit 3 FF Outlet	USEPA Method 13B	Total Fluorides	03/16/09	07:20	08:38
2	Unit 1 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/16/09	08:22	09:22
2	Unit 3 FF Outlet	USEPA Method 13B	Total Fluorides	03/16/09	09:30	10:47
3	Unit 1 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/16/09	09:50	10:50
2	Unit 2 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/16/09	09:58	12:09
2	Unit 2 SDA Inlet	USEPA Method 29	Mercury	03/16/09	09:58	12:09
1	Unit 1 FF Outlet	USEPA Method 23	PCDD/F	03/16/09	11:07	15:32
3	Unit 3 FF Outlet	USEPA Method 13B	Total Fluorides	03/16/09	11:20	12:41
3	Unit 2 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/16/09	12:45	14:59
3	Unit 2 SDA Inlet	USEPA Method 29	Mercury	03/16/09	12:45	14:59
2	Unit 1 FF Outlet	USEPA Method 23	PCDD/F	03/17/09	06:08	10:27
1	Unit 2 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/17/09	06:33	07:33
1	Unit 3 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/17/09	06:33	08:42
1	Unit 3 SDA Inlet	USEPA Method 29	Mercury	03/17/09	06:33	08:42
2	Unit 2 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/17/09	08:26	09:26
2	Unit 3 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/17/09	09:15	11:24
2	Unit 3 SDA Inlet	USEPA Method 29	Mercury	03/17/09	09:15	11:24
3	Unit 2 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/17/09	10:15	11:15
3	Unit 1 FF Outlet	USEPA Method 23	PCDD/F	03/17/09	10:54	15:18
1	Unit 2 FF Outlet	USEPA Method 13B	Total Fluorides	03/17/09	11:43	12:55
3	Unit 3 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/17/09	11:56	14:07
3	Unit 3 SDA Inlet	USEPA Method 29	Mercury	03/17/09	11:56	14:07
1	Ash Handling Sysytem	USEPA Method 22	Fugitive Emissions	03/17/09	12:53	16:33
2	Unit 2 FF Outlet	USEPA Method 13B	Total Fluorides	03/17/09	13:15	14:27
3	Unit 2 FF Outlet	USEPA Method 13B	Total Fluorides	03/17/09	14:40	15:49
1	Unit 1 FF Outlet	USEPA Method 13B	Total Fluorides	03/18/09	06:38	07:50
1	Unit 1 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/18/09	06:41	08:52
1	Unit 1 SDA Inlet	USEPA Method 29	Mercury	03/18/09	06:41	08:52
1	Unit 3 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/18/09	06:56	07:56
2	Unit 1 FF Outlet	USEPA Method 13B	Total Fluorides	03/18/09	08:06	09:21
2	Unit 3 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/18/09	09:13	10:13
2	Unit 1 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/18/09	09:19	11:30
2	Unit 1 SDA Inlet	USEPA Method 29	Mercury	03/18/09	09:19	11:30
1	Lime Silo FF Outlet	USEPA Method 9	Opacity	03/18/09	09:30	11:16
3	Unit 1 FF Outlet	USEPA Method 13B	Total Fluorides	03/18/09	09:47	11:00
3	Unit 3 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCI	03/18/09	10:40	11:40
3	Unit 1 SDA Inlet	USEPA Method 29	Mercury	03/18/09	12:12	14:22
3	Unit 1 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/18/09	12:12	14:22

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#### **PROJECT OVERVIEW**

### **TEST PROGRAM SYNOPSIS (CONTINUED)**

### Results Summary

Table 1-2 summarizes the results of the test program. A more detailed presentation of the test conditions and results of analysis are shown in Tables 2-1 through 2-23 on pages 2-1 through 2-21. Subpart Cb required operating data is summarized in Table 1-3 and opacity and fugitive emission results are presented in Table 1-4, both on page 1-5.

Table 1-2: Summary of Test Results

Sur	nmary of Test	Results		
Source	Average Unit 1	Average Unit 2	Average Unit 3	Permit Limit <sup>1</sup>
Constituent				
Particulate (mg/dscm @7% O₂)	1.7	1.2	1.4	27/25
Visual Emissions (%, by COMS) <sup>2</sup>	0	0	0	10
Fluoride (lb/MMBtu as HF) <sup>3</sup>	<0.0000060	<0.0000055	<0.000058	0.0040
Total PCCD/PCDF (ng/dscm @ 7% O₂)	3.8	NA	NA	30
Hydrogen Chloride (ppmdv @ 7% O₂) <u>or</u> Hydrogen Chloride Removal (%)⁴	15 96%	24 95%	24 96%	29 >95
Beryllium (mg/dscm @ 7% $O_2$ ) Cadmium (mg/dscm @ 7% $O_2$ ) Lead (mg/dscm @ 7% $O_2$ )	<0.000031 0.00037 0.0012	<0.000030 0.00022 0.0014	<0.000030 <0.00015 0.00067	0.001 0.040/0.035 0.44/0.40
Mercury (µg/dscm @ 7% O₂) Mercury Removal (%)⁴	2.3 97%	4.3 88%	4.1 92%	70/50 >85
Carbon Feed Rate (lbs/hr)⁵	5	6	6	NA
Average Steam Flow (Klbs/hr) <sup>6</sup>	184.0	184.2	184.1	192
Average FF Inlet Temperature (°F) <sup>6</sup>	312	317	313	NA

<sup>&</sup>lt;sup>1</sup> Limits obtained from facilities Title V Permit 0112119-009-AV. If a second limit is shown that limit is being implemented by the EPA as of April 28, 2009.

<sup>&</sup>lt;sup>2</sup>Visual Emissions (opacity) was obtained from the facilities COMS data as allowed under Title V Conditions B.53(6), B.76 and B.81.

<sup>&</sup>lt;sup>3</sup>lb/MMBtu calculations used Fd of 9,570 for MSW as per Method 19.

<sup>&</sup>lt;sup>4</sup> Removal for mercury and hydrogen chloride calculated in the unit of its standard (ppmdv @ 7% O<sub>2</sub>). The hydrogen chloride limit is 29 ppmdv @ 7% O<sub>2</sub> or 95% removal and the mercury limit is 70/50 μg/dscm @ 7% O<sub>2</sub> or 85% removal, whichever is less stringent.

<sup>&</sup>lt;sup>5</sup> From 40CFR60.58 b (m)(1)(i) an average mass carbon rate during mercury of dioxin testing. The minimum carbon feed rate is established as the lower of the average carbon feed rates measured during the mercury or dioxin testing

<sup>&</sup>lt;sup>6</sup> From all compliance test runs.

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PROJECT OVERVIEW				
Table 1-3: Subpart Cb Required Operating Data				
Process Condition				
Unit 1 Maximum Demonstrated Combustor Load (Klbs/hr) <sup>1</sup>	184.2			
Unit 2 Maximum Demonstrated Combustor Load (Klbs/hr) <sup>1</sup>	183.9 <sup>2</sup>			
Unit 3 Maximum Demonstrated Combustor Load (Klbs/hr) <sup>1</sup>	184.1 <sup>3</sup>			
Unit 1 Maximum Particulate Control Device Inlet Temperature (°F) <sup>4</sup>	320			
Unit 2 Maximum Particulate Control Device Inlet Temperature (°F) <sup>4</sup>	325 <sup>2</sup>			
Unit 3 Maximum Particulate Control Device Inlet Temperature (°F) <sup>4</sup>	325 <sup>3</sup>			
Unit 1 Carbon Feed Rate (lbs/hr) <sup>5</sup>	5			
Unit 2 Carbon Feed Rate (lbs/hr) <sup>5</sup>	6			
Unit 3 Carbon Feed rate (Klbs/hr) <sup>5</sup>	6			

<sup>&</sup>lt;sup>1</sup> From 40CFR60.58b (i) (8) the maximum demonstrated load during PCDD/PCDF testing, four hour average.

Table 1-4:
Opacity and Fugitive Emission Test Results

Source	Constituent	Sampling Method	Results	Permit Limit <sup>1</sup>
<u>Aşh Hand</u>	<u>ling System</u> ² Fugitive Emissions (%) Fugitive Emissions (minutes)	EPA M22	0 0	5% of observation time 9 minutes
Lime Silo <sup>3</sup>	Visual Emisssions (%)	EPA M9	0	5%

<sup>&</sup>lt;sup>1</sup> Limits obtained from 40 Code of Federal Register part 60 Subpart Cb - Emission Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994 published in Federal Register as 62 FR 45123 on December 19, 1995 as modified on August 25, 1997, Florida's Rule 62-296.416, F.A.C. and PSD-FL-105.

#### Discussion of Test Program

All test methods were done in triplicate. All data that is reported in the units of lb/MMBTU utilized the Fd of 9,570 as per EPA Method 19.

<sup>&</sup>lt;sup>2</sup> From CleanAir Cb test report dated April 19, 2007.

<sup>&</sup>lt;sup>3</sup> From CleanAir Cb test report dated April 24, 2008.

<sup>&</sup>lt;sup>4</sup> From 40CFR60.58b (i) (9) the highest four hour average during PCDD/PCDF testing.

<sup>&</sup>lt;sup>5</sup> From 40CFR60.58b (m)(1)(i) an average mass carbon rate during mercury or dioxin testing. The minimum carbon feer rate is established as the lower of the average carbon feed rates measured during the mercury or dioxin testing.

<sup>&</sup>lt;sup>2</sup> The Ash Handling System was observed at various locations for a total of 3 hours.

<sup>&</sup>lt;sup>3</sup> The Lime Silo was observed for one complete truck unloading.

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#### **PROJECT OVERVIEW**

All equipment utilized for compliance testing was manufactured by Clean Air Engineering, except for the Servomex O<sub>2</sub>/CO<sub>2</sub> analyzer utilized for all of the integrated gas sample bag analysis.

During compliance testing, all three (3) boilers were operated within 10% of the 192,000 lb/hr maximum steam flow rating. The result tables present each boilers steam output for every test run.

Shawn Joint performed the fugitive emission readings (per EPA Method 22) on the ash handling system. Ben Wiltse conducted the VE readings (per EPA Method 9) on the Lime Silo during one (1) entire truck unloading. Mr. Wiltse's VE evaluation certificate is presented in Appendix I.

Any fractions of the mercury analysis that were reported as not detected were summed as zero if there was at least one (1) fraction detected in that run. The beryllium, cadmium and lead front- and back-half fractions were combined proportionately for analysis per EPA Method 29, Section 5.4.

Field blanks were collected for the Method 23 and 29 testing by assembling a used set of glassware, taking the complete train to the outlet location and performing a leak check. These samples were treated exactly as the other samples. The results for the Method field blanks are presented in Table 2-22 on page 2-20, as well as Appendix H. The results of the Method 29 reagent blank analysis were used to correct any data, as outlined in Method 29.

All Method 23 samples were analyzed with the DB-5S column with modified calibration and additional quality assurance procedures as a direct substitute for the DB-5 and DB-225 columns. Confirmation of the 2,3,7,8 TCDF and TCDD 2,3,7,8 isomers was performed on the DB-5S column. The DB-5S column and modified calibration procedures meets the column separation requirement and can be used as a direct substitute for the DB-5 and DB-225 columns, in accordance with Method 23 as approved by the EPA. All QA/QC data (spikes and recoveries) for Method 23, as well as the EPA Audit Sample results, are presented in Appendix H.

The Method 23 results for Runs 1 and 2 each contained at least one (1) estimated maximum possible concentration (EMPC) value. EMPC results do not meet all the identification criteria required by Method 23 to be positively identified as a dioxin or furan. Specifically, the integrated ion abundance ratios were not within 15% of the theoretical value limits specified in Method 23 Section 5.3.2.5, Table 4. The laboratory reports EMPC results as zero and, for this reason, all EMPC results are enclosed in brackets and are considered zero when calculating total dioxin/furans.

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#### **PROJECT OVERVIEW**

For analytical results that are below the detection limit, values are reported as ND, with the detection limit in parenthesis and are considered zero for calculating total catch weights per Method 23, Section 9.9.

Chuck Faller of Wheelabrator South Broward Inc. provided the process (operating) data. This data is presented in its entirety in Appendix C. All process data and CleanAir run times are based on facility CEM time, which is 66 minutes earlier than actual Eastern Standard Time (EST) and the plant's Bailey Computer Time. The Lime Silo opacity start and stop times are based on EST, since the initial and final truck weights were recorded using "real" time.

Integrated gas samples (IGS) were collected in a vinyl sample bag from every sample train. The contents of the bag were then analyzed for  $O_2$  and  $CO_2$  concentrations using an  $O_2/CO_2$  continuous monitoring analyzer calibrated with EPA Protocol gases. A linearity and bias check was performed on the analyzers before each set of bags was analyzed and then a post bias check was performed after each set of bags was analyzed. All data was recorded using CleanAir's data acquisition system. The results of the IGS bag analyses are presented in Appendix G.

Metals and particulate matter sampling were combined during this test program per the Method 29 Section 1.2 Principle, "This method may be used to determine particulate emissions in addition to the metals emissions if the prescribed procedures and precautions are followed".

Additionally, 120-minute mercury measurements were conducted, using EPA Method 29, at the SDA Inlets, simultaneously with the Method 5/29. The SDA Inlet mercury testing was performed because the facility recently added carbon injection systems for mercury removal on all three (3) units. The carbon injection rate is set for the following year based on the results of these tests. The carbon rates established are presented in Table 1-3 on page 1-5.

Sixty-minute Method 26A sample trains at the SDA Inlets and FF Outlets were utilized to exhibit compliance with each unit's HCl limit(s). The Method 26A was modified to a single-point constant sampling rate at all test locations.

The FDEP supplied audit samples for metals, HF and HCl to CleanAir. The analytical results of these samples are presented in Appendix H, along with each respective lab report.

End of Section 1 - Project Overview

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RES	ULTS				
		e <b>2-1</b> :	Matala		
Run N	Unit 1 FF Outlet – Pa	articulate and	i Wetais 2	3	Average
Date (2		Mar 18	Mar 18	Mar 18	
•	ime (approx.)	06:41	09:19	12:12	
	ime (approx.)	08:52	11:30	14:22	
	ss Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hr)	183.6	183.4	184.0	183.7
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	313	305	305	308
Gae C	onditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.4	9.2	9.2	9.3
CO	Carbon dioxide (dry volume %)	10.2	10.6	10.5	10.4
Ts	Sample temperature (°F)	296	290	290	292
Bw	Actual water vapor in gas (% by volume)	21.9	22.4	22.5	22.3
Gas Fl	ow Rate				
Q <sub>a</sub>	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	166,552
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	88,715
Samnli	ng Data				-
V <sub>mstd</sub>	Volume metered, standard (dscf)	68.76	67.60	67.88	68.08
%I	Isokinetic sampling (%)	100.0	100.0	101.1	100.4
Particu	late Laboratory Data				
m	Net matter collected (g)	0.0009	0.0038	0.0034	
	ole Particulate Results		0.000		
C <sub>sd</sub>	Particulate Concentration (mg/dscm)	0.46	2.0	1.8	1.4
C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (mg/dscm)	0.56	2.4	2.1	1.7
		0.00			
C <sub>sd</sub>	um Results - Total Concentration (mg/dscm)	< 0.000026	<0.000026	<0.000026	<0.000026
C <sub>sd7</sub>	Concentration (Mg/dscm)	<0.000020	< 0.000020	<0.000020	<0.000020
_		0.0000		3.000001	-0.000001
m <sub>n</sub>	ım Laboratory Data Total matter corrected for allowable blanks (μg)	0.3934	0.3103	1.0930	
	" -	0.0004	0.5 105	1.0550	
	Im Results - Total	0.00000	0.00016	0.00057	0.00004
$C_{sd}$	Concentration (mg/dscm) Concentration @7% O₂ (mg/dscm)	0.00020 0.00024	0.00016 0.00019	0.00057 0.00067	0.00031 0.00037
		0.00024	0.00019	0.00007	0.00037
	aboratory Data	0.0004	40454	0.0000	
mn	Total matter corrected for allowable blanks (µg)	2.2834	1.3454	2.3089	
	esults - Total				
C <sub>sd</sub>	Concentration (mg/dscm)	0.0012	0.00070	0.0012	0.0010
C <sub>sd7</sub>	Concentration @7% O₂ (mg/dscm)	0.0014	0.00083	0.0014	0.0012

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	Table				
Run No.	nit 1 SDA Inlet and I	FF Outlet Mo	ercury 2	3	Average
		Mar 18			Average
Date (2009) Start Time (approx.)		06:41	Mar 18 09:19	Mar 18 12:12	
Stop Time (approx.)		08:52	11:30	14:22	
, , , , , ,		00.02	11.50	14.22	
Process Conditions  R <sub>P</sub> Steam Production Rate (K	The /hr \	183.6	183.4	184.0	183.7
P <sub>1</sub> Fabric Filter Inlet Tempera		313	305	305	308
P <sub>2</sub> Carbon Feed rate (lb/hr)	idio(1)	7	6	5	6
SDA Inlet Gas Conditions					
O <sub>2</sub> Oxygen (dry volume %)		9.7	8.9	8.9	9.2
CO₂ Carbon dioxide (dry volum	e %)	10.0	10.8	10.9	10.5
T <sub>s</sub> Sample temperature (°F)	,	505	506	508	506
B <sub>w</sub> Actual water vapor in gas	(% by volume)	16.0	16.9	17.5	16.8
SDA Inlet Gas Flow Rate					
Q <sub>a</sub> Volumetric flow rate, actua	ıl (acfm)	176,323	173,916	177,125	175,788
Q <sub>std</sub> Volumetric flow rate, dry s	tandard (dscfm)	81,161	79,153	79,904	80,073
SDA Inlet Sampling Data					
V <sub>mstd</sub> Volume metered, standard	I (dscf)	69.41	69.31	69.73	69.48
%I Isokinetic sampling (%)	,	104.0	106.4	106.1	105.5
SDA Inlet Mercury Laboratory Da	a				
m <sub>n</sub> Total matter corrected for		105.1263	116.8821	116.3232	
SDA Inlet Mercury Results - Total	" 0,				
C <sub>sd</sub> Concentration (µg/dscm)		53	60	59	57
C <sub>sd7</sub> Concentration @7% O <sub>2</sub> (µ	g/dscm)	66	69	68	68
FF Outlet Gas Conditions					
O <sub>2</sub> Oxygen (dry volume %)		9.4	9.2	9.2	9.3
CO₂ Carbon dioxide (dry volum	e %)	10.2	10.6	10.5	10.4
T <sub>s</sub> Sample temperature (°F)	,	296	290	290	292
B <sub>w</sub> Actual water vapor in gas	(% by volume)	21.9	22.4	22.5	22.3
FF Outlet Gas Flow Rate	,				
Q <sub>a</sub> Volumetric flow rate, actua	L(acfm)	168,899	165, <b>7</b> 81	164,975	166,552
Q <sub>std</sub> Volumetric flow rate, dry s	, ,	89,921	88,392	87,831	88,715
FF Outlet Sampling Data	<b>\-/</b>	,	,	,	•
V <sub>mstd</sub> Volume metered, standard	(dscf)	68.76	67.60	67.88	68.08
%I Isokinetic sampling (%)	(435.)	100.0	100.0	101.1	100.4
FF Outlet Mercury Laboratory Dat	2				
m <sub>n</sub> Total matter corrected for a		4.4126	3.1426	3.4661	
FF Outlet Mercury Results - Total	W- 07				
C <sub>sd</sub> Concentration (µg/dscm)		2.3	1.6	1.8	1.9
C <sub>sd7</sub> Concentration @7% O <sub>2</sub> (μ <sub>1</sub>	a/dscm)	2.7	1.9	2.1	2.3
	,				
Removal Efficiency (µg/dscm @ 7	% U₂ based)	96%	9 <b>7</b> %	97%	97%

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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RES	ULTS				
		ble 2-3:	•		
Run N		utlet - Fluoride 1	2 · S	3	Average
		·	_	_	Average
Date (2		Mar 18	Mar 18	Mar 18	
	me (approx.)	06:38	08:06	09:47	
Stop Ti	me (approx.)	07:50	09:21	11:00	
Proces	s Conditions				
$R_P$	Steam Production Rate (Klbs/hr)	184.3	183.8	184.1	184.1
P₁	Fabric Filter Inlet Temperature (°F)	315	308	305	309
Gas Co	onditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.4	9.3	10.1	9.6
CO2	Carbon dioxide (dry volume %)	10.2	10.3	9.6	10.0
$T_s$	Sample temperature (°F)	293	290	287	290
$B_w$	Actual water vapor in gas (% by volume)	21.6	22.3	22.7	22.2
Gas Flo	ow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	178,264	180,189	180,383	179,612
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	95,670	96,275	96,295	96,080
Sampli	ng Data				•
$V_{mstd}$	Volume metered, standard (dscf)	37.65	37.76	37.69	37.70
%1	Isokinetic sampling (%)	99.9	99.6	99.4	99.6
Labora	tory Data				
mn	Total HF collected (mg)	< 0.00606	<0.00547	<0.00597	
Hydrog	en Fluoride (HF) Results				
$C_{sd}$	HF Concentration (ppmdv)	<0.0068	< 0.0062	< 0.0067	<0.0066
$C_{\text{ad7}}$	HF Concentration @7% O₂ (ppmdv)	< 0.0082	< 0.0074	< 0.0087	<0.0081
$C_{\sf sd}$	HF Concentration (mg/dscm)	< 0.0057	< 0.0051	< 0.0056	<0.0055
$C_{\text{sd7}}$	HF Concentration @7% O <sub>2</sub> (mg/dscm)	<0.0068	< 0.0061	< 0.0072	<0.0067
E <sub>lb/hr</sub>	HF Rate (lb/hr)	<0.0020	<0.0018	<0.0020	<0.0020
$E_{Fd}$	HF Rate - Fd-based (lb/MMBtu)	< 0.0000062	<0.0000055	<0.0000065	<0.0000060

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RESU					
	Table 2				
	Unit 1 FF Outlet -	PCDDs/PCDFs			
Run No.		1	2	3	Averaç
Date (200	9)	Mar 16	Mar 17	Mar 17	
	e (approx.)	11:07	06:08	10:54	
Stop Time	e (approx.)	15:32	10:27	15:18	
Process (	Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hr)	184.0	183.4	184.2	183
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	320	320	320	32
P <sub>2</sub>	Carbon Feed Rate (lb/hr)	6	5	5	
Gas Cond	fitions				
O <sub>2</sub>	Oxygen (dry volume %)	9.5	9.7	9.4	9
CO₂	Carbon dioxide (dry volume %)	10.3	9.9	10.2	10.
Τ <sub>s</sub>	Sample temperature (°F)	301	301	301	30
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3	21.3	21.0	21.
Gas Flow	Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	176,448	182,079	175,503	178,01
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	94,787	96,525	93,680	94,99
Sampling	Data				
$V_{mstd}$	Volume metered, standard (dscf)	142.32	144.13	138.82	141.7
%I	Isokinetic sampling (%)	99.7	99.1	98.4	99.
Results (N	ND and EMPC = 0)				
aborator	y Data from USEPA Method 23				
m <sub>n</sub>	Total PCDDs & PCDFs (ng)	12.700	12.300	12.300	
m <sub>n_TEQ</sub>	Total TEQ PCDDs & PCDFs (ng)	0.133	0.127	0.129	
_	DD/F Results (TEF=1)				
C <sub>sd</sub>	PCDD/F Concentration (ng/dscm)	3.2	3.0	3.1	3.
C <sub>sd7</sub>	PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm)	3.9	3.7	3.8	3.
E <sub>lb/hr</sub>	PCDD/F Rate (lb/hr)	1.119E-06	1.090E-06	1.098E-06	1.102E-0
$E_{Fd}$	PCDD/F Rate - F <sub>d</sub> -based (lb/MMBtu)	3.464 <b>E</b> -09	3.349E-09	3.398E-09	3.404E-0
Total PCD	D/F TEQ Results (using USEPA/INTL 1989 TEFs)				
C <sub>scTEQ</sub>	TEQ Concentration (ng/dscm)	0.033	0.031	0.033	0.03
C <sub>sd7TEQ</sub>	TEQ Concentration @7% O <sub>2</sub> (ng/dscm)	0.040	0.038	0.040	0.04
Elitrited	TEQ Rate (lb/hr)	1.2E-08	1.1E-08	1.2E-08	1.1E-0
Erateo	TEQ Rate - F₀-based (lb/MMBtu)	3.6E-11	3.5E-11	3.6E-11	3.5E-1
Results (N	ID and EMPC = actual value)				
	y Data from USEPA Method 23, including NDs and EMP	Cs			
m <sub>n</sub>	Total PCDDs & PCDFs (ng)	12.700	12.500	12.400	
$m_{n\_TEQ}$	Total TEQ PCDDs & PCDFs (ng)	0.136	0.131	0.129	
Total PCD	D/F Results (TEF=1)				
C <sub>sd</sub>	PCDD/F Concentration (ng/dscm)	3.2	3.1	3.2	3.1
C <sub>sd7</sub>	PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm)	3.9	3.8	3.8	3.8
E <sub>lb/hr</sub>	PCDD/F Rate (lb/hr)	1.1E-06	1.1E-06	1.1E-06	1.1E-0
E <sub>Fd</sub>	PCDD/F Rate - F₀-based (lb/MMBtu)	3.5E-09	3.4E-09	3.4E-09	3.4E-0
Total PCD	D/F TEQ Results (using USEPA/INTL 1989 TEFs)				
C <sub>scTEQ</sub>	TEQ Concentration (ng/dscm)	0.034	0.032	0.033	0.03
C <sub>sd7TEQ</sub>	TEQ Concentration @7% O₂ (ng/dscm)	0.041	0.040	0.040	0.04
ElbArtEQ	TEQ Rate (lb/hr)	1.2E-08	1.2E-08	1.2E-08	1.2E-0
	- · · · · · · · · · · · · · · · · · · ·	00			

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RES	ULTS				
	Tab Unit 1 FF Outlet and SD	ole 2-5:	on Chlorid	_	
Run N		A iniet - Hydrog 1	<u>jen Chlorid</u> 2	3	Average
Date (2	2009)	Mar 16	Mar 16	Mar 16	
,	ime (approx.)	06:44	08:22	09:50	
Stop Ti	me (approx.)	07:44	09:22	10:50	
Proces	ss Conditions				
R₽	Steam Production Rate (Klbs/hr)	184.7	184.7	183.5	184.3
P₁	Fabric Filter Inlet Temperature (°F)	320	320	320	320
SDA In	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	8.0	7.7	8.5	8.1
CO₂	Carbon dioxide (dry volume %)	11.4	11.7	11.0	11.4
$T_s$	Sample temperature (°F)	492	488	487	489
B <sub>w</sub>	Actual water vapor in gas (% by volume)	18.2	16.2	16.6	17.0
SDA In	let Sampling Data				
$V_{matd}$	Volume metered, standard (dscf)	33.11	34.24	33.92	33.76
SDA In	let Laboratory Data				
m <sub>n</sub>	Total HCI collected (mg)	593.6855	508.7987	529.3518	
SDA In	let Hydrogen Chloride (HCl) Results				
$C_{sd}$	HCl Concentration (ppmdv)	418	346	364	376
$C_{sd7}$	HCI Concentration @7% O₂ (ppmdv)	450	366	406	407
FF Out	et Gas Conditions				
$O_2$	Oxygen (dry volume %)	9.2	9.0	9.5	9.2
CO₂	Carbon dioxide (dry volume %)	10.4	10.6	10.1	10.3
$T_s$	Sample temperature (°F)	304	307	306	305
B <sub>w</sub>	Actual water vapor in gas (% by volume)	22.7	21.5	20.6	21.6
	et Sampling Data				
$V_{mstd}$	Volume metered, standard (dscf)	39.71	39.12	38.83	39.22
FF Outl	et Laboratory Data				
$m_n$	Total HCl collected (mg)	17.6057	20.2666	24.8532	
FF Outl	et Hydrogen Chloride (HCI) Results				
$C_{sd}$	HCI Concentration (ppmdv)	10	12	15	12
$C_{sd7}$	HCl Concentration @7% O₂ (ppmdv)	12	14	18	15
RE	Reduction Efficiency (% Removal)	97%	96%	96%	96%

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RES	ULTS				
	Table		1 Martala		
Run No	Unit 2 FF Outlet – Pa	rticulate and	Metals 2	3	Average
Date (2	2009)	Mar 16	Mar 16	Mar 16	
	ime (approx.)	06:56	09:58	12:45	
	íme (approx.)	· 09:20	12:09	14:59	
Proces	ss Conditions				
Rp	Steam Production Rate (Klbs/hr)	184.1	184.9	183.9	184.3
$P_1$	Fabric Filter Inlet Temperature (°F)	315	315	315	315
Gas Co	onditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.9	9.9	9.8	9.9
$CO_2$	Carbon dioxide (dry volume %)	9.7	9.8	10.0	9.8
Ts	Sample temperature (°F)	298	297	298	298
$B_{w}$	Actual water vapor in gas (% by volume)	21.3	20.7	21.4	21.1
Gas Fle	ow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
Sampli	ing Data				
$V_{mstd}$	Volume metered, standard (dscf)	74.28	73.05	74.63	73.99
%I	Isokinetic sampling (%)	100.7	98.7	100.5	100.0
Particu	ılate Laboratory Data				
$m_n$	Net matter collected (g)	0.0020	0.0010	0.0032	
Filterat	ble Particulate Results				
$C_{sd}$	Particulate Concentration (mg/dscm)	0.95	0.48	1.5	0.98
$C_{\text{sd7}}$	Particulate Concentration @7% O <sub>2</sub> (mg/dscm)	1.2	0.61	1.9	1.2
Berylliu	um Results - Total				
C <sub>sd</sub>	Concentration (mg/dscm)	< 0.000024	<0.000024	<0.000024	<0.000024
$C_{\text{sd7}}$	Concentration @7% O₂ (mg/dscm)	< 0.000030	<0.000030	<0.000030	<0.000030
Cadmit	um Laboratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	0.4125	0.3372	0.3416	
Cadmit	um Results - Total				
C <sub>sd</sub>	Concentration (mg/dscm)	0.00020	0.00016 -	0.00016	0.00017
C <sub>sd7</sub>	Concentration @7% O₂ (mg/dscm)	0.00025	0.00021	0.00020	0.00022
Lead L	aboratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	1.9 <b>7</b> 70	2.3462	2.5954	
Lead R	esults - Total				
C <sub>sd</sub>	Concentration (mg/dscm)	0.00094	0.0011	0.0012	0.0011
C <sub>sd7</sub>	Concentration @7% O₂ (mg/dscm)	0.0012	0.0014	0.0015	0.0014

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KE2	ULTS				
	Table	2-7:			
	Unit 2 SDA Inlet and		ercury		
Run N	о.	1	2	3	Averag
Date (2	2009)	Mar 16	Mar 16	Mar 16	
Start Ti	ime (approx.)	06:58	09:58	12:45	
Stop Ti	ime (approx.)	09:20	12:09	14:59	
Proces	ss Conditions				
$R_P$	Steam Production Rate (Klbs/hr)	184.1	184.9	183.9	184.3
P۱	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed Rate (lb/hr)	5	7	6	6
SDAIn	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	8.8	9.2	9.0	9.0
CO₂	Carbon dioxide (dry volume %)	10.7	10.5	10.8	10.7
Ts	Sample temperature (°F)	513	514	514	514
B₩	Actual water vapor in gas (% by volume)	15.8	16.1	16.1	16.0
SDA In	let Gas Flow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	188,570	187,625	186,789	187,661
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	86,559	85,767	85,339	85,889
SDA In	let Sampling Data				
$V_{mstq}$	Volume metered, standard (dscf)	72.69	72.64	73.32	72.88
%I	Isokinetic sampling (%)	102.1	102.9	104.4	103.2
SDA Ini	let Mercury Laboratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	62.3587	81.4920	57.0036	
SDA Ini	let Mercury Results - Total				
C <sub>sd</sub>	Concentration (µg/dscm)	30	40	27	32
C <sub>sd7</sub>	Concentration @7% O₂ (µg/dscm)	35	47	32	38
EE Outl	et Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.9	9.9	9.8	9.9
CO₂	Carbon dioxide (dry volume %)	9.7	9.8	10.0	9.8
T <sub>s</sub>	, ,	298	297	298	298
B <sub>w</sub>	Sample temperature (°F) Actual water vapor in gas (% by volume)	21.3	20.7	290	21.1
		21.0	20.7	21.4	21.1
	et Gas Flow Rate	470.000	470.004	100 005	470.005
Q.	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
	et Sampling Data				
	Volume metered, standard (dscf)	74.28	73.05	74.63	73.99
%I	Isokinetic sampling (%)	100.7	98.7	100.5	100.0
FF Outle	et Mercury Laboratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	6.8700	6.5842	7.8493	
FF Outle	et Mercury Results - Total				
$C_{sd}$	Concentration (µg/dscm)	3.3	3.2	3.7	3.4
$C_{\text{sd7}}$	Concentration @7% O₂ (µg/dscm)	4.1	4.0	4.7	4.3
RE	Reduction Efficiency (% Removal)	88%	91%	85%	88%

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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		ole 2-8: utlet - Fluoride	s		
Run No	).	1	2	3	Average
Date (2	009)	Mar 17	Mar 17	Mar 17	
Start Tir	me (approx.)	11:43	13:15	14:40	
Stop Tir	ne (approx.)	12:55	14:27	15:49	
Proces	s Conditions				
$R_P$	Steam Production Rate (Klbs/hr)	185.1	184.7	183.9	184.6
$P_1$	Fabric Filter Inlet Temperature (°F)	320	320	320	320
Gas Co	nditions				
$O_2$	Oxygen (dry volume %)	9.6	9.5	9.4	9.5
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.1	10.2	10.2	10.2
$T_{s}$	Sample temperature (°F)	301	301	302	301
$B_w$	Actual water vapor in gas (% by volume)	20.4	20.3	20.1	20.3
Gas Flo	ow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	191,827	184,660	186,228	187,571
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	103,823	100,086	101,073	101,660
Sampli	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	41.11	40.38	40.45	40.65
%l	Isokinetic sampling (%)	100.5	102.4	101.6	101.5
Labora	tory Data				
$m_{\alpha}$	Total HF collected (mg)	< 0.00596	<0.00581	<0.00556	
Hydrog	en Fluoride (HF) Results				
$C_{sd}$	HF Concentration (ppmdv)	< 0.0062	< 0.0061	<0.0058	<0.0060
$C_{sd7}$	HF Concentration @7% O <sub>2</sub> (ppmdv)	< 0.0076	< 0.0074	< 0.0071	<0.0073
$C_{sd}$	HF Concentration (mg/dscm)	<0.0051	< 0.0051	< 0.0049	<0.0050
$C_{\text{sd7}}$	HF Concentration @7% O₂ (mg/dscm)	< 0.0063	< 0.0062	< 0.0059	<0.0061
E <sub>lb/hr</sub>	HF Rate (lb/hr)	<0.0020	< 0.0019	<0.0018	<0.0019
$E_{Fd}$	HF Rate - Fd-based (lb/MMBtu)	<0.0000057	<0.0000055	< 0.0000053	<0.0000055

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<b>RES</b>	ULTS				
	Unit 2 FF Outlet and	Table 2-9:	en Chlorid		
Run N		1	2	3	Average
Date (2	2009)	Mar 17	Mar 17	Mar 17	
Start T	ime (approx.)	06:33	08:26	10:15	
Stop T	ime (approx.)	07:33	09:26	11:15	
Proces	ss Conditions				
$R_P$	Steam Production Rate (Klbs/hr)	182.6	185.2	183.2	183.7
P₁	Fabric Filter Inlet Temperature (°F)	315	315	320	317
SDAIn	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	8.3	8.3	8.6	8.4
CO <sub>2</sub>	Carbon dio xide (dry volume %)	11.3	11.3	10.9	11.2
Ts	Sample temperature (°F)	506	506	518	510
$B_w$	Actual water vapor in gas (% by volume)	16.5	16.9	15.6	16.3
SDA In	let Sampling Data				
$V_{\text{mstd}}$	Volume metered, standard (dscf)	32.81	33.19	34.54	33.51
SDA In	let Laboratory Data				
$m_{n}$	Total HCl collected (mg)	503.5662	598.0783	603.5410	
SDA In	let Hydrogen Chloride (HCI) Results				
$C_{sd}$	HCl Concentration (ppmdv)	358	420	407	395
$C_{\text{sd7}}$	HCI Concentration @7% O₂ (ppmdv)	395	463	459	439
FF Out	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.7	9.1	9.5	9.4
CO <sub>2</sub>	Carbon dio xide (dry volume %)	10.0	10.6	10.6	10.4
$T_{s}$	Sample temperature (°F)	295	296	299	297
$B_w$	Actual water vapor in gas (% by volume)	20.2	21.4	20.5	20.7
FF Outl	et Sampling Data				
$V_{mstd}$	Volume metered, standard (dscf)	35.83	34.32	36.39	35.52
FF Outl	et Laboratory Data				
$m_n$	Total HCl collected (mg)	29.5404	25.8516	34.0382	
FF Outl	et Hydrogen Chloride (HCI) Results				
C <sub>sd</sub>	HCl Concentration (ppmdv)	19	18	22	20
C <sub>sd7</sub>	HCl Concentration @7% O <sub>2</sub> (ppmdv)	24	21	26	24
RE	Reduction Efficiency (% Removal)	94%	96%	94%	95%

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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RESI	JLTS				
	Table Unit 3 FF Outlet Pa		l Metals		
Run No		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
`	me (approx.)	06:33	09:15	11:56	
Stop Tir	me (approx.)	08:42	11:24	14:07	
Proces	s Conditions				
$R_P$	Steam Production Rate (Klbs/hr)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
Gas Co	onditions				
O <sub>2</sub>	Oxygen (dry volume %)	10.7	10.4	10.3	10.4
CO2	Carbon dioxide (dry volume %)	9.1	9.2	9.4	9.2
Ts	Sample temperature (°F)	295	296	296	296
$B_w$	Actual water vapor in gas (% by volume)	19.8	20.0	19.9	19.9
Gas Flo	ow Rate				
Qa	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
Samplii	ng Data				
$V_{\text{mstd}}$	Volume metered, standard (dscf)	79.35	77.16	75.17	77.23
%I	Isokinetic sampling (%)	101.6	100.8	101.1	101.2
Particul	late Laboratory Data				
$\mathbf{m}_{\mathbf{n}}$	Net matter collected (g)	0.0036	0.0024	0.0008	
Filterab	le Particulate Results				
$C_{sd}$	Particulate Concentration (mg/dscm)	1.6	1.1	0.38	1.0
$C_{\text{sd7}}$	Particulate Concentration @7% O₂ (mg/dscm)	2.2	1.4	0.49	1.4
Berylliu	m Results - Total				
$C_{sd}$	Concentration (mg/dscm)	< 0.000022	< 0.000023	< 0.000023	<0.000023
$C_{sd7}$	Concentration @7% O₂ (mg/dscm)	<0.000030	<0.000030	<0.000031	<0.000030
Cadmiu	m Laboratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	<0.2000	0.2333	0.2845	
Cadmiu	ım Results - Total				
$C_{sd}$	Concentration (mg/dscm)	< 0.000089	0.00011	0.00013	<0.00011
$C_{\text{sd7}}$	Concentration @7% O <sub>2</sub> (mg/dscm)	<0.00012	0.00014	0.00018	<0.00015
Lead La	boratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	0.6091	1.6247	1.0876	
Lead Re	esults - Total				
C <sub>sd</sub>	Concentration (mg/dscm)	0.00027	0.00074	0.00051	0.00051
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	0.00037	0.00098	0.00067	0.00067

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	Table 2 Unit 3 SDA Inlet and F		0,01121		
Run N		r Outlet – IVI 1	ercury 2	3	Averag
Date (2	2009)	Mar 17	Mar 17	Mar 17	
-	ime (approx.)	06:33	09:15	11:56	
	ime (approx.)	08:42	11:24	14:07	
	ss Conditions				
R <sub>p</sub>	Steam Production Rate (Klbs/hr)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	31
P2	Carbon Feed Rate (lb/hr)	6	6	5	
SDAIr	nlet Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.6	9.5	9.6	9.
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.2	10.1	10.0	10.
$T_{s}$	Sample temperature (°F)	488	490	493	49
$B_{\mathbf{w}}$	Actual water vapor in gas (% by volume)	16.3	16.0	15.8	16.6
SDA In	let Gas Flow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	196,240	192,853	190,845	193,313
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	91,644	90,198	89,201	90,348
SDA In	let Sampling Data				
$V_{mstd}$	Volume metered, standard (dscf)	74.14	71.87	72.15	72.7
<b>%</b> I	Isokinetic sampling (%)	98.3	96.9	98.3	97.8
SDA In	let Mercury Laboratory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	76.7234	89.6076	95.0869	
SDA in	let Mercury Results - Total				
$C_{sd}$	Concentration (µg/dscm)	37	44	47	42
$C_{\rm sd7}$	Concentration @7% O₂ (µg/dscm)	45	54	57	52
F Out	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	10.7	10.4	10.3	10.4
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.1	9.2	9.4	9.2
Ts	Sample temperature (°F)	295	296	296	296
$B_w$	Actual water vapor in gas (% by volume)	19.8	20.0	19.9	19.9
F Outl	et Gas Flow Rate				
Qa	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
F Outl	et Sampling Data				
V <sub>mstd</sub>	Volume metered, standard (dscf)	79.35	77.16	75.17	77.23
%!	Isokinetic sampling (%)	101.6	100.8	101.1	101.2
F Outl	et Mercury Laboratory Data				
m <sub>n</sub>	Total matter corrected for allowable blanks (µg)	6.6466	7.0201	6.5708	
	et Mercury Results - Total				
C <sub>sd</sub>	Concentration (µg/dscm)	3.0	3.2	3.1	3.1
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	4.0	4.2	4.1	4.1
	val Efficiency (µg/dscm @ 7% O₂ based)				

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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	Tah	le 2-12:						
Unit 3 FF Outlet - Fluorides								
Run No	).	1	2	3	Average			
Date (2	009)	Mar 16	Mar 16	Mar 16				
Start Ti	me (approx.)	07:20	09:30	11:20				
Stop Ti	me (approx.)	00:00	10:47	12:41				
Proces	s Conditions							
$R_P$	Steam Production Rate (Klbs/hr)	184.2	184.0	184.4	184.2			
$P_1$	Fabric Filter Inlet Temperature (°F)	315	315	315	315			
Gas Co	onditions							
O <sub>2</sub>	Oxygen (dry volume %)	9.7	11.1	10.3	10.4			
CO2	Carbon dioxide (dry volume %)	9.8	8.5	9.3	9.2			
$T_s$	Sample temperature (°F)	296	294	294	295			
$B_w$	Actual water vapor in gas (% by volume)	21.1	19.8	19.8	20.2			
Gas Flo	ow Rate							
$Q_a$	Volumetric flow rate, actual (acfm)	193,361	192,674	191,991	192,675			
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	104,075	106,228	106,037	105,447			
Sampli	ng Data							
$V_{mstd}$	Volume metered, standard (dscf)	41.77	41.58	41.69	41.68			
<b>%</b> I	Isokinetic sampling (%)	101.9	99.4	99.8	100.4			
Labora	tory Data							
$m_n$	Total HF collected (mg)	< 0.00615	< 0.00547	<0.00560				
Hydrog	en Fluoride (HF) Results							
$C_{sd}$	HF Concentration (ppmdv)	< 0.0063	< 0.0056	< 0.0057	<0.0058			
$C_{sd7}$	HF Concentration @7% O <sub>2</sub> (ppmdv)	<0.0078	< 0.0079	< 0.0075	<0.0077			
$C_{sd}$	HF Concentration (mg/dscm)	< 0.0052	<0.0046	< 0.0047	<0.0049			
$C_{\text{sd7}}$	HF Concentration @7% O2 (mg/dscm)	< 0.0065	< 0.0065	< 0.0062	<0.0064			
E <sub>ib/hr</sub>	HF Rate (lb/hr)	<0.0020	<0.0018	< 0.0019	<0.0019			
$E_{Fd}$	HF Rate - Fd-based (lb/MMBtu)	<0.0000058	< 0.0000059	< 0.0000056	<0.0000058			

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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RES	ULTS				
	Tal Unit 3 FF Outlet and SI	ble 2-13: DA Inlet - Hvdrod	en Chlorid	e	
Run N		1	2	3	Average
Date (2	2009)	Mar 18	Mar 18	Mar 18	
Start T	me (approx.)	06:56	09:13	10:40	
Stop T	me (approx.)	07:56	10:13	11:40	
Proces	ss Conditions				
$R_P$	Steam Production Rate (Klbs/hr)	184.1	184.2	183.9	184.1
P₁	Fabric Filter Inlet Temperature (°F)	315	305	305	308
SDA In	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.8	9.7	9.7	9.7
CO₂ ~	Carbon dioxide (dry volume %)	9.8	10.1	9.8	9.9
T,	Sample temperature (°F)	487	494	489	490
B <sub>w</sub>	Actual water vapor in gas (% by volume)	16.2	15.6	16.6	16.1
	let Sampling Data		22.22	00.00	
V <sub>mstd</sub>	Volume metered, standard (dscf)	32.04	33.22	33.30	32.86
	let Laboratory Data				
$m_n$	Total HCl collected (mg)	617.4202	601.5257	646.3785	
SDA In	let Hydrogen Chloride (HCI) Results				
$C_{sd}$	HCl Concentration (ppmdv)	449	422	452	441
$C_{sd7}$	HCl Concentration @7% O₂ (ppmdv)	560	525	562	549
	let Gas Conditions				
O <sub>2</sub>	Oxygen (dry volume %)	10.3	9.9	9.7	10.0
CO₂ T	Carbon dioxide (dry volume %)	9.4	9.8	9.9	9.7
T <sub>s</sub>	Sample temperature (°F)	292 19.3	286 21.9	284 21.4	287 20.9
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.3	21.9	21.4	20.9
	et Sampling Data		44.00	40.00	44.00
V <sub>mstd</sub>	Volume metered, standard (dscf)	41.44	41.26	40.90	41.20
	et Laboratory Data		00.1010	0.4.7000	
m <sub>n</sub>	Total HCI collected (mg)	41.0379	22.1246	34.7200	
	et Hydrogen Chloride (HCI) Results				
C <sub>sd</sub>	HCl Concentration (ppmdv)	23	13	20	18
$C_{sd7}$	HCl Concentration @7% O₂ (ppmdv)	30	16	25	24
RE	Reduction Efficiency (% Removal)	95%	97%	96%	96%

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**RESULTS** 

## WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

Table 2-14:

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	Table 2-14:			
Units 1, 2 a	nd 3 FF Outlets – (	Opacity by C	OMS	
Run No.	1	2	3	Average
<u>Unit 1</u>				
Date (2009)	Mar 18	Mar 18	Mar 18	
Start Time (approx.)	06:41	09:19	12:12	
Stop Time (approx.)	08:52	11:30	14:22	
Visible Emissions (%) <sup>1</sup>				
Average Opacity	0	0	0	0
Maximum Reading	0	0	0	0
Minimum Reading	0	0	0	0
Unit 2				
Date (2009)	Mar 16	Mar 16	Mar 16	
Start Time (approx.)	06:56	09:58	12:45	
Stop Time (approx.)	10:20	12:09	14:59	
Visible Emissions (%) <sup>1</sup>				
Average Opacity	0	0	0	0
Maximum Reading	0	0	0	0
Minimum Reading	0	0	0	0
Unit 3				
Date (2009)	Mar 17	Mar 17	Mar 17	
Start Time (approx.)	06:33	09:15	11:56	
Stop Time (approx.)	08:42	11:24	14:07	
Visible Emissions (%) <sup>1</sup>				
Average Opacity	0	0	0	0
Maximum Reading	0	0	0	0
Minimum Reading	0	0	0	0

<sup>&</sup>lt;sup>1</sup> Reading obtained from facility's continuous opacity monitoring system (COMS) as provided under 40 CFR 60.11(e) and Title V Conditions A.36(6), A.53 and A.54 and coincide with Method 5/29 test runs.

## WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

RESULTS 2-15

			i abi	e z-15:				
Ash Handling System - Fugitive Emissions								
Source Constituent	Date (2009)	Start Time (approx.)	Stop Time (approx.)	Observation Duration (minutes)	Accumulated Emission Duration (seconds)			
Ash Conveyor/Doors to	<u>Baghouse</u>							
Visual Opacity (%)	March 17	12:43	14:03	60	0			
Ash Unloading/Conveyo	<u>10</u>							
Visual Opacity (%)	March 17	14:08	15:18	60	0			
Rolling Door/Door to Ba	ghouse							
Visual Opacity (%)	March 17	15:23	16:33	60	0	Permit Limit		

Total (% of observation time) = 0 < 5% of observation Time

Total (minutes) = 0 < 9 minutes

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Table 2-16: Lime Silo Fabric Filter Outlet - Visible Emissions

Run No.	1
Date (2009) Start Time (approx.) Stop Time (approx.)	Mar 18 09:30 11:16
Process Conditions  Total lime unloaded (tons)	25.38
Rate of unloading (tons/hr)	14.4
Visible Emissions Average (percent opacity) Maximum reading (percent opacity)	0 0

## WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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### **RESULTS**

Table 2-17:

Air Flow Summary													
Run Number	Run Date	Run Time	Steam	Flue Gas	Air Flow	O <sub>2</sub> %	CO₂ %	Air Flow,	Air Flow,				
			Flow	Temp	ACFM			DSCFM	DSCFM@				
			Klbs/hour	Deg F					7%O₂				
1-O-M5/29-1	3/18/2009	06:41-08:52	183.6	296	168,899	9.4	10.2	89,921	74,201				
1-O-M5/29-2	3/18/2009	09:19-11:30	183.4	290	165,781	9.2	10.6	88,392	74,656				
1-O-M5/29-3	3/18/2009	12:12-14:22	184.0	290	164,975	9.2	10.5	87,831	74,182				
1-O-M13B-1	3/18/2009	06:38-07:50	184.3	293	178,264	9.4	10.2	95,670	79,426				
1-O-M13B-2	3/18/2009	08:06-09:21	183.8	290	180,189	9.3	10.3	96,275	80,345				
1-O-M13B-3	3/18/2009	09:47-11:00	184.1	287	180,383	10.1	9.6	96,295	74,680				
1-O-M23-1	3/16/2009	11:07-15:32	184.0	301	176,448	9.5	10.3	94,787	77,466				
1-O-M23-2	3/17/2009	06:08-10:27	183.4	301	182,079	9.7	9.9	96,525	78,053				
1-O-M23-3	3/17/2009	10:54-15:18	184.2	301	175,503	9.4	10.2	93,680	77,505				
		Average 2	183.9	294	174,725	9/5	10:2	93,264	76,724				
2-O-M5/29-1	3/16/2009	06:56-09:20	184.1	298	178,836	9.9	9.7	96,412	76,436				
2-O-M5/29-2	3/16/2009	09:58-12:09	184.9	297	178,004	9.9	9.8	96,780	76,798				
2-O-M5/29-3	3/16/2009	12:45-14:59	183.9	298	180,235	9.8	10.0	97,128	77,353				
2-O-M13B-1	3/17/2009	11:43-12:55	185.1	301	191,827	9.6	10.1	103,823	84,552				
2-O-M13B-2	3/17/2009	13:15-14:27	184.7	301	184,660	9.5	10.2	100,086	82,445				
2-O-M13B-3	3/17/2009	14:40-15:49	183.9	302	186,228	9.4	10.2	101,073	83,694				
		Average	184/4	300厘	183,298	97	10:0	99,217	80,213				
3-O-M5/29-1	3/17/2009	06:33-08:42	184.0	295	186,547	10.7	9.1	102,140	75,319				
3-O-M5/29-2	3/17/2009	09:15-11:24	184.0	296	183,521	10.4	9.2	100,105	75,979				
3-O-M5/29-3	3/17/2009	11:56-14:07	184.1	296	178,024	10.3	9.4	97,228	74,005				
3-O-M13B-1	3/16/2009	07:20-08:38	184.2	296	193,361	9.7	9.8	104,075	83,560				
3-O-M13B-2	3/16/2009	09:30-10:47	184.0	294	192,674	11.1	8.5	106,228	75,277				
3-O-M13B-3	3/16/2009	11:20-12:41	184.4	294	191,991	10.3	9.3	106,037	80,710				
		Average	4824	295	187,686	<u> </u>	302	102,636	77764775				

97.7

TRUE

95.9

TRUE

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### **RESULTS**

Max

Within M23 QC

Table 2-18:

Quality Control and Quality Assurance
PCDD/PCDF - Extraction Standard Percent Recoveries

PCDD/PC	DF - EXI	raction	Standar	d Perce	nt Reco	veries	
		Extrac	tion Stand	ard Perce	nt Recove	ries, %	
Sample Number	<sup>13</sup> C-	<sup>13</sup> C-	<sup>13</sup> C-	<sup>13</sup> C-	13C-	<sup>13</sup> C-	<sup>13</sup> C-
	TCDD	PeCDD	HxCDD	HxCDD	HxCDD	HpCDD	OCDD
0_6688_MB001	91.8	92.7	85.8	84.3	86.3	83.8	80.7
Field Blank	89.8	89.2	88.2	89.1	90.5	87.1	84.2
Run 1-Unit 1-FF-Outlet	97.7	95.9	88.8	90.1	93.2	87.5	85
Run 2-Unit 1-FF-Outlet	89.5	88.6	83.7	82.5	85.1	80.4	75.8
Run 3-Unit 1-FF-Outlet	92.1	92.4	86.5	84.8	88.3	83.1	82.9
					_		
Average	92	92	87	86	89	84	82
SD	3	3	2	3	3	3	4
Min	89.5	88.6	83.7	82.5	85.1	80.4	75.8

<del></del>		Extraction Standard Percent Recoveries, %										
13C												
Sample Number	TCDF	PeCDF	PeCDF	HxCDF	HxCDF	HxCDF	HxCDF	HpCDF	HpCDF	OCDF		
0_6688_MB001	93.9	91.1	90.8	83.6	84.5	84.7	79.6	82.4	82.6	79.9		
Field Blank	86.8	89.8	86.9	84.9	87.7	88.4	81.7	83.8	84.2	82.3		
Run 1-Unit 1-FF-Outlet	98.6	95.1	93.7	88	89.6	89.3	82.8	84.3	85.8	83.9		
Run 2-Unit 1-FF-Outlet	89.1	88.3	87.1	82.4	84	82.5	77.3	76.9	78.8	74.2		
Run 3-Unit 1-FF-Outlet	93.5	90.7	90.9	85.4	85.2	85.7	80.3	81	80.9	80.7		

88.8

TRUE

90.1

TRUE

93.2

TRUE

87.5

TRUE

85

TRUE

Average	92	91	90	85	86	86	80	82	82	80	
SD	5	3	3	2	2	3	2	3	3	4	
Min	86.8	88.3	86.9	82.4	84	82.5	77.3	76.9	78.8	74.2	
Max	98.6	95.1	93.7	88	89.6	89.3	82.8	84.3	85.8	83.9	
Within M23 OC	TRUF	TRUE	TRUE	TRUE	TRUF	TRUE	TRUE	TRUE	TRUE	TRUE	

Table 2-19:
Quality Control and Quality Assurance
PCDD/PCDF – CS/SS Percent Recoveries

		CS/SS Pe	ercent Rec	overies, %	
Sample Number	37CI-	<sup>13</sup> C-	<sup>13</sup> C-	<sup>13</sup> C-	13C-
	TCDD	PeCDD	PeCDF	HxCDF	HpCDF
0_6688_MB001	•	-	-	-	-
Field Blank	99.2	99.4	92.4	99.6	101
Run 1-Unit 1-FF-Outlet	97.6	99	98.2	97.8	101
Run 2-Unit 1-FF-Outlet	98	98.6	101	99.2	99.4
Run 3-Unit 1-FF-Outlet	96.7	98.6	104	100	100
_					

Average	98	99	99	99	100
SD	1	0	5	1	1
Min	96.7	98.6	92.4	97.8	99.4
Max	99.2	99.4	104	100	101
Min within M23 QC	TRUE	TRUE	TRUE	TRUE	TRUE

WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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RESULTS					,
	Quality Con	Table 2-2 strol and Quality		Motals	
	Quanty Cor	RPD RESU		ivietais	
	FH	BH	A	В	С
	Front		Empty	_	
Run Number	Half	H <sub>2</sub> O <sub>2</sub> /HNO <sub>4</sub>	Impinger	KMnO₄	HCI
U1 Inlet R1	0.5%	2.1%	NA	0.9%	0.5%
U1 Inlet R2	0.1%	3.2%	NA	1.3%	0.3%
U1 Inlet R3	0.2%	8.2%	NA	0.3%	0.6%
U1 Stack R1	NA	0.5%	NA	NA	NA
U1 Stack R2	NA	0.0%	NA	NA	NA
U1 Stack R3	NA	3.0%	NA	NA	NA
U2 Inlet R1	1.5%	1.3%	NA	NA	NA
U2 Inlet R2	0.0%	0.9%	NA	NA	0.5%
U2 Inlet R3	0.0%	1.2%	NA	NA	0.5%
J2 Stack R1	NA	0.1%	NA	NA	NA
U2 Stack R2	NA	0.2%	NA	NA	NA
J2 Stack R3	NA	2.6%	NA	NA	NA
J3 Inlet R1	0.0%	1.2%	NA	NA	0.9%
J3 Inlet R2	1.1%	0.5%	NA	NA	NA
J3 Inlet R3	1.8%	1.9%	NA	NA	1.2%
J3 Stack R1	NA	1.1%	NA	NA	NA
J3 Stack R2	NA	1.2%	NA	NA	NA
J3 Stack R3	NA	1.7%	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA
nlet Filter Blank	NA	NA	NA	NA	NA
		U1-FF-O-R2	U2-FF-O-R2	U3-FF-O-R2	
	Element	RPD	RPD	RPD	
		12233-5	12233-11	12233-17	
	Beryllium	NA	NA	NA	
	Cadmium	0.0%	5.1%	1.1%	
	Lead	2.0%	3.6%	0.2%	

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RESULTS						
0	-134 <i>1</i>	Cambral and	Table 2-2		- /C	
<u> </u>	anty (		Quality Assurated Spike and		3 (Continuea)	
		FH	pie Spike and BH	A A	В	С
		Front	<b>-</b> 1.	Empty		•
Run Number		Half	H <sub>2</sub> O <sub>2</sub> /HNO <sub>4</sub>		KMnO₄	нсі
U1 Inlet R3	#1	90%	98%	107%	99%	89%
	#2	90%	86%	107%	99%	88%
U1 Stack R3	#1	101%	90%	105%	100%	92%
	#2	100%	90%	106%	99%	92%
J2 Inlet R3	#1	106%	91%	103%	103%	90%
	#2	106%	90%	103%	104%	90%
J2 Stack R3	#1	94%	85%	104%	92%	90%
	#2	95%	86%	103%	91%	91%
J3 Inlet R3	#1	99%	85%	97%	92%	93%
	#2	96%	83%	95%	91%	92%
J3 Stack R3	#1	98%	88%	105%	95%	90%
	#2	99%	88%	103%	94%	90%
			U1-FF-O-R3	U2-FF-O-R3	3 U3-FF-O-R3	<b>,</b>
		Element	Recovery	Recovery		
			12233-6	12233-12	12233-18	
		Beryllium	81%	82%	86%	
		Cadmium	87%	89%	93%	
		Lead	99%	100%	103%	
		Second Sc	ource Calibrat	ion Verificat	ion	
Element		.25 ppb	1 ppb	50 ppb	100 ppb	250 ppb
•	ı	QC Std 8	QC Std 2	QC Std 5	QC Std 4	QC Std 3
Beryllium		104%	110%	103%	108%	104%
Cadmium			112%	105%	110%	104%
Lead			105%	99%	104%	99%

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

CleanAir Project No: 10735-4

RESULTS													
Table 2-22: Quality Control and Quality Assurance – Method and Field Blanks													
Average FH BH A B C  Method 29 Total Catch Front Empty													
		ug	Half	H <sub>2</sub> O <sub>2</sub> /HNO <sub>4</sub>	Impinger	KMnO₄	HCI						
			~~~~~										
Reagent Blank	#1	< 0.5	< 0.1	< 0.3	< 0.2	< 0.5	< 0.4						
	#2		< 0.1	< 0.3	< 0.2	< 0.5	< 0.4						
Inlet Filter Blank	#1	< 0.5	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4						
	#2		< 0.1	< 0.2	< 0.2	< 0.5	< 0.4						

Method 23	0_6688_MB001	Field Blank
	pg	pg
Totals		
TCDDs	0	2.77
PeCDDs	0	0
HxCDDs	0	6.32
HpC DDs	2.69	5.45
OCDD	0	10.2
TCDFs	0	0
PeCDFs	0	0
HxCDFs	7.91	0
HpCDFs	12.3	1.72
OCDF	8.74	0
Total PCDD/Fs (ND=0; EMPC=0)	31.6	26.5
Total PCDD/Fs (ND=0; EMPC=EMPC)	40.5	35.4
Total PCDD/Fs (2378-X ND=DL; EMPC=EMPC)	49.8	47.0
Tota I 2378s (ND=0; EMPC=0)	12.3	15.6
Total 2378s (ND=0.5; EMPC=0)	34.4	29.0
Tota i 2 378s (ND=1; EMPC=0)	56.5	42.3
Tota I 2378s (ND=0; EMPC=1)	12.3	15.6
Total 2378s (ND=0.5; EMPC=1)	34.4	29.0
Tota I 2378s (ND=1; EMPC=1)	56.5	42.3

# WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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	e 2-23:	Missellansous
Quality Control and Qualit Blanks	Result	- MISCENANEOUS
Acetone (g)	<0.0001	
HCl Dl H <sub>2</sub> O (mg/l)	< 0.024	
HCl 0.1 N H <sub>2</sub> SO <sub>4</sub> (mg/l)	<0.024	
HF DI H <sub>2</sub> O (mg/l)	<0.006	
Meters - Post Cal	Result	Limit
61-6	-0.9%	≤ ± 5%
61-7	3.6%	≤ ± 5%
61-8	-3.4%	≤ ± 5%
66-6	-1.7%	≤ ± 5%
66-7	2.3%	≤ ± 5%
66-11	-0.9%	≤ ± 5%
66-16	3.4%	≤ ± 5%
66-22	-1.1%	≤ ± 5%

End of Section 2 - Results

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Clean Air Project No: 10735-4

#### **DESCRIPTION OF INSTALLATION**

#### PROCESS DESCRIPTION

The South Broward Resource Recovery facility operates three (3) 750-tons-per-day municipal refuse-fired, water-wall boiler trains. The trains were manufactured by Babcock and Wilcox to produce electricity for sale to a local utility company. The boilers are rated at a maximum steam flow of 192,000 lbs/hr. Each boiler is equipped with an SDA for acid gas removal, followed by an FF baghouse for the control of particulate emissions and selective non-catalytic reduction for  $NO_X$  control. The control equipment is manufactured by Wheelabrator Air Pollution Control, Inc.

A carbon injection system was recently installed at South Broward for mercury control. All pertinent equipment for the carbon injection system was supplied by Chemco Systems of Monongahela, Pennsylvania, with the carbon rate scales being supplied by Merrick Industries of Lynn Haven, Florida. Each FF baghouse is followed by an induced draft fan that directs the flue gas to a dedicated flue in a common stack.

Figure 3-1 shows a general schematic of the facility. The general sampling locations for the Units 1, 2 and 3 SDA Inlets and FF Outlets are shown in Figure 3-2 on page 3-2.

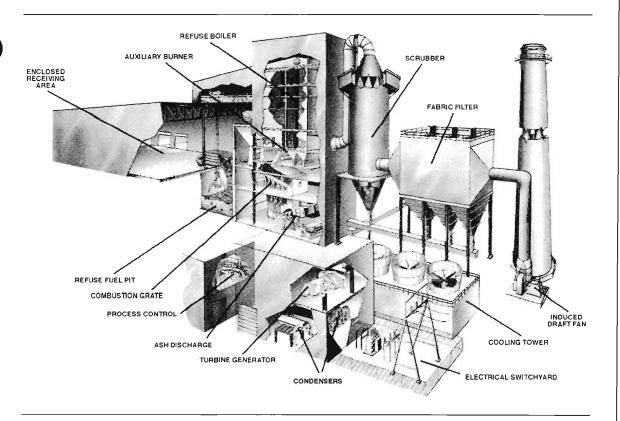


Figure 3-1: General Process Schematic

Clean Air Project No: 10735-4

# DESCRIPTION OF INSTALLATION

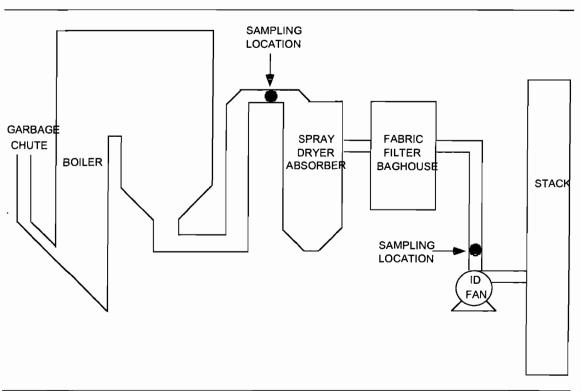


Figure 3-2: Process Schematic

3-3

CleanAir Project No: 10735-4

### DESCRIPTION OF INSTALLATION

Table 3-1:
Unit 1 Compliance Test Process Data

								Oille I	00	Pilaii	ce res	36 1 16	<del>/0033</del>	Data			
LANT NAM	AE: SO	UTH BF	OWARD				Dat	a from DC:	S Printou	ts		Calcu	ılated	Lie	ne Feed Ra	ate	
						Steam	FF Inlet	Fabric Filter	SDA Inlet	Total SDA	Diluton H2O	Slurry	Slurry	Slurry	Slurry CaO	CaO	
	Unit	Run		Tia	me	Flow	Temp	Delta	Temp	Flow	flow	Flow	Conc.	Specific	Density	Flow	
Test	No.	No.	Date	Start	Stop	klbs/hr	deg F	In. H2O	deg F	gp <u>m</u>	gpm	gpm	%	Gravity	lb/gal	lbs/hr	Test Run Comments
M-26A	1	1	3/24/2008	0619	0719	184.5	315.0	5.7	493.0	36.0	29.0	7.1	19.8	1.090	0.941	398.6	All times based on CEMS time
HCI		2	3/24/2008	0755	0855	183.6	314.8	5.8	495.1	36.3	29.0	7.3	19.8	1.090	0.941	411.0	
		3	3/24/2008	0954	1056	184.2	315.1	5.8	490.7	34.8	27.5	7.3	20.7	1.090	0.941	409.9	
					Avg	184.1	315.0	5.7	492.9	35.7	28.5	7.2	20.1	1.090	0.941	406.5	
M-29/5	1	1	3/25/2008	0606	0819	186.6	318.2	5.7	493.7	35.5	29.7	5.8	20.5	1.090	0.941	329.2	All times based on CEMS time
Metals	1	2	3/25/2008	0841	1052	184.3	315.2	5.8	492.6	34.9	28.4	6.5	20.6	1.090	0.941	368.7	
PM		3	3/25/2008	1116	1330	184.1	315.8	5.8	503.0	38.4	32.7	5.7	16.0	1.099	1.039	357.2	
					Avg	185.0	316.4	5.8	496.4	36.3	30.2	6.0	19.0	1.093	0.974	351.7	
M-13B	1	1	3/24/2008	0924	1039	183.8	315.1	5.8	489.6	34.2	26.9	7.3	21.0	1.090	0.941	41 1.6	All times based on CEMS time
HF		2	3/24/2008	1117	1227	184.3	315.0	5.6	489.5	33.5	26.3	7.2	21.4	1.090	0.941	408.2	
		3	3/24/2008	1245	1406	184.6	314.9	5.7	486.9	32.1	24.8	7.4	22.4	1.090	0.941	415.5	
					Avg	184.2	315.0	5.7	488.7	33.3	26.0	7.3	21.6	1.090	0.941	411.8	
M-29	1	4	3/26/2008	0546	0822	176.1	315.0	5.7	500.3	38.9	31.9	7.0	17.7	1.094	0.985	413.1	All times based on CEMS time
Mercury	l	5	3/26/2008	0859	1141	184.1	315.0	5.7	497.4	36.3	28.7	7.6	20.9	1.094	0.985	450.3	
	l	6	3/26/2008	1203	1413	183.8	315.0	5.9	501.6	37.6	27.5	10.1	26.7	1.094	0.985	596.3	
					Avg	181.3	315.0	5.8	499.8	37.6	29.4	8.2	21.7	1.094	0.985	486.6	

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CleanAir Project No: 10735-4

### DESCRIPTION OF INSTALLATION

#### Table 3-2:

Unit	2	Com	nliance	Test	<b>Process</b>	Data
Ollic	_	COILL	Pilalice	i Cat	1 100633	Data

									2 Con		ice i e						1
LANT NA	ME: SO	UTH BI	ROWARD				Da	ta From D				Calcu	ulated	Lir 	ne Feed Ra	ate	
						Steam	FF Inlet	Fabric Filter	SDA Inlet	Total SDA	Diluton H2O	Slurry	Slurry	Slurry	Slurry CaO	CaO	
	Unit	Run		Tii	me	Flow	Temp	Delta	Temp	Flow	flow	Flow	Conc.	Specific	Density	Flow	
Test	No.	No.	Date	Start	Stop	klbs/hr	deg F	In. H2O	deg F	gpm	gpm	gpm	%	Gravity	lb/gal	lbs/hr	Test Run Comments
M-26A	2	1	3/26/2008	0606	0706	183.4	314.9	7.3	517.4	41.7	34.9	6.9	16.5	1.093	0.974	400.9	All times based on CEMS time
HCI		2	3/26/2008	0732	0832	185.8	314.8	7.2	518.2	41.2	34.5	6.8	16.5	1.094	0.985	400.1	
		3	3/26/2008	0921	1021	185.2	314.5	7.0	518.1	40.8	33.7	7.1	17.1	1.094	0.985	419.0	
					Avg	184.8	314.7	7.1	517.9	41.3	34.3	6.9	16.7	1.094	0.981	406.7	
M-29/5	2	1	3/24/2008	0619	0947	182.3	315.2	8.4	525.0	36.3	29.2	7.2	15.5	1.090	0.941	404.3	All times based on CEMS time
Metals	1	2	3/24/2008	1122	1333	184.5	327.7	7.3	517.6	38.0	34.2	3.8	20.9	1.090	0.941	215.1	
PM		3	3/24/2008	1400	1611	183.0	326.6	7.8	528.1	41.3	41.5	-0.1	17.6	1.090	0.941	-6.2	
					Avg	183.3	323.2	7.8	523.6	38.5	34.9	3.6	18.0	1.090	0.941	204.4	
M-13B	2	1	3/25/2008	1103	1212	183.1	322.1	7.0	505.8	34.5	30.0	4.6	18.5	1.090	0.941	256.9	All times based on CEMS time
HF		2	3/25/2008	1236	1347	184.4	319.4	7.0	509.2	36.3	31.7	4.6	17.7	1.099	1.039	283.6	
	1	3	3/25/2008	1420	1531	184.5	316.5	7.0	511.5	36.8	32.6	4.2	16.5	1.099	1.039	258.7	
					Avg	184.0	319.3	7.0	508.8	35.9	31.4	4.4	17.6	1.096	1.006	266.4	
															_		
M-29	2	4	3/25/2008	0613	0820	186.6	317.9	7.2	512.4	39.1	32.0	7.0	18.6	1.090	0.941	395.8	All times based on CEMS time
Mercury		5	3/25/2008	0851	1107	184.3	315.5	6.9	502.8	35.5	29.2	6.3	20.2	1.090	0.941	352.9	
-	1	6	3/25/2008	1134	1349	183.7	321.2	7.0	509.0	36.0	31.4	4.6	18.0	1.099	1.039	283.6	
	I				Ava	184 9	318.2	7.0	508.1	36.8	30.9	5.9	18.9	1.093	N 974	344.1	1

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470.6

#### **DESCRIPTION OF INSTALLATION**

#### Table 3-3:

								Unit 3	Com	piiano	<u>ce res</u>	st Pro	cess	Data			•
LANT NAM	AE: SO	UTH BR	OWARD				Data	a From DC	S Printout	ts		Calcu	lated	Lir	ne Feed Ra	ıte	
	Γ					Steam	FF inlet	Fabric Filter	SDA Iniet	Total SDA	Diluton H2O	Slurry	Siurry	Slurry	Slurry CaO	CaO	
	Unit	Run		Tir	me	Flow	Temp	Delta	Temp	Flow	flow	Flow	Conc.	Specific	Density	Flow	
Test	No.	No.	Date	Start	Stop	klbs/hr	deg F	ln. H2O	deg F	gpm	gpm	gpm	%	Gravity	ib/gal	lbs/hr	Test Run Comments
M-26A	3	1	3/25/2008	0617	0728	182.8	315.5	6.4	485.0	37.4	31.1	6.3	22.6	1.090	0.941	356.3	All times based on CEMS time
HCI		2	3/25/2008	0754	0854	183.6	314.3	6.5	480.7	35.0	27.5	7.5	23.9	1.090	0.941	422.9	
1	1	3	3/25/2008	0922	1022	184.4	313.8	6.2	484.4	36.6	28.9	7.6	23.7	1.090	0.941	430.2	
					Avg	183.6	314.5	6.4	483.3	36.3	29.1	7.1	23.4	1.090	0.941	403.1	
M-29/5	3	1	3/24/2008	0622	0836	184.1	318.5	6.4	477.5	46.2	39.1	7.1	23.7	1.090	0.941	399.7	All times based on CEMS time
Metals	1	2	3/24/2008	0912	1126	184.3	315.2	6.2	480.4	37.0	31.5	5.5	21.8	1.090	0.941	310.0	
PM		3	3/24/2008	1208	1424	184.3	320.3	6.3	479.4	32.7	30.1	2.7	24.3	1.090	0.941	149.6	
					Avg	184.2	318.0	6.3	479.1	38.6	33.6	5.1	23.3	1.090	0.941	286.4	
M-23	3	1	3/24/2008	1037	1522	184.0	318.6	6.3	482.7	34.8	30.0	4.8	22.6	1.090	0.941	268.7	All times based on CEMS time
dioxins	l	2	3/25/2008	0603	1038	183.1	315.4	6.4	483.7	36.6	30.3	6.3	23.0	1.090	0.941	358.0	
	1	3	3/25/2008	1058	1534	181.9	316.1	6.4	487.7	37.4	33.4	4.0	20.2	1.099	1.039	251.2	
					Avg	183.0	316.7	6.4	484.7	36.3	31.2	5.0	22.0	1.093	0.974	292.6	
M-13B	3	1	3/26/2008	0630	0741	184.1	315.0	6.3	466.2	31.0	23.6	7.4	23.8	1.093	0.974	431.3	All times based on CEMS time
HF	l	2	3/26/2008	0757	0907	184.3	315.4	6.5	478.4	35.5	28.2	7.3	21.2	1.094	0.985	433.2	
	1	3	3/26/2008	0926	1036	184.3	314.8	6.2	490.9	39.4	31.8	7.6	19.3	1.094	0.985	447.4	
					Avg	184.2	315.1	6.3	478.5	35.3	27.9	7.4	21.4	1.094	0.981	437.3	
							_										
M-29	3	4	3/26/2008	0545	0759	185.5	314.9	6.3	469.0	31.8	24.4	7,4	23.2	1.093	0.974	430.7	All times based on CEMS time
	1	5	3/26/2008	0817	1030	184.0	315.1	6.4	488.8	39.2	31.8	7.4	19.2	1.094	0.000	438.5	
Mercury	1	•	3/20/2000	00 17	1030	104.0	313.1	0.4	400.0	39.2	31.0	1.4	19.2	1.094	0.985	430.5	

35.0

478.9

184.5

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#### **DESCRIPTION OF INSTALLATION**

#### **DESCRIPTION OF SAMPLING LOCATIONS**

Sampling point locations were determined according to EPA Method 1.

Table 3-4 outlines the sampling point configurations. Figures 3-3 through 3-5, on pages 3-7 through 3-9, illustrate the sampling points and orientation of sampling ports for each of the sources that were tested in the program.

Table 3-4: Sampling Points

Location	Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Units 1,2 and	3 SDA Inlets							
Hydrogen (	Chloride	26A <sup>1</sup>	1-3	1	1	60	60	3-3
Mercury		29	1-3	1	1	5	120	3-4
Units 1,2 and	3 FF Outlets							
Particulate	, Be, Cd, Pb and Hg	5/29 <sup>2</sup>	1-3	5	5	5	125	3-5
Hydrogen (	Chloride	26A <sup>1</sup>	1-3	1	1	60	60	NA
Fluorides		13B	1-3	5	5	2.5	62.5	3-5
PCDDs/PC	DFs (Unit 1 only)	23	1-3	5	5	10	250	3-5

<sup>&</sup>lt;sup>1</sup> Hydrogen chloride inlet testing utilized a modification of EPA Method 26A (single point constant sampling rate).

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<sup>&</sup>lt;sup>2</sup> FF Outlet metals testing was done in conjunction with EPA Method 5 particulate sampling.

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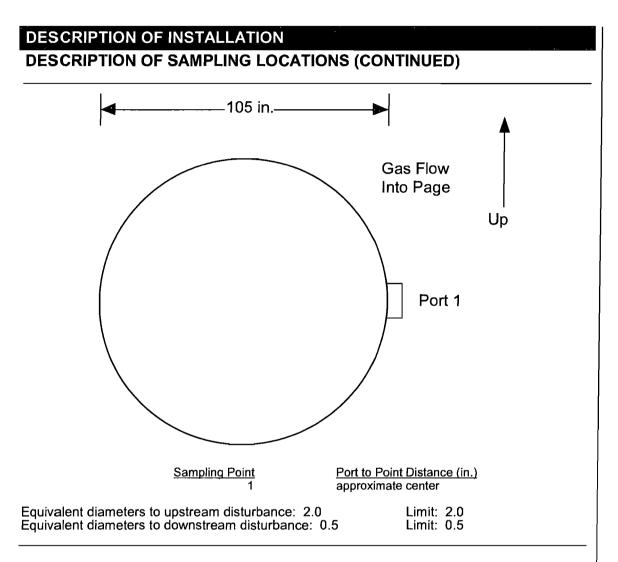


Figure 3-3: SDA Inlets - Sampling Point Determination (HCI Sampling)
(Units 1, 2 and 3 are identical)

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**DESCRIPTION OF INSTALLATION SAMPLING POINT DETERMINATION (CONTINUED)** 105 in. Port 2 + Up Port 1 Gas Flow Out of Page Sampling Point Port to Point Distance (in.) 102.8 98.0 2 3 92.6 86.4 78.9 67.7 37.3 26.3 9 18.6 10 12.4 11 7.0 12 2.2 Diameters to upstream disturbance: >2.0 Limit: 2.0 Diameters to downstream disturbance: >0.5 Limit: 0.5

Figure 3-4: SDA Inlets - Sampling Point Determination (Hg Sampling) (Units 1, 2 and 3 are identical)

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3-9

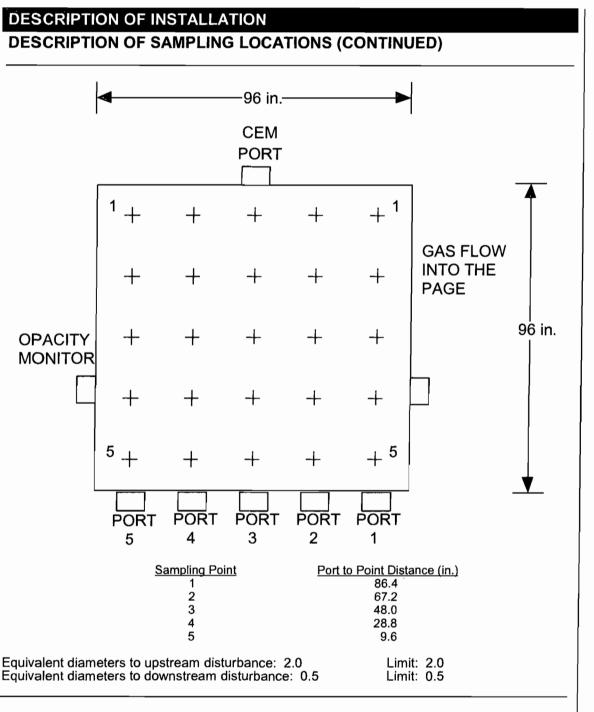


Figure 3-5: FF Outlets - Sampling Point Determination (Units 1, 2 and 3 are identical)

End of Section 3 – Description of Installation

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\_\_\_\_\_

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#### **METHODOLOGY**

Clean Air Engineering followed procedures as detailed in EPA Methods 1, 2, 3, 3A, 3B, 4, 5, 9, 13B, 22, 23, mod. 26A and 29. The following table summarizes the methods and their respective sources.

### Table 4-1: Summary of Sampling Procedures

S
•

<sup>&</sup>lt;sup>1</sup> Method 26A was modified at the inlet using single point constant sampling rate, and at the outlet it was done in conjunction with Method 5.

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR) and on the World Wide Web at http://www.cleanair.com.

Diagrams of the sampling apparatus and major specifications of the sampling, recovery and analytical procedures are summarized for each method in Appendix A.

CleanAir followed specific quality assurance and quality control (QA/QC) procedures as outlined in the individual methods and in EPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods", EPA/600/R-94/038C. Additional QA/QC methods, as prescribed in CleanAir's internal Quality Manual, were also followed. Results of all QA/QC activities performed by CleanAir are summarized in Appendix E.

End of Section 4 - Methodology

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#### CleanAir.

### WHEELABRATOR SOUTH BROWARD, INC. FT. LAUDERDALE, FL

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5-1

PPENDIX	
TEST METHOD SPECIFICATIONSA	
SAMPLE CALCULATIONSB	
PLANT DATAC	
PARAMETERSD	
QA/QC DATA E	
FIELD DATA F	
FIELD DATA PRINTOUTSG	
LABORATORY DATAH	
PERTINENT CERTIFICATIONSI	
CLARIFICATIONSJ	

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### **TEST METHOD SPECIFICATIONS**

Α

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#### EPA Method 5/29

Source Location Name(s)

Units 1, 2 and 3 FF Outlets

Pollutant(s) to be Determined

Particulate Matter (PM) and Trace Metals (including Mercury)

Other Parameters to be Determined from Train

Gas Density, Moisture, Flow Rate

Standard Method Specification

Dollutant	Sampling	Information
Ponutant	Samblimo	mormation

N/A

248'F±25'F

Dry Gas Meter

±2%

N/A

125 minutes

No. of Sample Traverse Points Sample Time per Point N/A 25 N/A 5 minutes

Sampling Rate Isokinetic (90-110%)

Isokinetic (90-110%)

**Actual Specification Used** 

#### **Sampling Probe**

Duration of Run

Nozzle Material
Nozzle Design
Probe Liner Material
Effective Probe Length
Probe Temperature Set-Point

Borosilicate or Quartz Glass Button-Hook or Elbow Borosilicate or Quartz Glass N/A

Button-Hook Borosilicate Glass 8 feet

248 F±25 F

Borosilicate Glass

#### **Velocity Measuring Equipment**

Pitot Tube Design
Pitot Tube Coefficient
Pitot Tube Calibration by
Pitot Tube Attachment

Type S
N/A
0.812
Geometric or Wind Tunnel
Attached to Probe
Type S
0.812
Wind-Tunnel
Attached to Probe

#### **Metering System Console**

Meter Type
Meter Accuracy
Meter Resolution
Meter Size
Meter Calibrated Against

N/A
N/A
t Wet Test Meter or Standard DGM
N/A

±1% 0.01 cubic feet 0.1 dcf/revolution

Wet Test Meter

Inclined Manometer

Inclined Manometer

Dry Gas Meter

Pump Type
Temperature Measurements
Temperature Resolution
ΔP Differential Pressure Gauge

5.4°F
Inclined Manameter or Equivalent

Rotary Vane
Type K Thermocouple/Pyrometer
1.0°F

ΔH Differential Pressure Gauge
Barometer

Inclined Manometer or Equivalent
Inclined Manometer or Equivalent
Mercury or Aneroid

Digital Barometer calibrated w/Mercury Aneroid

#### **Filter Description**

Filter Location
Filter Holder Material
Filter Support Material

After Probe Borosilicate Glass

Quartz or Fiberglass Fiber

Exit of Probe Borosilicate Glass

Filter Support Material

Cyclone Material

Filter Heater Set-Point

Teflon (or other non-metallic material)

N/A

248\*F±25\*F

Teflon None 248°F±25°F

Quartz Fiber

#### Other Components

Filter Material

Description N/A
Location N/A
Operating Temperature N/A

N/A N/A N/A

#### EPA Method 5/29

#### Impinger Train Description

Type of Glassware Connections Connection to Probe or Filter by Number of Impingers Impinger Stem Types Impinger 1

Impinger 2 Impinger 3 Impinger 4 Impinger 5 Impinger 6 Impinger 7

**Standard Method Specification** 

Ground Glass or Equivalent **Direct Glass Connection** 

Modified Greenburg-Smith Modified Greenburg-Smith Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith

Modified Greenburg-Smith Impinger 8

**Gas Density Determination** 

Sample Collection Sample Collection Medium Sample Analysis

Sample Recovery Information

Probe Brush Material Probe Rinse Reagent Probe Rinse Wash Bottle Material Probe Rinse Storage Container Filter Recovered? Filter Storage Container Impinger Contents Recovered? Impinger Rinse Reagent Impinger Wash Bottle

Impinger Storage Container

**Analytical Information** Method 4 H<sub>2</sub>O Determination by Filter Preparation Conditions Front-Half Rinse Preparation Back-Half Analysis Additional Analysis

Multi-point integrated Flexible Gas Bag Orsat or Fyrite Analyzer

Non-metallic swab or bristle Acetone/0.1N Nitric Acid

See Recovery Flow Chart

Glass or Teflon See Method 29 Recovery Flow Chart Yes

Petri Dish - Glass or Polystyrene Yes

See Method 29 Recovery Flow Chart Glass or Teflon

Volumetric or Gravimetric See Method 29 Analytical Flow Chart See Method 29 Analytical Flow Chart See Method 29 Analytical Flow Chart Gravimetric (EPA Method 5)

**Actual Specification Used** 

Screw Joint with Silicone Gasket Direct Glass Connection

Modified Greenburg-Smith Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith

Modified Greenburg-Smith

Modified Greenburg-Smith Modified Greenburg-Smith

Multi-Point Integrated

Vinyl Bag CEM

Teflon Mat

Acetone/0.1N. Nitric Acid

Teflon

See Recovery Flow Chart

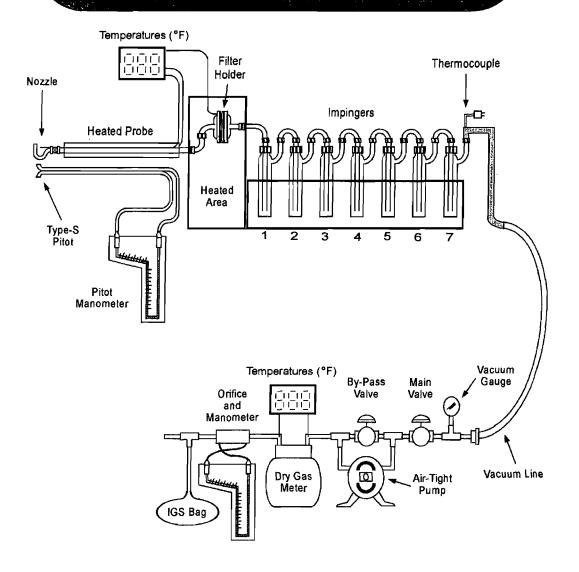
Yes Glass Yes

See Recovery Flow Chart Teflon

See Recovery Flow Chart

Gravimetric and Volumetric For Metals Analysis See Analytical Flow Chart See Analytical Flow Chart Gravimetric (EPA Method 5)

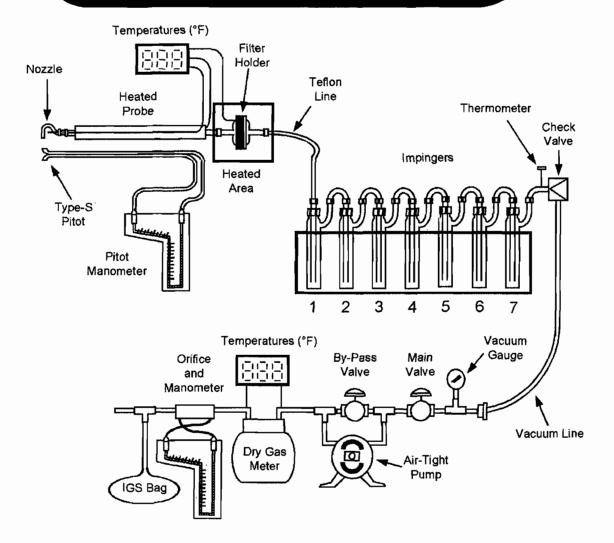
## EPA Method 5/29 Sampling Train Configuration



#### **Impinger Contents**

Impinger 1	Empty
Impinger 2	100 ml 5% HNO <sub>3</sub> / 10% H <sub>2</sub> O <sub>2</sub>
Impinger 3	100 ml 5% HNO <sub>3</sub> / 10% H <sub>2</sub> O <sub>2</sub>
Impinger 4	Empty
Impinger 5	100 ml 4% KMnO <sub>4</sub> / 10% H <sub>2</sub> SO
Impinger 6	100 ml 4% KMnO <sub>4</sub> / 10% H <sub>2</sub> SO,
Impinger 7	Silica Gel

## **EPA Method 29 SDA Inlet Sampling Train Configuration**



	Impinger Contents
Impinger 1	Empty
Impinger 2	100 ml 5% HNO <sub>3</sub> / 10% H <sub>2</sub> O <sub>2</sub>
Impinger 3	100 ml 5% HNO <sub>3</sub> / 10% H <sub>2</sub> O <sub>2</sub>
Impinger 4	Empty
Impinger 5	100 ml 4% KMnO <sub>4</sub> / 10% H <sub>2</sub> SO <sub>4</sub>
Impinger 6	100 ml 4% KMnO <sub>4</sub> / 10% H <sub>2</sub> SO <sub>4</sub>
Impinger 7	Silica Gel

#### **EPA Method 29**

**Standard Method Specification** 

**Actual Specification Used** 

Units 1,2 and 3 SDA Inlets Source Location Name(s) Pollutant(s) to be Determined Trace Metals (including Mercury) Other Parameters to be Determined from Train Gas Density, Moisture, Flow Rate

Pollutant Sampling Informat	ion

N/A 120 minutes **Duration of Run** NVA 24 No. of Sample Traverse Points N/A 5 minutes Sample Time per Point Isokinetic (90-110%)

Sampling Rate Isokinetic (90-110%)

Sampling Probe

Nozzle Material Borosilicate or Quartz Glass **Borosilicate Glass Button-Hook** Nozzle Design **Button-Hook or Elbow** Probe Liner Material Borosilicate or Quartz Glass **Borosilicate Glass** Effective Probe Length

Probe Temperature Set-Point 248'F±25'F 248'F±25'F

**Velocity Measuring Equipment** 

Pitot Tube Design Type S Type S Pitot Tube Coefficient N/A 0.82 Wind-Tunnel Pitot Tube Calibration by Geometric or Wind Tunnel Pitot Tube Attachment Attached to Probe Attached to Probe

**Metering System Console** 

Dry Gas Meter Meter Type Dry Gas Meter Meter Accuracy ±2% ±1% Meter Resolution N/A 0.01 cubic feet Meter Size N/A 0.1 dcf/revolution Wet Test Meter or Standard DGM Wet Test Meter Meter Calibrated Against

Pump Type N/A Rotary Vane

N/A Type K Thermocouple/Pyrometer **Temperature Measurements** 

5.4°F 1.0°F Temperature Resolution

Inclined Manometer or Equivalent Inclined Manometer ΔP Differential Pressure Gauge ΔH Differential Pressure Gauge Inclined Manometer or Equivalent Inclined Manometer

Barometer Mercury or Aneroid Digital Barometer calibrated w/Mercury Aneroid

Filter Description

After Probe Exit of Probe Filter Location Filter Holder Material Borosilicate Glass **Borosilicate Glass** 

Filter Support Material Teflon (or other non-metallic) Teflon Cyclone Material N/A None Filter Heater Set-Point 248°F±25°F 248'F±25'F Filter Material Quartz or Glass Fiber Quartz Fiber

Other Components

Description N/A N/A Location N/A N/A Operating Temperature N/A N/A

#### **EPA Method 29**

Impinger Train Description
----------------------------

Type of Glassware Connections Connection to Probe or Filter by Number of Impingers

Impinger Stem Types Impinger 1 Impinger 2 Impinger 3 Impinger 4 Impinger 5 Impinger 6 Impinger 7 Impinger 8

Ground Glass or Equivalent

Modified Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith Modifled Greenburg-Smith

**Gas Density Determination** 

Sample Collection Sample Collection Medium Sample Analysis

Sample Recovery Information

Probe Brush Material Probe Rinse Reagent Probe Rinse Wash Bottle Material Probe Rinse Storage Container Filter Recovered? Filter Storage Container

Impinger Contents Recovered? Impinger Rinse Reagent Impinger Wash Bottle

Impinger Storage Container

**Analytical Information** 

Filter Preparation Conditions Front-Half Rinse Preparation Back-Half Analysis

Method 4 H<sub>2</sub>O Determination by

Additional Analysis

**Direct Glass Connection** 

**Standard Method Specification** 

Modified Greenburg-Smith Modified Greenburg-Smith Greenburg-Smith

Multi-point integrated Flexible Gas Bag Orsat or Fyrite Analyzer

Non-metallic swab or bristle

0.1N Nitric Acid Glass or Teflon Polyethylene or glass

Petri Dish - Glass or Polystyrene

See Method 29 Recovery Flow Chart

Glass or Teflon

See Recovery Flow Chart

Volumetric or Gravimetric

See Method 29 Analytical Flow Chart See Method 29 Analytical Flow Chart See Method 29 Analytical Flow Chart

None

**Actual Specification Used** 

Screw Joint with Silicone Gasket

**Direct Glass Connection** 

Modified Greenburg-Smith Modified Greenburg-Smith Greenburg-Smith

Modified Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith

Multi-Point Integrated

Vinyl Bag CEM

Teflon Mat 0.1 N Nitric Acid

Teflon Polyethylene Yes Polyethylene

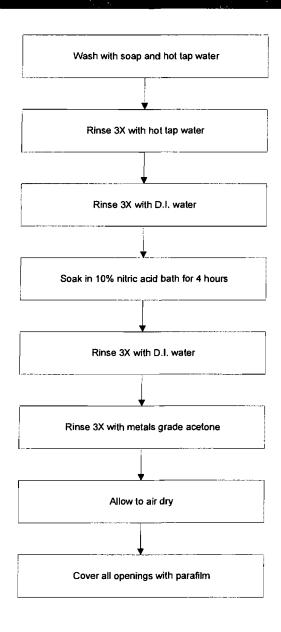
See Recovery Flow Chart Teffon

See Recovery Flow Chart

Gravimetric and Volumetric For Metals Analysis See Analytical Flow Chart See Analytical Flow Chart

None

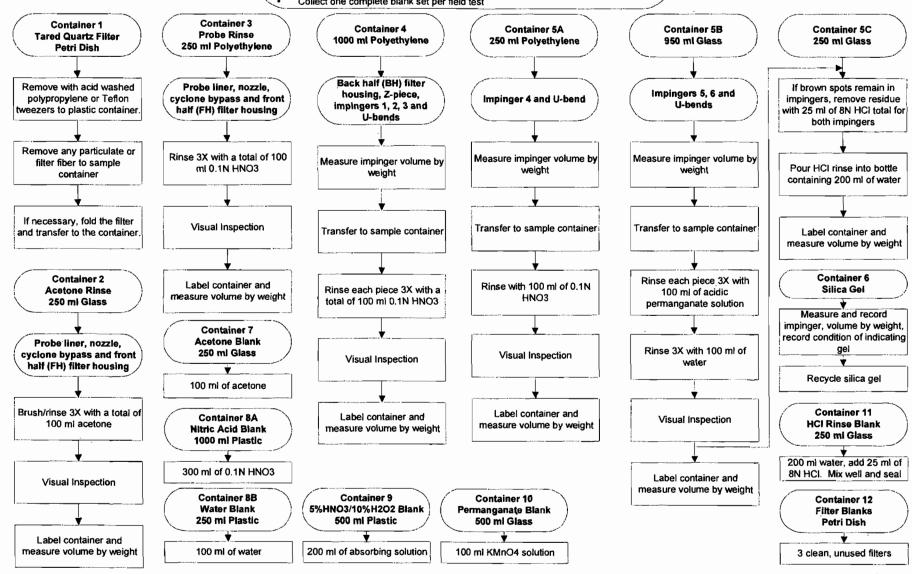
### EPA Method 29 Glassware Preparation Procedures

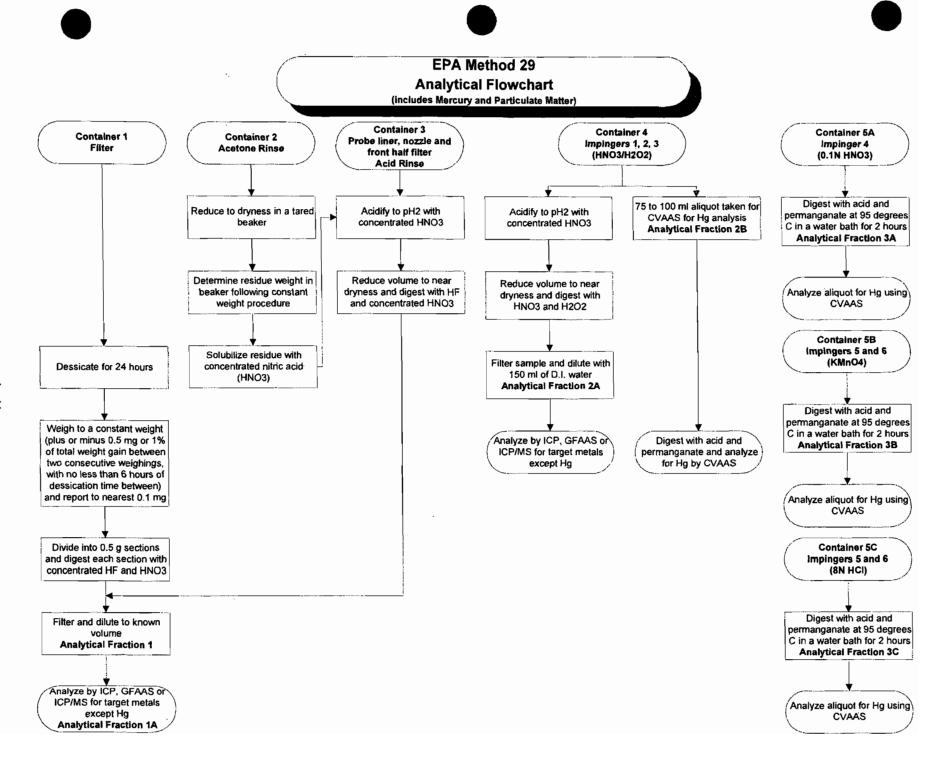


#### **EPA Method 29** Sample Recovery Flowchart

(includes Mercury and Particulate Matter)

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)
  - Collect one complete blank set per field test





#### **Specification Sheet for EPA Method 13B**

Units 1.2 and 3 FF Outlets Source Location Name(s)

Pollutant(s) to be Determined Total Fluoride (F)

Other Parameters to be Determined from Trai Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Use
B. II 4 4 6 5 5 5 11		

Pollutant Sampling Information

Duration of Run N/A 62.5 minutes No. of Sample Traverse Points N/A 25

Sample Time per Point N/A 2.5 minutes

Sampling Rate Isokinetic (90-110%) 1 cfm maximum Isokinetic (90-110%) 1 cfm maximum

**Sampling Probe** 

Nozzle Material Stainless Steel or Glass Romeilicate Glass Nozzle Design Button-Hook or Elbow Button-Hook Probe Liner Material Stainless Steel or Glass Borosilicate Glass

Effective Probe Length 8 feet

248°F±25°F (optional) Probe Temperature Set-Point 248°F±25°F

**Velocity Measuring Equipment** 

Pitot Tube Design Type S Type S Pitot Tube Coefficient N/A 0.825 Pitot Tube Calibration by Geometric or Wind Tunnel Wind-Tunnel Pitot Tube Attachment Attached to Probe Attached to Probe

**Metering System Console** 

Dry Gas Meter Meter Type Dry Gas Meter

±2% Meter Accuracy ±1%

Meter Resolution N/A 0.01 cubic feet Meter Size N/A 0.1 dcf/revolution Wet Test Meter or Standard DGM Meter Calibrated Against Wet Test Meter

Pump Type N/A Rotary Vane

Temperature Measurements N/A Type K Thermocouple/Pyrometer Temperature Resolution 5.4°F 1 0°F

ΔP Differential Pressure Gauge inclined Manometer or Equivalent Inclined Manometer ΔH Differential Pressure Gauge Inclined Manometer or Equivalent Inclined Manometer

Digital Barometer calibrated w/Mercury Aneroid Barometer Mercury or Aneroid

**Filter Description** 

Filter Location Exit of Probe or Between 3rd and 4th impingers Exit of Probe Filter Holder Material Borosilicate Glass or Stainless Steel Borosilicate Glass

Stainless Steel if filter at probe exit; Glass Frit if filter Filter Support Material after 3rd impinger Teflon

Cyclone Material N/A None

Filter Heater Set-Point 248°F±25°F if after probe, unheated if after 3rd imp. 248°F±25°F

Low F Quartz or Fiberglass if after probe, Whatman Filter Material No. 1 if after 3rd impinger Whatman No. 1 (Ashless)

**Other Components** 

Description N/A N/A Location N/A N/A Operating Temperature N/A N/A

#### **EPA Method 13B**

#### Impinger Train Description

Type of Glassware Connections Connection to Probe or Filter by Number of Impingers

Impinger Stem Types

Impinger 1 Impinger 2 Impinger 3 Impinger 4 Impinger 5

Impinger 6 Impinger 7 Impinger 8

**Standard Method Specification** 

Ground Glass or Equivalent

**Direct Glass Connection** 

Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith

Modified Greenburg-Smith

Screw Joint with Silicone Gasket

**Actual Specification Used** 

Direct Glass Connection 4

Modified Greenburg-Smith Greenburg-Smith

Modified Greenburg-Smith Modified Greenburg-Smith

**Gas Density Determination** 

Sample Collection Sample Collection Medium

Sample Analysis

Multi-point integrated Multi-Point Integrated

Flexible Gas Bag Vinyl Bag Orsat or Fyrite Analyzer CEM

Sample Recovery Information

Probe Brush Material Probe Rinse Reagent

Probe Rinse Wash Bottle Material Probe Rinse Storage Container Filter Recovered?

Filter Storage Container Impinger Contents Recovered?

Impinger Rinse Reagent Impinger Wash Bottle

Impinger Storage Container

Deionized distilled water Glass or Polyethylene

Polyethylene

Polyethylene

Polyethylene

Nylon Bristle

Yes

Deionized Distilled Water Glass or Polyethylene

Nylon Bristle

Deionized Distilled Water

Teflon Polyethylene Yes

Polyethylene Yes

Deionized Distilled Water

Teflon Polyethylene

**Analytical Information** 

Method 4 H<sub>2</sub>O Determination by Filter Preparation Conditions Front-Half Rinse Preparation **Back-Half Analysis** 

Additional Analysis

Volumetric or Gravimetric See analytical flow chart See analytical flow chart Ion Specific Electrode

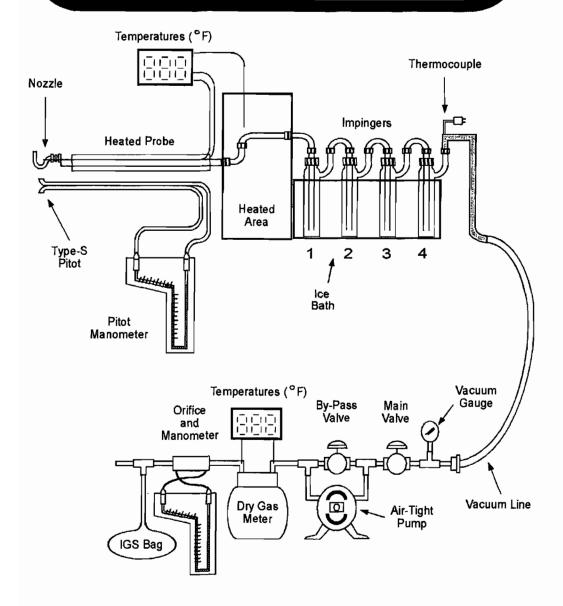
N/A

Gravimetric and Volumetric

See Analytical Flow Chart See Analytical Flow Chart Ion Chromatography

None

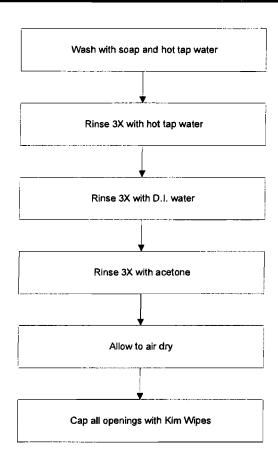
# EPA Method 13B Sampling Train Configuration



#### **Impinger Contents**

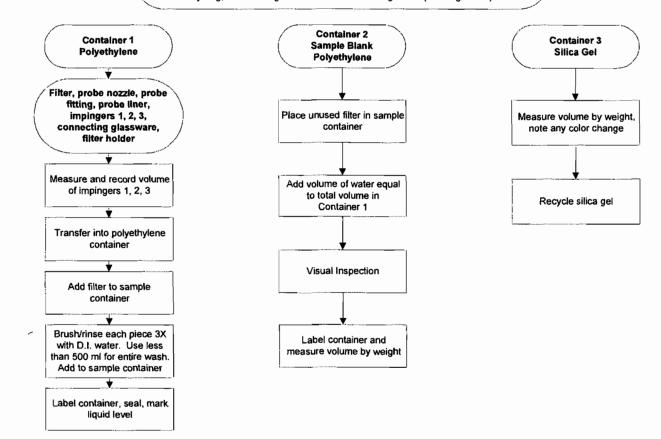
Impinger 1	100 ml Dl H₂O
Impinger 2	100 ml Dl H <sub>2</sub> O
Impinger 3	Empty
Impinger 4	Silica Gel

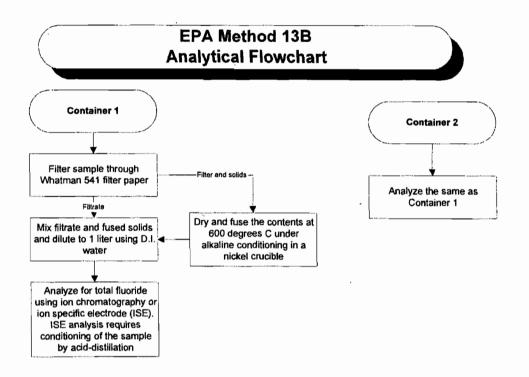
### EPA Method 13B Glassware Preparation Procedures



#### EPA Method 13B Sample Recovery Flowchart

- Tare all sample containers before sample collection
- · Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)





#### **EPA Method 23**

Source Location Name(s)

Unit 1 FF Outlet

Pollutant(s) to be Determined

Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans (PCDD/PCDF)

Other Parameters to be Determined from Train

Gas Density, Moisture, Flow Rate

Standard Method Specification

#### **Pollutant Sampling Information**

Actual Specification Used

Duration of Run No. of Sample Traverse Points Sample Time per Point N/A 250 minutes
N/A 25
N/A 10 minutes

Isokinetic (90-110%)

Sampling Rate

Sampling Probe

Nozzle Material Nickel, Quartz, Stainless Steel or Glass Borosilicate Glass
Nozzle Design Button-Hook or Elbow Button-Hook
Probe Liner Material Borosilicate or Quartz Glass Borosilicate Glass

Effective Probe Length N/A 8 feet
Probe Temperature Set-Point 248°F±25°F 248°F±25°F 248°F±25°F

isokinetic (90-110%)

#### **Velocity Measuring Equipment**

 Pitot Tube Design
 Type S
 Type S

 Pitot Tube Coefficient
 N/A
 0.833

 Pitot Tube Calibration by
 Geometric or Wind Tunnel
 Wind-Tunnel

 Pitot Tube Attachment
 Attached to Probe
 Attached to Probe

#### Metering System Console

 Meter Type
 Dry Gas Meter
 Dry Gas Meter

 Meter Accuracy
 ±2%
 ±1%

 Meter Resolution
 N/A
 0.01 cubic feet

 Meter Size
 N/A
 0.1 dcf/revolution

 Meter Calibrated Against
 Wet Test Meter or Standard DGM
 Wet Test Meter

 Pump Type
 N/A
 Rotary Vane

Temperature Measurements N/A Type K Thermocouple/Pyrometer

Temperature Resolution 5.4°F 1.0°F

ΔP Differential Pressure Gauge Inclined Manometer or Equivalent Inclined Manometer
ΔH Differential Pressure Gauge Inclined Manometer or Equivalent Inclined Manometer

Barometer Mercury or Aneroid Digital Barometer calibrated w/Mercury Aneroid

#### **Filter Description**

 Filter Location
 After Probe
 Exit of Probe

 Filter Holder Material
 Borosilicate Glass
 Borosilicate Glass

 Filter Support Material
 Glass Frit
 Teflon

 Cyclone Material
 N/A
 None

 Filter Heater Set-Point
 248'F±25'F
 248'F±25'F

Filter Material Glass Fiber - Toluene Extracted Glass Fiber - Toluene Extracted

#### **Other Components**

Adsorbent Module XAD-2 Trap XAD-II Adsorbent Trap

Location After filter and condenser After filter and condenser

Operating Temperature < 68°F <68°F

#### **EPA Method 23**

١	aml	naer	Train	Descri	ption

Type of Glassware Connections Connection to Probe or Filter by Number of Impingers

Impinger Stem Types

Impinger 1 Impinger 2 Impinger 3 Impinger 4 Impinger 5 Impinger 6 Impinger 7 Standard Method Specification

Ground Glass or Equivalent Direct Glass Connection

5

Actual Specification Used

Screw Joint with Silicone Gasket

Direct Glass Connection

5

Modified Greenburg-Smith Shortened Stem (open tip)
Modified Greenburg-Smith Modified Greenburg-Smith

Greenburg-Smith Greenburg-Smith

Modified Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith Modified Greenburg-Smith

**Gas Density Determination** 

Sample Collection
Sample Collection Medium

Sample Analysis

Impinger 8

Multi-point integrated Multi-Point Integrated

Flexible Gas Bag Vinyl Bag
Orsat or Fyrite Analyzer CEM

Sample Recovery Information

Probe Brush Material
Probe Rinse Reagent

Probe Rinse Wash Bottle Material Probe Rinse Storage Container

Filter Recovered?
Filter Storage Container
Impinger Contents Recovered?
Impinger Rinse Reagent

Impinger Wash Bottle Impinger Storage Container Inert Bristle

Acetone/Methylene Chloride/Toluene

Glass or Teflon Glass

Yes Petri Dish - Glass or Polystyrene

No N/A N/A N/A Teflon Mat

Acetone/Toluene (see Appendix J)

Teflon
Glass
Yes
Glass
Archived
HPLC Water
Teflon
Polyethylene

**Analytical Information** 

Method 4 H<sub>2</sub>O Determination by Filter Preparation Conditions Front-Half Rinse Preparation

Back-Half Analysis Additional Analysis Volumetric or Gravimetric

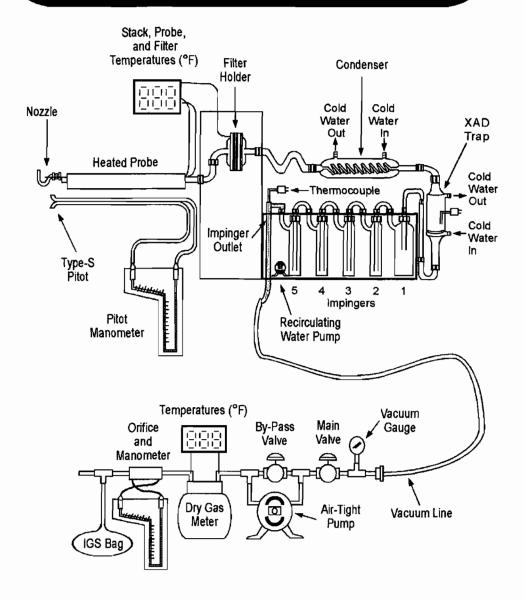
See Method 23 Analytical Flow Chart See Method 23 Analytical Flow Chart

N/A None Gravimetric

For Organic Analysis
Organic Analysis
Archive

None

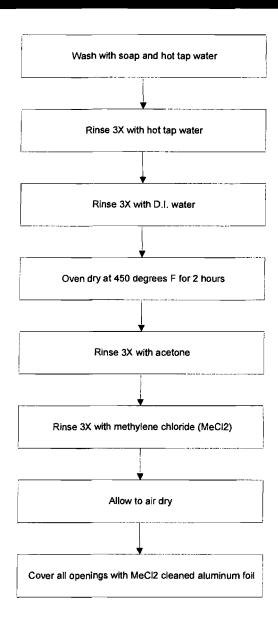
## EPA Method 23 Sampling Train Configuration



#### **Impinger Contents**

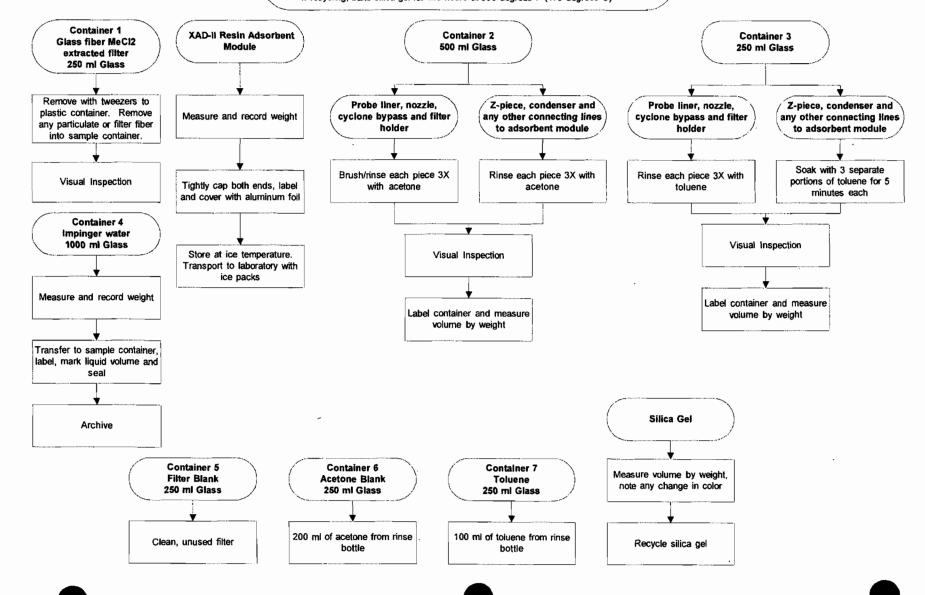
Impinger 1	Empty
Impinger 2	100 ml HPLC H₂O
Impinger 3	100 ml HPLC H₂O
Impinger 4	Empty
Impinger 5	Silica Gel

### EPA Method 23 Glassware Preparation Procedures



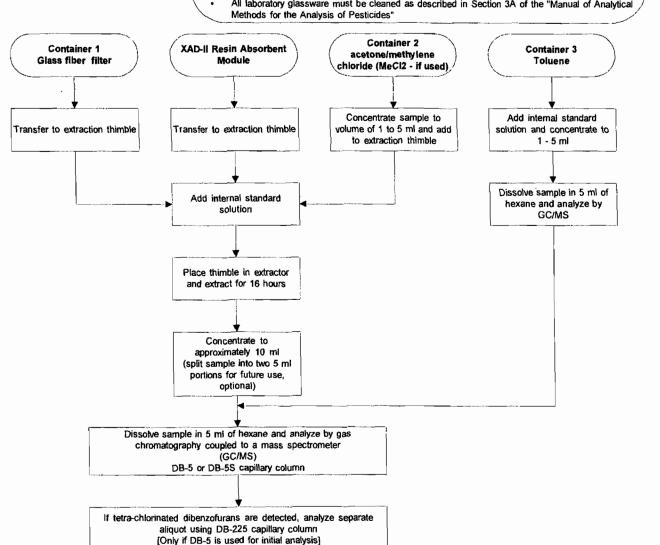
### EPA Method 23 Sample Recovery Flowchart

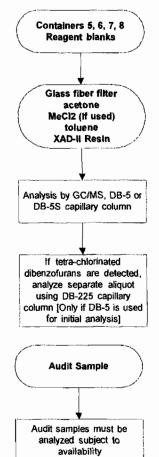
- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- · Seal all sample containers with Teflon tape
- . If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)



### **EPA Method 23 Analytical Flowchart**

- Log each sample in shipment and verify against chain-of-custody sheet
- Note liquid levels in the sample containers and confirm on the chain-of-custody sheet condition
- All samples must be extracted within 30 days of collection
- All samples must be analyzed within 45 days of extraction
- All laboratory glassware must be cleaned as described in Section 3A of the "Manual of Analytical





#### **EPA Method 26A (modified)**

Note: Modification includes the use of full-size impingers instead of midget impingers.

Source Location Name(s)

Units 1-3 SDA Inlets and Units 1-3 FF Outlets

Pollutant(s) to be Determined

Hydrogen Chloride (HCI) Gas Density, Moisture

Standard Method Specification

Other Parameters to be Determined from Train

**Actual Specification Used** 

#### **Pollutant Sampling Information**

**Duration of Run** 

N/A

60 minutes

No. of Sample Traverse Points

N/A

Sample Time per Point

N/A

60 minutes

Sampling Rate

Constant Rate (±10%)

Constant Rate (±10%)

#### Sampling Probe

Nozzle Material

N/A

None

Nozzle Design Probe Liner Material N/A

N/A

Effective Probe Length

Borosilicate Glass

Borosilicate Glass

N/A 5 feet

>248°F Probe Temperature Set-Point

350°F @ Inlet, Stack Temp @ FF Outlet

#### **Velocity Measuring Equipment**

Pitot Tube Design Pitot Tube Coefficient None N/A

None N/A

Pitot Tube Calibration by Pitot Tube Attachment

N/A N/A N/A N/A

#### **Metering System Console**

Meter Type

Dry Gas Meter or Critical Orifice

Dry Gas Meter

Meter Accuracy

±2% N/A

N/A

N/A

+1%

Meter Resolution

0.01 cubic feet

Meter Size

2 liters/minute

0.1 dcf/revolution

Meter Calibrated Against Pump Type

Wet Test Meter Diaphragm or equivalent Wet Test Meter Rotary Vane

Temperature Measurements

Dial Thermometer or equivalent

Type K Thermocouple/Pyrometer

Temperature Resolution

2°F-5.4°F 1.0°F

ΔP Differential Pressure Gauge ΔH Differential Pressure Gauge N/A

Inclined Manometer

Barometer

Mercury, aneroid or other.

Digital Barometer calibrated w/Mercury Aneroid

#### **Filter Description**

Filter Location

After Probe

Exit of Probe

Filter Holder Material

Teflon or Quartz

Borosilicate Glass

Filter Support Material Cyclone Material

Teflon Frit N/A

Teffon None

Filter Heater Set-Point

>248°F Teflon/Glass Mat (Quartz, Optional High Temp>410F)

350°F @ Inlet, Stack Temp @ FF Outlet Quartz Fiber @ Inlet, Teflon on Glass @ Outlet

#### Other Components

Description Location

Filter Material

N/A

N/A N/A

Operating Temperature

N/A N/A

N/A

#### **EPA Method 26A (modified)**

ı	lmni	naer	Train	Descr	Intion
ı		II IU <del>e</del> i	I I all I	Desci	IDUIDH

Type of Glassware Connections Connection to Probe or Filter by Number of Impingers

Impinger Stem Types

Impinger 1 Impinger 2 Impinger 3 Impinger 4 Impinger 5 Impinger 6 Impinger 7

Impinger 8

Standard Method Specification

Ground Glass or Equivalent

Direct Glass Connection

5 or 6 (Midget Impingers)

Actual Specification Used

Screw Joint with Silicone Gasket Direct Glass Connection

5

Midget Shortened Stem Shortened Stem (open tip)
Midget Bubbler Greenburg-Smith

Midget Bubbler Greenburg-Smith
Midget Bubbler Modified Greenburg-Smith
Midget Bubbler Modified Greenburg-Smith

**Gas Density Determination** 

Sample Collection N/A Single Point Integrated

Sample Collection Medium N/A Vinyl Bag
Sample Analysis N/A CEM

Mae West

Sample Recovery Information

Probe Brush Material N/A N/A Probe Rinse Reagent N/A N/A Probe Rinse Wash Bottle Material N/A N/A Probe Rinse Storage Container N/A N/A Filter Recovered? No Nο Filter Storage Container N/A N/A Impinger Contents Recovered? Yes Yes

Impinger Rinse Reagent Deionized Distilled Water Deionized Distilled Water

 Impinger Wash Bottle
 Polyethylene or glass
 Polyethylene

 Impinger Storage Container
 Polyethylene
 Polyethylene

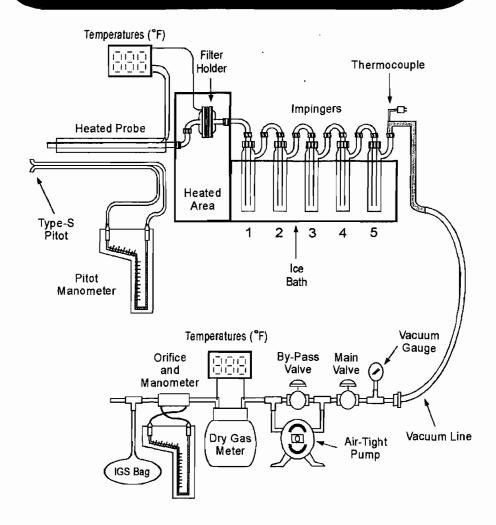
**Analytical Information** 

Method 4 H 2O Determination byN/AGravimetricFilter Preparation ConditionsN/AN/AFront-Half Rinse PreparationN/AN/A

Back-Half Analysis Ion Chromatography Ion Chromatography

Additional Analysis None None

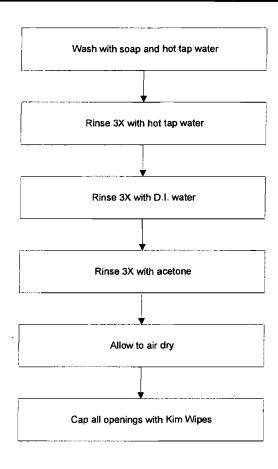
# Modified EPA Method 26A Sampling Train Configuration



#### **Impinger Contents**

TO PRODUCE TO CONTROLLED		
Impinger 1	50 ml 0.1 N H <sub>2</sub> SO <sub>4</sub>	
Impinger 2	100 ml 0.1 N H <sub>2</sub> SO <sub>4</sub>	
Impinger 3	100 ml 0.1 N H <sub>2</sub> SO <sub>4</sub>	
Impinger 4	Empty	
Impinger 5	Silica Gel	

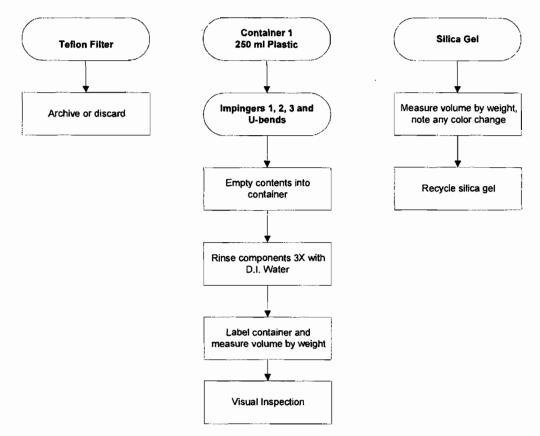
### EPA Method 26A Glassware Preparation Procedures



### EPA Method 26 Sample Recovery Flowchart

(without Cl2) (Modified)

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)



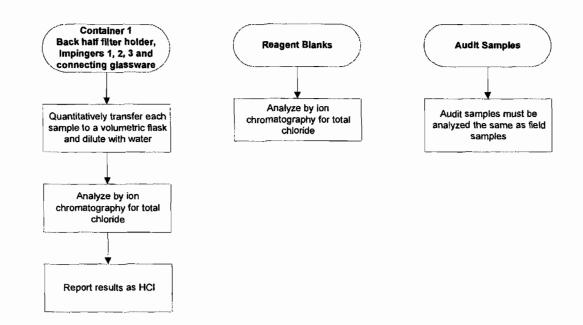
Container 2
Sulfuric Acid Blank
(H2SO4)
250 ml Plastic

200 ml of 0.1N H2SO4
diluted to approximate
volume of samples using
water from rinse bottle

# EPA Method 26 Analytical Flowchart

(without CI2) (Modified)

- · Log each sample in shipment and verify against chain-of-custody sheet
- Note liquid levels in the sample containers and confirm on the chain-of-custody sheet condition



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CleanAir Project No: 10735-4

SAMPLE CALCULATIONS

В

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Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 1 SDA Inlet

# USEPA Method 29 (Mercury) Sampling, Velocity and Moisture Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 082539

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

 $V_{lc}$  = total volume of liquid collected in impingers and silica gel (ml) = 281.7 ml 0.04706 = ideal gas conversion factor (ft<sup>3</sup> water vapor/ml or gm) = 0.04706 ft<sup>3</sup>/ml  $V_{wstd}$  = volume of water vapor collected at standard conditions (ft<sup>3</sup>) = 13.26 ft<sup>3</sup>

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P <sub>bar</sub>	= barometric pressure (in. Hg)	=	30.10	in. Hg
T <sub>m</sub>	= average dry gas meter temperature (°F)	=	76.92	°F
V <sub>m</sub>	<ul><li>volume of gas sample through the dry gas meter at meter conditions (dcf)</li></ul>	=	69.46	dcf
$Y_d$	= gas meter correction factor (dimensionless)	=	1.0079	
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.05	in. H₂O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H₂O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$V_{\text{mstd}}$	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	69.410	dscf

3. Sample gas pressure (in. Hg)

$$P_{s} = P_{bar} + \left(\frac{P_{g}}{13.6}\right)$$

Where:

wriere:				
$P_{bar}$	= barometric pressure (in. Hg)	=	30.10	in. Hg
$P_g$	= sample gas static pressure (in. H <sub>2</sub> O)	=	-1.50	in. H <sub>2</sub> O
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in. H₂O/in. Hg
Ps	= absolute sample gas pressure (in. Hg)	=	29.99	in. Hg

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29.99

in. Hg

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4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

	$\left(18.3036 - \frac{3816.44}{\sqrt[3]{(T_s - 32) + 273.15 - 46.13}}\right)$
$P_{v}$	= \frac{e}{25.4}

Where:  $T_s$ = average sample gas temperature (°F) °F 505.38 18.3036 = Antoine coefficient 18.3036 °K 3816.44 = Antoine coefficient 3816.44 °K 273.15 = temperature conversion factor 273.15 °K 46.13 = Antoine coefficient 46.13 °K 25.4 = conversion factor 25.4 mm Hg/in. Hg 5/9 = Fahrenheit to Celsius conversion factor 5/9 °C/°F 32 = temperature conversion (°F) 32 °F  $P_{\nu}$ = vapor pressure, actual (in. Hg) 29.99 in. Hg

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_{\nu} = P_{s}$$

Where:

 $P_{v}$ 

P<sub>s</sub> = absolute sample gas pressure (in. Hg) = 29.99 in. Hg

= water vapor pressure, actual (in. Hg)

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

Where:

 $V_{msld}$  = volume of gas sampled through the dry gas meter at standard = 69.410 dscf

conditions (dscf)

 $V_{wstd}$  = volume of water collected at standard conditions (scf) = 13.26 scf

B<sub>wo</sub> = proportion of water measured in the gas stream by volume = 0.1604 = 16.04 %

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100.00

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# 7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_{v}}{P_{s}}$$

Where:

B	= proportion of water vapor in the gas stream by volume at		1 0000	
$P_{\nu}$	= water vapor pressure, actual (in. Hg)	=	29.99	in. Hg
Ps	= absolute sample gas pressure (in. Hg)	=	29.99	in. Hg

# 8. Actual water vapor in gas (% by volume)

$$B_w = MINIMUM [B_{wo}, B_{ws}]$$

saturated conditions

Where:

B <sub>ws</sub>	<ul> <li>proportion of water vapor in the gas stream by volume at saturated conditions</li> </ul>	=	1.0000	
$B_{wo}$	= proportion of water measured in the gas stream by volume	=	0.1604	
$B_w$	= actual water vapor in gas	=	0.1604	
		=	16.04	%

9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO <sub>2</sub>	<ul><li>= proportion of carbon dioxide in the gas stream by volume (%)</li><li>= proportion of oxygen in the gas stream by volume (%)</li><li>= conversion factor (%)</li></ul>	=	10.0	%
O <sub>2</sub>		=	9.7	%
100		=	100	%
N <sub>2</sub> +CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.33	%

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# 10. Molecular weight of dry gas stream (lb/lb-mole)

$M_d$	$= \left(M_{CO_2}\right) \frac{\left(CO_2\right)}{\left(100\right)} + \left(M_{O_2}\right) \frac{\left(O_2\right)}{\left(100\right)} + \left(M_{N_2 + CO}\right) \frac{\left(N_2 + CO\right)}{\left(100\right)}$			
Where:				
M <sub>CO2</sub>	≈ molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M <sub>O2</sub>	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M <sub>N2+CO</sub>	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.7	%
N₂+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.3	%
100	= conversion factor (%)	=	100	%
M <sub>d</sub>	≈ dry molecular weight of sample gas (lb/lb·mole)	z	29.98	lb/lb·mole

# 11. Molecular weight of sample gas (lb/lb·mole)

$$M_{s} = (M_{d})(1 - B_{w}) + (M_{H_{2}O})(B_{w})$$

Where: B <sub>w</sub> M <sub>d</sub> M <sub>H2O</sub>	<ul> <li>≈ proportion of water vapor in the gas stream by volume</li> <li>≈ dry molecular weight of sample gas (lb/lb·mole)</li> <li>≈ molecular weight of water (lb/lb·mole)</li> </ul>	=======================================	0.1604 29.98 18.00	lb/lb·mole lb/lb·mole
$M_s$	≈ molecular weight of sample gas, wet basis (lb/lb·mole)	=	28.06	lb/lb·mole

# 12. Velocity of sample gas (ft/sec)

Where:

$$V_{s} = (K_{p})(C_{p})\sqrt{\sqrt{\Delta P}} \left(\sqrt{\frac{(\overline{T_{s}} + 460)}{(M_{s})(P_{s})}}\right)$$

$K_p$	velocity pressure constant	=	85.49	
$C_p$	= pitot tube coefficient	=	0.82	
$M_s$	wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	28.06	lb/lb·mole
$P_s$	≈ absolute sample gas pressure (in. Hg)	=	29.99	in. Hg
$T_s$	≈ average sample gas temperature (°F)	=	505.38	°F
√∆P	≈ average square roots of velocity heads of sample gas (in. H <sub>2</sub> O)	=	0.651	√in. H₂O
460	= °F to °R conversion constant	=	460	
٧.	≈ sample gas velocity (ft/sec)	=	48.87	ft/sec



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# 13. Volumetric flow rate of sample gas at actual gas conditions (acfm)

$Q_{a}$	$= (60)(A_s)(V_s)$			
Where:				
$A_s$	= cross sectional area of sampling location (ft <sup>2</sup> )	=	60.13	ft <sup>2</sup>
Vs	= sample gas velocity (ft/sec)	=	48.87	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	176,323	acfm

# 14. Total flow of sample gas (scfm)

$$Q_{s} = (Q_{a}) \left( \frac{P_{s}}{29.92} \right) \left( \frac{68 + 460}{T_{s} + 460} \right)$$

Where:				
$\mathbf{Q}_{\mathtt{a}}$	= volumetric flow rate at actual conditions (acfm)	=	176,323	acfm
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.99	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
$T_s$	= average sample gas temperature (°F)	=	505.4	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
$Q_s$	= volumetric flow rate at standard conditions, wet basis (scfm)	=	96,662	scfm

# 15. Dry flow of sample gas (dscfm)

$$Q_{sid} = (Q_s)(1 - B_w)$$

Where:

 $\mathbf{Q}_{\text{std}}$ 

 $B_{\rm w}$ = proportion of water vapor in the gas stream by volume 0.1604 Q, = volumetric flow rate at standard conditions, wet basis (scfm) 96,662 scfm

= volumetric flow rate at standard conditions, dry basis (dscfm)

# 16. Dry flow of sample gas corrected to 7%O2 (dscfm)

$$Q_{sd7} = (Q_{sd}) \left( \frac{20.9 - O_2}{20.9 - 7} \right)$$

Where:

$Q_{std}$ $O_2$	<ul><li>volumetric flow rate at standard conditions, dry basis (dscfm)</li><li>proportion of oxygen in the gas stream by volume (%)</li></ul>	=	81,161 9.7	dscfm %
20.9 7	= oxygen content of ambient air (%) = oxygen content of corrected gas (%)	=	20.9 7.0	% %
Q <sub>std7</sub>	= volumetric flow rate at STP and 7%O <sub>2</sub> , dry basis (dscfm)	=	65,279	dscfm

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dscfm

81,161

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# 17. Hourly time basis conversion of volumetric flow rate (Q<sub>std</sub> example)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

Q <sub>std-min</sub> 60	<ul> <li>volumetric flow rate, english units (ft³/min)</li> <li>conversion factor (min/hr)</li> </ul>	=	81,161 60	dscfm min/hr
Q <sub>std-hr</sub>	= volumetric flow rate, hourly basis (dscf/hr)	=	4,869,674	dscf/hr

# 18. Metric Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{sid-metric} = \left(Q_{sid-english}\right) \left(\frac{60}{35.31}\right)$$

Where:

$Q_{std ext{-english}}$	<ul> <li>volumetric flow rate, english units (ft³/min)</li> </ul>	=	81,161	dscfm
35.31	= conversion factor (ft <sup>3</sup> /m <sup>3</sup> )	=	35.31	ft <sup>3</sup> /m <sup>3</sup>
60	≈ conversion factor (min/hr)	=	60	min/hr

 $Q_{\text{std-metric}}$  = volumetric flow rate, metric units (m<sup>3</sup>/hr) = 137,912 dry std m<sup>3</sup>/hr

# 19. Standard to Normal Conversion of Gas Volumes ( $Q_{\text{std}}$ example)

$$Q_{Normal} = \left(Q_{sid-metric}\right) \left(\frac{32+460}{68+460}\right)$$

Where:

Q <sub>std-metric</sub>	≈ volumetric flow rate, metric units (dry std m³/hr)	æ	137,912	dry std m³/hr
32	≈ normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	≈ standard temperature in Rankine (68°F)	=	460	
Q <sub>Normal</sub>	≈ volumetric flow rate, metric units (dry Nm³/hr)	=	128,509	dry Nm³/hr

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# 20. Percent isokinetic (%)

, _	$(0.09450)(\overline{T_s} +$	460 (V <sub>msid</sub> )
_	$(P_s)(V_s)^{(D_n)^2(\pi)}_{(144)(4)}$	$(\Theta)(1-B_w)$

Where:				
$D_n$	= diameter of nozzle (in)	=	0.275	in.
$B_{w}$	= proportion of water vapor in the gas stream by volume	=	0.1604	
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.99	in. Hg
$T_s$	= average sample gas temperature (°F)	=	505.4	°F
$V_{mstd}$	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	69.410	dscf
$V_s$	= sample gas velocity (ft/sec)	=	48.87	ft/sec
θ	= total sampling time (min)	=	120	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= percent of isokinetic sampling (%)	=	103.96	%

# 21. Alternative Method 5 Post-Test Meter Calibration Factor

$$Y_{qa} = \frac{\Theta}{V_m} \sqrt{\frac{(0.0319)(T_m + 460)(28.96)}{(\Delta H_{@})(P_{bar} + \frac{\Delta H}{13.6})(M_d)}} (\sqrt{\Delta H})_{avg}$$

Where:				
θ	= total sampling time (min)	=	120	min
$V_{m}$	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	69.46	dcf
$T_{m}$	= average dry gas meter temperature (°F)	=	76.92	°F
$\Delta H_{@}$	= dry gas meter orifice coefficient	=	1.7934	
$P_{bar}$	= barometric pressure (in. Hg)	=	30.10	in. <b>Hg</b>
ΔН	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.048	in. H₂O
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	lb/lb·mole
√∆H <sub>avg</sub>	= average of square root of pressure drop across meter orifice	=	1.020	√in. H₂O
0.0319	= conversion constant	=	0.0319	
28.96	= molecular weight of ambient air (lb/lb-mole)	=	28.96	lb/ib-mole
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$Y_{qa}$	= alternative Method 5 post-test meter calibration factor	=	0.9740	

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# LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

# 1. Logic for Determining Total Blank (m<sub>Total-B</sub>) from 5 Fractions

Rule	CASE 1 All 5 fractions are D.	CASE 2 1 to 4 fractions are ND	CASE 3 All 5 fractions are ND
ND = 0	m <sub>Total-B</sub> = Sum D, 1-5	$m_{Total-B} = Sum D$	m <sub>Total-B</sub> = < Sum ND
ND=1x	$m_{Total-B} = Sum D, 1-5$	m <sub>Total-B</sub> = Sum D	m <sub>Total-B</sub> = < Sum ND
ND=0.5x	m <sub>Total-B</sub> = Sum D, 1-5	m <sub>Total-B</sub> = Sum D	$m_{Total-B} = < 0.5 \text{ Sum ND}$

# 2. Logic for Determining Total Sample (m<sub>Total-S</sub>) from 5 Fractions

	CASE 1 All 5 fractions are D.	CASE 2 1 to 4 fractions are ND	CASE 3 All 5 fractions are ND
Rule ND = 0	m <sub>Total-S</sub> = Sum D, 1-5	m <sub>Total-S</sub> = Sum D	m <sub>Total-S</sub> ≈ < Sum ND
	m <sub>Total-S</sub> ≈ Sum D, 1-5	m <sub>Total-S</sub> = < [Sum D + Sum ND]	*
ND=0.5x	$m_{Total-S} = Sum D, 1-5$	m <sub>Total-S</sub> = < [SumD+0.5 SumND	m <sub>Total-S</sub> = < 0.5 Sum ND

# 3. Logic for Determining Maximum Allowable Blank Correction (m<sub>T-B-allow</sub>)

Bula	CASE 1 All 5 fractions are D. $m_{\text{Total-B}} = D$	CASE 2 1 to 4 sample fractions are ND m <sub>Total-B</sub> = D	CASE 3 All 5 fractions are ND m <sub>Total-B</sub> = D	CASE 4 Any type of fractions m <sub>Total-B</sub> = ND
ND=1x	m <sub>T-B-aflow</sub> = M29 Rule	m <sub>T-B-allow</sub> = M29 Rule m <sub>T-B-allow</sub> = M29 Rule m <sub>T-B-allow</sub> = M29 Rule	$m_{T-B-allow} = 0$ $m_{T-B-allow} = 0$ $m_{T-B-allow} = 0$	$m_{T-B-allow} = 0$ $m_{T-B-allow} = 0$ $m_{T-B-allow} = 0$

<sup>\*</sup> M29 rule using only detected sample quantities for logical comparisons.

# 4. Logic for Determining Blank-Corrected Sample Amount (mn)

	CASE 1 All 5 fractions are D. $m_{\text{Total-S}} - m_{\text{T-B-allow}} \ge MIN(MDL)$	CASE 2 1 to 4 sample fractions are ND m <sub>Total-S</sub> - m <sub>T-B-allow</sub> ≥ MIN(MDL)		CASE 4 Any type of fractions m <sub>Total-S</sub> - m <sub>T-B-allow</sub> < MIN(MDL)
Rule				
ND = 0	$m_n = m_{Total-S} - m_{T-B-allow}$	$m_n = m_{Total-S} - m_{T-B-allow}$	$m_n = < m_{Total-S}$	$m_n = < MIN[MDL]$
ND=1x	$m_n = m_{Total-S} - m_{T-B-allow}$	$m_n = \langle [m_{Total-S} - m_{T-B-allow}]$	m <sub>n</sub> = < m <sub>Totel-S</sub>	$m_n = < MIN[MDL]$
ND=0.5x	$m_n = m_{Total-S} - m_{T-B-allow}$	$m_n = \langle [m_{Total-S} - m_{T-B-allow}]$	$m_n = < m_{Total-S}$	$m_n = \langle MIN[MDL]$

<u>Definitions and Notes</u>
The term "Rule" refers to the rule being implemented for handling non-detectable quantities in summations.

MDL = minimum detection limit.

D = Detectable quantity reported as D.

ND = Non-Detectable quantity reported at a value of ND.

MIN[MDL] = lowest quantity of all detection limits for 5 fractions.

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# **USEPA Method 29 Mercury Analyte Calculations**

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

041609 082539

#### 1. Total blank amount (µg)

$$m_{total-B} = \sum_{i=1}^{n} m_{i-B}$$

#### Where:

m <sub>total-B</sub>	= total amount of mercury in blank	=	<1.5000	μg
·m <sub>3¢-B</sub>	= mercury amount in blank for Fraction 3c	=	<0.4000	μg
m <sub>3b-B</sub>	= mercury amount in blank for Fraction 3b	=	<0.5000	μg
m <sub>3a-B</sub>	= mercury amount in blank for Fraction 3a	=	<0.2000	μg
m <sub>2b-B</sub>	= mercury amount in blank for Fraction 2b	=	<0.3000	μg
m <sub>1b-B</sub>	= mercury amount in blank for Fraction 1b	=	<0.1000	μg

#### 2. Total sample amount (µg)

$$m_{total - S}$$
 =  $\sum_{i=1}^{n} m_{i-S}$ 

#### Where:

m <sub>1b-S</sub> m <sub>2b-S</sub> m <sub>3a-S</sub>	<ul> <li>mercury amount in sample for Fraction 1b</li> <li>mercury amount in sample for Fraction 2b</li> <li>mercury amount in sample for Fraction 3a</li> </ul>	=	61.7408 39.5721 <0.0200	ha ha ha
m <sub>3b-S</sub>	= mercury amount in sample for Fraction 3b	=	0.7568	μg
m <sub>3c-S</sub>	= mercury amount in sample for Fraction 3c	=	3.0567	μg
m <sub>total-S</sub>	≖ total amount of mercury in sample	=	105.1263	μд

#### 3. Allowable blank correction (µg)

$$m_{T-B-allow} = m_{total-B} \text{ if } m_{total-B} \le 0.6$$
  
 $m_{T-B-allow} = MAX \left[0.6, MIN \left(m_{total-B}, 0.05 \times m_{total-S}\right)\right] \text{ if } m_{total-B} > 0.6$ 

#### Where:

m <sub>total-B</sub>	= total amount of mercury in blank	=	<1.5000	μg
m <sub>total-S</sub>	= total amount of mercury in sample	=	105.1263	μg
0.05 x m <sub>total-S</sub>	= 5% of m <sub>total-S</sub>	=	5.2563	μg

MAX = arithmetic operator that returns the maximum of two values MIN = arithmetic operator that returns the minimum of two values

0.0000 = total allowable blank correction μg

NOTE: In this case, the second criteria applies.

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3.0567

# 4. Sample corrected for allowable blank - Total (µg)

$$m_n = m_{total-S} - m_{T-B-allow}$$

Where:

m <sub>total-S</sub>	= total amount of mercury in sample	=	105.1263	hā
m <sub>T-B-allow</sub>	= total allowable blank correction		0.0000	hā
$m_n$	= total mercury in sample corrected for allowable blank	=	105.1263	μд

# 5. Sample corrected for allowable blank - Prorated for each fraction (µg)

$$m_{n-i} = \left(\frac{m_{i-S}}{m_{total-S}}\right) (m_n)$$

Where:

 $m_{n-3c}$ 

.w <sup>u</sup>	= total mercury in sample corrected for allowable blank	=	105.1263	μg
m <sub>1b-S</sub>	= mercury amount in sample for Fraction 1b	=	61.7408	μg
m <sub>2b-S</sub>	= mercury amount in sample for Fraction 2b	=	39.5721	μg
m <sub>3a-S</sub>	= mercury amount in sample for Fraction 3a	=	<0.0200	μg
$m_{3b-S}$	= mercury amount in sample for Fraction 3b	=	0.7568	μg
m <sub>3c-S</sub>	= mercury amount in sample for Fraction 3c	=	3.0567	μg
m <sub>total-S</sub>	= total amount of mercury in sample	=	105.1263	μg
m <sub>n-1b</sub>	= mercury corrected for blank - prorated for Fraction 1b	=	61.7408	μg
m <sub>n-2b</sub>	= mercury corrected for blank - prorated for Fraction 2b	=	39.5721	μg
$m_{n-3a}$	= mercury corrected for blank - prorated for Fraction 3a	=	<0.0200	μg
$m_{n-3b}$	= mercury corrected for blank - prorated for Fraction 3b	=	0.7568	μg

= mercury corrected for blank - prorated for Fraction 3c

# **USEPA Method 29 Mercury Sample Calculations**

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

1. Mercury concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right)$$

Where:

105.1263 = mercury collected in sample (total µg) mn μg = volume metered, standard (dscf) 69.4099 dscf 2.205 x 10<sup>-3</sup> = conversion factor (lb/g) 2.205E-03 lb/g = conversion factor (µg/g) 1.0E+06 µg/g

 $C_{\text{sd}}$ = mercury concentration (lb/dscf) 3.3396E-09 lb/dscf

2. Mercury concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mod}}\right) (35.31)$$

Where:

= mercury collected in sample (total µg) 105,1263  $m_{\alpha}$ μg = volume metered, standard (dscf) 69.4099 dscf 35.31 = conversion factor (dscf/dscm) 35.31 dscf/dscm

 $C_{sd}$ = mercury concentration (µg/dscm) 5.3480E+01 µg/dscm

3. Mercury concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{35.31}{1000}\right)$$

Where:

= mercury collected in sample (total µg) 105.1263 mn  $V_{mstd}$ = volume metered, standard (dscf) 69.4099 dscf 35.31 = conversion factor (dscf/dscm) 35.31 dscf/dscm 1000 = conversion factor (µg/mg) 1000 µg/mg

 $C_{sd}$ = mercury concentration (mg/dscm) 5.3480E-02 mg/dscm Unit 1 SDA Inlet

4. Mercury concentration (µg/Nm3 dry)

$$C_{sd}$$
 =  $\left(\frac{m_n}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$ 

Where:

m <sub>n</sub>	= mercury collected in sample (total µg)	=	105.1263	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	69.4099	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = mercury concentration (µg/Nm3 dry) = 5.7393E+01 µg/Nm<sup>3</sup> dry

5. Mercury concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

 $C_{sd}$  = mercury concentration (lb/dscf) = 3.3396E-09 lb/dscf x = oxygen content of corrected gas (%) = 7.0 %  $C_2$  = proportion of oxygen in the gas stream by volume (%) = 9.7 % 20.9 = oxygen content of ambient air (%) = 20.9 %

 $C_{\text{sdx}}$  = mercury concentration corrected to x% oxygen (lb/dscf) = 4.1521E-09 lb/dscf @ x%O<sub>2</sub>

6. Mercury concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

C<sub>sdy</sub> = mercury conc. corrected to y% carbon dioxide (lb/dscf) = 4.0277E-09 lb/dscf @ y%CO<sub>2</sub>

7. Mercury concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd} \left( \frac{Q_{std}}{Q_a} \right)$$

Where:

 $C_{sd}$  = mercury concentration (lb/dscf) . = 3.3396E-09 lb/dscf  $Q_{std}$  = volumetric flow rate at standard conditions, dry basis (dscfm) = 81,161 dscfm 
= volumetric flow rate at actual conditions (acfm) = 176,323 acfm

C<sub>g</sub> = mercury concentration at actual gas conditions (lb/acf) = 1.5372E-09 lb/acf

8. Mercury emission rate (lb/hr)
$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60)$$

#### Where:

**************************************				
m <sub>n</sub>	= mercury collected in sample (total μg)	=	105.1263	μg
V <sub>mstdi</sub>	= volume metered, standard (dscf)	=	69.4099	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	íb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	81,161	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

= mercury emission rate (lb/hr) 1.6263E-02 lb/hr

#### 9. Mercury emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{\text{mid}}}\right) \left(\frac{Q_{\text{std}}}{(10^6)(60)}\right)$$

#### Where:

m <sub>n</sub>	= mercury collected in sample (total μg)	=	105.1263	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	69.4099	dscf
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	81,161	dscfm
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min

E<sub>g/s</sub> = mercury emission rate (g/s) 2.0487E-03 g/s

10. Mercury emission rate (Ton/yr)
$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60) \left(\frac{Cap}{2000}\right)$$

#### Where:

m <sub>n</sub>	= mercury collected in sample (total μg)	=	105.1263	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	69.4099	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	μg/g
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	81,161	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton

ETAyr = mercury emission rate (Ton/yr) = 7.1232E-02 Ton/yr

#### 11. Mercury emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_d) \left(\frac{20.9}{20.9 - O_2}\right)$$

#### Where:

= mercury collected in sample (total µg) 105.1263  $m_{\text{n}}$  $V_{\text{mstd}}$ = volume metered, standard (dscf) 69.4099 dscf  $2.205 \times 10^{-3}$  = conversion factor (lb/g) 2.205E-03 lb/g 10<sup>6</sup> = conversion factor (µg/g) 1.0E+06 µg/g  $\mathbf{F}_{\mathbf{d}}$ = ratio of gas volume to heat content of fuel (dscf/MMBtu) = 9,570 dscf/MMBtu

 $O_2$  = proportion of oxygen in the gas stream by volume (%) = 9.7 % 20.9 = oxygen content of ambient air (%) = 20.9 %

E<sub>Fd</sub> = mercury emission rate - Fd-based (lb/MMBtu) = 5.9747E-05 lb/MMBtu

#### 12. Mercury emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{msid}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

#### Where:

= mercury collected in sample (total µg) 105.1263  $m_{\text{n}}$ μg  $V_{\text{mstd}}$ = volume metered, standard (dscf) 69.4099 dscf 2.205 x 10<sup>-3</sup> = conversion factor (lb/g) 2.205E-03 lb/g 10<sup>6</sup> = conversion factor (µg/g) 1.0E+06 µq/q = ratio of gas volume to heat content of fuel (dscf/MMBtu) Fc 1.820 dscf/MMBtu

CO<sub>2</sub> = proportion of oxygen in the gas stream by volume (%) = 10.0 % 100 = conversion factor = 100

E<sub>Fc</sub> = mercury emission rate - Fc-based (lb/MMBtu) = 6.1087E-05 lb/MMBtu

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# USEPA Method 5/29 (Particulate/Metals) Sampling, Velocity and Moisture Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

 $V_{lc}$  = total volume of liquid collected in impingers and silica gel (ml) = 410.6 ml 0.04706 = ideal gas conversion factor (ft<sup>3</sup> water vapor/ml or gm) = 0.04706 ft<sup>3</sup>/ml  $V_{wstd}$  = volume of water vapor collected at standard conditions (ft<sup>3</sup>) = 19.32 ft<sup>3</sup>

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P <sub>bar</sub>	= barometric pressure (in. Hg)	=	30.10	ın. Hg
$T_m$	= average dry gas meter temperature (°F)	=	75.96	°F
V <sub>m</sub>	<ul> <li>volume of gas sample through the dry gas meter at meter conditions (dcf)</li> </ul>	=	70.02	dcf
$Y_d$	= gas meter correction factor (dimensionless)	=	0.9886	
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.05	in. H₂O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$V_{msld}$	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	68.757	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

$P_{bar}$	= barometric pressure (in. Hg)	=	30.10	in. Hg
$P_{g}$	= sample gas static pressure (in. H₂O)	=	-12.00	in. H₂O
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in. H₂O/in. Hg
Ps	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg

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4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

$$P_{\nu} = \frac{e^{\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_{\nu} - 32) + 273.15 - 46.13}\right)}}{25.4}$$

Where:

$T_s$	= average sample gas temperature (°F)	=	296.00	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P.	= vapor pressure, actual (in. Hg)	=	29.22	in. Ha

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_{\nu} = P_{s}$$

Where:

$$P_v$$
 = water vapor pressure, actual (in. Hg) = 29.22 in. Hg

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

Where:

V<sub>mstd</sub> = volume of gas sampled through the dry gas meter at standard = 68.757 dscf conditions (dscf)

 $V_{wstd}$  = volume of water collected at standard conditions (scf) = 19.32 scf

B<sub>wo</sub> = proportion of water measured in the gas stream by volume = 0.2194 = 21.94 %

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21.94

%

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# 7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_{v}}{P_{s}}$$

Where:

$P_s$	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
$P_{v}$	= water vapor pressure, actual (in. Hg)	=	29.22	in. Hg

B<sub>ws</sub> = proportion of water vapor in the gas stream by volume at 1.0000 saturated conditions = 100.00 %

# 8. Actual water vapor in gas (% by volume)

$$B_{w} = MINIMUM \left[B_{wo}, B_{ws}\right]$$

Where

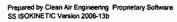
Vhere: B <sub>ws</sub>	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000
B <sub>wo</sub>	= proportion of water measured in the gas stream by volume	=	0.2194
B <sub>w</sub>	= actual water vapor in gas	=	0.2194

# 9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO <sub>2</sub> O <sub>2</sub> 100	<ul><li>= proportion of carbon dioxide in the gas stream by volume (%)</li><li>= proportion of oxygen in the gas stream by volume (%)</li><li>= conversion factor (%)</li></ul>	=	10.2 9.4 100	% % %
N₂+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.38	%



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# 10. Molecular weight of dry gas stream (lb/lb·mole)

$M_{d}$	$= \left(M_{CO_2}\right) \frac{\left(CO_2\right)}{\left(100\right)} + \left(M_{O_2}\right) \frac{\left(O_2\right)}{\left(100\right)} + \left(M_{N_2 + CO}\right) \frac{\left(N_2 + CO\right)}{\left(100\right)}$			
Where:				
M <sub>CO2</sub>	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M <sub>O2</sub>	= molecular weight of oxygen (lb/lb·mole)	=	32.00	ib/lb·mole
M <sub>N2+CO</sub>	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
N <sub>2</sub> +CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.4	%
100	= conversion factor (%)	=	100	%
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)	=	30.01	lb/lb·mole

# 11. Molecular weight of sample gas (lb/lb mole)

$$M_{s} = (M_{d})(1 - B_{w}) + (M_{H_{2}O})(B_{w})$$

Where:

B <sub>w</sub> M <sub>d</sub> M <sub>H2O</sub>	<ul> <li>proportion of water vapor in the gas stream by volume</li> <li>dry molecular weight of sample gas (lb/lb mole)</li> <li>molecular weight of water (lb/lb mole)</li> </ul>	= =	0.2194 30.01 18.00	lb/lb·mole lb/lb·mole
Ms	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.37	lb/lb·mole

# 12. Velocity of sample gas (ft/sec)

$$V_{s} = (K_{p})(C_{p})\sqrt{\sqrt{\Delta P}} \left(\sqrt{\frac{(\overline{T_{s}} + 460)}{(M_{s})(P_{s})}}\right)$$

Where:

K <sub>p</sub>	= velocity pressure constant	=	85.49	
C,	= pitot tube coefficient	=	0.81	
Ms	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.37	lb/lb·mole
Ps	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
T <sub>s</sub>	= average sample gas temperature (°F)	=	296.00	°F
√∆P	= average square roots of velocity heads of sample gas (in. H <sub>2</sub> O)	=	0.652	√in. H₂O
460	= °F to °R conversion constant	=	460	
V <sub>s</sub>	= sample gas velocity (ft/sec)	=	43.98	ft/sec

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13. Volumetric flow rate of sample gas at actual gas conditions (acfm)

$Q_a$	$= (60)(A_s)(V_s)$			
Where:				
$A_s$	= cross sectional area of sampling location (ft <sup>2</sup> )	=	64.00	ft <sup>2</sup>
V <sub>s</sub>	= sample gas velocity (ft/sec)	=	43.98	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Qa	= volumetric flow rate at actual conditions (acfm)	=	168,899	acfm

14. Total flow of sample gas (scfm)

$$Q_s = (Q_a) \left(\frac{P_s}{29.92}\right) \left(\frac{68+460}{T_s+460}\right)$$

Where:				
$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	168,899	acfm
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
Ts	= average sample gas temperature (°F)	=	296.0	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
$Q_s$	= volumetric flow rate at standard conditions, wet basis (scfm)	=	115,192	scfm

15. Dry flow of sample gas (dscfm)

$$Q_{sid} = (Q_s)(1 - B_w)$$

Where:

 $B_w$  = proportion of water vapor in the gas stream by volume = 0.2194  $Q_s$  = volumetric flow rate at standard conditions, wet basis (scfm) = 115,192 scfm  $Q_{std}$  = volumetric flow rate at standard conditions, dry basis (dscfm) = 89,921 dscfm

16. Dry flow of sample gas corrected to 7%O2 (dscfm)

$$Q_{std 7} = (Q_{std}) \left( \frac{20.9 - O_2}{20.9 - 7} \right)$$

Where:

Q <sub>std</sub> O <sub>2</sub> 20.9	<ul> <li>= volumetric flow rate at standard conditions, dry basis (dscfm)</li> <li>= proportion of oxygen in the gas stream by volume (%)</li> <li>= oxygen content of ambient air (%)</li> <li>= oxygen content of corrected gas (%)</li> </ul>	=	89,921 9.4 20.9 7.0	dscfm % % %
Q <sub>std7</sub>	= volumetric flow rate at STP and 7%O <sub>2</sub> , dry basis (dscfm)	=	74,201	dscfm

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# 17. Hourly time basis conversion of volumetric flow rate ( $Q_{\text{std}}$ example)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

Q <sub>std-min</sub> 60	<ul> <li>volumetric flow rate, english units (ft³/min)</li> <li>conversion factor (min/hr)</li> </ul>	=	89,921 60	dscfm min/hr
Q <sub>std-hr</sub>	= volumetric flow rate, hourly basis (dscf/hr)	=	5,395,281	dscf/hr

# 18. Metric Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{std-metric} = \left(Q_{std-english}\right) \left(\frac{60}{35.31}\right)$$

Where:

Q <sub>std-english</sub>	<ul> <li>volumetric flow rate, english units (ft³/min)</li> <li>conversion factor (ft³/m³)</li> <li>conversion factor (min/hr)</li> </ul>	=	89,921	dscfm
35.31		=	35.31	ft <sup>3</sup> /m <sup>3</sup>
60		=	60	min/hr
Q <sub>std-metric</sub>	= volumetric flow rate, metric units (m³/hr)	=	152,798	dry std m <sup>3</sup> /hr

# 19. Standard to Normal Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{Normal} = (Q_{std-metric}) \left( \frac{32 + 460}{68 + 460} \right)$$

= volumetric flow rate, metric units (dry Nm³/hr)

 $\mathbf{Q}_{\text{Normal}}$ 

vvnere: Q <sub>std-metric</sub>	= volumetric flow rate, metric units (dry std m³/hr)	<b>2</b>	152,798	dry std m³/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	

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dry Nm3/hr

142,380

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# 20. Percent isokinetic (%)

7	$(0.09450)(\overline{T_s} + 460)(V_{mstd})$
1	$= \frac{1}{(P_s)(V_s)\left(\frac{(D_n)^2(\pi)}{(144)(4)}\right)(\Theta)(1-B_w)}$

Where:				
$D_n$	= diameter of nozzle (in)	=	0.268	in.
$B_w$	= proportion of water vapor in the gas stream by volume	=	0.2194	
Ps	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
Ts	= average sample gas temperature (°F)	=	296.0	°F
V <sub>mstd</sub>	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	68.757	dscf
$V_s$	= sample gas velocity (ft/sec)	=	43.98	ft/sec
θ	= total sampling time (min)	=	125	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
1	= percent of isokinetic sampling (%)	=	100.00	%

# 21. Alternative Method 5 Post-Test Meter Calibration Factor

$$Y_{qa} = \frac{\Theta}{V_m} \sqrt{\frac{(0.0319)(T_m + 460)(28.96)}{(\Delta H_{@})(P_{bar} + \frac{\Delta H}{13.6})(M_d)}} (\sqrt{\Delta H})_{avg}$$

	13.0			
Where:				
θ	= total sampling time (min)	=	125	min
V <sub>m</sub>	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	70.02	dcf
T <sub>m</sub>	= average dry gas meter temperature (°F)	=	75.96	°F
$\Delta H_{@}$	= dry gas meter orifice coefficient	=	1.7796	
$P_{bar}$	= barometric pressure (in. Hg)	=	30.10	in. Hg
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.048	in. H <sub>2</sub> O
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)	=	30.01	lb/lb·mole
√∆H <sub>avg</sub>	= average of square root of pressure drop across meter orifice	=	1.012	√in. H₂O
0.0319	= conversion constant	=	0.0319	
28.96	= molecular weight of ambient air (lb/lb-mole)	=	28.96	lb/lb-mole
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
Y <sub>qa</sub>	= alternative Method 5 post-test meter calibration factor	=	1.0014	

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# USEPA Method 5/29 Filterable Particulate Gravimetric Analysis Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Total residue from gravimetric analysis of filters (g)

$$m_{fr} = \sum_{i=1}^{n} m_{fi}$$

Where:

= residual mass of filter "1" from gravimetric analysis (g) 0.00080  $m_{f1}$ m<sub>f2</sub> = residual mass of filter "2" from gravimetric analysis (g) 0.00000 g = residual mass of filter "3" from gravimetric analysis (g)  $m_{f3}$ 0.00000 = residual mass of filter "4" from gravimetric analysis (g)  $m_{f4}$ 0.00000 = total filter residue from gravimetric analysis (g) m<sub>fr</sub> 0.00080 a

2. Total particulate collected on filters (g)

$$m_{filter}$$
 =  $m_{fr}$  if  $m_{fr} \ge 0$   
 $m_{filter}$  = 0 if  $m_{fr} < 0$ 

Where:

 $m_{\rm fr}$  = total filter residue from gravimetric analysis (g) = 0.00080 g

m<sub>filter</sub> = total particulate collected on filters (g) = 0.00080 g

3. Solvent rinse - sample residue mass (g)

$$r_{si} = \left(r_{ai} \right) \left(\frac{v_{si}}{v_{ai}}\right)$$

Where:	, ,		Acetone	
r <sub>ai</sub>	= aliquot residue mass for solvent "i" (g)	=	0.00010	g
$V_{si}$	= sample liquid volume for solvent rinse "i" (ml)	=	118.0	ml
$V_{ai}$	= aliquot liquid volume for solvent rinse "i" (ml)	=	118.0	ml
[a:	= solvent rinse "i" - sample residue mass (g)	=	0 00010	a

4. Solvent rinse - blank residue (g)

$$m_{i-blank}$$
 =  $r_{ai-blank}$  if  $r_{ai-blank} \ge 0$   
 $m_{i-blank}$  = 0 if  $r_{ai-blank} < 0$ 

Where: Acetone  $r_{ai\text{-blank}}$  = blank residue for solvent "i" from gravimetric analysis (g) = 0.00010 g

 $m_{Holank}$  = solvent rinse - blank residue (g) = 0.00010 g

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5. Solvent rinse - maximum allowable blank correction (g)

$$m_{bi} = MINIMUM \left[ \left( \frac{(m_{i-blank})(v_{si})}{v_{ai-blank}} \right) \text{ or } (0.00001)(\rho_i)(v_{si}) \text{ or } (r_{si}) \right] \text{ if } r_{si} \ge 0$$

$$m_{bi} = 0 \qquad \text{if } r_{si} < 0$$

Where:			Acetone	
m <sub>i-blank</sub>	= solvent rinse - blank residue (g)	=	0.00010	g
$v_{si}$	= sample liquid volume for solvent rinse "i" (ml)	=	118.0	ml
V <sub>al-blank</sub>	= blank liquid volume for solvent rinse "i" (ml)	=	100.0	mi
0.00001	= EPA M5 fraction of total rinse that can be subtracted (g)	=	0.00001	g
ρι	= density of solvent rinse "i" (g/ml)	=	0.7845	g/ml
r <sub>st</sub>	= solvent rinse "i" - sample residue mass (g)	=	0.00010	g
m <sub>bi</sub>	= solvent rinse "i" - maximum allowable blank correction (g)	=	0.00000	g

6. Solvent rinse - net residue (g)

$$m_i$$
 =  $(r_{si} - m_{bi})$  if  $r_{si} \ge m_{bi}$   
 $m_i$  = 0 if  $r_{si} < m_{bi}$ 

Where:	ı		Acetone		
r <sub>si</sub>	= solvent rinse "i" - sample residue mass (g)	=	0.00010	g	
$m_{bi}$	= solvent rinse "i" - maximum allowable blank correction (g)	=	0.00000	g	
m,	≈ solvent rinse "i" - net residue (g)	=	0.00010	g	

7. Total solvent residue - (g)

$$m_s = \sum_{i=1}^n m_i$$

Where:

m <sub>1</sub>	= solvent rinse "1" - net residue (g)	= =	0.00010	g
m <sub>2</sub>	= solvent rinse "2" - net residue (g)		N/A	g
m <sub>3</sub>	= solvent rinse "3" - net residue (g)		N/A	g
m <sub>s</sub>	= total solvent residue (g)	=	0.00010	g

8. Total gravimetric result (g)

$$m_T = m_{filter} + m_s$$

Where:

 $m_{\text{filter}}$  = total particulate collected on filters (g) = 0.00080 g  $m_{\text{s}}$  = total solvent residue (g) = 0.00010 g  $m_{\text{T}}$  = total gravimetric result (g) = 0.00090 g

#### 9. Total gravimetric detection limit (g)

$$m_D = (MDL_{filter})(n_f) + (MDL_{rinse})(n_r)$$

Where:

 $m_D$  = total gravimetric detection limit (g) = 0.00020 g

# 10. Total particulate matter (g)

$$m_n = MAXIMUM[m_T \ or \ < m_D]$$

Where:

 $m_T$  = total gravimetric result (g) = 0.00090 g  $m_D$  = total gravimetric detection limit (g) = 0.00020 g

 $m_n$  = total particulate matter (g) = 0.00090 g

# USEPA Method 5/29 Filterable Particulate Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Particulate concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(2.205 \times 10^{-3}\right)$$

Where:

 $m_n$  = total particulate matter (g) = 0.00090 g  $V_{mstd}$  = volume metered, standard (dscf) = 68.7570 dscf 2.205 x 10<sup>-3</sup> = conversion factor (lb/g) = 2.205E-03 lb/g

 $C_{sd}$  = particulate concentration (lb/dscf) = 2.8863E-08 lb/dscf

2. Particulate concentration (gr/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (15.43)$$

Where:

 $m_n$ = total particulate matter (g)= 0.00090 g $V_{mstd}$ = volume metered, standard (dscf)= 68.7570 dscf15.43= conversion factor (gr/g)= 15.43 gr/g

 $C_{sd}$  = particulate concentration (gr/dscf) = 0.00020 gr/dscf

3. Particulate concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mid}}\right) (1000)(35.31)$$

Where:

 $C_{sd}$  = particulate concentration (mg/dscm) = 0.46219 mg/dscm

4. Particulate concentration (mg/Nm³ dry)

$$C_{sd}$$
 =  $\left(\frac{m_n}{V_{msid}}\right) (1000)(35.31) \left(\frac{68 + 460}{32 + 460}\right)$ 

Where:

m <sub>n</sub>	= total particulate matter (g)	=	0.00090	9
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
1,000	= conversion factor (mg/g)	=	1,000	mg/g
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = particulate concentration (mg/Nm<sup>3</sup> dry) = 0.49601 mg/Nm<sup>3</sup> dry

5. Particulate concentration corrected to x% O2 (gr/dscf example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

$C_{sd}$	= particulate concentration (gr/dscf)	=	0.00020	gr/dscf
X	= oxygen content of corrected gas (%)	=	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

 $C_{sdx}$  = particulate concentration corrected to  $x\%O_2$  (gr/dscf) = 0.00024 gr/dscf @  $x\%O_2$ 

6. Particulate concentration corrected to y% CO<sub>2</sub> (gr/dscf example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

$C_{sd}$	= particulate concentration (gr/dscf)	=	0.00020	gr/dscf
У	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%

 $C_{sdv}$  = particulate concentration corrected to y%CO<sub>2</sub> (gr/dscf) = 0.00024 gr/dscf @ y%CO<sub>2</sub>

7. Particulate concentration at actual gas conditions (gr/acf example)

$$C_a = C_{sd} \left( \frac{Q_{std}}{Q_a} \right)$$

Where:

$C_{sd}$	= particulate concentration (gr/dscf)	=	0.00020	gr/dscf
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	168,899	acfm

C<sub>a</sub> = particulate concentration at actual gas conditions (gr/acf) = 0.00011 gr/acf

Unit 1 FF Outlet

# 8. Particulate rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right) (2.205 \times 10^{-3}) (Q_{std}) (60)$$

#### Where:

m	= total particulate matter (g)	=	0.00090	9
Vm	td = volume metered, standard (dscf)	=	68.7570	dscf
2.2	05 x 10 <sup>-3</sup> = conversion factor (lb/g)	=	2.205E-03	lb/g
$Q_{st}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

 $E_{lb/hr}$  = particulate rate (lb/hr) = 0.1557 lb/hr

# 9. Particulate rate (kg/hr)

$$E_{kg/hr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{(Q_{std})(60)}{1000}\right)$$

#### Where:

f
fm
/hr
3

 $E_{kg/hr}$  = particulate rate (kg/hr) = 0.0706 kg/hr

# 10. Particulate rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right) (2.205 \times 10^{-3}) (Q_{std}) (60) \left(\frac{Cap}{2000}\right)$$

# Where:

$m_{n}$	= total particulate matter (g)	=	0.00090	9
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Сар	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2,000	= conversion factor (lb/Ton)	=	2,000	lb/Ton

 $E_{T/yr}$  = particulate rate (Ton/yr) = 0.6821 Ton/yr

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0.00050

lb/MMBtu

#### 11. Particulate rate - F<sub>d</sub>-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(2.205 \times 10^{-3}\right) \left(F_d\right) \left(\frac{20.9}{20.9 - O_2}\right)$$

#### Where:

m <sub>n</sub>	= total particulate matter (g)	=	0.00090	g
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
$F_d$	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
$O_2$	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

#### 12. Particulate rate - F<sub>c</sub>-based (ib/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(2.205 \times 10^{-3}\right) \left(F_c\right) \left(\frac{100}{CO_2}\right)$$

= particulate rate - F<sub>d</sub> - based (lb/MMBtu)

#### Where:

m <sub>n</sub>	= total particulate matter (g)	=	0.00090	g
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
F <sub>c</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	
E <sub>Fc</sub>	= particulate rate - F <sub>c</sub> - based (lb/MMBtu)	=	0.00052	lb/MMBtu

#### 13. Particulate rate - Heat Input-based (Ib/MMBtu)

$$E_{Hi} = \left(\frac{m_n}{V_{mstd}}\right) \left(2.205 \times 10^{-3}\right) \left(\frac{(Q_{std})(60)}{H_i}\right)$$

#### Where:

m <sub>n</sub>	= total particulate matter (g)	=	0.00090	g	
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf	
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	ib/g	
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm	
60	= conversion factor (min/hr)	=	60	min/hr	
H <sub>i</sub>	= actual heat input (MMBtu/hr)	=		MMBtu/hr	
E <sub>Hi</sub>	= particulate rate - Heat based (lb/MMBtu)	=	N/A	lb/MMBtu	

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# **USEPA Method 5/29 Mercury Analyte Calculations**

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

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#### 1. Total blank amount (µg)

$$m_{total-B} = \sum_{i=1}^{n} m_{i-B}$$

#### Where:

VVIICIE.				
m <sub>1b-B</sub>	= mercury amount in blank for Fraction 1b	=	<0.1000	μg
m <sub>2b-B</sub>	= mercury amount in blank for Fraction 2b	=	<0.3000	μg
m <sub>3a-B</sub>	= mercury amount in blank for Fraction 3a	=	<0.2000	μg
m <sub>3b-B</sub>	= mercury amount in blank for Fraction 3b	=	<0.5000	μg
m <sub>3c-B</sub>	≈ mercury amount in blank for Fraction 3c	=	<0.4000	µд
m <sub>total-B</sub>	= total amount of mercury in blank	=	<1.5000	μg

#### 2. Total sample amount (µg)

$$m_{total - S} = \sum_{i=1}^{n} m_{i-S}$$

#### Where:

m <sub>1b-S</sub>	= mercury amount in sample for Fraction 1b	=	<0.1000	μg
m <sub>2b-S</sub>	= mercury amount in sample for Fraction 2b	=	4.4126	μg
$m_{3a-S}$	= mercury amount in sample for Fraction 3a	=	<0.2000	μg
m <sub>3b-S</sub>	= mercury amount in sample for Fraction 3b	=	< 0.5000	þд
m <sub>3c-S</sub>	= mercury amount in sample for Fraction 3c	=	<0.4000	μg
m <sub>total-S</sub>	= total amount of mercury in sample	=	4.4126	μg

# 3. Allowable blank correction (µg)

$$m_{T-B-allow}$$
 =  $m_{total-B}$  if  $m_{total-B} \le 0.6$   
 $m_{T-B-allow}$  =  $MAX \left[ 0.6, MIN \left( m_{total-B}, 0.05 \times m_{total-S} \right) \right]$  if  $m_{total-B} > 0.6$ 

#### Where:

m <sub>total-B</sub>	= total amount of mercury in blank	=	<1.5000	μg
m <sub>total-S</sub>	= total amount of mercury in sample	=	4.4126	μg
0.05 x m <sub>total-S</sub>	= 5% of m <sub>lotal-S</sub>	=	0.2206	μg
MAX	= arithmetic operator that returns the maximum of two values			

MIN = arithmetic operator that returns the minimum of two values

= total allowable blank correction 0.0000 m<sub>T-B-allow</sub> μg

NOTE: In this case, the second criteria applies.

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QA/QC Date

μg

# 4. Sample corrected for allowable blank - Total (μg)

$m_n$	$= m_{total-S}$ -	$-m_{T-B-allow}$

Where:

m <sub>total-S</sub>	= total amount of mercury in sample	=	4.4126	μg
$m_{\text{T-B-allow}}$	= total allowable blank correction	=	0.0000	рg

m<sub>n</sub> = total mercury in sample corrected for allowable blank = 4.4126

# 5. Sample corrected for allowable blank - Prorated for each fraction ( $\mu g$ )

$$m_{n-i} = \left(\frac{m_{i-S}}{m_{total-S}}\right) (m_n)$$

۱۸	∕h	ra	

m <sub>n</sub> m <sub>1b-S</sub> m <sub>2b-S</sub> m <sub>3a-S</sub> m <sub>3b-S</sub> m <sub>3c-S</sub> m <sub>1otal-S</sub>	<ul> <li>total mercury in sample corrected for allowable blank</li> <li>mercury amount in sample for Fraction 1b</li> <li>mercury amount in sample for Fraction 2b</li> <li>mercury amount in sample for Fraction 3a</li> <li>mercury amount in sample for Fraction 3b</li> <li>mercury amount in sample for Fraction 3c</li> <li>total amount of mercury in sample</li> </ul>	= = = = = = = = = = = = = = = = = = = =	4.4126 <0.1000 4.4126 <0.2000 <0.5000 <0.4000 4.4126	19 19 19 19 19
m <sub>n-1b</sub> m <sub>n-2b</sub> m <sub>n-3a</sub> m <sub>n-3b</sub> m <sub>n-3c</sub>	<ul> <li>mercury corrected for blank - prorated for Fraction 1b</li> <li>mercury corrected for blank - prorated for Fraction 2b</li> <li>mercury corrected for blank - prorated for Fraction 3a</li> <li>mercury corrected for blank - prorated for Fraction 3b</li> <li>mercury corrected for blank - prorated for Fraction 3c</li> </ul>	= =	<0.1000 4.4126 <0.2000 <0.5000 <0.4000	ha ha ha ha

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# USEPA Method 5/29 Mercury Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Mercury concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right)$$

Where:

= mercury collected in sample (total µg) 4.4126 m<sub>B</sub> μg  $V_{mstd}$ = volume metered, standard (dscf) 68.7570 dscf 2.205 x 10<sup>-3</sup> = conversion factor (lb/g) 2.205E-03 lb/g = conversion factor (µg/g) 10<sup>6</sup> 1.0E+06 µg/g

C<sub>sd</sub> = mercury concentration (lb/dscf) = 1.4151E-10 lb/dscf

2. Mercury concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31)$$

Where:

 $m_n$  = mercury collected in sample (total μg) = 4.4126 μg  $V_{mstd}$  = volume metered, standard (dscf) = 68.7570 dscf 35.31 = conversion factor (dscf/dscm) = 35.31 dscf/dscm

 $C_{sd}$  = mercury concentration (µg/dscm) = 2.2661E+00 µg/dscm

3. Mercury concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{35.31}{1000}\right)$$

Where:

= mercury collected in sample (total µg) 4.4126  $m_n$ μg = volume metered, standard (dscf)  $V_{mstd}$ 68.7570 dscf = conversion factor (dscf/dscm) 35.31 35.31 dscf/dscm 1000 = conversion factor (µg/mg) 1000 µg/mg

C<sub>sd</sub> = mercury concentration (mg/dscm) = 2.2661E-03 mg/dscm

4. Mercury concentration (µg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mid}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$$

Where:

m <sub>n</sub>	= mercury collected in sample (total μg)	=	4.4126	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = mercury concentration (µg/Nm3 dry) = 2.4319E+00 µg/Nm<sup>3</sup> dry

5. Mercury concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

$C_{sd}$	= mercury concentration (lb/dscf)	=	1.4151E-10 lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0 %
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4 %
20.9	= oxygen content of ambient air (%)	=	20.9 %

C<sub>sdx</sub> = mercury concentration corrected to x% oxygen (lb/dscf) = 1.7149E-10 lb/dscf @ x%O<sub>2</sub>

6. Mercury concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

$$C_{sd}$$
 = mercury concentration (lb/dscf) = 1.4151E-10 lb/dscf  
y = carbon dioxide content of corrected gas (%) = 12.0 %  
 $CO_2$  = proportion of carbon dioxide in the gas stream by volume (%) = 10.2 %

 $C_{sdy}$  = mercury conc. corrected to y% carbon dioxide (lb/dscf) = 1.6665E-10 lb/dscf @ y%CO<sub>2</sub>

7. Mercury concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd} \left( \frac{Q_{std}}{Q_s} \right)$$

Where:

C <sub>sd</sub>	= mercury concentration (lb/dscf)	=	1.4151E-10	lb/dscf
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	168,899	acfm

C<sub>a</sub> = mercury concentration at actual gas conditions (lb/acf) = 7.5340E-11 lb/acf

8. Mercury emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60)$$

Where:

$m_n$	= mercury collected in sample (total µg)	=	4.4126	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

E<sub>lb/hr</sub> = mercury emission rate (lb/hr) 7.6349E-04 lb/hr

9. Mercury emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{nustd}}\right) \left(\frac{Q_{std}}{(10^6)(60)}\right)$$

Where:

$m_n$	= mercury collected in sample (total µg)	=	4.4126	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min

 $E_{g/s}$ = mercury emission rate (g/s) 9.6181E-05 g/s

10. Mercury emission rate (Ton/yr) 
$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60) \left(\frac{Cap}{2000}\right)$$

Where:

77110101				
$m_n$	= mercury collected in sample (total µg)	=	4.4126	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton

E<sub>T/yr</sub> = mercury emission rate (Ton/yr) = 3.3441E-03 Ton/yr

100

Unit 1 FF Outlet

#### 11. Mercury emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_d) \left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m <sub>o</sub>	= mercury collected in sample (total μg)	=	4.4126	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
F₫	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu

 $O_2$  = proportion of oxygen in the gas stream by volume (%) = 9.4 % 20.9 = oxygen content of ambient air (%) = 20.9 %

E<sub>Fd</sub> = mercury emission rate - Fd-based (lb/MMBtu) = 2.4676E-06 lb/MMBtu

# 12. Mercury emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

= conversion factor

Where:

100

m <sub>n</sub>	= mercury collected in sample (total μg)	=	4.4126	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
Fc	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO₂	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%

E<sub>Fc</sub> = mercury emission rate - Fc-based (lb/MMBtu) = 2.5275E-06 lb/MMBtu

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# LOGIC FOR TREATING DETECTION LIMITS

(all metals except mercury)

# 1. Logic for Determining Maximum Allowable Front-Half Blank Correction (m<sub>FB-allow</sub>)

	CASE 1	CASE 2
	$m_{FB} = D$	$m_{FB} = ND$
Rule		
ND = 0	$m_{FB-allow} = M29 Rule$	$m_{FB-allow} = 0$
ND=1x	$m_{FB-allow} = M29$ Rule	$m_{FB-allow} = 0$
ND=0.5x	$m_{FB-allow} = M29 Rule$	$m_{FB-allow} = 0$

# 2. Logic for Determining Blank-Corrected Front-Half Sample Amount (m<sub>F</sub>)

	CASE 1 m <sub>FS</sub> - m <sub>FB-allow</sub> ≥ MDL	CASE 2 m <sub>FS</sub> - m <sub>FB-allow</sub> < MDL
<b>Rule</b> <i>ND</i> = 0 <i>ND</i> =1 <i>x ND</i> =0.5 <i>x</i>	$m_F = m_{FS} - m_{FB-allow}$ $m_F = m_{FS} - m_{FB-allow}$ $m_F = m_{FS} - m_{FB-allow}$	m <sub>F</sub> = < MDL m <sub>F</sub> = < MDL m <sub>F</sub> = < MDL

# 3. Logic for Determining Maximum Allowable Back-Half Blank Correction (m<sub>BB-allow</sub>)

	CASE 1	CASE 2
	m <sub>BB</sub> = D	$m_{BB} = ND$
Rule		
ND = 0	m <sub>BB-allow</sub> = M29 Rule	$m_{BB-allow} = 0$
ND=1x	m <sub>BB-allow</sub> = M29 Rule	$m_{BB-allow} = 0$
ND=0.5x	m <sub>BB-allow</sub> = M29 Rule	$m_{BB-allow} = 0$

### 4. Logic for Determining Blank-Corrected Back-Half Sample Amount (m<sub>B</sub>)

	CASE 1 m <sub>BS</sub> - m <sub>BB-allow</sub> ≥ MDL	CASE 2 m <sub>BS</sub> - m <sub>BB-allow</sub> < MDL
<b>Rule</b> <i>ND</i> = 0 <i>ND</i> =1 <i>x ND</i> =0.5 <i>x</i>	$m_B = m_{BS} - m_{BB-allow}$ $m_B = m_{BS} - m_{BB-allow}$ $m_B = m_{BS} - m_{BB-allow}$	m <sub>B</sub> = < MDL m <sub>B</sub> = < MDL m <sub>B</sub> = < MDL

### 5. Logic for Adding Front and Back-Half Corrected Samples (mn)

	CASE 1	CASE 2	CASE 3
	Both are D	One is D, other is ND	Both are ND
Dula			
Rule			
ND = 0	$m_n = m_F + m_B$	$m_n = D$	$m_n = < Sum ND$
ND=1x	$m_n = m_F + m_B$	$m_n = \langle [D + ND] \rangle$	$m_n = < Sum ND$
ND≈0.5x	$m_n = m_F + m_B$	$m_n = < [D + 0.5ND]$	$m_0 = < 0.5 \text{ Sum ND}$

### **Definitions and Notes**

The term "Rule" refers to the rule being implemented for hanMDLing non-detectable quantities in summations MDL = minimum detection limit.

D = Detectable quantity reported as D.

ND = Non-Detectable quantity reported at a value of ND.

If Front and Back-Half fractions are combined, then only Items 1 and 2 are used.

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# USEPA Method 5/29 Beryllium Analyte Calculations

#### Sample data taken from Run 1

12.46

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

041509 09094

1. Maximum front-half blank correction criteria (µg)

٧

Α

$$A = (1.4) \left(\frac{3.141593}{4}\right) \left(\frac{D}{2.54}\right)^2$$

D	= diameter of filter used in sample apparatus	=	8.2	cm
1.4	= allowable blank per square inch of filter area	=	1.4	μg/in²
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	

2. Allowable blank correction - combined front and back-half sample fractions (µg)

= maximum front-half blank correction criteria

```
= m_{FB} if m_{FB} \le A + 1
   m FB - allow
                                   = MAX [A + 1, MIN (m_{FB}, 0.05 \times m_{FS})] if m_{FB} > A + 1
   m FB - allow
Where:
 m_{FB}
                 = beryllium amount in combined front- and back-half blank
                                                                                          < 0.0500
                                                                                                       μg
                 = beryllium amount in combined front- and back-half sample
                                                                                          < 0.0500
 m_{\text{FS}}
                                                                                                       μg
                 = max combined front- & back-half blank correction criteria
                                                                                           12.46
 A+1
                                                                                                       μg
 0.05 \times m_{ES}
                 = 5% of combined front- and back-half sample amount
                                                                                          < 0.0025
 MAX
                 = arithmetic operator that returns the maximum of two values
 MIN
                 = arithmetic operator that returns the minimum of two values
                 = allowable combined Beryllium blank correction
                                                                                          0.0000
                                                                                                      μg
 NOTE: In this case, the first criteria applies.
```

3. Combined front- and back-half sample corrected for allowable blank (µg)

$$m_n = m_{FS} - m_{FB-allow}$$

Where:  $m_{FS}$  = beryllium amount in combined front- and back-half sample = <0.0500 µg  $m_{FB-allow}$  = allowable combined beryllium blank correction = 0.0000 µg  $m_n$  = blank-corrected beryllium in combined sample = <0.0500 µg

# USEPA Method 5/29 Beryllium Sample Calculations

### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 090948

1. Beryllium concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right)$$

Where:

 $m_{n}$ = beryllium collected in sample (total µg) < 0.0500 μg  $V_{mstd}$ = volume metered, standard (dscf) 68.7570 dscf = conversion factor (lb/g) 2.205E-03 2.205 x 10<sup>-3</sup> ib/g 10<sup>6</sup> = conversion factor (µg/g) 1.0E+06 μg/g

 $C_{sd}$  = beryllium concentration (lb/dscf) = <1.6035E-12 lb/dscf

2. Beryllium concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31)$$

Where:

 $m_n$  = beryllium collected in sample (total μg) = <0.0500 μg  $V_{msid}$  = volume metered, standard (dscf) = 68.7570 dscf 35.31 = conversion factor (dscf/dscm) = 35.31 dscf/dscm

 $C_{sd}$  = beryllium concentration (µg/dscm) = <2.5677E-02 µg/dscm

3. Beryllium concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{35.31}{1000}\right)$$

Where:

 $m_n$ = beryllium collected in sample (total µg) < 0.0500 μg  $V_{mstd}$ = volume metered, standard (dscf) 68.7570 dscf 35.31 = conversion factor (dscf/dscm) 35.31 dscf/dscm 1000 = conversion factor (µg/mg) 1000 µg/mg

C<sub>sd</sub> = beryllium concentration (mg/dscm) = <2.5677E-05 mg/dscm

4. Beryllium concentration (µg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$$

Where:

$m_n$	= beryllium collected in sample (total µg)	=	<0.0500	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = beryllium concentration (µg/Nm3 dry) = <2.7556E-02 µg/Nm<sup>3</sup> dry

5. Beryllium concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

$\mathbf{C}_{sd}$	= beryllium concentration (lb/dscf)	=	<1.6035E-12	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

C<sub>sdx</sub> = beryllium concentration corrected to x% oxygen (lb/dscf) = <1.9432E-12 lb/dscf @ x%O<sub>2</sub>

6. Beryllium concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

C <sub>sd</sub>	= beryllium concentration (lb/dscf)	=	<1.6035E-12	lb/dscf
у	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%

C<sub>sdy</sub> = beryllium conc. corrected to y% carbon dioxide (lb/dscf) = <1.8883E-12 lb/dscf @ y%CO<sub>2</sub>

7. Beryllium concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd} \left( \frac{Q_{std}}{Q_a} \right)$$

Where:

$$C_{sd}$$
 = beryllium concentration (lb/dscf) = <1.6035E-12 lb/dscf   
 $Q_{std}$  = volumetric flow rate at standard conditions, dry basis (dscfm) = 89,921 dscfm   
= volumetric flow rate at actual conditions (acfm) = 168,899 acfm

C<sub>a</sub> = beryllium concentration at actual gas conditions (lb/acf) = <8.5369E-13 lb/acf

Unit 1 FF Outlet

# 8. Beryllium emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60)$$

### Where:

m <sub>n</sub>	= beryllium collected in sample (total μg)	=	< 0.0500	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	ib/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

E<sub>Jb/hr</sub> = beryllium emission rate (lb/hr) <8.6512E-06 lb/hr

### 9. Beryllium emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{mistd}}\right) \left(\frac{Q_{std}}{(10^6)(60)}\right)$$

#### Where:

m <sub>n</sub>	= beryllium collected in sample (total μg)	=	<0.0500	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
$Q_{\text{std}}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min

 $\mathsf{E}_{\mathsf{g/s}}$ = beryllium emission rate (g/s) = <1.0898E-06 g/s

10. Beryllium emission rate (Ton/yr) 
$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60) \left(\frac{Cap}{2000}\right)$$

#### Where:

m <sub>n</sub>	= beryllium collected in sample (total µg)	=	<0.0500	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Сар	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton

E<sub>Ton/yr</sub> = beryllium emission rate (Ton/yr) = <3.7892E-05 Ton/yr

### 11. Beryllium emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_d) \left(\frac{20.9}{20.9 - O_2}\right)$$

#### Where:

m <sub>n</sub>	= beryllium collected in sample (total µg)	=	<0.0500	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
$F_d$	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

E<sub>Fd</sub> = beryllium emission rate - Fd-based (lb/MMBtu) = <2.7961E-08 lb/MMBtu

# 12. Beryllium emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

#### Where:

m <sub>n</sub>	= beryllium collected in sample (total µg)	=	< 0.0500	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
F <sub>c</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	

E<sub>Fc</sub> = beryllium emission rate - Fc-based (lb/MMBtu) = <2.8639E-08 lb/MMBtu

# USEPA Method 5/29 Cadmium Analyte Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

041509 091743

1. Maximum front-half blank correction criteria (µg)

$$A = (1.4) \left( \frac{3.141593}{4} \right) \left( \frac{D}{2.54} \right)^2$$

1A/h	ere.

D	= diameter of filter used in sample apparatus	=	8.2	cm
1.4	= allowable blank per square inch of filter area	=	1.4	μg/in²
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	
Α	= maximum front-half blank correction criteria	=	12.46	μg

2. Allowable blank correction - combined front and back-half sample fractions (µg)

m FB - allow	$= m_{FB}  \text{if} \ m_{FB} \leq A + 1$	
m FB - allow	$= MAX \left[ A + 1,  MIN \left( m_{FB} \right), \right.$	$0.05 \times m_{FS}$ )] if $m_{FB} > A + 1$

#### Where:

m <sub>FB</sub>	= cadmium amount in combined front- and back-half blank	=	<0.2000	μg
$m_{FS}$	= cadmium amount in combined front- and back-half sample	=	0.3934	μg
A+1	= max combined front- & back-half blank correction criteria	=	12.46	μg
$0.05 \times m_{FS}$	= 5% of combined front- and back-half sample amount	=	0.0197	μg
MAX	= arithmetic operator that returns the maximum of two values			

MAX = arithmetic operator that returns the maximum of two values

MIN = arithmetic operator that returns the minimum of two values

 $m_{\text{FB-allow}}$  = allowable combined Cadmium blank correction = 0.0000  $\mu g$ 

NOTE: In this case, the first criteria applies.

3. Combined front- and back-half sample corrected for allowable blank (µg)

$$m_n = m_{FS} - m_{FB-allow}$$

### Where:

m <sub>FS</sub> m <sub>FB-allow</sub>	<ul> <li>= cadmium amount in combined front- and back-half sample</li> <li>= allowable combined cadmium blank correction</li> </ul>	=	0.3934 0.0000	μg
m <sub>n</sub>	= blank-corrected cadmium in combined sample	=	0.3934	μg

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QA/QC \_\_\_\_\_ Date

USEPA Method 5/29 Cadmium Sample Calculations

# USEPA Method 5/29 Cadmium Sample Calculations

### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 091758

1. Cadmium concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{msid}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right)$$

Where:

 $m_n$ = cadmium collected in sample (total µg) 0.3934 μg  $V_{mstd}$ = volume metered, standard (dscf) 68.7570 dscf 2.205 x 10<sup>-3</sup> = conversion factor (lb/g) 2.205E-03 lb/g 10<sup>6</sup> = conversion factor (µg/g) 1.0E+06 µg/g

C<sub>sd</sub> = cadmium concentration (lb/dscf) = 1.2616E-11 lb/dscf

2. Cadmium concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31)$$

Where:

 $m_n$ = cadmium collected in sample (total  $\mu g$ )= 0.3934 $\mu g$  $V_{mstd}$ = volume metered, standard (dscf)= 68.7570dscf35.31= conversion factor (dscf/dscm)= 35.31dscf/dscm

C<sub>sd</sub> = cadmium concentration (µg/dscm) = 2.0203E-01 µg/dscm

3. Cadmium concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mod}}\right) \left(\frac{35.31}{1000}\right)$$

Where:

 $m_n$ = cadmium collected in sample (total µg) 0.3934 μg = volume metered, standard (dscf) 68.7570  $V_{mstd}$ dscf 35.31 = conversion factor (dscf/dscm) 35.31 dscf/dscm 1000 = conversion factor (µg/mg) 1000 µg/mg

C<sub>sd</sub> = cadmium concentration (mg/dscm) = 2.0203E-04 mg/dscm

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Unit 1 FF Outlet

4. Cadmium concentration (µg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mxtd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$$

#### Where:

m <sub>n</sub>	= cadmium collected in sample (total µg)	=	0.3934	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = cadmium concentration (µg/Nm3 dry) = 2.1681E-01 µg/Nm<sup>3</sup> dry

5. Cadmium concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx} = C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$$

#### Where:

C <sub>sd</sub>	= cadmium concentration (lb/dscf)	=	1.2616E-11	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

C<sub>sdx</sub> = cadmium concentration corrected to x% oxygen (lb/dscf) = 1.5289E-11 lb/dscf @ x%Q<sub>2</sub>

6. Cadmium concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

#### Where:

C <sub>sd</sub>	= cadmium concentration (lb/dscf)	=	1.2616E-11	lb/dscf
у	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%

C<sub>sdy</sub> = cadmium conc. corrected to y% carbon dioxide (lb/dscf) = 1.4857E-11 lb/dscf @ y%CO<sub>2</sub>

7. Cadmium concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd} \left( \frac{Q_{std}}{Q_a} \right)$$

#### Where:

$C_{sd}$	= cadmium concentration (lb/dscf)	=	1.2616E-11	lb/dscf
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	168,899	acfm

C<sub>a</sub> = cadmium concentration at actual gas conditions (lb/acf) = 6.7168E-12 lb/acf

Unit 1 FF Outlet

8. Cadmium emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60)$$

Where:

m <sub>n</sub>	= cadmium collected in sample (total µg)	=	0.3934	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

E<sub>lb/hr</sub> = cadmium emission rate (lb/hr) 6.8068E-05 lb/hr

9. Cadmium emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{Q_{std}}{(10^6)(60)}\right)$$

Where:

m <sub>n</sub>	= cadmium collected in sample (total μg)	=	0.3934	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min

 $E_{g/s}$ = cadmium emission rate (g/s) 8.5749E-06 g/s

10. Cadmium emission rate (Ton/yr) 
$$= \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60) \left(\frac{Cap}{2000}\right)$$

Where:

m <sub>n</sub>	= cadmium collected in sample (total µg)	=	0.3934	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Сар	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	ib/Ton

E<sub>Ton/yr</sub> = cadmium emission rate (Ton/yr) = 2.9814E-04 Ton/yr

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# 11. Cadmium emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_d) \left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m <sub>n</sub>	= cadmium collected in sample (total μg)	=	0.3934	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
F <sub>d</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
Ο.	= proportion of everyon in the gas atroom by volume (9/)	_	0.4	0/

 $O_2$  = proportion of oxygen in the gas stream by volume (%) = 9.4 % 20.9 = oxygen content of ambient air (%) = 20.9 %

 $E_{Fd}$  = cadmium emission rate - Fd-based (lb/MMBtu) = 2.2000E-07 lb/MMBtu

# 12. Cadmium emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

Where:

m <sub>n</sub>	= cadmium collected in sample (total µg)	=	0.3934	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
F <sub>c</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%

100 = conversion factor = 100

 $E_{Fc}$  = cadmium emission rate - Fc-based (lb/MMBtu) = 2.2533E-07 lb/MMBtu

# USEPA Method 5/29 Lead Analyte Calculations

### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

041509 091859

1. Maximum front-half blank correction criteria (µg)

$$A = (1.4) \left( \frac{3.141593}{4} \right) \left( \frac{D}{2.54} \right)^2$$

#### Where:

D	= diameter of filter used in sample apparatus	=	8.2	cm
1.4	= allowable blank per square inch of filter area	=	1.4	μg/in²
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	
Α	= maximum front-half blank correction criteria	=	12.46	ua

2. Allowable blank correction - combined front and back-half sample fractions (µg)

m FB - allow	$= m_{FB}  \text{if}  m_{FB} \leq A + 1$	
m FB - allow	$= MAX \left[ A + 1,  MIN \left( m_{FB} \right) \right]$	$0.05 \times m_{FS}$ )] if $m_{FB} > A + 1$

# Where:

m <sub>FB</sub>	= lead amount in combined front- and back-half blank	=	<0.2000	μg
m <sub>FS</sub>	= lead amount in combined front- and back-half sample	=	2.2834	μg
A+1	= max combined front- & back-half blank correction criteria	æ	12.46	μg
0.05 x m <sub>FS</sub>	= 5% of combined front- and back-half sample amount	=	0.1142	μg
MAX	= arithmetic operator that returns the maximum of two values			

MIN = anthmetic operator that returns the minimum of two values

 $m_{FB-allow}$  = allowable combined Lead blank correction = 0.0000  $\mu$ g

NOTE: In this case, the first criteria applies.

3. Combined front- and back-half sample corrected for allowable blank (µg)

$$m_n = m_{FS} - m_{FB-allow}$$

# Where:

m <sub>FS</sub> m <sub>FB-allow</sub>	<ul> <li>lead amount in combined front- and back-half sample</li> <li>allowable combined lead blank correction</li> </ul>	=	2.2834 0.0000	ha ha
m <sub>n</sub>	= blank-corrected lead in combined sample	·=	2.2834	μg

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# USEPA Method 5/29 Lead Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 091859

1. Lead concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right)$$

Where:

 $\mathbf{m}_{\mathbf{n}}$ = lead collected in sample (total µg) 2.2834 μg  $V_{mstd}$ = volume metered, standard (dscf) 68.7570 dscf = conversion factor (lb/g) 2.205 x 10<sup>-3</sup> 2.205E-03 lb/g 10<sup>6</sup> = conversion factor (µg/g) 1.0E+06 μg/g

 $C_{sd}$  = lead concentration (lb/dscf) = 7.3227E-11 lb/dscf

2. Lead concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mvld}}\right) (35.31)$$

Where:

 $m_n$ = lead collected in sample (total  $\mu g$ )=2.2834 $\mu g$  $V_{mstd}$ = volume metered, standard (dscf)=68.7570dscf35.31= conversion factor (dscf/dscm)=35.31dscf/dscm

 $C_{sd}$  = lead concentration (µg/dscm) = 1.1726E+00 µg/dscm

3. Lead concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{35.31}{1000}\right)$$

Where:

= lead collected in sample (total µg) 2.2834  $m_n$ μg  $V_{mstd}$ = volume metered, standard (dscf) 68.7570 dscf 35.31 = conversion factor (dscf/dscm) dscf/dscm 35.31 1000 = conversion factor (μg/mg) 1000 µg/mg

 $C_{sd}$  = lead concentration (mg/dscm) = 1.1726E-03 mg/dscm

Unit 1 FF Outlet

4. Lead concentration (µg/Nm3 dry)

$$C_{sd}$$
 =  $\left(\frac{m_n}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$ 

Where:

m <sub>n</sub>	= lead collected in sample (total μg)	=	2.2834	μg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = lead concentration (µg/Nm3 dry) = 1.2584E+00 µg/Nm<sup>3</sup> dry

5. Lead concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx} = C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$$

Where:

 $C_{sd}$  = lead concentration (lb/dscf) = 7.3227E-11 lb/dscf x = oxygen content of corrected gas (%) = 7.0 %  $C_2$  = proportion of oxygen in the gas stream by volume (%) = 9.4 % 20.9 = oxygen content of ambient air (%) = 20.9 %

 $C_{sdx}$  = lead concentration corrected to x% oxygen (lb/dscf) = 8.8741E-11 lb/dscf @ x%O<sub>2</sub>

6. Lead concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

 $C_{sd}$  = lead concentration (lb/dscf) = 7.3227E-11 lb/dscf y = carbon dioxide content of corrected gas (%) = 12.0 %  $CO_2$  = proportion of carbon dioxide in the gas stream by volume (%) = 10.2 %

C<sub>sdy</sub> = lead conc. corrected to y% carbon dioxide (lb/dscf) = 8.6234E-11 lb/dscf @ y%CO<sub>2</sub>

7. Lead concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd} \left( \frac{Q_{std}}{Q_a} \right)$$

Where:

 $C_{sd}$  = lead concentration (lb/dscf) = 7.3227E-11 lb/dscf  $Q_{std}$  = volumetric flow rate at standard conditions, dry basis (dscfm) = 89,921 dscfm  $Q_{a}$  = volumetric flow rate at actual conditions (acfm) = 168,899 acfm

C<sub>a</sub> = lead concentration at actual gas conditions (lb/acf) = 3.8986E-11 lb/acf

USEPA Method 5/29 Lead Sample Calculations

Unit 1 FF Outlet

8. Lead emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (Q_{std}) (60)$$

Where:

m <sub>n</sub>	= lead collected in sample (total μg)	=	2.2834	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (µg/g)	=	1.0E+06	µg/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr

E<sub>lb/hr</sub> = lead emission rate (lb/hr) 3.9508E-04 lb/hr

9. Lead emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{nustd}}\right) \left(\frac{Q_{std}}{(10^6)(60)}\right)$$

Where:

=	2.2834	μg
=	68.7570	dscf
nditions, dry basis (dscfm) =	89,921	dscfm
=	1.0E+06	μg/g
=	60	sec/min
r	nditions, dry basis (dscfm) =	= 68.7570 nditions, dry basis (dscfm) = 89,921 = 1.0E+06

 $E_{g/s}$ = lead emission rate (g/s) 4.9771E-05 g/s

10. Lead emission rate (Ton/yr) 
$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) \left(Q_{std}\right) (60) \left(\frac{Cap}{2000}\right)$$
 Where:

Where:

m <sub>n</sub>	= lead collected in sample (total µg)	=	2.2834	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Сар	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton

E<sub>Ton/yr</sub> = lead emission rate (Ton/yr) = 1.7305E-03 Ton/yr Clean Air Project No: 10735

Unit 1 FF Outlet

11. Lead emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{msid}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_d) \left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m <sub>n</sub>	= lead collected in sample (total µg)	=	2.2834	µg
$V_{mstd}$	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
F <sub>4</sub>	= ratio of gas volume to heat content of fuel (dscf/MMRtu)	=	9.570	dscf/MMRtu

O<sub>2</sub> = proportion of oxygen in the gas stream by volume (%) = 9.4 %
20.9 = oxygen content of ambient air (%) = 20.9 %

E<sub>Fd</sub> = lead emission rate - Fd-based (lb/MMBtu) = 1.2769E-06 lb/MMBtu

12. Lead emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^6}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

Where:

m <sub>n</sub>	= lead collected in sample (total µg)	=	2.2834	μg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	68.7570	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
10 <sup>6</sup>	= conversion factor (μg/g)	=	1.0E+06	µg/g
F <sub>c</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu

CO<sub>2</sub> = proportion of oxygen in the gas stream by volume (%) = 10.2 100 = conversion factor = 100

E<sub>Fc</sub> = lead emission rate - Fc-based (lb/MMBtu) = 1.3079E-06 lb/MMBtu

Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 1 FF Outlet

# USEPA Method 23 (PCDD/F) Sampling, Velocity and Moisture Sample Calculations

### Sample data taken from Run 1

30.20

in Ha

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 092112

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

 $V_{lc}$  = total volume of liquid collected in impingers and silica gel (ml) = 817.5 ml 0.04706 = ideal gas conversion factor (ft<sup>3</sup> water vapor/ml or gm) = 0.04706 ft<sup>3</sup>/ml  $V_{wstd}$  = volume of water vapor collected at standard conditions (ft<sup>3</sup>) = 38.47 ft<sup>3</sup>

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m) \left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

= harometric pressure (in Ha)

Where:

bar	- barometric pressure (m. rig)	_	30.20	III. I IY
T <sub>m</sub>	= average dry gas meter temperature (°F)	=	85.52	°F
V <sub>m</sub>	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	146.57	dcf
$Y_d$	= gas meter correction factor (dimensionless)	=	0.9916	
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.13	in. H <sub>2</sub> O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$V_{mstd}$	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	142.320	dscf

3. Sample gas pressure (in. Hg)

$$P_{s} = P_{bar} + \left(\frac{P_{g}}{13.6}\right)$$

Where:

$$P_{bar}$$
 = barometric pressure (in. Hg) = 30.20 in. Hg  
 $P_{g}$  = sample gas static pressure (in. H<sub>2</sub>O) = -10.40 in. H<sub>2</sub>O  
13.6 = conversion factor (in. H<sub>2</sub>O/in. Hg) = 13.6 in. H<sub>2</sub>O/in. Hg

P<sub>s</sub> = absolute sample gas pressure (in. Hg) = 29.44 in. Hg

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4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

$$P_{\nu} = \frac{e^{\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_{s} - 32) + 273.15 - 46.13}\right)}}{25.4}$$

Where:

$T_s$	= average sample gas temperature (°F)	=	301.20	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
$P_{v}$	= vapor pressure, actual (in. Hg)	=	29.44	in. Hg

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_{\nu} = P_{s}$$

Where:

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

Where:

V<sub>mstd</sub> = volume of gas sampled through the dry gas meter at standard = 142.320 dscf conditions (dscf)

V<sub>wstd</sub> = volume of water collected at standard conditions (scf) = 38.47 scf

Description of the state of the

B<sub>wo</sub> = proportion of water measured in the gas stream by volume = 0.2128 = 21.28 %

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100.00

1.0000

80.21

%

%

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### 7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{I_{v}}{P_{s}}$$

Where:

 $P_{s} = \text{absolute sample gas pressure (in. Hg)} = 29.44 \quad \text{in. Hg}$ 
 $P_{v} = \text{water vapor pressure, actual (in. Hg)} = 29.44 \quad \text{in. Hg}$ 
 $P_{ws} = \text{proportion of water vapor in the gas stream by volume at}$ 

1.0000

# 8. Actual water vapor in gas (% by volume)

$$B_{w} = MINIMUM \left[B_{wo}, B_{ws}\right]$$

saturated conditions

Where:
B<sub>ws</sub> = proportion of water vapor in the gas stream by volume at

B<sub>wo</sub> = proportion of water measured in the gas stream by volume = 0.2128

B<sub>w</sub> = actual water vapor in gas = 0.2128 = 21.28 %

# 9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

saturated conditions

$$N_1 + CO = 100 - CO_1 - O_2$$

Where:

N<sub>2</sub>+CO

CO<sub>2</sub> = proportion of carbon dioxide in the gas stream by volume (%) = 10.3 %

O<sub>2</sub> = proportion of oxygen in the gas stream by volume (%) = 9.5 %

100 = conversion factor (%) = 100 %

= proportion of nitrogen and CO in the gas stream by volume (%) =

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### 10. Molecular weight of dry gas stream (lb/lb·mole)

$M_d$	$= \left(M_{CO_2}\right) \frac{\left(CO_2\right)}{\left(100\right)} + \left(M_{O_2}\right) \frac{\left(O_2\right)}{\left(100\right)} + \left(M_{N_2 + CO}\right) \frac{\left(N_2 + CO\right)}{\left(100\right)}$			
Where:				
M <sub>CO2</sub>	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M <sub>O2</sub>	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M <sub>N2+CO</sub>	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.3	%
$O_2$	= proportion of oxygen in the gas stream by volume (%)	=	9.5	%
N <sub>2</sub> +CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.2	%
100	= conversion factor (%)	=	100	·%
M <sub>d</sub>	= dry molecular weight of sample gas (lb/lb·mole)	=	30.02	lb/lb·mole

# 11. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

Where:				
B <sub>w</sub>	= proportion of water vapor in the gas stream by volume	=	0.2128	
M <sub>d</sub>	= dry molecular weight of sample gas (lb/lb mole)	=	30.02	lb/lb·mole
M <sub>H2O</sub>	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
• •			àa	
$M_s$	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.46	lb/lb·mole

# 12. Velocity of sample gas (ft/sec)

$V_s$	$= (K_p)(C_p) \sqrt{\sqrt{\Delta P}} \left( \sqrt{\frac{(\overline{T_s} + 460)}{(M_s)(P_s)}} \right)$
-------	-------------------------------------------------------------------------------------------------------

Where:				
Κ <sub>ρ</sub>	= velocity pressure constant	=	85.49	
C <sub>p</sub>	= pitot tube coefficient	=	0.83	
$M_s$	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.46	lb/lb·mole
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.44	in. Hg
$T_s$	= average sample gas temperature (°F)	=	301.20	°F
√∆P	= average square roots of velocity heads of sample gas (in. H <sub>2</sub> O)	=	0.665	√in. H₂O
460	= °F to °R conversion constant	=	460	
$V_s$	= sample gas velocity (ft/sec)	=	45.95	ft/sec

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13. Volumetric flow rate of sample gas at actual gas conditions (acfm)

$Q_a$	$= (60)(A_s)(V_s)$			
Where:				
$A_s$	= cross sectional area of sampling location (ft <sup>2</sup> )	=	64.00	ft <sup>2</sup>
$V_s$	= sample gas velocity (ft/sec)	=	45.95	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	176,448	acfm

14. Total flow of sample gas (scfm)

$$Q_s = (Q_a) \left(\frac{P_s}{29.92}\right) \left(\frac{68+460}{T_s+460}\right)$$

	(			
Where: Q <sub>a</sub>	= volumetric flow rate at actual conditions (acfm)	=	176,448	acfm
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.44	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
$T_s$	= average sample gas temperature (°F)	=	301.2	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
$Q_s$	= volumetric flow rate at standard conditions, wet basis (scfm)	=	120,409	scfm

15. Dry flow of sample gas (dscfm)

$$Q_{std} = (Q_s)(1 - B_w)$$

Where:

 $B_w$  = proportion of water vapor in the gas stream by volume = 0.2128  $Q_s$  = volumetric flow rate at standard conditions, wet basis (scfm) = 120,409 scfm  $Q_{std}$  = volumetric flow rate at standard conditions, dry basis (dscfm) = 94,787 dscfm

16. Dry flow of sample gas corrected to 7%O2 (dscfm)

$$Q_{sid7} = (Q_{sid}) \left( \frac{20.9 - O_2}{20.9 - 7} \right)$$

Where:

 $Q_{\text{std}}$ = volumetric flow rate at standard conditions, dry basis (dscfm) 94,787 dscfm  $O_2$ = proportion of oxygen in the gas stream by volume (%) 9.5 % 20.9 = oxygen content of ambient air (%) 20.9 % = oxygen content of corrected gas (%) 7.0 % = volumetric flow rate at STP and 7%O2, dry basis (dscfm) Q<sub>std7</sub> 77,466 dscfm

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# 17. Hourly time basis conversion of volumetric flow rate ( $Q_{\text{std}}$ example)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

Q <sub>std-min</sub> 60	<ul> <li>volumetric flow rate, english units (ft³/min)</li> <li>conversion factor (min/hr)</li> </ul>	=	94,787 60	dscfm min/hr
Q <sub>std-hr</sub>	= volumetric flow rate, hourly basis (dscf/hr)	=	5,687,202	dscf/hr

# 18. Metric Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{sid-metric} = \left(Q_{sid-english}\right) \left(\frac{60}{35.31}\right)$$

Where:

Q <sub>std-english</sub>	<ul> <li>volumetric flow rate, english units (ft³/min)</li> <li>conversion factor (ft³/m³)</li> <li>conversion factor (min/hr)</li> </ul>	=	94,787	dscfm
35.31		=	35.31	ft <sup>3</sup> /m <sup>3</sup>
60		=	60	min/hr
Q <sub>std-metric</sub>	= volumetric flow rate, metric units (m³/hr)	=	161,065	dry std m <sup>3</sup> /hr

# 19. Standard to Normal Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{Normal} = \left(Q_{sid-metric}\right) \left(\frac{32+460}{68+460}\right)$$

Where:

Q<sub>Normal</sub>

Q <sub>std-metric</sub>	= volumetric flow rate, metric units (dry std m³/hr)	=	161,065	dry std m³/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q <sub>Normal</sub>	= volumetric flow rate, metric units (dry Nm³/hr)	=	150,083	dry Nm³/hr

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# 20. Percent isokinetic (%)

7	$= (0.09450)(\overline{T_s} + 460)(V_{mstd})$
1	$= \frac{1}{(P_s)(V_s)\left(\frac{(D_n)^2(\pi)}{(144)(4)}\right)(\Theta)(1-B_w)}$

Where:				
$D_n$	= diameter of nozzle (in)	==	0.266	in.
₿ <sub>w</sub>	= proportion of water vapor in the gas stream by volume	=	0.2128	
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.44	in. Hg
Ts	= average sample gas temperature (°F)	=	301.2	°F
V <sub>mstd</sub>	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	142.320	dscf
$V_s$	= sample gas velocity (ft/sec)	=	45.95	ft/sec
θ	= total sampling time (min)	=	250	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
1	= percent of isokinetic sampling (%)	=	99.66	%

# 21. Alternative Method 5 Post-Test Meter Calibration Factor

$$Y_{qa} = \frac{\Theta}{V_m} \sqrt{\frac{(0.0319)(T_m + 460)(28.96)}{(\Delta H_{\oplus})(P_{bor} + \frac{\Delta H}{13.6})(M_d)}} (\sqrt{\Delta H})_{avg}$$

	15.0			
Where:				
θ	= total sampling time (min)	=	250	min
V <sub>m</sub>	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	146.57	dcf
T <sub>m</sub>	= average dry gas meter temperature (°F)	=	85.52	°F
$\Delta H_{\mathbf{@}}$	= dry gas meter orifice coefficient	=	1.8053	
$P_{bar}$	= barometric pressure (in. Hg)	=	30.20	in. Hg
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.128	in. H₂O
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)	=	30.02	lb/lb mole
√∆H <sub>avg</sub>	= average of square root of pressure drop across meter orifice	=	1.056	√in. H₂O
0.0319	= conversion constant	=	0.0319	
28.96	= molecular weight of ambient air (lb/lb-mole)	=	28.96	lb/lb-mole
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$Y_{qa}$	= alternative Method 5 post-test meter calibration factor	=	0.9984	

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# USEPA Method 23 PCDD/PCDF Emissions Calculations

### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: PCDD/F results may be presented in two formats - normally expected levels and the maximum possible levels. In the normal case, data classified as ND (non-detect) or EMPC (estimated maximum possible concentration) are not counted. In the maximum possible emissions case, NDs and EMPCs are fully counted.

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			Normal Case (ND & EMPC = 0)		Maximum Case	
<ol> <li>TEQ concentral</li> </ol>	tion (ng/dscm)					
$C_{sd}$	$= \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right) \times 35.31$					
Where:						
$m_{n\_TEQ}$	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600E-01	ng
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm	35.31	dscf/dscm
$C_{sd}$	= PCDD/FTEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm
2. TEQ concentrat	tion (ng/Nm3 dry)					
$C_{sd}$	$= \left(\frac{m_{n\_7EQ}}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$					
Where:						
$m_{n\_TEQ}$	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600E-01	ng
$V_{mstd}$	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm	35.31	dscf/dscm
68	≈ standard temperature (°F)	=	68	°F	68	°F
32	= normal temperature (°F)	=	32	°F	32	°F
460	= °F to °R conversion constant	=	460		460	
$C_{\rm sd}$	= PCDD/F TEQ concentration (ng/Nm3 dry)	=	3.5412E-02	ng/Nm³ dry	3.6211E-02	ng/Nm³ dry
3. TEQ concentrat	tion at actual gas conditions (ng/acm example)					
$C_a$	$=C_{sd}\left(\frac{Q_{std}}{Q_a}\right)$					
Where:						
C <sub>sd</sub>	= PCDD/F TEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscm/h)	=	161,065	dry std m3/h	nr 161,065	dry std m3/hr
$Q_a$	= volumetric flow rate at actual conditions (acm/h)	=	299,827	actual m <sup>3</sup> /h	r 299,827	actual m³/hr
Ca	= PCDD/F TEQ concentration at actual gas conditions (ng/acm)	=	1.7726E-02	ng/acm	1.8126E-02	ng/acm

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#### 4. TEQ concentration corrected to x% O2 (ng/dscm example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

C <sub>sd</sub>	= PCDD/F TEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm
×	= oxygen content of corrected gas (%)	=	7.0	%	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.5	%	9.5	%
20.9	= oxygen content of ambient air (%)	=	20.9	%	20.9	%

 $C_{\text{edx}}$  = PCDD/F TEQ concentration (ng/dscm corrected to x%  $O_2$ ) = 4.0376E-02 ng/dscm @ 4.1286E-02 ng/dscm @ x%  $O_2$ 

### 5. TEQ concentration corrected to y% CO2 (ng/dscm example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

Csd	= PCDD/F TEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm
у	= carbon dioxide content of corrected gas (%)	=	12.0	%	12.0	%
CO₂	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.3	%	10.3	%
$C_{\text{edy}}$	= PCDD/F TEQ concentration (ng/dscm corrected to y% CO <sub>2</sub> )	=	3.8631E-02	ng/dscm @	3.9503E-02	ng/dscm @
				y% CO <sub>2</sub>		v% CO2

6. TEQ Emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_{n-TEQ}}{V_{mstd}}\right) (2.205 \times 10^{-3}) (Q_{std}) \frac{(60)}{(10^{9})}$$

Where:

m <sub>n_TEQ</sub>	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600E-01	ng
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	. =	2.205E-03	lb/g	2.205E-03	lb/g
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,787	dscfm	94,787	dscfm
60	= conversion factor (min/hr)	=	60	min/hr	60	min/hr
10 <sup>9</sup>	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E <sub>lb/hr</sub>	= PCDDF TEQ Emission rate (lb/hr)	=	1.1719E-08	lb/hr	1.1983E-08	lb/hr

# 7. TEQ Emission rate (g/sec)

$$E_{g/\text{sec}} = \left(\frac{m_{n_{\text{T}}}}{V_{\text{mxid}}}\right) \left(\frac{Q_{\text{sid}}}{60 \times 10^{-9}}\right)$$

Where:

E <sub>g/sec</sub>	= PCDDF TEQ Emission rate (g/sec)	=	1.4763E-09	g/sec	1.5096E-09	g/sec
10 <sup>9</sup>	= conversion factor to convert from ng to grams	=	1,0E+09	ng/g	1.0E+09	ng/g
60	= conversion factor (sec/min)	=	60	sec/min	60	sec/min
Q <sub>etd</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,787	dscfm	94,787	dscfm
$V_{mstd}$	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
m <sub>n_TEQ</sub>	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600€-01	ng

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•	•	•	•	

8.

. TEQ emission rate	(Ton/yr)		2)
F	$-\left[\begin{array}{c} m_{n\_TEQ} \end{array}\right]$	γ 2.205×10°	$\frac{1}{2}$ $\frac{1}{2}$
$E_{T/yr}$	$=$ $V_{msid}$	109	$\frac{-3}{2}$ $Q_{std}$ )(60) $\left(\frac{Cap}{2000}\right)$
	msia	/\	/ (/

Where:						
m <sub>n_TEQ</sub>	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600E-01	ng
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,787	dscfm	94,787	dscfm
60	= conversion factor (min/hr)	=	60	min/hr	60	min/hr
Сар	= capacity factor for process (hours operated/year)	=	8,760	hours/yr	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2,000	lb/Ton	2,000	lb/Ton
10 <sup>9</sup>	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E <sub>T/yr</sub>	= PCDDF TEQ Emission rate (Ton/yr)	=	5.1329E-08	Ton/yr	5.2487E-08	Ton/yr

# 9. TEQ emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^{9}}\right) (F_d) \left(\frac{20.9}{20.9 - O_2}\right)$$

$m_{n\_TEQ}$	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600E-01	ng
$V_{mstd}$	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
F₫	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu	9,570	dscf/MMBtu
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.5	%	9.5	%
20.9	= oxygen content of amblent air (%)	=	20.9	%	20.9	%
10°	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E <sub>Fd</sub>	= PCDDF TEQ Emission rate (lb/MMBtu)	=	3.6280E-11	lb/MMBtu	3.7099E-11	lb/MMBtu

10. TEQ emission rate - Fc-based (lb/MMBtu) 
$$E_{Fc} = \left(\frac{m_{n\_TEQ}}{V_{\it mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{10^9}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

### Where:

TTITE C.						
m <sub>n_TEQ</sub>	= total TEQ mass for PCDDs and PCDFs (ng)	=	1.3300E-01	ng	1.3600E-01	ng
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	142.3205	dscf	142.3205	dscf
2.205 x 10	3 = conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
F。	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.3	%	10.3	%
100	= conversion factor	=	100		100	
10 <sup>9</sup>	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E <sub>Fc</sub>	= PCDDF TEQ Emission rate (lb/MMBtu)	=	3.6588E-11	lb/MMBtu	3.7413E-11	lb/MMBtu

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# USEPA Method 13B (Total Fluorides) Sampling, Velocity and Moisture Sample Calculations

### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

 $V_{lc}$  = total volume of liquid collected in impingers and silica gel (ml) = 220.6 ml 0.04706 = ideal gas conversion factor (ft<sup>3</sup> water vapor/ml or gm) = 0.04706 ft<sup>3</sup>/ml  $V_{wstd}$  = volume of water vapor collected at standard conditions (ft<sup>3</sup>) = 10.38 ft<sup>3</sup>

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)(P_{bar} + \frac{\Delta H}{13.6})(Y_d)}{(460 + T_m)}$$

Where:

$P_{bar}$	= barometric pressure (in. Hg)	=	30.10	in. Hg
$T_{m}$	= average dry gas meter temperature (°F)	=	71.00	°F
V <sub>m</sub>	<ul> <li>volume of gas sample through the dry gas meter at meter conditions (dcf)</li> </ul>	=	37.86	dcf
$Y_d$	= gas meter correction factor (dimensionless)	=	0.9916	
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.23	in. H₂O
17.64	<ul><li>standard temperature to pressure ratio (°R/in. Hg)</li></ul>	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
V <sub>mstd</sub>	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	37.647	dscf

3. Sample gas pressure (in. Hg)

$$P_{s} = P_{bar} + \left(\frac{P_{g}}{13.6}\right)$$

Where:

P <sub>bar</sub>	= barometric pressure (in. Hg)	=	30.10	in. Hg
Pa	= sample gas static pressure (in. H <sub>2</sub> O)	=	-12.00	in. H₂O
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	==	13.6	in. H₂O/in. Hg

P<sub>s</sub> = absolute sample gas pressure (in. Hg) = 29.22 in. Hg

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29.22

37.647

in. Hg

dscf

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4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

	$\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_s - 32) + 273.15 - 46.13}\right)$
$P_{\nu}$ =	25.4

vvnere:				
T <sub>s</sub>	= average sample gas temperature (°F)	=	293.08	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
$P_{v}$	= vapor pressure, actual (in. Hg)	=	29.22	in. Hg

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_{\nu}$$
 =  $P_{s}$  Where:  $P_{s}$  = absolute sample gas pressure (in. Hg) = 29.22 in. Hg  $P_{\nu}$  = water vapor pressure, actual (in. Hg) = 29.22 in. Hg

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{\left(V_{mstd} + V_{wstd}\right)}$$
 Where: 
$$V_{mstd} = \text{volume of gas sampled through the dry gas meter at standard conditions (dscf)}$$

= water vapor pressure, actual (in. Hg)

= volume of water collected at standard conditions (scf)  $V_{wstd}$ 10.38 scf

= proportion of water measured in the gas stream by volume 0.2162  $B_{wo}$ 21.62 %

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21.62

80.41

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# 7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_{v}}{P_{s}}$$
 Where:

$P_s$	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
$P_{v}$	= water vapor pressure, actual (in. Hg)	=	29.22	in. <b>H</b> g

# 8. Actual water vapor in gas (% by volume)

$$B_{w} = MINIMUM \left[B_{wo}, B_{ws}\right]$$

Where:

B <sub>ws</sub>	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000
B <sub>wo</sub>	= proportion of water measured in the gas stream by volume	=	0.2162
B <sub>w</sub>	= actual water vapor in gas	=	0.2162

# 9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

N<sub>2</sub>+CO

CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%
$O_2$	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
100	= conversion factor (%)	=	100	%

= proportion of nitrogen and CO in the gas stream by volume (%) =

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# 10. Molecular weight of dry gas stream (lb/lb·mole)

$M_d$	$= \left(M_{CO_2}\right) \frac{\left(CO_2\right)}{(100)} + \left(M_{O_2}\right) \frac{\left(O_2\right)}{(100)} + \left(M_{N_2 + CO}\right) \frac{\left(N_2 + CO\right)}{(100)}$			
Where:				
M <sub>CO2</sub>	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M <sub>O2</sub>	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M <sub>N2+CO</sub>	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
N <sub>2</sub> +CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.4	%
100	= conversion factor (%)	=	100	%
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)	=	30.01	lb/lb·mole

# 11. Molecular weight of sample gas (lb/lb-mole)

$$M_{s} = (M_{d})(1 - B_{w}) + (M_{H,O})(B_{w})$$

Where: 0.2162  $B_w$ = proportion of water vapor in the gas stream by volume  $M_d$ = dry molecular weight of sample gas (lb/lb·mole) 30.01 lb/lb·mole  $M_{H2O}$ = molecular weight of water (lb/lb·mole) 18.00 lb/lb·mole Мε = molecular weight of sample gas, wet basis (lb/lb·mole) 27.41 lb/lb-mole

# 12. Velocity of sample gas (ft/sec)

$$V_{s} = (K_{p})(C_{p})\sqrt{\sqrt{\Delta P}} \left(\sqrt{\frac{\overline{(T_{s} + 460)}}{(M_{s})(P_{s})}}\right)$$

Where:				
Κ <sub>p</sub>	= velocity pressure constant	=	85.49	
C <sub>p</sub>	= pitot tube coefficient	=	0.83	
M <sub>s</sub>	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.41	lb/lb·mole
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
$T_{s}$	= average sample gas temperature (°F)	=	293.08	°F
√∆P	= average square roots of velocity heads of sample gas (in. H <sub>2</sub> O)	=	0.679	√in. H₂O
460	= °F to °R conversion constant	=	460	
V.	= sample gas velocity (ff/sec)	=	46.42	ft/sec

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64.00

 $ft^2$ 

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13. Volumetric flow rate of sample gas at actual gas conditions (acfm)

$Q_{a}$	$= (60)(A_s)(V_s)$
Where:	
$A_s$	= cross sectional area of sampling location (ft²)
$V_s$	= sample gas velocity (ft/sec)

 $V_s$  = sample gas velocity (ft/sec) = 46.42 ft/sec 60 conversion factor (sec/min) = 60 sec/min

Q<sub>a</sub> = volumetric flow rate at actual conditions (acfm) = 178,264 acfm

14. Total flow of sample gas (scfm)

$$Q_s = (Q_a) \left(\frac{P_s}{29.92}\right) \left(\frac{68+460}{T_s+460}\right)$$

Where:

$Q_a$	= volumetric flow rate at actual conditions (acfm)	=	178,264	acfm
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
$T_s$	= average sample gas temperature (°F)	=	293.1	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	

Q<sub>s</sub> = volumetric flow rate at standard conditions, wet basis (scfm) = 122,051 scfm

15. Dry flow of sample gas (dscfm)

$$Q_{std} = (Q_s)(1 - B_w)$$

Where:

$B_w$	= proportion of water vapor in the gas stream by volume	=	0.2162	
$Q_s$	= volumetric flow rate at standard conditions, wet basis (scfm)	=	122,051	scfm

Q<sub>std</sub> = volumetric flow rate at standard conditions, dry basis (dscfm) = 95,670 dscfm

16. Dry flow of sample gas corrected to 7%O2 (dscfm)

$$Q_{sd7} = \left(Q_{sd}\right) \left(\frac{20.9 - O_2}{20.9 - 7}\right)$$

Where:

$Q_{std}$	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,670	dscfm
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
7	= oxygen content of corrected gas (%)	=	7.0	%

Q<sub>std7</sub> = volumetric flow rate at STP and 7%O<sub>2</sub>, dry basis (dscfm) = 79,426 dscfm

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5,740,172

dscf/hr

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# 17. Hourly time basis conversion of volumetric flow rate (Q<sub>std</sub> example)

= volumetric flow rate, hourly basis (dscf/hr)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

 $Q_{\text{std-hr}}$ 

Q<sub>std-min</sub> = volumetric flow rate, english units (ft³/min) = 95,670 dscfm 60 = conversion factor (min/hr) = 60 min/hr

# 18. Metric Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{std-metric} = \left(Q_{std-english}\right) \left(\frac{60}{35.31}\right)$$

Where:

 $\begin{array}{llll} Q_{\text{std-english}} & = \text{volumetric flow rate, english units (ft}^3/\text{min}) & = & 95,670 & \text{dscfm} \\ 35.31 & = & \text{conversion factor (ft}^3/\text{m}^3) & = & 35.31 & \text{ft}^3/\text{m}^3 \\ 60 & = & \text{conversion factor (min/hr)} & = & 60 & \text{min/hr} \\ \end{array}$ 

 $Q_{\text{std-metric}}$  = volumetric flow rate, metric units (m<sup>3</sup>/hr) = 162,565 dry std m<sup>3</sup>/hr

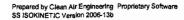
# 19. Standard to Normal Conversion of Gas Volumes (Q<sub>std</sub> example)

$$Q_{Normal} = \left(Q_{std-metric}\right) \left(\frac{32+460}{68+460}\right)$$

Where:

Qstd-metric= volumetric flow rate, metric units (dry std m³/hr)= 162,565dry std m³/hr32= normal temperature (°F)= 32°F68standard temperature (°F)= 68°F460= standard temperature in Rankine (68°F)= 460

Q<sub>Normal</sub> = volumetric flow rate, metric units (dry Nm³/hr) = 151,481 dry Nm³/hr





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# 20. Percent isokinetic (%)

,	$(0.09450)(\overline{T_s} + 460)(V_{mstd})$
,	$-\frac{1}{(P_s)(V_s)(\frac{(D_n)^2(\pi)}{(144)(4)})(\Theta)(1-B_w)}$

Where:				
$D_n$	= diameter of nozzle (in)	=	0.272	in.
B <sub>w</sub>	= proportion of water vapor in the gas stream by volume	=	0.2162	
$P_s$	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
$T_s$	= average sample gas temperature (°F)	=	293.1	°F
$V_{mstd}$	<ul> <li>volume of gas sample through the dry gas meter at standard conditions (dscf)</li> </ul>	=	37.647	dscf
Vs	= sample gas velocity (ft/sec)	=	46.42	ft/sec
θ	= total sampling time (min)	=	63	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
1	= percent of isokinetic sampling (%)	=	99.92	%

# 21. Alternative Method 5 Post-Test Meter Calibration Factor

$$Y_{qa} = \frac{\Theta}{V_m} \sqrt{\frac{(0.0319)(T_m + 460)(28.96)}{(\Delta H_{@})(P_{bar} + \frac{\Delta H}{13.6})(M_d)}} (\sqrt{\Delta H})_{avg}$$

Where:				
θ	= total sampling time (min)	=	63	min
V <sub>m</sub>	<ul> <li>volume of gas sample through the dry gas meter at meter conditions (dcf)</li> </ul>	=	37.86	dcf
$T_{m}$	= average dry gas meter temperature (°F)	=	71.00	°F
$\Delta H_{@}$	= dry gas meter orifice coefficient	=	1.8053	
P <sub>bar</sub>	= barometric pressure (in. Hg)	=	30.10	in. Hg
ΔН	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.231	in. H₂O
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)	=	30.01	lb/lb·mole
√∆H <sub>avg</sub>	= average of square root of pressure drop across meter orifice	=	1.106	√in. H₂O
0.0319	= conversion constant	=	0.0319	
28.96	= molecular weight of ambient air (lb/lb-mole)	=	28.96	lb/lb-mole *
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$Y_{qa}$	= alternative Method 5 post-test meter calibration factor	=	1.0001	

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# **USEPA Method 13B HF Analyte Calculations**

#### Sample data taken from Run 1

1.053

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

1. Fluoride to HF conversion factor

$$K_{HF} = \frac{MW_{HF}}{n \times MW_{F}}$$
Where:
$$MW_{HF} = \text{molecular weight of HF (mg/mg-mole)} = 20.006 \quad \text{mg/mg-mole}$$

$$MW_{F} = \text{molecular weight of fluoride ion (mg/mg-mole)} = 18.998 \quad \text{mg/mg-mole}$$

$$m = \text{molar ratio of fluoride to HF} = 1.0 \quad \text{mole F/mole HF}$$

2. Total HF collected (mg)

KHF

$m_{HF}$	$=K_{HF} \times \frac{(S_{F-1}v_1 + S_{F-2}v_2)}{1000}$			
Where:				
K <sub>HF</sub>	= conversion factor to convert mass F to mass HF	=	1.053	
S <sub>F-1</sub>	= fluoride concentration of sample fraction 1 (mg/liter)	=	<0.0060	mg/liter
<b>v</b> <sub>1</sub>	= liquid volume of sample fraction 1 (ml)	=	959.0	mi
S <sub>F-2</sub>	= fluoride concentration of sample fraction 2 (mg/liter)	=	0.0000	mg/liter
$V_2$	= liquid volume of sample fraction 2 (ml)	=	0.0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m <sub>HF</sub>	= total HF collected in sample (mg)  Note: Non-detects are treated as zero in summations.	=	<0.0061	mg

Fraction 1 = entire sample except last impinger containing applicable absorbing reagent.

= conversion factor to convert mass F to mass HF

Fraction 2 = last impinger containing applicable absorbing reagent, analyzed separately to evaluate collection efficiency. If entire sample is analyzed as a single fraction, then data is included as Fraction 1 (Fraction 2 = 0).

3. Allowable blank subtraction (mg)

$$m_b = K_{HF} \times B_F \times \frac{(v_1 + v_2)}{1000}$$
  
 $m_b = 0 \text{ if } B_F < MDL$ 

Where:

wilere.									
K <sub>HF</sub> B <sub>F</sub> V <sub>1</sub>	<ul> <li>conversion factor to convert mass F to mass HF</li> <li>fluoride concentration of blank (mg/liter)</li> <li>liquid volume of sample fraction 1 (ml)</li> </ul>	=======================================	1.053 <0.0060 959.0	mg/liter ml					
					V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0.0	ml
					1000	= conversion factor (ml/liter)	=	1000	ml/liter
m <sub>b</sub>	= allowable blank subtraction (mg)	=	0.0000	mg					
				5					

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#### 4. Total HF collected, corrected for blank (mg)

$$m_{nb} = m_{HF} - m_b$$

Where:

m <sub>HF</sub>	= total HF collected in sample (mg)	=	<0.0061	mg
$m_b$	= allowable blank subtraction (mg)	=	0.0000	mg

m<sub>nb</sub> = total HF collected, corrected for blank (mg) = <0.0061 mg

#### 5. Minimum detectable HF (mg)

$$m_{MDL} = K_{HF} \times MDL \times \frac{(v_1 + v_2)}{1000}$$

Where:

K <sub>HF</sub>	= conversion factor to convert mass F to mass HF	=	1.053	
MDL	= minimum detectable fluoride concentration	=	0.001	mg/liter
$V_1$	= liquid volume of sample fraction 1 (ml)	=	959.0	mi
V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0.0	mi
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m <sub>MDL</sub>	= minimum detectable HF (mg)	=	0.0010	mg

#### 6. Total HF value used in emission calculations (mg)

$$m_n = MAXIMUM [m_{nb} \ or < m_{MDL}]$$

Where:

Vhere: m <sub>nb</sub> m <sub>MDL</sub>	= total HF collected, corrected for blank (mg) = minimum detectable HF (mg)	=	<0.006 <b>1</b> 0.0010	mg mg
m <sub>n</sub>	= total HF value used in emission calculations (mg)	=	<0.0061	mg

# 7. Collection QC check (% mass collected in second fraction)

$$EFF = 100 \times \frac{K_{HF} \times S_{F-2} \times \frac{v_2}{1000}}{m_{HF}}$$

Where:

1110101					
K <sub>HF</sub>	= conversion factor to convert mass F to mass HF	=	1.053		
S <sub>F-2</sub>	= fluoride concentration of sample fraction 2 (mg/liter)	=	0.0000	mg/liter	
V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0.0	mi	
m <sub>HF</sub>	= total HF collected in sample (mg)	=	<0.0061	mg	
1000	= conversion factor (ml/liter)	=	1000	ml/liter	
100	= conversion factor	=	100	%	
FFF	= Collection QC check (% mass collected in second fraction)	=	0.00	%	

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USEPA Method 13B HF Sample Calculations

# USEPA Method 13B HF Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 092155 M N

1. HF concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right)$$

Where:

= total HF collected, corrected for applicable blank (mg) < 0.0061  $m_n$ mg  $V_{mstd}$ = volume metered, standard (dscf) 37.6474 dscf 2.205 x 10<sup>-3</sup> = conversion factor (lb/g) 2.205E-03 lb/g 1000 = conversion factor (mg/g) 1,000 mg/g

C<sub>sd</sub> = HF concentration (lb/dscf) = <3.5487E-10 lb/dscf

2. HF concentration (ppmdv)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{0.850}{1000}\right) \left(\frac{10^6}{MW}\right)$$

Where:

= total HF collected, corrected for applicable blank (mg) < 0.0061  $m_n$ mg  $V_{mstd}$ = volume metered, standard (dscf) 37.6474 dscf MW = molecular weight of HF (g/g-mole) 20.006 g/g-mole 0.850 = conversion factor (dscf/g-mole) 0.850 dscf/g-mole 1000 = conversion factor (mg/g) 1,000 mg/g  $10^{6}$ = conversion factor (ppm) 10<sup>6</sup> ppm  $C_{sd}$ = HF concentration (ppmdv) <0.0068 ppmdv

3. HF concentration (ppmwv)

$$C_{w} = C_{sd} \left( 1 - \frac{B_{w}}{100} \right)$$

Where:

C<sub>w</sub> = HF concentration (ppmwv) = <0.0054 ppmwv

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#### 4. HF concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31)$$

Where:

m <sub>n</sub>	= total HF collected, corrected for applicable blank (mg)	=	< 0.0061	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	37.6474	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm

 $C_{sd}$  = HF concentration (mg/dscm) = <0.0057 mg/dscm

# 5. HF concentration (mg/Nm<sup>3</sup> dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$$

Where:

m <sub>n</sub>	= total HF collected, corrected for applicable blank (mg)	=	< 0.0061	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	37.6474	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = HF concentration (mg/Nm<sup>3</sup> dry) = <0.0061 mg/Nm<sup>3</sup> dry

# 6. HF concentration corrected to x% O2 (ppmdv example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

$C_{sd}$	= HF concentration (ppmdv)	=	<0.0068	ppmdv
x	= oxygen content of corrected gas (%)	. =	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

 $C_{sdx}$  = HF concentration corrected to  $x\%O_2$  (ppmdv) = <0.0082 ppmdv @  $x\%O_2$ 

# 7. HF concentration corrected to y% CO<sub>2</sub> (ppmdv example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

C <sub>sd</sub>	= HF concentration (ppmdv)	=	<0.0068	ppmdv
у	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.2	%

 $C_{sdy}$  = HF concentration corrected to  $y\%CO_2$  (ppmdv) = <0.0080 ppmdv @  $y\%CO_2$ 

# 12. HF rate - F<sub>d</sub>-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) \left(F_d\right) \left(\frac{20.9}{20.9 - O_2}\right)$$

# Where:

m <sub>n</sub>	= total HF collected, corrected for applicable blank (mg)	=	< 0.0061	mg
V <sub>mstq</sub>	= volume metered, standard (dscf)	=	37.6474	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F₀	≈ ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%

20.9 = oxygen content of ambient air (%) = 20.9 %

 $E_{Fd}$  = HF rate (lb/MMBtu) = <6.1507E-06 lb/MMBtu

# 13. HF rate - F<sub>c</sub>-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

# Where:

m <sub>n</sub>	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	mg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	37.6474	dscf
$2.205 \times 10^{-3}$	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F <sub>c</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	

 $E_{Fc}$  = HF rate (lb/MMBtu) = <6.3135E-06 lb/MMBtu

# 14. HF rate - Heat Input-based (lb/MMBtu)

$$E_{Hi} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) \left(\frac{(Q_{std})(60)}{H_i}\right)$$

#### Where:

m <sub>n</sub>	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	37.6474	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
Q <sub>std</sub>	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,670	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
H,	= actual heat input (MMBtu/hr)	=		MMBtu/hr

E<sub>Hi</sub> = HF rate (lb/MMBtu) = N/A lb/MMBtu

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Unit 1 SDA Inlet

# **USEPA Method 26A (HCI)** Sampling, Velocity and Moisture Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 102810

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

 $V_{lc}$ = total volume of liquid collected in impingers and silica gel (ml) 157.0 ml 0.04706 = ideal gas conversion factor (ft³ water vapor/ml or gm) 0.04706 ft3/ml  $V_{\text{wstd}}$  $ft^3$ = volume of water vapor collected at standard conditions (ft<sup>3</sup>) 7.39

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P <sub>bar</sub>	= barometric pressure (in. Hg)	=	30.20	in. Hg
$T_{m}$	= average dry gas meter temperature (°F)	=	81.04	°F
$V_{m}$	<ul> <li>volume of gas sample through the dry gas meter at meter conditions (dcf)</li> </ul>	=	33.56	dcf
$Y_d$	= gas meter correction factor (dimensionless)	=	0.9992	
ΔΗ	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.09	in. H₂O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H₂O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
$V_{mstd}$	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	33.105	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

Çy.

P <sub>bar</sub>	<ul> <li>barometric pressure (in. Hg)</li> <li>sample gas static pressure (in. H<sub>2</sub>O)</li> <li>conversion factor (in. H<sub>2</sub>O/in. Hg)</li> </ul>	=	30.20	in. Hg
P <sub>g</sub>		=	-1.30	in. H₂O
13.6		=	13.6	in. H₂O/in. Hg
P <sub>s</sub>	= absolute sample gas pressure (in. Hg)	=	30.10	in, Hg

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#### 4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

_	$e^{\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_s - 32) + 273.15 - 46.12}\right)}$	<del>,</del>
$P_{\nu}$	=25.4	_

Where:				
T <sub>s</sub>	= average sample gas temperature (°F)	=	492.33	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
$P_{v}$	= vapor pressure, actual (in. Hg)	=	30.10	in. Hg

#### 5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_{\nu}$$
 =  $P_{s}$  Where:
 $P_{s}$  = absolute sample gas pressure (in. Hg) = 30.10 in. Hg
 $P_{\nu}$  = water vapor pressure, actual (in. Hg) = 30.10 in. Hg

# 6. Moisture measured in sample (% by volume)

$$B_{wo}$$
 =  $\frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$ 

Where:

 $V_{mstd}$  = volume of gas sampled through the dry gas meter at standard = 33.105 dscf conditions (dscf)

 $V_{wstd}$  = volume of water collected at standard conditions (scf) = 7.39 scf

 $E_{wo}$  = proportion of water measured in the gas stream by volume = 0.1825 = 18.25 %

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18.25

%

Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 1 SDA Inlet

#### 7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_{v}}{P_{s}}$$

Where:

$P_s$	= absolute sample gas pressure (in. Hg)	=	30.10	in. Hg
$P_{v}$	= water vapor pressure, actual (in. Hg)	=	30.10	in. Hg

B<sub>ws</sub> = proportion of water vapor in the gas stream by volume at saturated conditions = 1.0000 %

# 8. Actual water vapor in gas (% by volume)

$$B_{w} = MINIMUM [B_{wo}, B_{ws}]$$

Where:

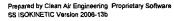
B <sub>ws</sub>	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B <sub>wo</sub>	= proportion of water measured in the gas stream by volume	=	0.1825	
B <sub>w</sub>	= actual water vapor in gas	=	0.1825	

# 9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.4	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	8.0	%
100	= conversion factor (%)	=	100	%
N₂+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.59	%



Unit 1 SDA Inlet

# 10. Molecular weight of dry gas stream (lb/lb mole)

$M_d$	$= \left(M_{CO_2}\right) \frac{\left(CO_2\right)}{\left(100\right)} + \left(M_{O_2}\right) \frac{\left(O_2\right)}{\left(100\right)} + \left(M_{N_2 + CO}\right) \frac{\left(N_2 + CO\right)}{\left(100\right)}$			
Where:				
M <sub>CO2</sub>	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M <sub>O2</sub>	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M <sub>N2+CO</sub>	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.4	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	8.0	%
N <sub>2</sub> +CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.6	%
100	= conversion factor (%)	=	100	%
M <sub>d</sub>	= dry molecular weight of sample gas (lb/lb·mole)	=	30.15	lb/lb·mole

# 11. Molecular weight of sample gas (lb/lb-mole)

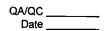
$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

W	ha	
VΥ	IIC	ΙС.

B <sub>w</sub>	= proportion of water vapor in the gas stream by volume	=	0.1825 30.15	lle/lle esole
M <sub>d</sub> M <sub>H2O</sub>	<ul><li>= dry molecular weight of sample gas (lb/lb·mole)</li><li>= molecular weight of water (lb/lb·mole)</li></ul>	=	18.00	lb/lb·mole lb/lb·mole
$M_s$	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.93	lb/lb·mole

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# USEPA Method 26A HCI Analyte Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041509 102810

#### 1. Chloride to HCl conversion factor

K HCI	$=\frac{MW_{\cdot HCl}}{n \times MW_{\cdot Cl}}$			
Where:	G			
MW <sub>HCI</sub>	= molecular weight of HCl (mg/mg-mole)	=	36.461	mg/mg-mole
MW <sub>CI</sub> -	= molecular weight of chloride ion (mg/mg-mole)	=	35.453	mg/mg-mole
n	= molar ratio of chloride to HCI	=	1.0	mole Cl/mole HCl
Кна	= conversion factor to convert mass Cl to mass HCl	=	1.028	

# 2. Total HCl collected (mg)

	$(S_{-}, v_{+}S_{-}, v_{-})$			
$m_{\!HCl}$	$=K_{HCI} \times \frac{\left(S_{CI-1}v_1 + S_{CI-2}v_2\right)}{1000}$			
Where:	2000			
K <sub>HCI</sub>	= conversion factor to convert mass Cl* to mass HCl	=	1.028	
S <sub>CF1</sub>	= chloride concentration of sample fraction 1 (mg/liter)	=	818.0100	mg/liter
V <sub>1</sub>	= liquid volume of sample fraction 1 (ml)	=	706.0	mi
S <sub>CI-2</sub>	= chloride concentration of sample fraction 2 (mg/liter)	=	0.0000	mg/liter
V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	`=	0.0	m!
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m <sub>HCI</sub>	= total HCl collected in sample (mg)	=	593,6855	mg
	Note: Non-detects are treated as zero in summations.			

#### DEFINITION

Fraction 1 = entire sample except last impinger containing applicable absorbing reagent.

Fraction 2 = last impinger containing applicable absorbing reagent, analyzed separately to evaluate collection efficiency. If entire sample is analyzed as a single fraction, then data is included as Fraction 1 (Fraction 2 = 0).

# 3. Allowable blank subtraction (mg)

$$m_b$$
 =  $K_{HCl} \times B_{Cl} \times \frac{(v_1 + v_2)}{1000}$   
 $m_b$  = 0 if  $B_{Cl} < MDL$ 

Where:

K <sub>HCI</sub>	= conversion factor to convert mass Cl' to mass HCl	=	1.0280	
B <sub>CI</sub>	= chloride concentration of blank (mg/liter)	=	<0.1	mg/liter
V <sub>1</sub>	= liquid volume of sample fraction 1 (ml)	=	706.0	ml
V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000.0000	ml/liter
m.	= allowable blank subtraction (mg)	=	0.0000	ma

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Unit 1 SDA Inlet

#### 4. Total HCI collected, corrected for blank (mg)

$$m_{nb} = m_{HCl} - m_b$$

Where:

m <sub>HCl</sub>	= total HCl collected in sample (mg)	=	593.6855	mg
$m_b$	= allowable blank subtraction (mg)	=	0.0000	mg

 $m_{nb}$  = total HCl collected, corrected for blank (mg) = 593.6854817 mg

#### 5. Minimum detectable HCI (mg)

$$m_{MDL} = K_{HCl} \times MDL \times \frac{(v_1 + v_2)}{1000}$$

Where:

K <sub>HCI</sub>	= conversion factor to convert mass Cl to mass HCl	=	1.028	
MDL	= minimum detectable chloride concentration	=	0.0	mg/liter
<b>V</b> <sub>1</sub>	= liquid volume of sample fraction 1 (ml)	2	706.0	mi
<b>v</b> <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m <sub>MDL</sub>	= minimum detectable HCI (mg)	=	0.010160752	mg

#### 6. Total HCl value used in emission calculations (mg)

$$m_n = MAXIMUM [m_{nb} \ or \ < m_{MDL}]$$

Where:

 $m_{nb}$  = total HCl collected, corrected for blank (mg) = 593.6855 mg  $m_{MOL}$  = minimum detectable HCl (mg) = 0.010160752 mg

m<sub>n</sub> = total HCl value used in emission calculations (mg) = 593.6854817 mg

# 7. Collection QC check (% mass collected in second fraction)

$$EFF = 100 \times \frac{K_{HCl} \times S_{Cl-2} \times \frac{v_2}{1000}}{m_{HCl}}$$

Where:

K <sub>HCl</sub> S <sub>Cl-2</sub> v <sub>2</sub>	<ul> <li>conversion factor to convert mass Ci to mass HCI</li> <li>chloride concentration of sample fraction 2 (mg/liter)</li> <li>liquid volume of sample fraction 2 (ml)</li> </ul>	= =	1.0280 0.0 0.0000	mg/liter ml
m <sub>HCI</sub> 1000	= total HCl collected in sample (mg) = conversion factor (ml/liter)  100 = conversion factor	= =	594 1000 100	mg ml/liter %

EFF = Collection QC check (% mass collected in second fraction) = 0 %

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# USEPA Method 26A HCI Sample Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. HCl concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right)$$

Where:

= total HCl collected, corrected for applicable blank (mg) 593.6855  $m_n$ mg  $V_{\text{mstd}}$ = volume metered, standard (dscf) 33.1054 dscf  $2.205 \times 10^{-3}$ = conversion factor (lb/g) 2.205E-03 lb/g 1000 = conversion factor (mg/g) 1,000 mg/g

 $C_{sd}$  = HCl concentration (lb/dscf) = 3.9543E-05 lb/dscf

2. HCl concentration (ppmdv)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{0.850}{1000}\right) \left(\frac{10^6}{MW}\right)$$

Where:

m <sub>n</sub>	<ul> <li>total HCl collected, corrected for applicable blank (mg)</li> </ul>	=	593.6855	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	33.1054	dscf
MW	= molecular weight of HCl (g/g-mole)	=	36.461	g/g-mole
0.850	= conversion factor (dscf/g-mole)	=	0.850	dscf/g-mole
1000	= conversion factor (mg/g)	=	1,000	mg/g
10 <sup>6</sup>	= conversion factor (ppm)	=	10 <sup>6</sup>	ppm
$C_{\sf sd}$	= HCl concentration (ppmdv)	=	418.0693	ppmdv

3. HCI concentration (ppmwv)

$$C_{w} = C_{sd} \left( 1 - \frac{B_{w}}{100} \right)$$

Where:

 $C_{sd}$  = HCI concentration (ppmdv) = 418.0693 ppmdv  $B_{w}$  = actual water vapor in gas (% v/v) = 18.2458 % v/v 100 = conversion factor (%) = 100 %

C<sub>w</sub> = HCl concentration (ppmwv) = 341.7892 ppmwv

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_ 4. HCl concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31)$$

Where:

m <sub>n</sub>	<ul> <li>total HCl collected, corrected for applicable blank (mg)</li> </ul>	=	593.6855	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	33.1054	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm

 $C_{sd}$  = HCl concentration (mg/dscm) = 633.2215 mg/dscm

5. HCl concentration (mg/Nm<sup>3</sup> dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$$

Where:

mn	= total HCl collected, corrected for applicable blank (mg)	=	593.6855	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	33.1054	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = HCl concentration (mg/Nm<sup>3</sup> dry) = 679.5548 mg/Nm<sup>3</sup> dry

6. HCl concentration corrected to x% O2 (ppmdv example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

$C_{sd}$	= HCl concentration (ppmdv)	=	418.0693	ppmdv
×	= oxygen content of corrected gas (%)	=	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	8.0	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

 $C_{\text{sdx}}$  = HCl concentration corrected to  $x\%O_2$  (ppmdv) = 450.4778 ppmdv @  $x\%O_2$ 

7. HCl concentration corrected to y% CO<sub>2</sub> (ppmdv example)

$$C_{sdy}$$
 =  $C_{sd} \left( \frac{y}{CO_2} \right)$ 

Where:

C<sub>sd</sub> = HCl concentration (ppmdv) = 418.0693 ppmdv y = carbon dioxide content of corrected gas (%) = 12.0 % CO<sub>2</sub> = proportion of carbon dioxide in the gas stream by volume (%) = 11.4 %

 $C_{sdy}$  = HCl concentration corrected to y%CO2 (ppmdv) = 439.6873 ppmdv @ y%CO<sub>2</sub>

Prepared by Clean Air Engineering Proprietary Software SS EPA28-1 Version 2008-10a (CI) 8. HCl rate - F<sub>d</sub>-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) \left(F_d\right) \left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m <sub>n</sub>	= total HCl collected, corrected for applicable blank (mg)	==	593.6855	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	33.1054	dscf
$2.205 \times 10^{-3}$	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F₀	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
_				**

O<sub>2</sub> = proportion of oxygen in the gas stream by volume (%) = 8.0 % 20.9 = oxygen content of ambient air (%) = 20.9 %

 $E_{Fd}$  = HCI rate (lb/MMBtu) = 6.1311E-01 lb/MMBtu

9. HCl rate - F<sub>c</sub>-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

Where:

m <sub>n</sub>		=	593.6855	mg
$V_{\sf mstd}$	= volume metered, standard (dscf)	=	33.1054	dscf
2.205 x 10 <sup>-3</sup>	≃ conversion factor (lb/g)	=	2.205E-03	lb/g
1000	≈ conversion factor (mg/g)	=	1,000	mg/g
Fc	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	11.4	%
100	= conversion factor	=	100	

 $E_{Fc}$  = HCl rate (lb/MMBtu) = 6.3074E-01 lb/MMBtu

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Unit 1 FF Outlet

# EPA Modified Method 26A (HCI) Sampling, Velocity and Moisture Sample Calculations

#### Sample data taken from Run 1

30.20

in. Hg

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

 $V_{lc}$  = total volume of liquid collected in impingers and silica gel (ml) = 248.4 ml 0.04706 = ideal gas conversion factor (ft<sup>3</sup> water vapor/ml or gm) = 0.04706 ft<sup>3</sup>/ml

 $V_{wsld}$  = volume of water vapor collected at standard conditions (ft<sup>3</sup>) = 11.69 ft<sup>3</sup>

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)(P_{bar} + \frac{\Delta H}{13.6})(Y_d)}{(460 + T_m)}$$

= barometric pressure (in. Hg)

Where: P<sub>bar</sub>

T <sub>m</sub>	= average dry gas meter temperature (°F)	=	81.46	°F
V <sub>m</sub>	<ul> <li>volume of gas sample through the dry gas meter at meter conditions (dcf)</li> </ul>	=	40.68	dcf
$Y_d$	= gas meter correction factor (dimensionless)	=	0.9886	
$\Delta H$	= average pressure drop across meter box orifice (in. H <sub>2</sub> O)	=	1.50	in. H₂O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H <sub>2</sub> O/in. Hg)	=	13.6	in.H₂O/in. Hg
460	= °F to °R conversion constant	=	460	
V <sub>metd</sub>	= volume of gas sampled through the dry gas meter at standard	=	39.712	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

conditions (dscf)

Where:

 $P_{bar}$  = barometric pressure (in. Hg) = 30.20 in. Hg  $P_{g}$  = sample gas static pressure (in. H<sub>2</sub>O) = -10.40 in. H<sub>2</sub>O 13.6 = conversion factor (in. H<sub>2</sub>O/in. Hg) = 13.6 in. H<sub>2</sub>O/in. Hg

P<sub>s</sub> = absolute sample gas pressure (in. Hg) = 29.44 in. Hg

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Unit 1 FF Outlet

# 4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

_	$e^{\left(18.3036 - \frac{3816.44}{\frac{1}{9}(T_s - 32) + 273.15 - 46.13}\right)}$
$P_{\nu}$ =	25.4

Where:				
Ts	= average sample gas temperature (°F)	=	304.08	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°К
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P <sub>v</sub>	= vapor pressure, actual (in. Hg)	=	29.44	in. Hg

#### 5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_{v}$$
 =  $P_{s}$  Where:

 $P_{s}$  = absolute sample gas pressure (in. Hg) = 29.44 in. Hg

 $P_{v}$  = water vapor pressure, actual (in. Hg) = 29.44 in. Hg

# 6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{\left(V_{mstd} + V_{wstd}\right)}$$
Where:
$$V_{mstd} = \text{volume of gas sampled through the dry gas meter at standard} = 39.712 \text{ dscf conditions (dscf)}$$

$$V_{wstd} = \text{volume of water collected at standard conditions (scf)} = 11.69 \text{ scf}$$

$$B_{wo} = \text{proportion of water measured in the gas stream by volume} = 0.2274$$

$$= 22.74 \%$$

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Unit 1 FF Outlet

# 7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_{v}}{P_{s}}$$

Where:

$P_s$	= absolute sample gas pressure (in. Hg)	=	29.44	in. Hg
$P_{v}$	= water vapor pressure, actual (in. Hg)	=	29.44	in. Hg

B<sub>ws</sub> = proportion of water vapor in the gas stream by volume at 1.0000 saturated conditions = 100.00 %

# 8. Actual water vapor in gas (% by volume)

$$B_{w} = MINIMUM \left[ B_{wo}, B_{ws} \right]$$

Where:

 $B_{wo}$ 

$B_{ws}$	= proportion of water vapor in the gas stream by volume at	=	1.0000
	saturated conditions		

= proportion of water measured in the gas stream by volume = 0.2274

# 9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO <sub>2</sub> O <sub>2</sub> 100	<ul> <li>= proportion of carbon dioxide in the gas stream by volume (%)</li> <li>= proportion of oxygen in the gas stream by volume (%)</li> <li>= conversion factor (%)</li> </ul>	= =	10.4 9.2 100	% % %
N₂+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.40	%

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0.2274 30.03

18.00

lb/lb·mole

lb/lb·mole

Wheelabrator South Broward, Inc. Clean Air Project No: 10735

Unit 1 FF Outlet

# 10. Molecular weight of dry gas stream (lb/lb mole)

$M_{d}$	$= \left(M_{CO_2}\right) \frac{\left(CO_2\right)}{\left(100\right)} + \left(M_{O_2}\right) \frac{\left(O_2\right)}{\left(100\right)} + \left(M_{N_2 + CO}\right) \frac{\left(N_2 + CO\right)}{\left(100\right)}$			
Where:				
M <sub>CO2</sub>	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
$M_{O2}$	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M <sub>N2+CO</sub>	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.4	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
N <sub>2</sub> +CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.4	%
100	= conversion factor (%)	=	100	%
Md	= dry molecular weight of sample gas (lb/lb mole)	=	30.03	lb/lb·mole

# 11. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

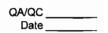
	•
Where:	
B <sub>w</sub>	= proportion of water vapor in the gas stream by volume
$M_d$	= dry molecular weight of sample gas (lb/lb·mole)
M <sub>H2O</sub>	= molecular weight of water (lb/lb·mole)

Мs = molecular weight of sample gas, wet basis (lb/lb·mole) 27.30 lb/lb·mole ·



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# EPA Modified Method 26A HCI Analyte Calculations

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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#### 1. Chloride to HCl conversion factor

$K_{HCI}$	$=\frac{MW_{HCl}}{n\times MW_{Cl}}$			
Where:	a			
MW <sub>HCI</sub>	= molecular weight of HCl (mg/mg-mole)	=	36.461	mg/mg-mole
MW <sub>CI</sub> -	= molecular weight of chloride ion (mg/mg-mole)	=	35.453	mg/mg-mole
n	= molar ratio of chloride to HCl	=	1.0	mole Cl/mole HCI
K <sub>HCI</sub>	= conversion factor to convert mass Cl* to mass HCt	=	1.028	

#### 2. Total HCI collected (mg)

$m_{\!\scriptscriptstyle HCl}$	$=K_{HCl} \times \frac{\left(S_{Cl-1}v_1 + S_{Cl-2}v_2\right)}{1000}$			•
Where:	1000			
K <sub>HCI</sub>	= conversion factor to convert mass Cl <sup>-</sup> to mass HCl	=	1.028	
S <sub>CF1</sub>	= chloride concentration of sample fraction 1 (mg/liter)	=	18.2000	mg/liter
V <sub>1</sub>	= liquid volume of sample fraction 1 (ml)	=	941.0	mi
S <sub>CI-2</sub>	= chloride concentration of sample fraction 2 (mg/liter)	=	0.0000	mg/liter
V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0.0	mi
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m <sub>HCI</sub>	= total HCl collected in sample (mg)	=	17.6057	mg
	Note: Non-detects are treated as zero in summations.			

#### DEFINITION

Fraction 1 = entire sample except last impinger containing applicable absorbing reagent.

Fraction 2 = last impinger containing applicable absorbing reagent, analyzed separately to evaluate collection efficiency. If entire sample is analyzed as a single fraction, then data is included as Fraction 1 (Fraction 2 = Q).

#### 3. Allowable blank subtraction (mg)

$$m_b = K_{HCl} \times B_{Cl} \times \frac{(v_1 + v_2)}{1000}$$
 $m_b = 0 \text{ if } B_{Cl} < MDL$ 

1111010.					
K <sub>HCI</sub>	= conversion factor to convert mass Cl to mass HCl	=	1.0280		
$\mathbf{B}_{Cl}$	= chloride concentration of blank (mg/liter)	=	<0.1	mg/liter	
V <sub>1</sub>	= liquid volume of sample fraction 1 (ml)	=	941.0	ml	
V <sub>2</sub>	= liquid volume of sample fraction 2 (ml)	=	0	ml	
1000	= conversion factor (ml/liter)	=	1000.0000	ml/liter	
m <sub>b</sub>	= allowable blank subtraction (mg)	=	0.0000	ma	

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_ 4. Total HCl collected, corrected for blank (mg)

$$m_{nb} = m_{HCl} - m_b$$

Where:

 $m_{HCI}$  = total HCI collected in sample (mg) = 17.6057 mg  $m_b$  = allowable blank subtraction (mg) = 0.0000 mg

m<sub>nb</sub> = total HCl collected, corrected for blank (mg) = 17.6057336 mg

5. Minimum detectable HCI (mg)

$$m_{MDL} = K_{HCl} \times MDL \times \frac{(v_1 + v_2)}{1000}$$

Where:

1.028 K<sub>HCI</sub> = conversion factor to convert mass Cl\* to mass HCl MDL = minimum detectable chloride concentration 0.0 mg/liter = liquid volume of sample fraction 1 (ml) 941.0 V٦ ml = liquid volume of sample fraction 2 (ml) 0 ml ٧2 1000 = conversion factor (ml/liter) 1000 ml/liter

 $m_{MDL}$  = minimum detectable HCI (mg) = 0.013542872 mg

6. Total HCl value used in emission calculations (mg)

$$m_n = MAXIMUM [m_{nb} \ or \ < m_{MDL}]$$

Where:

 $m_{nb}$  = total HCl collected, corrected for blank (mg) = 17.6057 mg  $m_{MDL}$  = minimum detectable HCl (mg) = 0.013542872 mg

m<sub>n</sub> = total HCI value used in emission calculations (mg) = 17.6057336 mg

7. Collection QC check (% mass collected in second fraction)

$$EFF = 100 \times \frac{K_{HCl} \times S_{Cl-2} \times \frac{v_2}{1000}}{m_{HCl}}$$

Where:

K<sub>HC1</sub> = conversion factor to convert mass Cl to mass HCl 1.0280  $S_{\text{CI-2}}$ = chloride concentration of sample fraction 2 (mg/liter) 0.0 mg/liter = liquid volume of sample fraction 2 (ml) 0.0000 ml V<sub>2</sub> = total HCI collected in sample (mg) 18 MHCI 1000 = conversion factor (ml/liter) 1000 m!/liter 100 = conversion factor 100

EFF = Collection QC check (% mass collected in second fraction) = 0 %

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# **EPA Modified Method 26A HCI Sample Calculations**

#### Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

> 041509 102856 0.0

# 1. HCI concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right)$$

#### Where:

m <sub>n</sub>	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	39.7123	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g

 $C_{\text{sd}}$ = HCI concentration (lb/dscf) 9.7755E-07 lb/dscf

#### 2. HCI concentration (ppmdv)

$$C_{sd} = \left(\frac{m_n}{V_{modd}}\right) \left(\frac{0.850}{1000}\right) \left(\frac{10^6}{MW}\right)$$

#### Where:

m <sub>n</sub>	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V <sub>msld</sub> MW	≃ volume metered, standard (dscf) = molecular weight of HCI (g/g-mole)	=	39.7123 36.461	dscf g/g-mole
0.850	= conversion factor (dscf/g-mole)	=	0.850	dscf/g-mole
1000	= conversion factor (mg/g)	=	1,000	mg/g
10 <sup>6</sup>	= conversion factor (ppm)	=	10 <sup>6</sup>	ppm
C <sub>sd</sub>	= HCl concentration (ppmdv)	=	10.3352	ppmdv

#### 3. HCI concentration (ppmwv)

$$C_{w} = C_{sd} \left( 1 - \frac{B_{w}}{100} \right)$$

#### Where:

C <sub>sd</sub>	= HCl concentration (ppmdv)	=	10.3352	ppmdv
$B_w$	= actual water vapor in gas (% v/v)	=	22.7417	% v/v
100	= conversion factor (%)	=	100	%

C<sub>w</sub> = HCl concentration (ppmwv) 7.9848 ppmwv

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QA/QC\_ Date

4. HCl concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31)$$

Where:

m <sub>n</sub>	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	39.7123	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm

C<sub>sd</sub> = HCl concentration (mg/dscm) = 15.6540 mg/dscm

5. HCl concentration (mg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) (35.31) \left(\frac{68 + 460}{32 + 460}\right)$$

Where:

m <sub>n</sub>	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V <sub>mstd</sub>	= volume metered, standard (dscf)	=	39.7123	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	

 $C_{sd}$  = HCl concentration (mg/Nm<sup>3</sup> dry) = 16.7995 mg/Nm<sup>3</sup> dry

6. HCl concentration corrected to x% O2 (ppmdv example)

$$C_{sdx}$$
 =  $C_{sd} \left( \frac{20.9 - x}{20.9 - O_2} \right)$ 

Where:

C <sub>sd</sub>	= HCl concentration (ppmdv)	=	10.3352	ppmdv
×	= oxygen content of corrected gas (%)	=	7.0	%
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

 $C_{\text{sdx}}$  = HCl concentration corrected to x%O<sub>2</sub> (ppmdv) = 12.2786 ppmdv @ x%O<sub>2</sub>

7. HCl concentration corrected to y% CO<sub>2</sub> (ppmdv example)

$$C_{sdy} = C_{sd} \left( \frac{y}{CO_2} \right)$$

Where:

C <sub>sd</sub>	= HCl concentration (ppmdv)	=	10.3352	ppmdv
у	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO <sub>2</sub>	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.4	%

C<sub>edy</sub> = HCl concentration corrected to y%CO<sub>2</sub> (ppmdv) = 11.9252 ppmdv @ y%CO<sub>2</sub>

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# 8. HCl rate - F<sub>d</sub>-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) \left(F_d\right) \left(\frac{20.9}{20.9 - O_2}\right)$$

#### Where:

mn	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
$V_{\sf mstd}$	= volume metered, standard (dscf)	=	39.7123	dscf
$2.205 \times 10^{-3}$	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
Fa	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%

E<sub>Fd</sub> = HCl rate (Ib/MMBtu) = 1.6711E-02 lb/MMBtu

# 9. HCl rate - F<sub>c</sub>-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right) \left(\frac{2.205 \times 10^{-3}}{1000}\right) (F_c) \left(\frac{100}{CO_2}\right)$$

# Where:

m <sub>n</sub>	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
$V_{mstd}$	= volume metered, standard (dscf)	=	39.7123	dscf
2.205 x 10 <sup>-3</sup>	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F <sub>c</sub>	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO <sub>2</sub>	= proportion of oxygen in the gas stream by volume (%)	=	10.4	%
100	= conversion factor	=	100	

E<sub>Fc</sub> = HCl rate (Ib/MMBtu) = 1.7107E-02 | Ib/MMBtu

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PLANT DATA

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CleanAir Project No: 10735-4

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		·			

# WHEELABRATOR SOUTH BROWARD TONS OF REFUSE PROCESSED PER STACK TEST RUN LOG (2009)

UNIT #1						
Date			Tripeses more to annual by the Car	The state of the s		Thash Processed (tens)
3/16/2009	HCI	26A	1	184.7	1.00	31.8
3/16/2009	HCI	26A	3	184.7 183.5	1.00	31.8 31.6
3/16/2009	HCI	26A	3		1.00	· · · · · · · · · · · · · · · · · · ·
3/18/2009	Particulate/Metals	5/29	1	183.6	2.18	69.0
3/18/2009	Particulate/Metals	5/29	2	183.4	2.18	68.9
3/18/2009	Particulate/Metals	5/29	3	184.0	2.17	68.9
3/18/2009	Fluorides	13B	1	184.3	1.33	42.3
3/18/2009	Fluorides	13B	2	183.8	1.32	41.8
3/18/2009	Fluorides	13B	3	184.1	1.23	39.0
3/16/2009	Dioxins/Furans	23	1	184.0	4.42	140.2
3/17/2009	Dioxins/Furans	23	2	183.4	4.32	136.6
3/17/2009	Dioxins/Furans	23	3	184.2	4.40	139.8
UNIT #2						
Date	en esta esta esta esta esta esta esta esta	Man of the	Rein#	Steemakiskis	Remilencia (6)	Trash Processed (fons)
3/17/2009	HCI	26A	1	182.6	1.00	31.5
3/17/2009	HCI	26A	2	185.2	1.00	31.9
3/17/2009	HCI	26A	3	183.2	1.00	31.6
3/16/2009	Particulate/Metals	5/29	1	184.1	2.40	76.2
3/16/2009	Particulate/Metals	5/29	2	184.9	2.18	69.5
3/16/2009	Particulate/Metals	5/29	3	183.9	2.23	70.7
3/17/2009	Fluorides	13B	1	185.1	1.18	37.6
3/17/2009	Fluorides	13B	2	184.7	1.20	38.2
3/17/2009	Fluorides	13B	3	183.9	1.15	36.5
n/a	Dioxins/Furans	23	1	n/a	n/a	n/a
n/a	Dioxins/Furans	23	2	n/a	n/a	n/a
n/a	Dioxins/Furans	23	3	n/a	n/a	n/a
UNIT #3						
Date 1	ar Pecil	l'Unatrodis.	Remaile	Sicela distributa	ASCIALLEGICISA CONSTITUTA	Trasjusticionalia
3/18/2009	HCI	26A	1	184.1	1.00	31.7
3/18/2009	HCI	26A	2	184.2	1.00	31.8
3/18/2009	HCI	26A	3	183.9	1.00	31.7
3/17/2009	Particulate/Metals	5/29	1	184.0	2.15	68.2
3/17/2009	Particulate/Metals	5/29	2	184.0	2.15	68.2
3/17/2009	Particulate/Metals	5/29	3	184.1	2.18	69.2
3/16/2009	Fluorides	13B	1	184.2	1.30	41.3
3/16/2009	Fluorides	13B	2	184.0	1.28	40.6
3/16/2009	Fluorides	13B	3	184.4	1.35	42.9
n/a	Dioxins/Furans	23	1	n/a	n/a	n/a
n/a	Dioxins/Furans	23	2	n/a	n/a	n/a
n/a	Dioxins/Furans	23	3	n/a	n/a	n/a

Metals: Cd (cadmium) Hg (mercury) Be (beryllium) Pb (lead)

Date: Start Time: End Time:	3/18/2009 7:47:00 9:58:00	-SDAVINLET TEMP	SDAYOUTINET	SEURBYELE	DIL WATERS	CONG	HE OUT TEMP	DP.	PRESS	STEAM FLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	5/29 run 1	516.30	313.25	37.07	30.68	11.76	290.74	6.38	-11.75	183.58
200 William	er en la maria	and the second						100		
Unit 2		513.06	313.41	37.75	30.96	11.52	295.90	6.58	-10.40	183.97
	ranki sita							11 11 14 14		
Unit 3	and the Section of th	485.28	313.15	35.73	25.48	12.47	294.50	6.84	-10.32	184.02

4	FEED HZO	STMIRRESS	FINAL STM. TEMP	FLOW.	FURNACE DRAFT	ECONO. OUT TEMP	SH ROLL AVC	SNER CHEMIFLOW	FURNACE 02	OUTLET : O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	 %	%

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	<u> </u>
Unit 1	185.71	910.44	826.38	88.34	-0.10	431.47	1096.53	3.83	6.30	9.27
Unit 2	185.13	908.50	822.69	86.74	-0.10	420.87	1085.42	3.58	5.92	9.38
			2000 - 1400				the state of the second		100	
Unit 3	187.71	900.17	825.44	81.34	-0.11	398.06	1086.58	4.13	6.83	9.81

Date: Start Time: End Time:	3/18/2009 10:25:00 12:36:00	SDXNNIPRE ATTEMP	ON SOUTH THE	TOTALE FI NURRYATE	DEWATER- PLOW:	LIME	(Mar Out a () (Campa )	(40)	IDINKEI) PRESS	STEAM FLOW	
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr	
Unit 1	5/29 run 2	519.07	305.02	38.71	33.51	12.79	286.46	6.42	-11.72	183.41	
Unit 2		519.96	305.12	41.97	32.98	11.76	288.51	6.56	-10.22	183.48	
Unit 3		493.98	304.92	40.05	34.27	14.04	289.33	6.83	-10.56	184.13	
, п		FLOW:	SIMIRRESSI	RINALSTINI CHEMIP	Tion AIR FLOW	EURNACE DRAFT	OUTENBE	SH ROLLEY AVE	SNOR CHEMICLOW	EURNAGE 102	OUTLE O2
		KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%

86.78

89.12

80.81

430.82

422.83

399.12

1120.26

1097.96

1106.64

-0.10

-0.10

-0.10

5.60

4.38

5.30

9.11

9.61

9.57

6.15

6.27

6.43

185.37

184.36

187.30

Unit 1

Unit 2

Unit 3

910.69

908.61

900.31

824.75

821.40

822.37

A IDINUET STEAM Date: 3/18/2009 TEMP Start Time: 13:18:00 End Time: 15:28:00 DEG F **GPM** DEG F DEG F "H2O **GPM** " H2O KLBs/hr 5/29 run 3 520.38 38.62 32.73 13.78 287.20 -11.57 304.96 6.35 184.03 Unit 1 521.65 305.02 12.79 288.50 41.50 34.42 -10.12 183.79 Unit 2 6.52 Unit 3 490.41 304.96 37.48 31.68 15.17 287.67 6.72 -10.11 183.99

FEEDH2022 SHOUL FLOW USUMPRESS	FINALSTM: #31(0)	AIR FEURNACE OW DRAFE.	Zeono 3Hir Zeoniziampi	CONTROL SNORWAY FROM CHEMIFLOW	IRNACE DUPLETOR

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	<u></u>
Unit 1	185.83	911.09	824.57	86.50	-0.11	430.54	1120.51	4.87	6.05	9.06
	100							in the second		
Unit 2	184.83	908.95	822.29	88.60	-0.10	421.91	1091.50	4.92	6.25	9.57
						Eli anicipi				
Unit 3	187.72	900.71	825.00	79.29	-0.10	393.10	1112.35	4.34	6.50	9.25

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# Gemeral Average Report

Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1 Time of Report: 03/18/09 14:46
Data Averaging Type: 6m Rolling Average Interval: 1

		OPACITY1
Date	Time	(PERCENT )
03/18/09	06:42	0
	06:48	0
	06:54	0
	07:00	0
	07:06	0
	07:12	0
	07:18	0
	07:24	0
	07:30	0
	07:36	0
	07:42	0
	07:48	0
	07:54	0
	08:00	0
	08:06	0
	08:12	o
	08:18	0
	08:24	0
	08:30	0
	08:36	0
	08:42	0
	08:48	0
Ave	rage =	0

Average = 0

Geometric Avg. = 0

Maximum = 0

Minimum = 0

Possible Values = 22

Included Values = 22

Total = 6

- excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- S suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

Plant Name: SBWD

General Average Report

Site Name: UNIT1

Reporting Period: 03/18/2009 to 03/18/2009 Time of Report: 03/18/09 14:46 Data Averaging Type: 6m Rolling Average Interval: 1

		OPACITY1				
Date	Time	(PERCENT )				
03/18/09	09:24	0				
	09:30	0				
	09:36	0				
	09:42	0				
	09:48	0				
	09:54	0				
	10:00	0				
	10:06	0				
	10:12	0				
	10:18	0				
	10:24	0				
	10:30	0				
	10:36	0				
	10:42	0				
	10:48	0				
	10:54	0				
	11:00	0				
	11:06	0				
	11:12	0				
	11:18	0				
	11:24	0				
	11:30	0				

Average = 0 Geometric Avg. = Maximum = Minimum = 0 22 Possible Values = 22 Included Values =

7 Total =

- excluded values (missing, OOC, invalid, suspect)
- out-of-control
- invalid
- suspect
- H exceedance
- stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

#### General Average Report

Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1 Time of Report: 03/18/09 14:46
Pata Averaging Type: 6m Rolling Average Interval: 1

		OPACITY1
Date	Time	(PERCENT )
03/18/09	12:12	a
	12:18	0
	12:24	0
	12:30	0
	12:36	0
	12:42	0
	12:48	0
	12:54	0
	13:00	0
	13:06	0
	13:12	0
	13:12	0
	13:24	0
	13:30	_
		0
	13:36	0
	13:42	0
	13:48	0
	13:54	0
	14:00	0
	14:06	0
	14:12	0
	14:18	0

Average = 0

Geometric Avg. = 0

Maximum = 0

Minimum = 0

Possible Values = 22

Included Values = 22

Total = 6

- \* excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- S suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

Plant Name: SBWD Page: 1

#### General Average Report

#### Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1
Data Averaging Type: 1m

Possible Values =

Total =

131

854

Time of Report: 03/18/09 14:43
Rolling Average Interval: 1

	CARFEED1 (LBS/HR )
	(LBS/HR )
Average =	•
Geometric Avg. =	(
Maximum =	8
Minimum =	:
Possible Values =	13

Plant Name: SBWD Page:

#### General Average Report

# Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1 Time of Report: 03/18/09 14:43
Data Averaging Type: 1m Rolling Average Interval: 1

	CARFEED1 (LBS/HR )
Average =	6
Geometric Avg. =	6
Maximum =	8
Minimum =	3
Possible Values =	132
Included Values =	132
Total ≈	748

#### General Average Report

# Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1 . Time of Report: 03/18/09 14:42

ging T	ype: lm		Rolling Average In					Inte		
	CARPEE	D1								
	(LBS/HR	)						 	 	
Average	=	5								
tric Avg.	=	5								
Maximum	=	7								
Mi <b>nim</b> um	=	3								
ible Values	=	132								
ded Values	=	132								
Total	=	703								

Date: Start Time: End Time:	3/18/2009 7:36:00 8:56:00			IONAL SLURRY ELE		EME EXCONC		DIP.	V 10 NEET	STEAM FLOW
		DEG F	DEG F	GPM -	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	13B run 1	514.14	314.98	35.97	27.45	12.00	290.71	6.38	-11.65	184.25
				STATE OF SHIPLE	TO SERVICE				Activities and the	
Unit 2		512.36	314.89	36.91	29.89	11.68	295.76	6.56	-10.45	184.49
		44								78 2 TA
Unit 3		485.11	314.84	35.23	24.64	12.27	294.45	6.88	-10.38	184.21
					·				·	

2 ·	FEEDIH20/4	SHOUTS SIMPRESS	HINAL STME	ALCOMATA	TURNAGEA BURANTUK	OUITEMR	WALLOWELDS.	SNER CHEMIELOW	FURNAGE   OZ	OUTLET 02
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.68	910.70	828.19	87.77	-0.10	429.77	1095.87	3.51	6.24	9.20

Date: Start Time: End Time:		SIDA INIETI	STOVATE OF THE TRANSPORT OF THE TRANSPOR	SERIER VALLE	EDILWATIER HEEOW		MATOUT STIEMP	EAC TOP	PRESS	STEAM:
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	13B run 2	517.31	308.40	38.18	33.43	11.69	289.06	6.30	-11.66	183.79
							- Year			
Unit 2		514.84	308.67	39.63	32.82	11.24	293.93	6.52	-10.22	183.79
Unit 3		486.89	308.58	37.67	30.53	12.86	292 79	6.79	-10.40	183.96

2	FLOW 1	SIM PRESS	FINAL SIME	ASTONIANIS	AFERNANDE (	OUIL TEMP	AVGT	SNCR CHEMITION	OZ P	00][4E] 2 02
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.76	910.58	824.39	87.54	-0.10	432.31	1112.17	5.15	6.15	9.12
	PER SOLUTION A									

Unit 1	100.70	9 10.50	024.39	07:54	-0.10	432.31		5.15	0.10	9.12
						200				
Unit 2	184.75	908.49	821.99	86.65	-0.10	421.70	1092.84	4.70	5.84	9.23
					2445					
Unit 3	187.41	900.25	824.93	82.32	-0.11	397.83	1092.89	4.49	6.80	9.68

Date: Start Time: End Time:	3/18/2009 10:53:00 12:07:00	SIDAYINEET TIEMP	SDA OUTST	TOTAL ESLURRYEL	FLOW	GONC	FIFOURE A	6 <b>6</b> - 20P	(ID)INUET PRESS	STEAM FILOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	13B run 3	519.77	305.01	38.90	33.81	12.71	286.67	6.50	-11.80	184.12
Unit 2	-	522.04	305.03	43.10	32.85	11.44	288.46	6.65	-10.40	183.71
Unit 3		494.80	304.94	40.10	34.45	13.98	289.91	6.84	-10.56	

<u>,</u>	FLOW	SHOUT SIMPRESS	FINAL STM.	TOWATE FROW	EURNACE:	CONSTRUCT	SHROLL AVG	SNER CHEMITION	UFNAGE	OUT DET
	1/1 0 - 1 -	DE0 5	DE0 5	KOOFM	11.10.0	DE0 5	DEO 5	OPU	0.4	0/
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.86	910.89	823.99	86.72	-0.10	431.55	1119.63	5.98	6.06	9.04

					CASS -					
Unit 2	184.65	908.78	820.98	89.87	-0.10	424.69	1096.18	5.24	6.27	9.63
				<b>《大学》</b>						
Unit 3	187.10	900.37	821.24	80.85	-0.10	399.11	1108.12	5.15	6.32	9.50

Date: 3/16/2009 Start Time: 12:13:00 End Time: 16:38:00

	THE PERSON NAMED AND POST OF THE PERSON NAMED
	E SUCAUS
SDAMIGETS SDAMUTEET STOTAL DILWAYER STUMES THE STEED SEEDING STEED SEEDING STEED SEEDING	<b>医生态性的 经产品的 医二氏性 医二氏性 医二氏性 医二氏性 医二氏性 医二氏性 医二氏性 医二氏性</b>

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1 23 run 1	520.61	320.08	37.22	32.14	11.97	300.70	6.42	-11.80	184.02
Unit 2	517.26	315.04	37.53	31.44	11.80	300.87	6.56	-9.77	183.46
Unit 3	497.15	314.99	38.08	32.23	11.60	299.10	6.79	-10.61	184.09

TEEDIFIO SHOUT FINALSIMI TIOTAIR FURNACE CONT. SHBOLL SMSR FURNACE OUTLET.

THEOMY STATERESS TEMP DELEGO STRAFT CUITIEMR? SAVE CHEMELOM 1.02

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.47	913.61	825.01	87.08	-0.10	432.44	1107.87	3.36	6.53	9.56
					200					
Unit 2	184.56	908.83	821.00	84.61	-0.10	420.01	1105.57	4.34	6.40	9.85
Unit 3	187.56	901.06	825.00	80.52	-0.11	399.00	1067.15	3.79	7.05	10.09

Date: Start Time: End Time:	3/17/2009 7:14:00 11:33:00	SDANNIESE BELLEMR	ESIDAÇO VITILLE IR		DIEWATER:	GONG 4	FF OUT	PF	ONNED SPRESS	STEAM FLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	"H2O	" H2O	KLBs/hr
Unit 1	23 run 2	521.07	320.01	37.24	31.41	11.81	300.00	6.45	-11.83	183.42
	100									
Unit 2		507.91	315.53	35.55	28.30	12.47	298.18	6.54	-10.08	183.46
Unit 3		489.84	315.00	37.40	29.99	10.74	299.53	6.86	-10.57	183.99

- 17	RESIDITION	SHEOUT STM PRESS	FINAL STATE	FLOW.	DRAPI	EGONOLIS OUTETEMPS	AVG	SNC: CHEMIELOW	G2	00014LET
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	184.90	912.62	824.46	90.68	-0.10	433.77	1104.79	3.17	6.49	
			and the same							
Unit 2	184.44	908.55	821.06	84.80	-0.10	417.34	1092.08	4.27	5.94	9.54
Unit 3	187.26	900.58	823.21	83.71	-0.11	400.74	1069.87	3.40	6.85	10.16

Date: Start Time: End Time:	3/17/2009 12:00:00 16:24:00	SDA INCETO	SDA OUTLET		DILWATER		TEMP	FE. DR	ID/INEET	STEAM
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	23 run 3	520.37	320.02	35.96	30.11	12.46	301.50	6.41	-11.62	
				1.00			100		A CONTRACTOR	
Unit 2		512.07	320.22	34.92	25.64	13.37	302.70	6.51	-9.44	184.38
						#2 far in the Table				
Unit 3		498.57	314.95	39.29	32.38	11.40	301.26	6.86	-10.84	184.09

₩₩.	EDIHZO HLOW S	SI-ROUR IM PRESS	TEMP	FLOW:	DRAFT FO	OFICE NO.	SHIROU AVG LCH	SMORE AND	RNACE 0 02	UILEI O2
		DEG E	DEG E	KSCEM	" H2O	DEG E	DEG E	CPH		

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	<u> </u>	<u> </u>
Unit 1	185.55	914.85	825.44	88.06	-0.10	430.81	1113.13	3.18	6.34	9.35
		A PROPERTY.								<b>学</b> 对于1000年1000年
Unit 2	185.69	909.60	822.54	83.94	-0.10	415.96	1105.23	3.67	5.82	9.45
				756	医排尿数学		He was			
Unit 3	187.53	901.49	824.32	85.36	-0.10	400.47	1095.26	3.96	6.94	10.20

04/10/2009 06:24 9545816705 WSB PAGE 02/04

Pago: 1

Plant Name: Sawo

# Gameral Average Report Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT1 Time of Report: 04/10/09 06:13
Data Averaging Type: 1m Rolling Average Anterval: 1

CARFRED1

(LBS/RR )

Average = 6
Geomatric Avg. = 6
Naximum = 1
Possible Values = 266
Included Values = 266
Total = 1601

Page: 1

Plant Name: SBWD

### General Average Raport

Reporting Pariod: 03/17/2009 to 03/17/2009

Site Name: UNIT1 Time of Report: 04/10/09 05:13
Data Averaging Type: 1m Rolling Average Interval: 1

CARFEED!
(LBS/HR )

Average = 5
Geometric Avg. = 5
Manimum = 7
Minimum = 3
Possible Values = 260
Ancluded Values = 260

Total -

1392

Page: 1

Plant Name: SBWD

#### General Average Report Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT1 Time of Report: 04/10/09 06:13 Data Averaging Type: Im Rolling Average Interval: 1

> CARPEED1 (LBS/KR )

Average -5 5 Geometric Avg. = 11 2 265 265 Maximum -Minimum = Pozsible Values -265 1386 Included Values =

Total s

SDAINLET SDA QUITER TOTAL DILWATER LIME TEMP SEURRYFLE PELOW CONC TO TRESS - FLOW 3/16/2009 FFOU Date: Start Time: 7:50:00 End Time: 8:50:00 DEG F DEG F **GPM GPM** % DEG F "H2O " H2O KLBs/hr Unit 1 26A run 1 516.47 320.00 37.05 30.70 17.05 298.89 6.44 -11.84 184.72 521.24 33.47 299.39 -10.31 Unit 2 314.68 41.20 15.35 6.50 184.61 492.92 314.90 31.71 17.17 299.16 -10.46 184.33 38.45 Unit 3 6.72

C - 22

ALOWAR SOUNTRESS AT ALEMPS AREOWAY COUNTRINES OF AVERAGE CHEMICAL COMPANY OF THE MARKOW STREET OF THE MARKOW STREE			DOWN DEAD			NACE OUTLET
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--	-----------	--	--	-------------

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG_F	GPH	%	<u> </u>
Unit 1	186.65	912.97	826.42	86.66	-0.11	433.45	1105.81	5.37	6.24	9.28
						Accessor applicated				
Unit 2	185.57	909.35	822.43	84.62	-0.10	427.45	1091.56	5.14	6.38	9.85
		<b>2015年的</b> 在於						Control of		
Unit 3	187.85	901.00	824.02	84.91	-0.11	403.78	1033.21	6.69	6.88	9.69

Date: Start Time: End Time:	3/16/2009 9:28:00 10:28:00	SDAINLET ZTEMP	SDA OUTLET	TIOTIAL SILURRY PE	IDIE WATER	HIME CONC	FT-YOUT	PE DP	ADINLET PRESS	STEAM: FELOW:
		DEG F	DEG F	GPM	GPM	%	DEG F	"H2O	" H2O	KLBs/hr
Unit 1	26A run 2	512.41	319.83	33.97	28.36	16.15	301.93	6.34	-11.47	184.67
		10 11 11 11 11 11 11 11 11 11 11 11 11 1							e received and	HANGER CO.
Unit 2		511.88	315.06	35.98	30.49	15.26	301.98	6.61	-9.94	183.32
				1						
Unit 3		490.25	315.09	36.06	30.19	16.36	298.11	6.71	-10.33	183.99

, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	PLOW	SHOUL SIM PRESS	TEMP	FLOW	DRAFT	OUTLIEMP	AVG	CHEMIFLOW	02	902
	KLBs/hr	DEG F	DEG F	KSCFM	"H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.23	913.30	824.30	84.66	-0.10	430.35	1110.84	3.94	6.10	9.13
Unit 2	185.29	908.88	823.83	83.96	-0.10	419.19	1098.33	4.81	6.30	9.59
										44.7
Unit 3	187.47	900.81	822.07	83.64	-0.11	398.59	1043.18	4.20	6.46	9.82

Date: 3/16/2009 Start Time: 10:56:00 End Time: 11:56:00

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1 26A run 3	512.25	320.05	33.86	29.54	12.43	300.32	6.41	-11.52	183.45
								12.56	
Unit 2	515.04	314.87	36.94	31.07	11.33	299.92	6.43	<b>-</b> 9.78	184.50
					V 50				
Unit 3	496.40	315.03	38.24	32.91	10.94	297.17	6.84	-10.66	183.92

FEEDNIZO SHOUT FINALSTN FOTAIR FEURNIZE SECONO SHEROID SNCR FEURNIZE QUITLET FOULTENIN STIMBRESS TEMP FLOW DRAFT FOULTENIN AVE. SHEMBLOW OF 02

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	% _
Unit 1	184.95	913.65	825.03	85.70	-0.12	428.15	1112.82	1.34	6.52	9.51
			4							
Unit 2	185.20	909.20	820.31	85.78	-0.10	420.83	1095.10	2.91	6.31	9.76
								2 4 7 7 4		
Unit 3	187.37	901.17	824.25	82.38	-0.10	400.77	1035.70	2.42	7.04	10.23

Date: 3/16/2009 Start Time: 8:02:00 End Time: 10:26:00	SDAYNUET STIEMP	STOAKOUHILIEHIR STEEMP SE	SMUPARO/FILE	DIE WAGER ELOW	CIME :	POUT N	TO CIGIPAL SE	DINESE PRESS	STEAM
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	514.58	319.88	35.57	29.90	15.75	300.74	6.40	-11.67	184.51
		Christian State			distribution of the second				
Unit 2 5/29 run 1	515.74	314.84	38.07	32.00	14.70	300.91	6.52	-10.02	184.11
						25.00			
Unit 3	491.42	315.05	37.00	31.05	16.12	299.12	6.74	-10.40	183.90

FEE	ortizologie, stroud Love estimidates	FINAL STIME	JOTANE A	URDIA OE	CECONO :- Objet <b>ieme</b>	SH ROPE AVG	SNOR CHEMELOW	EURNACE 02	OUTLET OZ
		_							

-	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.30	913.13	825.78	85.62	-0.10	432.15	1110.58	5.07	6.15	9.18
Unit 2	185.70	909.13	823.50	84.02	-0.10	422.77	1094.59	5.05	6.31	9.58
						V 25 10 10 10 10 10 10 10 10 10 10 10 10 10				
Unit 3	187.37	900.85	823.17	84.71	-0.11	400.89	1041.09	6.27	6.69	9.75

Date: 3/16/2009 Start Time: 11:04:00 End Time: 13:15:00

SDAJNIEW SDASI	Inlet TOTAL DIEWATE	R & LIME AFFOUR GONG AFEMP	FF JID INIE DP PRESS	TU LISTEAM FLOW

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	514.64	320.01	34.53	30.09	12.31	300.73	6.35	-11.51	183.57
	The Authority							Water Carlo	
Unit 2 5/29 run 2	514.53	314.98	36.91	30.86	11.48	299.98	6.48	-9.75	184.93
							Add Assets		
Unit 3	497.44	314.99	38.47	33.39	11.00	298.17	6.77	-10.68	184.14

FEEDHZOZ SHIOUTZ FINALSTAM TIGIFAIR: FURNACEZ Y ECONO SHROLL SNCR FURNACE CUFLET RLOW SUM PRESS TIEMP FLOW: DRAFT HOUTTEMP TAYC' CHEM FLOW 5 402 502

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.12	913.93	825.02	86.42	-0.10	429.27	1112.77	2.20	6.47	9.50
					Editor Ville			WHEN COUNTY		
Unit 2	185.99	909.48	821.69	84.06	-0.10	419.33	1098.78	3.33	6.33	9.75
						and the second	Tarana da Para			
Unit 3	187.43	901.38	824.30	81.71	-0.11	400.88	1050.18	2.99	7.13	10.28

Date: Start Time: End Time:	3/16/2009 13:51:00 16:05:00	PSDAINIETA ESTEMB	SDAYOUTHER	SEURRY DE	ODI WATER	CONC	EMP	PP P	SECTION S	STEAN
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		520.16	320.09	37.09	32.30	12.20	300.68	6.44	-11.79	184.32
Limit O	5/29 run 3	517.96	315.01	37.61	31.20	11.96	301.28	6.58	-9.72	183.93
Unit 2		1000								
Unit 3		497.07	315.03	38.14	32.26	11.76	299.14	6.81	-10.63	184.03

AREED HZGV. FLOW	SHOUT STMPRESS	SEINANE STUME	TOTAIR: FLOW:	SEVRNAGE LEDRAFI	ONE EWE	SHROLL STAVE	SNGR CHEM-ELOW	FURNAGE:	OURLETZ OZ
KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	<u>%</u>
Unit 1	185.84	913.77	824.60	87.25	-0.10	432.09	1103.81	3.49	6.49	9.51
Unit 2	185.36	909.23	823.73	84.76	-0.10	419.93	1111.67	4.36	6.19	9.64
Unit 3	187.26	901.14	823.19	80.91	-0.11	398.40	1076.84	4.24	7.00	10.04

### Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2

Time of Report: 03/17/09 07:26

Data Averaging Type: 6m

Rolling Average Interval: 1

Date Time ( 03/16/09 12:48 12:54 13:00 13:06 13:12 13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48 14:48			OPACITY2
12:54 13:00 13:06 13:12 13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48	Date	Time	(PERCENT )
13:00 13:06 13:12 13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48	03/16/09	12:48	0
13:06 13:12 13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48		12:54	0
13:12 13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48		13:00	0
13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48		13:06	0
13:18 13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48		13:12	0
13:24 13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48	·	13:18	0
13:30 13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48			0
13:36 13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48			0
13:42 13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42			0
13:48 13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48			0
13:54 14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42 14:48			0
14:00 14:06 14:12 14:18 14:24 14:30 14:36 14:42			0
14:06 14:12 14:18 14:24 14:30 14:36 14:42			0
14:12 14:18 14:24 14:30 14:36 14:42 14:48			0
14:18 14:24 14:30 14:36 14:42 14:48			0
14:24 14:30 14:36 14:42 14:48			0
14:30 14:36 14:42 14:48			0
14:36 14:42 14:48			
14:42 14:48			0
14:48			0
			0
14:54			0
		14:54	0

 Maximum =
 0

 Minimum =
 0

 Possible Values =
 22

 Included Values =
 22

Total =

Average = Geometric Avg. =

- excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- S suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

Plant Name: SBWD Page: 1

### General Average Report

### Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2 Time of Report: 03/17/09 07:26
Data Averaging Type: 6m Rolling Average Interval: 1

			On A CITIMIA
03/16/09 10:00 10:06 10:12 10:18 10:24 10:30 10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54 12:00			OPACITY2
10:06 10:12 10:18 10:24 10:30 10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54 12:00			(PERCENT )
10:12 10:18 10:24 10:30 10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54	03/16/09		0
10:18 10:24 10:30 10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54 12:00			0
10:24 10:30 10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54 12:00			0
10:30 10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54			0
10:36 10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54		10:24	0
10:42 10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54		10:30	0
10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54		10:36	0
10:48 10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54		10:42	0
10:54 11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54 12:00			0
11:00 11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54			0
11:06 11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54 12:00			0
11:12 11:18 11:24 11:30 11:36 11:42 11:48 11:54			0
11:18 11:24 11:30 11:36 11:42 11:48 11:54			0
11:24 11:30 11:36 11:42 11:48 11:54			0
11:30 11:36 11:42 11:48 11:54			0
11:36 11:42 11:48 11:54 12:00			
11:42 11:48 11:54 12:00			0
11:48 11:54 12:00			0
11:54 12:00			0
12:00			0
			0
12:06		12:00	0
		12:06	0

Average = 0

Geometric Avg. = 0

Maximum = 0

Minimum = 0

Possible Values = 22

Included Values = 22

Total = 0

- excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- s suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2

Data Averaging Type: 6m

Rolling Average Interval: 1

		OPACITY2
Date	Time	(PERCENT )
03/16/09	07:00	
	07:06	
	07:12	(
	07:18	(
	07:24	(
	07:30	(
	07:36	(
	07:42	
	07:48	
	07:54	
	08:00	Ċ
	08:06	·
	08:12	Ċ
	08:18	·
	08:24	
	08:30	
	08:36	
	08:42	
	08:48	
	08:54	,
	09:00	
	09:06	,
	09:00	,
	09:12	(
	09:10	,

Average = 0
Geometric Avg. = 0
Maximum = 0
Minimum = 0

 Possible Values =
 24

 Included Values =
 24

 Total =
 0

- excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- s suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

#### Plant Name: SBWD

### General Average Report

### Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2
Data Averaging Type: 1m

Time of Report: 03/17/09 07:27 Rolling Average Interval: 1

	CARFEED2	
	(LBS/HR	)
Average =		5
Geometric Avg. =		5
Maximum =		8
Minimum =		3
Possible Values =	1	35
Included Values =	1	35
Total =	72	7

### Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2

Time of Report: 03/17/09 07:27 Data Averaging Type: 1m Rolling Average Interval: 1

		CARFEED2
		(LBS/HR )
A	verage =	7
Geometri	c Avg. =	6
Ma	aximum =	11
M	inimum =	3
Possible '	Values =	132
Included	Values =	132
	Total =	859

Plant Name: SBWD Page: 1

### General Average Report

### Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2 Data Averaging Type: lm Time of Report: 03/17/09 07:27
Rolling Average Interval: 1

	CARFEED2 (LBS/HR )
Average =	6
Geometric Avg. =	6
Maximum =	11
Minimum =	3
Possible Values =	145
Included Values =	145
Total =	942

Date: 3/17/2009 Start Time: 12:50:00 End Time: 14:01:00

SSDAINGERS SDAYOUNGER SHOTAKS FOR WANTER	A TAMES PROFESOUR STEAM PROFESSOR STEAM PROFES
	PRODUCE SILES REMEDIATE STATE OF THE STATE O

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	519.12	320.07	35.57	30.99	12.45	301.58	6.42	-11.62	184.26
Unit 2 13B run 1	513.72	319.90	35.92	26.98	12.56	302.16	6.48	-9.41	185.05
						77.2			
Unit 3	497.73	314.93	38.89	33.19	11.36	302.04	6.76	-10.77	184.25

SEES ON FOR SEES OF STATE OF NOTESTICE	TOTALE FURNACE SECOND SHREE	SNOR FURNAGE OUTLET GHEMTELOW 502 02
	ELOWA BRANCE CONTROL AVA	
SA THOMSE STIMPERESS. SESTEMPS	PLOWER SOURAFILE SOUTEFEMPS AVA	CHEMITEÓW SÓ2 62
de section de la constant de la cons	Detection of the second particular transfer of the second	The state of the s

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.74	915.21	825.73	87.30	-0.11	430.49	1113.84	4.10	6.31	9.27
Unit 2	186.01	909.77	821.51	85.11	-0.10	417.28	1108.14	4.23	5.94	9.48
Unit 3	187.98	901.82	826.39	86.13	-0.10	400.39	1100.30	3.22	7.13	10.22

3/17/2009 Date: Start Time: 14:21:00 End Time: 15:33:00 DEG F **GPM** DEG F **GPM** DFG F " H2O " H2O KLBs/hr

			O1 101	<u></u>	70	DEC 1	1120	1120	(\LD3/111
Unit 1	523.90	319.95	37.21	29.52	12.34	301.72	6.40	-11.68	184.32
Unit 2 13B run 2	509.18	319.88	33.42	25.13	13.68	302.36	6.51	-9.25	184.69
	34.5					1000			
Unit 3	497.93	314.94	38.67	31.54	11.84	300.49	6.87	-10.75	183.92

i i	A TAKOWI	istini pitessi	E-ATTEMPS OF	is strowers	adra/sine	outatane.	V. AVG.	MENTE OWN	000	672
	KI Re/hr	DEG E	DEG E	KSCEM	" H2O	DEG E	DEC E	CPH	0/_	0%

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	<u></u>
Unit 1	. 185.39	914.81	822.32	89.72	-0.10	433.02	1111.50	3.47	6.55	9.57
					<b>的表示是</b>					
Unit 2	186.09	909.69	823.22	81.89	-0.11	413.26	1102.63	2.92	5.59	9.27
					A STATE OF					
Unit 3	187.67	901.35	823.61	85.17	-0.10	399.51	1090.93	3.49	6.75	10.07

Date: 3/17/2009 Start Time: 15:46:00 End Time: 16:55:00 **GPM** DEG F " H2O " H2O DEG F DEG F **GPM** KLBs/hr 517.36 319.95 34.09 28.01 13.71 300.34 6.37 -11.49 Unit 1 184.91 320.26 510.50 22.22 34.00 Unit 2 13B run 3 13.85 302.48 6.41 -9.49 183.85 502.00 40.36 31.23 299.86 183.76 Unit 3 314.96 11.71 6.87 -10.74

FLOW: SIMPRESS FEMP OF DRAFT OUTTEMP AVG. CHEMELOW 502
--------------------------------------------------------

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.69	914.11	826.49	85.53	-0.11	427.95	1111.55	1.97	5.98	9.01
		400000							<b>科美国教育</b>	
Unit 2	185.03	909.26	821.68	82.56	-0.10	413.42	1100.66	2.66	5.73	9.32
			2 - 7 - 2 - 3 - 6		1.0					
Unit 3	186.89	900.90	823.21	84.71	-0.10	401.14	1093.59	2.98	7.17	10.41

Date: 3/17/2009 Start Time: 7:39:00 End Time: 8:39:00	SDAINLET JEMP	SDA OUTLET	SEURRY EL	DIE WATERA FLOW	LIME CONG.	FFOUT TEMP	FF.	ID INCET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	GPM	%	DEG F	"H2O	" H2O	KLBs/hr
Unit 1	519.00	320.16	36.36	30.10	10.95	298.47	6.53	-11.87	181.80
	Control of the second	TAX ELEMAN	HINTER TO					Viganos III de S	Tarabay and the same of the sa
Unit 2 26A run 1	505.22	315.22	34.87	28.86	11.32	297.27	6.60	-10.24	182.58
Unit 3	485.89	315.22	35.90	27.20	11.10	298.86	6.97	-10.65	183.37

	FEED H20 SHOUT FINALSTM TOTAIRS FURNACE LECONO SHROLL SNCR FLOW DRAFT OUT TEMPS AVG GHEN FLOW	FURNACE GUTLET 02
--	-----------------------------------------------------------------------------------------------	-------------------

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	- %	%
Unit 1	183.47	911.17	824.31	90.02	-0.10	432.51	1096.32	2.98	6.54	9.66
								<b>ある。おかり</b>	<b>第14 18 18 18</b> 18 18 18 18 18 18 18 18 18 18 18 18 18	
Unit 2	182.82	907.68	818.95	84.75	-0.10	417.05	1091.11	3.52	5.99	9.74
	we follow					<b>对于社会</b>		1969年1月2日		437-607
Unit 3	187.01	899.84	825.85	82.26	-0.11	399.19	1066.73	3.14	7.03	10.47

Date: 3/17/2009 Start Time: 9:32:00 End Time: 10:32:00

GONC TEMP TOP TEMPS THE PRESS THOU
------------------------------------

	DEG F	DEG F	GP <b>M</b>	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	524.47	319.99	38.45	33.38	12.68	301.50	6.50	-11.95	184.86
									Kara Salah K
Unit 2 26A run 2	508.22	314.59	35.30	28.94	13.82	299.34	6.41	-9.77	185.20
							the same of the	A Commence of the Commence of	
Unit 3	489.40	314.97	37.08	30.74	10.82	300.03	6.74	-10.35	183.99

FEED H20 SHOUL PINALSIM TOTAIR FURNAGE ECONO SHROLL SNCR FURNACE GUITET FLOW STM PRESS TIEMP FLOW DRAFT OUTTENS AVG CHEM PLOW 92 02

•	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.34	914.08	825.99	91.77	-0.10	435.51	1111.25	3.68	6.41	9.50
Unit 2	186.66	910.01	824.69	83.63	-0.10	416.30	1094.87	5.16	5.70	9.15
		9 (49)			24157.3					
Unit 3	187.79	901.84	827.73	82.56	-0.11	399.79	1074.23	3.51	6.72	9.80

Date: Start Time: End Time:	3/17/2009 11:21:00 12:21:00	SDYANNUSTE STEMP	SDA OUTLET	SLURRY	ELOW:	LIME	TEMP	EF DP	PRESS 1	STEAM
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		517.94	319.86	35.40	27.78	12.98	302.28	6.40	-11.56	185.31
						10 miles				5-02-57
Unit 2	26A run 3	518.88	319.94	38.51	29.65	13.17	302.01	6.63	-10.18	183.23
Unit 3	.,	498.15	314.97	39.89	34.00	10.23	301.70	6.86	-10.94	184.04

20 20	FLOW:	SHIOUT STIM PRESS	FINAL STM.	TOTAIR:	FURNACE.	ECONO.	SH RONG THANG	SNER FI EMIFLOW	IRNACE CO	UTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%

		<b>D_O</b> .	520 .			J	0_0	O: 11	70	,,,
Unit 1	186.67	914.57	823.57	88.00	-0.10	430.30	1111.73	2.27	6.19	9.20
Unit 2	184.38	908.98	821.59	88.52	-0.10	422.82	1107.94	5.61	6.32	9.95
					Le vier d'Arres			100000		
Unit 3	187.11	901.32	823.18	86.84	-0.10	403.03	1084.38	3.52	7.06	10.39

Date: 3/17/2009 Start Time: 7:39:00 End Time: 9:48:00

SIDA INLETO SIDA OUTRE II	STURBYFU STOW	I CONC 4	F.O.UTT. F.F. IIEMP DP	HOUNTEIL STEAM

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	"H2O	KLBs/hr
Unit 1	520.98	320.10	37.33	31.60	11.06	299.40	6.46	-11.87	182.78
Unit 2	507.12	315.29	35.25	29.00	11.74	297.95	6.54	-10.17	183.40
Unit 3 5/29 run 1	490.63	314.99	37.90	30.49	10.65	299.37	6.89	-10.65	183.95

FEEDTIZO SHOUTE FINALSTME TOTAIN FURNACE ECONO SHIROLE SNCR FURNACE OUTLET FLOW SIMIPRESS TEMP I FLOW DRAFT OUTLEMP AVG CHEMPLOW 02 102
--------------------------------------------------------------------------------------------------------------------------------------------

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	184.40	911.94	824.75	91.21	-0.09	434.21	1102.75	3.22	6.57	9.67
	Contract Contract					Nick State	interfalls to		V 200	
Unit 2	184.25	908.35	821.15	84.83	-0.10	.417.49	1091.33	4.24	5.95	9.59
Unit 3	187.28	900.29	823.25	84.22	-0.11	402.65	1063.20	3.75	6.97	10.36

Date: 3/17/2009 Start Time: 10:21:00 End Time: 12:30:00

SDAINUET SDAOUTET TOTAL DILWATER EME PEOUT EP HOINLET STEAM TEMP SLURRYTE FLOW CONC THEMP SIDE PRESS FLOW

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	520.31	319.94	36.54	30.08	12.74	301.85	6.40	-11.64	184.75
				(Valendaria)					VI CALL TO THE REAL PROPERTY.
Unit 2	514.47	318.04	37.22	28.92	13.41	300.25	6.60	-10.05	182.93
						14 U		TOTAL PROPERTY.	
Unit 3 5/29 run 2	495.38	314.98	39.05	32.56	10.32	300.68	6.88	-10.82	183.99

J	FEEDERIZO (7 CSIEDOWIE	SHIQUIT SIMPRESS	PINAL STIME	FLOW	EURNACE DRALI	OUT TEMP	SHEROLL	SNOR CHEM FLOW	FURNAGE G2	О <b>ип</b> цен 02
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.90	914.05	823.84	89.33	-0.11	432.27	1110.68	3.08	6.33	9.36
	Service Committee			Carta Allera				A CONTRACTOR		
Unit 2	183.76	908.63	819.96	86.94	-0.10	420.24	1101.90	4.75	6.21	9.85
	JAN 20 YEAR	7276 2470 16	V-V-	Arek (Arek						
Unit 3	187.22	901.02	822.71	85.79	-0.10	401.87	1084.81	3.76	6.88	10.22

Date: Start Time: End Time:	3/17/2009 13:02:00 15:13:00	SDA INCET		SEUREMEE		CONC	TEMP	CP.	PRESS	STEAM FLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		521.62	320.04	36.50	30.95	12.40	301.86	6.45	-11.73	183.56
(A. W.)		arity of the							4.0	
Unit 2		511.17	319.79	34.70	25.90	13.03	302.12	6.46	-9.23	185.33
F. Letter		**************************************							A CONTRACTOR	
Unit 3	5/29 run 3	497.84	315.00	38.88	32.20	11.61	301.38	6.84	-10.81	184.10

FEED H207 SH OUT	ENALSTING TOTAIR TEMP FLOW	FURNACE: ECONO.	SH ROLL SNCR CHEM FLOW	PURNACE OUTLET OF OZ

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	184.63	915.00	824.40	88.65	-0.10	431.81	1111.83	3.65	6.50	9.49
	and the same			<b>建设设施</b>						
Unit 2	186.52	909.89	822.52	83.25	-0.11	415.25	1108.20	3.64	5.66	9.29
				##350/PUF						
Unit 3	187.43	901.65	825.01	85.90	-0.10	399.78	1095.52	3.69	6.95	10.16

Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3

Time of Report: 03/18/09 05:50 Rolling Average Interval: 1

		OPACITY3
Date	Time	(PERCENT )
03/17/09	06:36	(
	06:42	(
	06:48	
	06:54	(
	07:00	(
	07:06	
	07:12	·
	07:12	·
	07:24	; (
	07:30	1
	07:36	(
	07:42	•
	07:48	(
	07:54	(
	08:00	(
	08:06	(
	08:12	(
	08:18	(
	08:24	
	08:30	,
		·
	08:36	
	08:42	(

Average = 0

Geometric Avg. = 0

Maximum = 0

Minimum = 0

Possible Values = 22

Included Values = 22

Total = 0

Data Averaging Type: 6m

- excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- S suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3 Time of Report: 03/18/09 05:50

Data Averaging Type: 6m Rolling Average Interval: 1

D	ate	Time	OPACITY3 (PERCENT )
	17/09	09:18	.0
02,	-,, 05	09:24	0
		09:30	o o
		09:36	
			0
		09:42	0
		09:48	0
		09:54	0
		10:00	0
		10:06	0
		10:12	0
		10:18	0
		10:24	0
		10:30	0
		10:36	0
		10:42	0
		10:48	0
		10:54	0
		11:00	0
		11:06	0
		11:12	0
		11:18	
			0
		11:24	0
	·	rage =	0

Average = 0

Geometric Avg. = 0

Maximum = 0

Minimum = 0

Possible Values = 22

Included Values = 22

Total = 0

- excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- S suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3

Time of Report: 03/18/09 05:51

Rolling Average Interval: 1

		OPACITY3
Date	Time	(PERCENT
03/17/09	12:00	
	12:06	
	12:12	
	12:18	4
	12:24	•
	12:30	
	12:36	
	12:42	
	12:48	(
	12:54	(
	13:00	(
	13:06	(
	13:12	(
	13:18	(
	13:24	(
	13:30	(
	13:36	(
	13:42	
	13:48	
	13:54	
	14:00	(
		0
	14:06	C

Average = 0

Geometric Avg. =

Maximum = 0

Minimum = 0

Possible Values = 22

Included Values = 22

Total = 0

Data Averaging Type: 6m

- \* excluded values (missing, OOC, invalid, suspect)
- < missing
- T out-of-control
- I invalid
- S suspect
- H exceedance
- F stack not operating
- B invalid (PADER)
- U missing data substituted
- -999 missing value
- -888 value could not be calculated

#### Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3

Time of Report: 03/18/09 05:49

veraging Type	a: 1m.	Rolling Avera
	CARFEED3 (LBS/HR )	
Average =	6	
metric Avg. =	6	
Maximum =	10	
Minimum =	3	
sible Values =	130	
ded Values =	130	
Total =	830	

### Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3

Time of Report: 03/18/09 05:50

Data Averaging Type: lm

Rolling Average Interval: 1

	CARPBED3 (LBS/HR )
Average =	6
Geometric Avg. =	6
Maximum =	11
Minimum =	3
Possible Values =	130
Included Values =	130
Total =	763

#### Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3
Data Averaging Type: 1m

Time of Report: 03/18/09 05:50 Rolling Average Interval: 1

	720	
	CARFE	ED3
	(LBS/H	( AC
•••••		<b></b> -
Average	3	5
Geometric Avg.	<b>=</b>	5
Maximum	=	9
Minimum	=	3
Possible Values	=	132
Included Values	-	132
Total	=	724

Date: Start Time: End Time:	3/16/2009 8:26:00 9:44:00	SOATHER STIENE	SOAVOIUMUETE PAREMIPE	ASTORACES	ELOWS	EINE SONG	FE COUTE S	OFF	JUINITET PRESS	STEAM: F.LOW.
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		515.51	319.86	36.25	30.77	14.94	300.78	6.39	-11.70	184.76
	STATE OF THE									
Unit 2		516.11	314.55	37.99	32.30	14.27	300.83	6.45	-9.94	184.65
			A STATE OF	<b>建筑线 给食物</b>						
Unit 3	13B run 1	491.88	314.97	37.17	31.48	15.50	299.97	6.75	-10.42	184.20

	PERENTAL PROPERTY OF THE PROPE	SHIMPRESS	FINAL STM	TOTAIR FLOW	FURNACE SA	Maridono, 3 Outraliants	SHROLU	CHEMILLOW S	URNACE :	OUTILET.
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.32	913,29	B26.07	85.68	-0.11	433.05	1109.77	6.81	6.05	9.10

OTHE I	100.02	010,20	020.07	00.00		700.00	1100.77	0.01	0.00	0.10
										A CONTRACTOR
Unit 2	186.45	909.43	824.18	83.68	-0.10	423.15	1094.71	5.30	6.26	9.48
Unit 3	187.69	901.09	823.31	85.18	-0.11	401.76	1043.56	6.97	6.75	9.75

Start Time: 10	16/2009 0:36:00 1:53:00	CERTATING FILE	SEPACOUTECTI SETTEMP	AKO LAL ESEURRARIA ESEURRARIA	TO ILLOWATER	EIME GONG	PFOUNCE	E PP SE	ENDINGEN	STEAM
	_	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		511.59	320.00	33.47	29.20	12.45	300.54	6.39	-11.46	183.77
Unit 2		515.87	314.96	37.40	31.66	11.08	300.44	6.41	9.79	184.05
	3B run 2	495.35	314.95	37.77	32.76	11.00	297.21	6.79	-10.57	183.97

}	FLOW	STMPRESS	FIEVE S	TALGON :	DRAFT	OUT TEMP	AVG	OHEMI PLOW	02	102
				_						
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.10	913.48	823.84	85.25	-0.11	427.98	1110.33	1.35	6.47	9.46

Unit 1	185.10	913.48	823.84	85.25	-0.11	427.98	1110.33	1.35	6.47	9.46
		100	(A) (1975)							
Unit 2	184.67	908.84	818.83	86.20	-0.11	422.05	1093.87	3.63	6.37	9.82
					<b>的基础设施</b>					
Unit 3	187.29	900.94	823.08	82.53	-0.10	400.48	1037.18	2.55	6.93	10.19

Date: Start Time: End Time:	3/16/2009 12:26:00 13:47:00	SOAMERA BULLIN	SDATOURER PENESSE	SEURRYAGE	ODLEWAYIERO ELEOWI	CONC :	HAR OUT	jDP	PRESS	ELOW:
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		517.74	320.10	35.88	30.79	11.99	301.50	6.45	-11.74	183.49
							- 24 C	Barrer San San		
Unit 2		514.38	314.87	36.52	31.25	11.73	300.25	6.48	-9.67	184.50
Unit 3	13B run 3	496.62	314.94	37.84	32.56	11.30	298.79	6.74	-10.58	184.36

<b>1</b>		(3) (1) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4				<b>第370</b> 0		Sule 10 10 2 2 1 1 1		
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	0/.	0/
	NLDS/III	DEG F	DEG F	KOUFIN	ΠZU	DEG F	DEG F	GFH	70	
Unit 1	185.32	913.92	826.23	87.33	-0.10	430.88	1111.01	3.21	6.41	9.48
							The Carte State of the			
THE RESERVOIS AND THE PROPERTY OF THE PERSON	AND THE RESERVE AND THE PERSON NAMED IN	THE TAXABLE STORES OF THE PARTY OF THE	CV-10/2005-HOMENATORS RIVER	man because the state of the section	SECTION AND DESCRIPTION OF THE PROPERTY OF THE PERSON OF T	A column billion birth Salar Shares and	The state of the s	The state of the s	es matrimentaria acumbatemente como	TOWNERS AND MANAGEMENTS

Unit 2 Unit 3 185.60 909.24 820.69 82.18 -0.10 418.24 1105.08 3.29 6.48 1052.37 825.92 79.53 399.63 7.08 10.15 187.90 901.45 -0.11 3.64

Date: 3/18/2009 Start Time: 8:02:00 End Time: 9:02:00

9	SDAINBEIL SDAIGUITUEID TIOUALA DUWANER HIME TEROUITA PRE SIDUNEED ESTEANIA TEMPA TIEMPA SIUNRYALE FELOWAN AGONO RASIEMPER LOB TERESSE TELOWA

	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	515.04	315.13	36.30	29.88	11.93	290.94	6.43		
Unit 2	512.58	314.97	37.03	29.98	11.69	296.04	6.58	-10.44	184.43
Unit 3 26A run 1	485.74	315.11	35.23	23.11	12.33	294.79	6.87	-10.35	184.06

FEEDHZOX SHIOUT FINANCE CECONO SHROTE SUCRE FURNACE DUTTET OVERTEN STREET CHEMEROM 102 02

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.28	910.52	827.89	87.94	-0.10	430.48	1090.70	3.86	6.25	9.20
		100			and the second					
Unit 2	185.61	908.57	821.79	86.89	-0.10	420.86	1083.41	3.44	5.98	9.48
Unit 3	187.79	900.11	824.98	80.62	-0.11	398.85	1085.83	4.17	6.92	10.02

Date: Start Time: End Time:	3/18/2009 10:19:00 11:19:00	SIDANNESS	SONOURUER		\$(0)5\\$V\\$\\$(6)\$ \$(10)\\$(10)\\$(10)\$			ion-	TO HOLLETTE	SIEAM PLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		516.93	305.07	38.34	33.27	12.44	286.22	6.43	-11.77	182.99
								* 157		
Unit 2		517.40	305.13	41.31	32.63	11.49	289.68	6.58	-10.25	182.99
Unit 3	26A run 2	495.36	304.92	41.42	35.56	13.11	290.22	6.99	-10.93	184.16

TREEDHEON'S	SJIMPRESS		<b>基础的网络器</b>	HIROLE AVG	SMORE Stewardow	FURNACE 67	02
	<del>_</del>		 				

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.10	910.51	826.78	86.44	-0.10	430.37	1130.67	5.76	6.09	9.05
Unit 2	183.44	908.17	820.07	88.18	-0.10	422.51	1093.21	4.88	6.19	9.58
Unit 3	187.33	900.06	821.79	81.94	-0.11	402.11	1097.51	5.98	6.67	9.73

Date: 3/18/2009 Start Time: 11:46:00 End Time: 12:46:00	SDAINEST.	SO'A OUT BET	SUBJERRAÇAL	-DILWATER - IPLOW	kime Polovie	FE OUT	55F 2 MBR 5	ADINUEGO CAPRIESS	STEAM -
	DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	519.90	304.89	38.52	33.19	13.40	286.62	6.35	-11.56	183.94
			7 (V) (F)						
Unit 2	520.28	304.38	41.31	33.57	12.45	287.45	6.44	-9.94	185.32
Unit 3 26A run 3	492.32	304.95	38.84	32.99	15.03	287.85	6.64	-10.21	183.91

2	ALL OW S	SHOUT IMPRESS	TEMP 5	TIOTI AIR HE	DRAFI	ECONO DUI TEMP	SH-ROLLL SAVG	SNOR AT THE	RNACE OI	O2
										_
_	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%

	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	_ %	<b>%</b>
Unit 1	185.65	911.14	824.49	86.61	-0.09	430.59	1113.98	3.82	6.23	9.15
					0-1-1/4			Carlo Barrier		
Unit 2	185.87	909.49	822.77	88.47	-0.10	422.17	1102.08	2.70	6.17	9.42
Unit 3	187.10	900.74	824.17	80.07	-0.10	396.61	1111.76	4.64	6.38	9.53

### Wheelabrator - S. Broward

4400 South State Road 7 Fort Lauderdale, FL 33314

Tel: (954) 581-6606 Fax: (954) 581-6705

716488 Ticket

3/18/2009

9:06:25AM ln 11:27:04AM Out

623030 Account

Customer Chemical Lime

Chemical Lime

PO Box 7247-8945 Philadelphia, PA

LIME1 Decal # LIME1 Vehicle #

**Auto ID** 

2357474 Other 9020 Lime **Product** 

25.38 Ton Qty Wheelabrator So Origin Joyce Tate Operator

0.00 Price/Ton 0.00 **Fees** Other 0.00 Total 0.00

	Pounds	Tons
Gross	78160	39.08
Tare	27400	13.70
Net	50760	25.38

### Wheelabrator - S. Broward

4400 South State Road 7 Fort Lauderdale, FL 33314

Tel: (954) 581-6606 Fax: (954) 581-6705

**Ticket 716488** 

3/18/2009

9:06:25AM ln 11:27:04AM Out

623030 Account

Customer Chemical Lime

Chemical Lime

PO Box 7247-8945

Philadelphia, PA

Decal # LIME1 LIME1 Vehicle # **Auto ID** 0

2357474 Other

9020 **Product** 

25.38 Ton Qty Wheelabrator So Origin Joyce Tate Operator

Price/Ton 0.00 0.00 Fees Other 0.00 Total 0.00

	Pounds	Tons
Gross	78160	39.08
Tare	27400	13.70
Net	50760	25.38

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CleanAir Project No: 10735-4

**PARAMETERS** 

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# USEPA Method 29 (Mercury) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20)	09)	Mar 18	Mar 18	Mar 18	
Start Tim	e (approx.)	06:41	09:19	12:12	
Stop Tim	e (approx.)	08:52	11:30	14:22	
Samplin	g Conditions				
Yd	Dry gas meter correction factor	1.0079	1.0079	1.0079	
C <sub>p</sub>	Pitot tube coefficient	0.8200	0.8200	0.8200	
P.	Static pressure (in. H 2O)	-1.5000	-1.7000	-1.5000	
A	Sample location area (ft 2)	60.1320	60.1320	60.1320	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
$D_n$	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O <sub>2</sub>	Oxygen (dry volume %)	9.7200	8.8900	8.8500	9.1533
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.9500	10.8300	10.8500	10.5433
N₂+CO	Nitrogen plus carbon monoxide (dry volume %)	80.3300	80.2800	80.3000	80.3033
$V_{kc}$	Total Liquid collected (ml)	281.70	299.70	314.20	
$V_{m}$	Volume metered, meter conditions (ft 3)	69.4600	68.8700	69.1900	
T <sub>m</sub>	Dry gas meter temperature (°F)	76.9167	73.0625	72.3333	
T <sub>s</sub>	Sample temperature (°F)	505.3750	505.7500	507.9167	506.3472
$\Delta H$	Meter box orifice pressure drop (in. H 2O)	1.0483	1.0204	1.0271	
θ	Total sampling time (min)	120.0	120.0	120.0	
Flow Res	uits				
$V_{wstd}$	Volume of water collected (ft 3)	13.2568	14.1039	14.7863	14.0490
$V_{mstd}$	Volume metered, standard (dscf)	69.4099	69.3132	69.7317	69.4849
$P_s$	Sample gas pressure, absolute (in. Hg)	29.9897	29.9750	29.9897	29.9848
$P_{v}$	Vapor pressure, actual (in. Hg)	29.9897	29.9750	29.9897	29.9848
$B_{wo}$	Moisture measured in sample (% by volume)	16.0365	16.9077	17.4948	16.8130
B <sub>ws</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	16.0365	16.9077	17.4948	16.8130
√∆P	Velocity head (√in. H₂O)	0.6509	0.6415	0.6520	0.6481
$M_d$	MW of sample gas, dry (lb/lb-mole)	29.9808	30.0884	30.0900	30.0531
$M_s$	MW of sample gas, wet (lb/lb-mole)	28.0595	28.0445	27.9749	28.0263
V <sub>a</sub>	Velocity of sample (ft/sec)	48.8711	48.2040	49.0932	48.7228
%1	Isokinetic sampling (%)	103.9585	106.4474	106.0843	105.4967
$Q_a$	Volumetric flow rate, actual (acfm)	176,323	173,916	177,125	175,788
$Q_s$	Volumetric flow rate, standard (scfm)	96,662	95,259	96,847	96,256
$Q_{atd}$	Volumetric flow rate, dry standard (dscfm)	81,161	79,153	79,904	80,073
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	65,279	68,391	69,269	67,646
-	Volumetric flow rate, actual (acf/hr)	10,579,391	10,434,974	10,627,473	10,547,279
-	Volumetric flow rate, standard (scf/hr)	5,799,748	5,715,552	5,810,809	5,775,370
	Volumetric flow rate, dry standard (dscf/hr)	4,869,674	4,749,185	4,794,220	4,804,360
	Volumetric flow rate, actual (m <sup>3</sup> /hr)	299,615	295,525	300,976	298,705
	Volumetric flow rate, standard (m <sup>3</sup> /hr)	164,252	161,868	164,566	163,562
	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	137,912	134,500	135,775	136,062
	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	110,925	116,212	117,704	114,947
	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	153,053	150,831	153,345	152,410
	Volumetric flow rate, dry normal (Nm 3/hr)	128,509	125,329	126,518	126,785
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm³/hr)	103,362	108,288	109,679	107,110

Comments:

Average includes 3 runs.

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# USEPA Method 29 Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (20	009)	Mar 18	Mar 18	Mar 18	
	ne (approx.)	06:41	09:19	12:12	
	ne (approx.)	08:52	11:30	14:22	
Process	Conditions				
R <sub>P</sub>	Steam Production Rate (Kibs/hour)	183.6	183.4	184.0	183.7
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	313	305	305	308
P <sub>2</sub>	Carbon Feed rate (lb/hr)	7	6	5	6
Fa	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F.	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Cor	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.7200	8.8900	8.8500	9.1533
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.9500	10.8300	10.8500	10.5433
T <sub>s</sub>	Sample temperature (°F)	505.3750	505.7500	507.9167	506.3472
B <sub>w</sub>	Actual water vapor in gas (% by volume)	16.0365	16.9077	17.4948	16.8130
Gas Flo	Volumetric flow rate, actual (acfm)	176,323	173,916	177,125	175,788
Q, Q,	Volumetric flow rate, standard (scfm)	96,662	95,259	96,847	96,256
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	81,161	79,153	79,904	80,073
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	65,279	68,391	69,269	67,646
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	10,579,391	10,434,974	10,627,473	10,547,279
Q,	Volumetric flow rate, standard (scf/hr)	5,799,748	5,715,552	5,810,809	5,775,370
Q <sub>eld</sub>	Volumetric flow rate, dry standard (dscf/hr)	4,869,674	4,749,185	4,794,220	4,804,360
Q <sub>a</sub>	Volumetric flow rate, actual (m 3/hr)	299,615	295,525	300,976	298,705
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	164,252	161,868	164,566	163,562
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	137,912	134,500	135,775	136,062
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	110,925	116,212	117,704	114,947
Q,	Volumetric flow rate, normal (Nm 3/hr)	153,053	150,831	153,345	152,410
$Q_{\text{std}}$	Volumetric flow rate, dry normal (Nm 3/hr)	128,509	125,329	126,518	126,785
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm3/hr)	103,362	108,288	109,679	107,110
Samplin	og Data				
V <sub>mstd</sub>	Volume metered, standard (dscf)	69.4099	69.3132	69.7317	69.4849
%1	Isokinetic sampling (%)	103.9585	106.4474	106.0843	105.4967
Laborati	ory Data				
m <sub>n-1b</sub>	Fraction 1B (µg)	61.7408	61.4205	72.7139	
m <sub>n-2b</sub>	Fraction 2B (µg)	39.5721	47.6470	37.0594	
m <sub>n-3a</sub>	Fraction 3A (µg)	<0.0200	<0.0200	<0.0200	
m <sub>n-3b</sub>	Fraction 3B (µg)	0.7568	1.5 <b>2</b> 32	1.0325	
m <sub>n-3c</sub>	Fraction 3C (µg)	3.0567	6.2913	5.5174	
mn	Total matter corrected for allowable blanks (µg)	105.1263	116.8821	116.3232	
Mercury	Results - Total				
C <sub>sd</sub>	Concentration (lb/dscf)	3.3396E-09	3.7183E-09	3.6783E-09	3.5787E-09
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	4.1521E-09	4.3034E-09	4.2430E-09	4.2328E-09
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	4.0277E-09	4.1200E-09	4.0681E-09	4.0719E-09
C	Concentration (lb/acf)	1.5372E-09	1.6923E-09	1.6593E-09	1.6296E-09
C <sub>sd</sub>	Concentration (µg/dscm)	5.3480E+01	5.9543E+01	5.8902E+01	5.7308E+01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	6.6491E+01	6.8913E+01	6.7946E+01	6.7783E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	6.4498E+01	6.5975E+01	6.5146E+01	6.5206E+01
C <sub>sd</sub>	Concentration (mg/dscm)	5.3480E-02	5.9543E-02	5.8902E-02	5.7308E-02
C <sub>sq7</sub>	Concentration @7% O 2 (mg/dscm)	6.6491E-02	6.8913E-02	6.7946E-02	6.7783E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	6.4498E-02	6.5975E-02	6.5146E-02	6.5206E-02
C.	Concentration (µg/m 3 (actual,wet))	2.4617E+01	2.7099E+01	2.6572E+01	2.6096E+01
C <sub>sd</sub>	Concentration (µg/Nm 3 dry)	5.7393E+01	6.3900E+01	6.3212E+01	8.1502E+01
$C_{sd7}$	Concentration @7% O 2 (µg/Nm3 dry)	7.1356E+01	7.3955E+01	7.2917E+01	7.2743E+01
$C_{sd12}$	Concentration @12% CO ₂ (µg/Nm³ dry)	6.9217E+01	7.0803E+01	6.9912E+01	6.9978E+01
E <sub>Ib/hr</sub>	Rate (lb/hr)	1.6263E-02	1.7659E-02	1.7634E-02	1.7185E-02
E <sub>9/s</sub>	Rate (g/s)	2.0487E-03	2.2246E-03	2.2215E-03	2.1650E-03
ETAT	Rate (Ton/yr)	7.1232E-02	7.7345E-02	7.7239E-02	7.5272E-02
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	5.9747E-05	6.1924E-05	6.1054E-05	6.0908E-05
E <sub>Fc</sub>	Rate - Fc-based (ib/MMBtu)	6.1087E-05	6.2486E-05	6.1700E-05	6.1758E-05
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QA/QC \_\_\_ Date \_\_\_

# USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Front Half Results

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tim	ne (approx.)	06:41	09:19	12:12	
Stop Tim	e (approx.)	08:52	11:30	14:22	
Morouna	Results - Front Half				
C <sub>sd</sub>	Concentration (lb/dscf)	1,9614E-09	1.9539E-09	2.2993E-09	2.0715E-09
C <sub>sd7</sub>	Concentration (87% O 2 (lb/dscf)	2.4386E-09	2.2614E-09	2.6523E-09	2.4508E-09
	Concentration @12% CO 2 (lb/dscf)	2.3655E-09	2.1650E-09	2.5430E-09	2.3578E-09
C <sub>sd12</sub>	Concentration (lb/acf)	9.0282E-10	8.8927E-10	1.0372E-09	9.4311E-10
C"	Concentration (ib/acr) Concentration (µg/dscm)	3.1409E+01	3.1289E+01	3.6820E+01	3.3173E+01
C <sub>sd</sub>		3.9050E+01		4.2473E+01	3.9245E+01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)		3.6213E+01		
$C_{ad12}$	Concentration @12% CO 2 (µg/dscm)	3.7880E+01	3.4670E+01	4.0723E+01	3.7757E+01
Ced	Concentration (mg/dscm)	3.1409E-02	3.1289E-02	3.6820E-02	3.3173E-02
C <sub>sd7</sub>	Concentration @7% O ₂ (mg/dscm)	3.9050E-02	3.6213E-02	4.2473E-02	3.9245E-02
C <sub>ad12</sub>	Concentration @12% CO 2 (mg/dscm)	3.7880E-02	3.4670E-02	4.0723E-02	3.7757E-02
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	1.4457E+01	1.4240E+01	1.6610E+01	1.5103E+01
Csd	Concentration (µg/Nm 3 dry)	3.3707E+01	3.3579E+01	3.9514E+01	3.5600E+01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	4.1907E+01	3.8863E+01	4.5581E+01	4.2117E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	4.0651E+01	3.7206E+01	4.3702E+01	4.0520E+01
Elb/hr	Rate (lb/hr)	9.5512E-03	9.2795E-03	1,1023E-02	9.9514E-03
E <sub>g/a</sub>	Rate (g/s)	1,2032E-03	1.1690E-03	1.3887E-03	1.2536E-03
E <sub>T/yr</sub>	Rate (Ton/yr)	4.1834E-02	4.0644E-02	4.8282E-02	4.3587E-02
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	3:5089E-05	3.2540E-05	3.8165E-05	3.5265E-05
E <sub>Fa</sub>	Rate - Fc-based (Ib/MMBtu)	3.5876E-05	3.2836E-05	3.8569E-05	3.5760E-05
<b>⊢</b> Fc	rate - 10 based (issumble)	3.307 <b>6L</b> -03	0.E000E-00	J.5555E-00	U.U. UUL-UU

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# USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 1-3 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tim	ne (approx.)	06:41	09:19	12:12	
Stop Tim	ne (approx.)	08:52	11:30	14:22	
Mercury	Results - Impingers 1-3 Solution				
Cad	Concentration (lb/dscf)	1.2571E-09	1.5158E-09	1.1719E-09	1.3149E-09
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	1.5630E-09	1.7543E-09	1.3518E-09	1.5563E-09
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	1.5161E-09	1.6795E-09	1.2961E-09	1.4972E-09
C.	Concentration (lb/acf)	5.7865E-10	6.8985E-10	5.2865E-10	5.9905E-10
Csd	Concentration (µg/dscm)	2.0131E+01	2.4273E+01	1.8766E+01	2.1056E+01
Csa7	Concentration @7% O 2 (µg/dscm)	2.5029E+01	2.8092E+01	2.1647E+01	2.4923E+01
C <sub>2012</sub>	Concentration @12% CO 2 (µg/dscm)	2.4279E+01	2.6895E+01	2.0755E+01	2.3976E+01
C∞d	Concentration (mg/dscm)	2.0131E-02	2.4273E-02	1.8766E-02	2.1056E-02
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	2.5029E-02	2.8092E-02	2.1647E-02	2.4923E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	2.4279E-02	2.6895E-02	2.0755E-02	2.3976E-02
Ca	Concentration (µg/m 3 (actual,wet))	9.2663E+00	1.1047E+01	8.4655E+00	9.5929E+00
Csd	Concentration (µg/Nm 3 dry)	2.1604E+01	2.6049E+01	2.0139E+01	2.2597E+01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	2.6860E+01	3.0148E+01	2.3231E+01	2.6746E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	2.6055E+01	2.8863E+01	2.2273E+01	2.5730E+01
Elph	Rate (lb/hr)	6.1218E-03	7.1986E-03	5.6182E-03	6.3128E-03
E <sub>g/s</sub>	Rate (g/s)	7.7120E-04	9.0685E-04	7.0776E-04	7.9527E-04
ET/yr	Rate (Ton/yr)	2.6813E-02	3.1530E-02	2.4608E-02	2,7650E-02
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	2.2490E-05	2.5243E-05	1.9451E-05	2.2395E-05
$E_{Fc}$	Rate - Fc-based (lb/MMBtu)	2.2995E-05	2.5473E-05	1.9657E-05	2.2708E-05

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# USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 4 Results

Run No		1	2	3	Average
Date (20	009)	Mar 18	Mar 18	Mar 18	
	ne (approx.)	06:41	09:19	12:12	
Stop Tin	ne (approx.)	08:52	11:30	14:22	
Mercury	y Results - Impinger 4 Solution				
Csd	Concentration (lb/dscf)	<6.3536E-13	<6.3624E-13	<6.3242E-13	<6.3467E-13
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<7.8993E-13	<7.3637E-13	<7.2952E-13	<7.5194E-13
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	<7.6626E-13	<7.0498E-13	<6.9945E-13	<7.2356E-13
C <sub>a</sub>	Concentration (lb/acf)	<2.9245E-13	<2.8957E-13	<2.8530E-13	<2.8911E-13
C∞d	Concentration (µg/dscm)	<1.0174E-02	<1.0189E-02	<1.0127E-02	<1.0163E-02
$C_{sd7}$	Concentration @7% O 2 (µg/dscm)	<1.2650E-02	<1.1792E-02	<1.1682E-02	<1.2041E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.2271E-02	<1.1289E-02	<1.1201E-02	<1.1587E-02
$C_{sd}$	Concentration (mg/dscm)	<1.0174E-05	<1.0189E-05	<1.0127E-05	<1.0163E-05
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<1.2650E-05	<1.1792E-05	<1.1682E-05	<1.2041E-05
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<1.2271E-05	<1.1289E-05	<1.1201E-05	<1.1587E-05
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	<4.6832E-03	<4.6370E-03	<4.5686E-03	<4.6296E-03
C∞d	Concentration (µg/Nm 3 dry)	<1.0919E-02	<1.0934E-02	<1.0868E-02	<1.0907E-02
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<1.3575E-02	<1.2655E-02	<1.2537E-02	<1.2922E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<1.3168E-02	<1.2115E-02	<1.2020E-02	<1.2435E-02
Elb/hr	Rate (lb/hr)	<3.0940E-06	<3.0216E-06	<3.0320E-06	<3.0492E-06
E <sub>0/s</sub>	Rate (g/s)	<3.8977E-07	<3.8065E-07	<3.8196E-07	<3.8413E-07
ETAT	Rate (Ton/yr)	<1.3552E-05	<1.3235E-05	<1.3280E-05	<1.3355E-05
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<1,1367E-08	<1.0596E-08	<1.0497E-08	<1.0820E-08
E <sub>Fc</sub>	Rate - Fc-based (lb/MM8tu)	<1.1622E-08	<1.0692E-08	<1.0608E-08	<1.0974E-08

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# USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 5-6 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tim	e (approx.)	06:41	09:19	12:12	
	e (approx.)	08:52	11:30	14:22	
Mercury	Results - Fittered Permanganate Solution				
C <sub>sd</sub>	Concentration (lb/dscf)	2.4041E-11	4.8456E-11	3.2648E-11	3.5048E-11
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	2.9889E-11	5.6081E-11	3.7660E-11	4.1210E-11
C <sub>ad12</sub>	Concentration @12% CO 2 (lb/dscf)	2.8994E-11	5.3691E-11	3.6109E-11	3.9598E-11
C.	Concentration (lb/acf)	1.1066E-11	2.2053E-11	1.4728E-11	1.5949E-11
Cad	Concentration (µg/dscm)	3.8498E-01	7.7595E-01	5.2281E-01	5.6125E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	4.7864E-01	8.9806E-01	6.0308E-01	6.5993E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	4.6429E-01	8.5978E-01	5.7823E-01	6.3410E-01
Csd	Concentration (mg/dscm)	3.8498E-04	7.7595E-04	5.2281E-04	5.6125E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	4.7864E-04	8.9806E-04	6.0308E-04	8.5993E-04
C <sub>ad12</sub>	Concentration @12% CO 2 (mg/dscm)	4.6429E-04	8.5978E-04	5.7823E-04	6.3410E-04
C,	Concentration (µg/m 3 (actual, wet))	1.7720E-01	3.5315E-01	2.3585E-01	2.5540E-01
Cad	Concentration (µg/Nm <sup>3</sup> dry)	4.1314E-01	8.3273E-01	5.6107E-01	6.0231E-01
C <sub>≈67</sub>	Concentration @7% O 2 (µg/Nm³ dry)	5.1366E-01	9.6377E-01	6.4721E-01	7.0821E-01
C <sub>ad12</sub>	Concentration @12% CO 2 (µg/Nm³ dry)	4.9826E-01	9.2269E-01	6,2054E-01	6.8050E-01
Elb/iv	Rate (lb/hr)	1.1707E-04	2.3013E-04	1.5652E-04	1.6791E-04
E <sub>a/s</sub>	Rate (g/s)	1.4748E-05	2.8990E-05	1.9718E-05	2.1152E-05
E <sub>T/v</sub>	Rate (Ton/yr)	5.1276E-04	1.0079E-03	6.8557E-04	7.3543E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	4.3009E-07	8.0698E-07	5.4191E-07	5.9299E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	4.3974E-07	8.1431E-07	5.4765E-07	6.0056E-07
	Results - HCI Rinse + HCI/MnO2 Precipitate				
C <sub>sd</sub>	Concentration (lb/dscf)	9.7103E-11	2.0014E-10	1.7447E-10	1.5724E-10
C <sub>od7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	1.2073E-10	2.3164E-10	2.0125E-10	1.8454E-10
C <sub>ad12</sub>	Concentration @12% CO 2 (lb/dscf)	1.1711E-10	2.2176E-10	1.9296E-10	1.7728E-10
Ca	Concentration (lb/acf)	4.4697E-11	9.1088E-11	7.8705E-11	7.1497E-11
C <sub>sd</sub>	Concentration (µg/dscm)	1.5550E+00	3.2050E+00	2.7938E+00	2.5179E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	1.9333E+00	3.7093E+00	3.2228E+00	2.9551E+00
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/dscm)	1.8753E+00	3.5512E+00	3.0900E+00	2.8388E+00
Cad	Concentration (mg/dscm)	1.5550E-03	3.2050E-03	2.7938E-03	2.5179E-03
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	1.9333E-03	3.7093E-03	3.2228E-03	2.9551E-03
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	1.8753E-03	3.5512E-03	3.0900E-03	2.8388E-03
C <sub>s</sub>	Concentration (µg/m ³ (actual,wet))	7.1575E-01	1.4587E+00	1.2603E+00	1.1449E+00
C <sub>sd</sub>	Concentration (µg/Nm <sup>3</sup> dry)	1.6688E+00	3.4395E+00	2.9983E+00	2.7022E+00
C <sub>ed</sub> 7	Concentration @7% O 2 (µg/Nm³ dry)	2.0747E+00	3.9808E+00	3.4586E+00	3.1714E+08
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/Nm³ dry)	2.0126E+00	3.8111E+00	3.3161E+00	3.0466E+00
E <sub>IM'r</sub>	Rate (lb/hr)	4.7286E-04	9.5051E-04	8.3643E-04	7.5327E-04
E <sub>a/s</sub>	Rate (g/s)	5.9569E-05	1.1974E-04	1.0537E-04	9.4894E-05
E <sub>t/s</sub>	Rate (Ton/yr)	2.0711E-03	4.1632E-03	3.6636E-03	3.2993E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	1.7372E-06	3.3331E-06	2.8959E-06	2.6554E-06
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	1.7762E-06	3.3634E-06	2.9265E-06	2.6887E-06
<b>□</b> Fc	Trate - Fo-based (Inhibitato)	1.77021-00	3.3034L-00	2.02001-00	2,0007 12-00

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_ Wheelabrator South Broward, Inc. Clean Air Project No: 10735

Unit 1 FF Outlet

# USEPA Method 5/29 (Particulate/Metals) Sampling, Velocity and Moisture Parameters

Run No	•	1	2	3	Average
Date (20	009)	Mar 18	Mar 18	· Mar 18	
Start Tin	ne (approx.)	06:41	09:19	12:12	
Stop Tin	ne (approx.)	08:52	11:30	14:22	
Samplir	ng Conditions				
Yd	Dry gas meter correction factor	0.9886	0.9886	0.9886	
C <sub>p</sub>	Pitot tube coefficient	0.8120	0.8120	0.8120	
$P_{g}^{r}$	Static pressure (in. H <sub>2</sub> O)	-12.0000	-12.0000	-12.0000	
A <sub>s</sub>	Sample location area (ft 2)	64.0000	64.0000	64.0000	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
$D_n$	Nozzie diameter (in.)	0.2680	0.2680	0.2680	
O <sub>2</sub>	Oxygen (dry volume %)	9.4300	9.1600	9.1600	9.2500
CO2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	10.4133
N₂+CC	Nitrogen plus carbon monoxide (dry volume %)	80.3800	80.2900	80.3400	80.3367
V <sub>Ic</sub>	Total Liquid collected (ml)	410.60	414.70	419.00	
V <sub>m</sub>	Volume metered, meter conditions (ft 3)	70.0250	69.6650	69.5300	
T <sub>m</sub>	Dry gas meter temperature (°F)	75.9600	82.2800	79.0000	
T <sub>s</sub>	Sample temperature (°F)	296.0000	290.4000	290.4800	292.2933
ΔН	Meter box orifice pressure drop (in. H 2O)	1.0480	1.0180	1.0220	
8	Total sampling time (min)	125.0	125.0	125.0	
Flow Re	sults				
V <sub>wstd</sub>	Volume of water collected (fl <sup>3</sup> )	19.3228	19.5158	19.7181	19.5189
V <sub>matd</sub>	Volume metered, standard (dscf)	68.7570	67.6014	67.8816	68.0800
Ps	Sample gas pressure, absolute (in. Hg)	29.2176	29.2176	29.2176	29.2176
$P_{v}$	Vapor pressure, actual (in. Hg)	29.2176	29.2176	29.2176	29.2176
B <sub>wo</sub>	Moisture measured in sample (% by volume)	21.9379	22.4018	22.5094	22.2830
B <sub>ws</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.9379	22.4018	22.5094	22.2830
√∆P	Velocity head (√in. H₂O)	0.6517	0.6418	0.6384	0.6440
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.0076	30.0544	30.0464	30.0361
$M_s$	MW of sample gas, wet (lb/lb-mole)	27.3734	27.3540	27.3348	27.3541
$V_s$	Velocity of sample (ft/sec)	43.9841	43.1723	42.9622	43.3729
<b>%</b> I	Isokinetic sampling (%)	99.9960	100.0164	101.0729	100.3617
$Q_a$	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	166,552
$Q_s$	Volumetric flow rate, standard (scfm)	115,192	113,910	113,343	114,148
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	88,715
$Q_{\text{std7}}$	Volumetric flow rate, dry std@7%O 2 (dscfm)	74,201	74,656	74,182	74,347
$Q_n$	Volumetric flow rate, actual (acf/hr)	10,133,929	9,946,890	9,898,500	9,993,106
Q,	Volumetric flow rate, standard (scf/hr)	6,911,521	6,834,583	6,800,610	6,848,905
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	5,395,281	5,303,516	5,269,836	5,322,877
Q <sub>a</sub>	Volumetric flow rate, actual (m <sup>3</sup> /hr)	286,999	281,702	280,331	283,011
$Q_s$	Volumetric flow rate, standard (m <sup>3</sup> /hr)	195,738	193,559	192,597	193,965
$\mathbf{Q}_{std}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	152,798	150,199	149,245	150,747
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	126,085	126,858	126,053	126,332
$Q_s$	Volumetric flow rate, normal (Nm ³/hr)	182,393	180,362	179,466	180,740
$Q_{std}$	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	142,380	139,958	139,069	140,469
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm3/hr)	117,489	118,209	117,458	117,719

Comments:

Average includes 3 runs.

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## USEPA Method 5/29 Filterable Particulate Parameters

Date   Carbon   Car	Run No.		1	2	3	Average
Sign   Time   (approx.)   Co.   Co	Date (20	09)	Mar 18	Mar 18	Mar 18	
Shop Time (approx.)   11:30   14:22	-	· ·				
Forcess Conditions           R <sub>P</sub> Steam Production Rate (kibs/hour)         183.6         183.4         184.0         183.0           R <sub>P</sub> Pabric Filter Intel Temperature (°F)         313         305         305         308           F <sub>Z</sub> Caryon-based F-factor (dsc/fMMBtu)         9.570         9.570         9.570         9.570           F <sub>Z</sub> Carbon dioxide-based F-factor (dsc/fMMBtu)         1.820         1.820         1.820         1.820           Cas Conditions         Co.         Oxygen (dry volume %)         9.4300         9.1600         9.1600         9.2500           CO <sub>Z</sub> Carbon dioxide (dry volume %)         10.1900         10.5500         10.5000         10.4133           R <sub>X</sub> Actual water vapor in gas (% by volume)         21.9379         22.4018         22.5094         22.2830           Gas Flow Rate         C <sub>X</sub> Volumetric flow rate, actual (acfm)         1168,889         165,781         164,975         166,552           Q <sub>x</sub> Volumetric flow rate, actual (acfm)         115,192         113,910         113,343         114,148           Q <sub>x</sub> Volumetric flow rate, actual (acfm)         1,18,192         113,941         114,148           Q <sub>x</sub> Volumet		* * * * *				
RP, P         Sleam Production Rate (Kibs/hour)         18.3.6         18.3.4         18.0.3         30.5         30.5         50.5         50.5         F.J.         Oxygen-based F-factor (dsc/f/MMBtu)         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         9.570         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760         8.760	•					
P <sub>I</sub> all Dayson-based F-factor (dischfMMBtu)         9,570 9,570 9,570 9,570 9,570 9,570         9,570 9,570 9,570 9,570 9,570         9,570 9,570 9,570 9,570 9,570 9,570         9,570 9,570 9,570 9,570 9,570 9,570 9,570 9,570         9,570 9,570 9,570 9,570 9,570 9,570 9,570 9,570 9,570 9,570 0,570 9,570 0,570 9,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0,570 0		·	183.6	183.4	184 0	183.7
F <sub>c</sub> Chygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         2,820         2,822         2,823         1,820         1,820         1,820         1,820         2,822         2,822         2,823         1,141	-	•				
F <sub>C</sub>   Carbon dioxide-based F-factor (decfMMBlu)   1,820   1,820   1,820   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760   8,760						
Cap Cap Conditions         Cap Conditions         8,760         8,760         8,760         9,8760         9,8760         2,8760         Conditions         9,1600         9,1600         9,2500         CO, Conditions         9,4300         9,1600         9,1600         9,2500         CO, Conditions         10,1900         10,5500         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         10,5000         20,2500         202,233         22,24018         22,2594         22,2330         22,2330           Gas Flow Rate         Cq.         Volumetric flow rate, actual (acfm)         116,8,899         165,781         164,975         166,552         166,552         166,552         166,552         166,552         166,552         174,121         74,856         74,122         74,457         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166,552         166	_				-	
Gas Conditions         O₂         O₂ yagen (dry volume %)         9.4300         9.1600         9.1600         9.2500           CO₂         Carbon dioxide (dry volume %)         10.1900         10.5500         10.5000         10.4133           T₂         Sample temperature (°F)         296.0000         290.4000         290.4800         292.2933           Saw         Actual water vapor in gas (% by volume)         21.9379         22.4018         22.5094         22.2830           Gas Flow Rate         Volumetric flow rate, actual (acfm)         168,899         165,781         164,975         166,572           Q₂         Volumetric flow rate, standard (dscfm)         19,139,101         113,910         113,343         114,148           Q₂         Volumetric flow rate, actual (acfm)         89,921         88,392         87,831         88,715           Q₂         Volumetric flow rate, actual (acfm)         10,133,929         9946,899         39,985,000         99,931,006           Q₂         Volumetric flow rate, actual (acfm)rin         10,133,929         281,702         280,331         282,287           Q₂         Volumetric flow rate, actual (acfm)rin         195,738         180,362         39,985,00         99,993,106           Q₃         Volumetric flow rate, actual (acfm)r		·				-
O₂         Cxygen (dry volume %)         9,4300         9,1600         9,1600         9,1600           CO₂         Carbon dioxide (dry volume %)         10,1900         10,5500         10,5000         10,5000         10,5000         290,4800         290,4800         290,4800         292,2833           Bw         Actual water vapor in gas (% by volume)         21,9379         22,4018         22,5094         22,2830           Gas Flow Rate         Qa         Volumetric flow rate, actual (acfm)         1168,899         165,781         113,343         1114,418           Cate         Volumetric flow rate, dry standard (scfm)         99,921         88,392         87,831         88,715           Qa         Volumetric flow rate, dry standard (scfm)         10,133,929         9,946,890         9,898,500         9,993,106           Qa         Volumetric flow rate, actual (arthr)         10,133,929         9,946,890         9,898,500         9,993,106           Qa         Volumetric flow rate, actual (arthr)         10,133,929         9,946,890         9,898,500         9,993,106           Qa         Volumetric flow rate, actual (arthr)         10,133,929         9,946,890         9,898,500         9,898,500         9,898,500         9,898,500         9,898,500         9,898,500         9,898,500 <td>•</td> <td>ditions</td> <td></td> <td></td> <td></td> <td></td>	•	ditions				
CO₂         Carbon dioxide (dry volume %)         10,1900         10,5500         10,5000         10,4103           T₂         Sample temperature (°F)         296,0000         290,4000         290,4800         292,2833           B₂         Actual water vapor (nga (% by volume)         21,3379         22,4018         22,5094         22,2830           Gas         Flowmetric flow rate, actual (acfmr)         168,899         165,781         164,975         166,552           Q₂         Volumetric flow rate, dry standard (dscfm)         89,921         88,392         37,831         81,114           Q₂         Volumetric flow rate, dry standard (dscfmr)         10,133,929         9,946,890         9,888,500         9,993,106           Q₂         Volumetric flow rate, dry standard (dscfmr)         6,911,521         6,834,583         6,800,610         9,993,106           Q₂         Volumetric flow rate, dry standard (dscfmr)         15,385,281         5,303,516         5,289,383         5,322,877           Q₂         Volumetric flow rate, dry standard (dscfmr)         15,759         19,365         19,365           Q₂         Volumetric flow rate, dry stadpard (dscfmr)         15,759         193,059         193,065           Q₂         Volumetric flow rate, dry stadpard (dsr m²m)         152,798			9.4300	9 1600	9 1600	9.2500
T₂         Sample temperature ("F)         296,0000         290,4000         290,4800         292,2833           B₂         Actual water vapor in gas (% by volume)         21,3379         22,4018         22,5994         22,2830           Gas Flow Rate Q₂         Volumetric flow rate, actual (acfm)         168,899         165,781         164,975         166,552           Q₂         Volumetric flow rate, dry standard (dscfm)         18,921         88,392         83,311         13,343         114,148           Q₂         Volumetric flow rate, dry standard (dscfm)         19,132,192         88,392         88,312         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,182         74,1						
B <sub>w</sub> Actual water vapor in gas (% by volume)         21.9379         22.4018         22.5094         22.2830           Gas Flow Rate         CQ <sub>a</sub> Volumetric flow rate, actual (acfm)         168,899         165,761         164,975         166,552           Q <sub>a</sub> Volumetric flow rate, standard (scfm)         89,921         88,392         87,831         88,152           Q <sub>est</sub> Volumetric flow rate, dry stad(3*Vo) (dscfm)         74,201         74,656         74,182         74,147           Q <sub>a</sub> Volumetric flow rate, actual (acf/hr)         10,133,929         9,946,890         9,888,500         9,993,106           Q <sub>a</sub> Volumetric flow rate, standard (scf/hr)         5,395,281         5,303,516         5,209,893         6,848,005           Q <sub>ab</sub> Volumetric flow rate, dry standard (dscf/hr)         26,8999         281,702         200,331         283,017           Q <sub>ab</sub> Volumetric flow rate, dry standard (dscf/hr)         152,798         150,199         149,245         150,199           Q <sub>ab</sub> Volumetric flow rate, dry standard (dscf/m/hr)         152,798         150,199         149,245         150,749           Q <sub>ab</sub> Volumetric flow rate, dry standard (dscf/m/hr)         182,393         193,595         128,053         128,053	_	, ,				
Gas Flow Rate Q <sub>a</sub> Volumetric flow rate, actual (acfm)         168,899         165,781         164,975         166,552           Q <sub>a</sub> Volumetric flow rate, standard (scfm)         115,192         113,910         113,343         114,148           O <sub>est</sub> Volumetric flow rate, dry standard (scfm)         89,921         88,392         87,831         88,715           Q <sub>a</sub> Volumetric flow rate, actual (acf/hr)         10,133,929         9,946,899         9,898,500         9,998,500           Q <sub>a</sub> Volumetric flow rate, actual (acf/hr)         6,911,521         6,834,893         6,800,610         6,848,905           Q <sub>av</sub> Volumetric flow rate, dry standard (scf/hr)         5,932,897         5,932,817         22,8331         283,011           Q <sub>a</sub> Volumetric flow rate, dry standard (dry m²/hr)         152,798         150,199         149,245         150,745           Q <sub>ast</sub> Volumetric flow rate, dry standard (dry m²/hr)         126,085         126,858         126,053         128,332           Q <sub>ast</sub> Volumetric flow rate, dry standard (dry m²/hr)         126,085         126,858         126,053         128,332           Q <sub>a</sub> Volumetric flow rate, dry standard (dry m²/hr)         112,380         139,958         139,069         140,469						
Q <sub>s</sub> Volumetric flow rate, actual (acfm)         168,899         165,781         164,975         166,552           Q <sub>st</sub> Volumetric flow rate, standard (scfm)         115,192         113,910         113,343         114,148           Q <sub>st</sub> Volumetric flow rate, dry standard (scsfm)         89,921         88,992         87,831         88,715           Q <sub>st</sub> Volumetric flow rate, dry standard (scsfm)         10,133,932         9,486,989         9,893,016         6,848,905           Q <sub>st</sub> Volumetric flow rate, standard (scsfm)         5,395,281         5,303,516         5,269,836         5,222,877           Q <sub>st</sub> Volumetric flow rate, standard (scsfm)         2,899         281,702         280,332         3,283,911           Q <sub>st</sub> Volumetric flow rate, actual (m²/hr)         266,899         281,702         280,332         283,011           Q <sub>st</sub> Volumetric flow rate, actual (m²/hr)         195,738         1193,559         119,297         193,965           Q <sub>st</sub> Volumetric flow rate, dry standard (dry m²/hr)         126,085         126,859         126,053         126,332           Q <sub>st</sub> Volumetric flow rate, dry standard (dscfm)         182,093         180,362         179,466         180,740           Q <sub>st</sub>						
Q <sub>4</sub> Volumetric flow rate, standard (scrfm)         115,192         113,910         113,343         114,148           Q <sub>est</sub> Volumetric flow rate, dry standard (scrfm)         89,921         88,392         87,831         87,157           Q <sub>est</sub> Volumetric flow rate, dry standard (scrfm)         10,133,929         9,946,890         9,898,500         9,993,106           Q <sub>4</sub> Volumetric flow rate, actual (scrfm)         6,911,521         6,848,908         8,980,00         9,989,306           Q <sub>4</sub> Volumetric flow rate, standard (dscrfm)         286,999         281,702         280,331         282,011           Q <sub>4</sub> Volumetric flow rate, actual (m²/m²)         195,738         193,555         192,957         193,965           Q <sub>4</sub> Volumetric flow rate, dry standard (dry m²/m²)         152,798         150,199         149,245         150,147           Q <sub>84</sub> Volumetric flow rate, dry standard (dry m²/m²)         126,085         126,838         126,093         140,489           Q <sub>84</sub> Volumetric flow rate, dry standard (dry m²/m²)         182,393         180,362         179,466         180,749           Q <sub>84</sub> Volumetric flow rate, dry standard (dscrf)         68,757         17,486         180,749           Q <sub>84</sub> Vol			168 899	165 781	164 975	166.552
O <sub>std</sub> Q <sub>estf</sub> Volumetric flow rate, dry standard (dsc/fm)         89,921 74,201         88,392 74,656         78,331 74,556         88,715 74,347           Q <sub>a</sub> Volumetric flow rate, actual (ac/fm)         10,133,929 10,684,890         9,989,500 9,999,31,06         9,999,106           Q <sub>a</sub> Volumetric flow rate, standard (sc/fm)         6,911,521 6,834,583 6,800,610 6,944,905         6,844,905 6,844,905         6,848,905 6,844,905         9,999,31,06           Q <sub>a</sub> Volumetric flow rate, standard (m²/hr)         286,999 281,702 280,331         283,011 283,011         19,245 192,597         193,955 192,597         193,955 193,595         193,955 193,595         193,955 193,053         193,059 193,695         193,955 193,065         194,245 150,747         195,733 193,059         194,245 150,747         195,733 193,059         194,245 150,747         195,733 193,059         192,597 193,965 193,069         193,965 193,049         193,965 193,069         193,965 180,749         193,069 140,469         140,469         117,458         117,719         117,479         117,489         118,209 117,458         117,719         117,719         117				-		-
Quest/ Qa         Volumetric flow rate, actual (act/hr)         74,201         74,656         74,182         74,347           Qa         Volumetric flow rate, actual (act/hr)         10,133,929         9,946,890         9,898,500         9,993,106           Qa         Volumetric flow rate, actual (m²/hr)         6,911,521         6,834,583         6,800,610         6,844,905           Qa         Volumetric flow rate, dry standard (dsc/hr)         5,395,281         5,303,516         5,269,836         5,322,877           Qa         Volumetric flow rate, dry standard (m²/hr)         195,738         193,559         192,597         193,965           Qard         Volumetric flow rate, dry standard (dby m³/hr)         152,798         150,199         149,245         150,747           Qard         Volumetric flow rate, dry standard (dby m³/hr)         126,858         128,653         126,053         126,033         126,033         126,033         126,032         126,033         126,032         126,032         126,032         126,033         126,032         126,033         126,032         126,033         126,033         126,033         126,032         126,033         126,032         126,032         126,032         126,032         126,032         126,032         126,032         126,032         126,032 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
Qa         Volumetric flow rate, actual (act/hr)         10,133,929         9,948,890         9,898,500         9,993,106           Qa         Volumetric flow rate, standard (scr/hr)         5,395,281         5,303,516         5,269,836         5,222,877           Qa         Volumetric flow rate, actual (m³/hr)         286,999         281,702         280,331         283,011           Qa         Volumetric flow rate, actual (m³/hr)         195,738         193,559         192,997         193,955           Qad         Volumetric flow rate, actual (m³/hr)         152,798         150,199         149,245         150,747           Qad         Volumetric flow rate, dry standard (dry m³/hr)         1126,085         126,858         126,053         126,332           Qa         Volumetric flow rate, dry standard (lm³/hr)         142,380         139,958         139,069         140,469           Qad         Volumetric flow rate, dry normal @7%O₂ (Nm³/hr)         117,489         118,209         117,458         117,719           Sampling         Data         Volumetric flow rate, dry normal @7%O₂ (Nm³/hr)         117,489         118,209         117,458         117,719           Sampling         Data         Volumetric flow rate, dry normal @7%O₂ (Nm³/hr)         110,466         68.750         67,6014         67,80						
O <sub>4</sub> Volumetric flow rate, standard (sc/fhr)         6,911,521         6,834,583         6,800,610         6,848,905           O <sub>4</sub> Volumetric flow rate, stry standard (dsc/fhr)         2,395,281         5,303,516         5,208,838         5,322,877           O <sub>4</sub> Volumetric flow rate, standard (m²/hr)         266,999         281,702         280,331         283,011           O <sub>4</sub> Volumetric flow rate, standard (m²/hr)         195,738         193,559         192,597         193,965           O <sub>4</sub> Volumetric flow rate, standard (m²/hr)         126,085         126,858         126,083         126,033           Q <sub>4</sub> Volumetric flow rate, normal (Nm²/hr)         182,393         180,362         179,466         180,740           Q <sub>4</sub> Volumetric flow rate, dry normal (Nm²/hr)         112,380         139,958         139,069         140,469           Sampling         Data         Volumetric flow rate, dry normal (M²²k²Q (Nm²²/hr)         117,489         118,209         117,458         117,719           Sampling         Data         Volumetric flow rate, dry normal (M²²k²Q (Nm²²/hr)         117,489         118,209         117,458         110,0729         100,0361           Laboratory         Data         Male Collected of flifer(s) (g)         68,7570						
Qetable         Volumetric flow rate, dry standard (dsc/fhr)         5,395,281         5,305,581         5,269,836         5,322,877           Qa         Volumetric flow rate, actual (m²/hr)         286,999         281,702         280,331         283,011           Qat         Volumetric flow rate, standard (m²/hr)         195,738         193,559         193,559         193,965           Qatd         Volumetric flow rate, dry stad@r%Q (dry m²/hr)         152,798         150,199         149,245         150,747           Qard         Volumetric flow rate, dry stad@r%Q (dry m²/hr)         126,085         126,655         126,055         126,832           Qatd         Volumetric flow rate, dry normal (Mm²/hr)         182,093         180,362         179,466         180,740           Qatd         Volumetric flow rate, dry normal (m²/hr)         142,380         139,958         139,069         140,469           Sampling         Data         Volumetric flow rate, dry normal (m²/hr)         117,489         118,209         117,458         117,719           Sampling         Data         Volumetric flow rate, dry normal (m²/hr)         68.7570         67,6014         67,8816         68.0800           %1         Sating         Matter collected on filter(s) (g)         0.00080         0.00010         0.00010		• • • • • • • • • • • • • • • • • • • •				
Q₂         Volumetric flow rate, standard (m³/hr)         266,999         281,702         280,331         283,011           Q₂         Volumetric flow rate, standard (m³/hr)         195,738         193,559         192,597         193,965           Q₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂₂						
Q <sub>et</sub> Q <sub>ard</sub> Volumetric flow rate, standard (m²/hr)         195,738         193,559         192,597         133,955           Q <sub>ard</sub> Volumetric flow rate, dry standard (dry m²/hr)         152,798         150,199         149,245         150,747           Q <sub>et</sub> Volumetric flow rate, dry standard (dry m²/hr)         126,085         126,688         126,053         126,332           Q <sub>et</sub> Volumetric flow rate, dry normal (Nm²/hr)         182,393         180,362         179,466         180,740           Q <sub>etd</sub> Volumetric flow rate, dry normal (P²Q-Q (Nm²/hr)         142,380         139,958         139,069         140,469           Sampling Data         Volume metered, standard (dscf)         68.7570         67.6014         67.8816         68.0800           %i         Isokinetic sampling (%)         99.9960         100.0164         101.0729         100.3617           Laboratory Data Mnler         Matter collected on filter(s) (g)         0.00080         0.0010         0.00340         0.00340           Filterable Particulate Results         Cast         Particulate Results         2.8863E-08         1.2395E-07         1.1044E-07         8.7751E-08           C <sub>edf</sub> Particulate Concentration (@12% CO <sub>2</sub> (Ib/dscf)         3.4977E-08         1.4675E-07         1.2622E-07         1.0446E-07           C <sub>edf</sub> Particulate Concentration (@12% CO <sub>2</sub> (I						
O <sub>std</sub> O <sub>eff</sub> Volumetric flow rate, dry standard (dry m³/hr)         152,798         150,199         149,245         150,747           O <sub>eff</sub> Volumetric flow rate, dry std@7%O₂ (dry m³/hr)         126,085         126,858         126,053         126,332           Q₂ Volumetric flow rate, normal (Nm³/hr)         182,393         180,362         179,466         180,740           Q₂ dar         Volumetric flow rate, dry normal (Nm³/hr)         142,380         139,958         139,069         140,469           Q₂ dar         Volumetric flow rate, dry normal @7%O₂ (Nm³/hr)         117,489         118,209         117,458         117,719           Sampling Data           V <sub>matal</sub> Volume metered, standard (dscf)         68.7570         67.6014         67.8816         68.080           %1         Isokinetic sampling (%)         99.9960         100.0164         101.0729         100.3617           Laboratory Data           mn <sub>m</sub> Matter collected on filter(s) (g)         0.00080         0.00010         0.00010         0.00340           Laboratory Data           mn <sub>m</sub> Matter collected in solvent rinse(s) (g)         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.0003         0.00034		,				
O <sub>est</sub> 7         Volumetric flow rate, dry std@7%O₂ (dry m³/hr)         126,085         126,858         126,053         126,332           Q <sub>e</sub> Volumetric flow rate, normal (Nm³/hr)         182,393         180,362         179,466         180,749           Q <sub>est</sub> 7         Volumetric flow rate, dry normal (Nm³/hr)         142,380         139,959         117,458         117,479           Sampling Data           V <sub>matdl</sub> 8/61         Volume metered, standard (dscf)         68.7570         67.6014         67.8816         68.0800           %1         Solicinetic sampling (%)         99.9960         100.0164         101.0729         100.3617           Laboratory Data           m <sub>flot</sub> Matter collected on filter(s) (g)         0.00080         0.00010         0.00340           m <sub>n</sub> Total particulate results         3.00090         0.00380         0.00340           Filterable Particulate Results         2.8863E-08         1.2395E-07         1.104E-07         8.7751E-08           C <sub>set</sub> 7         Particulate Concentration (bl/dscf)         2.8863E-08         1.2395E-07         1.104E-07         8.7751E-08           C <sub>set</sub> 7         Particulate Concentration (@12% CO2 (bl/dscf)         3.4977E-08         1.4675E-07         1.3076E-07         1.0040E-07	-	, ,				
Q <sub>c</sub> Q <sub>atd</sub> Volumetric flow rate, normal (Nm³/hr)         182,393         180,362         179,466         180,740           Q <sub>atd</sub> Volumetric flow rate, dry normal (Mm³/hr)         142,380         139,958         139,069         140,469           Sampling Data         Volume metered, standard (dscf)         68.7570         67.6014         67.8816         68.0800           %1         Isokinetic sampling (%)         99.9960         100.0164         101.0729         100.3617           Laboratory Data         Matter collected on filter(s) (g)         0.00080         0.00010         0.00010         0.00340           m <sub>m</sub> Matter collected in solvent rinse(s) (g)         0.00010         0.00380         0.00340           Filterable Particulate Results         Cad         Particulate Concentration (Ib/dscf)         2.8863E-08         1.2395E-07         1.1044E-07         8.7751E-08           C <sub>sd1</sub> Particulate Concentration (@7% O <sub>2</sub> (Ib/dscf)         3.4977E-08         1.4675E-07         1.3076E-07         1.044E-07         1.044E-07           C <sub>sd2</sub> Particulate Concentration (@7% O <sub>2</sub> (Ib/dscf)         3.3989E-08         1.4098E-07         1.2622E-07         1.044E-07         1.0446E-07           C <sub>sd1</sub> Particulate Concentration (@7/dscf)         0.0002         0.0009			126,085		126,053	126,332
Q <sub>std</sub> Q <sub>stf</sub> Volumetric flow rate, dry normal (Nm³/hr)         142,380         139,958         139,069         140,469           Q <sub>stf</sub> Volumetric flow rate, dry normal @7%O₂ (Nm³/hr)         117,489         118,209         117,458         117,719           Sampling V <sub>matd</sub> %1         Volume metered, standard (dscf)         68,7570         67,6014         67,8816         68,0800           %1         Isokinetic sampling (%)         99,9960         100,0164         101,0729         100,3617           Laboratory Data           m <sub>filter</sub> m <sub>a</sub> Matter collected on filter(s) (g)         0,00010         0,00010         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040         0,00040			182,393	180,362	179,466	180,740
Sampling Data   Vinute   Volume   Vol		Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	142,380	139,958	139,069	140,469
V <sub>matid</sub> %I         Volume metered, standard (dscf)         68.7570         67.6014         67.8816         68.0800           %I         Isokinetic sampling (%)         99.9960         100.0164         101.0729         100.3617           Laboratorry Data         Matter collected on filter(s) (g)         0.00080         0.00010         0.00010         0.00040           m <sub>m</sub> Matter collected in solvent rinse(s) (g)         0.00090         0.00380         0.00340           Filterable           Particulate Results           C <sub>sdf</sub> Particulate Concentration (B/McScf)         2.8863E-08         1.2395E-07         1.0416E-07         8.7751E-08           C <sub>sdf1</sub> Particulate Concentration @7% O₂ (Ib/dscf)         3.4977E-08         1.4675E-07         1.0416E-07         1.0416E-07           C <sub>sdf12</sub> Particulate Concentration (B12% CO₂ (Ib/dscf)         3.3989E-08         1.4098E-07         1.2622E-07         1.0416E-07         1.0416E-07           C <sub>sdf12</sub> Particulate Concentration (Ib/acf)         0.0002         0.0009         0.0008         4.675E-08         5.8798E-08         4.675E-07         1.0416E-07           C <sub>sdf12</sub> Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0008		Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm <sup>3</sup> /hr)	117,489	118,209	117,458	117,719
V <sub>matid</sub> %I         Volume metered, standard (dscf)         68.7570         67.6014         67.8816         68.0800           %I         Isokinetic sampling (%)         99.9960         100.0164         101.0729         100.3617           Laboratorry Data         Matter collected on filter(s) (g)         0.00080         0.00010         0.00010         0.00040           m <sub>m</sub> Matter collected in solvent rinse(s) (g)         0.00090         0.00380         0.00340           Filterable           Particulate Results           C <sub>sdf</sub> Particulate Concentration (B/McScf)         2.8863E-08         1.2395E-07         1.0416E-07         8.7751E-08           C <sub>sdf1</sub> Particulate Concentration @7% O₂ (Ib/dscf)         3.4977E-08         1.4675E-07         1.0416E-07         1.0416E-07           C <sub>sdf12</sub> Particulate Concentration (B12% CO₂ (Ib/dscf)         3.3989E-08         1.4098E-07         1.2622E-07         1.0416E-07         1.0416E-07           C <sub>sdf12</sub> Particulate Concentration (Ib/acf)         0.0002         0.0009         0.0008         4.675E-08         5.8798E-08         4.675E-07         1.0416E-07           C <sub>sdf12</sub> Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0008	Samplin	g Data				
Isokinetic sampling (%)   99.9960   100.0164   101.0729   100.3617		<del>-</del>	68.7570	67.6014	67.8816	68.0800
Matter collected on filter(s) (g)         0.00080         0.00010         0.00010           m <sub>B</sub> Matter collected in solvent rinse(s) (g)         0.00010         0.00380         0.00340           m <sub>D</sub> Total particulate matter collected (g)         0.00090         0.00380         0.00340           Filterable           Particulate Results           C <sub>ad</sub> Particulate Concentration (lb/dscf)         2.8863E-08         1.2395E-07         1.1044E-07         8.7751E-08           C <sub>sd1</sub> Particulate Concentration @7% O <sub>2</sub> (lb/dscf)         3.4977E-08         1.4675E-07         1.3076E-07         1.0416E-07           C <sub>sd1</sub> 2         Particulate Concentration (lb/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           C <sub>sd2</sub> Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0006           C <sub>sd2</sub> 7         Particulate Concentration @72% O <sub>2</sub> (gr/dscf)         0.0002         0.0010         0.0009         0.0007           C <sub>sd2</sub> 3         Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           C <sub>sd2</sub> 4         Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003			99.9960	100.0164	101.0729	100.3617
Matter collected on filter(s) (g)         0.00080         0.00010         0.00010           m <sub>B</sub> Matter collected in solvent rinse(s) (g)         0.00010         0.00380         0.00340           m <sub>D</sub> Total particulate matter collected (g)         0.00090         0.00380         0.00340           Filterable           Particulate Results           C <sub>ad</sub> Particulate Concentration (lb/dscf)         2.8863E-08         1.2395E-07         1.1044E-07         8.7751E-08           C <sub>sd1</sub> Particulate Concentration @7% O <sub>2</sub> (lb/dscf)         3.4977E-08         1.4675E-07         1.3076E-07         1.0416E-07           C <sub>sd1</sub> 2         Particulate Concentration (lb/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           C <sub>sd2</sub> Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0006           C <sub>sd2</sub> 7         Particulate Concentration @72% O <sub>2</sub> (gr/dscf)         0.0002         0.0010         0.0009         0.0007           C <sub>sd2</sub> 3         Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           C <sub>sd2</sub> 4         Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003	Laborate	one Data				
m <sub>B</sub> Matter collected in solvent rinse(s) (g)         0.00010         0.00380         0.00340           m <sub>n</sub> Total particulate matter collected (g)         0.00090         0.00380         0.00340           Filterable Particulate Results           C <sub>ad</sub> Particulate Concentration (lb/dscf)         2.8863E-08         1.2395E-07         1.1044E-07         8.7751E-08           C <sub>sd7</sub> Particulate Concentration (m2°% O₂ (lb/dscf)         3.4977E-08         1.4675E-07         1.0040E-07           C <sub>ad12</sub> Particulate Concentration (lb/acf)         3.3989E-08         1.4098E-07         1.2622E-07         1.0040E-07           C <sub>a</sub> Particulate Concentration (lb/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           C <sub>ad27</sub> Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0006           C <sub>ad12</sub> Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0007           C <sub>ad2</sub> Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           C <sub>ad3</sub> Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           C <sub>ad4</sub> <t< td=""><td></td><td>•</td><td>0.00080</td><td>0.00010</td><td>0.00010</td><td></td></t<>		•	0.00080	0.00010	0.00010	
Total particulate matter collected (g)   0.00090   0.00380   0.00340						
Particulate Concentration (lb/dscf)   2.8863E-08   1.2395E-07   1.1044E-07   8.7751E-08   C sd7   Particulate Concentration (@7% O <sub>2</sub> (lb/dscf)   3.4977E-08   1.4675E-07   1.3076E-07   1.0416E-07   C sd12   Particulate Concentration (@12% CO <sub>2</sub> (lb/dscf)   3.3989E-08   1.4098E-07   1.2622E-07   1.0040E-07   C sd12   Particulate Concentration (lb/acf)   1.5366E-08   6.6087E-08   5.8798E-08   4.6750E-08   C sd12   Particulate Concentration (gr/dscf)   0.0002   0.0009   0.0008   0.0006   C sd7   Particulate Concentration (@7% O <sub>2</sub> (gr/dscf)   0.0002   0.0010   0.0009   0.0007   C sd12   Particulate Concentration (@7% O <sub>2</sub> (gr/dscf)   0.0002   0.0010   0.0009   0.0007   C sd12   Particulate Concentration (gr/dscf)   0.0001   0.0005   0.0004   0.0003   C sd2   Particulate Concentration (gr/dscf)   0.0001   0.0005   0.0004   0.0003   C sd2   Particulate Concentration (@7% O <sub>2</sub> (mg/dscm)   0.4622   1.9848   1.7686   1.4052   C sd7   Particulate Concentration (@7% O <sub>2</sub> (mg/dscm)   0.5801   2.3500   2.0940   1.6680   C sd12   Particulate Concentration (@7% O <sub>2</sub> (mg/dscm)   0.5443   2.2576   2.0212   1.6077   C sd12   Particulate Concentration (mg/m³ (actual,wet))   0.2461   1.0583   0.9416   0.7486   C sd2   Particulate Concentration (mg/m³ dry)   0.4960   2.1301   1.8980   1.5080   C sd12   Particulate Concentration (@7% O <sub>2</sub> (mg/Nm³ dry)   0.5841   2.5220   2.2472   1.7901   C sd12   Particulate Concentration (@7% O <sub>2</sub> (mg/Nm³ dry)   0.5841   2.4228   2.1691   1.7254   E lbbr   Particulate Rate (lb/hr)   0.0706   0.2981   0.2640   0.2109   E lbbr   Particulate Rate (lb/hr)   0.0706   0.2981   0.2640   0.2109   E lbbr   Particulate Rate (ror/yr)   0.6821   2.8792   2.5492   2.0368   E lbbr   Particulate Rate (ror/yr)   0.6821   2.8792   2.5492   2.0368   E lbbr   Particulate Rate (ror/yr)   0.6015   0.0021   0.0019   0.0015   E lbbr   Particulate Rate (ror/yr)   0.0015   0.0021   0.0019   0.0015   0.0021   0.0019   0.0015   0.0021   0.0019   0.0015   0.0021   0.0021   0.0021   0.0021   0.0022   0.0022   0.0022   0.00						
C <sub>sd</sub> Particulate Concentration (lb/dscf)         2.8863E-08         1.2395E-07         1.1044E-07         8.7751E-08           C <sub>sd7</sub> Particulate Concentration @7% O₂ (lb/dscf)         3.4977E-08         1.4675E-07         1.3076E-07         1.0416E-07           C <sub>sd12</sub> Particulate Concentration @12% CO₂ (lb/dscf)         3.3989E-08         1.4098E-07         1.2622E-07         1.0040E-07           C <sub>sd</sub> Particulate Concentration (lb/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           C <sub>sd</sub> Particulate Concentration @7% O₂ (gr/dscf)         0.0002         0.0009         0.0009         0.0009           C <sub>sd</sub> Particulate Concentration @7% O₂ (gr/dscf)         0.0002         0.0010         0.0009         0.0007           C <sub>sd</sub> Particulate Concentration @12% CO₂ (gr/dscf)         0.0001         0.0005         0.0004         0.0003           C <sub>sd</sub> Particulate Concentration (mg/dscm)         0.4622         1.9848         1.7686         1.4052           C <sub>sd</sub> Particulate Concentration @7% O₂ (mg/dscm)         0.5601         2.3500         2.0940         1.6680           C <sub>sd</sub> Particulate Concentration @12% CO₂ (mg/dscm)         0.5443         2.2576         2.0212         1.6077           C <sub>a</sub> Particulate Concentration (mg/m³ (actual,wet))         0.2461         1.0583         0.9416         0.7486 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
C <sub>sdT</sub> Particulate Concentration @7% O <sub>2</sub> (lb/dscf)         3.4977E-08         1.4675E-07         1.3076E-07         1.0416E-07           C <sub>sd12</sub> Particulate Concentration @12% CO <sub>2</sub> (lb/dscf)         3.3989E-08         1.4098E-07         1.2622E-07         1.0040E-07           C <sub>a</sub> Particulate Concentration (lb/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           C <sub>bd</sub> Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0006           C <sub>sd7</sub> Particulate Concentration @7% O <sub>2</sub> (gr/dscf)         0.0002         0.0010         0.0009         0.0007           C <sub>a</sub> Particulate Concentration @12% CO <sub>2</sub> (gr/dscf)         0.0001         0.0005         0.0004         0.0007           C <sub>a</sub> Particulate Concentration (mg/dscm)         0.4622         1.9848         1.7686         1.4052           C <sub>ad7</sub> Particulate Concentration @7% O <sub>2</sub> (mg/dscm)         0.5601         2.3500         2.0940         1.6680           C <sub>ad7</sub> Particulate Concentration @12% CO <sub>2</sub> (mg/dscm)         0.5443         2.2576         2.0212         1.6077           C <sub>a</sub> Particulate Concentration (mg/m³ (actual,wet))         0.2461         1.0583         0.9416         0.7486			2 8863E-08	1 2305E-07	1 1044F-07	8 7751F-08
Csd12 Particulate Concentration @12% CO₂ (ib/dscf)         3.3989E-08         1.4098E-07         1.2622E-07         1.0040E-07           Ca Particulate Concentration (ib/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           Cad Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0006           Cad7 Particulate Concentration @7% O₂ (gr/dscf)         0.0002         0.0010         0.0009         0.0007           Cad8 Particulate Concentration @7% O₂ (gr/dscf)         0.0002         0.0010         0.0009         0.0007           Ca Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           Cad8 Particulate Concentration (mg/dscm)         0.4622         1.9848         1.7686         1.4052           Cad9 Particulate Concentration @7% O₂ (mg/dscm)         0.5801         2.3500         2.0940         1.6680           Cad12 Particulate Concentration (mg/m³ (actual,wet))         0.5443         2.2576         2.0212         1.6077           Ca Particulate Concentration (mg/Nm³ dary)         0.4960         2.1301         1.8980         1.5080           Cad7 Particulate Concentration @7% O₂ (mg/Nm³ dry)         0.6011         2.5220         2.2472         1.7901           Csd12 Particulate Concentration @7% O₂		-				
Ca         Particulate Concentration (Ib/acf)         1.5366E-08         6.6087E-08         5.8798E-08         4.6750E-08           Cad         Particulate Concentration (gr/dscf)         0.0002         0.0009         0.0008         0.0006           Csd7         Particulate Concentration @7% O₂ (gr/dscf)         0.0002         0.0010         0.0009         0.0007           Cad12         Particulate Concentration @12% CO₂ (gr/dscf)         0.0002         0.0010         0.0009         0.0007           Ca         Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           Cad         Particulate Concentration (mg/dscm)         0.4622         1.9848         1.7686         1.4052           Cad         Particulate Concentration @7% O₂ (mg/dscm)         0.5601         2.3500         2.0940         1.6680           Cad12         Particulate Concentration @12% CO₂ (mg/dscm)         0.5443         2.2576         2.0212         1.8077           Ca         Particulate Concentration (mg/m³ (actual,wet))         0.2461         1.0583         0.9416         0.7486           Cad         Particulate Concentration (mg/Nm³ dry)         0.4960         2.1301         1.8980         1.5080           Cad12         Particulate Concentration @7% O₂ (mg/Nm³ dry) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
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C sd12         Particulate Concentration @12% CO2 (gr/dscf)         0.0002         0.0010         0.0009         0.0007           Ca         Particulate Concentration (gr/acf)         0.0001         0.0005         0.0004         0.0003           Csd         Particulate Concentration (mg/dscm)         0.4622         1.9848         1.7686         1.4052           Csd7         Particulate Concentration @7% O2 (mg/dscm)         0.5801         2.3500         2.0940         1.6680           Csd7         Particulate Concentration @12% CO2 (mg/dscm)         0.5443         2.2576         2.0212         1.8077           Ca         Particulate Concentration (mg/m³ (actual,wet))         0.2461         1.0583         0.9416         0.7486           Csd         Particulate Concentration (mg/Nm³ dry)         0.4960         2.1301         1.8980         1.5080           Csd7         Particulate Concentration @7% O2 (mg/Nm³ dry)         0.6011         2.5220         2.2472         1.7901           Csd12         Particulate Concentration @12% CO2 (mg/Nm³ dry)         0.5841         2.4228         2.1691         1.7254           Elbfrr         Particulate Rate (kg/hr)         0.0706         0.2981         0.2640         0.2109           Erg         Particulate Rate (Tor/yr)         0.6821						
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C <sub>sd7</sub> Particulate Concentration @7% O₂ (mg/dscm)         0.5601         2.3500         2.0940         1.6680           C <sub>sd12</sub> Particulate Concentration @12% CO₂ (mg/dscm)         0.5443         2.2576         2.0212         1.8077           Ca         Particulate Concentration (mg/m³ (actual,wet))         0.2461         1.0583         0.9416         0.7486           C <sub>sd</sub> Particulate Concentration (mg/Nm³ dry)         0.4960         2.1301         1.8980         1.5080           C <sub>sd7</sub> Particulate Concentration @7% O₂ (mg/Nm³ dry)         0.6011         2.5220         2.2472         1.7901           C <sub>sd12</sub> Particulate Concentration @12% CO₂ (mg/Nm³ dry)         0.5841         2.4228         2.1691         1.7254           E <sub>lbfr</sub> Particulate Rate (lb/hr)         0.1557         0.6574         0.5820         0.4650           E <sub>kg/hr</sub> Particulate Rate (kg/hr)         0.0706         0.2981         0.2640         0.2109           E <sub>T/yr</sub> Particulate Rate (Tor/yr)         0.6821         2.8792         2.5492         2.0368           E <sub>Fd</sub> Particulate Rate - F <sub>a</sub> -based (lb/MMBtu)         0.0005         0.0021         0.0019         0.0015           E <sub>Fc</sub> Particulate Rate - F <sub>a</sub> -based (lb/MMBtu)						
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		· ·			2.0940	1.6680
Ca         Particulate Concentration (mg/m³ (actual,wet))         0.2461         1.0583         0.9416         0.7486           C₃d         Particulate Concentration (mg/Nm³ dry)         0.4960         2.1301         1.8980         1.5080           C₃d7         Particulate Concentration @7% O₂ (mg/Nm³ dry)         0.6011         2.5220         2.2472         1.7901           C₃d12         Particulate Concentration @12% CO₂ (mg/Nm³ dry)         0.5841         2.4228         2.1691         1.7254           Eibfir         Particulate Rate (lb/hr)         0.1557         0.6574         0.5820         0.4650           E₂g/hr         Particulate Rate (kg/hr)         0.0706         0.2981         0.2640         0.2109           E₁√r         Particulate Rate (Ton/yr)         0.6821         2.8792         2.5492         2.0368           E戌d         Particulate Rate - F₂-based (lb/MMBtu)         0.0005         0.0021         0.0019         0.0015           E₂c         Particulate Rate - F₂-based (lb/MMBtu)         0.0005         0.0021         0.0019         0.0081		Particulate Concentration @12% CO <sub>2</sub> (mg/dscm)	0.5443	2.2576	2.0212	1.6077
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Particulate Concentration (mg/m³ (actual,wet))	0.2461	1.0583	0.9416	0.7486
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			0.4960	2.1301	1.8980	1.5080
	C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	0.6011	2.5220	2.2472	1.7901
	C <sub>sdf2</sub>	Particulate Concentration @12% CO₂ (mg/Nm³ dry)	0.5841	2.4228	2.1691	
$E_{T/r}$ Particulate Rate (Ton/yr)         0.6821         2.8792         2.5492         2.0368 $E_{Fd}$ Particulate Rate - $F_d$ -based (lb/MMBtu)         0.0005         0.0021         0.0019         0.0015 $E_{Fc}$ Particulate Rate - $F_c$ -based (lb/MMBtu)         0.0005         0.0021         0.0019         0.0015           Comments:	Eliphr	Particulate Rate (lb/hr)	0.1557	0.6574	0.5820	
$E_{Fd}$ Particulate Rate - $F_d$ -based (lb/MMBtu) 0.0005 0.0021 0.0019 0.0015 $E_{Fc}$ Particulate Rate - $F_c$ -based (lb/MMBtu) 0.0005 0.0021 0.0019 0.0015 Comments:	E <sub>kg/hr</sub>	Particulate Rate (kg/hr)				
EFc         Particulate Rate - F <sub>c</sub> -based (lb/MMBtu)         0.0005         0.0021         0.0019         0.0015           Comments:         0.0005         0.0021         0.0019         0.0015	$E_{T/yr}$					
Comments:						
10001	$E_{Fc}$	Particulate Rate - F <sub>c</sub> -based (lb/MMBtu)	0.0005	0.0021	0.0019	0.0015
Average includes 3 runs.	Commer	nts:				
	Averag	e includes 3 runs.				F008"

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#### USEPA Method 5/29 Mercury (Hg) Emission Parameters

Run No	).	1	2	3	Average
Date (20	nng)	Mar 18	Mar 18	Mar 18	_
-	me (approx.)	06:41	09:19	12:12	
	ne (approx.)	08:52	11:30		
	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	183.7
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	313	305	305	308
P <sub>2</sub>	Carbon Feed rate (lb/hr)	7	6	5	6
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,769
-			0,	0,, 00	0,, 00
	nditions	9.4300	0.4600	0.1600	0.0500
O₂ CO₂	Oxygen (dry volume %) Carbon dioxlde (dry volume %)	10.1900	9.1600 10.5500	9.1600 10.5000	9.2500 10.4133
T <sub>s</sub>	Sample temperature (°F)	296.0000	290,4000	290.4800	292,2933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.9379	22.4018	22.5094	22.2830
		21.0010	22.4010	22.5084	22.2030
Gas Flo					
Q,	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	166,552
Q,	Volumetric flow rate, standard (scfm)	115,192	113,910	113,343	114,148
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	88,715
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%0 2 (dscfm)	74,201	74,656	74,182	74,347
ď.	Volumetric flow rate, actual (acf/hr)	10,133,929	9,946,890	9,898,500	9,993,106
Q <sub>s</sub> Q <sub>sid</sub>	Volumetric flow rate, standard (scf/hr) Volumetric flow rate, dry standard (dscf/hr)	6,911,521 5,395,281	6,834,583 5,303,516	6,800,610 5,269,836	6,848,905 5,322,877
Q <sub>sld</sub>	Volumetric flow rate, actual (m 3/hr)	286,999	281,702	280,331	283,011
Q,	Volumetric flow rate, standard (m <sup>-3</sup> /hr)	195,738	193,559	192,597	193,965
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	152,798	150,199	149,245	150,747
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	126,085	126,858	126,053	126,332
Q <sub>s</sub>	Volumetric flow rate, normal (Nim 3/hr)	182,393	180,362	179,466	180,740
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm 3/hr)	142,380	139,958	139,069	140,469
Q <sub>sld7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	117,489	118,209	117,458	117,719
			•,===	,	
Samplin	_	68.7570	67.6014	67:8816	68.0800
V <sub>rnstd</sub> %I	Volume metered, standard (dscf) Isokinetic sampling (%)	99.9960	100.0164	101.0729	100.3617
701	Isokinede samping (76)	30.0300	100.0104	101,0729	100.3017
Laborate					
m <sub>n-1b</sub>	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
m <sub>n-2b</sub>	Fraction 2B (µg)	4.4126	3.1426	3.4661	
m <sub>n-3a</sub>	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m <sub>n-3b</sub>	Fraction 3B (µg)	<0.5000 <0.4000	<0.5000 <0.4000	<0.5000 <0.4000	
m <sub>n-3c</sub>	Fraction 3C (µg)  Total matter corrected for allowable blanks (µg)	4,4126	3,1426	3.4661	
m <sub>n</sub>	Total inditel corrected for showable blacks (59)	4.4120	3.1420	3.4001	
-	Results - Total				
C⊶	Concentration (lb/dscf)	1.4151E-10	1.0250E-10	1.1259E-10	1.1887E-10
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	1.7149E-10	1.2136E-10	1.3331E-10	1.4205E-10
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	1.6665E-10	1.1659E-10	1.2867E-10	1,3730E-10
C <sub>a</sub>	Concentration (Ib/acf)	7.5340E-11	5.4654E-11	5.9942E-11	6.3312E-11
C <sub>sd</sub>	Concentration (µg/dscm) Concentration @7% O 2 (µg/dscm)	2.2661E+00	1.6415E+00	1.8030E+00	1.9035E+00
C <sub>ed7</sub>	Concentration @12% CO 2 (µg/dscm)	2.7462E+00 2.6686E+00	1.9435E+00 1.8671E+00	2.1347E+00 2.0605E+00	2.2748E+00 2.1987E+00
C <sub>sd12</sub>	Concentration (mg/dscm)	2.2661E-03	1.6415E-03	1.8030E-03	1,9035E-03
C <sub>sd</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	2.7462E-03	1.9435E-03	2.1347E-03	2.2748E-03
C <sub>ad7</sub>	Concentration @12% CO 2 (mg/dscm)	2.6686E-03	1.8671E-03	2.0605E-03	2.1987E-03
C <sub>ed12</sub> C <sub>a</sub>	Concentration (µg/m <sup>3</sup> (actual,wet))	1.2065E+00	8.7521E-01	9.5988E-01	1.0138E+00
C <sub>sc</sub>	Concentration (µg/Nm <sup>3</sup> dry)	2.4319E+00	1.7616E+00	1.9349E+00	2.0428E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm <sup>3</sup> dry)	2.9471E+00	2.0857E+00	2.2909E+00	2.4412E+00
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm³ dry)	2.8639E+00	2.0037E+00	2.2113E+00	2.3596E+00
E <sub>lb/hr</sub>	Rate (lb/hr)	7.6349E-04	5.4364E-04	5.9333E-04	6.3349E-04
E <sub>g/s</sub>	Rate (g/s)	9.6181E-05	6.8485E-05	7,4746E-05	7.9804E-05
⊏g/s E <sub>T/yr</sub>	Rate (Ton/yr)	3.3441E-03	2.3811E-03	2.5988E-03	2.7747E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	2,4676E-06	1.7464E-06	1.9182E-06	2.0441E-06
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	2.5275E-08	1.7683E-06	1.9516E-06	2.0825E-06
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#### USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Front Half Results

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tirr	ne (approx.)	06:41	09:19	12:12	
Stop Tim	е (арргох.)	08:52	11:30	14:22	
Mercury	Results - Front Half				
C <sub>ad</sub>	Concentration (lb/dscf)	<3.2069E-12	<3.2618E-12	<3.2483E-12	<3.2390E-12
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<3.8864E-12	<3.8619E-12	<3.8459E-12	<3.8647E-12
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	<3.7766E-12	<3.7101E-12	<3.7123E-12	<3.7330E-12
C.	Concentration (lb/acf)	<1.7074E-12	<1.7391E-12	<1.7294E-12	<1.7253E-12
$C_{ad}$	Concentration (µg/dscm)	<5.1355E-02	<5.2233E-02	<5.2017E-02	<5.1868E-02
$C_{\rm sd7}$	Concentration @7% O 2 (µg/dscm)	<6.2235E-02	<6.1843E-02	<6.1587E-02	<6.1888E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<6.0477E-02	<5.9412E-02	<5.9448E-02	<5.9779E-02
$C_{sd}$	Concentration (mg/dscm)	<5.1355E-05	<5.2233E-05	<5.2017E-05	<5.1868E-05
$C_{ad7}$	Concentration @7% O <sub>2</sub> (mg/dscm)	<6.2235E-05	<6.1843E-05	<6.1587E-05	<6.1888E-05
C <sub>ad 12</sub>	Concentration @12% CO 2 (mg/dscm)	<6.0477E-05	<5.9412E-05	<5.9448E-05	<5.9779E-05
C,	Concentration (µg/m 3 (actual,wet))	<2.7341E-02	<2.7850E-02	<2.7693E-02	<2.7628E-02
$C_{ed}$	Concentration (µg/Nm 3 dry)	<5.5112E-02	<5.6055E-02	<5.5823E-02	<5.5663E-02
C <sub>ed7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<6.6788E-02	<6.6368E-02	<6.6094E-02	<6.6417E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<6.4902E-02	<6.3759E-02	<6.3798E-02	<6.4153E-02
E <sub>lb/hr</sub>	Rate (lb/hr)	<1.7302E-05	<1.7299E-05	<1.7118E-05	<1.7240E-05
E <sub>g/s</sub>	Rate (g/s)	<2.1797E-06	<2.1792E-06	<2.1565E-06	<2.1718E-06
ETA	Rate (Ton/yr)	<7.5784E-05	<7.5769E-05	<7.4977E-05	<7.5510E-05
$E_{Fd}$	Rate - Fd-based (lb/MMBtu)	<5.5922E-08	<5.5570E-08	<5.5341E-08	<5.5611E-08
EFc	Rate - Fc-based (Ib/MMBtu)	<5.7278E-08	<5.6269E-08	<5.6304E-08	<5.6617E-08

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# USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 1-3 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tim	e (approx.)	06:41	09:19	12:12	
Stop Tim	e (approx.)	08:52	11:30	14:22	
Mercury	Results - Impingers 1-3 Solution				
Csd	Concentration (lb/dscf)	1.4151E-10	1.0250E-10	1.1259E-10	1.1887E-10
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	1.7149E-10	1.2136E-10	1.3331E-10	1.4205E-10
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	1.6665E-10	1.1659E-10	1.2867E-10	1.3730E-10
Ca	Concentration (ib/acf)	7.5340E-11	5.4654E-11	5.9942E-11	6.3312E-11
$C_{sd}$	Concentration (µg/dscm)	2.2661E+00	1.6415E+00	1.8030E+00	1.9035E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	2.7462E+00	1.9435E+00	2.1347E+00	2.2748E+00
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	2.6686E+00	1.8671E+00	2.0605E+00	2.1987E+00
C∞d	Concentration (mg/dscm)	2.2661E-03	1.6415E-03	1.8030E-03	1.9035E-03
C <sub>ed7</sub>	Concentration @7% O 2 (mg/dscm)	2.7462E-03	1.9435E-03	2.1347E-03	2.2748E-03
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	2.6686E-03	1.8671E-03	2.0605E-03	2.1987E-03
C,	Concentration (µg/m 3 (actual,wet))	1.2065E+00	8.7521E-01	9.5988E-01	1.0138E+00
$C_{sd}$	Concentration (µg/Nm 3 dry)	2.4319E+00	1.7616E+00	1.9349E+00	2.0428E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	2.9471E+00	2.0857E+00	2.2909E+00	2.4412E+00
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	2.8639E+00	2.0037E+00	2.2113E+00	2.3596E+00
E <sub>lb/lv</sub>	Rate (lb/hr)	7.6349E-04	5.4364E-04	5.9333E-04	6.3349E-04
E <sub>g/s</sub>	Rate (g/s)	9.6181E-05	6.8485E-05	7.4746E-05	7.9804E-05
ETAT	Rate (Ton/yr)	3.3441E-03	2.3811E-03	2.5988E-03	2.7747E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	2.4676E-06	1.7464E-06	1.9182E-06	2.0441E-06
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	2.5275E-06	1.7683E-06	1.9516E-06	2.0825E-06

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## **USEPA Method 5/29** Mercury (Hg) Emission Parameters (continued) Separate Impinger 4 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
	e (approx.)	06:41	09:19	12:12	
Stop Tim	e (approx.)	08:52	11:30	14:22	
Mercury	Results - Impinger 4 Solution				
Ces	Concentration (lb/dscf)	<6.4139E-12	<6.5235E-12	<6.4966E-12	<6.4780E-12
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	<7.7727E-12	<7.7238E-12	<7.6919E-12	<7.7295 <b>E</b> -12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<7.5532 <b>E</b> -12	<7.4201E-12	<7.4247E-12	<7.4680E-12
Ca	Concentration (lb/acf)	<3.4147E-12	<3.4782E-12	<3.4587E-12	<3.4506E-12
Cad	Concentration (µg/dscm)	<1.0271E-01	<1.0447E-01	<1.0403E-01	<1.0374E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	<1.2447E-01	<1.2369E-01	<1.2317E-01	<1.2378E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.2095E-01	<1.1882E-01	<1.1890E-01	<1.1956E-01
Csd	Concentration (mg/dscm)	<1.0271E-04	<1.0447E-04	<1.0403E-04	<1.0374E-04
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<1.2447E-04	<1.2369E-04	<1.2317E-04	<1.2378E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<1.2095E-04	<1.1882E-04	<1.1890E-04	<1.1956E-04
Ca	Concentration (µg/m 3 (actual,wet))	<5.4682E-02	<5.5699E-02	<5.5386E-02	<5.5256E-02
C∞	Concentration (µg/Nm 3 dry)	<1.1022E-01	<1.1211E-01	<1.1165E-01	<1.1133E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<1.3358E-01	<1.3274E-01	<1.3219E-01	<1.3283E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<1.2980E-01	<1.2752 <b>E</b> -01	<1.2760E-01	<1.2831E-01
Eller	Rate (lb/hr)	<3.4605E-05	<3.4598E-05	<3.4236E-05	<3.4479E-05
E <sub>g/s</sub>	Rate (g/s)	<4.3594E-06	<4.3585E-06	<4.3129E-06	<4.3436E-06
ETAT	Rate (Ton/yr)	<1.5157E-04	<1.5154E-04	<1.4995E-04	<1.5102E-04
EFd	Rate - Fd-based (ib/MMBtu)	<1.1184E-07	<1.11 <b>1</b> 4E-07	<1.1068E-07	<1.1122E-07
EFc	Rate - Fc-based (lb/MMBtu)	<1.1456E-07	<1.1254E-07	<1.1261E-07	<1.1323E-07

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# USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 5-6 Results

Run No		1	2	3	Average
Date (20	009)	Mar 18,	Mar 18	Mar 18	
Start Tin	me (approx.)	06:41	09:19	12:12	
Stop Tin	ne (approx.)	08:52	11:30	14:22	
Mercury	y Results - Filtered Permanganate Solution				
$C_{sd}$	Concentration (lb/dscf)	<1.6035E-11	<1.6309E-11	<1.6242E-11	<1.6195E-11
$C_{sd7}$	Concentration @7% O 2 (lb/dscf)	<1.9432E-11	<1.9309E-11	<1.9230E-11	<1.9324E-11
$C_{sd12}$	Concentration @12% CO 2 (lb/dscf)	<1.8883E-11	<1.8550E-11	<1.8562E-11	<1.8665E-11
C <sub>s</sub>	Concentration (lb/acf)	<8.5369E-12	<8.6956 <b>E</b> -12	<8.6468E-12	<8.6264E-12
$C_{sd}$	Concentration (µg/dscm)	<2.5677E-01	<2.6116E-01	<2.6009E-01	<2.5934E-01
$C_{sd7}$	Concentration @7% O 2 (µg/dscm)	<3.1117E-01	<3.0921E-01	<3.0794E-01	<3.0944E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<3,0238E-01	<2.9706E-01	<2.9724E-01	<2.9889E-01
Csd	Concentration (mg/dscm)	<2.5677E-04	<2.6116E-04	<2.6009E-04	<2.5934E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	<3.1117E-04	<3.0921E-04	<3.0794E-04	<3.0944E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<3.0238E-04	<2.9706E-04	<2.9724E-04	<2.9889E-04
Ca	Concentration (µg/m 3 (actual,wet))	<1.3671E-01	<1.3925E-01	<1.3847E-01	<1.3814E-01
C <sup>sd</sup>	Concentration (µg/Nm 3 dry)	<2.7556E-01	<2.8027E-01	<2.7912E-01	<2.7832E-01
C <sub>ad7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<3.3394E-01	<3.3184E-01	<3.3047E-01	<3.3208E-01
C <sub>ad12</sub>	Concentration @12% CO 2 (µg/Nm <sup>3</sup> dry)	<3,2451E-01	<3.1879E-01	<3.1899E-01	<3.2076E-01
Elbtv	Rate (lb/hr)	<8.6512E-05	<8.6494 <b>E</b> -05	<8.5590E-05	<8.6199E-05
Egis	Rate (g/s)	<1,0898£-05	<1.0896E-05	<1.0782E-05	<1.0859E-05
E <sub>7/vr</sub>	Rate (Ton/yr)	<3.7892E-04	<3.7884E-04	<3.7488E-04	<3.7755E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.7961E-07	<2.7785E-07	<2.7670E-07	<2.7806E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<2.8639E-07	<2.8135E-07	<2.8152E-07	<2.8309E-07
	, ,	2.00002 01	2.01002 0	2.0100.	2.0000
•	Results - HCI Rinse + HCI/MnO2 Precipitate	<1.2828E-11	<1.3047E-11	<1.2993E-11	<1,2956E-11
C <sub>sd</sub>	Concentration (lb/dscf)	<1.5545E-11	<1.5448E-11	<1.2993E-11	<1.5459E-11
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	<1.5106E-11	<1.4840E-11	<1.4849E-11	<1.4932E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<6.8295E-12	<6.9565E-12	<6.9174E-12	<6.9011E-12
C.	Concentration (lb/acf)				
C <sub>sd</sub>	Concentration (µg/dscm)	<2.0542E-01	<2.0893E-01	<2.0807E-01	<2,0747E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	<2.4894E-01	<2.4737E-01	<2.4635E-01	<2.4755E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.4191E-01	<2.3765E-01	<2.3779E-01	<2.3912E-01
C <sub>sd</sub>	Concentration (mg/dscm)	<2.0542E-04	<2.0893E-04	<2.0807E-04	<2.0747E-04
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<2.4894E-04	<2.4737E-04	<2.4635E-04	<2.4755E-04
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (mg/dscm)	<2.4191E-04	<2.3765E-04	<2.3779E-04	<2.3912E-04
C <sub>e</sub>	Concentration (µg/m 3 (actual,wet))	<1.0936E-01	<1.1140E-01	<1.1077E-01	<1.1051E-01
Csd	Concentration (µg/Nm <sup>3</sup> dry)	<2.2045E-01	<2.2422E-01	<2.2329E-01	<2.2265E-01
C <sub>sd7</sub>	Concentration @7% O₂ (µg/Nm³ dry)	<2.6715E-01	<2.6547E-01	<2.6438E-01	<2.6567E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<2.5961E-01	<2.5504E-01	<2.5519E-01	<2.5661E-01
E <sup>IP/h</sup>	Rate (lb/hr)	<6.9210E-05	<6.9195 <b>E</b> -05	<6.8472E-05	<6.8959 <i>E-</i> 05
E <sub>g/s</sub>	Rate (g/s)	<8.7188E-06	<8.7170E-06	<8.6259E-06	<8.6872E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<3.0314E-04	<3.0308E-04	<2.9991E-04	<3.0204E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.2369E-07	<2.2228E-07	<2.2136E-07	<2.2245E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<2.2911E-07	<2.2508E-07	<2.2522E-07	<2.2647E-07

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### USEPA Method 5/29 Beryllium (Be) Emission Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tim	ne (approx.)	06:41	09:19	12:12	
Stop Tim	e (approx.)	08:52	11:30	14:22	
Process	Conditions				
R₽	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	183.7
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	313	305	305	308
$P_2$	Carbon Feed rate (lb/hr)	7	6	5	6
$F_d$	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Cor					
O <sub>2</sub>	Oxygen (dry volume %)	9.4300	9.1600	9.1600	9.2500
CO2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	10.4133
Ts	Sample temperature (°F)	296.0000	290.4000	290.4800	292.2933
$B_w$	Actual water vapor in gas (% by volume)	21.9379	22,4018	22.5094	22.2830
Gas Flov	w Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	166,552
$Q_s$	Volumetric flow rate, standard (scfm)	115,192	113,910	113,343	114,148
$Q_{\text{etd}}$	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	88,715
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	74,201	74,656	74,182	74,347
$Q_a$	Volumetric flow rate, actual (acf/hr)	10,133,929	9,946,890	9,898,500	9,993,106
$Q_s$	Volumetric flow rate, standard (scf/hr)	6,911,521	6,834,583	6,800,610	6,848,905
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	5,395,281	5,303,516	5,269,836	5,322,877
$Q_a$	Volumetric flow rate, actual (m <sup>3</sup> /hr)	286,999	281,702	280,331	283,011
Q,	Volumetric flow rate, standard (m 3/hr)	195,738	193,559	192,597	193,965
$Q_{std}$	Volumetric flow rate, dry standard (dry m 3/hr)	152,798	150,199	149,245	150,747
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O ₂ (dry m³/hr)	126,085	126,858	126,053	126,332
$Q_s$	Volumetric flow rate, normal (Nm 3/hr)	182,393	180,362	179,466	180,740
$Q_{\text{std}}$	Volumetric flow rate, dry normal (Nm 3/hr)	142,380	139,958	139,069	140,469
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	117,489	118,209	117,458	117,719
Samplin	g Data				
$V_{mstd}$	Volume metered, standard (dscf)	68.7570	67.6014	67.8816	68.0800
%1	Isokinetic sampling (%)	99.9960	100.0164	101.0729	100.3617
Laborate	ory Data				
$m_{\mathbf{n}}$	Total matter corrected for allowable blanks (µg)	<0.0500	<0.0500	<0.0500	
Berylliu	m Results - Total				
$C_{sd}$	Concentration (lb/dscf)	<1.6035E-12	<1.6309E-12	<1.6242E-12	<1.6195E-12
C <sub>sd7</sub>	0				
- 607	Concentration @7% O <sub>2</sub> (lb/dscf)	<1.9432E-12	<1.9309E-12	<1.9230E-12	
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf)	<1.8883E-12	<1.8550E-12	<1.8562E-12	<1,8665E-12
			<1.8550E-12		<1.8665E-12 <8.6264E-13
$C_{\rm sd12}$	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm)	<1.8883E-12	<1.8550E-12	<1.8562E-12	<1.8665E-12 <8.6264E-13
C <sub>sd12</sub> C <sub>a</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf)	<1.8883E-12 <8.5369E-13	<1.8550E-12 <8.6956E-13	<1.8562E-12 <8.6468E-13	<1.8665E-12 <8.6264E-13 <2.5934E-02
C <sub>sd12</sub> C <sub>s</sub> C <sub>sd</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm)	<1.8883E-12 <8.5369E-13 <2.5677E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02
C <sub>sd12</sub> C <sub>s</sub> C <sub>sd</sub> C <sub>sd7</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02
$C_{sd12}$ $C_a$ $C_{sd}$ $C_{sd7}$ $C_{sd12}$	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05
C <sub>sd12</sub> C <sub>s</sub> C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>sd</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05
C <sub>sd12</sub> C <sub>s</sub> C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>sd</sub> C <sub>sd7</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05
C <sub>sd12</sub> C <sub>a</sub> C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd7</sub> C <sub>sd7</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual, wet)) Concentration (µg/Nm <sup>3</sup> dry)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <2.9706E-05	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02
$C_{sd12}$ $C_a$ $C_{sd}$ $C_{sd7}$ $C_{sd12}$ $C_{sd}$ $C_{sd7}$ $C_{sd12}$ $C_{sd12}$ $C_{sd12}$ $C_{sd12}$	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual,wet))	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05 <1.3671E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <2.9706E-05 <1.3925E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05 <1.3847E-02	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02 <2.7832E-02
$\begin{array}{c} C_{sd12} \\ C_a \\ C_{sd} \\ C_{ed7} \\ C_{sd12} \\ C_{sd} \\ C_{sd} \\ C_{sd12} \\ C_{sd12} \\ C_{sd12} \\ C_{a} \\ C_{sd} \end{array}$	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual, wet)) Concentration (µg/Nm <sup>3</sup> dry)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05 <1.3671E-02 <2.7556E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <2.9706E-05 <1.3925E-02 <2.8027E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05 <1.3847E-02 <2.7912E-02	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02 <2.7832E-02 <3.3208E-02
$C_{sd12}$ $C_a$ $C_{sd}$ $C_{sd7}$ $C_{sd12}$ $C_{sd3}$ $C_{sd12}$ $C_{sd12}$ $C_{sd12}$ $C_{sd12}$ $C_{sd2}$ $C_{sd3}$	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual, wet)) Concentration (µg/Nm <sup>3</sup> dry) Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05 <1.3671E-02 <2.7556E-02 <3.3394E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <2.9706E-05 <1.3925E-02 <2.8027E-02 <3.3184E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05 <1.3847E-02 <2.7912E-02 <3.3047E-02	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02 <2.7832E-02 <3.3208E-02 <3.2076E-02
C <sub>sd12</sub> C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>sd4</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>sd12</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd7</sub> C <sub>sd7</sub> C <sub>sd7</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual,wet)) Concentration (µg/Nm <sup>3</sup> dry) Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry) Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05 <1.3671E-02 <2.7556E-02 <3.3394E-02 <3.2451E-02	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <2.9706E-05 <1.3925E-02 <2.8027E-02 <3.3184E-02 <3.1879E-02	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05 <1.3847E-02 <2.7912E-02 <3.3047E-02 <3.1899E-02	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02 <2.7832E-02 <3.3208E-02 <8.6199E-06
Csd12 Ca Csd Csd12 Csd12 Csd12 Ca Csd12 Ca Csd12 Csd12 Csd Csd2 Csd2 Csd2 Csd7 Csd12	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual,wet)) Concentration (µg/Nm <sup>3</sup> dry) Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry) Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry) Rate (lb/hr)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05 <1.3671E-02 <2.7556E-02 <3.3394E-02 <3.2451E-02 <8.6512E-08	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <2.9706E-05 <1.3925E-02 <2.8027E-02 <3.3184E-02 <3.1879E-02 <8.6494E-06	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05 <1.3847E-02 <2.7912E-02 <3.3047E-02 <3.1899E-02 <8.5590E-06	<1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02 <2.7832E-02 <3.3208E-02 <3.2076E-02 <8.6199E-06 <1.0859E-06
Csd12 Ca Csd Csd12 Csd12 Csd7 Csd12 Ca Csd12 Ca Csd12 Csd Csd7 Csd12 Elb/hr Eg/s	Concentration @12% CO <sub>2</sub> (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm) Concentration @12% CO <sub>2</sub> (µg/dscm) Concentration (mg/dscm) Concentration @7% O <sub>2</sub> (mg/dscm) Concentration @12% CO <sub>2</sub> (mg/dscm) Concentration (µg/m <sup>3</sup> (actual,wet)) Concentration (µg/Nm <sup>3</sup> dry) Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry) Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry) Rate (lb/hr) Rate (g/s)	<1.8883E-12 <8.5369E-13 <2.5677E-02 <3.1117E-02 <3.0238E-02 <2.5677E-05 <3.1117E-05 <3.0238E-05 <1.3671E-02 <2.7556E-02 <3.3394E-02 <3.2451E-02 <8.6512E-06 <1.0898E-06	<1.8550E-12 <8.6956E-13 <2.6116E-02 <3.0921E-02 <2.9706E-02 <2.6116E-05 <3.0921E-05 <1.3925E-02 <2.8027E-02 <3.3184E-02 <3.1879E-02 <8.6494E-06 <1.0896E-06	<1.8562E-12 <8.6468E-13 <2.6009E-02 <3.0794E-02 <2.9724E-02 <2.6009E-05 <3.0794E-05 <2.9724E-05 <1.3847E-02 <2.7912E-02 <3.3047E-02 <3.1899E-02 <8.5590E-06 <1.0782E-06	<1.9324E-12 <1.8665E-12 <8.6264E-13 <2.5934E-02 <3.0944E-02 <2.9889E-02 <2.5934E-05 <3.0944E-05 <2.9889E-05 <1.3814E-02 <2.7832E-02 <3.3208E-02 <3.2076E-02 <8.6199E-06 <1.0859E-06 <3.7755E-05 <2.7806E-08

## USEPA Method 5/29 Cadmium (Cd) Emission Parameters

Run No	<b>5</b> .	1	2	3	Average
					Average
Date (2	me (approx.)	Mar 18 06:41	Mar 18 09:19	Mar 18	
	me (approx.)	08:52	11:30	12:12 14:22	
-	• • • • • • • • • • • • • • • • • • • •	06.52	11.30	14.22	
	s Conditions				
R₽	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	183.7
P₁	Fabric Filter Inlet Temperature (°F)	313	305	305	308
P₂	Carbon Feed rate (lb/hr)	7	6	5	6
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.4300	9.1600	9.1600	9.2500
CO₂	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	10.4133
T,	Sample temperature (°F)	296.0000	290.4000	290.4800	292.2933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.9379	22.4018	22.5094	22.2830
Gas Flo	w Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	166,552
$\mathbf{Q}_{\scriptscriptstyle{0}}$	Volumetric flow rate, standard (scfm)	115,192	113,910	113,343	114,148
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	88,715
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	74,201	74,656	74,182	74,347
$\mathbf{Q}_{a}$	Volumetric flow rate, actual (acf/hr)	10,133,929	9,946,890	9,898,500	9,993,106
$Q_a$	Volumetric flow rate, standard (scf/hr)	6,911,521	6,834,583	6,800,610	6,848,905
$\mathbf{Q}_{std}$	Volumetric flow rate, dry standard (dscf/hr)	5,395,281	5,303,516	5,269,836	5,322,877
$Q_a$	Volumetric flow rate, actual (m <sup>3</sup> /hr)	286,999	281,702	280,331	283,011
$Q_a$	Volumetric flow rate, standard (m <sup>3</sup> /hr)	195,738	193,559	192,597	193,965
$Q_{std}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	152,798	150,199	149,245	150,747
$Q_{std7}$	Volumetric flow rate, dry std@7%O <sub>2</sub> (dry m <sup>3</sup> /hr)	126,085	126,858	126,053	126,332
$Q_s$	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	182,393	180,362	179,466	180,740
$Q_{std}$	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	142,380	139,958	139,069	140,469
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm³/hr)	117,489	118,209	117,458	117,719
Samplin	g Data				
$V_{mstd}$	Volume metered, standard (dscf)	68.7570	67.6014	67.8816	68.0800
%1	Isokinetic sampling (%)	99.9960	100.0164	101.0729	100.3617
Laborate	orv Data				
m <sub>n</sub>	Total matter corrected for allowable blanks (µg)	0.3934	0.3103	1.0930	
	m Results - Total	1.2616E-11	1.0120E-11	3.5504E-11	1.9413E-11
C <sub>sd</sub>	Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf)	1.5289E-11	1.1982E-11	4.2036E-11	2.3102E-11
C <sub>sd7</sub> C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	1.4857E-11	1.1502E-11	4.2036E-11	2.2315E-11
C <sub>sd12</sub>	Concentration (!b/acf)	6.7168E-12	5.3960E-12	1.8902E-11	1.0338E-11
C <sub>sd</sub>	Concentration (µg/dscm)	2.0203E-01	1.6206E-01	5.6854E-01	3.1088E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	2.4483E-01	1.9188E-01	6.7315E-01	3.6995E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	2.3792E-01	1.8434E-01	6.4976E-01	3.5734E-01
C <sub>sd</sub>	Concentration (mg/dscm)	2.0203E-04	1.6206E-04	5.6854E-04	3.1088E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	2.4483E-04	1.9188E-04	6.7315E-04	3.6995E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	2.3792E-04	1.8434E-04	6.4976E-04	3.5734E-04
Ca	Concentration (µg/m³ (actual,wet))	1.0756E-01	8.6409E-02	3.0269E-01	1.6555E-01
C <sub>ed</sub>	Concentration (µg/Nm <sup>3</sup> dry)	2.1681E-01	1.7392E-01	6.1014E-01	3.3363E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	2.6275E-01	2.0592E-01	7.2240E-01	3.9702E-01
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	2.5532E-01	1.9783E-01	6.9731E-01	3.8349E-01
E <sub>fb/hr</sub>	Rate (lb/hr)	6.8068E-05	5.3673E-05	1.8710E-04	1.0295E-04
E <sub>g/s</sub>	Rate (g/s)	8.5749E-06	6.7616E-06	2.3570E-05	1.2969E-05
E <sub>T/yr</sub>	Rate (Ton/yr)	2.9814E-04	2.3509E-04	8.1949E-04	4.5091E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	2.2000E-07	1.7242E-07	6.0487E-07	3.3243E-07
Predered by Clay	-Rateon-Forbesed-Ne/MMBtu)	2.2533E-07	1.7459E-07	6.1540E-07	3.3844E-07
SS Metale-1 Ver					
Committed @ 2000	9 Cloan Air Engineering Inc.				

## USEPA Method 5/29 Lead (Pb) Emission Parameters

Run No		1	2	3	Average
Date (20		Mar 18	Mar 18	Mar 18	
	ne (approx.)	06:41	09:19	12:12	
	ne (approx.)	08:52	11:30	14:22	
-	• • • •				
Process R <sub>P</sub>	s Conditions Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	183.7
-	·	313	305	305	308
P <sub>1</sub> P <sub>2</sub>	Fabric Filter Inlet Temperature (°F)  Carbon Feed rate (lb/hr)	7	6	5	6
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
		0,700	0,700	0,700	0,700
	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.4300	9.1600	9.1600	9.2500
CO₂	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	10.4133
T <sub>s</sub>	Sample temperature (°F)	296.0000	290.4000	290.4800	292.2933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.9379	22.4018	22.5094	22.2830
Gas Flo	w Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	166,552
Q <sub>s</sub>	Volumetric flow rate, standard (scfm)	115,192	113,910	113,343	114,148
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	88,715
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	74,201	74,656	74,182	74,347
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	10,133,929	9,946,890	9,898,500	9,993,106
Q,	Volumetric flow rate, standard (scf/hr)	6,911,521	6,834,583	6,800,610	6,848,905
$Q_{\text{etd}}$	Volumetric flow rate, dry standard (dscf/hr)	5,395,281	5,303,516	5,269,836	5,322,877
Q,	Volumetric flow rate, actual (m 3/hr)	286,999	281,702	280,331	283,011
Q <sub>s</sub>	Volumetric flow rate, standard (m <sup>3</sup> /hr)	195,738	193,559	192,597	193,965
$Q_{\text{etd}}$	Volumetric flow rate, dry standard (dry m 3/hr)	152,798	150,199	149,245	150,747
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	126,085	126,858	126,053	126,332
Qs	Volumetric flow rate, normal (Nm 3/hr)	182,393	180,362	179,466	180,740
Q <sub>etd</sub>	Volumetric flow rate, dry normal (Nm 3/hr)	142,380	139,958	139,069	140,469
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	117,489	118,209	117,458	117,719
Samplin V <sub>mstd</sub>	Volume metered, standard (dscf)	68.7570	67.6014	67.8816	68.0800
V mstd %1	Isokinetic sampling (%)	99.9960	100.0164	101.0729	100,3617
701	isokinetic sampling (70)	33.3333	100.0104		10010011
	ory Data	0.0004	4.0454	0.0000	
m <sub>n</sub>	Total matter corrected for allowable blanks (µg)	2.2834	1.3454	2.3089	
Lead Re	esults - Total				
$C_{sd}$	Concentration (lb/dscf)	7.3227E-11	4.3885E-11	7.4999E-11	6.4037E-11
C <sub>ed7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	8.8741E-11	5.1959E-11	8.8798E-11	7.6499E-11
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	8.6234E-11	4.9916E-11	8.5713E-11	7.3955E-11
Ca	Concentration (lb/acf)	3.8986E-11	2.3398E-11	3.9929E-11	3.4104E-11
Ced	Concentration (µg/dscm)	1.1726E+00	7.0275E-01	1.2010E+00	1.0255E+00
$C_{\rm sd7}$	Concentration @7% O <sub>2</sub> (µg/dscm)	1.4211E+00	8.3205E-01	1.4220E+00	1.2250E+00
C <sub>sd12</sub>	Concentration @12% CO ₂ (µg/dscm)	1.3809E+00	7.9934E-01	1.3726E+00	1.1843E+00
$C_{ad}$	Concentration (mg/dscm)	1.1726E-03	7.0275E-04	1.2010E-03	1.0255E-03
C <sub>ad7</sub>	Concentration @7% O 2 (mg/dscm)	1.4211E-03	8.3205E-04	1.4220E-03	1.2250E-03
C <sub>ed12</sub>	Concentration @12% CO 2 (mg/dscm)	1.3809E-03	7.9934E-04	1.3726E-03	1.1843E-03
$C_a$	Concentration (µg/m 3 (actual,wet))	6.2431E-01	3.7469E-01	6.3940E-01	5.4613E-01
$C_{\rm sd}$	Concentration (µg/Nm <sup>3</sup> dry)	1.2584E+00	7.5417E-01	1.2889E+00	1.1005E+00
$C_{\rm sd7}$	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	1.5250E+00	8.9293E-01	1.5260E+00	1.3147E+00
$C_{\rm sd12}$	Concentration @12% CO 2 (µg/Nm3 dry)	1.4820E+00	8.5782E-01	1.4730E+00	1.2709E+00
E <sub>lb/hr</sub>	Rate (lb/hr)	3.9508E-04	2.3274E-04	3.9523E-04	3.4102E-04
E <sub>g/s</sub>	Rate (g/s)	4.9771E-05	2.9320E-05	4.9790E-05	4.2960E-05
ETAY	Rate (Ton/yr)	1.7305E-03	1.0194E-03	1.7311E-03	1.4937E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	1.2769E-06	7.4766E-07	1.2778E-06	1.1008E-08
Preparate by CI	eenRateonGorbasede(IsAMMBtu)	1.3079E-06	7.5706E-07	1.3000E-06	1.1218E-06
SS Metals-1 Ve	ersion 2006-12a				
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Wheelabrator South Broward, Inc. Clean Air Project No: 10735

Unit 1 FF Outlet

### USEPA Method 13B (Total Fluorides) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tim	ne (approx.)	06:38	08:06	09:47	
Stop Tim	e (approx.)	07:50	09:21	11:00	
Samplin	g Conditions				
Yd	Dry gas meter correction factor	0.9916	0.9916	0.9916	
C.	Pitot tube coefficient	0.8250	0.8250	0.8250	
P <sub>a</sub>	Static pressure (in. H 2O)	-12.0000	-12.0000	-12.0000	
A <sub>s</sub>	Sample location area (ft 2)	64.0000	64.0000	64.0000	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
$D_n$	Nozzle diameter (in.)	0.2720	0.2720	0.2720	
O <sub>2</sub>	Oxygen (dry volume %)	9.3600	9.3000	10.1200	9.5933
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.2300	10.3400	9.5600	10.0433
N₂+CO	Nitrogen plus carbon monoxide (dry volume %)	80.4100	80.3600	80.3200	80.3633
Vic	Total Liquid collected (mi)	220.60	230.00	234.70	
$V_m$	Volume metered, meter conditions (ft 3)	37.8550	38.2900	38.4800	
$\tau_{m}$	Dry gas meter temperature (°F)	71.0000	75.6000	79.2200	
$T_a$	Sample temperature (°F)	293.0800	290.0000	286.9600	290.0133
ΔH	Meter box orifice pressure drop (in. H 2O)	1.2312	1.2612	1.2868	
θ	Total sampling time (min)	62.5	62.5	62.5	
Flow Res	sults				
$V_{watd}$	Volume of water collected (ft 3)	10.3814	10.8238	11.0450	10.7501
$V_{mstd}$	Volume metered, standard (dscf)	37.6474	37.7557	37.6907	37.6979
$P_{s}$	Sample gas pressure, absolute (in. Hg)	29.2176	29.2176	29.2176	29.2176
$P_{v}$	Vapor pressure, actual (in. Hg)	29.2176	29.2176	29.2176	29.2176
Bwo	Moisture measured in sample (% by volume)	21.6150	22.2806	22.6630	22.1862
$B_{we}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_{w}$	Actual water vapor in gas (% by volume)	21.6150	22.2806	22.6630	22.1862
√∆P	Velocity head ( √in. H₂O)	0.6788	0.6867	0.6874	0.6843
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.0112	30.0264	29.9344	29.9907
$M_s$	MW of sample gas, wet (lb/lb-mole)	27.4150	27.3468	27.2297	27.3305
Va	Velocity of sample (ft/sec)	46.4230	46.9242	46.9747	46.7740
%!	Isokinetic sampling (%)	99.9197	99.5770	99.3851	99.6272
$Q_a$	Volumetric flow rate, actual (acfm)	178,264	180,189	180,383	179,612
Q,	Volumetric flow rate, standard (scfm)	122,051	123,875	124,513	123,480
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	95,670	96,275	96,295	96,080
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	79,426	80,345	74,680	78,150
Qa	Volumetric flow rate, actual (acf/hr)	10,695,858	10,811,326	10,822,977	10,776,721
Q,	Volumetric flow rate, standard (scf/hr)	7,323,052	7,432,506	7,470,798	7,408,785
Qed	Volumetric flow rate, dry standard (dscf/hr)	5,740,172	5,776,499	5,777,68 <b>7</b>	5,764,786
Q <sub>a</sub>	Volumetric flow rate, actual (m <sup>3</sup> /hr)	302,913	306,183	306,513	305,203
Q <sub>s</sub>	Volumetric flow rate, standard (m <sup>3</sup> /hr)	207,393	210,493	211,577	209,821
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	162,565	163,594	163,628	163,262
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	134,964 193,253	136,524	126,900 197,152	132,796 195,515
Q,	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	151,481	196,141 152,440	152,471	152,131
G <sup>et0</sup>	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	125,762	152,440	118,247	123,742
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	123,702	127,210	110,247	123,142

Comments:

Average includes 3 runs.

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## USEPA Method 13B HF Parameters

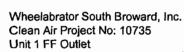
Run No.		1	2	3	Average
Data (20	00)	Mar 18	Mar 18	Mar 18	
Date (20		06:38	08:06	09:47	
	ne (approx.)	07:50	09:21	11:00	
Stob 1111	ne (approx.)	07.50	05.21	11.00	
Process	Conditions				
$R_P$	Steam Production Rate (Klbs/hour)	184.3	183.8	184.1	184.1
$P_1$	Fabric Filter inlet Temperature (°F)	315	308	305	309
$F_d$	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
$F_c$	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8.760	8,760
Gas Cor	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.3600	9.3000	10.1200	9.5933
CO₂	Carbon dioxide (dry volume %)	10.2300	10.3400	9.5600	10.0433
T <sub>s</sub>	Sample temperature (°F)	293.0800	290.0000	286.9600	290.0133
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.6150	22.2806	22.6630	22,1862
Gas Flo		178,264	180,189	180,383	179,612
Q <sub>a</sub>	Volumetric flow rate, actual (acfm)	122,051	123,875	124,513	123,480
Ω <sup>ε</sup>	Volumetric flow rate, standard (scfm)	95,670	96,275	96,295	96,080
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	79,426	80,345	74,680	78,150
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)			•	10,776,721
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	10,695,858	10,811,326	10,822,977	7,408,785
Q,	Volumetric flow rate, standard (scf/hr)	7,323,052	7,432,506	7,470,798	
Q <sub>etd</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,740,172	5,776,499	5,777,687	5,764,786 305,203
Q <sub>a</sub>	Volumetric flow rate, actual (m 3/hr)	302,913	306,183	306,513	
Q۵	Volumetric flow rate, standard (m 3/hr)	207,393	210,493	211,577	209,821
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m 3/hr)	162,565	163,594	163,628	163,262
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	134,964	136,524	126,900	132,796
$Q_s$	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	193,253	196,141	197,152	195,515
$Q_{\text{std}}$	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	151,481	152,440	152,471	152,131
$Q_{std7}$	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	125,762	127,216	118,247	123,742
Samplin	g Data '				
V <sub>mstd</sub>	Volume metered, standard (dscf)	37.6474	37.755 <b>7</b>	37.6907	37.6979
%1	Isokinetic sampling (%)	99.9197	99.5770	99.3851	99.6272
Laborate	ony Data				
mn	Total HF collected (mg)	< 0.0061	<0.0055	<0.0060	
	en Fluoride (HF) Results	<3.5487E-10	<3.1954E-10	<3.4929E-10	<3.4123E-10
Ced	HF Concentration (lb/dscf)		<3.8290E-10		<4.2024E-10
C <sub>sd7</sub>	HF Concentration @7% O <sub>2</sub> (lb/dscf)	<4.2745E-10		<4.5038E-10 <4.3844E-10	<4.2024E-10
C <sub>sd12</sub>	HF Concentration @12% CO 2 (lb/dscf)	<4.1627E-10 <1.9045E-10	<3.7084E-10 <1.7073E-10	<1.8646E-10	<1.8255E-10
C <sub>a</sub>	HF Concentration (lb/acf)	<0.0068	<0.0062	<0.0067	<0.0066
C <sub>sd</sub>	HF Concentration (ppmdv)			<0.0087	<0.0081
C <sub>sd7</sub>	HF Concentration @7% O 2 (ppmdv)	<0.0082	<0.0074		
C <sub>sd12</sub>	HF Concentration @12% CO 2 (ppmdv)	<0.0080	<0.0071	<0.0084	<0.0079
C <sub>w</sub>	HF Concentration (ppmwv)	< 0.0054	<0.0048	<0.0052	<0.0051
C <sub>sci</sub>	HF Concentration (mg/dscm)	<0.0057	<0.0051	<0.0056	<0.0055
C <sub>ed7</sub>	HF Concentration @7% O <sub>2</sub> (mg/dscm)	<0.0068	< 0.0061	<0.0072	<0.0067
C <sub>ed12</sub>	HF Concentration @12% CO 2 (mg/dscm)	<0.0067	<0.0059	<0.0070	<0.0065
Ca	HF Concentration (mg/m 3 (actual,wet))	<0.0030	<0.0027	<0.0030	<0.0029
$C_{ad}$	HF Concentration (mg/Nm <sup>3</sup> dry)	<0.0061	<0.0055	<0.0060	<0.0059
C <sub>sd7</sub>	HF Concentration @7% O 2 (mg/Nm <sup>3</sup> dry)	<0.0073	<0.0066	<0.0077	<0.0072
C <sub>sd12</sub>	HF Concentration @12% CO 2 (mg/Nm3 dry)	<0.0072	<0.0064	<0.0075	<0.0070
E <sub>lb/hr</sub>	HF Rate (lb/hr)	<0.0020	<0.0018	<0.0020	<0.0020
$E_{kg/hr}$	HF Rate (kg/hr)	<0.0009	<0.0008	<0.0009	<0.0009
$E_{T/yr}$	HF Rate (Ton/yr)	<0.0089	<0.0081	<0.0088	<0.0086
$E_{Fd}$	HF Rate - Fd-based (lb/MMBtu)	<0.0000062	<0.0000055	<0.000065	<0.0000060
E <sub>Fc</sub>	HF Rate - Fc-based (lb/MMBtu)	<0.0000063	<0.0000056	<0.0000066	<0.0000062

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## USEPA Method 23 (PCDD/F) Sampling, Velocity and Moisture Parameters

Run No		1	2	3	Average
Date (20	009)	Mar 16	Mar 17	Mar 17	
Start Tin	ne (approx.)	11:07	06:08	10:54	
Stop Tin	ne (approx.)	15:32	10:27	15:18	
Samplin	ng Conditions				
Yd	Dry gas meter correction factor	0.9916	0.9916	0.9916	
C <sub>p</sub>	Pitot tube coefficient	0.8330	0.8330	0.8330	
P.	Static pressure (in. H 2O)	-10.4000	-14.3000	-13.1000	
Αs	Sample location area (ft 2)	64.0000	64.0000	64.0000	
Pber	Barometric pressure (in. Hg)	30.20	30.10	30.10	30.1333
$D_n$	Nozzle diameter (in.)	0.2660	0.2660	0.2660	
O <sub>2</sub>	Oxygen (dry volume %)	9.5400	9.6600	9.4000	9.5333
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.2500	9.9400	10.1700	10.1200
N₂+CC	Nitrogen plus carbon monoxide (dry volume %)	80.2100	80.4000	80.4300	80.3467
V <sub>Ic</sub>	Total Liquid collected (ml)	817.50	830.20	784.30	
$V_{m}$	Volume metered, meter conditions (ft 3)	146.5700	147.1850	144.4350	
T <sub>m</sub>	Dry gas meter temperature (°F)	85.5200	79.1800	89.2600	
T <sub>s</sub>	Sample temperature (°F)	301.2000	300.7600	300.9600	300.9733
ΔΗ	Meter box orifice pressure drop (in. H 2O)	1.1278	1.1482	1.0964	
θ	Total sampling time (min)	250.0	250.0	250.0	
Flow Res	suits				
$V_{wetd}$	Volume of water collected (ft 3)	38.4716	39.0692	36.9092	38.1500
$V_{mstd}$	Volume metered, standard (dscf)	142.3205	144.1278	138.8218	141.7567
P۶	Sample gas pressure, absolute (in. Hg)	29.4353	29.0485	29.1368	29.2069
$P_{v}$	Vapor pressure, actual (in. Hg)	29.4353	29.0485	29.1368	29.2069
B <sub>wo</sub>	Moisture measured in sample (% by volume)	21.2795	21.3263	21.0032	21.2030
$B_{wa}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.2795	21.3263	21.0032	21.2030
√∆P	Velocity head ( √in. H₂O)	0.6649	0.6813	0.6584	0.6682
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.0216	29.9768	30.0032	30.0005
Ms	MW of sample gas, wet (lb/lb-mole)	27.4635	27.4226	27.4821	27.4561
$V_s$	Velocity of sample (ft/sec)	45.9501	47.4165	45.7038	46.3568
%1	Isokinetic sampling (%)	99.6609	99.1092	98.3598	99.0433
$Q_a$	Volumetric flow rate, actual (acfm)	176,448	182,079	175,503	178,010
$Q_s$	Volumetric flow rate, standard (scfm)	120,409	122,690	118,587	120,562
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	94,787	96,525	93,680	94,997
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	77,466	78,053	77,505	77,675
$Q_a$	Volumetric flow rate, actual (acf/hr)	10,586,895	10,924,751	10,530,158	10,680,602
Q,	Volumetric flow rate, standard (scf/hr)	7,224,546	7,361,399	7,115,194	7,233,713
Q <sub>etd</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,687,202	5,791,482	5,620,774	5,699,820
Q,	Volumetric flow rate, actual (m <sup>3</sup> /hr)	299,827	309,395	298,220	302,481
Q <sub>s</sub>	Volumetric flow rate, standard (m 3/hr)	204,603	208,479	201,506	204,863
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	161,065	164,018	159,184	161,422
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	131,633	132,631	131,699	131,987
Q <sub>s</sub>	Volumetric flow rate, normal (Nm ³/hr)	190,653	194,265	187,767	190,895
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm ³/hr)	150,083	152,835	148,330	150,416
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	122,658	123,588	122,719	122,988

Comments:

Average includes 3 runs.

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# USEPA Method 23 Parameters (NDs & EMPCs counted as Zero) Total Tetra- through Octa-PCDD/F Results (using USEPA/INTL 1989 TEFs)

		1	2	3	Average
Date (200	9)	Mar 16	Mar 17	Mar 17	
Start Time	e (approx.)	11:07	06:08	10:54	
Stop Time	e (approx.)	15:32	10:27	15:18	
	Conditions	184.0	183.4	184.2	183.9
R <sub>P</sub>	Steam Production Rate (Kibs/hour)	320	320	320	320
P <sub>1</sub>	Fabric Filter Inlet Temperature (*F)	6	5	5	520
P <sub>2</sub>	Carbon Feed Rate (lb/hr)				9,570
F₄	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570 1,820	1,820
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820 8,760	1,820 8,760	8,760	8,760
Сар	Capacity factor (hours/year)	0,700	0,700	0,700	0,100
Gas Con∙ O₂	Oxygen (dry volume %)	9.5400	9.6600	9.4000	9.5333
CO2	Carbon dloxide (dry volume %)	10.2500	9.9400	10.1700	10.1200
T.	Sample temperature (°F)	301.2	300.8	301.0	301.0
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.2795	21.3263	21.0032	21.2030
Gas Flow	v Rete				
Q,	Volumetric flow rate, actual (acfm)	176,448	182,079	175,503	178,010
Q,	Volumetric flow rate, standard (scfm)	120,409	122,690	118,587	120,562
Qua	Volumetric flow rate, dry standard (dscfm)	94,787	96,525	93,680	94,997
Q <sub>sto7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	77,466	78,053	77,505	77,675
Q,	Volumetric flow rate, actual (act/hr)	10,586,895	10,924,751	10,530,158	10,680,602
Q,	Volumetric flow rate, standard (scf/hr)	7,224,546	7,361,399	7,115,194	7,233,713
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,687,202	5,791,482	5,620,774	5,699,820
Q,	Volumetric flow rate, actual (m 3/hr)	299,827	309,395	298,220	302,481
Q <sub>s</sub>	Volumetric flow rate, standard (m 3/hr)	204,603	208,479	201,506	204,863
Qstd	Volumetric flow rate, dry standard (dry m 3/hr)	161,065	164,018	159,184	161,422
Q <sub>sts7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	131,633	132,631	131,699	131,987
Q,	Volumetric flow rate, normal (Nm 3/hr)	190,653	194,265	187,767	190,895
Qstd	Volumetric flow rate, dry normal (Nm 3/hr)	150,083	152,835	148,330	150,416
Q <sub>atd7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm <sup>3</sup> /hr)	122,658	123,588	122,719	122,988
Sampling	p Data				
Vmate	Volume metered, standard (dscf)	142.3205	144,1278	138.8218	141.7567
%1	Isokinetic sampling (%)	99.6609	99.1092	98.3598	99.0433
Laborato	ry Data from USEPA Method 23				
Laborato	ry Data from USEPA Method 23 Total PCDDs (ng)	9.19300	9.08100	9.01300	
Laborato	-	9.19300 3.47830	9.08100 3.21770	9.01300 3.28990	
Laborato m <sub>n</sub>	Total PCDDs (ng)			3.28990 12.30000	
	Total PCDDs (ng) Total PCDFs (ng)	3.47830	3.21770	3.28990	
m <sub>r</sub> ms_TEQ	Total PCDDs (ng) Total PCDFs (ng) Total PCDDs & PCDFs (ng)	3.47830 12.70000	3.21770 12.30000	3.28990 12.30000	
m <sub>r</sub> ms_TEQ	Total PCDDs (ng) Total PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)	3.47830 12.70000	3.21770 12.30000	3.28990 12.30000 0.12900 3.1286E+00	
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC	Total PCDDs (ng) Total PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng) DD/F Results (TEF=1)	3.47830 12.70000 0.13300	3.21770 12.30000 0.12700	3.28990 12.30000 0.12900	3.7878E+00
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC C <sub>ed</sub>	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng) DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm)	3.47830 12.70000 0.13300 3.1509E+00	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00	3.28990 12.30000 0.12900 3.1286E+00	3.7878E+00 3.6728E+00
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC C <sub>sd</sub> C <sub>sd7</sub>	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm)	3.47830 12.7000 0.13300 3.1509E+00 3.8554E+00	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00	3.7878E+00 3.6728E+00
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub>	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O2 (ng/dscm) PCDD/F Concentration @12% CO2 (ng/dscm)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.6915E+00 4.0582E+00	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC C <sub>ad</sub> C <sub>ad</sub> C <sub>ad</sub> C <sub>ad</sub> C <sub>ad</sub>	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm <sup>3</sup> dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00 3.9041E+00	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.6915E+00 4.0582E+00 3.9616E+00	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC C <sub>bd</sub> C <sub>sd7</sub> C <sub>bd12</sub> C <sub>bd</sub> C <sub>bd7</sub>	Total PCDDs (ng) Total PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @ 12% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @ 12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @ 7% O <sub>2</sub> (ng/Nm³ dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 3.3814E+00 4.1375E+00 1.1190E-06	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.6915E+00 4.0582E+00	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC Ced Ced Ced12 Ced12 Ced7 Ced7 Ced7	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @15% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @15% O <sub>2</sub> (ng/Nm <sup>3</sup> dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm <sup>3</sup> dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm <sup>3</sup> dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00 3.9041E+00	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.5975E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07
m <sub>n</sub> m <sub>n_TEQ</sub> Total PC Ced Ced Ced7 Ced12 Ced Ced7 Ced12 Ced Ced7 Ced12	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 3.3814E+00 4.1375E+00 1.1190E-06	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00 3.9041E+00 1.0898E-06	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.6915E+00 4.0582E+00 3.9616E+00 1.0981E-06	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07
m <sub>n</sub> m <sub>n_TEQ</sub> Total PCi Cad Cad7 Cad12 Cad7 Cad7 Cad12 Etbhy Eg/s	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (g/s)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2992E+00 3.9992E+00 1.0998E-06 1.3729E-07 4.7734E-06 3.3486E-09	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.9575E+00 4.0582E+00 4.0582E+00 1.9881E-06 1.3834E-07 4.8098E-06 3.3979E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09
m <sub>n</sub> m <sub>n_TEQ</sub> Total PCI Ced	Total PCDDs (ng) Total PCDFs (ng) Total PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (g/s) PCDD/F Rate (Ton/yr)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 4.1375E+00 1.1190E-06 1.4097E-07 4.9014E-06	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.8379E+00 3.2339E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-06	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.5975E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-06	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09
mn mn_TEQ  Total PC  Ced  Ced7  Ced12  Ced7  Ced12  Elbhy  Eg/s  ET/yr  EFG  EFG	Total PCDDs (ng) Total PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Rasults (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O2 (ng/dscm) PCDD/F Concentration @12% CO2 (ng/dscm) PCDD/F Concentration @7% O2 (ng/Nm³ dry) PCDD/F Concentration @7% O2 (ng/Nm³ dry) PCDD/F Concentration @12% CO2 (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (lb/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate (Ton/yr) PCDD/F Rate (Ton/yr) PCDD/F Rate (Fa-based (lb/MMBtu)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 3.3814E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2992E+00 3.9992E+00 1.0998E-06 1.3729E-07 4.7734E-06 3.3486E-09	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.9575E+00 4.0582E+00 4.0582E+00 1.9881E-06 1.3834E-07 4.8098E-06 3.3979E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09
mn mn_TEQ  Total PC  Ced  Ced7  Ced12  Ced7  Ced12  Elb/ry  Eg/s  ET/yr  EFG  EFC	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @1% O <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @1% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/Irr) PCDD/F Rate (g/s) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 3.3814E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2992E+00 3.9992E+00 1.0998E-06 1.3729E-07 4.7734E-06 3.3486E-09	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.9575E+00 4.0582E+00 4.0582E+00 1.9881E-06 1.3834E-07 4.8098E-06 3.3979E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09 3.4785E-09
mn mn_TEQ  Total PC  Ced  Ced7  Ced12  Ced7  Ced12  Elbhy  Eg/s  ET/yr  EFG  EFG	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (lb/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>d</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>c</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 4.1375E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.8379E+00 3.2339E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.5975E+00 4.0582E+00 3.3975E+00 1.0981E-06 1.3834E-07 4.8098E-06 3.3979E-09 3.4963E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3867E-07 4.8282E-06 3.4036E-09 3.4785E-09
mn mn_TEQ Total PCI Cod7 Cod7 Cod7 Cod7 Cod7 Cod7 EByby EGys ETyyr EFG EFF Total PCI CodTEO	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (forlyr) PCDD/F Rate (Tonlyr) PCDD/F Rate - F <sub>d</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>c</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @7% O <sub>2</sub> (ng/dscm)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09	3.28990 12.30000 0.12900 3.1286E+00 3.6915E+00 3.3675E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-05 3.3979E-09 3.4963E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09 3.4785E-09 3.2308E-02 3.9504E-02 3.8303E-02
mn mn_TEQ  Total PC  Cad7  Cad12  Cad7  Cad12  Ebby  E7/yr  E7c  E7c  Total PC  CadTeo  CadTeo  CadTeo  CadTeo  CadTeo  CadTeo	Total PCDDs (ng) Total PCDDs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (forlyr) PCDD/F Rate (Tonlyr) PCDD/F Rate - F <sub>d</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>c</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @7% O <sub>2</sub> (ng/dscm)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.9992E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-08 3.3486E-09 3.4455E-09	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.3575E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-06 3.3979E-09 3.4963E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 3.4036E-09 3.4785E-09 3.2308E-02 3.9504E-02 3.8303E-02 3.4672E-02
mn mn_TEQ  Total PC  Cod7  Cod12  Cod7  Cod12  Egyls  ETyyr  EFG  EFC  Total PC  Cod7  Cod	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDPs & PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (lb/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration (ng/Nm³ dry) TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.2339E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09	3.28990 12.30000 0.12900 3.1286E+00 3.6915E+00 3.3675E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-05 3.3979E-09 3.4963E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 3.4036E-09 3.4785E-09 3.2308E-02 3.9504E-02 3.8303E-02 3.4672E-02
mn mn_TEQ  Total PC  Cod7  Cod12  Cod7  Cod12  Egyls  ETyyr  EFG  EFC  Total PC  Cod7  Cod	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDPs & PCDFs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (lb/hr) PCDD/F Rate (lb/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration (ng/Nm³ dry) TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09	3.21770 12.30000 0.12700 3.0134E+00 3.235E+00 3.6379E+00 3.2339E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09 3.1114E-02 3.8477E-02 3.7562E-02 3.3390E-02	3.28990 12.30000 0.12900 3.1286E+00 3.6915E+00 3.3575E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-05 3.3979E-09 3.4963E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09 3.4785E-09 3.2308E-02 3.9504E-02 3.8303E-02 3.4672E-02 4.2395E-02
mn mn_TEQ  Total PC  Cod7  Cod12  Cod7  Cod12  Egyls  ETyyr  EFG  EFC  Total PC  Cod7  Cod	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDDs & PCDFs (ng) Total PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @1% O <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (b/hr) PCDD/F Rate (b/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @17% O <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 3.988E+00 1.1375E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09 3.2998E-02 4.0376E-02 3.8631E-02 3.5412E-02 4.3330E-02	3.21770 12.30000 0.12700 3.0134E+00 3.0265E+00 3.6379E+00 3.2339E+00 3.9992E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09 3.1114E-02 3.8477E-02 3.7562E-02 3.3390E-02 4.1292E-02	3.28990 12.30000 0.12900 3.1286E+00 3.6915E+00 3.6915E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-06 3.3979E-09 3.4963E-09	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09 3.4785E-09 3.2308E-02 3.9504E-02 3.8303E-02 4.2395E-02 4.1106E-02
mn mn_TEQ  Total PC  Cod7  Cod12  Cod7  Cod12  Egyls  ETyyr  EFG  EFC  Total PC  Cod7  Cod	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDDs & PCDFs (ng) Total PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @1% O <sub>2</sub> (ng/dscm) PCDD/F Concentration (ng/Nm³ dry) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (b/hr) PCDD/F Rate (b/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @17% O <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 3.3814E+00 4.1375E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09 3.2998E-02 4.0376E-02 3.6631E-02 3.5412E-02 4.3330E-02 4.1458E-02	3.21770 12.30000 0.12700 3.0134E+00 3.0379E+00 3.6379E+00 3.939E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09 3.1114E-02 3.8477E-02 3.7562E-02 4.1292E-02 4.0310E-02	3.28990 12.30000 0.12900 3.1286E+00 3.6915E+00 3.3575E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-06 3.3979E-09 3.4963E-09 3.2812E-02 3.9659E-02 3.6213E-02 4.2561E-02 4.1549E-02	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 3.4036E-09 3.4785E-09 3.2308E-02 3.8303E-02 3.8303E-02 4.2395E-02 4.1106E-02 1.1496E-08
mn mo_TEQ  Total PC  Cod7  Cod7  Cod7  Cod7  Cod7  Cod7  Cod7  Cod7  Eo/o  Eo/o  Eo/o  Cod7  Cod	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (Ib/hr) PCDD/F Rate (Ib/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>c</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @7% O <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) TEQ Rate (lb/hr) TEQ Rate (g/sec)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-02 4.0376E-02 3.8631E-02 3.5412E-02 4.3330E-02 4.1458E-02 1.1719E-08	3.21770 12.30000 0.12700 3.0134E+00 3.7265E+00 3.6379E+00 3.9992E+00 3.9941E+00 1.0898E-06 1.3729E-07 4.7734E-06 3.3486E-09 3.4455E-09 3.4477E-02 3.7562E-02 3.3390E-02 4.1292E-02 4.0310E-02 1.1253E-08	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.6915E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-06 3.3979E-09 3.4963E-09 3.2812E-02 3.9659E-02 3.5213E-02 4.2561E-02 4.1549E-02 1.517E-08	3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 1.3887E-07 4.8282E-06 3.4036E-09 3.4785E-09 3.2308E-02 3.9504E-02 3.8303E-02 3.4672E-02 4.1106E-02 1.1496E-08 1.4482E-09
mn mn_TEQ  Total PC  Cod7  Cod12  Cod7  Cod12  Eb/hr  Erd  ET/hr  Erd  Erc  Total PC  Cod12	Total PCDDs (ng) Total PCDPs (ng) Total PCDPs (ng) Total PCDDs & PCDFs (ng) Total TEQ PCDDs & PCDFs (ng)  DD/F Results (TEF=1) PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/dscm) PCDD/F Concentration @12% CO <sub>2</sub> (ng/dscm) PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) PCDD/F Rate (Ib/hr) PCDD/F Rate (Ib/hr) PCDD/F Rate (Ton/yr) PCDD/F Rate - F <sub>a</sub> -based (lb/MMBtu) PCDD/F Rate - F <sub>c</sub> -based (lb/MMBtu) DD/F TEQ Results (using USEPA/INTL 1989 TEFs) TEQ Concentration (ng/dscm) TEQ Concentration @7% O <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/dscm) TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry) TEQ Rate (lb/hr) TEQ Rate (g/sec)	3.47830 12.70000 0.13300 3.1509E+00 3.8554E+00 3.6889E+00 4.1375E+00 3.9588E+00 1.1190E-06 1.4097E-07 4.9014E-06 3.4644E-09 3.4938E-09 3.2998E-02 4.0376E-02 3.631E-02 3.5412E-02 4.3330E-02 4.1458E-02 1.1719E-08 1.4763E-09	3.21770 12.30000 0.12700 3.0134E+00 3.6379E+00 3.2339E+00 3.9992E+00 3.9992E+00 1.0998E-06 1.3729E-04 4.7734E-06 3.3486E-09 3.4455E-09 3.1114E-02 3.8477E-02 3.7562E-02 4.1292E-02 4.1292E-02 4.0310E-02 1.1253E-08 1.4176E-09	3.28990 12.30000 0.12900 3.1286E+00 3.7815E+00 3.3575E+00 4.0582E+00 3.9616E+00 1.0981E-06 1.3834E-07 4.8098E-06 3.3979E-09 3.4963E-09 3.2812E-02 3.9659E-02 3.5213E-02 4.2561E-02 4.1549E-02 1.1517E-08 1.4509E-09	3.0976E+00 3.7878E+00 3.6728E+00 3.3243E+00 4.0650E+00 3.9415E+00 1.1023E-06 3.4036E-09 3.4785E-09 3.2308E-02 3.8303E-02 3.8303E-02 4.1106E-02 1.1496E-08 1.4482E-09 5.0353E-08 3.5497E-11 3.6277E-11

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QA/QC Date

## USEPA Method 23 Maximum Emissions Parameters (NDs & EMPCs included) Total Tetra- through Octa-PCDD/F Results (TEQ based on USEPA/INTL 1989 TEFs)

Run No.		1	2	3	Average
Date (200)	9)	Mar 16	Mar 17	Mar 17	
Start Time	•	11:07	06:08	10:54	
Stop Time	(approx.)	15:32	10:27	15:18	
Process (	Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.0	183.4	184.2	183.9
Ρ,	Fabric Filter Inlet Temperature (°F)	320	320	320	320
P <sub>2</sub>	Carbon Feed Rate (lb/hr)	6	5	5	5
Fa	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Cond	fitions				
O <sub>2</sub>	Oxygen (dry volume %)	9.5400	9.6600	9.4000	9.5333
CO2	Carbon dioxide (dry volume %)	10.2500	9.9400	10.1700	10.1200
T <sub>s</sub>	Sample temperature (°F)	301.2	300.8	301.0	301.0
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.2795	21.3263	21.0032	21.2030
Gas Flow	Rate				
Q,	Volumetric flow rate, actual (acfm)	176,448	182,079	175,503	178,010
G.	Volumetric flow rate, standard (scfm)	120,409	122,690	118,587	120,562
$Q_{add}$	Volumetric flow rate, dry standard (dscfm)	94,787	96,525	93,680	94,997
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O <sub>2</sub> (dscfm)	7 <b>7</b> ,466	78,053	77,505	77,675
Q.	Volumetric flow rate, actual (acf/hr)	10,586,895	10,924,751	10,530,158	10,680,602
Q,	Volumetric flow rate, standard (scf/hr)	7,224,546	7,361,399	7,115,194 5,620,774	7,233,713 5,699,820
Q <sub>atd</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,687,202	5,791,482 309,395	298,220	302,481
Q,	Volumetric flow rate, actual (m³/hr)	299,827 204,603	208,479	201,506	204,863
Q,	Volumetric flow rate, standard (m³/hr)	161,065	164,018	159,184	161,422
Q <sub>std</sub> Q <sub>std7</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr) Volumetric flow rate, dry std@7%O <sub>2</sub> (dry m <sup>3</sup> /hr)	131,633	132,631	131,699	131,987
Q.	Volumetric flow rate, normal (Nm³/hr)	190,653	194,265	187,767	190,895
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm³/hr)	150,083	152,835	148,330	150,416
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm³/hr)	122,658	123,588	122,719	122,988
Sampling V <sub>mstd</sub>	Volume metered, standard (dscf)	142.3205	144.1278	138.8218	141.7567
%I	Isokinetic sampling (%)	99.6609	99.1092	98.3598	99.0433
	y Data from USEPA Method 23, including NDs and EMPCs Total PCDDs & PCDFs (ng)	12.70000	12.50000	12.40000	
m,	Total TEQ PCDDs & PCDFs (ng)	0.13600	0.13100	0.12900	
m <sub>n_TEO</sub>		•			
	ID/F Results (TEF=1)	3.1509E+00	3.0624E+00	3.1540E+00	3.1224E+00
C**	PCDD/F Concentration (ng/dscm) PCDD/F Concentration @7% O₂ (ng/dscm)	3.8554E+00	3.7871E+00	3.8122E+00	3.8183E+00
C <sub>sd7</sub>	PCDD/F Concentration @12% CO 2 (ng/dscm)	3.6889E+00	3.6970E+00	3.7215E+00	3.7025E+00
C <sub>sd12</sub> C <sub>sd</sub>	PCDD/F Concentration (ng/Nm³ dry)	3.3814E+00	3.2865E+00	3.3848E+00	3.3509E+00
C <sub>sd7</sub>	PCDD/F Concentration @7% O <sub>2</sub> (ng/Nm³ dry)	4.1375E+00	4.0642E+00	4.0912E+00	4.0976E+00
C <sub>sd12</sub>	PCDD/F Concentration @12% CO 2 (ng/Nm³ dry)	3.9588E+00	3.9676E+00	3.9938E+00	3.9734E+00
Eiblir	PCDD/F Rate (lb/hr)	1.1190E-06	1.1075E-06	1.1071E-06	1.1112E-06
Eg/s	PCDD/F Rate (g/s)	1.4097E-07	1.3952E-07	1.3946E-07	1.3999E-07
E <sub>T/y</sub>	PCDD/F Rate (Ton/yr)	4.9014E-06	4.8510E-06	4.8489E-06	4.8671E-06
EFa	PCDD/F - F <sub>d</sub> -based (lb/MMBtu)	3.4644E-09	3.4030E-09	3.4256E-09	3.4310E-09
$E_{Fe}$	PCDD/F Rate - F <sub>c</sub> -based (lb/MMBtu)	3.4938E-09	3.5015E-09	3.5247E-09	3.5067E-09
EHI	PCDD/F Rate - Heat Input-based (Ib/MMBtu)	N/A	N/A	N/A	5 0 420E 00
$E_{R_{P}}$	PCDD/F Rate - Production-based (lb/xxxxx)	6.0817E-09	6.0389E-09	6.0101E-09	6.0436E-09
$E_Rp$	PCDD/F Rate - Production-based (g/xxxxx)	2.7581E-06	2.7388E-06	2.7257E-06	2.7408E-06
Total PCD	D/F TEQ Results (using USEPA/INTL 1989 TEFs)			<b>-</b>	
Cedito	TEQ Concentration (ng/dscm)	3.3742E-02	3.2094E-02	3.2812E-02	3.2882E-02
C <sub>ed7reo</sub>	TEQ Concentration @7% O <sub>2</sub> (ng/dscm)	4.1286E-02	3.9689E-02	3.9659E-02	4.0212E-02 3.8988E-02
	TEQ Concentration @12% CO <sub>2</sub> (ng/dscm)	3.9503E-02	3.8745E-02	3.8716E-02	3.5289E-02
C <sub>sdrto</sub>	TEQ Concentration (ng/Nm³ dry)	3.6211E-02	3.4442E-02 4.2593E-02	3.5213E-02 4.2561E-02	4.3154E-02
C <sub>ed77E0</sub>	TEQ Concentration @7% O <sub>2</sub> (ng/Nm³ dry)	4.4307E-02 4.2393E-02	4.2593E-02 4.1580E-02	4.1549E-02	4.1841E-02
	TEQ Concentration @12% CO <sub>2</sub> (ng/Nm³ dry)	1.1983E-08	1.1607E-08	1.1517E-08	1.1702E-08
E <sub>Ib/h/TE</sub> o	TEQ Rate (Ib/hr)	1.5096E-09	1.4622E-09	1.4509E-09	1.4742E-09
Eg/erea	TEQ Rate (g/sec) TEQ Rate (Ton/yr)	5.2487E-08	5.0839E-08	5.0444E-08	5.1257E-08
E <sub>TAymea</sub> E <sub>Fdrea</sub>	TEQ Rate - F <sub>d</sub> -based (lb/MMBtu)	3.7099E-11	3.5664E-11	3.5637E-11	3.6133E-11
E <sub>FcTE0</sub>	TEQ Rate - F <sub>c</sub> -based (lb/MMBtu)	3.7413E-11	3.6696E-11	3.6668E-11	3.6926E-11
EHITEO	TEQ Rate - Heat Input-based (Ib/MMBtu)	N/A	N/A	N/A	
ERPTEO	TEQ Rate - Production-based (Ib/xxxxx)	6.5127E-11	6.3288E-11	6.2524E-11	6.3646E-11
ERPTEO	TEQ Rate - Production-based (g/xxxxx)	2.9536E-08	2.8702E-08	2.8356E-08	2.8865E-08
	-				

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Wheelabrator South Broward, Inc. Clean Air Project No: 10735

Unit 1 SDA Inlet

### USEPA Method 26A (HCI) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
Start Tin	ne (approx.)	06:44	08:22	09:50	
Stop Tim	ne (approx.)	07:44	09:22	10:50	
Samplin	g Conditions				
$Y_d$	Dry gas meter correction factor	0.9992	0.9992	0.9992	-1
$P_g$	Static pressure (in. H <sub>2</sub> O)	-1.3000	-1.3000	-1.3000	
As	Sample location area (ft <sup>2</sup> )	60.1320	60.1320	60.1320	
$P_{bar}$	Barometric pressure (in. Hg)	30.20	30.20	30.20	30.2000
$O_2$	Oxygen (dry volume %)	8.0000	7.7300	8.4500	8.0600
CO <sub>2</sub>	Carbon dioxide (dry volume %)	11.4100	11.6800	10.9900	11.3600
N <sub>2</sub> +CC	Nitrogen plus carbon monoxide (dry volume %)	80.5900	80.5900	80.5600	80.5800
V <sub>Ic</sub>	Total Liquid collected (m!)	157.00	140.80	143.80	
$V_m$	Volume metered, meter conditions (ft3)	33.5600	35.4400	35.2900	
$T_{m}$	Dry gas meter temperature (°F)	81.0417	92.5833	95.3333	
$T_s$	Sample temperature (°F)	492.3333	487.5833	487.3333	489.0833
ΔΗ	Meter box orifice pressure drop (in. H <sub>2</sub> O)	1.0883	1.1833	1.1833	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Re	sults				
$V_{wstd}$	Volume of water collected (ft <sup>3</sup> )	7.3884	6.6260	6.7672	6.9272
$V_{mstd}$	Volume metered, standard (dscf)	33.1054	34.2376	33.9239	33.7556
$P_s$	Sample gas pressure, absolute (in. Hg)	30.1044	30.1044	30.1044	30.1044
$P_{v}$	Vapor pressure, actual (in. Hg)	30.1044	30.1044	30.1044	30.1044
$B_{wo}$	Moisture measured in sample (% by volume)	18.2458	16.2150	16.6307	17.0305
$B_{ws}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	18.2458	16.2150	16.6307	17.0305
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.1456	30.1780	30.0964	30.1400
$M_s$	MW of sample gas, wet (lb/lb-mole)	27.9295	28.2033	28.0847	28.0725

Comments:

Average includes 3 runs.

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Unit 1 SDA Inlet

#### USEPA Method 26A HCI Parameters

Run No	).	1	2	3	Average
Date (2	009)	Mar 16	Mar 16	Mar 16	
Start Ti	me (approx.)	06:44	08:22	09:50	
Stop Tir	me (approx.)	07:44	09:22	10:50	
Proces	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.7	184.7	183.5	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	320	320	320	320
Fd	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
Fc	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	8.0000	7.7300	8.4500	8.0600
CO2	Carbon dioxide (dry volume %)	11.4100	11.6800	10.9900	11.3600
$T_{s}$	Sample temperature (°F)	492.3333	487.5833	487.3333	489.0833
$B_w$	Actual water vapor in gas (% by volume)	18.2458	16.2150	16.6307	17.0305
Samplir	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	33.1054	34.2376	33.9239	33.7556
Laborat	ory Data				
$m_n$	Total HCl collected (mg)	593.6855	508.7987	529.3518	
Hydrog	en Chloride (HCl) Results				
$C_{sd}$	HCI Concentration (lb/dscf)	3.9543E-05	3.2768E-05	3.4407E-05	3.5573E-05
$C_{\sf sd7}$	HCI Concentration @7% O <sub>2</sub> (lb/dscf)	4.2608E-05	3.4584E-05	3.8414E-05	3.8536E-05
$C_{sd12}$	HCI Concentration @12% CO <sub>2</sub> (lb/dscf)	4.1587E-05	3.3666E-05	3.7569E-05	3.7607E-05
$C_{\sf sd}$	HCl Concentration (ppmdv)	418.0693	346.4440	363.7721	376.0952
$C_{sd7}$	HCI Concentration @7% O <sub>2</sub> (ppmdv)	450.4778	365.6470	406.1392	407.4213
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (ppmdv)	439.6873	355.9356	397.2034	397.6088
C <sub>w</sub>	HCI Concentration (ppmwv)	341.7892	290.2680	303.2742	311.7771
$C_{sd}$	HCI Concentration (mg/dscm)	633.2215	524.7354	550.9812	569.6461
$C_{\sf sd7}$	HCl Concentration @7% O <sub>2</sub> (mg/dscm)	682.3085	553.8210	615.1517	617.0937
$C_{sd12}$	HCI Concentration @12% CO <sub>2</sub> (mg/dscm)	665.9648	539.1118	601.6174	602.2313
$C_{sd}$	HCl Concentration (mg/Nm³ dry)	679.5548	563.1307	591.2969	611.3275
$C_{sd7}$	HCl Concentration @7% O₂ (mg/Nm³ dry)	732.2335	594.3445	660.1628	662.2469
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (mg/Nm <sup>3</sup> dry)	714.6939	578.5590	645.6381	646.2970
$E_{Fd}$	HCl Rate - Fd-based (lb/MMBtu)	0.6131	0.4976	0.5528	0.5545
$E_Fc$	HCI Rate - Fc-based (lb/MMBtu)	0.6307	0.5106	0.5698	0.5704

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Unit 1 FF Outlet

# EPA Modified Method 26A (HCI) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:44	08:22	09:50	
Stop Time (approx.)		07:44	09:22	10:50	
Samplin	g Conditions				
Y <sub>d</sub>	Dry gas meter correction factor	0.9886	0.9886	0.9886	
$P_{g}$	Static pressure (in. H <sub>2</sub> O)	-10.4000	-10.4000	-10.5000	
$A_s$	Sample location area (ft²)	64.0000	64.0000	64.0000	
$P_{bar}$	Barometric pressure (in. Hg)	30.20	30.20	30.20	30.2000
O <sub>2</sub>	Oxygen (dry volume %)	9.2000	8.9700	9.5000	9.2233
CO2	Carbon dioxide (dry volume %)	10.4000	10.5500	10.0700	10.3400
N <sub>2</sub> +CC	Nitrogen plus carbon monoxide (dry volume %)	80.4000	80.4800	80.4300	80.4367
$V_{ic}$	Total Liquid collected (ml)	248.40	228.20	213.90	
$V_{m}$	Volume metered, meter conditions (ft3)	40.6800	40.4500	40.3900	
$T_{\mathbf{m}}$	Dry gas meter temperature (°F)	81.4583	86.5833	89.8750	
$T_{s}$	Sample temperature (°F)	304.0833	306.6667	305.5833	305.4444
ΔH	Meter box orifice pressure drop (in. H <sub>2</sub> O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Re	sults				
$V_{wstd}$	Volume of water collected (ft <sup>3</sup> )	11.6897	10.7391	10.0661	10.8316
$V_{mstd}$	Volume metered, standard (dscf)	39.7123	39.1175	38.8257	39.2185
$P_s$	Sample gas pressure, absolute (in. Hg)	29.4353	29.4353	29.4279	29.4328
$P_{v}$	Vapor pressure, actual (in. Hg)	29.4353	29.4353	29.4279	29.4328
$B_{wo}$	Moisture measured in sample (% by volume)	22.7417	21.5399	20.5886	21.6234
$B_{ws}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	22.7417	21.5399	20.5886	21.6234
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.0320	30.0468	29.9912	30.0233
$M_s$	MW of sample gas, wet (lb/lb-mole)	27.2957	27.4519	27.5224	27.4233

Comments:

Average includes 3 runs.

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### EPA Modified Method 26A HCI Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:44	08:22	09:50	
Stop Time (approx.)		07:44	09:22	10:50	
Proces	s Conditions				
Re	Steam Production Rate (Klbs/hour)	184.7	184.7	183.5	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	320	320	320	320
F	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
Fc	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.2000	8.9700	9.5000	9.2233
CO₂	Carbon dioxide (dry volume %)	10.4000	10.5500	10.0700	10.3400
T <sub>s</sub>	Sample temperature (°F)	304.0833	306.6667	305.5833	305.4444
B <sub>w</sub>	Actual water vapor in gas (% by volume)	22.7417	21.5399	20.5886	21.6234
Samplin	ng Data				
V <sub>mstd</sub>	Volume metered, standard (dscf)	39.7123	39.1175	38.8257	39.2185
	ory Data				
m <sub>n</sub>	Total HCl collected (mg)	17.6057	20.2666	24.8532	
••	· <del>-</del> ·	11.0001	20.2000	24.0002	
•	en Chloride (HCI) Results	0.77555.07	4 44045 00	4 4445 = 00	4 45745 00
C <sub>sd</sub>	HCI Concentration (lb/dscf)	9.7755E-07	1.1424E-06	1.4115E-06	1.1771E-06
C <sub>sd7</sub>	HCI Concentration @7% O <sub>2</sub> (lb/dscf)	1.1614E-06	1.3310E-06	1.7210E-06	1.4045E-06
C <sub>sd12</sub>	HCI Concentration @12% CO <sub>2</sub> (lb/dscf)	1.1279E-06	1.2994E-06	1.6820E-06	1.3698E-06
$C_{sd}$	HCI Concentration (ppmdv)	10.3352	12.0781	14.9229	12.4454
C <sub>sd7</sub>	HCI Concentration @7% O <sub>2</sub> (ppmdv)	12.2786	14.0726	18.1955	14.8489
C <sub>sd12</sub>	HCI Concentration @12% CO₂ (ppmdv)	11.9252	13.7381	17.7830	14.4821
C <sub>w</sub>	HCl Concentration (ppmwv)	7.9848	9.4765	11.8505	9.7706
C <sub>sd</sub>	HCI Concentration (mg/dscm)	15.6540	18.2939	22.6027	18.8502
C <sub>sd7</sub>	HCI Concentration @7% O <sub>2</sub> (mg/dscm)	18.5975	21.3148	27.5595	22.4906
C <sub>sd12</sub>	HCl Concentration @12% CO <sub>2</sub> (mg/dscm)	18.0624	20.8082	26.9347	21.9351
C <sub>sd</sub>	HCI Concentration (mg/Nm³ dry)	16.7995	19.6325	24.2566	20.2295
C <sub>sd7</sub>	HCI Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	19.9583	22.8744	29.5760	24.1363
C <sub>sd12</sub>	HCI Concentration @12% CO <sub>2</sub> (mg/Nm <sup>3</sup> dry)	19.3840	22.3308	28.9056	23.5401
E <sub>Fd</sub>	HCl Rate - Fd-based (lb/MMBtu)	0.0167	0.0192	0.0248	0.0202
$E_Fc$	HCl Rate - Fc-based (lb/MMBtu)	0.0171	0.0197	0.0255	0.0208

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### USEPA Method 29 (Mercury) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:58	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Sampline	g Conditions				
Y	Dry gas meter correction factor	1.0079	1.0079	1.0079	
C <sub>p</sub>	Pitot tube coefficient	0.8200	0.8200	0.8200	
P,	Static pressure (In. H 2O)	-1.9000	-1.7000	-1.8000	
A <sub>s</sub>	Sample location area (ft 2)	60.1320	60.1320	60.1320	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.20	30.20	30.20	30.2000
$D_n$	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O <sub>2</sub>	Oxygen (dry volume %)	8.8300	9.2100	.8,9800	9.0067
CO₂	Carbon dioxide (dry volume %)	10.7300	10.4900	10.7700	10.6633
N <sub>2</sub> +CO	Nitrogen plus carbon monoxide (dry volume %)	80.4400	80.3000	80.2500	80.3300
V <sub>lc</sub>	Total Liquid collected (ml)	289.70	297.10	299.80	
V <sub>m</sub>	Volume metered, meter conditions (ft 3)	73.9160	75.0900	75.0900	
T <sub>m</sub>	Dry gas meter temperature (°F)	87.6250	96.7083	91.5417	
$T_{s}$	Sample temperature (°F)	513.1250	513.6250	513.9583	513.5694
ΔΗ	Meter box orifice pressure drop (in. H 2O)	1.2142	1.2083	1.2079	
θ	Total sampling time (min)	120.0	120.0	120.0	
Flow Res	ults				
V <sub>wetd</sub>	Volume of water collected (ft 3)	13.6333	13.9815	14.1086	13.9078
$V_{mstd}$	Volume metered, standard (dscf)	72.6876	72.6362	73.3166	72.8801
P <sub>e</sub>	Sample gas pressure, absolute (in. Hg)	30.0603	30.0750	30.0676	30.0676
$P_{v}$	Vapor pressure, actual (in. Hg)	30.0603	30.0750	30.0676	30.0676
B <sub>wo</sub>	Moisture measured in sample (% by volume)	15.7937	16.1416	16.1379	16.0244
B <sub>we</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	15.7937	16.1416	16.1379	16.0244
√∆P	Velocity head ( √in. H₂O)	0.6954	0.6912	0.6883	0.6916
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.0700	30.0468	30.0824	30.0664
M <sub>s</sub>	MW of sample gas, wet (lb/lb-mole)	28.1637	28.1022	28.1326	28.1328
$V_s$	Velocity of sample (ft/sec)	52.2654	52.0035	51.7720	52.0136
%l	Isokinetic sampling (%)	102.0785	102.9480	104,4336	103.1534
$Q_a$	Volumetric flow rate, actual (acfm)	188,570	187,625	186,789	187,661
Q,	Volumetric flow rate, standard (scfm)	102,794	102,277	101,761	102,277
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	86,559	85,767	85,339	85,889
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,163	72,131	73,183	73,492
Q,	Volumetric flow rate, actual (acf/hr)	11,314,177	11,257,482	11,207,359	11,259,673
Q,	Volumetric flow rate, standard (scf/hr)	6,167,652	6,136,596	6,105,689	6,136,646
Q <sub>etd</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,193,550	5,146,048	5,120,359	5,153,319
Q,	Volumetric flow rate, actual (m <sup>3</sup> /hr)	320,424	318,819	317,399	318,881
Q.	Volumetric flow rate, standard (m <sup>3</sup> /hr)	174,672	173,792	172,917	173,793
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	147,084	145,739	145,012	145,945
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	127,720	122,568	124,355	124,881
Q <sub>s</sub>	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	162,762	161,943	161,127	161,944
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm ³/hr)	137,056	135,802	135,124	135,994
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,012	114,211	115,876	116,366

Comments:

Average includes 3 runs.

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## USEPA Method 29 Mercury (Hg) Emission Parameters

Run No	).	1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Ti	me (approx.)	06:58	09:58	12:45	
Stop Ti	me (approx.)	09:20	12:09	14:59	
Proces	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	5.5	7	6	515
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820			1,820
Cap	Capacity factor (hours/year)	8,760	1,820	1,820 8,760	•
Сар	Capacity factor (flours/year)	8,760	8,760	0,760	8,780
	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	8.8300	9.2100	8.9800	9.0067
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.7300	10.4900	10.7700	10.6633
T,	Sample temperature (°F)	513.1250	513.6250	513.9583	513.5694
B <sub>w</sub>	Actual water vapor in gas (% by volume)	15.7937	16.1416	16.1379	16.0244
Gas Flo	w Rate				
Q,	Volumetric flow rate, actual (acfm)	188,570	187,625	186,789	187,661
Q,	Volumetric flow rate, standard (scfm)	102,794	102,277	101,761	102,277
Q <sub>sld</sub>	Volumetric flow rate, dry standard (dscfm)	86,559	85,767	85,339	85,889
Q <sub>sto7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,163	72,131	73,183	73,492
Q,	Volumetric flow rate, actual (acf/hr)	11,314,177	11,257,482	11,207,359	11,259,673
Q,	Volumetric flow rate, standard (scf/hr)	6,167,652	6,136,596	6,105,689	6,136,846
Q <sub>sto</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,193,550	5,146,048	5,120,359	5,153,319
Q,	Volumetric flow rate, actual (m 3/hr)	320,424	318,819	317,399	318,881
Q,	Volumetric flow rate, standard (m <sup>-7/m</sup> )	174,672	173,792	172,917	173,793
Q <sub>sto</sub>	Volumetric flow rate, standard (iii /hir)  Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	147,084	145,739	145,012	145,945
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	127,720	122,568	124,355	124,881
Q,		162,762	161,943	161,127	161,944
	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	137,056		135,124	
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)		135,802		135,994
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,012	114,211	115,876	116,366
Samplin	g Data				
$V_{matd}$	Volume metered, standard (dscf)	72.6876	72.6362	73.3166	72.8801
<b>%</b> I	Isokinetic sampling (%)	102.0785	102.9480	104.4336	103.1534
Laborato	ory Data				
m <sub>n-1b</sub>	Fraction 1B (µg)	54.8752	57.1172	50.7188	
m <sub>n-2b</sub>	Fraction 2B (µg)	· 7.4834	22.2673	5.7219	
m <sub>n-3e</sub>	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m <sub>n-3b</sub>	Fraction 3B (µg)	< 0.5000	<0.5000	< 0.5000	
m <sub>n-3c</sub>	Fraction 3C (µg)	< 0.4000	2.1075	0.5629	
mn	Total matter corrected for allowable blanks (µg)	62.3587	81.4920	57.0036	
	·· <del>- ·</del>				
	Results - Total	4 00475 00	0.47005.00	4 71445 00	0.00005.00
C <sub>sd</sub>	Concentration (Ib/dscf)	1.8917E-09	2.4738E-09	1.7144E-09	2.0266E-09
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	2.1785E-09	2.9415E-09	1.9992E-09	2.3730E-09
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	2.1156E-09	2.8299E-09	1.9102E-09	2.2852E-09
Ca	Concentration (lb/acf)	8.6833E-10	1.1308E-09	7.8326E-10	9.2748E-10
Ced	Concentration (µg/dscm)	3.0292E+01	3.9615E+01	2.7453E+01	3.2454E+01
C <sub>sd7</sub>	Concentration @7% O z (µg/dscm)	3.4885E+01	4.7104E+01	3.2014E+01	3.8001E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	3.3878E+01	4.5317E+01	3.0589E+01	3.6595E+01
C <sub>sd</sub>	Concentration (mg/dscm)	3.0292E-02	3.9615E-02	2.7453E-02	3.2454E-02
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	3.4885E-02	4.7104E-02	3.2014E-02	3.8001E-02
$C_{\rm sd12}$	Concentration @12% CO 2 (mg/dscm)	3.3878E-02	4.5317E-02	3.0589E-02	3.6595E-02
Ca	Concentration (µg/m³ (actual,wet))	1.3905E+01	1.8109E+01	1.2543E+01	1.4852E+01
C₅d	Concentration (µg/Nm <sup>3</sup> dry)	3.2509E+01	4.2514E+01	2.9462E+01	3.4828E+01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm <sup>3</sup> dry)	3.7438E+01	5.0551E+01	3.4356E+01	4.0782E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm <sup>3</sup> dry)	3.6357E+01	4.8633E+01	3.2827E+01	3.9272E+01
E <sub>IMTer</sub>	Rate (lb/hr)	9.8245E-03	1.2730E-02	8.7783E-03	1.0444E-02
E <sub>0/s</sub>	Rate (g/s)	1.2377E-03	1.6037E-03	1.1059E-03	1.3157E-03
E <sub>T/yr</sub>	Rate (Ton/yr)	4.3031E-02	5.5759E-02	3.8449E-02	4.5747E-02
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	3.1347E-05	4.2327E-05	2.8767E-05	3.4147E-05
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	3.2086E-05	4.2921E-05	2.8971E-05	3.4659E-05
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#### USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Front Half Results

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:58	09:58	12:45	
Stop Tim	e (approx.)	09:20	12:09	14:59	
Mercury	Results - Front Half				
Ced	Concentration (lb/dscf)	1.6647E-09	1.7339E-09	1.5254E-09	1.6413E-09
$C_{sd7}$	Concentration @7% O <sub>2</sub> (lb/dscf)	1.9170E-09	2.0617E-09	1.7787E-09	1.9192E-09
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	1.8617E-09	1.9835E-09	1.6996E-09	1.8482E-09
C.	Concentration (lb/acf)	7.6413E-10	7.9260E-10	6.9690E-10	7.5121E-10
$C_{sd}$	Concentration (µg/dscm)	2.6657E+01	2.7766E+01	2.4427E+01	2.6283E+01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	3.0699E+01	3.3015E+01	2.8484E+01	3.0733E+01
C <sub>ad12</sub>	Concentration @12% CO 2 (µg/dscm)	2.9812E+01	3.1763E+01	2.7216E+01	2.9597E+01
C <sub>sd</sub>	Concentration (mg/dscm)	2.6657E-02	2.7766E-02	2.4427E-02	2.6283E-02
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	3.0699E-02	3.3015E-02	2.8484E-02	3.0733E-02
C <sub>ed12</sub>	Concentration @12% CO 2 (mg/dscm)	2.9812E-02	3.1763E-02	2.7216E-02	2.9597E-02
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	1.2236E+01	1.2692E+01	1.1160E+01	1.2030E+01
$C_{sd}$	Concentration (µg/Nm 3 dry)	2.8608E+01	2.9798E+01	2.6214E+01	2.8206E+01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	3.2945E+01	3.5431E+01	3.0568E+01	3.2981E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	3.1994E+01	3.4087E+01	2.9208E+01	3.1763E+01
E <sub>ib/hr</sub>	Rate (lb/hr)	8.6455E-03	8.9227E-03	7.8104E-03	8.4595E-03
E <sub>g/s</sub>	Rate (g/s)	1.0891E-03	1.1240E-03	9.8393E-04	1.0657E-03
ETAT	Rate (Ton/yr)	3.7867E-02	3.9081E-02	3.4210E-02	3.7053E-02
EFd	Rate - Fd-based (lb/MMBtu)	2.7585E-05	2.9666E-05	2.5595E-05	2.7616E-05
É <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	2.8236E-05	3.0083E-05	2.5 <b>7</b> 77E-05	2.8032E-05
EHI	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
ERP	Rate - Production-based (lb/xxxxx)	4.6961E-05	4.8257E-05	4.2471E-05	4.5896E-05
ERP	Rate - Production-based (g/xxxxx)	2.1297E-02	2.1885E-02	1.9261E-02	2.0815E-02

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# USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 1-3 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
Start Tim	ne (approx.)	06:58	09:58	12:45	
Stop Tim	e (approx.)	09:20	12:09	14:59	
Mercury	Results - Impingers 1-3 Solution				
Csd	Concentration (lb/dscf)	2.2701E-10	6.7596E-10	1.7209E-10	3.5835E-10
$C_{sd7}$	Concentration @7% O 2 (lb/dscf)	2.6143E-10	8.0376E-10	2.0067E-10	4.2195E-10
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	2.5388E-10	7.7327E-10	1.9174E-10	4.0630E-10
Ca	Concentration (lb/acf)	1.0421E-10	3.0900E-10	7.8622E-11	1.6394E-10
C∞	Concentration (µg/dscm)	3.6353E+00	1.0825E+01	2.7557E+00	5.7385E+00
$C_{sd7}$	Concentration @7% O 2 (µg/dscm)	4.1865E+00	1.2871E+01	3.2135E+00	6.7570E+00
C <sub>sd12</sub>	Concentration @12% CO ₂ (µg/dscm)	4.0656E+00	1.2383E+01	3.0704E+00	6.5063E+00
$C_{sd}$	Concentration (mg/dscm)	3.6353E-03	1.0825E-02	2.7557E-03	5.7385E-03
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	4.1865E-03	1.2871E-02	3.2135E-03	6.7570E-03
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	4.0656E-03	1.2383E-02	3.0704E-03	6.5063E-03
Ca	Concentration (µg/m 3 (actual,wet))	1.6687E+00	4.9482E+00	1.2590E+00	2.6253E+00
Ced	Concentration (µg/Nm 3 dry)	3.9013E+00	1.1617E+01	2.9574E+00	6.1584E+00
$C_{sd7}$	Concentration @7% O 2 (µg/Nm3 dry)	4.4928E+00	1.3813E+01	3.4486E+00	7.2514E+00
$C_{sd12}$	Concentration @12% CO 2 (µg/Nm3 dry)	4.3630E+00	1.3289E+01	3.2951E+00	6.9823E+00
E <sub>ID/Iv</sub>	Rate (lb/hr)	1.1790E-03	3.4785E-03	8.8115E-04	1.8462E-03
E <sub>g/s</sub>	Rate (g/s)	1.4853E-04	4.3821E-04	1.1100E-04	2.3258E-04
E <sub>T/yr</sub>	Rate (Ton/yr)	5.1640E-03	1.5236E-02	3.8594E-03	8.0865E-03
EFd	Rate - Fd-based (lb/MMBtu)	3.7618E-06	1.1566E-05	2.8875E-06	6.0717E-06
$E_{Fc}$	Rate - Fc-based (lb/MMBtu)	3.8505E-06	1.1728E-05	2.9081E-06	6.1622E-06
EHi	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
$E_Rp$	Rate - Production-based (lb/xxxxx)	6.4041E-06	1.8813E-05	4.7914E-06	1.0003E-05
ERP	Rate - Production-based (g/xxxxx)	2.9044E-03	8.5320E-03	2.1730E-03	4.5365E-03

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# USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 4 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
Start Tirr	ne (approx.)	06:58	09:58	12:45	
Stop Tim	e (approx.)	09:20	12:09	14:59	
	Results - Impinger 4 Solution				
C <sub>sd</sub>	Concentration (lb/dscf)	<6.0671E-12	<6.0714E-12	<6.0150E-12	<6.0511E-12
$C_{sd7}$	Concentration @7% O <sub>2</sub> (lb/dscf)	<6.9869E-12	<7.2191E-12	<7.0141E-12	<7.0734E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<6.7852E-12	<6.9453E-12	<6.7020E-12	<6.8108E-12
C.	Concentration (lb/acf)	<2.7850E-12	<2.7754E-12	<2.7481E-12	<2.7695E-12
C <sub>sct</sub>	Concentration (µg/dscm)	<9.7156E-02	<9.7224E-02	<9.6322E-02	<9.6901E-02
C <sub>sd7</sub>	Concentration @7% O ₂ (µg/dscm)	<1.1189E-01	<1.1560E-01	<1.1232E-01	<1.1327E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.0865E-01	<1.1122E-01	<1.0732E-01	<1.0907E-01
C <sub>ed</sub>	Concentration (mg/dscm)	<9.7156E-05	<9.7224E-05	<9.6322E-05	<9.6901E-05
$C_{ed7}$	Concentration @7% O ₂ (mg/dscm)	<1.1189E-04	<1.1560E-04	<1.1232E-04	<1.1327E-04
C <sub>ad12</sub>	Concentration @12% CO 2 (mg/dscm)	<1.0865E-04	<1.1122E-04	<1.0732E-04	<1.0907E-04
C.	Concentration (µg/m 3 (actual,wet))	<4.4597E-02	<4.4443E-02	<4.4007E-02	<4.4349E-02
Cad	Concentration (µg/Nm 3 dry)	<1.0426E-01	<1.0434E-01	<1.0337E-01	<1.0399E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<1.2007E-01	<1.2406E-01	<1.2054E-01	<1.2156E-01
Cad12	Concentration @12% CO 2 (µg/Nm3 dry)	<1.1661E-01	<1.1936E-01	<1.1518E-01	<1.1705E-01
Elbyr	Rate (lb/hr)	<3.1510E-05	<3.1243E-05	<3.0799E-05	<3.1184E-05
E <sub>9/5</sub>	Rate (g/s)	<3.9695E-06	<3.9359E-06	<3.8799E-06	<3.9284E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<1.3801E-04	<1.3685E-04	<1.3490E-04	<1.3659E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<1.0054E-07	<1.0388E-07	<1.0093E-07	<1.0178E-07
EFC	Rate - Fc-based (lb/MMBtu)	<1.0291E-07	<1.0534E-07	<1.0165E-07	<1.0330E-07
EH	Rate - Heat Input-based (ib/MMBtu)	N/A	N/A	N/A	
ERD	Rate - Production-based (lb/xxxxx)	<1.7115E-07	<1.6897E-07	<1.6748E-07	<1.6920E-07
ERP	Rate - Production-based (g/xxxxx)	<7.7621E-05	<7.6633E-05	<7.5953E-05	<7.6736E-05
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#### USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 5-6 Results

Run No		1	2	3	Average
Date (20	009)	Mar 16	Mar 16	Mar 16	
-	ne (approx.)	06:58	09:58	12:45	
	ne (approx.)	09:20	12:09	14:59	
	,				
Mercury	Results - Filtered Permanganate Solution				
Csd	Concentration (lb/dscf)	<1.5168E-11	<1.5178E-11	<1.5038E-11	<1.5128E-11
$C_{sd7}$	Concentration @7% O 2 (lb/dscf)	<1.7467E-11	<1.8048E-11	<1.7535E-11	<1.7684E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.6963E-11	<1.7363E-11	<1.6755E-11	<1.7027E-11
C,	Concentration (lb/acf)	<6.9624E-12	<6.9384E-12	<6.8703E-12	<6.9237E-12
Csd	Concentration (µg/dscm)	<2.4289E-01	<2.4306E-01	<2.4081E-01	<2.4225E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<2.7971E-01	<2.8901E-01	<2,8080E-01	<2.8318E-01
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.7164E-01	<2.7805E-01	<2.6831E-01	<2.7268E-01
Ced	Concentration (mg/dscm)	<2.4289E-04	<2.4306E-04	<2.4081E-04	<2.4225E-04
$C_{\rm sd7}$	Concentration @7% O <sub>2</sub> (mg/dscm)	<2.7971E-04	<2.8901E-04	<2.8080E-04	<2.8318E-04
$C_{sd12}$	Concentration @12% CO 2 (mg/dscm)	<2.7164E-04	<2.7805E-04	<2.6831E-04	<2.7266E-04
Ca	Concentration (µg/m 3 (actual,wet))	<1.1149E-01	<1.1111E-01	<1,1002E-01	<1.1087E-01
$C_{sd}$	Concentration (µg/Nm <sup>3</sup> dry)	<2.6066E-01	<2.6085E-01	<2.5842E-01	<2.5998E-01
$C_{sd7}$	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<3.0018E-01	<3,1016E-01	<3.0135E-01	<3.0390E-01
$C_{sd12}$	Concentration @12% CO 2 (µg/Nm3 dry)	<2.9151E-01	<2.9839E-01	<2.8794E-01	<2.9262E-01
E <sub>lb/hr</sub>	Rate (lb/hr)	<7.8774E-05	<7.8109E-05	<7.6998E-05	<7.7960E-05
Egra	Rate (g/s)	<9.9237E-06	<9.8398E-06	<9.6999E-06	<9.8211E-06
$E_{T/yr}$	Rate (Ton/yr)	<3.4503E-04	<3.4212E-04	<3.3725E-04	<3.4147E-04
$E_{Fd}$	Rate - Fd-based (lb/MMBtu)	<2.5134E-07	<2.5970E-07	<2.5232E-07	<2.5446E-07
$E_Fc$	Rate - Fc-based (lb/MMBtu)	<2.5727E-07	<2.6334E-07	<2.5412E-07	<2.5824E-07
EHi	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
$E_Rp$	Rate - Production-based (fb/xxxxx)	<4.2789E-07	<4.2244E-07	<4.1869E-07	<4.2301E-07
$E_Rp$	Rate - Production-based (g/xxxxx)	<1.9405E-04	<1.9158E-04	<1.8988E-04	<1.9184E-04
Mercury	Results - HCI Rinse + HCI/MnO2 Precipitate				
$C_{sd}$	Concentration (lb/dscf)	<1.2134E-11	6.3977E-11	1.6928E-11	<3.1013E-11
$C_{sd7}$	Concentration @7% O 2 (lb/dscf)	<1.3974E-11	7.6072E-11	1.9740E-11	<3.6595E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.3570E-11	7.3186E-11	1.8862E-11	<3.5206E-11
Ca	Concentration (lb/acf)	<5.5699E-12	2.9245E-11	7.7341E-12	<1.4183E-11
Ced	Concentration (µg/dscm)	<1.9431E-01	1.0245E+00	2.7108E-01	<4.9663E-01
C <sub>ed7</sub>	Concentration @7% O 2 (µg/dscm)	<2.2377E-01	1.2182E+00	3,1611E-01	<5.8602E-01
C <sub>ed12</sub>	Concentration @12% CO <sub>2</sub> (µg/dscm)	<2.1731E-01	1,1720E+00	3.0204E-01	<5.6378E-01
$C_{sd}$	Concentration (mg/dscm)	<1.9431E-04	1.0245E-03	2.7108E-04	<4.9663E-04
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<2.2377E-04	1.2182E-03	3.1611E-04	<5.8602E-04
$C_{sd12}$	Concentration @12% CO 2 (mg/dscm)	<2.1731E-04	1,1720E-03	3.0204E-04	<5.6378E-04
C.	Concentration (µg/m 3 (actual,wet))	<8.9195E-02	4.6832E-01	1.2385E-01	<2.2712E-01
Cad	Concentration (µg/Nm <sup>3</sup> dry)	<2.0853E-01	1.0995E+00	2.9092E-01	<5.3297E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm <sup>3</sup> dry)	<2.4015E-01	1.3073E+00	3.3924E-01	<6.2890E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<2.3321E-01	1.2577E+00	3.2414E-01	<6.0503E-01
EIPA	Rate (lb/hr)	<6.3019E-05	3.2923E-04	8.6679E-05	<1.5964E-04
E <sub>g/s</sub>	Rate (g/s)	<7.9389E-06	4.1475E-05	1.0920E-05	<2.0111E-05
E <sub>T/y</sub>	Rate (Ton/yr)	<2.7602E-04	1.4420E-03	3.7965E-04	<6.9923E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.0108E-07	1.0946E-06	2.8405E-07	<5.2659E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<2.0582E-07	1.1100E-06	2.8607E-07	<5.3396E-07
EH	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
$E_Rp$	Rate - Production-based (lb/xxxxx)	<3.4231E-07	1.7806E-06	4.7134E-07	<8.6474E-07
ERP	Rate - Production-based (g/xxxxx)	<1.5524E-04	8.0752E-04	2.1376E-04	<3.9217E-04

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### USEPA Method 5/29 (Particulate/Metals) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
•	ne (approx.)	06:56	09:58	12:45	
Stop Tim	e (approx.)	09:20	12:09	14:59	
Samplin	g Conditions				
Y <sub>d</sub>	Dry gas meter correction factor	0.9897	0.9897	0.9897	
C,	Pitot tube coefficient	0.8120	0.8120	0.8120	
P <sub>g</sub>	Static pressure (in. H 20)	-10.5000	-10.5000	-10.5000	
A <sub>s</sub>	Sample location area (ft 2)	64.0000	64.0000	64.0000	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.20	30.20	30.20	30.2000
D <sub>n</sub>	Nozzle dlameter (in.)	0.2680	0.2680	0.2680	
02	Oxygen (dry volume %)	9.8800	9.8700	9.8300	9.8600
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	9.8167
N <sub>2</sub> +CC	Nitrogen plus carbon monoxide (dry volume %)	80.4500	80.3000	80.2200	80.3233
V <sub>Ic</sub>	Total Liquid collected (ml)	428.30	405.10	430.50	
$V_{m}$	Volume metered, meter conditions (ft 3)	76.8700	75.6350	77.3000	
T <sub>m</sub>	Dry gas meter temperature (°F)	87.3400	87.5400	87.7800	
$T_s$	Sample temperature (°F)	297.6800	297.4800	297.9200	297.6933
ΔH	Meter box orifice pressure drop (in. H 2O)	1.2640	1.2440	1.2720	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Re	sults				
V <sub>westd</sub>	Volume of water collected (ft 3)	20.1558	19.0640	20.2593	19.8264
V <sub>mstd</sub>	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	73.9862
P <sub>s</sub>	Sample gas pressure, absolute (in. Hg)	29.4279	29.4279	29.4279	29.4279
$P_{\mathbf{v}}$	Vapor pressure, actual (in. Hg)	29.4279	29.4279	29.4279	29.4279
B <sub>wo</sub>	Moisture measured in sample (% by volume)	21.3445	20.6957	21.3500	21.1301
Bws	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	21.1301
√∆P	Velocity head ( √in. H₂O)	0.6920	0.6901	0.6977	0.6933
$M_d$	MW of sample gas, dry (lb/lb-mole)	29.9424	29.9676	29.9852	29.9651
Ms	MW of sample gas, wet (lb/lb-mole)	27.3934	27.4908	27.4264	27.4368
V <sub>e</sub>	Velocity of sample (ft/sec)	46.5718	46.3552	46.9362	46.6211
%	Isokinetic sampling (%)	100.7493	98.7122	100.4864	99.9826
$Q_a$	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
$Q_s$	Volumetric flow rate, standard (scfm)	122,575	122,037	123,495	122,702
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
$Q_{std7}$	Volumetric flow rate, dry std@7%O 2 (dscfm)	76,436	76,798	77,353	76,862
$Q_a$	Volumetric flow rate, actual (acf/hr)	10,730,142	10,680,234	10,814,095	10,741,491
$Q_s$	Volumetric flow rate, standard (scf/hr)	7,354,478	7,322,204	7,409,673	7,362,118
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	5,784,702	5,806,819	5,827,706	5,806,409
Q <sub>s</sub>	Volumetric flow rate, actual (m 3/hr)	303,884	302,471	306,262	304,205
Q <sub>s</sub>	Volumetric flow rate, standard (m <sup>3</sup> /hr)	208,283	207,369	209,846	208,500
$\mathbf{Q}_{std}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	163,826	164,453	165,044	164,441
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	129,882	130,497	131,442	130,607
Q <sub>s</sub>	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	194,082	193,230	195,539	194,284
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	152,656	153,240	153,791	153,229
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O ₂ (Nm³/hr)	121,027	121,600	122,480	121,702

Comments:

Average includes 3 runs.

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### USEPA Method 5/29 Filterable Particulate Parameters

Run No	э.	1	2	3	Average
Date (2	009)	Mar 16	Mar 16	Mar 16	
Start Ti	me (approx.)	06:56	09:58	12:45	
Stop Ti	me (approx.)	09:20	12:09	14:59	
Proces	s Conditions				
R₽	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
Fd	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F.	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820		1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	onditions				•
O <sub>2</sub>	Oxygen (dry volume %)	9.8800	9.8700	9.8300	9.8600
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	9.8167
T <sub>s</sub>	Sample temperature (°F)	297.6800	297.4800	297.9200	297.6933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	21.1301
	,	21.54-0	20.0337	21.5500	21.1301
Gas Flo		.=			
Q,	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
Q,	Volumetric flow rate, standard (scfm)	122,575	122,037	123,495	122,702
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O <sub>2</sub> (dscfm)	76,436	76,798	77,353	76,862
Q,	Volumetric flow rate, actual (acf/hr)	10,730,142	10,680,234	10,814,095	10,741,491
Q,	Volumetric flow rate, standard (scf/hr)	7,354,478	7,322,204	7,409,673	7,362,118
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,784,702	5,806,819	5,827,706	5,806,409
Q,	Volumetric flow rate, actual (m³/hr)	303,884	302,471	306,262	304,205
Q,	Volumetric flow rate, standard (m³/hr)	208,283	207,369	209,846	208,500
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m³/hr)	163,826	164,453	165,044	164,441
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O₂ (dry m³/hr)	129,882	130,497	131,442	130,607
Q <sub>s</sub>	Volumetric flow rate, normal (Nm³/hr)	194,082	193,230	195,539	194,284
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm³/hr)	152,656	153,240	153,791	153,229
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm³/hr)	121,027	121,600	122,480	121,702
Sampiln	ng Data				
V <sub>mstd</sub>	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	73.9862
%1	Isokinetic sampling (%)	100.7493	98.7122	100.4864	99.9826
Laborat	orv Data				
m <sub>filter</sub>	Matter collected on filter(s) (g)	0.00060	0.00070	0.00070	
ms	Matter collected in solvent rinse(s) (g)	0.00140	0.00030	0.00250	
$m_n$	Total particulate matter collected (g)	0.00200	0.00100	0.00320	
Eilteachl	e Particulate Results				
C <sub>sd</sub>	Particulate Concentration (lb/dscf)	5.9374E-08	3.018 <b>4E</b> -08	9.4544E-08	6.1367E-08
C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (lb/dscf)	7.4891E-08	3.8038E-08	1.1871E-07	7.7214E-08
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (lb/dscf)	7.3680E-08	3.6847E-08	1.1402E-07	7.4850E-08
C <sub>a</sub>	Particulate Concentration (lb/acf)	3.2009E-08	1.6411E-08	5.0950E-08	3.3123E-08
C <sub>sd</sub>	Particulate Concentration (gr/dscf)	0.0004	0.0002	0.0007	0.0004
C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (gr/dscf)	0.0005	0.0003	0.0008	0.0005
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (gr/dscf)	0.0005	0.0003	0.0008	0.0005
C <sub>a</sub>	Particulate Concentration (gr/acf)	0.0002	0.0001	0.0004	0.0002
C <sub>sd</sub>	Particulate Concentration (mg/dscm)	0.9508	0.4834	1.5140	0.9827
C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (mg/dscm)	1.1993	0.6091	1.9010	1.2365
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (mg/dscm)	1.1799	0.5901	1.8259	1.1986
C <sub>a</sub>	Particulate Concentration (mg/m³ (actual,wet))	0.5126	0.2628	0.8159	0.5304
C <sub>sd</sub>	Particulate Concentration (mg/Nm³ dry)	1.0204	0.5187	1.6248	1.0546
C <sub>sd7</sub>	Particulate Concentration (mg/Nm dry)  Particulate Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	1.2870	0.6537	2.0401	1.3270
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (mg/Nm³ dry)	1.2662	0.6332	1.9595	1.2863
E <sub>Brhr</sub>	Particulate Rate (lb/hr)	0.3435	0.0332	0.5510	0.3566
E <sub>kg/hr</sub>	Particulate Rate (kg/hr)	0.1558	0.0795	0.2499	0.1617
E <sub>T/y</sub>	Particulate Rate (Ton/yr)	1.5044	0.7677	2.4133	1.5618
E <sub>Fd</sub>	Particulate Rate - F <sub>d</sub> -based (lb/MMBtu)	0.0011	0.0005	0.0017	0.0011
E <sub>Fc</sub>	Particulate Rate - F <sub>c</sub> -based (lb/MMBtu)	0.0011	0.0006	0.0017	0.0011
	· · · · ·	2.0011	2.0000	2.0017	
<u>Comment</u> Average	<u>ls:</u> e includes 3 runs.				041509 122719 SOP@_N

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### USEPA Method 5/29 Mercury (Hg) Emission Parameters

		1	2	3	Average
Date (20	•	Mar 16	Mar 16	Mar 16	
	ne (approx.)	06:56	09:58	12:45	
-	ne (approx.)	09:20	12:09	14:59	
	Conditions	4044	404.0	400.0	404.0
R₽	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	5	7	6	6
F₫	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co		9.8800	9.8700	0.8300	9.8600
O <sub>2</sub>	Oxygen (dry volume %)			9.8300	
CO₂ -	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	9.8167
Τ,	Sample temperature (°F)	297.6800	297.4800	297.9200	297.6933 21.1301
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	21,1301
Gas Flo		470.000	470.004	400.005	470.005
Qa	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
Q <sub>s</sub>	Volumetric flow rate, standard (scfm)	122,575	122,037	123,495	122,702
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	76,436	76,798	77,353	76,862
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	10,730,142	10,680,234	10,814,095	10,741,491
Q,	Volumetric flow rate, standard (scf/hr)	7,354,478	7,322,204	7,409,673	7,362,118
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,784,702	5,806,819	5,827,706	5,806,409
Q,	Volumetric flow rate, actual (m <sup>3</sup> /hr)	303,884	302,471	306,262	304,205 208,500
Q <sub>s</sub>	Volumetric flow rate, standard (m 3/hr)	208,283	207,369 164,453	209,846 165,044	164,441
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m 3/hr)	163,826 129,882	130,497	131,442	130,607
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	194,082	193,230	195,539	194,284
O.	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	152,656	153,240	153,791	153,229
Q <sub>std</sub> Q <sub>std7</sub>	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr) Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm <sup>3</sup> /hr)	121,027	121,600	122,480	121,702
		,	,000		,
Samplin	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	73.9862
V <sub>mstd</sub> %I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	99.9826
m <sub>n-1b</sub>	ory Data Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
m <sub>n-2b</sub>	Fraction 2B (µg)	6.8700	6.5842	7.8493	
m <sub>n-3a</sub>	Fraction 3A (µg)		•		
		< 0.2000	< 0.2000	< 0.2000	
		<0.2000 <0.5000	<0.2000 <0.5000	<0.2000 <0.5000	
m <sub>n-3b</sub>	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m <sub>n-3b</sub> m <sub>n-3c</sub>	Fraction 3B (µg) Fraction 3C (µg)				
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub>	Fraction 3B (μg) Fraction 3C (μg) Total matter corrected for allowable blanks (μg)	<0.5000 <0.4000	<0.5000 <0.4000	<0.5000 <0.4000	
m <sub>n-35</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg) Results - Total	<0.5000 <0.4000 6.8700	<0.5000 <0.4000 6.5842	<0.5000 <0.4000	2.1153E-10
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg) Results - Total Concentration (lb/dscf)	<0.5000 <0.4000 6.8700 2.0395E-10	<0.5000 <0.4000 6.5842 1.9874E-10	<0.5000 <0.4000 7.8493 2.3191E-10	2.1153E-10 2.6630E-10
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd7</sub>	Fraction 3B (μg) Fraction 3C (μg) Total matter corrected for allowable blanks (μg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf)	<0.5000 <0.4000 6.8700	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10	<0.5000 <0.4000 7.8493	
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10	2.6630E-10
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>s</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf) Concentration (lb/acf)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10	2.6630E-10 2.5846E-10
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>s</sub> C <sub>sd</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf) Concentration (lb/acf) Concentration (lb/acf)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00	2.6630E-10 2.5846E-10 1.1433E-10
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>a</sub> C <sub>sd7</sub> C <sub>sd7</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O 2 (µg/dscm)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd7</sub> C <sub>sd12</sub> C <sub>a</sub> C <sub>sd7</sub> C <sub>sd6</sub> C <sub>sd7</sub> C <sub>sd7</sub> C <sub>sd7</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O 2 (µg/dscm) Concentration @12% CO 2 (µg/dscm)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub> C <sub>sd</sub> C <sub>sd12</sub> C <sub>a</sub> C <sub>sd2</sub> C <sub>sd2</sub> C <sub>sd3</sub> C <sub>sd3</sub> C <sub>sd3</sub> C <sub>sd3</sub> C <sub>sd4</sub> C <sub>sd4</sub> C <sub>sd4</sub> C <sub>sd4</sub> C <sub>sd5</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O 2 (µg/dscm)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 4.0529E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 4.4788E+00	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub>	Fraction 3B (μg) Fraction 3C (μg) Total matter corrected for allowable blanks (μg)  Results - Total Concentration (lb/dscf) Concentration @7% O ₂ (lb/dscf) Concentration @12% CO ₂ (lb/dscf) Concentration (lb/acf) Concentration (μg/dscm) Concentration @7% O ₂ (μg/dscm) Concentration @12% CO ₂ (μg/dscm) Concentration @12% CO ₂ (μg/dscm) Concentration (mg/dscm)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 4.0529E+00 3.2660E-03	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 4.4788E+00 3.7137E-03	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub>	Fraction 3B (μg) Fraction 3C (μg) Total matter corrected for allowable blanks (μg)  Results - Total Concentration (lb/dscf) Concentration @7% O ₂ (lb/dscf) Concentration @12% CO ₂ (lb/dscf) Concentration (lb/acf) Concentration (μg/dscm) Concentration @7% O ₂ (μg/dscm) Concentration @12% CO ₂ (μg/dscm) Concentration (mg/dscm) Concentration (mg/dscm) Concentration @7% O ₂ (mg/dscm)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 4.0529E+00 3.2660E-03 4.1195E-03	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 3.7137E-03 4.6631E-03	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03 4.2644E-03
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>3d</sub> C <sub>3d7</sub> C <sub>3d12</sub> C <sub>6d</sub> C <sub>6d7</sub> C <sub>6d12</sub> C <sub>5d</sub> C <sub>5d7</sub> C <sub>5d12</sub> C <sub>5d7</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration @12% CO 2 (lb/dscf) Concentration (lb/acf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O 2 (µg/dscm) Concentration @12% CO 2 (µg/dscm) Concentration (mg/dscm) Concentration @7% O 2 (mg/dscm) Concentration @7% O 2 (mg/dscm) Concentration @7% O 2 (mg/dscm)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 4.0529E+00 3.2660E-03 4.1195E-03 4.0529E-03	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03 3.8851E-03	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 3.7137E-03 4.6631E-03 4.4788E-03	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03 4.2644E-03 4.1389E-03
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>3d</sub> C <sub>3d7</sub> C <sub>3d12</sub> C <sub>3d</sub> C <sub>3d7</sub> C <sub>3d12</sub> C <sub>3d7</sub> C <sub>3d</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O₂ (lb/dscf) Concentration (lb/acf) Concentration (lb/acf) Concentration (lb/acf) Concentration (lb/acf) Concentration (lp/dscm) Concentration @7% O₂ (µg/dscm) Concentration (mg/dscm) Concentration (mg/dscm) Concentration @7% O₂ (mg/dscm) Concentration @12% CO₂ (mg/dscm) Concentration @12% CO₂ (mg/dscm) Concentration @12% CO₂ (mg/dscm) Concentration @12% CO₂ (mg/dscm) Concentration (µg/m³ (actual,wet))	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 4.0529E+00 3.2660E-03 4.1195E-03 4.0529E-03 1.7607E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.8851E-03 1.7303E+00	<ul> <li>&lt;0.5000</li> <li>&lt;0.4000</li> <li>7.8493</li> <li>2.3191E-10</li> <li>2.9119E-10</li> <li>2.7969E-10</li> <li>1.2498E-10</li> <li>3.7137E+00</li> <li>4.6631E+00</li> <li>4.4788E+00</li> <li>3.7137E-03</li> <li>4.6631E-03</li> <li>4.4788E-03</li> <li>2.0013E+00</li> </ul>	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03 4.2644E-03 4.1389E-03 1.8308E+00
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>sd</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O ₂ (lb/dscf) Concentration (lb/acf) Concentration (lb/acf) Concentration (µg/dscm) Concentration @7% O ₂ (µg/dscm) Concentration @12% CO ₂ (µg/dscm) Concentration (mg/dscm) Concentration @7% O ₂ (mg/dscm) Concentration @7% O ₂ (mg/dscm) Concentration (µg/m³ (actual,wet)) Concentration (µg/m³ dsctual,wet)) Concentration (µg/m³ dry) Concentration (µg/m³ dry)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 4.0529E+00 3.2660E-03 4.1195E-03 1.7607E+00 3.5050E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03 3.8851E-03 1.7303E+00 3.4154E+00	<ul> <li>&lt;0.5000</li> <li>&lt;0.4000</li> <li>7.8493</li> <li>2.3191E-10</li> <li>2.9119E-10</li> <li>2.7969E-10</li> <li>1.2498E-10</li> <li>3.7137E+00</li> <li>4.6631E+00</li> <li>4.4788E+00</li> <li>3.7137E-03</li> <li>4.6631E-03</li> <li>4.4788E-03</li> <li>2.0013E+00</li> <li>3.9854E+00</li> </ul>	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03 4.2644E-03 4.1389E-03 1.8308E+00 3.6353E+00
m <sub>n-3b</sub> m <sub>n-3c</sub> m <sub>n</sub> Mercury C <sub>3d</sub> C <sub>3d7</sub> C <sub>3d12</sub> C <sub>3d</sub> C <sub>3d7</sub> C <sub>3d12</sub> C <sub>3d7</sub> C <sub>3d</sub>	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration (lb/acf) Concentration (lb/acf) Concentration (lb/acf) Concentration (pg/dscm) Concentration @7% O 2 (µg/dscm) Concentration @12% CO 2 (µg/dscm) Concentration (mg/dscm) Concentration @7% O 2 (mg/dscm) Concentration @12% CO 2 (mg/dscm) Concentration @12% CO 2 (mg/dscm) Concentration @12% CO 2 (mg/dscm) Concentration (µg/m³ (actual,wet)) Concentration (µg/m³ dry)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.0529E+00 3.2660E-03 4.1195E-03 4.0529E-03 1.7607E+00 3.5050E+00 4.4209E+00	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03 3.8851E-03 1.7303E+00 3.4154E+00 4.3041E+00	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 4.4788E+00 3.7137E-03 4.6631E-03 4.4788E-03 2.0013E+00 3.9854E+00 5.0043E+00	2.6630E-10 2.5846E-10 1.1433E-10 3.3674E+00 4.2644E+00 3.3874E-03 4.2644E-03 4.1389E-03 1.8308E+00 3.6353E+00 4.5764E+00
mn-36 mn-3c mn Csd Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd2 Csd7 Csd12 Csd2 Csd7 Csd12 Csd2 Csd7 Csd12 Csd12 Csd2 Csd2 Csd2 Csd2 Csd3 Csd3 Csd3 Csd4 Csd4 Csd4 Csd4 Csd4 Csd4 Csd4 Csd4	Fraction 3B (µg) Fraction 3C (µg) Total matter corrected for allowable blanks (µg)  *Results - Total Concentration (lb/dscf) Concentration @7% O 2 (lb/dscf) Concentration (lb/acf) Concentration (lb/acf) Concentration (lb/acf) Concentration @7% O 2 (µg/dscm) Concentration @7% O 2 (µg/dscm) Concentration (mg/dscm) Concentration @12% CO 2 (µg/dscm) Concentration @7% O 2 (mg/dscm) Concentration @12% CO 2 (mg/dscm) Concentration @12% CO 2 (mg/dscm) Concentration (µg/m 3 (actual, wet)) Concentration (µg/m 3 dry) Concentration @7% O 2 (µg/Nm 3 dry) Concentration @7% O 2 (µg/Nm 3 dry) Concentration @7% O 2 (µg/Nm 3 dry) Concentration @12% CO 2 (µg/Nm 3 dry)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.0529E+00 3.2660E-03 4.1195E-03 4.0529E-03 1.7607E+00 3.5050E+00 4.4209E+00 4.3495E+00	<pre>&lt;0.5000 &lt;0.4000 6.5842  1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03 3.8851E-03 1.7303E+00 3.4154E+00 4.3041E+00 4.1693E+00</pre>	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 4.4788E+00 3.7137E-03 4.6631E-03 4.4788E-03 2.0013E+00 3.9854E+00 5.0043E+00 4.8065E+00	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 3.3874E-03 4.2644E-03 4.1389E-03 1.8308E+00 3.6353E+00 4.478E+00
mn-3b mn-3c mn Csd Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7	Fraction 3B (μg) Fraction 3C (μg) Total matter corrected for allowable blanks (μg)  *Results - Total Concentration (lb/dscf) Concentration @7% O ₂ (lb/dscf) Concentration @12% CO ₂ (lb/dscf) Concentration (lb/acf) Concentration (μg/dscm) Concentration @7% O ₂ (μg/dscm) Concentration @12% CO ₂ (μg/dscm) Concentration @12% CO ₂ (μg/dscm) Concentration @7% O ₂ (mg/dscm) Concentration @12% CO ₂ (mg/dscm) Concentration @12% CO ₂ (mg/dscm) Concentration @12% CO ₂ (mg/dscm) Concentration (μg/mm ³ (actual, wet)) Concentration (μg/mm ³ dry) Concentration @7% O ₂ (μg/Nm ³ dry) Concentration @7% O ₂ (μg/Nm ³ dry) Concentration @12% CO ₂ (μg/Nm ³ dry) Rate (lb/hr)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 3.2660E-03 4.1195E-03 4.0529E-03 1.7607E+00 3.5050E+00 4.4209E+00 4.3495E+00 1.1798E-03	<pre>&lt;0.5000 &lt;0.4000 6.5842  1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03 3.8851E-03 1.7303E+00 3.4154E+00 4.3041E+00 4.1693E+00 1.1540E-03</pre>	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 4.4788E+00 3.7137E-03 4.6631E-03 4.4788E-03 2.0013E+00 3.9854E+00 5.0043E+00 4.8065E+00 1.3515E-03	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03 4.2644E-03 4.1389E+00 3.6353E+00 4.5764E+00 4.4418E+00 1.2284E-03
mn-36 mn-3c mn Mercury Csd Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd7 Csd12 Csd Csd7 Csd12 Csd Csd7 Csd12 Esbrv Esbrv	Fraction 3B (μg) Fraction 3C (μg) Total matter corrected for allowable blanks (μg)  *Results - Total Concentration (lb/dscf) Concentration @7% O ₂ (lb/dscf) Concentration (lb/acf) Concentration (lb/acf) Concentration (μg/dscm) Concentration @7% O ₂ (μg/dscm) Concentration @12% CO ₂ (μg/dscm) Concentration (mg/dscm) Concentration @7% O ₂ (mg/dscm) Concentration @7% O ₂ (mg/dscm) Concentration (μg/m³ (actual,wet)) Concentration (μg/m³ day) Concentration (μg/m³ dry) Concentration @7% O ₂ (μg/Nm³ dry) Concentration @12% CO ₂ (μg/Nm³ dry) Concentration @12% CO ₂ (μg/Nm³ dry) Rate (lb/hr) Rate (g/s)	<0.5000 <0.4000 6.8700 2.0395E-10 2.5725E-10 2.5309E-10 1.0995E-10 3.2660E+00 4.1195E+00 3.2660E-03 4.1195E-03 4.0529E-03 1.7607E+00 3.5050E+00 4.4209E+00 4.3495E+00 1.1798E-03 1.4863E-04	<0.5000 <0.4000 6.5842 1.9874E-10 2.5045E-10 2.4261E-10 1.0805E-10 3.1825E+00 4.0106E+00 3.8851E+00 3.1825E-03 4.0106E-03 3.8851E-03 1.7303E+00 3.4154E+00 4.3041E+00 4.1693E+00 1.1540E-03 1.4538E-04	<0.5000 <0.4000 7.8493 2.3191E-10 2.9119E-10 2.7969E-10 1.2498E-10 3.7137E+00 4.6631E+00 4.4788E+00 3.7137E-03 4.6631E-03 4.6631E-03 2.0013E+00 3.9854E+00 5.0043E+00 4.8065E+00 1.3515E-03 1.7026E-04	2.6630E-10 2.5846E-10 1.1433E-10 3.3874E+00 4.2644E+00 4.1389E+00 3.3874E-03 4.2644E-03 4.1389E+00 3.6353E+00 4.5764E+00 4.4418E+00 1.2284E-03 1.5475E-04

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## USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Front Half Results

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
Start Tim	ne (approx.)	06:56	09:58	12:45	
Stop Tim	e (approx.)	09:20	12:09	14:59	
Mercury	Results - Front Half				
$C_{sd}$	Concentration (lb/dscf)	<2.9687E-12	<3.0184E-12	<2.9545E-12	<2.9805E-12
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	<3.7445E-12	<3.8038E-12	<3.7098E-12	<3.7527E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<3.6840E-12	<3.6847E-12	<3.5632E-12	<3.6440E-12
C <sub>e</sub>	Concentration (lb/acf)	<1.6004E-12	<1.6411E-12	<1.5922E-12	<1.6112E-12
$C_{\rm ad}$	Concentration (µg/dscm)	<4.7539E-02	<4.8336E-02	<4.7312E-02	<4.7729E-02
$C_{sd7}$	Concentration @7% O 2 (µg/dscm)	<5.9964E-02	<6.0913E-02	<5.9407E-02	<6.0095E-02
$C_{sd12}$	Concentration @12% CO 2 (µg/dscm)	<5.8994E-02	<5.9006E-02	<5.7060E-02	<5.8353E-02
C <sub>sd</sub>	Concentration (mg/dscm)	<4.7539E-05	<4.8336E-05	<4.7312E-05	<4.7729E-05
$C_{sd7}$	Concentration @7% O 2 (mg/dscm)	<5.9964E-05	<6.0913E-05	<5.9407E-05	<6.0095E-05
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<5.8994E-05	<5.9006E-05	<5.7060E-05	<5.8353E-05
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	<2.5629E-02	<2.6280E-02	<2.5496E-02	<2.5802E-02
Csa	Concentration (µg/Nm <sup>3</sup> dry)	<5.1018E-02	<5.1872E-02	<5.0774E-02	<5.1221E-02
$C_{sd7}$	Concentration @7% O 2 (µg/Nm3 dry)	<6.4351E-02	<6.5370E-02	<6.3754E-02	<6.4492E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<6.3311E-02	<6.3323E-02	<6.1235E-02	<6.2623E-02
Eliahr	Rate (lb/hr)	<1.7173E-05	<1.7527E-05	<1.7218E-05	<1.7306E-05
$E_{g/s}$	Rate (g/s)	<2.1634E-06	<2.2080E-06	<2.1691E-06	<2.1802E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<7.5218E-05	<7.6770E-05	<7.5415E-05	<7.5801E-05
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<5.3882E-08	<5.4735E-08	<5.3382E-08	<5.3999E-08
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<5.5874E-08	<5.5885E-08	<5.4042E-08	<5.5267E-08

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#### USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 1-3 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
Start Tim	ne (approx.)	06:56	09:58	12:45	
Stop Tim	ne (approx.)	09:20	12:09	14:59	
Marcun	Results - Impingers 1-3 Solution				
Csc	Concentration (lb/dscf)	2.0395E-10	1.9874E-10	2.3191E-10	2.1153E-10
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	2.5725E-10	2.5045E-10	2.9119E-10	2.6630E-10
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	2.5309E-10	2.4261E-10	2.7969E-10	2.5846E-10
C <sub>a</sub>	Concentration (lb/acf)	1.0995E-10	1.0805E-10	1.2498E-10	1.1433E-10
Cad	Concentration (ug/dscm)	3.2660E+00	3.1825E+00	3.7137E+00	3.3874E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	4.1195E+00	4.0106E+00	4.6631E+00	4.2844E+00
C <sub>ad12</sub>	Concentration @12% CO 2 (µg/dscm)	4.0529E+00	3.8851E+00	4.4788E+00	4.1389E+00
C <sub>sd</sub>	Concentration (mg/dscm)	3.2660E-03	3.1825E-03	3.7137E-03	3.3874E-03
C <sub>ed7</sub>	Concentration @7% O 2 (mg/dscm)	4.1195E-03	4.0106E-03	4.6631E-03	4.2644E-03
C <sub>3d12</sub>	Concentration @12% CO 2 (mg/dscm)	4.0529E-03	3.8851E-03	4.4788E-03	4.1389E-03
C,	Concentration (µg/m <sup>3</sup> (actual,wet))	1.7607E+00	1.7303E+00	2.0013E+00	1.8308E+00
C <sub>sd</sub>	Concentration (µg/Nm <sup>3</sup> dry)	3.5050E+00	3.4154E+00	3.9854E+00	3.6353E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	4.4209E+00	4.3041E+00	5.0043E+00	4.5764E+00
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	4.3495E+00	4.1693E+00	4.8065E+00	4.4418E+00
E	Rate (lb/hr)	1.1798E-03	1.1540E-03	1.3515E-03	1.2284E-03
E <sub>g/a</sub>	Rate (g/s)	1.4863E-04	1.4538E-04	1.7026E-04	1.5475E-04
E <sub>T/y</sub>	Rate (Ton/yr)	5.1675E-03	5.0547E-03	5.9195E-03	5.3806E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	3.7017E-06	3.6038E-06	4.1901E-06	3.8319E-06
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	3.8386E-06	3.6796E-06	4.2419E-06	3.9200E-06

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# USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 4 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 16	Mar 16	Mar 16	
Start Tim	e (approx.)	06:56	09:58	12:45	
Stop Tim	e (approx.)	09:20	12:09	14:59	
Mercury	Results - Impinger 4 Solution				
$C_{sd}$	Concentration (lb/dscf)	<5.9374E-12	<6.0368E-12	<5.9090E-12	<5.9611E-12
$C_{sd7}$	Concentration @7% O 2 (lb/dscf)	<7.4891E-12	<7.6076E-12	<7.4196E-12	<7.5054E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<7.3680E-12	<7.3695E-12	<7.1264E-12	<7.2880E-12
C,	Concentration (lb/acf)	<3.2009E-12	<3.2822E-12	<3.1843E-12	<3.2225E-12
$C_{sd}$	Concentration (µg/dscm)	<9.5079E-02	<9.6671E-02	<9.4624E-02	<9.5458E-02
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<1.1993E-01	<1.2183E-01	<1.1881E-01	<1.2019E-01
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.1799E-01	<1.1801E-01	<1.1412E-01	<1.1671E-01
Ced	Concentration (mg/dscm)	<9.5079E-05	<9.6671E-05	<9.4624E-05	<9.5458E-05
$C_{\rm sd7}$	Concentration @7% O 2 (mg/dscm)	<1.1993E-04	<1.2183E-04	<1.1881E-04	<1.2019E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<1.1799E-04	<1.1801E-04	<1.1412E-04	<1.1871E-04
C,	Concentration (µg/m 3 (actual,wet))	<5.1258E-02	<5.2560E-02	<5.0993E-02	<5.1604E-02
Csd	Concentration (µg/Nm 3 dry)	<1.0204E-01	<1.0374E-01	<1.0155E-01	<1.0244E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<1.2870E-01	<1.3074E-01	<1.2751E-01	<1.2898E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<1.2662E-01	<1.2665E-01	<1.2247E-01	<1.2525E-01
E <sub>rb/hr</sub>	Rate (lb/hr)	<3.4346E-05	<3.5055E-05	<3.4436E-05	<3.4612E-05
E <sub>g/6</sub>	Rate (g/s)	<4.3268E-06	<4.4161E-06	<4.3381E-06	<4.3603E-06
ETAT	Rate (Ton/yr)	<1.5044E-04	<1.5354E-04	<1.5083E-04	<1.5160E-04
Erd	Rate - Fd-based (lb/MMBtu)	<1.0776E-07	<1.0947E-07	<1.0676E-07	<1.0800E-07
EFG	Rate - Fc-based (lb/MMBtu)	<1.1175E-07	<1.1177E-07	<1.0808E-07	<1.1053E-07

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## USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 5-6 Results

Run No.		1	2	3	Average
Date (20	009)	Mar 16	Mar 16	Mar 16	
Start Tin	ne (approx.)	06:56	09:58	12:45	
Stop Tim	ne (approx.)	09:20	12:09	14:59	
Mercury	Results - Filtered Permanganate Solution				
Cad	Concentration (lb/dscf)	<1,4843E-11	<1.5092E-11	<1.4772E-11	<1.4903E-11
C <sub>ad7</sub>	Concentration @7% O2 (lb/dscf)	<1.8723E-11	<1.9019E-11	<1.8549E-11	<1.8764E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.8420E-11	<1.8424E-11	<1.7816E-11	<1.8220E-11
C.	Concentration (lb/acf)	<8.0022E-12	<8.2055E-12	<7.9609E-12	<8.0562E-12
C <sub>sd</sub>	Concentration (µg/dscm)	<2.3770E-01	<2.4168E-01	<2.3656E-01	<2.3865E-01
C <sub>ad?</sub>	Concentration @7% O 2 (µg/dscm)	<2.9982E-01	<3.0456E-01	<2.9704E-01	<3.0047E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.9497E-01	<2.9503E-01	<2.8530E-01	<2.9177E-01
C <sub>sd</sub>	Concentration (mg/dscm)	<2.3770E-04	<2.4168E-04	<2.3656E-04	<2.3865E-04
C <sub>6d7</sub>	Concentration @7% O 2 (mg/dscm)	<2.9982E-04	<3.0456E-04	<2.9704E-04	<3.0047E-04
C <sub>sq12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.9497E-04	<2.9503E-04	<2.8530E-04	<2.9177E-04
Ca	Concentration (µg/m 3 (actual,wet))	<1.2814E-01	<1.3140E-01	<1.2748E-01	<1.2901E-01
Csd	Concentration (ug/Nm 3 dry)	<2.5509E-01	<2.5936E-01	<2.5387E-01	<2.5611E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm³ dry)	<3.2176E-01	<3.2685E-01	<3.1877E-01	<3.2246E-01
C <sub>ad12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<3.1655E-01	<3.1662E-01	<3.0617E-01	<3.1312E-01
Elby	Rate (lb/hr)	<8.5865E-05	<8.7637E-05	<8.6090E-05	<8.6531E-05
E <sub>g/s</sub>	Rate (g/s)	<1.0817E-05	<1.1040E-05	<1.0845E-05	<1.0901E-05
E <sub>T/yr</sub>	Rate (Ton/yr)	<3.7609E-04	<3.8385E-04	<3.7707E-04	<3.7900E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.6941E-07	<2.7367E-07	<2.6691E-07	<2.7000E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<2.7937E-07	<2.7943E-07	<2.7021E-07	<2.7634E-07
	Results - HCi Rinse + HCi/MnO2 Precipitate				
. C <sub>sd</sub>	Concentration (lb/dscf)	<1.1875E-11	<1.2074E-11	<1.1818E-11	<1.1922E-11
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<1.4978E-11	<1.5215E-11	<1.4839E-11	<1.5011E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.4736E-11	<1.4739E-11	<1.4253E-11	<1.4576E-11
C <sub>a</sub>	Concentration (lb/acf)	<6.4018E-12	<6.5644E-12	<6.3687E-12	<6.4450E-12
Csd	Concentration (µg/dscm)	<1.9016E-01	<1.9334E-01	<1.8925E-01	<1.9092E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<2.3985E-01	<2.4365E-01	<2.3763E-01	<2.4038E-01
C <sub>ad12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.3598E-01	<2.3602E-01	<2.2824E-01	<2.3341E-01
Ced	Concentration (mg/dscm)	<1.9016E-04	<1.9334E-04	<1.8925E-04	<1.9092E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	<2.3985E-04	<2.4365E-04	<2.3763E-04	<2.4038E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.3598E-04	<2.3602E-04	<2.2824E-04	<2.3341E-04
C.	Concentration (µg/m 3 (actual,wet))	<1.0252E-01	<1.0512E-01	<1.0199E-01	<1.0321E-01
C <sub>sd</sub>	Concentration (µg/Nm <sup>3</sup> dry)	<2.0407E-01	<2.0749E-01	<2.0310E-01	<2.0489E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<2.5740E-01	<2.6148E-01	<2.5502E-01	<2.5797E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<2.5324E-01	<2.5329E-01	<2.4494E-01	<2.5049E-01
E <sub>lb/hr</sub>	Rate (lb/hr)	<6.8692E-05	<7.0110E-05	<6.8872E-05	<6.9224E-05
E <sub>o/e</sub>	Rate (g/s)	<8.6536E-06	<8.8321E-06	<8.6762E-06	<8.7206E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<3.0087E-04	<3.0708E-04	<3.0166E-04	<3.0320E-04
Erd	Rate - Fd-based (lb/MMBtu)	<2.1553E-07	<2.1894E-07	<2.1353E-07	<2.1600E-07
EFC	Rate - Fc-based (lb/MMBtu)	<2.2350E-07	<2.2354E-07	<2.1617E-07	<2.2107E-07
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SS Metala-1 Version 2006-12.6

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### USEPA Method 5/29 Beryllium (Be) Emission Parameters

Run No	<b>o</b> .	1	2	. 3	Average
Date (2	009)	Mar 16	Mar 16	Mar 16	
	me (approx.)	06:56	09:58	12:45	
	me (approx.)	09:20	12:09	14:59	
Droces	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315			
P <sub>2</sub>	Carbon Feed rate (lb/hr)	5			
Fa	Oxygen-based F-factor (dscf/MMBtu)	9,570			9,570
F.	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	-	-	1,820
Сар	Capacity factor (hours/year)	8,760	-		8,760
	nditions		,		
02	Oxygen (dry volume %)	9.8800	9.8700	9.8300	9.8600
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.6700			9.8167
Т,	Sample temperature (°F)	297.6800	297.4800		297.6933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	21.1301
Gas Flo	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
Q,	Volumetric flow rate, standard (scfm)	122,575	122,037	123,495	122,702
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
Q <sub>std7</sub>	Volumetric flow rate, dry standard (dscim)	76,436	76,798	77,353	76,862
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	10,730,142	10,680,234	10,814,095	10,741,491
Q,	Volumetric flow rate, standard (scf/hr)	7,354,478	7,322,204	7,409,673	7,362,118
Q <sub>std</sub>	Volumetric flow rate, dry standard (dsc//hr)	5,784,702	5,806,819	5,827,706	5,806,409
Q,	Volumetric flow rate, actual (m <sup>3</sup> /hr)	303,884	302,471	306,262	304,205
Q,	Volumetric flow rate, standard (m <sup>-3</sup> /hr)	208,283	207,369	209,846	208,500
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	163,826	164,453	165,044	164,441
Q <sub>std7</sub>	Volumetric flow rate, dry standard (dry m²/hr)	129,882	130,497	131,442	130,607
Q <sub>s</sub>	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	194,082	193,230	195,539	194,284
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm ³/hr)	152,656	153,240	153,791	153,229
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	121,027	121,600	122,480	121,702
		121,02	12.1000	122,100	,
Samplin	•	74 0751	72.0546	746220	72 0002
V <sub>mstd</sub>	Volume metered, standard (dscf)	74.2751 100.7493	73.0516 98.7122	74.6320	73.9862 99.9826
<b>%</b> I	Isokinetic sampling (%)	100.7493	90.7122	100.4864	99.9020
Laborate	-				
mn	Total matter corrected for allowable blanks (µg)	<0.0500	<0.0500	<0.0500	
-	m Results - Total				
$C_{sd}$	Concentration (lb/dscf)	<1.4843E-12	<1.5092E-12	<1.4772E-12	<1.4903E-12
$C_{sd7}$	Concentration @7% O <sub>2</sub> (lb/dscf)	<1.8723E-12	<1.9019E-12	<1.8549E-12	<1.8764E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.8420E-12	<1.8424E-12	<1.7816E-12	<1.8220E-12
C <sub>a</sub>	Concentration (lb/acf)	<8.0022E-13	<8.2055E-13	<7.9609E-13	<8.0562E-13
C <sub>sd</sub>	Concentration (µg/dscm)	<2.3770E-02	<2.4168E-02	<2.3656E-02	<2.3865E-02
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<2.9982E-02	<3.0456E-02	<2.9704E-02	<3.0047E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.9497E-02	<2.9503E-02	<2.8530E-02	<2.9177E-02
C⊶	Concentration (mg/dscm)	<2.3770E-05	<2.4168E-05	<2.3656E-05	<2.3865E-05
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<2.9982E-05	<3.0456E-05	<2.9704E-05	<3.0047E-05
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.9497E-05	<2.9503E-05	<2.8530E-05	<2.9177E-05
C <sub>a</sub>	Concentration (µg/m³ (actual,wet))	<1.2814E-02	<1.3140E-02	<1.2748E-02	<1.2901E-02
C <sub>sd</sub>	Concentration (µg/Nm <sup>3</sup> dry)	<2.5509E-02	<2.5936E-02	<2.5387E-02	<2.5611E-02
C <sub>ed7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm³ dry)	<3.2176E-02	<3.2685E-02	<3.1877E-02	<3.2246E-02
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<3.1655E-02	<3.1662E-02	<3.0617E-02	<3.1312E-02
E <sub>lb/hr</sub>	Rate (lb/hr)	<8.5865E-06	<8.7637E-06	<8.6090E-06	<8.6531E-06
E <sub>g/s</sub>	Rate (g/s)	<1.0817E-06	<1.1040E-06	<1.0845E-06	<1.0901E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<3.7609E-05	<3.8385E-05	<3.7707E-05	<3.7900E-05
E <sub>Fd</sub>	Rate - Fd-based (Ib/MMBtu)	<2.6941E-08	<2.7367E-08	<2.6691E-08	<2.7000E-08
Prepared by Cleans SS Metals-1 Van	ாகைஸ்கி obe asse (IsAMMBtu) sion 2006-12a	<2.7937E-08	<2.7943E-08	<2.7021E-08	<2.7634E-08
Completed 200	6 Clean Air Francesina Ire				

#### USEPA Method 5/29 Cadmium (Cd) Emission Parameters

Run No	).	1	2	3	Average
Date (2	009)	Mar 16	Mar 16	Mar 16	
Start Ti	me (approx.)	06:56	09:58	12:45	
Stop Tir	me (approx.)	09:20	12:09	14:59	
Proces	s Conditions				
R₽	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	5	7	6	6
Fd	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F.	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.8800	9.8700	9.8300	9.8600
CO2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	9.8167
Τ,	Sample temperature (°F)	297.6800	297.4800	297.9200	297.6933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	21.1301
Gas Flo	w Rate				
Qa	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
Q <sub>s</sub>	Volumetric flow rate, standard (scfm)	122,575	122,037	123,495	122,702
Qstd	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O <sub>2</sub> (dscfm)	76,436	76,798	77,353	76,862
Q.	Volumetric flow rate, actual (act/hr)	10,730,142	10,680,234	10,814,095	10,741,491
Q,	Volumetric flow rate, standard (scf/hr)	7,354,478	7,322,204	7,409,673	7,362,118
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,784,702	5,806,819	5,827,706	5,806,409
Q,	Volumetric flow rate, actual (m³/hr)	303,884	302,471	306,262	304,205
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	208,283	207,369	209,846	208,500
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m³/hr)	163,826	164,453	165,044	164,441
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O <sub>2</sub> (dry m³/hr)	129,882	130,497	131,442	130,607
Q <sub>sd</sub>	Volumetric flow rate, normal (Nm³/hr)	194,082 152,656	193,230 153,240	195,539	194,284
Q <sub>std7</sub>	Volumetric flow rate, dry normal (Nm³/hr)  Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm³/hr)	121,027	121,600	153,791 122,480	153,229 121,702
	,	121,021	121,000	122,400	121,702
Samplin	·	74.2751	72.0516	74 6220	72 0862
V <sub>rnstd</sub> %i	Volume metered, standard (dscf) Isokinetic sampling (%)	100.7493	73.0516 98.7122	74.6320 100.4864	73.9862 99.9826
	. •	100.7400	30.7122	100.4004	33.3020
	ory Data	0.4405	0.0070	0.0446	
m <sub>n</sub>	Total matter corrected for allowable blanks (µg)	0.4125	0.3372	0.3416	
	m Results - Total				
Csd	Concentration (lb/dscf)	1.2246E-11	1.0179E-11	1.0093E-11	1.0839E-11
C <sub>ed7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	1.5446E-11	1.2827E-11	1.2673E-11	1.3649E-11
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	1.5197 <b>E</b> -11	1.2426E-11	1.2172E-11	1.3265E-11
C.	Concentration (ib/acf)	6.6019E-12	5.5341E-12 1.6300E-01	5.4390E-12	5.8583E-12
C <sub>sd</sub> C <sub>sd7</sub>	Concentration (µg/dscm) Concentration @7% O <sub>2</sub> (µg/dscm)	1.9610E-01 2.4735E-01	2.0541E-01	1.6162E-01 2.0294E-01	1.7357E-01 2.1857E-01
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/dscm)	2.4335E-01	1.9898E-01	1.9492E-01	2.1242E-01
Ced	Concentration (mg/dscm)	· 1.9610E-04	1.6300E-04	1.6162E-04	1.7357E-04
C <sub>ad?</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	2.4735E-04	2.0541E-04	2.0294E-04	2.1857E-04
C <sub>ad12</sub>	Concentration @12% CO <sub>2</sub> (mg/dscm)	2.4335E-04	1.9898E-04	1.9492E-04	2.1242E-04
C,	Concentration (µg/m³ (actual,wet))	1.0572E-01	8.8621E-02	8.7097E-02	9.3813E-02
Csd	Concentration (µg/Nm³ dry)	2.1045E-01	1.7492E-01	1.7345E-01	1.8627E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm³ dry)	2.6545E-01	2.2044E-01	2.1779E-01	2.3456E-01
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm³ dry)	2.6116E-01	2.1354E-01	2.0918 <b>E-</b> 01	2.2796E-01
Elbrir	Rate (lb/hr)	7.0840E-05	5.9106E-05	5.8817E-05	6.2921E-05
E <sub>g/s</sub>	Rate (g/s)	8.9241E-06	7.4459E-06	7.4096E-06	7.9266E-06
ETAY	Rate (Ton/yr)	3.1028E-04	2.5888E-04	2.5762E-04	2.7559E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	2.2227E-07	1.8458E-07	1.8236E-07	1.9640E-07
€ <sub>Fo</sub>	Rate - Fc-based (lb/MMBtu)	2.3048E-07	1.8846E-07	1.8461E-07	2.0118E-07

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### USEPA Method 5/29 Lead (Pb) Emission Parameters

Run N	о.	1	2	3	Average
Date (2	2009)	Mar 16	Mar 16	Mar 16	
	ime (approx.)	06:56	09:58	12:45	
	me (approx.)	09:20	12:09	14:59	
	,	00.20	12.00	14.00	
	Store Production Page (Miles/Sour)	4044	404.0	402.0	404.0
R₽	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	184.3
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	5	7	6	6
Fd	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
_	onditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.8800	9.8700	9.8300	9.8600
CO₂	Carbon dloxide (dry volume %)	9.6700	9.8300	9.9500	9.8167
T <sub>s</sub>	Sample temperature (°F)	297.6800	297.4800	297.9200	297.6933
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	21.1301
Gas Flo	ow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	179,025
$Q_{\mathfrak{s}}$	Volumetric flow rate, standard (scfm)	122,575	122,037	123,495	122,702
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	96,773
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	76,436	76,798	77,353	76,862
$Q_a$	Volumetric flow rate, actual (acf/hr)	10,730,142	10,680,234	10,814,095	10,741,491
$Q_s$	Volumetric flow rate, standard (scf/hr)	7,354,478	7,322,204	7,409,673	7,362,118
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscf/hr)	5,784,702	5,806,819	5,827,706	5,806,409
$Q_a$	Volumetric flow rate, actual (m <sup>3</sup> /hr)	303,884	302,471	306,262	304,205
$Q_8$	Volumetric flow rate, standard (m <sup>3</sup> /hr)	208,283	207,369	209,846	208,500
$Q_{atd}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	163,826	164,453	165,044	164,441
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O <sub>2</sub> (dry m³/hr)	129,882	130,497	131,442	130,607
$Q_s$	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	194,082	193,230	195,539	194,284
$Q_{std}$	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	152,656	153,240	153,791	153,229
$Q_{std7}$	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	121,027	121,600	122,480	121,702
Samplin	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	73.9862
<b>%</b> I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	99.9826
Laborat	ory Data				
m <sub>n</sub>	Total matter corrected for allowable blanks (µg)	1.9770	2.3462	2.5954	
	esults - Total				
$C_{\sf sd}$	Concentration (lb/dscf)	5.8692E-11	7.0818E-11	7.6681E-11	6.8730E-11
C <sub>ed?</sub>	Concentration @7% O 2 (lb/dscf)	7.4031E-11	8.9245E-11	9.6284E-11	8.6520E-11
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	7.2834E-11	8.6451E-11	9.2479E-11	8.3922E-11
Ca	Concentration (lb/acf)	3.1642E-11	3.8504E-11	4.1323E-11	3.7156E-11
C <sub>sd</sub>	Concentration (µg/dscm)	9.3988E-01	1.1340E+00	1.2279E+00	1.1006E+00
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	1.1855E+00	1.4291E+00	1.5418E+00	1.3855E+00
C <sub>ad12</sub>	Concentration @12% CO <sub>2</sub> (µg/dscm)	1.1663E+00	1.3844E+00	1.4809E+00	1.3439E+00
C <sub>ad</sub>	Concentration (mg/dscm)	9.3988E-04	1.1340E-03	1.2279E-03	1.1006E-03
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	1.1855E-03	1.4291E-03	1.5418E-03	1.3855E-03
$C_{8d12}$	Concentration @12% CO 2 (mg/dscm)	1,1663E-03	1.3844E-03	1.4809E-03	1.3439E-03
Ca	Concentration (µg/m ³ (actual,wet))	5.0669E-01	6.1658E-01	6.6173E-01	5.9500E-01
$C_{sd}$	Concentration (µg/Nm <sup>3</sup> dry)	1.0086E+00	1.2170E+00	1.3178E+00	1.1812E+00
C <sub>ed7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm³ dry)	1.2723E+00	1.5337E+00	1.6547E+00	1.4869E+00
C <sub>ed12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	1.2517E+00	1.4857E+00	1.5893E+00	1.4422E+00
E <sup>IP/la</sup>	Rate (lb/hr)	3.3952E-04	4.1123E-04	4.4687E-04	3.9921E-04
E <sub>g/s</sub>	Rate (g/s)	4.2771E-05	5.1805E-05	5.6295E-05	5.0290E-05
E <sub>T/yr</sub>	Rate (Ton/yr)	1.4871E-03	1.8012E-03	1.9573E-03	1.7485E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	1.0653E-06	1.2842E-06	1.3855E-06	1.2450E-06
Proplement by Cle SS Mebals-1 Ver	aff#819ginle@යාප කලේ( <b>jb/M#4</b> Btu) sion 2008-12a	1.1047E-06	1.3112E-06	1.4026E-06	1.2728E-06

### USEPA Method 13B (Total Fluorides) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (200	09)	Mar 17	Mar 17	Mar 17	
,	e (approx.)	11:43	13:15	14:40	
Stop Time	e (approx.)	12:55	14:27	15:49	
Sampline	g Conditions				
Y <sub>d</sub>	Dry gas meter correction factor	1.0028	1.0028	1.0028	
C <sub>p</sub>	Pitot tube coefficient	0.8250	0.8250	0.8250	
Pg	Static pressure (in. H 2O)	-10.4000	-10.4000	-10.5000	
A <sub>e</sub>	Sample location area (ft <sup>2</sup> )	64.0000	64.0000	64.0000	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
D <sub>n</sub>	Nozzle diameter (in.)	0.2720	0.2720	0.2720	
O <sub>2</sub>	Oxygen (dry volume %)	9.5800	9.4500	9.3900	9.4733
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.0900	10.2000	10.1800	10.1567
_	Nitrogen plus carbon monoxide (dry volume %)	80.3300	80.3500	80.4300	80.3700
V <sub>kc</sub>	Total Liquid collected (ml)	224.30	218.20	216.30	
V <sub>m</sub>	Volume metered, meter conditions (ft 3)	42.1400	41.4600	41.2600	
Tm	Dry gas meter temperature (°F)	87.6600	88.5400	84.8800	
Ts	Sample temperature (°F)	301.0800	301.4800	301.8800	301.4800
ΔН	Meter box orifice pressure drop (in. H 2O)	1.4320	1.3640	1.3440	
θ	Total sampling time (min)	62.5	62.5	62.5	
Flow Res	sults				•
V <sub>wstd</sub>	Volume of water collected (ft 3)	10.5556	10.2685	10.1791	10.3344
V <sub>metd</sub>	Volume metered, standard (dscf)	41.1130	40.3780	40.4512	40.6474
P <sub>s</sub>	Sample gas pressure, absolute (in. Hg)	29.3353	29.3353	29.3279	29.3328
Pv	Vapor pressure, actual (in. Hg)	29.3353	29.3353	29.3279	29.3328
B <sub>wo</sub>	Moisture measured in sample (% by volume)	20.4294	20.2748	20.1047	20.2696
B <sub>ws</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	20.4294	20.2748	20.1047	20.2696
V∆P	Velocity head ( √in. H <sub>2</sub> O)	0.7298	0.7027	0.7086	0.7137
$M_d$	MW of sample gas, dry (lb/lb-mole)	29.9976	30.0100	30.0044	30.0040
Ms	MW of sample gas, wet (lb/lb-mole)	27.5466	27.5750	27.5909	27.5708
$V_s$	Velocity of sample (ft/sec)	49.9548	48.0885	48.4969	48.8467
%1	Isokinetic sampling (%)	100.5485	102.4385	101.6221	101.5363
Q,	Volumetric flow rate, actual (acfm)	191,827	184,660	186,228	187,571
Q,	Volumetric flow rate, standard (scfm)	130,479	125,538	126,506	127,508
$Q_{\rm std}$	Volumetric flow rate, dry standard (dscfm)	103,823	100,086	101,073	101,660
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	84,552	82,445	83,694	83,564
$Q_a$	Volumetric flow rate, actual (acf/hr)	11,509,596	11,079,588	11,173,681	11,254,288
$Q_s$	Volumetric flow rate, standard (scf/hr)	7,828,752	7,532,305	7,590,381	7,650,480
$Q_{atd}$	Volumetric flow rate, dry standard (dscf/hr)	6,229,389	6,005,143	6,064,356	6,099,629
$Q_a$	Volumetric flow rate, actual (m <sup>3</sup> /hr)	325,959	313,780	316,445	318,728
$Q_s$	Volumetric flow rate, standard (m <sup>3</sup> /hr)	221,715	213,319	214,964	216,666
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	176,420	170,069	171,746	172,745
$Q_{\text{std7}}$	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	143,674	140,093	142,216	141,994
$Q_s$	Volumetric flow rate, normal (Nm 3/hr)	206,598	198,775	200,307	201,893
$Q_{\rm std}$	Volumetric flow rate, dry normal (Nm 3/hr)	164,391	158,474	160,036	160,967
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	133,878	130,541	132,519	132,313
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Average includes 3 runs.

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Comments:

QA/QC Date\_

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#### **USEPA Method 13B HF Parameters**

P1         Fabric Filter Inlet Temperature (°F)         320         320         320           Fd         Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570           Fc         Carbon dioxide-based F-factor (dscf/MMBtu)         1,820         1,820         1,820         1,820	rage
Stop Time (approx.)         12:55         14:27         15:49           Process Conditions           R <sub>P</sub> Steam Production Rate (Klbs/hour)         185.1         184.7         183.9         18           P <sub>1</sub> Fabric Filter Inlet Temperature (°F)         320         320         320           F <sub>d</sub> Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,	
Stop Time (approx.)         12:55         14:27         15:49           Process Conditions           R <sub>P</sub> Steam Production Rate (Klbs/hour)         185.1         184.7         183.9         18           P <sub>1</sub> Fabric Filter Inlet Temperature (°F)         320         320         320           F <sub>d</sub> Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,	
Rp         Steam Production Rate (Klbs/hour)         185.1         184.7         183.9         18           P1         Fabric Filter Inlet Temperature (°F)         320         320         320         320           Fd         Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,580 <td></td>	
Rp         Steam Production Rate (Klbs/hour)         185.1         184.7         183.9         18           P1         Fabric Filter Inlet Temperature (°F)         320         320         320         320           Fd         Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,580 <td></td>	
P1         Fabric Filter Inlet Temperature (°F)         320         320         320           Fd         Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         9,570         8,60         8,760         8,760         8,760         8,760         8,760         8,760         8,760         9,3900         9,3900         9,3900         9,3900 <t< td=""><td>4.6</td></t<>	4.6
F <sub>d</sub> Oxygen-based F-factor (dscf/MMBtu)         9,570         9,570         9,570           F <sub>c</sub> Carbon dioxide-based F-factor (dscf/MMBtu)         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820 <td>320</td>	320
F <sub>c</sub> Carbon dioxide-based F-factor (dscf/MMBtu)         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         1,820         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         8,760         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900         9,3900 <td>570</td>	570
Cap         Capacity factor (hours/year)         8,760         8,760         8,760         8,760           Gas Conditions           O2         Oxygen (dry volume %)         9.5800         9.4500         9.3900         9.4           CO2         Carbon dioxide (dry volume %)         10.0900         10.2000         10.1800         10.1           Te         Sample temperature (°F)         301.0800         301.4800         301.8800         301.4           Bw         Actual water vapor in gas (% by volume)         20.4294         20.2748         20.1047         20.2           Gas Flow Rate         Qa         Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,0           Qa         Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,0           Qstd         Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	320
O2         Oxygen (dry volume %)         9.5800         9.4500         9.3900         9.4           CO2         Carbon dioxide (dry volume %)         10.0900         10.2000         10.1800         10.1           T <sub>8</sub> Sample temperature (°F)         301.0800         301.4800         301.8800         301.4           B <sub>w</sub> Actual water vapor in gas (% by volume)         20.4294         20.2748         20.1047         20.2           Gas Flow Rate           Q <sub>a</sub> Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,0           Q <sub>a</sub> Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,4           Q <sub>std</sub> Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	60
CO2         Carbon dioxide (dry volume %)         10.0900         10.2000         10.1800         10.1           T <sub>6</sub> Sample temperature (°F)         301.0800         301.4800         301.8800         301.4           B <sub>w</sub> Actual water vapor in gas (% by volume)         20.4294         20.2748         20.1047         20.2           Gas Flow Rate           Q <sub>a</sub> Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,00           Q <sub>a</sub> Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,40           Q <sub>std</sub> Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	
Te         Sample temperature (°F)         301.0800         301.4800         301.8800         301.4           Bw         Actual water vapor in gas (% by volume)         20.4294         20.2748         20.1047         20.2           Gas Flow Rate           Qa         Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,000           Qa         Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,400           Qstd         Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	33
Tell Sample temperature (°F)         301.0800         301.4800         301.8800         301.4800           Bw         Actual water vapor in gas (% by volume)         20.4294         20.2748         20.1047         20.2748           Gas Flow Rate           Qa         Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,000           Qa         Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,000           Qstd         Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	67
Bw         Actual water vapor in gas (% by volume)         20.4294         20.2748         20.1047         20.2748           Gas Flow Rate           Qa         Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,000           Qa         Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,000           Qstd         Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	00
Gas Flow Rate           Q <sub>a</sub> Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,183           Q <sub>a</sub> Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,183           Q <sub>std</sub> Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	96
Q <sub>a</sub> Volumetric flow rate, actual (acfm)         191,827         184,660         186,228         187,0           Q <sub>a</sub> Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,0           Q <sub>std</sub> Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	
Q <sub>s</sub> Volumetric flow rate, standard (scfm)         130,479         125,538         126,506         127,4           Q <sub>sid</sub> Volumetric flow rate, dry standard (dscfm)         103,823         100,086         101,073         101,073	71
Q <sub>std</sub> Volumetric flow rate, dry standard (dscfm) 103,823 100,086 101,073 <b>101,</b>	
4507 Totalinatio in the fact of a fact of the fact of	
Q <sub>a</sub> Volumetric flow rate, actual (acf/hr) 11,509,596 11,079,588 11,173,681 <b>11,254,</b> 2	
Q <sub>s</sub> Volumetric flow rate, standard (scf/hr) 7,828,752 7,532,305 7,590,381 <b>7,650,</b>	
Q <sub>std</sub> Volumetric flow rate, dry standard (dscf/hr) 6,229,389 6,005,143 6,064,356 <b>6,099,</b>	
Q <sub>a</sub> Volumetric flow rate, actual (m <sup>3</sup> /hr) 325,959 313,780 316,445 <b>318</b> ,7	
Q <sub>s</sub> Volumetric flow rate, standard (m <sup>3</sup> /hr) 221,715 213,319 214,964 <b>216</b> ,6	
Q <sub>std</sub> Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr) 176,420 170,069 171,746 172,7	
Q <sub>std7</sub> Volumetric flow rate, dry std@7%O <sub>2</sub> (dry m³/hr) 143,674 140,093 142,216 <b>141</b> ,8	
Q <sub>s</sub> Volumetric flow rate, normal (Nm <sup>3</sup> /hr) 206,598 198,775 200,307 <b>201,8</b>	
Q <sub>std</sub> Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr) 164,391 158,474 160,036 <b>160,</b> 9	
Q <sub>std7</sub> Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm <sup>3</sup> /hr) 133,878 130,541 132,519 <b>132,</b> 3	13
Sampling Data	
V <sub>mstd</sub> Volume metered, standard (dscf) 41.1130 40.3780 40.4512 <b>40.6</b> 4	74
%I Isokinetic sampling (%) 100.5485 102.4385 101.6221 <b>101.53</b>	
Laboratory Data	
m <sub>n</sub> Total HF collected (mg) <0.0060 <0.0058 <0.0056	
Hydrogen Fluoride (HF) Results	
C <sub>sd</sub> HF Concentration (Ib/dscf) <3.1988E-10 <3.1742E-10 <3.0307E-10 <3.1345E-	10
C <sub>sd7</sub> HF Concentration @7% O <sub>2</sub> (lb/dscf) <3.9278E-10 <3.8534E-10 <3.6600E-10 < <b>3.8137E</b> -	0
C <sub>ed12</sub> HF Concentration @12% CO <sub>2</sub> (lb/dscf) <3.8043E-10 <3.7343E-10 <3.5725E-10 < <b>3.7037E-</b>	
C <sub>a</sub> HF Concentration (lb/acf) <1.7313E-10 <1.7204E-10 <1.6449E-10 <1.6988E-	0
C <sub>sd</sub> HF Concentration (ppmdv) <0.0062 <0.0061 <0.0058 < <b>0.00</b>	
C <sub>sd7</sub> HF Concentration @7% O <sub>2</sub> (ppmdv) <0.0076 <0.0074 <0.0071 < <b>0.00</b>	_
C <sub>sd12</sub> HF Concentration @12% CO <sub>2</sub> (ppmdv) <0.0073 <0.0072 <0.0069 < <b>0.00</b>	
C <sub>w</sub> HF Concentration (ppmwv) <0.0049 <0.0049 <0.0047 < <b>0.00</b>	
C <sub>ed</sub> HF Concentration (mg/dscm) <0.0051 <0.0051 <0.0049 <b>&lt;0.00</b>	
C <sub>sd7</sub> HF Concentration @7% O <sub>2</sub> (mg/dscm) <0.0063 <0.0062 <0.0059 < <b>0.00</b>	
C <sub>sd12</sub> HF Concentration @12% CO <sub>2</sub> (mg/dscm) <0.0061 <0.0060 <0.0057 < <b>0.00</b>	
C <sub>a</sub> HF Concentration (mg/m <sup>3</sup> (actual,wet)) <0.0028 <0.0028 <0.0026 < <b>0.00</b>	
C <sub>sd</sub> HF Concentration (mg/Nm <sup>3</sup> dry) <0.0055 <0.0052 <0.005	
C <sub>sd7</sub> HF Concentration @7% O <sub>2</sub> (mg/Nm³ dry) <0.0068 <0.0066 <0.0063 < <b>0.00</b>	
C <sub>ed12</sub> HF Concentration @12% CO <sub>2</sub> (mg/Nm <sup>3</sup> dry) <0.0065 <0.0064 <0.0061 < <b>0.00</b>	
E <sub>lb/hr</sub> HF Rate (lb/hr) <0.0020 <0.0019 <0.0018 < <b>0.00</b>	
E <sub>kg/hr</sub> HF Rate (kg/hr) <0.0009 <0.0008 <0.000	
E <sub>T/yr</sub> HF Rate (Ton/yr) <0.0087 <0.0083 <0.0081 < <b>0.00</b>	
E <sub>Fd</sub> HF Rate - Fd-based (lb/MMBtu) <0.0000057 <0.0000055 <0.0000053 <0.000005	
E <sub>Fc</sub> HF Rate - Fc-based (lb/MMBtu) <0.0000058 <0.0000057 <0.0000054 <b>&lt;0.00000</b> 5	U

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QA/QC\_ Date \_ Wheelabrator South Broward, Inc. Clean Air Project No: 10735

Unit 2 SDA Inlet

## USEPA Method 26A (HCI) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	e (approx.)	06:33	08:26	10:15	
Stop Tim	e (approx.)	07:33	09:26	11:15	
Samplin	g Conditions				
$Y_d$	Dry gas meter correction factor	1.0079	1.0079	1.0079	
$P_g$	Static pressure (in. H <sub>2</sub> O)	-1.7000	-1.7000	-1.7000	
As	Sample location area (ft²)	60.1320	60.1320	60.1320	
$P_{bar}$	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
O <sub>2</sub>	Oxygen (dry volume %)	8.3200	8.3000	8.5600	8.3933
CO2	Carbon dioxide (dry volume %)	11.2500	11.3100	10.9100	11.1567
N <sub>2</sub> +CO	Nitrogen plus carbon monoxide (dry volume %)	80.4300	80.3900	80.5300	80.4500
$V_{lc}$	Total Liquid collected (ml)	137.40	143.70	135.40	
$V_m$	Volume metered, meter conditions (ft <sup>3</sup> )	32.9500	34.2700	36.1500	
$T_{m}$	Dry gas meter temperature (°F)	78.7500	94.1250	101.7500	
$T_{\mathtt{s}}$	Sample temperature (°F)	505.8333	505.9167	518.3333	510.0278
$\Delta H$	Meter box orifice pressure drop (in. H <sub>2</sub> O)	1.0158	1.0908	1.1467	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Res	sults				
$V_{wstd}$	Volume of water collected (ft <sup>3</sup> )	6.4660	6.7625	6.3719	6.5335
$V_{mstd}$	Volume metered, standard (dscf)	32.8116	33.1852	34.5352	33.5107
Ps	Sample gas pressure, absolute (in. Hg)	29.9750	29.9750	29.9750	29.9750
$P_v$	Vapor pressure, actual (in. Hg)	29.9750	29.9750	29.9750	29.9750
$B_{wo}$	Moisture measured in sample (% by volume)	16.4624	16.9284	15.5765	16.3225
$B_{ws}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	16.4624	16.9284	15.5765	16.3225
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.1328	30.1416	30.0880	30.1208
$M_{\mathfrak{s}}$	MW of sample gas, wet (lb/lb-mole)	28.1354	28.0862	28.2051	28.1423

Comments:

Average includes 3 runs.

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_

### USEPA Method 26A HCI Parameters

Run No	o.	1	2	3	Average
Date (2	009)	Mar 17	Mar 17	Mar 17	
Start Ti	me (approx.)	06:33	08:26	10:15	
Stop Tir	me (approx.)	07:33	09:26	11:15	
Proces	s Conditions				
$R_P$	Steam Production Rate (Klbs/hour)	182.6	185.2	183.2	183.7
$P_1$	Fabric Filter Inlet Temperature (°F)	315	315	320	317
$F_{d}$	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,5 <b>7</b> 0	9,570	9,570
$F_c$	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
$O_2$	Oxygen (dry volume %)	8.3200	8.3000	8.5600	8.3933
CO2	Carbon dioxide (dry volume %)	11.2500	11.3100	10.9100	11.1567
$T_s$	Sample temperature (°F)	505.8333	505.9167	518.3333	510.0278
$B_w$	Actual water vapor in gas (% by volume)	16.4624	16.9284	15.5765	16.3225
Samplir	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	32.8116	33.1852	34.5352	33.5107
Laborat	tory Data				
$m_n$	Total HCl collected (mg)	503.5662	598.0783	603.5410	
Hydroge	en Chloride (HCI) Results				
$C_{sd}$	HCl Concentration (lb/dscf)	3.3841E-05	3.9739E-05	3.8535E-05	3.7372E-05
$C_{sd7}$	HCl Concentration @7% O <sub>2</sub> (lb/dscf)	3.7391E-05	4.3840E-05	4.3406E-05	4.1546E-05
$C_{sd12}$	HCI Concentration @12% CO <sub>2</sub> (lb/dscf)	3.6097E-05	4.2164E-05	4.2385E-05	4.0215E-05
$\mathbf{C}_{sd}$	HCI Concentration (ppmdv)	357.7832	420.1494	407.4127	395.1151
$C_{sd7}$	HCI Concentration @7% O₂ (ppmdv)	395.3248	463.4982	458.9170	439.2467
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (ppmdv)	381.6354	445. <b>7</b> 819	448.1166	425.1779
$C_w$	HCI Concentration (ppmwv)	298.8834	349.0247	343.9519	330.6200
$C_{sd}$	HCI Concentration (mg/dscm)	541.9101	636.3721	617.0806	598.4543
$C_{sd7}$	HCl Concentration @7% O₂ (mg/dscm)	598.7719	702.0295	695.0908	665.2974
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (mg/dscm)	578.0375	675.1958	678.7321	643.9885
$C_{\sf sd}$	HCI Concentration (mg/Nm <sup>3</sup> dry)	581.5621	682.9359	662.2329	642.2436
$C_{sd7}$	HCl Concentration @7% O₂ (mg/Nm³ dry)	642.5845	753.3975	745.9511	713.9777
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (mg/Nm <sup>3</sup> dry)	620.3329	724.6004	728.3955	691.1096
$E_Fd$	HCI Rate - Fd-based (lb/MMBtu)	0.5380	0.6308	0.6246	0.5978
$E_Fc$	HCl Rate - Fc-based (lb/MMBtu)	0.5475	0.6395	0.6428	0.6099

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Wheelabrator South Broward, Inc. Clean Air Project No: 10735

Unit 2 FF Outlet

## EPA Modified Method 26A (HCI) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	ne (approx.)	06:33	08:26	10:15	
Stop Tim	e (approx.)	07:33	09:26	11:15	
Samplin	g Conditions				
Yd	Dry gas meter correction factor	0.9897	0.9897	0.9897	
$P_{g}$	Static pressure (in. H <sub>2</sub> O)	-10.5000	-10.4000	-10.5000	
As	Sample location area (ft²)	64.0000	64.0000	64.0000	
$P_{bar}$	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
$O_2$	Oxygen (dry volume %)	9.7300	9.1000	9.4600	9.4300
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.0000	10.6000	10.6000	10.4000
N₂+CO	Nitrogen plus carbon monoxide (dry volume %)	80.2700	80.3000	79.9400	80.1700
$V_{lc}$	Total Liquid collected (ml)	192.40	198.80	199.10	
$V_{m}$	Volume metered, meter conditions (ft <sup>3</sup> )	36.7800	36.4800	38.1300	
$T_{m}$	Dry gas meter temperature (°F)	80.9583	100.1250	92.4583	
$T_{s}$	Sample temperature (°F)	295.4167	296.3333	299.0000	296.9167
ΔΗ	Meter box orifice pressure drop (in. H <sub>2</sub> O)	1.2083	1.1750	1.3500	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Res	sults				
$V_{wstd}$	Volume of water collected (ft <sup>3</sup> )	9.0543	9.3555	9.3696	9.2598
$V_{mstd}$	Volume metered, standard (dscf)	35.8341	34.3228	36.3886	35.5152
$P_s$	Sample gas pressure, absolute (in. Hg)	29.3279	29.3353	29.3279	29.3304
$P_{v}$	Vapor pressure, actual (in. Hg)	29.3279	29.3353	29.3279	29.3304
$B_{wo}$	Moisture measured in sample (% by volume)	20.1708	21.4191	20.4764	20.6888
$B_{ws}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	20.1708	21.4191	20.4764	20.6888
$M_d$	MW of sample gas, dry (lb/lb-mole)	29.9892	30.0600	30.0744	30.0412
$M_{s}$	MW of sample gas, wet (lb/lb-mole)	27.5709	27.4769	27.6020	27.5499
$V_s$	Velocity of sample (ft/sec)	45.0147	44.2434	47.4550	45.5710

Comments:

Average includes 3 runs.

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#### **EPA Modified Method 26A HCI Parameters**

Run No	).	1	2	3	Average
Date (2)	009)	Mar 17	Mar 17	Mar 17	
Start Time (approx.)		06:33	08:26	10:15	
Stop Tir	ne (approx.)	07:33	09:26	11:15	
Proces	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	182.6	185.2	183.2	183.7
$P_1$	Fabric Filter Inlet Temperature (°F)	315	315	320	317
$F_d$	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
$F_c$	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.7300	9.1000	9.4600	9.4300
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.0000	10.6000	10.6000	10.4000
$T_{s}$	Sample temperature (°F)	295.4167	296.3333	299.0000	296.9167
B <sub>w</sub>	Actual water vapor in gas (% by volume)	20.1708	21.4191	20.4764	20.6888
Samplin	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	35.8341	34.3228	36.3886	35.5152
Laborat	ory Data				~
$m_n$	Total HCl collected (mg)	29.5404	25.8516	34.0382	
Hydroge	en Chloride (HCI) Results				
$C^{sd}$	HCl Concentration (lb/dscf)	1.8177E-06	1.6608E-06	2.0626E-06	1.8470E-06
$C_{\sf sd7}$	HCl Concentration @7% O <sub>2</sub> (lb/dscf)	2.2620E-06	1.9563E-06	2.5061E-06	2.2415E-06
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (lb/dscf)	2.1813E-06	1.8801E-06	2.3350E-06	2.1321E-06
$C_a$	HCI Concentration (lb/acf)	9.9416E-07	8.9326E-07	1.1185E-06	1.0020E-06
$C_{\sf sd}$	HCl Concentration (ppmdv)	19.2181	17.5588	21.8068	19.5279
$C_{sd7}$	HCl Concentration @7% O <sub>2</sub> (ppmdv)	23.9150	20.6837	26.4960	23.6982
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (ppmdv)	23.0617	19.8779	24.6869	22.5421
Cw	HCl Concentration (ppmwv)	15.3416	13.7979	17.3415	15.4937
$C_{sd}$	HCI Concentration (mg/dscm)	29.1083	26.5951	33.0292	29.5776
$C_{sd7}$	HCl Concentration @7% O <sub>2</sub> (mg/dscm)	36.2225	31.3282	40.1317	35.8941
$C_{\sf sd12}$	HCl Concentration @12% CO <sub>2</sub> (mg/dscm)	34.9300	30.10 <b>7</b> 7	37.3916	34.1431
$C_a$	HCl Concentration (mg/m³ (actual,wet))	15.9201	14.3044	17.9105	16.0450
C <sub>sd</sub>	HCl Concentration (mg/Nm³ dry)	31.2382	28.5411	35.4460	31.7418
C <sub>sd7</sub>	HCl Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	38.8729	33.6205	43.0681	38.5205
C <sub>sd12</sub>	HCI Concentration @12% CO <sub>2</sub> (mg/Nm <sup>3</sup> dry)	37.4858	32.3107	40.1275	36.6414
E <sub>Fd</sub>	HCl Rate - Fd-based (lb/MMBtu)	0.0325	0.0282	0.0361	0.0323
$E_{Fc}$	HCI Rate - Fc-based (lb/MMBtu)	0.0331	0.0285	0.0354	0.0323

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### USEPA Method 29 (Mercury) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (200	09)	Mar 17	Mar 17	Mar 17	
	e (approx.)	06:33	09:15	11:56	
	e (approx.)	08:42	11:24	14:07	
Sampling	g Conditions				
Y <sub>d</sub>	Dry gas meter correction factor	0.9992	0.9992	0.9992	
C <sub>P</sub>	Pitot tube coefficient	0.8200	0.8200	0.8200	
$P_{g}$	Static pressure (in. H <sub>2</sub> O)	-1.8000	-1.7000	-1.7000	
A <sub>s</sub>	Sample location area (ft 2)	60.1320	60.1320	60.1320	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
D <sub>n</sub>	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O <sub>2</sub>	Oxygen (dry volume %)	9.5700	9.4900	9.5500	9.5367
CO <sub>2</sub>	Carbon dioxide (dry volume %)	10.1500	10.0700	10.0000	10.0733
N₂+CO	Nitrogen plus carbon monoxide (dry volume %)	80.2800	80.4400	80.4500	80.3900
Vic	Total Liquid collected (ml)	305.90	290.90	286.90	
$V_{m}$	Volume metered, meter conditions (ft 3)	76.3500	75.9000	75.8600	
T <sub>m</sub>	Dry gas meter temperature (°F)	88.1042	102.0000	99.5208	
T <sub>a</sub>	Sample temperature (°F)	488.2917	490.0417	493.3333	490.5556
ΔΗ	Meter box orifice pressure drop (in. H 2O)	1.3121	1.2600	1.2625	
θ	Total sampling time (min)	120.0	120.0	120.0	
Flow Res	sults				
V <sub>wstd</sub>	Volume of water collected (ft 3)	14.3957	13.6898	13.5015	13.8623
V <sub>mstd</sub>	Volume metered, standard (dscf)	74.1401	71.8717	72.1525	72.7214
Ps	Sample gas pressure, absolute (in. Hg)	29.9676	29.9750	29.9750	29.9725
Pv	Vapor pressure, actual (in. Hg)	29.9676	29.9750	29.9750	29.9725
B <sub>wo</sub>	Moisture measured in sample (% by volume)	16.2597	15.9999	15.7628	16.0075
B <sub>ws</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	16.2597	15.9999	15.7628	16.0075
√∆P	Velocity head (√in. H₂O)	0.7306	0.7176	0.7092	0.7191
$M_d$	MW of sample gas, dry (lb/lb-mole)	30.0068	29.9908	29.9820	29.9932
Ms	MW of sample gas, wet (lb/lb-mole)	28.0545	28.0723	28.0933	28.0734
Vs	Velocity of sample (ft/sec)	54.3914	53.4527	52.8961	53.5801
%l	Isokinetic sampling (%)	98.3413	96.8610	98.3258	97.8427
Q <sub>B</sub>	Volumetric flow rate, actual (acfm)	196,240	192,853	190,845	193,313
$Q_s$	Volumetric flow rate, standard (scfm)	109,439	107,378	105,893	107,570
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dscfm)	91,644	90,198	89,201	90,348
$Q_{std7}$	Volumetric flow rate, dry std@7%O 2 (dscfm)	74,700	74,040	72,837	73,859
$Q_a$	Volumetric flow rate, actual (acf/hr)	11,774,391	11,571,203	11,450,703	11,598,766
$Q_s$	Volumetric flow rate, standard (scf/hr)	6,566,312	6,442,692	6,353,586	6,454,197
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	5,498,649	5,411,867	5,352,079	5,420,865
$Q_a$	Volumetric flow rate, actual (m 3/hr)	333,458	327,703	324,291	328,484
$Q_s$	Volumetric flow rate, standard (m <sup>3</sup> /hr)	185,962	182,461	179,937	182,787
$Q_{\text{std}}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	155,725	153,267	151,574	153,522
$Q_{\text{std7}}$	Volumetric flow rate, dry std@7%O <sub>2</sub> (dry m <sup>3</sup> /hr)	126,933	125,811	123,767	125,504
$Q_{\mathfrak{s}}$	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	173,283	170,020	167,669	170,324
$Q_{\text{std}}$	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	145,107	142,817	141,239	143,055
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm <sup>3</sup> /hr)	118,278	117,233	115,329	116,947

Comments:

Average includes 3 runs.

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### USEPA Method 29 Mercury (Hg) Emission Parameters

Run No	<b>o</b> .	1	2	3	Average
Date (2	2009)	Mar 17	Mar 17	Mar 17	
•	ime (approx.)	06:33	09:15	11:56	
Stop Ti	me (approx.)	08:42	11:24	14:07	
Proces	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	6	6	5	6
Fd	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F.	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	anditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.5700	9.4900	9.5500	9.5367
CO2	Carbon dioxide (dry volume %)	10.1500	10.0700	10.0000	10.0733
T,	Sample temperature (°F)	488.2917	490.0417	493.3333	490.5556
Вw	Actual water vapor in gas (% by volume)	16.2597	15.9999	15. <b>76</b> 28	16.0075
	ow Rate				
Q	Volumetric flow rate, actual (acfm)	196,240	192,853	190,845	193,313
Q,	Volumetric flow rate, standard (scfm)	109,439	107,378	105,893	107,570
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	91,644	90,198	89,201	90,348
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	74,700	74,040	72,837	73,859
Q,	Volumetric flow rate, actual (acf/hr)	11,774,391	11,571,203	11,450,703	11,598,766
Q,	Volumetric flow rate, standard (scf/hr)	6,566,312	6,442,692	6,353,586	6,454,197
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	5,498,649	5,411,867	5,352,079	5,420,865
Q,	Volumetric flow rate, actual (m 3/hr)	333,458	327,703	324,291	328,484
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	185,962	182,461	179,937	182,787
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m 3/hr)	155,725	153,267	151,574	153,522
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	126,933	125,811	123,767	125,504
Q,	Volumetric flow rate, normal (Nm 3/hr)	173,283	170,020	167,669	170,324
$Q_{\rm std}$	Volumetric flow rate, dry normal (Nm 3/hr)	145,107	142,817	141,239	143,055
$Q_{std7}$	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	118,278	117,233	115,329	116,947
Samplin	no Data				
V <sub>mstd</sub>	Volume metered, standard (dscf)	74.1401	71.8717	72.1525	72.7214
%I	Isokinetic sampling (%)	98.3413	96.8610	98.3258	97.8427
Laborat	ory Data				
m <sub>n-1b</sub>	Fraction 1B (µg)	51.7021	62.7160	78.8613	
m <sub>n-2b</sub>	Fraction 2B (µg)	23.1328	26.8916	14.6764	
m <sub>n-3a</sub>	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m <sub>n-3b</sub>	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m <sub>n-3c</sub>	Fraction 3C (µg)	1.8885	<0.4000	1.5492	
mn	Total matter corrected for allowable blanks (µg)	76.7234	89.6076	95.0869	
Morcus	Results - Total				
C <sub>sd</sub>	Concentration (lb/dscf)	2.2818E-09	2.7491E-09	2.9059E-09	2.6456E-09
C <sub>ad7</sub>	Concentration @7% O 2 (lb/dscf)	2.7994E-09	3.3491E-09	3.5587E-09	3.2357E-09
C <sub>ed12</sub>	Concentration @12% CO 2 (lb/dscf)	2.6977E-09	3.2760E-09	3.4871E-09	3.1536E-09
C <sub>a</sub>	Concentration (lb/acf)	1.0656E-09	1.2858E-09	1.3582E-09	1.2365E-09
C <sub>sd</sub>	Concentration (µg/dscm)	3.6540E+01	4.4024E+01	4.6534E+01	4.2366E+01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	4.4829E+01	5.3631E+01	5.6988E+01	5.1816E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	4.3200E+01	5.2461E+01	5.5840E+01	5.0501E+01
C <sub>ad</sub>	Concentration (mg/dscm)	3.6540E-02	4.4024E-02	4.6534E-02	4.2366E-02
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	4.4829E-02	5.3631E-02	5.6988E-02	5.1816E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	4.3200E-02	5.2461E-02	5.5840E-02	5.0501E-02
C <sub>a</sub>	Concentration (µg/m 3 (actual, wet))	1.7064E+01	2.0590E+01	2.1750E+01	1.9801E+01
C <sub>sd</sub>	Concentration (µg/Nm <sup>3</sup> dry)	3.9214E+01	4.7245E+01	4.9939E+01	4.5466E+01
C <sub>ad7</sub>	Concentration @7% O 2 (µg/Nm³ dry)	4.8109E+01	5.7555E+01	6.1158E+01	5.5607E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	4.6361E+01	5.6300E+01	5.9926E+01	5.4196E+01
Elibrity	Rate (lb/hr)	1.2547E-02	1.4878E-02	1.5553E-02	1.4326E-02
E <sub>g/s</sub>	Rate (g/s)	1.5806E-03	1.8743E-03	1.9592E-03	1.8047E-03
E <sub>T/yr</sub>	Rate (Ton/yr)	5.4956E-02	6.5165E-02	6.8120E-02	6.2747E-02
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	4.0282E-05	4.8191E-05	5.1208E-05	4.6561E-05
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	4.0916E-05	4.9686E-05	5.2887E-05	4.7830E-05

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## USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Front Half Results

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
•	e (approx.)	06:33	09:15	11:56	
	e (approx.)	08:42	11:24	14:07	
Mercury	Results - Front Half				
C <sub>sd</sub>	Concentration (lb/dscf)	1.5377E-09	1.9241E-09	2.4100E-09	1.9573E-09
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	1.8865E-09	2.3440E-09	2.9515E-09	2.3940E-09
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	1.8179E-09	2.2929E-09	2.8920E-09	2.3343E-09
Cs	Concentration (lb/acf)	7.1809E-10	8.9991E-10	1.1264E-09	9.1482E-10
Cad	Concentration (µg/dscm)	2.4624E+01	3.0812E+01	3.8593E+01	3.1343E+01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	3.0209E+01	3.7536E+01	4.7264E+01	3.8336E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	2.9112E+01	3.6717E+01	4.6312E+01	3.7380E+01
Csd	Concentration (mg/dscm)	2.4624E-02	3.0812E-02	3.8593E-02	3.1343E-02
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	3.0209E-02	3.7536E-02	4.7264E-02	3.8336E-02
C <sub>ad12</sub>	Concentration @12% CO 2 (mg/dscm)	2.9112E-02	3.6717E-02	4.6312E-02	3.7380E-02
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	1.1499E+01	1.4411E+01	1.8038E+01	1.4650E+01
C <sub>sd</sub>	Concentration (µg/Nm 3 dry)	2.6425E+01	3.3066E+01	4.1417E+01	3.3636E+01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	3.2419E+01	4.0282E+01	5.0722E+01	4.1141E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	3.1242E+01	3.9404E+01	4.9700E+01	4.0115E+01
Elb/hr	Rate (lb/hr)	8.4551E-03	1.0413E-02	1.2899E-02	1.0589E-02
E <sub>o/s</sub>	Rate (g/s)	1.0651E-03	1.3118E-03	1.6249E-03	1.3340E-03
E <sub>T/yr</sub>	Rate (Ton/yr)	3.7033E-02	4.5609E-02	5.6496E-02	4.6379E-02
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	2.7145E-05	3.3729E-05	4.2470E-05	3.4448E-05
E <sub>Fo</sub>	Rate - Fc-based (lb/MMBtu)	2.7572E-05	3.4775E-05	4.3862E-05	3.5403E-05

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## USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 1-3 Results

Run No		1	2	3	Average
Date (20	009)	Mar 17	Mar 17	Mar 17	
Start Tir	ne (approx.)	06:33	09:15	11:56	
Stop Tin	ne (approx.)	08:42	11:24	14:07	
Mercury	Results - Impingers 1-3 Solution				
Csd	Concentration (lb/dscf)	6.8799E-10	8.2503E-10	4.4851E-10	6.5384E-10
$C_{sd7}$	Concentration @7% O 2 (lb/dscf)	8.4405E-10	1.0051E-09	5.4928E-10	7.9947E-10
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	8.1339E-10	9.8315E-10	5.3822E-10	7.7825E-10
C <sub>a</sub>	Concentration (lb/acf)	3.2129E-10	3.8587E-10	2.0964E-10	3.0560E-10
$C_{sd}$	Concentration (µg/dscm)	1.1017E+01	1.3212E+01	7.1823E+00	1.0470E+01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	1.3516E+01	1.6095E+01	8.7960E+00	1.2802E+01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	1.3025E+01	1.5744E+01	8.6188E+00	1.2463E+01
$C_{sd}$	Concentration (mg/dscm)	1.1017E-02	1.3212E-02	7.1823E-03	1.0470E-02
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	1.3516E-02	1.6095E-02	8.7960E-03	1.2802E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	1.3025E-02	1.5744E-02	8.6188E-03	1.2463E-02
Ca	Concentration (µg/m 3 (actual,wet))	5.1451E+00	6.1791E+00	3.3570E+00	4.8937E+00
$C_{sd}$	Concentration (µg/Nm 3 dry)	1.1823E+01	1.4178E+01	7.7079E+00	1.1237E+01
$C_{sd7}$	Concentration @7% O 2 (µg/Nm3 dry)	1.4505E+01	1.7272E+01	9.4396E+00	1.3739E+01
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	1.3978E+01	1.6896E+01	9.2495E+00	1.3375E+01
E <sub>lb/hr</sub>	Rate (lb/hr)	3.7830E-03	4.4649E-03	2.4005E-03	3.5495E-03
$E_{g/s}$	Rate (g/s)	4.7657E-04	5.6248E-04	3.0240E-04	4.4715E-04
ETAT	Rate (Ton/yr)	1.6570E-02	1.9556E-02	1.0514E-02	1.5547E-02
EFd	Rate - Fd-based (lb/MMBtu)	1.2145E-05	1.4462E-05	7.9039E-06	1.1504E-05
E <sub>F¢</sub>	Rate - Fc-based (lb/MMBtu)	1.2336E-05	1.4911E-05	8.1630E-06	1.1804E-05

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#### USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 4 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	ne (approx.)	06:33	09:15	11:56	
	e (approx.)	08:42	11:24	14:07	
Mercury	Results - Impinger 4 Solution				
$C_{sd}$	Concentration (lb/dscf)	<5.9482E-12	<6.1359E-12	<6.1121E-12	<6.0654E-12
C <sub>ed7</sub>	Concentration @7% O 2 (lb/dscf)	<7.2974E-12	<7.4750E-12	<7.4852E-12	<7.4192E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<7.0324E-12	<7.3119E-12	<7.3345E-12	<7.2263E-12
Ca	Concentration (lb/acf)	<2.7778E-12	<2.8698E-12	<2.8568E-12	<2.8348E-12
$C_{sd}$	Concentration (µg/dscm)	<9.5252E-02	<9.8258E-02	<9.7876E-02	<9.7129E-02
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<1.1686E-01	<1.1970E-01	<1.1987E-01	<1.1881E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.1261E-01	<1.1709E-01	<1.1745E-01	<1.1572E-01
$C_{sd}$	Concentration (mg/dscm)	<9.5252E-05	<9.8258E-05	<9.7876E-05	<9.7129E-05
$C_{sd7}$	Concentration @7% O 2 (mg/dscm)	<1.1686E-04	<1.1970E-04	<1.1987E-04	<1.1881E-04
C <sub>ed12</sub>	Concentration @12% CO 2 (mg/dscm)	<1.1261E-04	<1.1709E-04	<1.1745E-04	<1.1572E-04
C.	Concentration (µg/m 3 (actual,wet))	<4.4483E-02	<4.5956E-02	<4.5747E-02	<4.5395E-02
Cad	Concentration (µg/Nm 3 dry)	<1.0222E-01	<1.0545E-01	<1.0504E-01	<1.0424E-01
$C_{sd7}$	Concentration @7% O 2 (µg/Nm3 dry)	<1.2541E-01	<1.2846E-01	<1.2864E-01	<1.2750E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<1.2085E-01	<1.2566E-01	<1.2605E-01	<1.2419E-01
E <sub>lb/lv</sub>	Rate (lb/hr)	<3.2707E-05	<3.3207E-05	<3.2712E-05	<3.2875E-05
E <sub>g/s</sub>	Rate (g/s)	<4.1203E-06	<4.1833E-06	<4.1210E-06	<4.1415E-08
Etryr	Rate (Ton/yr)	<1.4326E-04	<1.4545E-04	<1.4328E-04	<1.4399E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<1.0501E-07	<1.0756E-07	<1.0771E-07	<1.0676E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<1.0666E-07	<1.1090E-07	<1.1124E-07	<1.0960E-07

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#### USEPA Method 29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 5-6 Results

Run No	<b>).</b>	1	2	3	Average
Date (20	009)	Mar 17	Mar 17	Mar 17	
,	me (approx.)	06:33	09:15	11:56	
Stop Tir	me (approx.)	08:42	11:24	14:07	
Moreus	y Results - Filtered Permanganate Solution				
Csd	Concentration (lb/dscf)	<1.4870E-11	<1.5340E-11	<1.5280E-11	<1.5163E-11
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<1.8244E-11	<1.8687E-11	<1.8713E-11	<1.8548E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.7581E-11	<1.8280E-11	<1.8336E-11	<1.8066E-11
C <sub>e</sub>	Concentration (lb/acf)	<6.9445E-12	<7.1745E-12	<7.1420E-12	<7.0870E-12
Csd	Concentration (µg/dscm)	<2.3813E-01	<2.4565E-01	<2.4469E-01	<2.4282E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<2.9215E-01	<2.9925E-01	<2.9966E-01	<2.9702E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.8153E-01	<2.9273E-01	<2.9363E-01	<2.8930E-01
C <sub>sd</sub>	Concentration (mg/dscm)	<2.3813E-04	<2.4565E-04	<2.4469E-04	<2.4282E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	<2.9215E-04	<2.9925E-04	<2.9966E-04	<2.9702E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.8153E-04	<2.9273E-04	<2.9363E-04	<2.8930E-04
C <sub>a</sub>	Concentration (µg/m ³ (actual,wet))	<1,1121E-01	<1.1489E-01	<1.1437E-01	<1.1349E-01
C <sub>ad</sub>	Concentration (µg/Nm <sup>3</sup> dry)	<2.5555E-01	<2.6362E-01	<2.6259E-01	<2.6059E-01
	Concentration (µg/Nm ary) Concentration @7% O 2 (µg/Nm³ dry)	<3.1352E-01	<3.2115E-01	<3.2159E-01	<3.1875E-01
C <sub>sd7</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<3.0213E-01	<3.1415E-01	<3.1511E-01	<3.1046E-01
C <sub>sd12</sub>		<8.1768E-05	<8.3017E-05	<8.1780E-05	<8.2188E-05
E <sub>ib/h</sub>	Rate (lb/hr)				
E <sub>9/s</sub>	Rate (g/s)	<1.0301E-05	<1.0458E-05	<1.0302E-05	<1.0354E-05
E <sub>T/yr</sub>	Rate (Ton/yr)	<3.5814E-04	<3.6362E-04	<3.5820E-04	<3.5999E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.6251E-07	<2.6890E-07 <2.7724E-07	<2.6927E-07 <2.7810E-07	<2.6690E-07 <2.7400E-07
EFC	Rate - Fc-based (lb/MMBtu)	<2.6664E-07	<2.7724E-07	<2.7810E-07	<2.740UE-U7
	Results - HCl Rinse + HCl/MnO2 Precipitate				
$C_{sd}$	Concentration (lb/dscf)	5.6165E-11	<1.2272E-11	4.7345E-11	<3.8594E-11
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	6.8905E-11	<1.4950E-11	5.7982E-11	<4.7279E-11
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	6.6402E-11	<1.4624E-11	5.6814E-11	<4.5947E-11
Ca	Concentration (lb/acf)	2.6229E-11	<5.7396E-12	2.2129E-11	<1.8033E-11
$C_{sd}$	Concentration (µg/dscm)	8.9941E-01	<1.9652E-01	7.5817E-01	<6.1803E-01
$C_{sd7}$	Concentration @7% O <sub>2</sub> (µg/dscm)	1.1034E+00	<2.3940E-01	9.2850E-01	<7.5711E-01
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/dscm)	1.0633E+00	<2.3418E-01	9.0980E-01	<7.3577E-01
$C_{sd}$	Concentration (mg/dscm)	8.9941E-04	<1.9652E-04	7.5817E-04	<6.1803E-04
$C_{\rm ed7}$	Concentration @7% O <sub>2</sub> (mg/dscm)	1.1034E-03	<2.3940E-04	9.2850E-04	<7.5711Ë-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	1.0633E-03	<2.3418E-04	9.0980E-04	<7.3577E-04
Ca	Concentration (µg/m 3 (actual,wet))	4.2002E-01	<9.1911E-02	3.5437E-01	<2.8877E-01
$C_{sd}$	Concentration (µg/Nm 3 dry)	9.6522E-01	<2.1090E-01	8.1364E-01	<6.6325E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	1.1842E+00	<2.5692E-01	9.9644E-01	<8.1251E-01
C <sub>sd12</sub>	Concentration @12% CO ₂ (µg/Nm³ dry)	1.1411E+00	<2.5132E-01	9.7637E-01	<7.8961E-01
E <sub>lb/m</sub>	Rate (ib/hr)	3.0883E-04	<6.6414E-05	2.5339E-04	<2.0955E-04
E <sub>g/s</sub>	Rate (g/s)	3.8906E-05	<8.3666E-06	3.1922E-05	<2.6398E-05
E <sub>T/yr</sub>	Rate (Ton/yr)	1.3527E-03	<2.9089E-04	1.1099E-03	<9.1782E-04
$E_{Fd}$	Rate - Fd-based (lb/MMBtu)	9.9151E-07	<2.1512E-07	8.3433E-0 <b>7</b>	<6.8032E-07
$E_Fe$	Rate - Fc-based (lb/MMBtu)	1.0071E-06	<2.2180E-07	8.6168E-07	<6.9686E-07

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### USEPA Method 5/29 (Particulate/Metals) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	ne (approx.)	06:33	09:15	11:56	
Stop Tim	e (approx.)	08:42	11:24	14:07	
Samplin	g Conditions				
$Y_d$	Dry gas meter correction factor	0.9937	0.9937	0.9937	
$C_p$	Pitot tube coefficient	0.8120	0.8120	0.8120	
$P_{g}$	Static pressure (in. H 2O)	-12.0000	-12.0000	<b>-</b> 12.0000	
$A_s$	Sample location area (ft 2)	64.0000	64.0000	64.0000	
$P_{bar}$	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
$D_n$	Nozzle diameter (in.)	0.2680	0.2680	0.2680	
O <sub>2</sub>	Oxygen (dry volume %)	10.6500	10.3500	10.3200	10.4400
CO₂	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	9.2400
_	Nitrogen plus carbon monoxide (dry volume %)	80.2500	80.4500	80.2600	80.3200
V <sub>tc</sub>	Total Liquid collected (ml)	416.60	411.10	397.60	
V <sub>m</sub>	Volume metered, meter conditions (ft 3)	80.9450	80.6450	78.6700	
T <sub>m</sub>	Dry gas meter temperature (°F)	79.9400	93.1200	93.7800	
T <sub>s</sub>	Sample temperature (°F)	295.1200	295.7600	295.9200	295.6000
ΔН	Meter box orifice pressure drop (in. H <sub>2</sub> O)	1.2892	1.2464	1.1972	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Res	sults				
$V_{wetd}$	Volume of water collected (ft 3)	19.6052	19.3464	18.7111	19.2209
$V_{metd}$	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	77.2270
$P_{\epsilon}$	Sample gas pressure, absolute (in. Hg)	29.2176	29.2176	29.2176	29.2176
P <sub>v</sub>	Vapor pressure, actual (in. Hg)	29.2176	29.2176	29.2176	29.2176
B <sub>wo</sub>	Moisture measured in sample (% by volume)	19.8128	20.0465	19.9300	19.9298
B <sub>ws</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	19.9298
√∆P	Velocity head (√in, H₂O)	0.7222	0.7099	0.6891	0.7071
M <sub>d</sub>	MW of sample gas, dry (lb/lb-mole)	29.8820	29.8860	29.9200	29.8960
M <sub>s</sub>	MW of sample gas, wet (lb/lb-mole)	27.5278	27.5033	27.5443	27.5252
V <sub>s</sub> %I	Velocity of sample (ft/sec) Isokinetic sampling (%)	48.5799 101.5932	47.7918 100.8025	46.3604 101.1112	47.5773 101.1690
Q <sub>a</sub>	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
Q <sub>a</sub>	Volumetric flow rate, standard (scfm)	127,376	125,204	121,428	124,670
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,319	75,979	74,005	75,101
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	11,192,801	11,011,232	10,681,426	10,961,820
Q,	Volumetric flow rate, standard (scf/hr)	7,642,587	7,512,242	7,285,695	7,480,175
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	6,128,377	6,006,302	5,833,655	5,989,444
Q <sub>a</sub>	Volumetric flow rate, actual (m <sup>3</sup> /hr)	316,987	311,845	302,504	310,445
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	216,443	212,751	206,335	211,843
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	173,559	170,102	165,213	169,625
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	127,984	129,106	125,752	127,614
Q	Volumetric flow rate, riormal (Nm 3/hr)	201,685	198,245	192,267	197,399
$\mathbf{Q}_{std}$	Volumetric flow rate, dry normal (Nm 3/hr)	161,726	158,504	153,948	158,059
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,258	120,303	117,178	118,913

Comments:

Average includes 3 runs.

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#### USEPA Method 5/29 Filterable Particulate Parameters

Run N	in a	1	2	3	Average
Date (		Mar 17	Mar 17	Mar 17	Average
•	ime (approx.)	06:33	09:15	11:56	
	ime (approx.)	08:42	11:24	14:07	
		08.42	11.24	14.07	
_	ss Conditions	194.0	494.0	104.4	404.0
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	184.0
P,	Fabric Filter Inlet Temperature (°F)	315	315	315	315
F₀	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
	onditions				
O <sub>2</sub>	Oxygen (dry volume %)	10.6500	10.3500	10.3200	10.4400
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	9.2400
T,	Sample temperature (°F)	295.1200	295.7600	295.9200	295.6000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	19.9298
Gas Fl	ow Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
$Q_s$	Volumetric flow rate, standard (scfm)	127,3 <b>7</b> 6	125,204	121,428	124,670
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
$Q_{std7}$	Volumetric flow rate, dry std@7%O₂ (dscfm)	75,319	75,979	74,005	75,101
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	11,192,801	11,011,232	10,681,426	10,961,820
$Q_s$	Volumetric flow rate, standard (scf/hr)	7,642,587	7,512,242	7,285,695	7,480,175
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	6,128,377	6,006,302	5,833,655	5,989,444
$Q_a$	Volumetric flow rate, actual (m³/hr)	316,987	311,845	302,504	310,445
Q,	Volumetric flow rate, standard (m³/hr)	216,443	212,751	206,335	211,843
$Q_{std}$	Volumetric flow rate, dry standard (dry m³/hr)	173,559	170,102	165,213	169,625
$Q_{std7}$	Volumetric flow rate, dry std@7%O2 (dry m3/hr)	127,984	129,106	125,752	127,614
$Q_s$	Volumetric flow rate, normal (Nm³/hr)	201,685	198,245	192,267	197,399
$Q_{std}$	Volumetric flow rate, dry normal (Nm3/hr)	161,726	158,504	153,948	158,059
Q <sub>std?</sub>	Volumetric flow rate, dry normal @7%O <sub>2</sub> (Nm <sup>3</sup> /hr)	119,258	120,303	117,178	118,913
Sampli	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	77.2270
%1	Isokinetic sampling (%)	101,5932	100.8025	101.1112	101.1690
Laborat	tory Data				
m <sub>filter</sub>	Matter collected on filter(s) (g)	0.00010	0.00090	0.00010	
m <sub>s</sub>	Matter collected in solvent rinse(s) (g)	0.00360	0.00150	0.00080	
m <sub>n</sub>	Total particulate matter collected (g)	0.00360	0.00240	0.00080	
Filterah	ele Particulate Results				
C <sub>sd</sub>	Particulate Concentration (lb/dscf)	1.0004E-07	6.8584E-08	2.3466E-08	6.4030E-08
C <sub>sd?</sub>	Particulate Concentration @7% O <sub>2</sub> (lb/dscf)	1.3567E-07	9.0361E-08	3.0830E-08	8.5619E-08
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (lb/dscf)	1.3192E-07	8.9457E-08	2.9893E-08	8.3758E-08
C <sub>a</sub>	Particulate Concentration (lb/acf)	5.4776E-08	3.7410E-08	1.2816E-08	3.5001E-08
C <sub>sd</sub>	Particulate Concentration (gr/dscf)	0.0007	0.0005	0.0002	0.0004
C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (gr/dscf)	0.0009	0.0006	0.0002	0.0006
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (gr/dscf)	0.0009	0.0006	0.0002	0.0006
Ca	Particulate Concentration (gr/acf)	0.0004	0.0003	0.0001	0.0002
C <sub>sd</sub>	Particulate Concentration (mg/dscm)	1.6020	1.0983	0.3758	1.0254
C <sub>sd7</sub>	Particulate Concentration @7% O <sub>2</sub> (mg/dscm)	2.1725	1.4470	0.4937	1.3711
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (mg/dscm)	2.1126	1.4325	0.4787	1.3413
C <sub>a</sub>	Particulate Concentration (mg/m³ (actual,wet))	0.8772	0.5991	0.2052	0.5605
C <sub>sd</sub>	Particulate Concentration (mg/Nm³ dry)	1.7192	1.1786	0.4033	1.1004
C <sub>sd7</sub>	Particulate Concentration (mg/Nm dry)  Particulate Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	2.3315	1.5529	0.5298	1.4714
C <sub>sd12</sub>	Particulate Concentration @12% CO <sub>2</sub> (mg/Nm³ dry)	2.2671	1.5373	0.5137	1.4394
E <sub>lb/hr</sub>	Particulate Rate (lb/hr)	0.6131	0.4119	0.5137	0.3873
E <sub>kg/hr</sub>	Particulate Rate (kg/hr)	0.2780	0.4119	0.1369	0.3873
⊏kg/hr E <sub>T/yr</sub>	Particulate Rate (kg/m) Particulate Rate (Ton/yr)	2.6853	1.8043	0.0621	
E <sub>Fd</sub>	Particulate Rate - F <sub>a</sub> -based (lb/MMBtu)	0.0020	0.0013	0.0996	1.6964 0.0012
E <sub>Fo</sub>	Particulate Rate - F <sub>c</sub> -based (lb/MMBtu)	0.0020	0.0013	0.0004	0.0012
		0.0020	0.0014	0.0003	
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Proposed by Georgan Engineering Proprietary SS PPA ST Variabri 2006-08b Average includes 3 runs. Copyright © 2006 Clean Air Engineering Inc.

#### USEPA Method 5/29 Mercury (Hg) Emission Parameters

Run No		1	2	3	Average
Date (20	009)	Mar 17	Mar 17	Mar 17	
	me (approx.)	06:33	09:15	11:56	
Stop Tir	ne (approx.)	08:42	11:24	14:07	
Process	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	6	6	5	6
Fa	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
Fc	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
02	Oxygen (dry volume %)	10.6500	10.3500	10.3200	10.4400
CO2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	9.2400
T.	Sample temperature (°F)	295.1200	295.7600	295.9200	295.6000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	19.9298
Gas Flo	w Rate				
Q,	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
Q,	Volumetric flow rate, standard (scfm)	127,376	125,204	121,428	124,670
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,319	75,979	74,005	75,101
Q,	Volumetric flow rate, actual (acf/hr)	11,192,801	11,011,232	10,681,426	10,961,820
Q,	Volumetric flow rate, standard (scf/hr)	7,642,587	7,512,242	7,285,695	7,480,175
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	6,128,377	6,006,302	5,833,655	5,989,444
Q,	Volumetric flow rate, actual (m 3/hr)	316,987	311,845	302,504	310,445
Q,	Volumetric flow rate, standard (m 3/hr)	216,443	212,751	206,335	211,843
$Q_{std}$	Volumetric flow rate, dry standard (dry m 3/hr)	173,559	170,102	165,213	169,625
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	127,984	129,106	125,752	127,614
Q,	Volumetric flow rate, normal (Nm 3/hr)	201,685	198,245	192,267	197,399
$Q_{std}$	Volumetric flow rate, dry normal (Nm 3/hr)	161,726	158,504	153,948	158,059
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,258	120,303	117,178	118,913
Samplin	ng Data				
$V_{matd}$	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	77.2270
<b>%</b> I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	101.1690
Laborat	tory Data				
m <sub>n-1b</sub>	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
m <sub>n-2b</sub>	Fraction 2B (µg)	6.6466	7.0201	6.5708	
m <sub>n-3a</sub>	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m <sub>n-3b</sub>	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m <sub>n-3c</sub>	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
$m_n$	Total matter corrected for allowable blanks (µg)	6.6466	7.0201	6.5708	
Mercur	y Results - Total				
C <sub>sd</sub>	Concentration (lb/dscf)	1.8470E-10	2.0061E-10	1.9274E-10	1.9268E-10
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	2.5048E-10	2.6431E-10	2.5322E-10	2.5600E-10
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	2.4357E-10	2.6167E-10	2.4552E-10	2.5025E-10
$C_a$	Concentration (lb/acf)	1.0113E-10	1.0943E-10	1.0526E-10	1.0527E-10
$C_{\text{sd}}$	Concentration (µg/dscm)	2.9578E+00	3.2125E+00	3.0864E+00	3.0856E+00
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	4.0110E+00	4.2326E+00	4.0549E+00	4.0995E+00
C <sub>ed12</sub>	Concentration @12% CO <sub>2</sub> (µg/dscm)	3.9004E+00	4.1902E+00	3.9317E+00	4.0074E+00
C <sub>scl</sub>	Concentration (mg/dscm)	2.9578E-03	3.2125E-03	3.0864E-03	3.0856E-03
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	4.0110E-03	4.2326E-03	4.0549E-03	4.0995E-03
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	3.9004E-03	4.1902E-03	3.9317E-03	4.0074E-03
C <sub>a</sub>	Concentration (µg/m ³ (actual,wet))	1.6195E+00	1.7523E+00	1.6856E+00	1.6858E+00 3.3113E+00
C <sub>sd</sub>	Concentration (µg/Nm ³ dry)	3.1742E+00 4.3045E+00	3.4476E+00	3.3122E+00	4.3995E+00
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm³ dry)		4.5423E+00	4.3516E+00 4.2194E+00	4.3995E+00 4.3007E+00
C <sub>8d12</sub>	Concentration @12% CO 2 (µg/Nm³ dry)	4.1858E+00 1.1319E-03	4.4968E+00 1.2049E-03	1.1244E-03	1.1537E-03
Elb/h	Rate (lb/hr)	1.4260E-04	1.5179E-04	1.4164E-04	1.1537E-03 1.4534E-04
E <sub>g/s</sub>	Rate (g/s) Rate (Ton/yr)	4.9579E-03	5.2776E-03	4.9247E-03	5.0534E-03
E <sub>T/yr</sub> E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	3.6042E-06	3.8033E-06	3.6437E-06	3.6837E-06
E <sub>Fc</sub>	Rate - Fc-based (Ib/MMBtu)	3.6941E-06	3.9686E-06	3.7238E-06	3.7955E-06
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## USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Front Half Results

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	ne (approx.)	06:33	09:15	11:56	
Stop Tim	e (approx.)	08:42	11:24	14:07	
Mercury	Results - Front Half				
$C_{sd}$	Concentration (lb/dscf)	<2.7789E-12	<2.8577E-12	<2.9332E-12	<2.8586E-12
$C_{sd7}$	Concentration @7% O <sub>2</sub> (lb/dscf)	<3.7685E-12	<3.7651E-12	<3.8537E-12	<3.7958E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<3.6645E-12	<3.7274E-12	<3.7366E-12	<3.7095E-12
C <sub>e</sub>	Concentration (lb/acf)	<1.5215Ë-12	<1.5588E-12	<1.6020E-12	<1.5608E-12
$C_{ad}$	Concentration (µg/dscm)	<4.4501E-02	<4.5761E-02	<4.6972E-02	<4.5745E-02
C <sub>ad7</sub>	Concentration @7% O 2 (µg/dscm)	<6.0347E-02	<6.0292E-02	<6.1712E-02	<6.0784E-02
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/dscm)	<5.8682E-02	<5.9689E-02	<5.9837E-02	<5.9403E-02
Ced	Concentration (mg/dscm)	<4.4501E-05	<4.5761E-05	<4.6972E-05	<4.5745E-05
$C_{sd7}$	Concentration @7% O 2 (mg/dscm)	`<6.0347E-05	<6.0292E-05	<6.1712E-05	<6.0784E-05
C <sub>ed12</sub>	Concentration @12% CO 2 (mg/dscm)	<5.8682E-05	<5.9689E-05	<5.9837E-05	<5.9403E-05
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	<2.4365E-02	<2.4961E-02	<2.5654E-02	<2.4994E-02
$C_{sd}$	Concentration (µg/Nm 3 dry)	<4.7757E-02	<4.9110E-02	<5.0409E-02	<4.9092E-02
C <sub>ad7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<6.4763E-02	<6.4704E-02	<6.6227E-02	<6.5231E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<6.2976E-02	<6.4056E-02	<6.4215E-02	<6.3749E-02
E <sub>Ib/lv</sub>	Rate (lb/hr)	<1.7030E-05	<1.7164E-05	<1.7112E-05	<1.7102E-05
$E_{g/s}$	Rate (g/s)	<2.1454E-06	<2.1622E-06	<2.1556E-06	<2.1544E-06
ETA	Rate (Ton/yr)	<7.4593E-05	<7.5178E-05	<7.4948E-05	<7.4906E-05
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<5.4227E-08	<5.4177E-08	<5.5452E-08	<5.4619E-08
$E_{Fc}$	Rate - Fc-based (lb/MMBtu)	<5.5579E-08	<5.6532 <b>E-</b> 08	<5.6672E-08	<5.6261E-08

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# USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 1-3 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	ne (approx.)	06:33	09:15	11:56	
	ne (approx.)	08:42	11:24	14:07	
Mercury	Results - Impingers 1-3 Solution				
Csd	Concentration (lb/dscf)	1.8470E-10	2.0061E-10	1.9274E-10	1.9268E-10
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	2.5048E-10	2.6431E-10	2.5322E-10	2.5600E-10
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	2.4357E-10	2.6167E-10	2.4552E-10	2.5025E-10
C,	Concentration (lb/acf)	1.0113E-10	1.0943E-10	1.0526E-10	1.0527E-10
Csd	Concentration (µg/dscm)	2.9578E+00	3.2125E+00	3.0864E+00	3.0856E+00
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	4.0110E+00	4.2326E+00	4.0549E+00	4.0995E+00
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	3.9004E+00	4.1902E+00	3.9317E+00	4.0074E+00
Csd	Concentration (mg/dscm)	2.9578E-03	3.2125E-03	3.0864E-03	3.0856E-03
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	4.0110E-03	4.2326E-03	4.0549E-03	4.0995E-03
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	3.9004E-03	4.1902E-03	3.9317E-03	4.0074E-03
C.	Concentration (µg/m 3 (actual,wet))	1.6195E+00	1.7523E+00	1.6856E+00	1.6858E+00
Csd	Concentration (µg/Nm 3 dry)	3.1742E+00	3.4476E+00	3.3122E+00	3.3113E+00
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	4.3045E+00	4.5423E+00	4.3516E+00	4.3995E+00
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	4.1858E+00	4.4968E+00	4.2194E+00	4.3007E+00
Elbyhr	Rete (lb/hr)	1.1319E-03	1.2049E-03	1.1244E-03	1.1537E-03
E <sub>g/s</sub>	Rate (g/s)	1.4260E-04	1.5179E-04	1.4164E-04	1.4534E-04
ETAT	Rate (Ton/yr)	4.95 <b>7</b> 9E-03	5.2776E-03	4.9247E-03	5.0534E-03
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	3.6042E-06	3.8033E-06	3.6437E-06	3.6837E-06
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	3.6941E-06	3.9686E-06	3.7238E-06	3.7955E-06

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## USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate Impinger 4 Results

Run No.		1	2	3	Average
Date (20	009)	Mar 17	Mar 17	Mar 17	
Start Tin	ne (approx.)	06:33	09:15	11:56	
Stop Tin	ne (approx.)	08:42	11:24	14:07	
Mercury	Results - Impinger 4 Solution				
Cad	Concentration (lb/dscf)	<5.5579E-12	<5.7153E-12	<5.8665E-12	<5.7132E-12
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<7.5370E-12	<7.5301E-12	<7.7074E-12	<7.5915E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<7.3291E-12	<7.4548E-12	<7.4732E-12	<7.4190E-12
C.	Concentration (lb/acf)	<3.0431E-12	<3.1175E-12	<3.2040E-12	<3.1215E-12
$C_{sd}$	Concentration (µg/dscm)	<8.9001E-02	<9.1523E-02	<9.3944E-02	<9.1489E-02
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	<1.2069E-01	<1.2058E-01	<1.2342E-01	<1.2157E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.1736E-01	<1,1938E-01	<1.1967E-01	<1.1881E-01
Csd	Concentration (mg/dscm)	<8.9001E-05	<9.1523E-05	<9.3944E-05	<9.1489E-05
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<1.2069E-04	<1.2058E-04	<1.2342E-04	<1.2157E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<1.1736E-04	<1.1938E-04	<1.1967E-04	<1.1881E-04
C.	Concentration (µg/m 3 (actual,wet))	<4.8731E-02	<4.9923E-02	<5.1307E-02	<4.9987E-02
Csd	Concentration (µg/Nm 3 dry)	<9.5514E-02	<9.8220E-02	<1.0082E-01	<9.8184E-02
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<1.2953E-01	<1.2941E-01	<1.3245E-01	<1.3046E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm <sup>3</sup> dry)	<1.2595E-01	<1.2811E-01	<1.2843E-01	<1.2750E-01
E <sub>lb/h</sub>	Rate (lb/hr)	<3.4061E-05	<3.4328E-05	<3.4223E-05	<3.4204E-05
E <sub>o/s</sub>	Rate (g/s)	<4.2908E-06	<4.3245E-06	<4.3113E-06	<4.3089E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<1.4919E-04	<1.5036E-04	<1.4990E-04	<1.4981E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<1.0845E-07	<1.0835E-07	<1.1090E-07	<1.0924E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<1.1116E-07	<1.1306E-07	<1.1334E-07	<1.1252E-07

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# USEPA Method 5/29 Mercury (Hg) Emission Parameters (continued) Separate ImpInger 5-6 Results

Run No.		1	2	3	Average
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tin	ne (approx.)	06:33	09:15	11:56	
Stop Tim	ne (approx.)	08:42	11:24	14:07	
Mercury	Results - Flitered Permanganate Solution				
C <sub>sd</sub>	Concentration (lb/dscf)	<1.3895E-11	<1.4288E-11	<1.4666E-11	<1.4283E-11
C <sub>ed7</sub>	Concentration @7% O 2 (lb/dscf)	<1.8843E-11	<1.8825E-11	<1.9268E-11	<1.8979E-11
C <sub>ad12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.8323E-11	<1.8637E-11	<1.8683E-11	<1.8548E-11
C.	Concentration (lb/acf)	<7.6077E-12	<7.7938E-12	<8.0099E-12	<7.8038E-12
Ced	Concentration (µg/dscm)	<2.2250E-01	<2.2881E-01	<2.3486E-01	<2.2872E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<3.0174E-01	<3.0146E-01	<3.0856E-01	<3.0392E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.9341E-01	<2.9844E-01	<2.9918E-01	<2.9701E-01
Csd	Concentration (mg/dscm)	<2.2250E-04	<2.2881E-04	<2.3486E-04	<2.2872E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	<3.0174E-04	<3.0146E-04	<3.0856E-04	<3.0392E-04
C <sub>ad12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.9341E-04	<2.9844E-04	<2.9918E-04	<2.9701E-04
C,	Concentration (µg/m 3 (actual,wet))	<1.2183E-01	<1.2481E-01	<1.2827E-01	<1.2497E-01
Csd	Concentration (µg/Nm 3 dry)	<2.3878E-01	<2.4555E-01	<2.5204E-01	<2.4546E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm3 dry)	<3.2382E-01	<3.2352E-01	<3.3114E-01	<3.2616E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm3 dry)	<3.1488E-01	<3.2028E-01	<3.2107E-01	<3.1875E-01
E <sub>lb/hr</sub>	Rate (lb/hr)	<8.5152E-05	<8.5820E-05	<8.5558E-05	<8.5510E-05
E <sub>g/a</sub>	Rate (g/s)	<1.0727E-05	<1.0811E-05	<1.0778E-05	<1.0772E-05
E <sub>T/vr</sub>	Rate (Ton/yr)	<3.7296E-04	<3.7589E-04	<3.7474E-04	<3.7453E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.7113E-07	<2.7089E-07	<2.7726E-07	<2.7309E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<2.7789E-07	<2.8266E-07	<2.8336E-07	<2.8130E-07
	Results - HCI Rinse + HCI/MnO2 Precipitate				
C <sub>sd</sub>	Concentration (lb/dscf)	<1.1116E-11	<1.1431E-11	<1.1733E-11	<1.1426E-11
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<1.5074E-11	<1.5060E-11	<1.5415E-11	<1.5183E-11
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.4658E-11	<1.4910E-11	<1.4946E-11	<1.4838E-11
C <sub>a</sub>	Concentration (lb/acf)	<6.0862E-12	<6.2351E-12	<6.4080E-12	<6.2431E-12
C <sub>ed</sub>	Concentration (µg/dscm)	<1.7800E-01	<1.8305E-01	<1.8789E-01	<1.8298E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/dscm)	<2.4139E-01	<2.4117E-01	<2.4685E-01	<2.4313E-01
C <sub>ed12</sub>	Concentration @12% CO 2 (µg/dscm)	<2.3473E-01	<2.3875E-01	<2.3935E-01	<2.3761E-01
C <sub>sd</sub>	Concentration (mg/dscm)	<1.7800E-04	<1.8305E-04	<1.8789E-04	<1.8298E-04
C <sub>sd7</sub>	Concentration @7% O 2 (mg/dscm)	<2.4139E-04	<2.4117E-04	<2.4685E-04	<2.4313E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.3473E-04	<2.3875E-04	<2.3935E-04	<2.3761E-04
C.	Concentration (µg/m 3 (actual,wet))	<9.7462E-02	<9.9846E-02	<1.0261E-01	<9.9974E-02
C <sub>sd</sub>	Concentration (µg/Nm 3 dry)	<1.9103E-01	<1.9644E-01	<2.0164E-01	<1.9637E-01
C <sub>sd7</sub>	Concentration @7% O 2 (µg/Nm³ dry)	<2.5905E-01	<2.5882E-01	<2.6491E-01	<2.6093E-01
C <sub>ed12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<2.5190E-01	<2.5622E-01	<2.5686E-01	<2.5500E-01
E <sub>lb/hr</sub>	Rate (lb/hr)	<6.8121E-05	<6.8656E-05	<6.8446E-05	<6.8408E-05
E <sub>g/s</sub>	Rate (g/s)	<8.5817E-06	<8.6490E-06	<8.6226E-06	<8.6178E-06
–g/a E <sub>T/vr</sub>	Rate (Ton/yr)	<2.9837E-04	<3.0071E-04	<2.9979E-04	<2.9963E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.1691E-07	<2.1671E-07	<2.2181E-07	<2.1847E-07
E <sub>Fc</sub>	Rate - Fc-based (lb/MMBtu)	<2.2231E-07	<2.2613E-07	<2.2669E-07	<2.2504E-07
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### USEPA Method 5/29 Beryllium (Be) Emission Parameters

Run No		1	2	3	Average
Date (20	1091	Mar 17	Mar 17	Mar 17	
-	ne (approx.)	06:33	09:15		
	ne (approx.)	08:42	11:24	14:07	
	• • • •	00.42	11.24	14.07	
	Conditions	404.0	404.0	4044	404.0
R <sub>e</sub>	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	
P <sub>2</sub>	Carbon Feed rate (lb/hr)	6	6	5	
Fa	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Cor	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	10.6500	10.3500	10.3200	10.4400
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	9.2400
Ts	Sample temperature (°F)	295.1200	295.7600	295.9200	295.6000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	19.9298
Gas Flor	w Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
Q,	Volumetric flow rate, standard (scfm)	127,376	125,204	121,428	124,670
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
$Q_{std7}$	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,319	75,979	74,005	75,101
$Q_a$	Volumetric flow rate, actual (acf/hr)	11,192,801	11,011,232	10,681,426	10,961,820
Q,	Volumetric flow rate, standard (scf/hr)	7,642,587	7,512,242	7,285,695	7,480,175
$Q_{std}$	Volumetric flow rate, dry standard (dscf/hr)	6,128,377	6,006,302	5,833,655	5,989,444
Q <sub>a</sub>	Volumetric flow rate, actual (m 3/hr)	316,987	311,845	302,504	310,445
Q,	Volumetric flow rate, standard (m 3/hr)	216,443	212,751	206,335	211,843
$Q_{std}$	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	173,559	170,102	165,213	169,625
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	127,984	129,106	125,752	127,614
Q <sub>s</sub>	Volumetric flow rate, normal (Nm 3/hr)	201,685	198,245	192,267	197,399
$Q_{std}$	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	161,726	158,504	153,948	158,059
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,258	120,303	117,178	118,913
Sampling	g Data				
$V_{mstd}$	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	77.2270
%1	Isokinetic sampling (%)	101.5932	100.8025	101.1112	101.1690
Laborato	ory Data				
m <sub>n</sub>	Total matter corrected for allowable blanks (µg)	<0.0500	<0.0500	<0.0500	
Berylliun	n Results - Total				
$C_{sd}$	Concentration (lb/dscf)	<1.3895E-12	<1.4288E-12	<1.4666E-12	<1.4283E-12
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<1.8843E-12	<1.8825E-12	<1.9268E-12	<1.8979E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<1.8323E-12	<1.8637E-12	<1.8683E-12	<1.8548E-12
$C_a$	Concentration (lb/acf)	<7.6077E-13	<7.7938E-13	<8.0099E-13	<7.8038E-13
$C_{sd}$	Concentration (µg/dscm)	<2.2250E-02	<2.2881E-02	<2.3486E-02	<2.2872E-02
$C_{sd7}$	Concentration @7% O <sub>2</sub> (µg/dscm)	<3.0174E-02	<3.0146E-02	<3.0856E-02	<3.0392E-02
$C_{sd12}$	Concentration @12% CO 2 (µg/dscm)	<2.9341E-02	<2.9844E-02	<2.9918E-02	<2.9701E-02
$C_{ad}$	Concentration (mg/dscm)	<2.2250E-05	<2.2881E-05	<2.3486E-05	<2.2872E-05
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<3.0174E-05	<3.0146E-05	<3.0856E-05	<3.0392E-05
C <sub>ed12</sub>	Concentration @12% CO 2 (mg/dscm)	<2.9341E-05	<2.9844E-05	<2.9918E-05	<2.9701E-05
C <sub>a</sub>	Concentration (µg/m 3 (actual,wet))	<1.2183E-02	<1.2481E-02	<1.2827E-02	<1.2497E-02
$C_{sd}$	Concentration (µg/Nm 3 dry)	<2.3878E-02	<2.4555E-02	<2.5204E-02	<2.4546E-02
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<3.2382E-02	<3.2352E-02	<3.3114E-02	<3.2616E-02
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/Nm³ dry)	<3.1488E-02	<3.2028E-02	<3.2107E-02	<3.1875E-02
E <sub>lb/hr</sub>	Rate (lb/hr)	<8.5152E-06	<8.5820E-06	<8.5558E-06	<8.5510E-06
E <sub>g/s</sub>	Rate (g/s)	<1.0727E-06	<1.0811E-06	<1.0778E-06	<1.0772E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<3.7296E-05	<3.7589E-05	<3.7474E-05	<3.7453E-05
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<2.7113E-08	<2.7089E-08	<2.7726E-08	<2.7309E-08
Prepared by Clea	Ration for based (Ib/MMB(u)	<2.7789E-08	<2.8266E-08	<2.8336E-08	<2.8130E-08
SS Metals-1 Vers	100 ZVVO-128				

QA/QC\_ Date \_

### USEPA Method 5/29 Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
Date (20	na)	Mar 17	Mar 17	Mar 17	
	ne (approx.)	06:33	09:15	11:56	
	ne (approx.)	08:42	11:24	14:07	
	•				
Process R <sub>P</sub>	s Conditions Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	6	6	5	6
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
Fc	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
	nditions			.,	·
O <sub>2</sub>	Oxygen (dry volume %)	10.6500	10.3500	10.3200	10.4400
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	9.2400
T <sub>e</sub>	Sample temperature (°F)	295.1200	295.7600	295.9200	295.6000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	19.9298
Gas Flo	Poto				
Q <sub>a</sub>	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
Q,	Volumetric flow rate, standard (scfm)	127,376	125,204	121,428	124,670
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,319	75,979	74,005	75,101
Q	Volumetric flow rate, actual (acf/hr)	11,192,801	11,011,232	10,681,426	10,961,820
Q,	Volumetric flow rate, standard (scf/hr)	7,642,587	7,512,242	7,285,695	7,480,175
Qetd	Volumetric flow rate, dry standard (dscf/hr)	6,128,377	6,006,302	5,833,655	5,989,444
Q,	Volumetric flow rate, actual (m 3/hr)	316,987	311,845	302,504	310,445
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	216,443	212,751	206,335	211,843
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m 3/hr)	173,559	170,102	165,213	169,625
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	127,984	129,106	125,752	127,614
$Q_{\epsilon}$	Volumetric flow rate, normal (Nm 3/hr)	201,685	198,245	192,267	197,399
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm 3/hr)	161,726	158,504	153,948	158,059
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,258	120,303	117,178	118,913
Samplin	g Data				
$V_{metd}$	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	77.2270
%1	Isokinetic sampling (%)	101.5932	100.8025	101.1112	101.1690
Laborate	ory Data				
$m_n$	Total matter corrected for allowable blanks (µg)	<0.2000	0.2333	0.2845	
Cadmiu	m Results - Total				
$C_{sd}$	Concentration (lb/dscf)	<5.5579E-12	6.6657E-12	8.3454E-12	<6.8563E-12
C <sub>sd7</sub>	Concentration @7% O 2 (lb/dscf)	<7.5370E-12	8.7822E-12	1.0964E-11	<9.0945E-12
C <sub>sd12</sub>	Concentration @12% CO 2 (lb/dscf)	<7.3291E-12	8.6943E-12	1.0631E-11	<8.8848E-12
Св	Concentration (lb/acf)	<3.0431E-12	3.6359E-12	4.5578E-12	<3.7456E-12
$C_{ed}$	Concentration (µg/dscm)	<8.9001E-02	1.0674E-01	1.3364E-01	<1.0979E-01
$C_{\rm sd7}$	Concentration @7% O <sub>2</sub> (µg/dscm)	<1.2069E-01	1.4064E-01	1.7558E-01	<1.4564E-01
C <sub>sd12</sub>	Concentration @12% CO 2 (µg/dscm)	<1.1736E-01	1.3923E-01	1.7024E-01	<1.4228E-01
$C_{ad}$	Concentration (mg/dscm)	<8.9001E-05	1.0674E-04	1.3364E-04	<1.0979E-04
C <sub>ed7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	<1.2069E-04	1.4064E-04	1.7558E-04	<1.4564E-04
$C_{ed12}$	Concentration @12% CO 2 (mg/dscm)	<1.1736E-04	1.3923E-04	1.7024E-04	<1.4228E-04
$C_a$	Concentration (µg/m <sup>3</sup> (actual,wet))	<4.8731E-02	5.8224E-02	7.2987E-02	<5.9981E-02
Ced	Concentration (µg/Nm <sup>3</sup> dry)	<9.5514E-02	1.1455E-01	1.4342E-01	<1.1783E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<1.2953E-01	1.5093E-01	1.8842E-01	<1.5629E-01
C <sub>ed12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	<1.2595E-01	1.4941E-01	1.8270E-01	<1.5269E-01
E <sub>lb/hr</sub>	Rate (lb/hr)	<3.4061E-05	4.0036E-05	4.8684E-05	<4.0927E-05
E <sub>g/s</sub>	Rate (g/s)	<4.2908E-06	5.0436E-06	6.1330E-06	<5.1558E-06
E <sub>T/yr</sub>	Rate (Ton/yr)	<1.4919E-04	1.7536E-04	2.1324E-04	<1.7926E-04
E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	<1.0845E-07	1.2637E-07	1.5777E-07	<1.3086E-07
Property by Cl SS Metals-1 Ve	aa <b>Re 1869 പ്രപ്രമുള്ള (ib/MMB</b> tu) arsion 2006-12a	<1.1116E-07	1.3186E-07	1.6124E-07	<1.3475E-07
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### USEPA Method 5/29 Lead (Pb) Emission Parameters

Run No	o.	1	2	3	Average
Date (2	009)	Mar 17	Mar 17	Mar 17	
-	me (approx.)	06:33	09:15	11:56	
	me (approx.)	08:42	11:24	14:07	
	s Conditions	_			
Re	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	184.0
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	315	315	315
P <sub>2</sub>	Carbon Feed rate (lb/hr)	6	6	5	6
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
	nditions	-,	-,	-,	,,,,,,
O <sub>2</sub>	Oxygen (dry volume %)	10.6500	10.3500	10.3200	10.4400
CO₂	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	9.2400
T <sub>s</sub>	Sample temperature (°F)	295.1200	295.7600	295.9200	295.6000
$B_w$	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	19.9298
Gas Flo	w Rate				
$Q_a$	Volumetric flow rate, actual (acfm)	186,547	183,521	178,024	182,697
$Q_s$	Volumetric flow rate, standard (scfm)	127,376	125,204	121,428	124,670
$Q_{std}$	Volumetric flow rate, dry standard (dscfm)	102,140	100,105	97,228	99,824
$Q_{std7}$	Volumetric flow rate, dry std@7%O 2 (dscfm)	75,319	75,979	74,005	75,101
$Q_a$	Volumetric flow rate, actual (acf/hr)	11,192,801	11,011,232	10,681,426	10,961,820
Q,	Volumetric flow rate, standard (scf/hr)	7,642,587	7,512,242	7,285,695	7,480,175
$\mathbf{Q}_{std}$	Volumetric flow rate, dry standard (dscf/hr)	6,128,377	6,006,302	5,833,655	5,989,444
Q <sub>s</sub>	Volumetric flow rate, actual (m 3/hr)	316,987	311,845	302,504	310,445
Q,	Volumetric flow rate, standard (m 3/hr)	216, <del>44</del> 3	212,751	206,335	211,843
$\mathbf{Q}_{std}$	Volumetric flow rate, dry standard (dry m 3/hr)	173,559	170,102	165,213	169,625
$Q_{std7}$	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	127,984	129,106	125,752	127,614
$Q_s$	Volumetric flow rate, normal (Nm 3/hr)	201,685	198,245	192,267	197,399
$Q_{\text{std}}$	Volumetric flow rate, dry normal (Nm 3/hr)	161,726	158,504	153,948	158,059
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	119,258	120,303	117,178	118,913
Samplin					
V <sub>mstd</sub>	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	77.2270
<b>%</b> l	Isokinetic sampling (%)	101.5932	100.8025	101.1112	101.1690
Laborate	ory Data				
m"	Total matter corrected for allowable blanks (µg)	0.6091	1.6247	1.0876	
	sults - Total				<b>-</b>
Ced	Concentration (lb/dscf)	1.6928E-11	4.6427E-11	3.1901E-11	3.1752E-11
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (lb/dscf)	2.2955E-11	6.1169E-11	4.1912E-11	4.2012E-11
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (lb/dscf)	2.2322E-11	6.0557E-11	4.0638E-11	4.1173E-11
C <sub>s</sub>	Concentration (lb/acf)	9.2683E-12	2.5325E-11	1.7423E-11	1.7339E-11
C <sub>sd</sub>	Concentration (µg/dscm)	2.7107E-01	7.4346E-01	5.1085E-01	5.0846E-01
C <sub>ad7</sub>	Concentration @7% O <sub>2</sub> (µg/dscm)	3.6760E-01	9.7954E-01	6.7116E-01	6.7277E-01
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/dscm)	3.5746E-01	9.6974E-01	6.5077E-01	6.5932E-01
C <sub>sd</sub>	Concentration (mg/dscm)	2.7107E-04	7.4346E-04	5.1085E-04	5.0846E-04
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (mg/dscm)	3.6760E-04 3.5746E-04	9.7954E-04	6.7116E-04	6.7277E-04
C <sub>sd12</sub>	Concentration @12% CO 2 (mg/dscm)		9.6974E-04	6.5077E-04	6.5932E-04
C <sub>a</sub>	Concentration (µg/m³ (actual,wet))	1.4842E-01	4.0554E-01	2.7900E-01	2.7765E-01
C <sub>sd</sub>	Concentration (µg/Nm <sup>3</sup> dry)	2.9091E-01	7.9786E-01 1.0512E+00	5.4823E-01 7.2027E-01	5.4567E-01
C <sub>sd7</sub>	Concentration @7% O <sub>2</sub> (µg/Nm³ dry)	3.9450E-01 3.8361E-01	1.0512E+00 1.0407E+00	6.9839E-01	7.2199E-01 7.0756E-01
C <sub>sd12</sub>	Concentration @12% CO <sub>2</sub> (µg/Nm <sup>3</sup> dry)	1.0374E-04	2.7885E-04	1.8610E-04	
E <sub>lb/hr</sub>	Rate (lb/hr)	1.3069E-05		2.3444E-05	1.8956E-04 2.3881E-05
E <sub>9/8</sub>	Rate (g/s) Rate (Ton/yr)	4.5437E-04	3.5129E-05 1.2214E-03	8.1512E-04	8.3029E-04
E <sub>T/yr</sub> E <sub>Fd</sub>	Rate - Fd-based (lb/MMBtu)	3.3031E-07	8.8019E-07	6.0309E-07	6.0453E-07
	rate - ru-based (Ib/MMBtu) ം <del>Ratio പര</del> യ്ക്കൾ(Ib/MMBtu)	3.3855E-07	9.1845E-07	6.0309E-07	6.2445E-07
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#### USEPA Method 13B (Total Fluorides) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (200	09)	Mar 16	Mar 16	Mar 16	
Start Tim	e (approx.)	07:20	09:30	11:20	
Stop Time	e (approx.)	00:00	10:47	12:41	
Sampline	g Conditions				
Yď	Dry gas meter correction factor	0.9937	0.9937	0.9937	
C <sub>p</sub>	Pitot tube coefficient	0.8250	0.8250	0.8250	
Pg	Static pressure (in. H 2O)	-13.0000	-11.4000	-10.8000	
A <sub>s</sub>	Sample location area (ft 2)	64.0000	64.0000	64.0000	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.20	30.20	30.20	30.2000
D <sub>n</sub>	Nozzle diameter (in.)	0.2720	0.2720	0.2720	
O <sub>2</sub>	Oxygen (dry volume %)	9.7400	11.0500	10.3200	10.3700
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.7800	8.4800	9.2600	9.1733
-	Nitrogen plus carbon monoxide (dry volume %)	80.4800	80.4700	80,4200	80.4567
Vk	Total Liquid collected (ml)	237.60	217.50	218.60	
V <sub>m</sub>	Volume metered, meter conditions (ft 3)	42.6500	42.9500	43.1150	
T <sub>m</sub>	Dry gas meter temperature (°F)	82.3600	88.7200	89.4400	
T,	Sample temperature (°F)	296.3600	294.1600	293.6000	294.7067
ΔΗ	Meter box orifice pressure drop (in. H 2O)	1.4420	1.4344	1.4492	
θ	Total sampling time (min)	62.5	62.5	62.5	
Flow Res	uilfo				
V <sub>watd</sub>	Volume of water collected (ft <sup>3</sup> )	11.1815	10.2356	10.2873	10.5681
V <sub>mstd</sub>	Volume metered, standard (dscf)	41.7748	41.5803	41.6868	41.6806
P <sub>a</sub>	Sample gas pressure, absolute (in. Hg)	29.2441	29.3618	29.4059	29.3373
P <sub>v</sub>	Vapor pressure, actual (in. Hg)	29.2441	29.3618	29.4059	29.3373
B <sub>wo</sub>	Moisture measured in sample (% by volume)	21.1145	19.7537	19.7932	20.2205
B <sub>wa</sub>	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
B <sub>w</sub>	Actual water vapor in gas (% by volume)	21.1145	19.7537	19.7932	20.2205
√∆P	Velocity head ( vin. H <sub>2</sub> O)	0.7353	0.7357	0.7349	0.7353
M <sub>d</sub>	MW of sample gas, dry (lb/lb-mole)	29.9544	29.7988	29.8944	29.8825
M <sub>s</sub>	MW of sample gas, wet (lb/lb-mole)	27.4303	27.4681	27.5401	27.4795
V,	Velocity of sample (ft/sec)	50.3544	50.1756	49.9977	50.1759
%i	Isokinetic sampling (%)	101.9192	99.3890	99.8229	100.3770
Q <sub>a</sub>	Volumetric flow rate, actual (acfm)	193,361	192,674	191,991	192,675
Q,	Volumetric flow rate, standard (scfm)	131,932	132,378	132,205	132,172
Q <sub>etd</sub>	Volumetric flow rate, dry standard (dscfm)	104,075	106,228	106,037	105,447
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	83,560	75,277	80,710	79,849
Q <sub>a</sub>	Volumetric flow rate, actual (acf/hr)	11,601,662	11,560,447	11,519,481	11,560,530
Q,	Volumetric flow rate, standard (scf/hr)	7,915,940	7,942,653	7,932,290	7,930,294
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	6,244,528	6,373,684	6,362,240	6,326,817
Q <sub>a</sub>	Volumetric flow rate, actual (m <sup>3</sup> /hr)	328,566	327,399	326,238	327,401
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	224,184	224,941	224,647	224,591
Q <sub>std</sub>	Volumetric flow rate, standard (dry m <sup>3</sup> /hr)	176,849	180,506	180,182	179,179
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m³/hr)	141,988	127,913	137,146	135,682
Q <sub>s</sub>	Volumetric flow rate, normal (Nm <sup>3</sup> /hr)	208,899	209,604	209,330	209,278
Q <sub>std</sub>	Volumetric flow rate, dry normal (Nm <sup>3</sup> /hr)	164,791	168,199	167,897	166,962
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm³/hr)	132,307	119,192	127,795	126,431
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Comments:

Average includes 3 runs.

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#### USEPA Method 13B HF Parameters

Run No	o.	1	2	3	Average
Date (2	-	Mar 16	Mar 16		
	me (approx.)	07:20	09:30		
Stop Ti	me (approx.)	00:00	10:47	12:41	
Proces	s Conditions				
$R_P$	Steam Production Rate (Klbs/hour)	184.2	184.0	184.4	184.2
P₁	Fabric Filter Inlet Temperature (°F)	315	315	315	315
$F_d$	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
Fc	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
O <sub>2</sub>	Oxygen (dry volume %)	9.7400	11.0500	10.3200	10.3700
CO2	Carbon dioxide (dry volume %)	9.7800	8.4800	9.2600	9.1733
Ts	Sample temperature (°F)	296.3600	294.1600	293.6000	294.7067
Bw	Actual water vapor in gas (% by volume)	21.1145	19.7537	19.7932	20.2205
Gas Flo	w Pata				
Q <sub>a</sub>	Volumetric flow rate, actual (acfm)	193,361	192,674	191,991	192,675
Q,	Volumetric flow rate, standard (scfm)	131,932	132,378	132,205	132,172
Q <sub>sld</sub>	Volumetric flow rate, dry standard (dscfm)	104,075	106,228	106,037	105,447
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dscfm)	83,560	75,277	80,710	79,849
Qa	Volumetric flow rate, actual (acf/hr)	11,601,662	11,560,447	11,519,481	11,560,530
Q,	Volumetric flow rate, standard (scf/hr)	7,915,940	7,942,653	7,932,290	7,930,294
Q <sub>std</sub>	Volumetric flow rate, dry standard (dscf/hr)	6,244,528	6,373,684	6,362,240	6,326,817
Q,	Volumetric flow rate, actual (m 3/hr)	328,566	327,399	326,238	327,401
Q,	Volumetric flow rate, standard (m <sup>3</sup> /hr)	224,184	224,941	224,647	224,591
Q <sub>std</sub>	Volumetric flow rate, dry standard (dry m <sup>3</sup> /hr)	176,849	180,506	180,182	179,179
Q <sub>std7</sub>	Volumetric flow rate, dry std@7%O 2 (dry m3/hr)	141,988	127,913	137,146	135,682
$Q_8$	Volumetric flow rate, normal (Nm 3/hr)	208,899	209,604	209,330	209,278
$Q_{std}$	Volumetric flow rate, dry normal (Nm 3/hr)	164,791	168,199	167,897	166,962
Q <sub>std7</sub>	Volumetric flow rate, dry normal @7%O 2 (Nm3/hr)	132,307	119,192	127,795	126,431
Samplin					
V <sub>mstd</sub>	Volume metered, standard (dscf)	41.7748	41.5803	41.6868	41.6806
%l	Isokinetic sampling (%)	101,9192	99.3890	99.8229	100.3770
			00.000	00.0220	
Laborat		-0.0004	.0.0055	-0.0050	
m <sub>n</sub>	Total HF collected (mg)	<0.0061	<0.0055	<0.0056	
Hydroge	en Fluoride (HF) Results				
$C_{sd}$	HF Concentration (lb/dscf)	<3.2448E-10	<2.8981E-10	<2.9642E-10	<3.0357E-10
C <sub>sd7</sub>	HF Concentration @7% O 2 (lb/dscf)	<4.0415E-10	<4.0897E-10	<3.8944E-10	<4.0085E-10
C <sub>sd12</sub>	HF Concentration @12% CO <sub>2</sub> (lb/dscf)	<3.9813E-10	<4.1011E-10	<3.8413E-10	<3.9746E-10
$C_a$	HF Concentration (lb/acf)	<1.7465E-10	<1.5978E-10	<1.6372E-10	<1.6605E-10
$C_{sd}$	HF Concentration (ppmdv)	<0.0063	<0.0056	<0.0057	<0.0058
C <sub>sd7</sub>	HF Concentration @7% O <sub>2</sub> (ppmdv)	<0.0078	<0.0079	<0.0075	<0.0077
C <sub>sd12</sub>	HF Concentration @12% CO 2 (ppmdv)	<0.0077	<0.0079	<0.0074	<0.0077
Cw	HF Concentration (ppmwv)	<0.0049	<0.0045	<0.0046	<0.0047
$C_{sd}$	HF Concentration (mg/dscm)	< 0.0052	<0.0046	<0.0047	<0.0049
C <sub>sd7</sub>	HF Concentration @7% O <sub>2</sub> (mg/dscm)	<0.0065	<0.0065	<0.0062	<0.0064
C <sub>sd12</sub>	HF Concentration @12% CO 2 (mg/dscm)	<0.0064	<0.0066	<0.0062	<0.0064
C <sub>a</sub>	HF Concentration (mg/m <sup>3</sup> (actual,wet))	<0.0028	<0.0026	<0.0026	<0.0027
C <sub>sd</sub>	HF Concentration (mg/Nm <sup>3</sup> dry)	<0.0056	<0.0050	<0.0051	<0.0052
C <sub>sd7</sub>	HF Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	<0.0069	<0.0070	<0.0067	<0.0069
C <sub>sd12</sub>	HF Concentration @12% CO <sub>2</sub> (mg/Nm <sup>3</sup> dry)	<0.0068	<0.0070	<0.0066	<0.0068
Elphr	HF Rate (lb/hr)	<0.0020	<0.0018	<0.0019	<0.0019
E <sub>kg/hr</sub>	HF Rate (kg/hr)	<0.0009	<0.0008	<0.0009	<0.0009
E <sub>T/yr</sub>	HF Rate (Ton/yr)	<0.0089	<0.0081	<0.0083	<0.0084
E <sub>Fd</sub>	HF Rate - Fd-based (lb/MMBtu)	<0.0000058	<0.0000059	<0.0000056	<0.0000058
E <sub>Fo</sub>	HF Rate - Fc-based (lb/MMBtu)	<0.000060	<0.0000062	<0.0000058	<0.0000060

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Unit 3 SDA Inlet

## USEPA Method 26A (HCI) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
Start Tin	ne (approx.)	06:56	09:13	10:40	
Stop Tim	ne (approx.)	07:56	10:13	11:40	
Samplin	g Conditions				
$Y_d$	Dry gas meter correction factor	0.9992	0.9992	0.9992	
$P_{g}$	Static pressure (in. H <sub>2</sub> O)	-1.2000	-1.2000	-1.2000	
$A_s$	Sample location area (ft²)	60.1320	60.1320	60.1320	
$P_{bar}$	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
O <sub>2</sub>	Oxygen (dry volume %)	9.7500	9.7300	9.7100	9.7300
CO2	Carbon dioxide (dry volume %)	9.7900	10.0600	9.8400	9.8967
N₂+CC	Nitrogen plus carbon monoxide (dry volume %)	80.4600	80.2100	80.4500	80.3733
$V_{lc}$	Total Liquid collected (ml)	131.60	130.00	141.30	
$V_{m}$	Volume metered, meter conditions (ft3)	32.1000	33.5800	33.7400	
$T_{m}$	Dry gas meter temperature (°F)	72.7917	77.7083	78.9583	
$T_s$	Sample temperature (°F)	486.6667	494.0000	488.9167	489.8611
ΔΗ	Meter box orifice pressure drop (in. H₂O)	0.9992	1.0817	1.1150	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Re	sults				
$V_{wstd}$	Volume of water collected (ft <sup>3</sup> )	6.1931	6.1178	6.6496	6.3202
$V_{mstd}$	Volume metered, standard (dscf)	32.0423	33.2198	33.3034	32.8552
$P_s$	Sample gas pressure, absolute (in. Hg)	30.0118	30.0118	30.0118	30.0118
$P_v$	Vapor pressure, actual (in. Hg)	30.0118	30.0118	30.0118	30.0118
$B_{wo}$	Moisture measured in sample (% by volume)	16.1973	15.5520	16.6435	16.1309
$B_{ws}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	16.1973	15.5520	16.6435	16.1309
$M_d$	MW of sample gas, dry (lb/lb-mole)	29.9564	29.9988	29.9628	29.9727
$M_s$	MW of sample gas, wet (lb/lb-mole)	28.0198	28.1327	27.9718	28.0414

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 3 SDA Inlet

## USEPA Method 26A HCI Parameters

Run No	o.	1	2	3	Average
Date (2	009)	Mar 18	Mar 18	Mar 18	
Start Tir	me (approx.)	06:56	09:13	10:40	
Stop Tir	ne (approx.)	07:56	10:13	11:40	
Proces	s Conditions				
$R_P$	Steam Production Rate (Klbs/hour)	184.1	184.2	183.9	184.1
$P_1$	Fabric Filter Inlet Temperature (°F)	315	305	305	308
$F_d$	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
Fc	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Co	nditions				
$O_2$	Oxygen (dry volume %)	9.7500	9.7300	9.7100	9.7300
CO2	Carbon dioxide (dry volume %)	9.7900	10.0600	9.8400	9.8967
$T_s$	Sample temperature (°F)	486.6667	494.0000	488.9167	489.8611
$B_w$	Actual water vapor in gas (% by volume)	16.1973	15.5520	16.6435	16.1309
Samplin	ng Data				
$V_{mstd}$	Volume metered, standard (dscf)	32.0423	33.2198	33.3034	32.8552
Laborat	ory Data				
$m_n$	Total HCl collected (mg)	617.4202	601.5257	646.3785	
Hydroge	en Chloride (HCI) Results				
$C_{\sf sd}$	HCI Concentration (lb/dscf)	4.2488E-05	3.9927E-05	4.2796E-05	4.1737E-05
$C_{\sf sd7}$	HCI Concentration @7% O₂ (lb/dscf)	5.2967E-05	4.9685E-05	5.3161E-05	5.1938E-05
$C_{sd12}$	HCl Concentration @12% CO₂ (lb/dscf)	5.2079E-05	4.7626E-05	5.2191E-05	5.0632E-05
$C_{\sf sd}$	HCI Concentration (ppmdv)	449.2078	422.1308	452.4687	441.2691
$C_{sd7}$	HCl Concentration @7% O₂ (ppmdv)	559.9990	525.3015	562.0478	549.1161
$C_{sd12}$	HCl Concentration @12% CO₂ (ppmdv)	550.6122	503.5358	551.7911	535.3130
$C_{w}$	HCl Concentration (ppmwv)	376.4484	356.4809	377.1620	370.0304
$C_{\sf sd}$	HCI Concentration (mg/dscm)	680.3849	639.3732	685.3240	668.3607
$C_{\sf sd7}$	HCl Concentration @7% O <sub>2</sub> (mg/dscm)	848.1928	795.6390	851.2961	831.7093
$C_{sd12}$	HCl Concentration @12% CO₂ (mg/dscm)	833.9754	762.6718	835.7609	810.8027
$C_{\sf sd}$	HCl Concentration (mg/Nm³ dry)	730.1692	686.1566	735.4696	717.2651
$C_{\sf sd7}$	HCl Concentration @7% O <sub>2</sub> (mg/Nm <sup>3</sup> dry)	910.2557	853.8564	913.5860	892.5661
$C_{sd12}$	HCl Concentration @12% CO₂ (mg/Nm³ dry)	894.9980	818.4770	896.9142	870.1297
$\mathbf{E}_{Fd}$	HCl Rate - Fd-based (lb/MMBtu)	0.7622	0.7149	0.7650	0.7474
$E_Fc$	HCl Rate - Fc-based (lb/MMBtu)	0.7899	0.7223	0.7916	0.7679

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Unit 3 FF Outlet

## EPA Modified Method 26A (HCI) Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (20	09)	Mar 18	Mar 18	Mar 18	
-	e (approx.)	06:56	09:13	10:40	
	e (approx.)	07:56	10:13	11:40	
Samplin	g Conditions				
Yd	Dry gas meter correction factor	0.9937	0.9937	0.9937	
$P_{g}$	Static pressure (in. H <sub>2</sub> O)	-10.6000	-10.5000	-10.4000	
A <sub>s</sub>	Sample location area (ft²)	64.0000	64.0000	64.0000	
P <sub>bar</sub>	Barometric pressure (in. Hg)	30.10	30.10	30.10	30.1000
O <sub>2</sub>	Oxygen (dry volume %)	10.2800	9.8500	9.7300	9.9533
CO₂	Carbon dioxide (dry volume %)	9.4000	9.7600	9.9300	9.6967
N <sub>2</sub> +CO	Nitrogen plus carbon monoxide (dry volume %)	80.3200	80.3900	80.3400	80.3500
$V_{ic}$	Total Liquid collected (ml)	210.90	245.50	236.50	
$V_{m}$	Volume metered, meter conditions (ft <sup>3</sup> )	41.8900	41.8200	41.6400	
$T_{m}$	Dry gas meter temperature (°F)	75.3333	76.791 <b>7</b>	79.1250	
$T_s$	Sample temperature (°F)	292.4167	285.7500	283.5833	287.2500
$\Delta H$	Meter box orifice pressure drop (in. H <sub>2</sub> O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Res	sults				
$V_{wstd}$	Volume of water collected (ft <sup>3</sup> )	9.9250	11.5532	11.1297	10.8693
$V_{mstd}$	Volume metered, standard (dscf)	41.4376	41.2560	40.9006	41.1981
$P_s$	Sample gas pressure, absolute (in. Hg)	29.3206	29.3279	29.3353	29.3279
$P_{v}$	Vapor pressure, actual (in. Hg)	29.3206	29.3279	29.3353	29.3279
$B_{wo}$	Moisture measured in sample (% by volume)	19.3233	21.8773	21.3908	20.8638
$B_{ws}$	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000
$B_w$	Actual water vapor in gas (% by volume)	19.3233	21.8773	21.3908	20.8638
$M_d$	MW of sample gas, dry (lb/lb-mole)	29.9152	29.9556	29.9780	29.9496
$M_{s}$	MW of sample gas, wet (lb/lb-mole)	27.6128	27.3400	27.4158	27.4562

Comments:

Average includes 3 runs.

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_ Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 3 FF Outlet

## **EPA Modified Method 26A HCI Parameters**

Run No	) <b>.</b>	1	2	3	Average
Date (2	009)	Mar 18	Mar 18	Mar 18	
Start Ti	me (approx.)	06:56	09:13	10:40	
Stop Tir	ne (approx.)	07:56	10:13	11:40	
Proces	s Conditions				
R <sub>P</sub>	Steam Production Rate (Klbs/hour)	184.1	184.2	183.9	184,1
P <sub>1</sub>	Fabric Filter Inlet Temperature (°F)	315	305	305	308
F <sub>d</sub>	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F <sub>c</sub>	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Сар	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
-	nditions				•
O <sub>2</sub>	Oxygen (dry volume %)	10.2800	9.8500	9.7300	9.9533
CO <sub>2</sub>	Carbon dioxide (dry volume %)	9.4000	9.7600	9.9300	9.6967
T <sub>s</sub>	Sample temperature (°F)	292,4167	285.7500	283.5833	287.2500
B <sub>w</sub>	Actual water vapor in gas (% by volume)	19.3233	21.8773	21.3908	20,8638
Samplir					
V <sub>mstd</sub>	Volume metered, standard (dscf)	41.4376	41.2560	40.9006	41.1981
	, ,	41.4570	41.2000	40.3000	41.1301
	ory Data				
$m_n$	Total HCl collected (mg)	41.0379	22.1246	34.7200	
Hydroge	en Chloride (HCI) Results				
$C_{\sf sd}$	HCI Concentration (lb/dscf)	2.1837E-06	1.1825E-06	1.8718E-06	1.7460E-06
$C_{\sf sd7}$	HCI Concentration @7% O <sub>2</sub> (lb/dscf)	2.8582E-06	1.4875E-06	2.3293E-06	2.2250E-06
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (lb/dscf)	2.7877E-06	1.4539E-06	2.2620E-06	2.1679E-06
$\mathbf{C}_{sd}$	HCI Concentration (ppmdv)	23.0877	12.5020	19.7897	18.4598
$\mathbf{C}_{sd7}$	HCl Concentration @7% O <sub>2</sub> (ppmdv)	30.2184	15.7265	24.6264	23.5238
$C_{sd12}$	HCl Concentration @12% CO <sub>2</sub> (ppmdv)	29.4737	15.3713	23.9151	22.9200
$C_w$	HCl Concentration (ppmwv)	18.6264	9.7669	15.5565	14.6499
$C_{\sf sd}$	HCl Concentration (mg/dscm)	34.9694	18.9359	29.9 <b>7</b> 42	27.9598
$C_{sd7}$	HCl Concentration @7% O <sub>2</sub> (mg/dscm)	45.7697	23.8198	37.3000	35. <b>6299</b>
$C_{\sf sd12}$	HCl Concentration @12% CO₂ (mg/dscm)	44.6418	23.2819	36.2226	34.7154
$C_{sd}$	HCl Concentration (mg/Nm³ dry)	37.5281	20.3215	32.1674	30.0057
$C_{\sf sd7}$	HCl Concentration @7% O₂ (mg/Nm³ dry)	49.1188	25.5627	40.0293	38.2369
$C_{sd12}$	HCl Concentration @12% CO₂ (mg/Nm³ dry)	47.9083	24.9854	38.8730	37.2556
$E_{Fd}$	HCl Rate - Fd-based (lb/MMBtu)	0.0411	0.0214	0.0335	0.0320
$E_Fc$	HCl Rate - Fc-based (lb/MMBtu)	0.0423	0.0221	0.0343	0.0329

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QA/QC\_\_ Date \_\_\_\_ Wheelabrator North Broward, Inc. CleanAir Project No. 10735 Lime Silo

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#### **Visible Emission Parameters**

Run

Date (2009) Mar 18 Start Time 9:30

Time		Time	(sec)	
(min)	15	30	45	60
0	0	0	_0	0
1	0	0	0	0
2 3	0	0	0	ő
4	ő	ŏ	0 0 0	o l
5	0	0	0	0
6	0	0	0	0
7 8	0 0 0 0 0 0	0	0	0
9	0	ő	0	ő
10	Ö	0	Ö	0
11	0	0	0	0
12	0	0	0	0
13 14	0	0	0	ŏ
15	ő	0	ŏ	ŏ
16	0 0	0	0	0 0 0
17	0	0	0	0
18 19	0	0		0
20	0	ŏ	ő	0
21	0	0	0 0 0	0
22	0	0	0	0
23 24	0	0	0	0
25	ŏ	0	0	ŏ
26	0	0	0	0
27	0 0 0 0	0	0 0 0 0 0 0 0 0 0	0
28 29	0	0	0	0
30	0	0	Ö	ŏ
31	Ō	Ō	0	0
32	0000000	0	0	0
33 34	0	0 0	0	0
35	0	0	Ô	ŏ
36	ŏ	0	ŏ	0
37	0	0	0 0 0 0 0	0
38	0	0	0	0
39 40	Ü	0	0	0
41	0 0	0	ŏ	ŏ
42	0	0	0	0
43	0 0 0 0 0	0	0 0 0	ō i
44	0	0 0 0 0	0	0
45 46	0	0	n	0 0 0
47	ŏ	ŏ	ō	ŏ
48	0	0	0	0 I
49	0	0	0	0
50 51	0	0	0	0
51 52	0	Ö	Ö	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56 57	0	0	0	0
58	ő	ŏ	ŏ	ŏ
59	ŏ	ŏ	ŏ	ō

Time		Time	(sec)	
(min)	15	30	45	60
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 19 21 22 22 24 25 26 27 28 29 29 29 29 29 29 29 29 29 29 29 29 29				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Average Opacity

Minimum Reading

Maximum Reading 0

No. of Readings >5% 0

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CleanAir Project No: 10735-4

QA/QC DATA

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Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 1 SDA Inlet

## USEPA Method 29 (Mercury) QA/QC Results

Run No	) <b>.</b>	1	2	3	
Date (20	009)	Mar 18	Mar 18	Mar 18	
Start Tir	me (approx.)	06:41	09:19	12:12	
Stop Tin	me (approx.)	08:52	11:30	14:22	
Total Du	uration of Test Run (min.)	131	131	130	
Net San	npling Time (min.)	120	120	120	
Samplin	ng System Calibration Summary				
	Nozzle ID No:	275-1	275-1	275-1	
$D_n$	Nozzle Diameter (in):	0.275	0.275	0.275	
	Probe ID No:	67-10-5	67-10-5	67-10-5	
$C_p$	Pitot Coefficient:	0.8200	0.8200	0.8200	
-μ					
.,	Meter Box ID. No:	61-8	61-8	61-8	
$Y_d$	Meter Box Yd - Field Sheet	1.0079	1.0079	1.0079	
	Meter Box Yd - Database	1.0079	1.0079	1.0079	
	Meter Box ΔH@ - Field Sheet	1.7934	1.7934	1.7934	
	Meter Box ΔH@ - Database	1.7934	1.7934	1.7934	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0232	0.0230	0.0231	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0010	0.0010	0.0020	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	69.410	69.313	69.732	
	Alternative Method 5 Post-Test Calibration (EPA A	LT-009)			
√∆H <sub>avg</sub>	Average of Square Root of $\Delta H$ (in. W.C.)	1.0196	1.0084	1.0120	
$Y_{q_B}$	Alternative Meter Calibration Factor	0.9740	0.9663	0.9646	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	-3.4%	-4.1%	-4.3%	-3.9%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%1	Actual Variation (%)	103.96	106.45	106.08	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	1	0	0	
	Number of points >110%	2	2	0	
	Number of points <80%	0	0	0	
	Number of points >120%	1	0	0	

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Unit 1 FF Outlet

## USEPA Method 5/29 (Particulate/Metals) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 18	Mar 18	Mar 18	
Start Tir	ne (approx.)	06:41	09:19	12:12	
Stop Tir	ne (approx.)	08:52	11:30	14:22	
Total Du	uration of Test Run (min.)	131	131	130	
Net San	npling Time (min.)	125	125	125	
Samplit	ng System Calibration Summary				
	Nozzle ID No:	268-1	268-1	268-1	
$D_n$	Nozzle Diameter (in):	0.268	0.268	0.268	
	Probe ID No:	67-8-4	67-8-4	67-8-4	
C <sub>p</sub>	Pitot Coefficient:	0.8120	0.8120	0.8120	
r	Meter Box ID. No:	61-7	61-7	61-7	
$Y_d$	Meter Box Yd - Field Sheet	0.9886	0.9886	0.9886	
• 0	Meter Box Yd - Database	0.9886	0.9886	0.9886	
	Meter Box ΔH@ - Field Sheet	1.7796	1.7796	1.7796	
	Meter Box ΔH@ - Database	1.7796	1.7796	1.7796	
	•				
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0224	0.0223	0.0222	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0030	0.0030	0.0040	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	68.757	67.601	67.882	
	Alternative Method 5 Post-Test Calibration (EPA A	LT-009)			
√∆H <sub>avg</sub>	Average of Square Root of $\Delta H$ (in. W.C.)	1.0120	0.9987	1.0015	
$Y_{qa}$	Alternative Meter Calibration Factor	1.0014	0.9984	1.0002	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	1.3%	1.0%	1.2%	1.1%
	Mean   sokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	100.00	100.02	101.07	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	0	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

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Unit 1 FF Outlet

## USEPA Method 13B (Total Fluorides) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 18	Mar 18	Mar 18	
Start Tir	me (approx.)	06:38	08:06	09:47	
Stop Tin	ne (approx.)	07:50	09:21	11:00	
	ration of Test Run (min.)	72	75	73	
Net San	npling Time (min.)	63	63	63	
Samplin	ng System Calibration Summary				
	Nozzle ID No:	272-1	272-1	272-1	
$D_n$	Nozzle Diameter (in):	0.272	0.272	0.272	
<b>⊷</b> n	Nozzie Biameter (iii).	0.212	0.212	0.272	
	Probe ID No:	67-8-7	67-8-7	67-8-7	
$C_p$	Pitot Coefficient:	0.8250	0.8250	0.8250	
	Meter Box ID. No:	66-6	66-6	66-6	
$Y_d$	Meter Box Yd - Field Sheet	0.9916	0.9916	0.9916	
	Meter Box Yd - Database	0.9916	0.9916	0.9916	
	Meter Box ΔH@ - Field Sheet	1.8053	1.8053	1.8053	
	Meter Box ΔH@ - Database	1.8053	1.8053	1.8053	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0242	0.0245	0.0246	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0010	0.0030	0.0010	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	37.647	37.756	37.691	
	Alternative Method 5 Post-Test Calibration (EPA A	LT-009)			
√∆H <sub>avg</sub>	Average of Square Root of ΔH (in. W.C.)	1.1062	1.1192	1.1313	
$Y_{qa}$	Alternative Meter Calibration Factor	1.0001	1.0045	1.0152	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	0.9%	1.3%	2.4%	1.5%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
<b>%</b> I	Actual Variation (%)	99.92	99.58	99.39	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	2	1	2	
	Number of points >110%	1	0	0	
	Number of points <80%	1	0	0	
	Number of points >120%	1	0	0	

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Unit 1 FF Outlet

## USEPA Method 23 (PCDD/F) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 16	Mar 17	Mar 17	
	ne (approx.)	11:07	06:08	10:54	
	ne (approx.)	15:32	10:27	15:18	
Total Du	uration of Test Run (min.)	265	259	264	
Net San	npling Time (min.)	250	250	250	
Samplin	ng System Calibration Summary				
	Nozzle ID No:	266-1	266-1	266-1	
$D_n$	Nozzle Diameter (in):	0.266	0.266	0.266	
	Probe ID No:	67-8-17	67-8-17	67-8-17	
C <sub>p</sub>	Pitot Coefficient:	0.8330	0.8330	0.8330	
r	Meter Box ID. No:	66-6	66-6	66-6	
$Y_d$	Meter Box Yd - Field Sheet	0.9916	0.9916	0.9916	
٠.۵	Meter Box Yd - Database	0.9916	0.9916	0.9916	
	Meter Box ∆H@ - Field Sheet	1.8053	1.8053	1.8053	
	Meter Box ∆H@ - Database	1.8053	1.8053	1.8053	
QA/QC					
	Final Look Chook				
	Final Leak Check (a) 4% of Sampling Rate (cfm)	0.0235	0.0235	0.0231	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0030	0.0020	0800.0	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	142.320	144.128	138.822	
	Alternative Method 5 Post-Test Calibration (EPA A	ALT-009)			
√∆H <sub>avg</sub>		1.0563	1.0657	1.0403	
Y <sub>qa</sub>	Alternative Meter Calibration Factor	0.9984	0.9995	1.0032	Average
40	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	0.7%	0.8%	1.2%	0.9%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%l	Actual Variation (%)	99.66	99.11	98.36	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	0	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

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#### USEPA Method 29 (Mercury) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 16	Mar 16	Mar 16	
Start Tin	ne (approx.)	06:58	09:58	12:45	
•	ne (approx.)	09:20	12:09	14:59	
	ıration of Test Run (min.)	142	131	134	
Net Sam	npling Time (min.)	120	120	120	
Samplin	ng System Calibration Summary				
Odingin					
	Nozzle ID No:	275-1	275-1	275-1	
$D_n$	Nozzłe Diameter (in):	0.275	0.275	0.275	
	Probe ID No:	67-10-5	67-10-5	67-10-5	
$C_p$	Pitot Coefficient:	0.8200	0.8200	0.8200	
	Meter Box ID. No:	61-8	61-8	61-8	
$Y_d$	Meter Box Yd - Field Sheet	1.0079	1.0079	1.0079	
	Meter Box Yd - Database	1.0079	1.0079	1.0079	
	Meter Box ∆H@ - Field Sheet	1.7934	1.7934	1.7934	
	Meter Box ∆H@ - Database	1.7934	1.7934	1.7934	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0246	0.0250	0.0250	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0010	0.0010	0.0010	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	72.688	72.636	73.317	
	Alternative Method 5 Post-Test Calibration (EPA	<u> ALT-009</u> )		•	
√∆H <sub>avg</sub>	Average of Square Root of ΔH (in. W.C.)	1.0983	1.0973	1.0953	
$Y_{qa}$	Alternative Meter Calibration Factor	0.9923	0.9844	0.9774	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	-1.5%	-2.3%	-3.0%	-2.3%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%1	Actual Variation (%)	102.08	102.95	104.43	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	0	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

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QA/QC \_\_\_\_\_

Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 2 FF Outlet

## USEPA Method 5/29 (Particulate/Metals) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 16	Mar 16	Mar 16	
	ne (approx.)	06:56	09:58	12:45	
	ne (approx.)	09:20	12:09	14:59	
Total Du	ration of Test Run (min.)	144	131	134	
Net Sam	npling Time (min.)	125	125	125	
Samplin	ng System Calibration Summary				
	Nozzie ID No:	268-1	268-1	268-1	
$D_n$	Nozzle Diameter (in);	0.268	0.268	0.268	
	Probe ID No:	67-8-4	67-8-4	67-8-4	
$C_p$	Pitot Coefficient:	0.8120	0.8120	0.8120	
	Meter Box ID. No:	66-11	66-11	66-11	
$Y_d$	Meter Box Yd - Field Sheet	0.9897	0.9897	0.9897	
	Meter Box Yd - Database	0.9897	0.9897	0.9897	
	Meter Box ∆H@ - Field Sheet	1.8958	1.8958	1.8958	
	Meter Box ∆H@ - Database	1.8958	1.8958	1.8958	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0246	0.0242	0.0247	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0030	0.0030	0.0020	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	74.275	73.052	74.632	
	Alternative Method 5 Post-Test Calibration (EPA A				
√∆H <sub>avg</sub>	Average of Square Root of $\Delta H$ (in. W.C.)	1.1224	1.1135	1.1264	
$Y_{qa}$	Alternative Meter Calibration Factor	0.9897	0.9977	0.9874	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	0.0%	0.8%	-0.2%	0.2%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
<b>%</b> I	Actual Variation (%)	100.75	98.71	100.49	
	Point-by-Point Isokinetic Variation	•	•	•	
	Number of points <90%	0	2	0	
	Number of points >110%	1	1	0	
	Number of points <80% Number of points >120%	0 0	0 0	0 0	
	Number of points > 120%	U	U	U	

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_

Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 2 FF Outlet

#### USEPA Method 13B (Total Fluorides) QA/QC Results

Run No	) <b>.</b>	1	2	3	
Date (20	009)	Mar 17	Mar 17	Mar 17	
	ne (approx.)	11:43	13:15	14:40	
Stop Tin	ne (approx.)	12:55	14:27	15:49	
Total Du	uration of Test Run (min.)	72	72	69	
Net San	npling Time (min.)	63	63	63	
C	Sundaya Calllandia a Sayrana				
Sampur	ng System Calibration Summary				
	Nozzle ID No:	272-1	272-1	272-1	
$D_n$	Nozzle Diameter (in):	0.272	0.272	0.272	
	Probe ID No:	67-8-7	67-8-7	67-8-7	
$C_p$	Pitot Coefficient:	0.8250	0.8250	0.8250	
	Meter Box ID. No:	66-7	66-7	66-7	
$Y_d$	Meter Box Yd - Field Sheet	1.0028	1.0028	1.0028	
	Meter Box Yd - Database	1.0028	1.0028	1.0028	
	Meter Box ∆H@ - Field Sheet	1.7673	1.7673	1.7673	
	Meter Box ∆H@ - Database	1.7673	1.7673	1.7673	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0270	0.0265	0.0264	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0020	0.0020	0.0020	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	41.113	40.378	40.451	
	Alternative Method 5 Post-Test Calibration (EPA A	LT-009)			
√∆H <sub>avg</sub>	Average of Square Root of $\Delta H$ (in. W.C.)	1.1956	1.1659	1.1583	
$Y_{qa}$	Alternative Meter Calibration Factor	0.9968	0.9886	0.9838	<b>Average</b>
·	Variation from full-test $Y_d$ (average $\leq \pm 5\%$ )	-0.6%	-1.4%	-1.9%	-1.3%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%l	Actual Variation (%)	100.55	102.44	101.62	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	1	0	1	
	Number of points >110%	1	0	1	
	Number of points <80%	0	0	0	
	Number of points >120%	1	0	0	

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QA/QC \_\_\_\_\_

Unit 3 SDA Inlet

## USEPA Method 29 (Mercury) QA/QC Results

Run No.		1	2	3	
Date (20	09)	Mar 17	Mar 17	Mar 17	
Start Tim	ne (approx.)	06:33	09:15	11:56	
	e (approx.)	08:42	11:24	14:07	
	ration of Test Run (min.)	129	129	131	
Net Sam	pling Time (min.)	120	120	120	
<u>Samplin</u>	g System Calibration Summary				
	Nozzle ID No:	275-1	275-1	275-1	
$D_n$	Nozzle Diameter (in):	0.275	0.275	0.275	
	Probe ID No:	67-10-5	67-10-5	67-10-5	
$C_p$	Pitot Coefficient:	0.8200	0.8200	0.8200	
,	Mater Pay ID No.	66.16	66-16	66-16	
$Y_d$	Meter Box ID. No: Meter Box Yd - Field Sheet	66-16 0.9992	0.9992	0.9992	
T d	Meter Box Yd - Pield Sneet	0.9992	0.9992	0.9992	
	Meter Box ΔH@ - Field Sheet	1.7371	1.7371	1.7371	
	Meter Box ΔH@ - Database	1.7371	1.7371	1.7371	
QA/QC					
WAIGE					
	Final Leak Check	0.0055	0.0050	0.0050	
	(a) 4% of Sampling Rate (cfm)	0.0255 0.0200	0.0253 0.0200	0.0253 0.0200	
	(b) Allowable Rate from Method (cfm) Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0200	0.0010	0.0200	
	Sample Volume	0.0010	0.0010	0.0010	
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	74.140	71.872	72.153	
	Alternative Method 5 Post-Test Calibration (EPA	ALT-009)			
√∆H <sub>avg</sub>	Average of Square Root of ΔH (in. W.C.)	1.1419	1.1192	1.1209	
Y <sub>qa</sub>	Alternative Meter Calibration Factor	1.0180	1.0166	1.0166	Average
·	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	1.9%	1.7%	1.7%	1.8%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
<b>%</b> I	Actual Variation (%)	98.34	96.86	98.33	
	Point-by-Point Isokinetic Variation Number of points <90%	0	0	0	
	Number of points <90% Number of points >110%	0	1	0	
	Number of points <80%	0	Ó	Ö	
	Number of points >120%	0	ŏ	Ö	
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QA/QC \_\_\_\_\_ Date \_\_\_\_

Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 3 FF Outlet

## USEPA Method 5/29 (Particulate/Metals) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 17	Mar 17	Mar 17	
Start Tir	me (approx.)	06:33	09:15	11:56	
•	ne (approx.)	08:42	11:24	14:07	
	uration of Test Run (min.)	129	129	131	
Net San	npling Time (min.)	125	125	125	
Sampiii	ng System Calibration Summary				
	Nozzle ID No:	268-1	268-1	268-1	
$D_n$	Nozzle Diameter (in):	0.268	0.268	0.268	
	Probe ID No:	67-8-4	67-8-4	67-8-4	
$C_p$	Pitot Coefficient:	0.8120	0.8120	0.8120	
	Meter Box ID. No:	66-22	66-22	66-22	
$Y_d$	Meter Box Yd - Field Sheet	0.9937	0.9937	0.9937	
	Meter Box Yd - Database	0.9937	0.9937	0.9937	
	Meter Box ∆H@ - Field Sheet	1.7498	1.7498	1.7498	
	Meter Box ∆H@ - Database	1.7498	1.7498	1.7498	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0259	0.0258	0.0252	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0020	0.0020	0.0030	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	79.347	77.161	75.173	
	Alternative Method 5 Post-Test Calibration (EPA A	<u>(LT-009)</u>			
√∆H <sub>avg</sub>	Average of Square Root of ΔH (in. W.C.)	1.1290	1.1142	1.0919	•
$Y_{qa}$	Alternative Meter Calibration Factor	0.9800	0.9825	0.9871	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	-1.4%	<b>-1</b> .1%	-0.7%	-1.1%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
<b>%</b> I	Actual Variation (%)	101.59	100.80	101.11	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	2	0	1	
	Number of points >110%	2	0	1	
	Number of points <80%	0	0	0	
	Number of points >120%	2	0	0	

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QA/QC\_ Date\_ Wheelabrator South Broward, Inc. Clean Air Project No: 10735 Unit 3 FF Outlet

## USEPA Method 13B (Total Fluorides) QA/QC Results

Run No		1	2	3	
Date (20	009)	Mar 16	Mar 16	Mar 16	
	ne (approx.)	07:20	09:30	11:20	
Stop Tin	ne (approx.)	00:00	10:47	12:41	
Total Du	ration of Test Run (min.)	1000	77	81	
Net Sam	apling Time (min.)	63	63	63	
Samplin	g System Calibration Summary				
	Nozzle ID No:	272-1	272-1	272-1	
Dn	Nozzle Diameter (in):	0.272	0.272	0.272	
	Probe ID No:	67-8-7	67-8-7	67-8-7	
$C^b$	Pitot Coefficient:	0.8250	0.8250	0.8250	
	Meter Box ID. No:	66-22	66-22	66-22	
$Y_d$	Meter Box Yd - Field Sheet	0.9937	0.9937	0.9937	
	Meter Box Yd - Database	0.9937	0.9937	0.9937	
	Meter Box △H@ - Field Sheet	1.7498	1.7498	1.7498	
	Meter Box ∆H@ - Database	1.7498	1.7498	1.7498	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0273	0.0275	0.0276	
	(b) Allowable Rate from Method (cfm)	0.0200	0.0200	0.0200	
	Allowable Limit - minimum of a and b (cfm)	0.0200	0.0200	0.0200	
	Actual Final Leak Rate (cfm)	0.0010	0.0070	0.0010	
	Sample Volume				
	Minimum Volume Required (dscf)	30.00	30.00	30.00	
$V_{mstd}$	Actual Sample Volume (dscf)	41.775	41.580	41.687	
	Alternative Method 5 Post-Test Calibration (EPA A				
√∆H <sub>avg</sub>	Average of Square Root of $\Delta H$ (in. W.C.)	1.1947	1.1930	1.1970	
$Y_{qa}$	Alternative Meter Calibration Factor	0.9832	0.9833	0.9818	Average
	Variation from full-test Y <sub>d</sub> (average ≤ ±5%)	-1.1%	-1.0%	-1.2%	-1.1%
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
<b>%</b> I	Actual Variation (%)	101.92	99.39	99.82	
	Point-by-Point Isokinetic Variation		_		
	Number of points <90%	0	0	1	
	Number of points >110%	0	0	3	
	Number of points <80%	0	0	1	
	Number of points >120%	0	0	0	

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QA/QC \_\_\_\_\_ Date \_\_\_\_\_

## **Nozzle Calibration Sheet**

Client Whee a bra	ton WS Brown	Project Number	0735
Calibrated by:	,		3
Date 3/10-19	7/1009	Runs I-	3
	( "	<del>-</del>	

	Nozzle Identification	D <sub>1</sub> (inches)	D <sub>2</sub> (inches)	D <sub>3</sub> (inches)	ΔD - (inches)	_D <sub>ave</sub> : (inches)
5/29	8.268-1	0.269	0.267	0.268	0.002	0.268
133	0.272-1	0.272	\$P772	0.272	0.000	0.272
23	01266-1	0.265	0.266	0.266	0.001	0.266
29.10	0.275-1	0.275	0.275	0.275	0.000	0.275
						., .
					· .	<u>.</u>

$D_1$ , $D_2$ , $D_3 = three no$	zżle diameter measurements:	
		A TIPITA IL LI
ΔD; = maximui	m difference between any two diam	eters / \///
	004 inches*	D <sub>2</sub>
D <sub>ave</sub> = average	of D <sub>1</sub> , D <sub>2</sub> , D <sub>3</sub>	

<sup>\* (40</sup> CFR 60, Appendix A, Method 5, Section 5.1)



CDS005A-Nozzle.xls, August 2004 Copyright © 2004 Clean Air Engineering, Inc. **Meter Box No:** 

61-6

Date of Calibration:

7/23/2008

**Meter Box Y<sub>d</sub>:** 0.9875

Calibration Conducted by: \_\_\_\_\_

**OLEG** 

Meter Box ∆H@:

1.6981

Barometric Pressure:

29.34

		Standard Meter Gas Volume (ft³)		Meter Box Gas Volume (ft³)		Std. Meter Temperature ('F)		Meter Box Temperature ('F)		Time (min.)		ration ults						
						V <sub>ds</sub>			V <sub>d</sub>	Tis	Tos	T <sub>ds</sub>	Ti	T <sub>o</sub>	T <sub>d</sub>			
Q	ΔΗ	ΔP	Yds	Initial	Final	Net	Initial	Final	Net	In	Out	Avg.	<b>in</b>	Out	Avg.	Θ	Yd	ΔH@
0.390	0.50	-1.30	1.0000	0.000	5.000	5.000	106.300	111.448	5.148	77.5	77.5	77.50	92.0	90.0	91.00	12.35	0.9912	1.7422
0.390	0.50	-1.30	1.0000	0.000	5.000	5.000	111.448	116.601	5.153	77.5	77.5	77.50	92.0	90.0	91.00	12.34	0.9902	1.7393
0.977	3.00	-1.80	1.0000	0.000	10.000	10.000	142.791	153.152	10.361	77.5	77.5	77.50	98.0	91.0	94.50	9.86	0.9838	1.6627
0.971	3.00	-1.90	1.0000	0.000	10.000	10.000	153.152	163.500	10,348	77.5	77.5	77.50	97.0	91.0	94.00	9.92	0.9839	1.6830
0.688	1.50	-1.50	1.0000	0.000	10.000	10.000	166.689	177.024	10.335	77.5	77.5	77.50	95.0	90.0	92.50	14.00	0.9871	1.6791
0.688	1.50	-1.50	1.0000	0.000	10.000	10.000	177.024	187.323	10.299	77.5	77.5	77.50	94.0	89.0	91.50	14.00	0.9888	1.6821

Averages 0.98750 1.69807

	Nomenclature	Equations
Po Q AH AP Vota To Tota You AH (	Barometric Pressure (in. Hg) Flow Rate (cfm) Orifice Pressure differential (in. H <sub>2</sub> O) Inlet Pressure Differential (in. H <sub>2</sub> O) Gas Meter Volume - Dry (ft³) Standard Meter Volume - Dry (ft³) Average Meter Box Temperature ("F) Outlet Meter Box Temperature ("F) Average Standard Meter Temperature ("F) Meter Correction Factor (unitless), Y₁≤Y <sub>evg</sub> ±0.02	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \left[ \frac{T_{d} + 460}{T_{ds} + 460} \right] \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b}(T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$
1		

vacuun	ı Gauge
Standard	Gauge
(in.Hg)	(in.Hg)
5.8	5.0
10.6	10.0
15.8	15.0
20.4	20.0
25.6	25.0



## Meter Box - Pyrometer Calibration Sheet

Meter Box No:	61-	6	Office:	
Calibrated by:	OLE	G	Client:	
Date:	7/23/	08	Job No:	
Temperature Sca	le Used:	Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings		Pyrometer Reading for each Channel (°F)											
(°F)	1	2	3	4	5	6	7						
	Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out						
50	50	48	52										
100	100	98	102										
150	150	148	152										
200	201	198	202	23.17	5. 抗氢酶	是是这种							
250	251	248	252			思问题							
300	300	298	302										
350	350	348	352										
400	400	398	401		能於這								
450	450	449	452										
500	501	500	501										
550	550	549	551				MARKET STATE						
600	600	599	601	4.3.4.4.00	ALEXA DE		ALC: U.S.						

Tolerance = ±2°F difference from reference setting.

#### **Calibration Reference Information**

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH Metrology	Date Calibrated:	10/7/2007
Calibration Report No:	R044701		
	, <u> </u>		



#### **Meter Box Critical Orifice Post-Test Calibration Data**

Project No. 10735 Meter No. 61-6

Orifice A-2

Leak Checks **Negative Pressure** 

Location

Operator

warehouse

r. vicere

Meter Yd 0.9875

Full Test Cal. Date 07/23/08

Orifice K' 0.4506

No movement of manameter in one-minute

Pass

**Test Date** 03/25/09

Meter ΔH@ 1.6981

Orifice Cal. Date 01/21/09

Positive Pressure

Average Y

Cal. Error

✓ Pass

No movement of manometer in one-minute

Barom. Press. (Pb)

28.94 in. Hg Important: All leak checks must pass in order for calibration to be valid.

0.9788

-0.9%

Rus	Eispasid Time (minutes)	Meta: Voluma (den)		oter erature Outlet	Antion: Temp. (1)	Ortflee AH (In. W.C.)	Yacuum (in.:Hg)	Net Run Time : 0 (minutes)	i Nati Metar Volume for Run - V <sub>n</sub> (def)	Avg Meter Tenpe to Run Ca (F)	OGM Coelloration Factor 31	Percenti Variation (A)
1	0.0 5.0	838.10 841.08	71 72	68 69	75	1.00	20	5.0	2.98	70.0	0.9796	0.1%
2	10.0	844.06	72	69	76	1.00	20	5.0	2.98	70.5	0.9796	0.1%
3	15.0	847.05	73	70	76	1.00	20	5.0	2.99	71.0	0.9772	-0.2%

**Calculations and Specifications** 

$$Y_i = \frac{K \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times (P_b + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.}: \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100$$
 Spec.:  $Cal.Error \le \pm 5\%$ 



**Meter Box No:** 

61-7

Date of Calibration: 11/17/2008

Meter Box Y<sub>d</sub>: 0.9886

Calibration Conducted by: OLEG LAVROV

 $A_{s_i}$ 

Meter Box ∆H@:

1.7796

**Barometric Pressure:** 

29.42

					Standard Meter Gas Volume (ft <sup>3</sup> )		Meter Box Gas  Volume (ft³)			Std. Meter Temperature ('F)			Meter Box Temperature (°F)			Time (min.)	Calib:	ration ults
						V <sub>ds</sub>			Λ <sup>q</sup>	Tis	Tos	T <sub>ds</sub>	Ti	T <sub>o</sub>	T <sub>d</sub>			
Q	ΔН	ΔΡ	Yds	Initial	Final	Net	Initial	Final	Net	In	Out	Avg.	ln	Out	Avg.	Θ	Yd	ΔН@
0.952	3.00	-1.80	1.0000	0.000	10.000	10.000	508.848	519.093	10.245	68.0	68.0	68.00	81.0	76.0	78.50	10.32	0.9836	1.8019
0.951	3.00	-1.80	1.0000	0.000	10.000	10.000	519.093	529.355	10.262	68.0	68.0	68.00	84.0	77.0	80.50	10.34	0.9857	1.8055
0.395	0.50	-1.20	1.0000	0.000	5.000	5.000	534.052	539.168	5.116	68.0	68.0	68.00	79.0	77.0	78.00	12.43	0.9916	1.7395
0.396	0.50	-1.20	1.0000	0.000	5.000	5.000	539.168	544.282	5.114	68.0	68.0	68.00	79.0	77.0	78.00	12,42	0.9920	1.7367
0.673	1.50	-1.60	1.0000	0.000	10.000	10.000	548.819	559.068	10.249	68.0	68.0	68.00	82.0	77.0	79.50	14.60	0.9893	1.7999
0.674	1.50	-1.60	1.0000	0.000	10.000	10.000	559.068	569.323	10.255	68.0	68.0	68.00	82.0	78.0	80.00	14.59	0.9896	1.7941
															A	verages	0.98863	1.77958

	Nomenclature	Equations
Pb Q AH AP Vds Td Tds Yd AH AH @	Barometric Pressure (in. Hg) Flow Rate (cfm) Orifice Pressure differential (in. H <sub>2</sub> O) Inlet Pressure Differential (in. H <sub>2</sub> O) Gas Meter Volume - Dry (ft³) Standard Meter Volume - Dry (ft³) Average Meter Box Temperature (*F) Outlet Meter Box Temperature (*F) Average Standard Meter Temperature (*F) Meter Correction Factor (unitless), $Y_1 \le Y_{avg} \pm 0.02$ Standard Meter Correction Factor (unitless) Orifice Pressure Differential giving 0.75 cfm of air at 68 F and 29.92 in. Hg (in. H <sub>2</sub> O) $\Delta H@_i \le \Delta H@_{avg} \pm 0.2$ Duration of Run (minutes)	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \left[ \frac{T_{d} + 460}{T_{ds} + 460} \right] \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b}(T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$
		•

Vacuum Gauge

vacuum	i Gauge
Standard	Gauge
(in.Hg)	(in.Hg)
5.3	5.0
10.3	10.0
15.0	15.0
19.7	20.0
24.8	25.0
L	



## Meter Box - Pyrometer Calibration Sheet

Meter Box No:	<u>61</u> -7	Office:	
Calibrated by:	OLEG LAVROV	Client:	
Date:	11/17/08	Job No:	
Temperature Sca	le Used: Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings			-	meter Ro each Cha (°F)	_		
(°F)	1	2	3	4	5	6	7
	Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out
50	50	48	49				
100	100	98	99				
150	150	148	149				
200	200	198	199				
250	250	248	248	DESIGN.	<b>MALE</b>	認識問題	
300	300	298	299		ENTE		经工作
350	350	348	349	Andrews		15 4.	<b>建想到</b>
400	400	398	399		Ale Residen		<b>经</b> 产证据
450	450	448	449	SELECTION OF THE SERVICE OF THE SERV		S. C. ME	
500	500	498	499				REAL PROPERTY.
550	550	548	549		Mark.	數是說	SERVICE SERVICES
600	600	598	599			22.0	

Tolerance = ±2°F difference from reference setting.

#### Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH Metrology	Exp. Date:	10/13/2009
Calibration Report No:	R044791		



#### **Meter Box Critical Orifice Post-Test Calibration Data**

10735 Project No.

warehouse

Meter No. 61-7 Meter Yd 0.9886

Orifice B-3 Orifice K' 0.4534 Leak Checks **Negative Pressure** 

No movement of manometer in

one-minute

✓ Pass

Pass

**Test Date** 03/25/09 Meter ΔH@ 1.7796

Orifice Cal. Date 02/13/09

Positive Pressure

No movement of

Cal. Error

Operator r. vicere Full Test Cal. Date 11/17/08

manometer in one-minute

Barom. Press. (Ph)

Location

28.94 in. Hg Important: All leak checks must pass in order for calibration to be valid.

3.6%

Run	Elepsed Time (plinutes)	Meter Volume (def)	Temp	cter grature Outlet (*F)	Ambient Temp. Tem (tt)	(¥ (¥ (± (± (± (± (±) (±) (±) (±) (±) (±) (±)	Vecuum (in: Hg)	Net Run Time - 9 (minutes)	Het Mater Volume for Run: Va (dd)	Avg Moter: Temp-for Run (fr. (17)	DGM Calibration Factor : ()	Percent Variation
	0.0	747.20	73	70								
1	5.0	750.09	73	70	73	1.00	19	5.0	2.89	71.5	1.0212	-0.3%
2	10.0	752.97	74	71	74	1.00	19	5.0	2.88	72.0	1.0247	0.1%
3	15.0	755.85	75	72	74	1.00	19	5.0	2.88	73.0	1.0266	0.2%
					-					Average Y	1.0242	

#### **Calculations and Specifications**

$$Y_i = \frac{K \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times (P_b + \Delta H_{13.6}) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100$$
 Spec. :  $\Delta Y_i \le \pm 2\%$ 

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100$$
 Spec.:  $Cal.Error \le \pm 5\%$ 



## **Meter Box Full Test Calibration**

**Meter Box No:** 

61-8

Date of Calibration: 10/10/2008

**Meter Box Y<sub>d</sub>:** 1.0079

Calibration Conducted by: OLEG LAVROV

Meter Box ΔH@: 1.7934

**Barometric Pressure:** 29.41

				_	indard Me S Volume	_	Meter Box Gas  Volume (ft³)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)		ration sults
						V <sub>ds</sub>			V <sub>d</sub>	Tis	Tos	T <sub>ds</sub>	Ti	To	T <sub>d</sub>			
Q	ΔΗ	ΔР	Yds	Initial	Final	Net	Initial	Final	Net	In	Out	Avg.	ln	Out	Avg.	Θ	Yd	∆Н@
0.962	3.00	-1.70	1.0000	0.000	10.000	10.000	178.888	188.822	9.934	70.0	70.0	70.00	78.0	73.0	75.50	10.18	1.0052	1.7772
0.957	3.00	-1.70	1.0000	0.000	10.000	10.000	188.822	198.772	9.950	70.0	70.0	70.00	81.0	74.0	77.50	10.23	1.0074	1.7913
0.381	0.50	-1.00	1.0000	0.000	5.000	5.000	216.571	221.528	4.957	70.5	70.5	70.50	79.0	76.0	77.50	12.82	1.0182	1.8720
0.382	0.50	-1.00	1.0000	0.000	5.000	5.000	221.528	226.500	4.972	70.5	70.5	70.50	80.0	77.0	78.50	12.81	1.0170	1.8856
0.686	1.50	-1.30	1.0000	0.000	10.000	10.000	231.519	241.649	10.130	70.5	70.5	70.50	84.0	79.0	81.50	14.26	1.0006	1.7275
0.685	1.50	-1.30	1.0000	0.000	10.000	10.000	241.849	251.820	10.171	70.5	70.5	70.50	86.0	80.0	83.00	14.27	0.9993	1.7267

Averages 1.00794 1.79338

	Nomenclature	Equations
Pb Q AH AP Vds Td To Yds Yds AH@	Barometric Pressure (in. Hg) Flow Rate (cfm) Orifice Pressure differential (in. H <sub>2</sub> O) Inlet Pressure Differential (in. H <sub>2</sub> O) Gas Meter Volume - Dry (ft³) Standard Meter Volume - Dry (ft³) Average Meter Box Temperature (*F) Outlet Meter Box Temperature (*F) Average Standard Meter Temperature (*F) Meter Correction Factor (unitless), $Y_1 \le Y_{avg} \pm 0.02$ Standard Meter Correction Factor (unitless) Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H <sub>2</sub> O) $\Delta H@_{avg} \pm 0.2$ Duration of Run (minutes)	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \left[ \frac{T_{d} + 460}{T_{ds} + 460} \right] \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b}(T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$

Vacuum Gauge

Standard	Gauge
(in.Hg)	_(in.Hg)
5,2	5.0
9.7	10.0
14.3	15.0
19.7	20.0
24.1	25.0
100 m may 200 m	



## Meter Box - Pyrometer Calibration Sheet

Meter Box No:	61-8	Office:	
Calibrated by:	OLEG LAVROV	Client:	
Date:	10/10/08	Job No:	
Temperature Sca	ile Used: Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings		Pyrometer Reading for each Channel (°F)												
(°F)	1	2	3	4	5	6	7							
	Stack	Probe	Filter	imp Out	Aux	DGM In	DGM Out							
50	49	50	50											
100	99	100	100											
150	149	150	150											
200	199	200	200		翻想就是									
250	249	250	250	部份數	<b>建程22</b> 编	数数数数	學性質學							
300	299	300	300			Num ia	10000000000000000000000000000000000000							
350	349	350	350		<b>国和</b> 创新	<b>建筑中原设</b>								
400	399	400	400			<b>SETTINGS</b>	Confessor Articles							
450	449	450	450	CHARGE			RELEASE							
500	499	500	500	被除至生			KON EN							
550	549	550	551	经验证据		AND THE	<b>多</b>							
600	599	600	601			<b>学。开始</b>								

Tolerance = ±2°F difference from reference setting.

	Calibration Referen	ce Information	
Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH Metrology	Exp. Date:	10/13/2009
Calibration Report No:	R044791		



#### Meter Box Critical Orifice Post-Test Calibration Data

Project No. 10735 Meter No. 61-8 Meter Yd 1.0079

Orifice A-4 Orifice K' 0.4959 Leak Checks **Negative Pressure** 

Location warehouse **Test Date** 03/25/09

r. vicere

Meter ΔH@ 1.7934

Full Test Cal. Date 10/10/08

Orifice Cal. Date 01/21/09

No movement of manometer in

one-minute

☑ Pass

Positive Pressure

No movement of

Cal. Error

2 Pass

manometer in one-minute

Barom. Press. (Pb)

Operator

28.94 in. Hg Important: All leak checks must pass in order for calibration to be valid.

-3.4%

			N.	ster .				Net Run	Net Meter			
Run	Elepsed Time	Mater Volume	Temp	erature.	Ambient Temp. T	Ortfice AH	Vacuum In No.	Ret Run Time : Θ	Volume for	Avg Meter Temp for Run	Calibration	Percent Variation
	(minutes)	(65)	Indea (Ta)	Outlet (TF)	m			(minutes)	(def)	Ta (T)	Factor - Y	Δ¥,
	0.0	255.80	73	70								
1	5.0	259.11	74	70	75	1.30	18	5.0	3.31	71.8	0.9731	-0.1%
2	10.0	262.41	74	71	75	1.30	18	5.0	3.30	72.3	0.9769	0.3%
3	15.0	265.73	75	71	75	1.30	18	5.0	3.32	72.8	0.9719	-0.2%
<u> </u>		<u> </u>			<u></u>			<b>-</b>		Average Y	0.9740	

**Calculations and Specifications** 

$$Y_{i} = \frac{K' \times P_{b} \times (T_{m} + 460) \times \theta}{17.64 \times V_{m} \times (P_{b} + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y_i}}{\overline{Y_i}} \times 100$$
 Spec. :  $\Delta Y_i \le \pm 2\%$ 

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100$$
 Spec.:  $Cal.Error \le \pm 5\%$ 

**Meter Box No:** 

66-6

**Date of Calibration:** 

2/23/2009

Meter Box Y<sub>d</sub>: 0.9916

Calibration Conducted by:

M. Vaquero

Meter Box ∆H@:

1.8053

**Barometric Pressure:** 

29.88

	21 S		. ·	Standard Meter Gas Volume (ft³)			Meter Box Gas Volume (ft³)			Std. Meter Temperature (°F)		Meter Box Temperature (°F)		-	Time (min.)		ration ults	
						V <sub>ds</sub>			Λ <sup>q</sup>	Tis	Tos	Tds	Ti	T <sub>o</sub>	Td			
Q	$\Delta H$	ΔΡ	Yds	Initial	Final	Net	Initial	Final	Net	In	Out	Avg.	In	Out	Avg.	Θ	Yď	∆Н@
0.979	3.00	-1.90	1.0000	0.000	10.000	10.000	562.625	572.791	10.166	65.0	65.0	65.00	75.0	73.0	74.00	10.25	0.9886	1.7401
0.979	3.00	-1.90	1.0000	0.000	10.000	10.000	572.791	582.945	10.154	65.0	65.0	65.00	75.0	73.0	74.00	10.26	0.9897	1.7435
0.384	0.50	-1.20	1.0000	0.000	5.000	5.000	625.330	630.420	5.090	65.0	65.0	65.00	73.0	72.0	72.50	13.07	0.9922	1.8897
0.384	0.50	-1.20	1.0000	0.000	5.000	5.000	630.420	635.515	5.095	65.0	65.0	65.00	73.0	72.0	72.50	13.07	0.9912	1.8897
0.684	1.50	-1.50	1.0000	0.000	10.000	10.000	639.532	649.665	10.133	65.0	65.0	65.00	74.0	72.0	73.00	14.68	0.9945	1.7880
0.685	1.50	-1.50	1.0000	0.000	10.000	10.000	649.665	659.807	10.142	65.0	65.0	65.00	74.0	72.0	73.00	14.65	0.9937	1.7807
															A	verages	0.99165	1.80528

$\frac{\Delta P/13.6}{\Delta H/13.6}$ $\frac{\partial \Theta}{\partial P}$

Vacuum Gauge Standard Gauge (in.Hg) (in.Hg) 5.0 5.0 10.2 10.0 15.2 15.0 20.0 20.0 24.4 24.5



Θ Duration of Run (minutes)

## Meter Box - Pyrometer Calibration Sheet

Meter Box No:	66-6	Office:	
Calibrated by:	M. Vaquero	Client:	
Date:	2/23/09	Job No:	
Temperature Scal	e Used: Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings			Pyro for e	meter Re each Cha (°F)	eading annel		
(°F)	1	2	3	4	5	6	7
<u> </u>	. Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out
50	48	48	49				
100	98	98	99				
150	148	148	149		,		
200	198	199	199	THE PARTY			
250	248	249	249				
300	298	298	299				
350	348	349	349			30.04	
400	398	399	399	3650 1300		200	
450	448	449	449		<b>建筑线线</b>		
500	498	499	499	PER M		<b>编型数</b>	100
550	548	549	549	1,777.03	2.05		
600	598	599	599				

Tolerance = ±2°F difference from reference setting.

#### Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH Metrology	Date Calibrated:	10/13/2009
Calibration Report No:	R044701		

#### **Meter Box Critical Orifice Post-Test Calibration Data**

10735 Project No.

r. vicere

Meter No. 66-6 Meter Yd 0.9916

Orifice A-4 Orifice K' 0.4959 Leak Checks **Negative Pressure** 

Location warehouse **Test Date** 03/24/09

Meter ΔH@ 1.8053

Full Test Cal. Date 02/23/09

Orifice Cal. Date \_01/21/09

No movement of manometer in

✓ Pass one-minute

Positive Pressure

No movement of

Cal. Error

manometer in one-minute

✓ Pass

Barom. Press. (Pb)

Operator

28.95 in. Hg Important: All leak checks must pass in order for calibration to be valid.

-1.7%

<u>.</u>	Elepsed Time (minutes)	Metari Vaturne (dial)	Tonie Tonie Inter	eter erature Coutlet	Ambiert Temp (1)	Office AT (E-WC)	Vacuum (ic. 19)	Net Run Time • 9 (minutes)	Net Megal You're to Run Vis (80)	A's liber Temp (p. R.S)	DOM Callbration E Factor : Y	Reroent Variation - ΔΥ,
	0.0	697.90	72	71								
1	5.0	701.17	72	69	77	1.30	17	5.0	3.27	71.0	0.9817	0.7%
2	10.0	704.48	72	69	79	1.30	17	5.0	3.31	70.5	0.9672	-0.8%
3	15.0	707.76	73	70	80	1.30	17	5.0	3.28	71.0	0.9760	0.1%
										Average Y <sub>i</sub>	0.9750	

#### **Calculations and Specifications**

$$Y_i = \frac{K \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times (P_b + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100$$
 Spec.:  $\Delta Y_i \le \pm 2\%$ 

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_c} \times 100$$
 Spec.:  $Cal.Error \le \pm 5\%$ 



## **Meter Box Full Test Calibration**

**Meter Box No:** 

66-7

**Date of Calibration:** 

2/20/2009

Meter Box Y<sub>d</sub>: 1.0028

Calibration Conducted by:\_\_\_\_

Martin Vaquero

**Meter Box** ∆**H@:** 1.7673

**Barometric Pressure:** 29.36

	er Şiğ	÷		Standard Meter Gas Volume (ft³)			77.05	leter Box Gas Volume (ft³)		Std. Meter Temperature ('F)			leter Box perature (°F)		Time (min.)		ration ults	
Q	ΔΗ	ΔΡ	Y <sub>ds</sub>	Initial	Final	V <sub>ds</sub> Net	Initial	Final	V <sub>d</sub> Net	T <sub>is</sub> In	T <sub>os</sub> Out	T <sub>ds</sub> Avg.	T <sub>i</sub> In	T <sub>o</sub>	T <sub>d</sub> Avg.	Θ	Yd	ΔН@
0.960	3.00	-1.80	1.0000	0.000	10.000	10.000	930.751	940.869	10.118	65.5	65.5	65.50	80.0	73.0	76.50	10.27	0.9970	1.7812
0.961	3.00	-1.80	1.0000	0.000	10.000	10.000	940.869	950.970	10.101	65.5	65.5	65.50	80.0	73.0	76.50	10.26	0.9987	1.7777
0.394	0.50	-1.00	1.0000	0.000	5.000	5.000	954.620	959.686	5.066	65.5	65.5	65.50	77.0	74.0	75.50	12.51	1.0020	1.7587
0.394	0.50	-1.00	1.0000	0.000	5.000	5.000	959.686	964.737	5.051	65.5	65.5	65.50	76.0	74.0	75.00	12.51	1.0040	1.7587
0.681	1.50	-1.40	1.0000	0.000	10.000	10.000	980.882	990.970	10.088	65.5	65.5	65.50	80.0	75.0	77.50	14.47	1.0066	1.7614
0.680	1.50	-1.40	1.0000	0.000	10.000	10.000	990.970	1001.037	10.067	65.5	65.5	65.50	80.0	75.0	77.50	14.49	1.0087	1.7663
															A	verages	1.00282	1.76732

Nomenclature	Equations
P <sub>b</sub> Barometric Pressure (in. Hg) Q Flow Rate (cfm) ΔH Orifice Pressure differential (in. H <sub>2</sub> O) ΔP Inlet Pressure Differential (in. H <sub>2</sub> O) V <sub>d</sub> Gas Meter Volume - Dry (ft²) V <sub>ds</sub> Standard Meter Volume - Dry (ft²) T <sub>d</sub> Average Meter Box Temperature ('F) T <sub>o</sub> Outlet Meter Box Temperature ('F) T <sub>ds</sub> Average Standard Meter Temperature ('F) Y <sub>d</sub> Meter Correction Factor (unitless), Y₁≤Y <sub>avg</sub> ±0.02 Y <sub>ds</sub> Standard Meter Correction Factor (unitless) ΔH@ Orifice Pressure Differential giving 0.75 cfm of air at 68'F and 29.92 in. Hg (in. H <sub>2</sub> O) ΔH@₁≤ ΔH@ <sub>avg</sub> ±0.2 Θ Duration of Run (minutes)	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \left[ \frac{T_{d} + 460}{T_{ds} + 460} \right] \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b} (T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$

Vacuum Gauge_								
Standard	Gauge							
(in:Hg)	(in.Hg)							
5.0	5.0							
10.2	10.0							
15.2	15.0							
19.8	20.0							
25.2	25.0							



## Meter Box - Pyrometer Calibration Sheet

Meter Box No:	66-7	Office:	
Calibrated by:	Martin Vaquero	Client:	
Date:	2/20/09	Job No:	
Temperature Sca	le Used: Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings				meter Re each Cha (°F)			
(°F)	1	2	3	4	5	6	7
	Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out
50	51	51	51				
100	100	100	101				
150	151	151	151				
200	201	201	201		<b>M</b>	STATE OF THE PARTY.	am. The
250	252	250	251				
300	302	301	301	<b>EXECUTE</b>	数值数		
350	352	351	351				
400	401	400	401				
450	450	450	451	<b>科性發展</b>			
500	500	500	501.	<b>WEST</b>		<b>SERVICE</b>	調調
550	550	550	551			網鐵鐵	心理
600	601	600	601		REPORT OF THE		

# Calibration Reference Information Reference Used: Omega CL23A Serial No: T-225950 Calibrated By: JH Metrology Exp. Date: 10/13/2009 Calibration Report No: R044791

#### **Meter Box Critical Orifice Post-Test Calibration Data**

Project No. 10735 Meter No. 66-7

Orifice B-5

Leak Checks **Negative Pressure** 

Location

warehouse

Meter Yd 1.0028

Orifice K' 0.5612

No movement of manometer in one-minute

☑ Pass

**Test Date** 

03/25/09

Meter ΔH@ 1.7673

Orifice Cal. Date 02/13/09

Positive Pressure

Cal. Error

2.3%

Pass

Operator r. vicere Full Test Cal. Date 02/20/09

No movement of manometer in one-minute

Important: All leak checks must pass in

order for calibration to be valid.

Barom. Press. (Pb)	28.94	in. Hg

	Elapsed		1	en i				Net Run	Net Meter	Ava Meter	DGM	Percent 1
Ron	Time	Mater Yolume (dct)	Comp	erature Cutlet	Temp. T	Onfice AH (In. W.C.)	Yearin	Time 8	Yolume for Run - Y <sub>n</sub>	Temp. for Run	Calibration	Variation -
	(minutee)		m		Ē			(minutes).	(dcf)	Te (F)	Factor Y	<b>X</b> .
	0.0	632.90	73	70								
1	5.0	636.47	73	70	71	1.50	18	5.0	3.57	71.5	1.0238	-0.2%
2	10.0	640.02	74	70	72	1.50	18	5.0	3.55	71.8	1.0291	0.3%
3	15.0	643.59	74	71	72	1.50	18	5.0	3.57	72.3	1.0243	-0.1%
						_				Average Y <sub>I</sub>	1.0257	

#### Calculations and Specifications

$$Y_{i} = \frac{K \times P_{b} \times (T_{m} + 460) \times \theta}{17.64 \times V_{m} \times (P_{b} + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.}: \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.}: Cal.Error \le \pm 5\%$$



**Meter Box No:** 

66-11

Date of Calibration: 10/29/2008

Meter Box Y<sub>d</sub>: 0.9897

Calibration Conducted by:

**OLEG LAVROV** 

Meter Box ΔH@: 1.8958

Barometric Pressure:

29.38

	Standard Meter Gas Volume (ft <sup>3</sup> )		Meter Box Gas Volume (ft <sup>3</sup> )		Std. Meter Temperature ('F)		Meter Box Temperature ('F)			Time (min.)	Callbi Res	ration ults						
						V <sub>ds</sub>			V <sub>d</sub>	Tis	Tos	T <sub>ds</sub>	T <sub>i</sub>	T₀	T <sub>d</sub>			
Q	ΔΗ	ΔΡ	Y <sub>ds</sub>	Initial	Final	Net	Initial	Final	Net	in	Out	Avg.	In	Out	Avg.	Θ '	Υ <sub>d</sub>	ΔН@
0.938	3.00	-1.90	1.0000	0.000	10.000	10.000	17.805	27.997	10.192	69.0	69.0	69.00	83.0	75.0	79.00	10.44	0.9875	1.8570
0.938	3.00	-1.90	1.0000	0.000	10.000	10.000	27.997	38,210	10.213	69.0	69.0	69.00	84.0	76.0	80.00	10.44	0.9873	1.8536
0.371	0.50	-1.30	1.0000	0.000	5.000	5.000	42.333	47.433	5.100	69.0	69.0	69.00	80.0	77.0	78.50	13.22	0.9935	1.9777
0.371	0.50	-1.30	1.0000	0.000	5.000	5.000	47.433	52.542	5.109	69.0	69.0	69.00	80.0	77.0	78,50	13.21	0.9918	1.9747
0.660	1.50	-1.50	1.0000	0.000	10.000	10.000	67.288	77.585	10.297	69.0	69.0	69.00	85.0	80.0	82.50	14.84	0.9885	1.8587
0.661	1.50	-1.50	1.0000	0.000	10.000	10.000	77.585	87.887	10.302	69.0	69.0	69.00	86.0	81.0	83.50	14.83	0.9898	1.8528
			<u> </u>		•										Α	verages	0.98974	1.89577

Nomenclature	Equations
P <sub>b</sub> Barometric Pressure (in. Hg) Q Flow Rate (cfm) ΔH Orifice Pressure differential (in. H <sub>2</sub> O) ΔP Inlet Pressure Differential (in. H <sub>2</sub> O) V <sub>d</sub> Gas Meter Volume - Dry (ft³) V <sub>ds</sub> Standard Meter Volume - Dry (ft³) T <sub>d</sub> Average Meter Box Temperature ("F) T <sub>o</sub> Outlet Meter Box Temperature ("F) T <sub>ds</sub> Average Standard Meter Temperature ("F) Y <sub>d</sub> Meter Correction Factor (unitless), Y <sub>1</sub> ≤Y <sub>xvg</sub> ±0.02 Y <sub>ds</sub> Standard Meter Correction Factor (unitless) ΔH@ Orifice Pressure Differential giving 0.75 cfm of air at 68"F and 29.92 in. Hg (in. H <sub>2</sub> O) ΔH@ <sub>1</sub> ≤ ΔH@ <sub>xvg</sub> ±0.2 Θ Duration of Run (minutes)	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \frac{T_{d} + 460}{T_{ds} + 460} \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b}(T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$

Vacuum Gauge Gauge Standard (in.Hg) (in.Hg) 4.5 5.0 9.7 10.0 14.9 15.0 20.3 20.0 25.3 25.0

## Meter Box - Pyrometer Calibration Sheet

Meter Box No:	66-11	Office:	
Calibrated by:	OLEG LAVROV	Client:	
Date:	10/29/08	Job No:	····a···
Temperature Sca	le Used: Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings		Pyrometer Reading for each Channel (°F)								
(°F)	1	2	3	4	5	6	7			
	Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out			
50	49	50	50							
100	99	100	100							
150	149	150	150							
200	199	200	200	正認認	HANAGE	金额的油	能力基金			
250	249	250	250	N. W.	都設建	為歷史總				
300	299	300	300	EAST.	理控制		Manager (1972)			
350	349	350	350	<b>建設公司</b>	CARC	認性法律	<b>大学の大学では、大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大</b>			
. 400	399	400	399			建設認	BENEFIT!			
450	449	450	449	學的概	豐江僧					
500	499	499	499	MARINE.						
550	549	549	549	STEELS.	<b>新加州</b>	流地的	量認定的			
600	599	600	599	HOYEN		<b>第一组数</b>				

Tolerance = ±2°F difference from reference setting.

## Calibration Reference Information Reference Used: Omega CL23A Serial No: T-225950 Calibrated By: JH Metrology Exp. Date 10/13/2009 Calibration Report No: R044791



#### **Meter Box Critical Orifice Post-Test Calibration Data**

Project No. 10715 Meter No. 66-11

Orifice A-2

Leak Checks **Negative Pressure** 

Location warehouse

r. vicere

Meter Yd 0.9897

Full Test Cal. Date 10/29/08

Orifice K' 0.4506

No movement of manometer in one-minute

✓ Pass

**Test Date** 03/26/09 Meter ΔH@ 1.8958

Orifice Cal. Date 01/21/09

Positive Pressure

No movement of manameter in one-minute

Cal. Error

✓ Pass

Barom. Press. (Pb)

Operator

29.07 in. Hg important: All leak checks must pass in order for calibration to be valid.

-0.9%

Ř	Elipsed fime (minutes)	Meter Volume (dcr)	Temp	nter erasture Outlier	Ambients Temp : Tam	Orifice AH (in. W.C.)			No Meter Volume (pr Run No	/Avg Meler Temp for Run		Percent Vertation
			ED:	CFV								
	0.0	587.30	72	69								
1	5.0	590.28	73	70	75	1.10	20	5.0_	2.98	71.0	0.9812	0.0%
2	10.0	593.26	73	70	76	1.10	20	5.0	2.98	71.5	0.9812	0.0%
3	15.0	596.24	74	71	77	1.10	20	5.0	2.98	72.0	0.9812	0.0%
										Average Y <sub>1</sub>	0.9812	

**Calculations and Specifications** 

$$Y_{i} = \frac{K \times P_{b} \times (T_{m} + 460) \times \theta}{17.64 \times V_{m} \times (P_{b} + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \widetilde{Y}_i}{\overline{Y}_i} \times 100$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.} : \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.} : Cal.Error \le \pm 5\%$$



# **Meter Box Full Test Calibration**

**Meter Box No:** 

66-16

Date of Calibration:

9/13/2008

Meter Box Y<sub>d</sub>: 0.9992

Calibration Conducted by:

**OLEG** 

Meter Box ΔH@: 1.7371

Barometric Pressure: 29.17

	Standard Meter Gas Volume (ft <sup>3</sup> )			•	Meter Box Gas Volume (ft <sup>3</sup> )			Std. Meter Temperature ('F)			Meter Box Temperature (°F)			Time (min.)		ration :		
						V <sub>ds</sub>			V <sub>d</sub>	Tis	Tos	T <sub>ds</sub>	Ti	T <sub>o</sub>	T <sub>d</sub>		_	
Q	ΔΗ	ΔΡ	Y <sub>ds</sub>	Initial	Final	Net	Initial	Final	Net	_In	Out	Avg.	In	Out	Avg.	Θ	Y۵	∆Н@
0.961	3.00	-1.90	1.0000	0.000	10.000	10.000	171.536	181.553	10.017	75.5	75.5	75.50	83.0	78.0	80.50	10.00	0.9953	1.7487
0.958	3.00	-1.90	1.0000	0.000	10.000	10.000	181.553	191.593	10.040	75.5	75.5	75.50	85.0	79.0	82.00	10.03	0.9957	1.7559
0.391	0.50	-1.30	1.0000	0.000	5.000	5.000	197.931	202.959	5.028	75.5	75.5	75.50	82.0	80.0	81.00	12,29	1.0001	1.7543
0.390	0.50	-1.30	1.0000	0.000	5.000	5.000	202.959	207.985	5.026	75.5	75.5	75.50	82.0	80.0	81.00	12.31	1.0005	1.7601
0.687	1.50	-1.50	1.0000	0.000	10.000	10.000	210.719	220.760	10.041	75.5	75.5	75.50	85.0	81.0	83.00	13,99	1.0023	1.7018
0.687	1.50	-1.50	1.0000	0.000	10.000	10.000	220.760	230.810	10.050	75.5	75.5	75.50	85.0	81.0	83.00	13.99	1.0014	1.7018
	Averages 0.99920 1.73709																	

	Nomenclature	Equations
Pb Q AH AP Vda To Tos Yda AH@	Barometric Pressure (in. Hg) Flow Rate (cfm) Orifice Pressure differential (in. $H_2O$ ) Inlet Pressure Differential (in. $H_2O$ ) Gas Meter Volume - Dry (ft²) Standard Meter Volume - Dry (ft²) Average Meter Box Temperature ("F) Outlet Meter Box Temperature ("F) Average Standard Meter Temperature ("F) Meter Correction Factor (unitless), $Y_1 \leq Y_{avg} \pm 0.02$ Standard Meter Correction Factor (unitless) Orifice Pressure Differential giving 0.75 cfm of alr at 68°F and 29.92 in. Hg (in. $H_2O$ ) $\Delta H@_a \leq \Delta H@_{avg} \pm 0.2$ Duration of Run (minutes)	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \left[ \frac{T_{d} + 460}{T_{ds} + 460} \right] \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b}(T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$

Standard Gauge (in.Hg) (in.Hg) 5.0 9.9 10.0 15.3 15.0 20.3 20.0 24.8 25.0

Vacuum Gauge



# Meter Box - Pyrometer Calibration Sheet

Meter Box No:	66-16	Office:	
Calibrated by:	OLEG	Client:	
Date:	9/13/08	Job No:	
Temderature Sca	le Used Fahrenheit	Type of Calibration: Full-Test	Ī

Calibration Reference Settings		Pyrometer Reading for each Channel (°F)										
(°F)	1	2	3	4	5	6	7					
	Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out					
50	49	49	51									
100	99	100	101									
150	149	150	150									
200	199	200	200	ALL PR		<b>意思读</b>	直延而					
250	249	250	250		na hit	商出现籍						
300	299	300	300	E.	是常想是							
350	349	350	350	4	Life and Life							
400	399	400	400	1331, 123	<b>为证书,扩</b>	<b>与特别的</b>						
450	449	450	450									
500	499	500	500		Mark Miles		STATE WELLS					
550	549	550	550	<b>州州学</b>		The state of the s						
600	599	600	600		is its in the		MUARIN					

Tolerance = ±2°F difference from reference setting.

#### **Calibration Reference Information**

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH Metrology	Date Calibrated:	10/7/2007
		Date Gallorated.	
Calibration Report No:	R044701		



#### **Meter Box Critical Orifice Post-Test Calibration Data**

Project No. 10735 Meter No. 66-16

Orifice B-3 Leak Checks **Negative Pressure** 

Location

Operator

warehouse

r. vicere

Meter Yd 0.9992

Orifice K' 0.4534

No movement of manometer in one-minute

Pass

**Test Date** 03/24/09 Meter ΔH@ 1.7371

Full Test Cal. Date 09/13/08

Orifice Cal. Date 02/13/09

Positive Pressure

No movement of

Average Y

Cal. Error

Pass

manometer in one-minute

Barom. Press. (Pb)

28.95 in. Hg Important: All leak checks must pass in order for calibration to be valid.

1.0332

3.4%

	Elapsed	1 Meter:Volume	Me	rter erature	Ambient			Net Run	Net Meter	Avg Metar.	DGM .	Percent
Run	77me (crinutes)	(66)	Intet	Outlet	Temp::Tum (°F)	(na Wei	(n. 149)	Time - 0 (minutes)	Bir Va	Avg Meter Temp. for Run Temp. (FF)	Calibration Factor Y	Veriation : \(\Delta\)
	0.0	748.10	71	68								
1	5.0	750.92	72	68	79	1.00	21	5.0	2.82	69.8	1.0372	0.4%
2	10.0	<sub></sub> 753.76	73	69	80	1.00	21	5.0	2.84	70.5	1.0304	-0.3%
3	15.0	756.60	74	69	80	1.00	21	5.0	2.84	71.3	1.0319	-0.1%

Calculations and Specifications

$$Y_{i} = \frac{K \times P_{b} \times (T_{m} + 460) \times \theta}{17.64 \times V_{m} \times (P_{b} + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100$$
 Spec. :  $\Delta Y_i \le \pm 2\%$ 

$$Cal.Error = \frac{\overline{Y}_{1} - \underline{Y}_{2}}{\underline{Y}_{d}} \times 100$$
 Spec.:  $Cal.Error \le \pm 5\%$ 



**Meter Box No:** 

66-22

Date of Calibration:

11/13/2008

Meter Box Y<sub>d</sub>: 0.9937

Calibration Conducted by:

Martin Vaquero

Meter Box ∆H@:

1.7498

**Barometric Pressure:** 

29.01

	Standard Meter Gas Volume (ft <sup>3</sup> )		Meter Box Gas Volume (ft³)		Std. Meter Temperature ('F)		Meter Box Temperature ('F)			Time (min.)		ration ults						
						V <sub>ds</sub>			Λ <sup>q</sup>	Tis	Tos	Tds	Ti	To	T <sub>d</sub>			
Q	ΔH	ΔΡ	Y <sub>ds</sub>	Initial	Final	Net	Initial	Final	Net	in	Out	Avg.	in	Out	Avg.	Θ	Yd	∆Н@
0.966	3.00	-1.90	1.0000	0.000	10.000	10.000	937.916	948.134	10.218	69.5	69.5	69.50	87.0	79.0	83.00	10.00	0.9912	1.7160
0.966	3.00	-1.90	1.0000	0.000 ^	11.000	11.000	948.134	959.364	11.230	69.5	69.5	69.50	87.0	0.08	83.50	11.00	0.9930	1.7128
0.385	0.50	-1.10	1.0000	0.000	5.000	5.000	962.944	968.050	5.106	69.5	69.5	69.50	80.0	79.0	79.50	12.55	0.9937	1.8018
0.385	0.50	-1.10	1.0000	0.000	5.000	5.000	968.050	973.153	5.103	69.5	69.5	69.50	80.0	79.0	79.50	12.55	0.9943	1.8018
0.679	1.50	-1.40	1.0000	0.000	10.000	10.000	974.427	984.641	10.214	69.5	69.5	69.50	85.0	79.0	82.00	14.23	0.9948	1.7373
0.680	1.50	-1.40	1.0000	0.000	10.000	10.000	984.641	994.859	10.218	69.5	69.5	69.50	85.0	80.0	82.50	14.21	0.9954	1.7293
															A	verages	0.99374	1.74982

Nomenclature	Equations
P <sub>b</sub> Barometric Pressure (in. Hg) Q Flow Rate (cfm) ΔH Orifice Pressure differential (in. H <sub>2</sub> O) ΔP Inlet Pressure Differential (in. H <sub>2</sub> O) V <sub>d</sub> Gas Meter Volume - Dry (ft³) V <sub>ds</sub> Standard Meter Volume - Dry (ft³) T <sub>d</sub> Average Meter Box Temperature (*F) T <sub>o</sub> Outlet Meter Box Temperature (*F) Y <sub>d</sub> Average Standard Meter Temperature (*F) Y <sub>d</sub> Meter Correction Factor (unitless), Y₁≤Y <sub>evo</sub> ±0.02 Y <sub>ds</sub> Standard Meter Correction Factor (unitless) ΔH@ Orifice Pressure Differential giving 0.75 cfm of air at 68*F and 29.92 in. Hg (In. H <sub>2</sub> O) ΔH@₁≤ ΔH@ <sub>evo</sub> ±0.2 Θ Duration of Run (minutes)	$Y_{d} = (Y_{ds}) \left[ \frac{V_{ds}}{V_{d}} \right] \left[ \frac{T_{d} + 460}{T_{ds} + 460} \right] \left[ \frac{P_{b} + \Delta P / 13.6}{P_{b} + \Delta H / 13.6} \right]$ $\Delta H @= \frac{(0.0319)(\Delta H)}{P_{b}(T_{o} + 460)} \left[ \frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})} \right]^{2}$ $Q = \frac{17.64(V_{ds})(P_{b})}{(T_{ds} + 460)(\Theta)}$

Vacuum Gauge Standard Gauge (in.Hg) (in.Hg) 5.0 5.0 10.0 10.1 14.7 15.0 19.3 20.0 24.0 : 25.0



# Meter Box - Pyrometer Calibration Sheet

Meter Box No:	66-	22	Office:	
Calibrated by:	Martin V	'aquero_	Client:	
Date:	11/1:	3/08	Job No:	
Temperature Sca	ale Used:	Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings			_	meter Re each Cha (°F)	_		
(°F)	1	2	3	4	5	6	7
_	Stack	Probe	Filter	Imp Out	Aux	DGM In	DGM Out
50	49	49	49				
100	99	99	99				
150	149	149	149				
200	199	199	199	語意為四		直端基	對亞達斯
250	249	249	249		WELT.	Since 2	製造業
300	299	299	299		建物的	WEETE WAR	<b>经验</b>
350	349	349	349		ELECTED .		
400	399	399	399		整理过程	TO HE WAS	
450	449	449	449		经过程的		
500	499	499	499				
550	_549	549	549	遊響。		題的推	<b>第</b>
600	599	599	599		HALL	湖北道	

Tolerance =  $\pm 2^{\circ}F$  difference from reference setting.

#### Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH Metrology	Exp. Date:	10/13/2009
Calibration Report No:	R044791		



#### **Meter Box Critical Orifice Post-Test Calibration Data**

Project No. 10735 Location warehouse Meter No. 66-22 Meter Yd 0.9937

Orifice A-2 Orifice K' 0.4506

**Negative Pressure** 

Leak\_Checks

No movement of manometer in one-minute

Pass

**Test Date** 

03/24/09

Meter ΔH@ 1.7498

Orifice Cal. Date 01/21/09

Positive Pressure

No movement of manometer in one-minute

Cal. Error

✓ Pass

Operator r. vicere Full Test Cal. Date 11/13/08

Important: All leak checks must pass in order for calibration to be valid.

-1.1%

Barom. Press. (Ph) 28.95 in. Hg

			) No	iter					Net Meter		DOM -	Percent
Run		Meter Volume	Temp	Heture	Temp: Tan	Orifice AH	Vaccini	Net Run Time -0 (minutes)	Yolume for Run - V <sub>a</sub>	Avg leater Temp. for Run	Celibration	Variation :
	(minutes)			Outer			(n. <b>+0</b> )	(minutes)	(def)	T6 (P)	Pacier Y	ΔΥι
	0.0	324.90	72	68								
1	5.0	327.89	74	68	75	1.10	21	5.0	2.99	70.5	0.9770	-0.6%
2	10.0	330.86	75	69	78	1.10	21	5.0	2.97	71.5	0.9827	0.0%
3	15.0	333.81	77	70	81	1.10	21	5.0	2.95	72.8	0.9889	0.6%
										Average Y	0.9829	ļ

**Calculations and Specifications** 

$$Y_{i} = \frac{K \times P_{b} \times (T_{m} + 460) \times \theta}{17.64 \times V_{m} \times (P_{b} + \Delta H/13.6) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.}: \Delta Y_i \leq \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.}: Cal.Error \leq \pm 5\%$$



Probe Type: M5 with S-Type Pitot I.D. Number: 67-8-4
Project Number: 10733

Thermocouple Calibration, Thermocouple Calib

Reference Type: Thermocouple Reference I.D. No: 15-078-39 Pyrometer I.D. No: 80512890 Units: \*F

Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Specification
1	Ambient	66	68	-2	0.38%	
2	200°F-250°F	250	255	-5	0.70%	%Difference ≤ 1.5

\* Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? ------

#### Pitot Tube Calibration (Wind Tunnel Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Itot Side 'A'	:			Abs. Deviation	
Trial No.	Reference AP	Probe ∆P	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(A)</sub> **	
1	0.546	0.836	0.801	0.008	
2	0.553	0.826	0.810	0.001	
3	0.546	0.806	0.815	0.007	
	Side 'A' Ave	rage Brobe C -	0.0005	0.0053	

Specification

Avg. C<sub>p</sub> Deviations ≤ 0.01

Pitot Side 'B'				Abs. Deviation	
Trial No.	Reference ΔP	Probe AP	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(B)</sub> ***_	
1	0.550	0.823	0.810	0.006	
2	0.550	0.810	0.816	0.000	
3	0.553	0.803	0.822	0.006	
	Side 'B' Ave	rage Probe C <sub>p(8)</sub> =	0.8157	0.0039	

Specification
Avg. C<sub>p</sub> Deviations ≤ 0.01

	'A' Average C <sub>p</sub>	'B' Average C <sub>p</sub>		Difference	Specification
ı	0.809	 0.816	=	-0.007	Difference  ≤ 0.01

Does assembly meet specifications?

YES ---

If "Yes", C<sub>p</sub>= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.

$${}^{\bullet}C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad {}^{\bullet\bullet}Deviation = \left| C_{P(S)} - \overline{C_{P(A \text{ or } B)}} \right|$$

All specifications are from EPA-600/9:76-005 section 3.1

Probe Cp= 0.812 Calibrated by: W. Berry Date: 01/06/2009



CDS002C-Pitot\_TNL, Dec 2008 Copyright © 2008 Clean Air Engineering Inc.

Probe Type:	M5 with	S-Type Pitot	•	I.D. Number Project Number		7-8-4
He strategy and the			STREET CANADA CA	libration 1		
Reference Type:		Reference I.D. No:		Pyrometer I.D. No		Units: °F
Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Within spec?
1	Ambient	Note to the	marcated remp.	Terrip. Dillerence	70 Dillotelle	TTILINI SPECT
2	200°F-250°F		·	-		
<del></del>		* Based on At	osolute Temperature	(Rankine)	%Difference ≤ 1.5	
			Geometric Pitot Ca	ilibration 3		
Is pitot assembl	y in good repa	air?	lf no, explain:			
	Dimensions		Dimensions	Specifica	tions	Within Spec?
α1=	2	α2=	1	<=10		YES
β1=	0	β2=	0	<=5°		YES
γ=	1	θ=	2	None		N/A
A=	0.713	<del></del>	<del> </del>	None		N/A
Dt=	0.244			0.1875"<=Dt	<=0.375"	YES
		Calculations	· <del></del>	Specifica		Within Spec?
A/2=Pa=Pb=		0.357 inches		None		N/A
Pa/Dt=Pb/Dt=		1.461 inches		1.05 <p d<="" td=""><td></td><td>YES</td></p>		YES
z = A sin γ =		0.012 inches		<=0.12		YES
w = A sin θ =		0.025 inches		<=0.031	25"	YES
Pitot Cp= (		g to 40 CFR 60 andard Pitot				
<i>,</i> -	Measu	rement	Spec	ification	Calculation	Within Spec?
Tube O.D.				lone		
Static Hole I.D.		<del></del>		of (0.1*O.D.)		
Tip to Static	-			3*O.D.		
Static to Bend			>=8	3*O.D.		
Pitot Cp=	anial I wakhawat			Pate	4 <i>101</i> 000	
Calibrated by: D	aniai Luckhard			Date: _	1/6/2009	

CleanAir.

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Probe Type: M5 with S-Type Pitot I.D. Number: 67-8-7

Project Number: 1073

Thermocouple Calibration (1997)

Reference Type: Thermocouple Reference I.D. No: 15-078-39 Pyrometer I.D. No: 80512890 Units; °F

	Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Specification
	1	Ambient	72.0	79.0	-7	1.32%	
-	2	200°F-250°F	213.0	213.0	0	0.00%	%Difference ≤ 1.5

\* Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? — YES

### Pltot Tubercalibration (Wind) Tunnel Method @ 50 H/sec

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

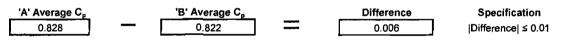
Pitot Side 'A' : Abs. Deviation Trial No. Reference ∆P Probe ∆P Probe C<sub>p(8)</sub> from Avg. C<sub>p(A)</sub>\*\* 0.563 0.822 0.820 0.009 2 0.568 0.800 0.834 0.006 3 0.571 0.811 0.830 0.002 Side 'A' Average Probe Cp(A)= 0.8281 0.0057

Specification
Avg. C<sub>p</sub> Deviations ≤ 0.01

Pitot Side 'B': Abs. Deviation Trial No. Reference AP Probe ∆P Probe C<sub>p(S)</sub>\* from Avg. Cp(B)\* 0.573 0.822 0.827 0.005 1 0.574 0.832 2 0.001 0.822 0.570 0.839 0.816 0.006 Side 'B' Average Probe Cp(B) 0.8216 0.0040

Specification

Avg. C₀ Deviations ≤ 0.01



Does assembly meet specifications?

YES ----

If "Yes", C<sub>p</sub>= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.

$$C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad \text{``Deviation} = \left| C_{P(S)} - \overline{C_{P(A \text{ or B})}} \right|$$

All specifications are from EPA-600/91/6-005, section 3.7

 Probe Cp=
 0.825
 Calibrated by: W. Berry
 Date:
 03/05/2009



CDS002C-Pitol\_TNL, Dec 2008
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Probe Type:	M5 with	S-Type Pitot	-	I.D. Number: Project Number:		7-8-7 0735
National Control of Co	ng saga sharaning ang saga sa 1918 dhina ba	Réfles valores a la presentation de la company de la compa			····	0733
			∍Thermocouple Ca	ibration		
Reference Type:	Thermometer	Reference I.D. No:	15-078-39	Pyrometer I.D. No:	80512890	Units: °F
Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Within spec?
1	Ambient	72.0	79.0	-7.0	1.32%	YES
2	200°F-250°F	213.0	213.0	0.0	0.00%	YES
	<u></u>	* Based on Al	osolute Temperature	(Rankine)	%Difference ≤ 1.5	· · · - · · · · · · · · · · · · · · · ·
Talad Second Cold Mark Second and an access of the	me is and the Stiffer Anasome and		and a substantial programme the factor of the control of the contr	YES	an the select of the origin in the test when when a program	ni in list Callante proposici printe e melicare
			Geometric Pitot Ca	libration " " " " " " " " " " " " " " " " " " "		
la nitat accombl	v in good rang	vir2	If no, explain:			
is pitot assembl	y in good repa	iii ? • Yes • No	и по, ехрант.	·		
		HOH DIA				
		"S" Pitot				
	Dimensions		Dimensions	Specificat		Within Spec
αl=	2 _	α2=	1	<=10°		YES
β1=	2	β2=	11	<=5°		YES
γ=	2	θ=	1	None		N/A
A=	0.716			None		N/A
Dt=	0.250			0.1875"<=Dt<	=0.375"	YES
· · · · · · · · · · · · · · · · · · ·						
		Calculations		Specificat	ions	Within Spec
A/2=Pa=Pb=		0.358 inches		No <u>ne</u>		N/A
Pa/Dt=Pb/Dt=		1.432 inches		1.05 <p dt<="" td=""><td></td><td>YES</td></p>		YES
z = A sin γ =		0.025 inches		<=0.125		YES
w = A sin θ =		0.012 inches		<=0.0312	25"	YES
Pitot Cp=		g to 40 CFR 60				
	Measu	rement	Speci	fication	Calculation	Within Spec?
	_			one		
Tube O.D.						
Static Hole I.D.			within 10%	of (0.1*O.D.)		
Tube O.D. Static Hole I.D. Tip to Static Static to Bend	<u>-</u>			of (0.1*O.D.) *O.D.		



Date: 3/4/2009

Calibrated by: N. Hitchins

M5 with S-Type Pitot Probe Type:

I.D. Number:

67-8-17

Project Number:

10735

Thermocouple Calibration

Reference Type: Thermocouple Reference I.D. No: 15-078-39 Pyrometer I.D. No: 80512890

Units: °F

Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Specification
1	Ambient	73.0	74.0	-1	0.19%	
2	200°F-250°F	221.0	219.0	2	0.29%	%Difference ≤ 1.5

<sup>\*</sup> Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? -

#### Pitotylube(calibration (Windy prine) Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel

Reference Pitot Cp:

Pitot Side 'A'	Pitot Side 'A' :							
Trial No.	Reference ∆P	Probe ∆P	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(A)</sub> **				
1	0.566	0.801	0.832	0.006				
2	0.570	0.794	0.839	0.001				
3	0.566	0.781	0.843	0.005				
	Side 'A' Av	rerage Probe C <sub>a(A)</sub> ≃	0.8381	0.0039				

Specification Avg. C<sub>p</sub> Deviations ≤ 0.01

Pitot Side 'B'	<b>:</b>			Abs. Deviation
Trial No.	Reference ∆P	Probe ∆P	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(B)</sub> **
1	0.573	0.815	0.830	0.001
2	0.565	0.808	0.828	0.000
3	0.566	0.809	0.828	0.001
	Side 'B' Av	erage Probe C <sub>p(B)</sub> =	0.8288	0.0007

Specification Avg. C<sub>p</sub> Deviations ≤ 0.01

'A' Average C <sub>p</sub>	'B' Average C <sub>P</sub>	_	Difference	Specification
0.838	 0.829	<u> </u>	0.009	Difference  ≤ 0.01

Does assembly meet specifications?

YES

If "Yes", Cp= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.

$$C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad \text{```Deviation} = \left| C_{P(S)} - \overline{C_{P(A \text{ or B})}} \right|$$

All specifications are from ERA 600/97/6,005, section 31

Probe Cp= 0.833 Calibrated by: W. Berry

03/05/2009 Date:



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Probe Type:	M5 with S-Type Pitot			I.D. Number: Project Number:	67-8-17 10735	
			Thermocouple 6a	ibration		
Reference Type:	Thermometer	Reference I.D. No:	15-078-39	Pyrometer I.D. No:	80512890	Units: °F
Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Within spec?
1	Ambient	73.0	74.0	-1.0	0.19%	YES
2	200°F-250°F	221.0	219.0	2.0	0.29%	YES
	_	* Based on Ab	solute Temperature	(Rankine) YES	%Difference ≤ 1.5	
			Geometric Pitot Ca	ibration-		
Is pitot assembl	y in good repa	air?	If no, explain:			

# "S" Pitot

	Dimensions		Dimensions	Specifications	Within Spec?
αl=	1	α2=	1	<=10 °	YES
β1=	1	β2=	1	<=5°	YES
γ=	0	θ=	1	None	N/A
A=	0.714			None	N/A
Dt≈	0.250			0.1875"<=Dt<=0.375"	YES

	Calculations	Specifications	Within Spec?
A/2=Pa=Pb=	0.357 inches	None	N/A
Pa/Dt=Pb/Dt=	1.428 inches	1.05 <p dt<1.5<="" td=""><td>YES</td></p>	YES
z = A sin γ =	0.000 inches	<=0.125"	YES
w = A sin θ =	0.012 inches	<=0.03125"	YES

Pitot Cp= 0.84 according to 40 CFR 60 section 10.1

### **Standard Pitot**

	Measurement	Specification	Calculation	Within Spec?
Tube O.D.		None		<u></u>
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static	The state of the s	>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: N. Hitchins Date: 3/4/2009



Probe Type: M5 with S-Type Pitot I.D. Number: 67-4-1

**Project Number:** Inermocouple Calibration

Reference Type: Thermocouple Reference I.D. No: 15-078-39 Units: °F Pyrometer I.D. No: 80512890

Point No. Target Temp. Reference Temp. Indicated Temp. Temp. Difference % Difference\* Specification 68.0 71.0 0.57% -3 Ambient 2 200°F-250°F 232.0 224.0 8 1.16% %Difference ≤ 1.5

\* Based on Absolute Temperature (Rankine)

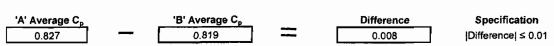
Does thermocouple assembly meet specifications? -

#### Pitot Tube Calibration (Wind Tunnel Method @ 50 ff/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp:

Pitot Side 'A'	Pitot Side 'A' :				Specification	
Trial No.	Reference ∆P	Probe ΔP	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(A)</sub> **	Avg. C <sub>p</sub> Deviations ≤ 0.01	
1	0.571	0.826	0.823	0.003		
2	0.572	0.816	0.829	0.002		
3	0.570	0.816	0.828	0.001		
	Side 'A' Ave	rage Probe C <sub>p(A)</sub> =	0.8265	0.0021		

Pitot Side 'B'			Abs. Deviation	Specification	
Trial No.	Reference ΔP	Probe ∆P	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(B)</sub> **	Avg. C <sub>p</sub> Deviations ≤ 0.01
1	0.564	0.830	0.816	0.003	
2	0.571	0.829	0.822	0.002	
3	0.568	0.827	0.821	0.001	
	Side 'B' Av	erage Probe C <sub>p(B)</sub> =	0.8193	0.0023	



If "Yes", Cp= Average of Side 'A' and 'B' Cp Does assembly meet YES values. If "No", Pitot must be replaced. specifications?

$${}^{*}C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad {}^{**}Deviation = \left| C_{P(S)} - \overline{C_{P(A \text{ or B})}} \right|$$

All specifications are from EFA-600/9-76-005 section 3.1

Probe Cp= 0.823 Calibrated by: W. Berry 03/04/2009 Date:



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٦.

Probe Type:	M5 with	S-Type Pitot		I.D. Number: Project Number:		7-4-1 0735
			Thermocouple Ca	(bration		
Reference Type:	Thermometer	Reference I.D. No:	15-078-39	Pyrometer I.D. No:	80512890	Units: °F
Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Within spec?
1	Ambient	68.0	71.0	-3.0	0.57%	YES
2	200°F-250°F	232.0	224.0	8.0	1.16%	YES
		* Based on Ab	solute Temperature		%Difference ≤ 1.5	
The state of the s	out the second of the list of the section that	the world of the investment was a sure of the first first the best of	Parlamentaria estructura de la cida de la casa del como de la casa del c	YES	maniference de la constante de	Control State Control State Control State Control
			Geometric Pitot Ca	ibration .		
Is pitot assemb	ly in good repa	air? ● Yes ○ No "S" Pitot	If no, explain:	. <u> </u>		
	Dimensions		Dimensions	Specifica	tions	Within Spec
αl=		α2=	1	<=10 °		YES
$\beta l =$		β2=	1	<=5°		YES
<u>γ</u> =		θ=	1	None		N/A
	0.714			None		N/A
Dt≈	0.250			0.1875"<=Dt<		YES
						<u></u>
		Calculations		Specificat	ions	Within Spec?
A/2=Pa=Pb=		0.357 inches		None		N/A
Pa/Dt=Pb/Dt≈		1.428 inches		1.05 <p dt<="" td=""><td></td><td>YES</td></p>		YES
z = A sin γ =		0.012 inches		<=0.12	5"	YES
w = A sin θ =		0.012 inches		<=0.031	25"	YES
Pitot Cp=		ng to 40 CFR 60	-			
	Measu	rement	Speci	fication	Calculation	Within Spec?
Tube O.D.	<u> </u>			one		····
Static Hole I.D.	<u> </u>			of (0.1*O.D.)		<del>,</del>
Tip to Static	<u> </u>	2 to 10 to 15 to 45 to 4		*O.D.		
Static to Bend			>=8	*O.D.		
Pitot Cp=  Calibrated by: 1	N. Hitchins			Date: _	3/4/2009	



Probe Type:

į.

M5 with S-Type Pitot

I.D. Number:

**Project Number:** 

Themocouple Galibration

Reference Type: Thermocouple Reference I.D. No: \_\_\_\_15-078-39

Pyrometer I.D. No: 80512890

Units: "F

Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Specification
1	Ambient	69.0	71.0	-2	0.38%	
2	200°F-250°F	223.0	217.0	6	0.88%	%Difference ≤ 1.5

\* Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? -

P(totaling Calibration (Wind Tunnel Method @ 50 Tr/sec)

Reference Pitot I.D. No: Wind Tunnel

Reference Pitot Cp:

	Pitot Side 'A'				Abs. Deviation
I	Trial No.	Reference ∆P	Probe ∆P	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(A)</sub> **
	1	0.561	0.822	0.818	0.002
ſ	2	0.568	0.822	0.823	0.003
ſ	3	0.564	0.822	0.820	0.001
_		Side 'A' Ave	0.8204	0.0020	

Specification Avg. C<sub>o</sub> Deviations ≤ 0.01

Specification
Avg. C <sub>p</sub> Deviations ≤ 0.01

Pitot Side 'B'	:			Abs. Deviation
Trial No.	Reference ∆P	Probe ∆P	Probe C <sub>p(S)</sub> *	from Avg. C <sub>p(B)</sub> **
1	0.568	0.815	0.826	0.001
2	0.563	0.816	0.823	0.002
3	0.574	0.825	0.826	0.001
	Side 'B' Ave	0.8249	0.0015	

'B' Average C Difference 'A' Average C<sub>p</sub> 0.820 0.825

Specification [Difference] ≤ 0.01

Does assembly meet specifications?

YES

If "Yes", Co= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.

$$^*C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}}$$

\*\* Deviation = 
$$\left| C_{P(S)} - \overline{C_{P(A \text{ or B})}} \right|$$

All specifications are from EPA-6009-76-005; section 3-1

Probe Cp=\_\_\_0.823\_

Calibrated by: W. Berry

Date: 03/04/2009



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Probe Type:	M5 with	S-Type Pitot		I.D. Number: Project Number:		7-4-4 0735		
			alijermodotjelekka	bration				
Reference Type:	Thermometer	Reference I.D. No:	15-078-39	Pyrometer I.D. No:	80512890	Units: °F		
Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Within spec?		
1	Ambient	69.0	71.0	-2.0	0.38%	YES		
2	200°F-250°F	223.0	217.0	6.0	0.88%	YES		
		* Based on Ab	solute Temperature	(	%Difference ≤ 1.5			
			Geometric Pitot Ca	YES libration - :				
Is pitot assembly in good repair?   Yes No If no, explain:  "S" Pitot								

Dimension	ons	Dimensions	Specifications	Within Spec?
αl= 2	α2=	1	<=10 °	YES
β1= 0	β2=	2	<=5°	YES
γ= 2	θ=	1	None	N/A
A= 0.724			None	N/A
Dt= 0.250			0.1875"<=Dt<=0.375"	YES

	Calculations	Specifications	Within Spec?
A/2=Pa=Pb=	0.362 inches	None	N/A
Pa/Dt=Pb/Dt=	1.448 inches	1.05 <p dt<1.5<="" td=""><td>YES</td></p>	YES
z = A sin γ =	0.025 inches	<=0.125"	YES
w = A sin θ =	0.013 inches	<=0.03125"	YES

Pitot Cp= 0.

0.84 according to 40 CFR 60 section 10.1

# **Standard Pitot**

	Measurement	Calculation	Within Spec?	
Tube O.D.	A SA	None		
Static Hole I.D.		within 10% of (0.1*O.D.)	1.	
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

P	i	t	o	t	С	p	=

Calibrated by: N. Hito	hins	Date:	3/4/2009



Probe Type: M5 with S-Type Pitot I.D. Number: 67-10-5
Project Number: 10735

Thermocouple Calibration (1997)

Reference Type: Thermocouple Reference I.D. No: 15-078-39 Pyrometer I.D. No: 80512890 Units: °F

Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Specification
1	Ambient	69.0	75.0	-6	1.13%	
2	200°F-250°F	207.0	216.0	-9	1.35%	%Difference ≤ 1.5

<sup>\*</sup> Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? — YES

#### Pitot Tube Calibration (Wind Tunnel Method @ 50 (t/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A' : Abs. Deviation Probe C<sub>g(S)</sub>\* Trial No. Reference AP Probe ∆P from Avg. C<sub>p(A)</sub>\*\* 0.565 0.830 0.817 0.002 1 2 0.565 0.820 0.822 0.003 0.001 0.559 0.819 0.818 Side 'A' Average Probe C<sub>p(A)</sub>= 0.8190 0.0019

Specification

Avg. C<sub>p</sub> Deviations ≤ 0.01

Pitot Side 'B' : Abs. Deviation Probe ∆P Trial No. Reference  $\Delta P$ Probe C<sub>p(S)</sub>\* from Avg. C<sub>p(B)</sub>\*\* 0.828 0.001 0.567 0.819 0.566 0.822 0.001 2 0.821 3 0.559 0.814 0.821 0.000 Side 'B' Average Probe Cp(B)= 0.8205 0.0009

Specification

Avg. C<sub>p</sub> Deviations ≤ 0.01

'A' Average C <sub>p</sub> 'B' Average C <sub>p</sub>		_	Difference	Specification	
0.819	_	0.820	=	-0.001	Difference  ≤ 0.01

Does assembly meet specifications?

YES ----

If "Yes", C<sub>p</sub>= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.

$${}^{\bullet}C_{P(S)} = C_{P(STD)} \sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad \qquad {}^{\bullet\bullet}Deviation = \left| C_{P(S)} - \overline{C_{P(A \text{ or B})}} \right|$$

L. All Specifications are from EPA-600/9-76-005 section 3.1

Probe Cp= 0.820 Calibrated by: W. Berry Date: 03/05/2009



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•		Juin	p.o o.o c			
Probe Type:	M5 with	S-Type Pitot		I.D. Number:	67	-10-5
			•	Project Number:		0735
	4 14 14		Thermocouple Cal	bratton 4		447000
Reference Type:	Thermometer	Reference I.D. No:	15-078-39	Pyrometer I.D. No:	80512890	Units: °F
Point No.	Target Temp.	Reference Temp.	Indicated Temp.	Temp. Difference	% Difference*	Within spec?
1	Ambient	69.0	75.0	-6.0	1.13%	YES
2	200°F-250°F	207.0	216.0	-9.0	1.35%	YES
		* Based on Ab	solute Temperature	(Rankine)	%Difference ≤ 1.5	
		of Languages and the Control of the	Cryspans, r., surperba	YES	a c v znachou modalatuje z sieme danieni	and a wark without strate from the first
		<b>《李教</b> 》	Geometric Pitot Ga	bration	Service Control	* 4.745 + 4.
In although a community		-:- <b>0</b>	If an annual above			
is pitot assemb	iy in good repa	air? Yes O No	If no, explain:			
		000 D:4 4				
		"S" Pitot				
	Dimensions		Dimensions	Specifica		Within Spec?
α1=	0	α2=	0	<=10 °		YES
β1=		β2=	1	<=5°		YES
γ=	γ= 1		0	None		N/A
	A= 0.726			None		N/A
Dt=	0.250			0.1875"<=Dt<	<=0.375"	YES
		Calculations		Specifica		Within Spec?
A/2=Pa=Pb=		0.363 inches		None		N/A
Pa/Dt=Pb/Dt=		1.452 inches		1.05 <p dt<1.5<="" td=""><td>YES</td></p>		YES
z = A sin γ = w = A sin θ =		0.013 inches		<=0.12		YES
W - A SIII 0 -		0.000 inches		<=0.03125"		YES
D'4 - 4 O	0.04	4- 40 OFD CO	4404			
Pitot Cp=	U.84 accordi	ng to 40 CFR 60	section 10.1			
	_	tandond Ditot				
	<u> </u>	tandard Pitot	<u>-</u>			
	Mana		<u> </u>	fication	Calculation	Within Space
Tuba O D	ivieas	urement	Specification		Calculation	Within Spec?
Tube O.D. Static Hole I.D.			None			
Tip to Static			within 10% of (0.1*O.D.) >=6*O.D.			
Static to Bend			>=8*O.D.		+	
Otatic to Bend				0.0.		
Pitot Cp=						
op-						
Calibrated by:	N. Hitchins			Date:	3/4/2009	





Air Liquide America Specialty Gases LLC



## RATA CLASS

#### Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

P.O. No.: 57134-71-65000

Customer CLEAN AIR ENGINEERING

AIR LIQUIDE AMERICA SPECIALTY GASES LLC Project No.: 05-72060-003

DON ALLEN

1290 COMBERMERE STREET

TROY, MI 48083

500 W. WOOD STREET PALATINE IL 60067

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:

ALM045493 Certification Date:

13Jan2009

Exp. Date: 13Jan2012

Cylinder Pressure\*\*\*:

2000 PSIG

COMPONENT

**CERTIFIED CONCENTRATION (Moles)** 

ANALYTICAL

TRACEABILITY

CARBON DIOXIDE

14.0 % ACCURACY\*\*

Direct NIST and NMI

OXYGEN

6.05 % +1-1% +/- 1%

Direct NIST and NMi

NITROGEN

BALANCE

\*\*\* Do not use when cylinder pressure is below 150 ps/g.

. 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 NTRM 2350 01Jul2009 01Dec2011 K026898 K016398 5.008 % 23.20 %

CARBON DIOXIDE

OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#

DATE LAST CALIBRATED

ANALYTICAL PRINCIPLE

PIB/2000/609015

CAi/110P/V03018

13Jan2009 22Dec2008

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: 13Jan2009 Response Unit:MV

71 = 0.00000 R1 = 39.30000

T1=83.10000

R2=39.40000 Z2=0.00000

T2 = 83.10000

Z3 = 0.00000 T3 = B3.10000 R3 = 39.40000

Concentration = A + Bx + Cx2 + Dx3 + Ex4

r=0.999998

Constants:

A=-0.0052472

B=0.108852633

C=0.0002522

D=5.76883E-06 E=0

OXYGEN

Avg. Concentration:

Date: .13Jan2008 Response Unit:%

Z1 = 0.00000 R1 = 23.20000

6.053

14.00

T1 = 6.05000

R2 ≈ 23,20000 Z2 ≈ 0.00000 23 = 0.00000 T3 = 6.06000

T2=6.08000

R3 = 23.20000

Concentration = A + Bx + Cx2 + Dx3 + Ex4

r= 0.999999

Constants:

D=0

A=-0.00558057

B=0.999821643

C=0 E=0

APPROVED BY:

### RATA CLASS



# **Scott Specialty Gases**

Dual-Analyzed Calibration Standard

290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

#### CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

P.O. No.: 55647-71-65000

CLEAN AIR ENGINEERING

SCOTT SPECIALTY GASES 1290 COMBERMERE STREET

Project No.: 05-53475-001

DON ALLEN

Customer

500 W. WOOD STREET PALATINE IL 60067

TROY,M I 48083

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:

AAL9828 Certification Date: 05Apr2007

Cylinder Pressure \*\*\*:

1900 PSIG

Exp. Date: 04Apr2010

COMPONENT

CERTIFIED CONCENTRATION (Moles)

ANALYTICAL

ACCURACY\*\* **TRACEABILITY** 

CARBON DIOXIDE

6.054 %

+/- 1%

Direct NIST and NMi

OXYGEN

14.02

+/- 1%

Direct NIST and NMi

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 2300

01Nov2010

1D002807

23.04 %

CARBON DIOXIDE

NTRM 2350 01May2009 K026542 23.48 % OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#

VARIAN/3400/10693

CALIFORNIA /1 10P/S02041

DATE LAST CALIBRATED

04Apr2007 05Apr 2007

ANALYTICAL PRINCIPLE THERMAL CONDUCTIVITY

PARAMAGNETIC

**ANALYZER READINGS** 

|Z = Zero Gas R = Reference Gas T = Test Gas

r = Correlation Coefficient) Calibration Curve

CARBON DIOXIDE

Date: 04Apr 2007 Response Unit:AREA

21 = 0.0000O R1 = 1165892. T1 = 305456.0

R2 = 1166031, 22 = 0.00000 T2 = 305856.0 Z3 = 0.00000 T3 = 305949.0R3 = 1166669.

First Triad Analysis

Avg. Concentration: 6.054

Second Triad Analysis

Concentration = A + Bx + Cx2 + Dx3 + Ex4

A = 0.010560

B = 0.000020

T2 = 14 03000

23 = 0.00000 13 = 14 0200n

Avg. Concentration:

r=0.999996

Constants:

C=0

OXYGEN

Date: 05Apr2007 Response Unit:%

Z1 = 0.00000 R1 = 23.48000 T1 = 14,03000

R3 = 23.49000

Concentration = A + Bx + Cx2 + Dx3 + Ex4

r = 0.999999 Constants:

A = -0.002923

B=0.999759 C = 0

APPROVED BY:



1290 COMBERMERE STREET

From:

Shipped TROY MI 48083 From: Phone: 248-589-2950

Fax: 248-589-2134

Phone: 248-589-2950 Fax: 248-589 CERTIFICATE OF ANALYSIS

WAREHOUSE/STOCK WAREHOUSE/STOCK/ CHICAGO WAREHOUSE PROJECT #: 05-69004-002

PO#: GENERAL STOCK ITEM #: 0501813 AL

DATE: 15Sep2008

868 SIVERT WOOD DALE

IL 60191

CYLINDER #: ALM061790

FILL PRESSURE: 02000 PSIG

PURE MATERIAL: NITROGEN

CAS# 7727-37-9

GRADE:

ZERO GAS

PURITY: 99.998%

MAXIMUM

THC

CONCENTRATIONS

0.5 PPM

E - 52 **End of Appendix**