Wheelabrator South Broward Inc.
A Waste Management Company
4400 South State Road 7
Ft. Lauderdale, FL 33314
(954) 581-6606
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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

WASTE MANAGEMENT

CleanAir.

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500 W. Wood Street
Palatine, IL 60067-4975
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Wheelabrator South Broward, Inc.
4400 South State Road 7
Ft. Lauderdale, FL 33314

RECEIVED
MAY 01 2009
BUREAU OF AIR 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,

Scott Brown
Project Manager
sbrown@cleanair.com
(800) 627-0033 ext. 4544

Reviewed by,

Mark Roach, P.E.
Engineering Group Technical Leader
mroach@cleanair.com
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REVISION HISTORY

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
0	04/28/09	All	Final version of original document.

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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

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.

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 Number	Location	Method	Analyte	Date	Start Time	End Time
1	Unit 1 SDA Inlet/FF Outlet	USEPA Mod. M26A	HCl	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	HCl	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	HCl	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	HCl	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	HCl	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	HCl	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	HCl	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	HCl	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	HCl	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

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

Source	Average Unit 1	Average Unit 2	Average Unit 3	Permit Limit[1]
Constituent				
Particulate (mg/dscm @7% O_2)	1.7	1.2	1.4	27/25
Visual Emissions (%, by COMS)[2]	0	0	0	10
Fluoride (lb/MMBtu as HF)[3]	<0.0000060	<0.0000055	<0.0000058	0.0040
Total PCCD/PCDF (ng/dscm @ 7% O_2)	3.8	NA	NA	30
Hydrogen Chloride (ppmdv @ 7% O_2) or	15	24	24	29
Hydrogen Chloride Removal (%)[4]	96%	95%	96%	>95
Beryllium (mg/dscm @ 7% O_2)	<0.000031	<0.000030	<0.000030	0.001
Cadmium (mg/dscm @ 7% O_2)	0.00037	0.00022	<0.00015	0.040/0.035
Lead (mg/dscm @ 7% O_2)	0.0012	0.0014	0.00067	0.44/0.40
Mercury (µg/dscm @ 7% O_2)	2.3	4.3	4.1	70/50
Mercury Removal (%)[4]	97%	88%	92%	>85
Carbon Feed Rate (lbs/hr)[5]	5	6	6	NA
Average Steam Flow (Klbs/hr)[6]	184.0	184.2	184.1	192
Average FF Inlet Temperature (^{O}F)[6]	312	317	313	NA

[1] 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.
[2] Visual Emissions (opacity) was obtained from the facilities COMS data as allowed under Title V Conditions B.53(6), B.76 and B.81.
[3] lb/MMBtu calculations used Fd of 9,570 for MSW as per Method 19.
[4] Removal for mercury and hydrogen chloride calculated in the unit of its standard (ppmdv @ 7% O_2). The hydrogen chloride limit is 29 ppmdv @ 7% O2 or 95% removal and the mercury limit is 70/50 µg/dscm @ 7% O2 or 85% removal, whichever is less stringent.
[5] From 40CFR60.58b (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
[6] From all compliance test runs.

Table 1-3:
Subpart Cb Required Operating Data

Process Condition	
Unit 1 Maximum Demonstrated Combustor Load (Klbs/hr)[1]	184.2
Unit 2 Maximum Demonstrated Combustor Load (Klbs/hr)[1]	183.9 [2]
Unit 3 Maximum Demonstrated Combustor Load (Klbs/hr)[1]	184.1 [3]
Unit 1 Maximum Particulate Control Device Inlet Temperature (°F)[4]	320
Unit 2 Maximum Particulate Control Device Inlet Temperature (°F)[4]	325 [2]
Unit 3 Maximum Particulate Control Device Inlet Temperature (°F)[4]	325 [3]
Unit 1 Carbon Feed Rate (lbs/hr)[5]	5
Unit 2 Carbon Feed Rate (lbs/hr)[5]	6
Unit 3 Carbon Feed rate (Klbs/hr)[5]	6

[1] From 40CFR60.58b (i) (8) the maximum demonstrated load during PCDD/PCDF testing, four hour average.
[2] From CleanAir Cb test report dated April 19, 2007.
[3] From CleanAir Cb test report dated April 24, 2008.
[4] From 40CFR60.58b (i) (9) the highest four hour average during PCDD/PCDF testing.
[5] From 40CFR60.58b (m)(1)(i) an average mass carbon rate during mercury or dioxin testing. The minimum carbon fee rate is established as the lower of the average carbon feed rates measured during the mercury or dioxin testing.

Table 1-4:
Opacity and Fugitive Emission Test Results

Source / **Constituent**	**Sampling Method**	**Results**	**Permit Limit**[1]
Ash Handling System[2]			
Fugitive Emissions (%)	EPA M22	0	5% of observation time
Fugitive Emissions (minutes)		0	9 minutes
Lime Silo[3]			
Visual Emisssions (%)	EPA M9	0	5%

[1] 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 modifed on August 25, 1997, Florida's Rule 62-296.416, F.A.C. and PSD-FL-105.
[2] The Ash Handling System was observed at various locations for a total of 3 hours.
[3] The Lime Silo was observed for one complete truck unloading.

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.

PROJECT OVERVIEW

All equipment utilized for compliance testing was manufactured by Clean Air Engineering, except for the Servomex O_2/CO_2 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.

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

RESULTS

Table 2-1:
Unit 1 FF Outlet – Particulate and Metals

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	183.6	183.4	184.0	**183.7**
P_1	Fabric Filter Inlet Temperature (°F)	313	305	305	**308**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.4	9.2	9.2	**9.3**
CO_2	Carbon dioxide (dry volume %)	10.2	10.6	10.5	**10.4**
T_s	Sample temperature (°F)	296	290	290	**292**
B_w	Actual water vapor in gas (% by volume)	21.9	22.4	22.5	**22.3**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	**166,552**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	68.76	67.60	67.88	**68.08**
%I	Isokinetic sampling (%)	100.0	100.0	101.1	**100.4**
Particulate Laboratory Data					
m_n	Net matter collected (g)	0.0009	0.0038	0.0034	
Filterable Particulate Results					
C_{sd}	Particulate Concentration (mg/dscm)	0.46	2.0	1.8	**1.4**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	0.56	2.4	2.1	**1.7**
Beryllium Results - Total					
C_{sd}	Concentration (mg/dscm)	<0.000026	<0.000026	<0.000026	**<0.000026**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<0.000031	<0.000031	<0.000031	**<0.000031**
Cadmium Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	0.3934	0.3103	1.0930	
Cadmium Results - Total					
C_{sd}	Concentration (mg/dscm)	0.00020	0.00016	0.00057	**0.00031**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.00024	0.00019	0.00067	**0.00037**
Lead Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	2.2834	1.3454	2.3089	
Lead Results - Total					
C_{sd}	Concentration (mg/dscm)	0.0012	0.00070	0.0012	**0.0010**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.0014	0.00083	0.0014	**0.0012**

RESULTS

Table 2-2:
Unit 1 SDA Inlet and FF Outlet – Mercury

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	183.6	183.4	184.0	**183.7**
P_1	Fabric Filter Inlet Temperature (°F)	313	305	305	**308**
P_2	Carbon Feed rate (lb/hr)	7	6	5	**6**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.7	8.9	8.9	**9.2**
CO_2	Carbon dioxide (dry volume %)	10.0	10.8	10.9	**10.5**
T_s	Sample temperature (°F)	505	506	508	**506**
B_w	Actual water vapor in gas (% by volume)	16.0	16.9	17.5	**16.8**
SDA Inlet Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,323	173,916	177,125	**175,788**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	81,161	79,153	79,904	**80,073**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	69.41	69.31	69.73	**69.48**
%I	Isokinetic sampling (%)	104.0	106.4	106.1	**105.5**
SDA Inlet Mercury Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	105.1263	116.8821	116.3232	
SDA Inlet Mercury Results - Total					
C_{sd}	Concentration (µg/dscm)	53	60	59	**57**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	66	69	68	**68**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.4	9.2	9.2	**9.3**
CO_2	Carbon dioxide (dry volume %)	10.2	10.6	10.5	**10.4**
T_s	Sample temperature (°F)	296	290	290	**292**
B_w	Actual water vapor in gas (% by volume)	21.9	22.4	22.5	**22.3**
FF Outlet Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	168,899	165,781	164,975	**166,552**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	68.76	67.60	67.88	**68.08**
%I	Isokinetic sampling (%)	100.0	100.0	101.1	**100.4**
FF Outlet Mercury Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	4.4126	3.1426	3.4661	
FF Outlet Mercury Results - Total					
C_{sd}	Concentration (µg/dscm)	2.3	1.6	1.8	**1.9**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.7	1.9	2.1	**2.3**
Removal Efficiency (µg/dscm @ 7% O_2 based)		96%	97%	97%	**97%**

RESULTS

Table 2-3:
Unit 1 FF Outlet - Fluorides

Run No.		1	2	3	Average
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:38	08:06	09:47	
Stop Time (approx.)		07:50	09:21	11:00	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.3	183.8	184.1	**184.1**
P_1	Fabric Filter Inlet Temperature (°F)	315	308	305	**309**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.4	9.3	10.1	**9.6**
CO_2	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 Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	178,264	180,189	180,383	**179,612**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	95,670	96,275	96,295	**96,080**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	37.65	37.76	37.69	**37.70**
%I	Isokinetic sampling (%)	99.9	99.6	99.4	**99.6**
Laboratory Data					
m_n	Total HF collected (mg)	<0.00606	<0.00547	<0.00597	
Hydrogen Fluoride (HF) Results					
C_{sd}	HF Concentration (ppmdv)	<0.0068	<0.0062	<0.0067	**<0.0066**
C_{sd7}	HF Concentration @7% O_2 (ppmdv)	<0.0082	<0.0074	<0.0087	**<0.0081**
C_{sd}	HF Concentration (mg/dscm)	<0.0057	<0.0051	<0.0056	**<0.0055**
C_{sd7}	HF Concentration @7% O_2 (mg/dscm)	<0.0068	<0.0061	<0.0072	**<0.0067**
$E_{lb/hr}$	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**

RESULTS

Table 2-4:
Unit 1 FF Outlet - PCDDs/PCDFs

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 17	Mar 17	
Start Time (approx.)		11:07	06:08	10:54	
Stop Time (approx.)		15:32	10:27	15:18	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.0	183.4	184.2	**183.9**
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	**320**
P_2	Carbon Feed Rate (lb/hr)	6	5	5	**5**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.5	9.7	9.4	**9.5**
CO_2	Carbon dioxide (dry volume %)	10.3	9.9	10.2	**10.1**
T_s	Sample temperature (°F)	301	301	301	**301**
B_w	Actual water vapor in gas (% by volume)	21.3	21.3	21.0	**21.2**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,448	182,079	175,503	**178,010**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	94,787	96,525	93,680	**94,997**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	142.32	144.13	138.82	**141.76**
%I	Isokinetic sampling (%)	99.7	99.1	98.4	**99.0**
Results (ND and EMPC = 0)					
Laboratory Data from USEPA Method 23					
m_n	Total PCDDs & PCDFs (ng)	12.700	12.300	12.300	
m_{n_TEQ}	Total TEQ PCDDs & PCDFs (ng)	0.133	0.127	0.129	
Total PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	3.2	3.0	3.1	**3.1**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	3.9	3.7	3.8	**3.8**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.119E-06	1.090E-06	1.098E-06	**1.102E-06**
E_{Fd}	PCDD/F Rate - F_d-based (lb/MMBtu)	3.464E-09	3.349E-09	3.398E-09	**3.404E-09**
Total PCDD/F TEQ Results (using USEPA/INTL 1989 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	0.033	0.031	0.033	**0.032**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	0.040	0.038	0.040	**0.040**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	1.2E-08	1.1E-08	1.2E-08	**1.1E-08**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.6E-11	3.5E-11	3.6E-11	**3.5E-11**
Results (ND and EMPC = actual value)					
Laboratory Data from USEPA Method 23, including NDs and EMPCs					
m_n	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 PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	3.2	3.1	3.2	**3.1**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	3.9	3.8	3.8	**3.8**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.1E-06	1.1E-06	1.1E-06	**1.1E-06**
E_{Fd}	PCDD/F Rate - F_d-based (lb/MMBtu)	3.5E-09	3.4E-09	3.4E-09	**3.4E-09**
Total PCDD/F TEQ Results (using USEPA/INTL 1989 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	0.034	0.032	0.033	**0.033**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	0.041	0.040	0.040	**0.040**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	1.2E-08	1.2E-08	1.2E-08	**1.2E-08**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.7E-11	3.6E-11	3.6E-11	**3.6E-11**

RESULTS

Table 2-5:
Unit 1 FF Outlet and SDA Inlet - Hydrogen Chloride

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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.7	184.7	183.5	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	**320**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	8.0	7.7	8.5	**8.1**
CO_2	Carbon dioxide (dry volume %)	11.4	11.7	11.0	**11.4**
T_s	Sample temperature (°F)	492	488	487	**489**
B_w	Actual water vapor in gas (% by volume)	18.2	16.2	16.6	**17.0**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	33.11	34.24	33.92	**33.76**
SDA Inlet Laboratory Data					
m_n	Total HCl collected (mg)	593.6855	508.7987	529.3518	
SDA Inlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	418	346	364	**376**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	450	366	406	**407**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.2	9.0	9.5	**9.2**
CO_2	Carbon dioxide (dry volume %)	10.4	10.6	10.1	**10.3**
T_s	Sample temperature (°F)	304	307	306	**305**
B_w	Actual water vapor in gas (% by volume)	22.7	21.5	20.6	**21.6**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	39.71	39.12	38.83	**39.22**
FF Outlet Laboratory Data					
m_n	Total HCl collected (mg)	17.6057	20.2666	24.8532	
FF Outlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	10	12	15	**12**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	12	14	18	**15**
RE	Reduction Efficiency (% Removal)	97%	96%	96%	**96%**

RESULTS

Table 2-6:
Unit 2 FF Outlet – Particulate and Metals

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Process Conditions					
R_P	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 Conditions					
O_2	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**
T_s	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 Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	**179,025**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	**96,773**
Sampling 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**
Particulate Laboratory Data					
m_n	Net matter collected (g)	0.0020	0.0010	0.0032	
Filterable Particulate Results					
C_{sd}	Particulate Concentration (mg/dscm)	0.95	0.48	1.5	**0.98**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	1.2	0.61	1.9	**1.2**
Beryllium Results - Total					
C_{sd}	Concentration (mg/dscm)	<0.000024	<0.000024	<0.000024	**<0.000024**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<0.000030	<0.000030	<0.000030	**<0.000030**
Cadmium Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	0.4125	0.3372	0.3416	
Cadmium Results - Total					
C_{sd}	Concentration (mg/dscm)	0.00020	0.00016	0.00016	**0.00017**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.00025	0.00021	0.00020	**0.00022**
Lead Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	1.9770	2.3462	2.5954	
Lead Results - Total					
C_{sd}	Concentration (mg/dscm)	0.00094	0.0011	0.0012	**0.0011**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.0012	0.0014	0.0015	**0.0014**

Table 2-7: Unit 2 SDA Inlet and FF Outlet – Mercury

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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.1	184.9	183.9	**184.3**
P_1	*Fabric Filter Inlet Temperature (°F)*	315	315	315	**315**
P_2	Carbon Feed Rate (lb/hr)	5	7	6	**6**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	8.8	9.2	9.0	**9.0**
CO_2	Carbon dioxide (dry volume %)	10.7	10.5	10.8	**10.7**
T_s	Sample temperature (°F)	513	514	514	**514**
B_w	Actual water vapor in gas (% by volume)	15.8	16.1	16.1	**16.0**
SDA Inlet Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	188,570	187,625	186,789	**187,661**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	86,559	85,767	85,339	**85,889**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	72.69	72.64	73.32	**72.88**
%I	Isokinetic sampling (%)	102.1	102.9	104.4	**103.2**
SDA Inlet Mercury Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	62.3587	81.4920	57.0036	
SDA Inlet Mercury Results - Total					
C_{sd}	Concentration (μg/dscm)	30	40	27	**32**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	35	47	32	**38**
FF Outlet Gas Conditions					
O_2	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**
T_s	Sample temperature (°F)	298	297	298	**298**
B_w	Actual water vapor in gas (% by volume)	21.3	20.7	21.4	**21.1**
FF Outlet Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	178,836	178,004	180,235	**179,025**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	96,412	96,780	97,128	**96,773**
FF Outlet Sampling 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**
FF Outlet Mercury Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	6.8700	6.5842	7.8493	
FF Outlet Mercury Results - Total					
C_{sd}	Concentration (μg/dscm)	3.3	3.2	3.7	**3.4**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	4.1	4.0	4.7	**4.3**
RE	Reduction Efficiency (% Removal)	88%	91%	85%	**88%**

RESULTS

Table 2-8:
Unit 2 FF Outlet - Fluorides

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		11:43	13:15	14:40	
Stop Time (approx.)		12:55	14:27	15:49	
Process 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 Conditions					
O_2	Oxygen (dry volume %)	9.6	9.5	9.4	**9.5**
CO_2	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 Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	191,827	184,660	186,228	**187,571**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	103,823	100,086	101,073	**101,660**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.11	40.38	40.45	**40.65**
%I	Isokinetic sampling (%)	100.5	102.4	101.6	**101.5**
Laboratory Data					
m_n	Total HF collected (mg)	<0.00596	<0.00581	<0.00556	
Hydrogen Fluoride (HF) Results					
C_{sd}	HF Concentration (ppmdv)	<0.0062	<0.0061	<0.0058	**<0.0060**
C_{sd7}	HF Concentration @7% O_2 (ppmdv)	<0.0076	<0.0074	<0.0071	**<0.0073**
C_{sd}	HF Concentration (mg/dscm)	<0.0051	<0.0051	<0.0049	**<0.0050**
C_{sd7}	HF Concentration @7% O_2 (mg/dscm)	<0.0063	<0.0062	<0.0059	**<0.0061**
$E_{lb/hr}$	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**

RESULTS

Table 2-9:
Unit 2 FF Outlet and SDA Inlet - Hydrogen Chloride

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		06:33	08:26	10:15	
Stop Time (approx.)		07:33	09:26	11:15	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	182.6	185.2	183.2	**183.7**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	320	**317**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	8.3	8.3	8.6	**8.4**
CO_2	Carbon dioxide (dry volume %)	11.3	11.3	10.9	**11.2**
T_s	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 Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	32.81	33.19	34.54	**33.51**
SDA Inlet Laboratory Data					
m_n	Total HCl collected (mg)	503.5662	598.0783	603.5410	
SDA Inlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	358	420	407	**395**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	395	463	459	**439**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.7	9.1	9.5	**9.4**
CO_2	Carbon dioxide (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 Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	35.83	34.32	36.39	**35.52**
FF Outlet Laboratory Data					
m_n	Total HCl collected (mg)	29.5404	25.8516	34.0382	
FF Outlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	19	18	22	**20**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	24	21	26	**24**
RE	Reduction Efficiency (% Removal)	94%	96%	94%	**95%**

RESULTS

Table 2-10: Unit 3 FF Outlet – Particulate and Metals

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
Gas Conditions					
O_2	Oxygen (dry volume %)	10.7	10.4	10.3	**10.4**
CO_2	Carbon dioxide (dry volume %)	9.1	9.2	9.4	**9.2**
T_s	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 Flow Rate					
Q_a	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**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.35	77.16	75.17	**77.23**
%I	Isokinetic sampling (%)	101.6	100.8	101.1	**101.2**
Particulate Laboratory Data					
m_n	Net matter collected (g)	0.0036	0.0024	0.0008	
Filterable Particulate Results					
C_{sd}	Particulate Concentration (mg/dscm)	1.6	1.1	0.38	**1.0**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	2.2	1.4	0.49	**1.4**
Beryllium Results - Total					
C_{sd}	Concentration (mg/dscm)	<0.000022	<0.000023	<0.000023	**<0.000023**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<0.000030	<0.000030	<0.000031	**<0.000030**
Cadmium Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	<0.2000	0.2333	0.2845	
Cadmium Results - Total					
C_{sd}	Concentration (mg/dscm)	<0.000089	0.00011	0.00013	**<0.00011**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<0.00012	0.00014	0.00018	**<0.00015**
Lead Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	0.6091	1.6247	1.0876	
Lead Results - Total					
C_{sd}	Concentration (mg/dscm)	0.00027	0.00074	0.00051	**0.00051**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.00037	0.00098	0.00067	**0.00067**

RESULTS

Table 2-11:
Unit 3 SDA Inlet and FF Outlet – Mercury

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed Rate (lb/hr)	6	6	5	**6**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.6	9.5	9.6	**9.5**
CO_2	Carbon dioxide (dry volume %)	10.2	10.1	10.0	**10.1**
T_s	Sample temperature (°F)	488	490	493	**491**
B_w	Actual water vapor in gas (% by volume)	16.3	16.0	15.8	**16.0**
SDA Inlet 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 Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.14	71.87	72.15	**72.72**
%I	Isokinetic sampling (%)	98.3	96.9	98.3	**97.8**
SDA Inlet Mercury Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	76.7234	89.6076	95.0869	
SDA Inlet Mercury Results - Total					
C_{sd}	Concentration (µg/dscm)	37	44	47	**42**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	45	54	57	**52**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	10.7	10.4	10.3	**10.4**
CO_2	Carbon dioxide (dry volume %)	9.1	9.2	9.4	**9.2**
T_s	Sample temperature (°F)	295	296	296	**296**
B_w	Actual water vapor in gas (% by volume)	19.8	20.0	19.9	**19.9**
FF Outlet Gas Flow Rate					
Q_a	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**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.35	77.16	75.17	**77.23**
%I	Isokinetic sampling (%)	101.6	100.8	101.1	**101.2**
FF Outlet Mercury Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	6.6466	7.0201	6.5708	
FF Outlet Mercury Results - Total					
C_{sd}	Concentration (µg/dscm)	3.0	3.2	3.1	**3.1**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.0	4.2	4.1	**4.1**
Removal Efficiency (µg/dscm @ 7% O_2 based)		91%	92%	93%	**92%**

RESULTS

Table 2-12:
Unit 3 FF Outlet - Fluorides

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		07:20	09:30	11:20	
Stop Time (approx.)		00:00	10:47	12:41	
Process 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 Conditions					
O_2	Oxygen (dry volume %)	9.7	11.1	10.3	**10.4**
CO_2	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 Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	193,361	192,674	191,991	**192,675**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	104,075	106,228	106,037	**105,447**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.77	41.58	41.69	**41.68**
%I	Isokinetic sampling (%)	101.9	99.4	99.8	**100.4**
Laboratory Data					
m_n	Total HF collected (mg)	<0.00615	<0.00547	<0.00560	
Hydrogen Fluoride (HF) Results					
C_{sd}	HF Concentration (ppmdv)	<0.0063	<0.0056	<0.0057	**<0.0058**
C_{sd7}	HF Concentration @7% O_2 (ppmdv)	<0.0078	<0.0079	<0.0075	**<0.0077**
C_{sd}	HF Concentration (mg/dscm)	<0.0052	<0.0046	<0.0047	**<0.0049**
C_{sd7}	HF Concentration @7% O_2 (mg/dscm)	<0.0065	<0.0065	<0.0062	**<0.0064**
$E_{lb/hr}$	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**

RESULTS

Table 2-13:
Unit 3 FF Outlet and SDA Inlet - Hydrogen Chloride

Run No.		**1**	**2**	**3**	**Average**
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:56	09:13	10:40	
Stop Time (approx.)		07:56	10:13	11:40	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.1	184.2	183.9	**184.1**
P_1	Fabric Filter Inlet Temperature (°F)	315	305	305	**308**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.8	9.7	9.7	**9.7**
CO_2	Carbon dioxide (dry volume %)	9.8	10.1	9.8	**9.9**
T_s	Sample temperature (°F)	487	494	489	**490**
B_w	Actual water vapor in gas (% by volume)	16.2	15.6	16.6	**16.1**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	32.04	33.22	33.30	**32.86**
SDA Inlet Laboratory Data					
m_n	Total HCl collected (mg)	617.4202	601.5257	646.3785	
SDA Inlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	449	422	452	**441**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	560	525	562	**549**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	10.3	9.9	9.7	**10.0**
CO_2	Carbon dioxide (dry volume %)	9.4	9.8	9.9	**9.7**
T_s	Sample temperature (°F)	292	286	284	**287**
B_w	Actual water vapor in gas (% by volume)	19.3	21.9	21.4	**20.9**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.44	41.26	40.90	**41.20**
FF Outlet Laboratory Data					
m_n	Total HCl collected (mg)	41.0379	22.1246	34.7200	
FF Outlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	23	13	20	**18**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	30	16	25	**24**
RE	Reduction Efficiency (% Removal)	95%	97%	96%	**96%**

Table 2-14:
Units 1, 2 and 3 FF Outlets – Opacity by COMS

Run No.	1	2	3	Average
Unit 1				
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 (%)[1]				
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 (%)[1]				
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 (%)[1]				
Average Opacity	0	0	0	**0**
Maximum Reading	0	0	0	**0**
Minimum Reading	0	0	0	**0**

[1] 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.

RESULTS

Table 2-15:
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 Baghouse						
Visual Opacity (%)	March 17	12:43	14:03	60	0	
Ash Unloading/Conveyor						
Visual Opacity (%)	March 17	14:08	15:18	60	0	
Rolling Door/Door to Baghouse						Permit Limit
Visual Opacity (%)	March 17	15:23	16:33	60	0	
				Total (% of observation time) = 0		< 5% of observation Time
				Total (minutes) = 0		< 9 minutes

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

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

WHEELABRATOR SOUTH BROWARD, INC.
FT. LAUDERDALE, FL

CleanAir Project No: 10735-4

RESULTS

Table 2-17:
Air Flow Summary

Run Number	Run Date	Run Time	Steam Flow Klbs/hour	Flue Gas Temp Deg F	Air Flow ACFM	O_2 %	CO_2 %	Air Flow, DSCFM	Air Flow, DSCFM@ 7%O_2
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	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	183,298	9.7	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	184.1	295	187,686	10.4	9.2	102,636	77,475
	Facility Average		184.1	296	181,903	9.8	9.8	98,372	78,137

RESULTS

**Table 2-18:
Quality Control and Quality Assurance
PCDD/PCDF - Extraction Standard Percent Recoveries**

Sample Number	Extraction Standard Percent Recoveries, %						
	^{13}C-TCDD	^{13}C-PeCDD	^{13}C-HxCDD	^{13}C-HxCDD	^{13}C-HxCDD	^{13}C-HpCDD	^{13}C-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
Max	97.7	95.9	88.8	90.1	93.2	87.5	85
Within M23 QC	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

Sample Number	Extraction Standard Percent Recoveries, %									
	^{13}C-TCDF	^{13}C-PeCDF	^{13}C-PeCDF	^{13}C-HxCDF	^{13}C-HxCDF	^{13}C-HxCDF	^{13}C-HxCDF	^{13}C-HpCDF	^{13}C-HpCDF	^{13}C-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
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 QC	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

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

Sample Number	CS/SS Percent Recoveries, %				
	^{37}Cl-TCDD	^{13}C-PeCDD	^{13}C-PeCDF	^{13}C-HxCDF	^{13}C-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

RESULTS

Table 2-20:
Quality Control and Quality Assurance - Metals

RPD RESULTS

Run Number	FH Front Half	BH H_2O_2/HNO_4	A Empty Impinger	B $KMnO_4$	C HCl
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%
U2 Stack R1	NA	0.1%	NA	NA	NA
U2 Stack R2	NA	0.2%	NA	NA	NA
U2 Stack R3	NA	2.6%	NA	NA	NA
U3 Inlet R1	0.0%	1.2%	NA	NA	0.9%
U3 Inlet R2	1.1%	0.5%	NA	NA	NA
U3 Inlet R3	1.8%	1.9%	NA	NA	1.2%
U3 Stack R1	NA	1.1%	NA	NA	NA
U3 Stack R2	NA	1.2%	NA	NA	NA
U3 Stack R3	NA	1.7%	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA
Inlet Filter Blank	NA	NA	NA	NA	NA

Element	U1-FF-O-R2 RPD	U2-FF-O-R2 RPD	U3-FF-O-R2 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%

Table 2-21:
Quality Control and Quality Assurance – Metals (Continued)

Sample Spike and Recovery

Run Number		FH Front Half	BH H_2O_2/HNO_4	A Empty Impinger	B $KMnO_4$	C HCl
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%
U2 Inlet R3	#1	106%	91%	103%	103%	90%
	#2	106%	90%	103%	104%	90%
U2 Stack R3	#1	94%	85%	104%	92%	90%
	#2	95%	86%	103%	91%	91%
U3 Inlet R3	#1	99%	85%	97%	92%	93%
	#2	96%	83%	95%	91%	92%
U3 Stack R3	#1	98%	88%	105%	95%	90%
	#2	99%	88%	103%	94%	90%

Element	U1-FF-O-R3 Recovery	U2-FF-O-R3 Recovery	U3-FF-O-R3 Recovery
	12233-6	12233-12	12233-18
Beryllium	81%	82%	86%
Cadmium	87%	89%	93%
Lead	99%	100%	103%

Second Source Calibration Verification

Element	.25 ppb	1 ppb	50 ppb	100 ppb	250 ppb
	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%

RESULTS

Table 2-22:
Quality Control and Quality Assurance – Method and Field Blanks

Method 29		Average Total Catch ug	FH Front Half	BH H_2O_2/HNO_4	A Empty Impinger	B $KMnO_4$	C HCl
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 pg	Field Blank pg
Totals		
TCDDs	0	2.77
PeCDDs	0	0
HxCDDs	0	6.32
HpCDDs	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
Total 2378s (ND=0; EMPC=0)	12.3	15.6
Total 2378s (ND=0.5; EMPC=0)	34.4	29.0
Total 2378s (ND=1; EMPC=0)	56.5	42.3
Total 2378s (ND=0; EMPC=1)	12.3	15.6
Total 2378s (ND=0.5; EMPC=1)	34.4	29.0
Total 2378s (ND=1; EMPC=1)	56.5	42.3

Table 2-23:
Quality Control and Quality Assurance - Miscellaneous

Blanks	Result	
Acetone (g)	<0.0001	
HCl DI H_2O (mg/l)	<0.024	
HCl 0.1 N H_2SO_4 (mg/l)	<0.024	
HF DI H_2O (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

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.

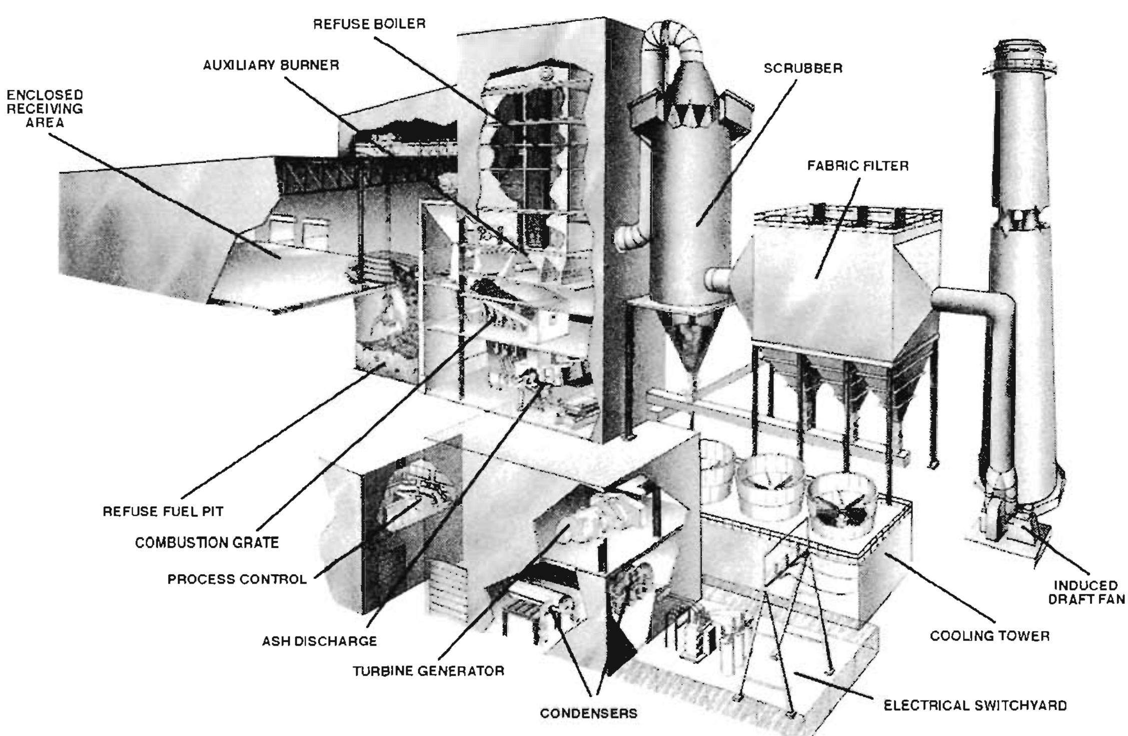


Figure 3-1: General Process Schematic

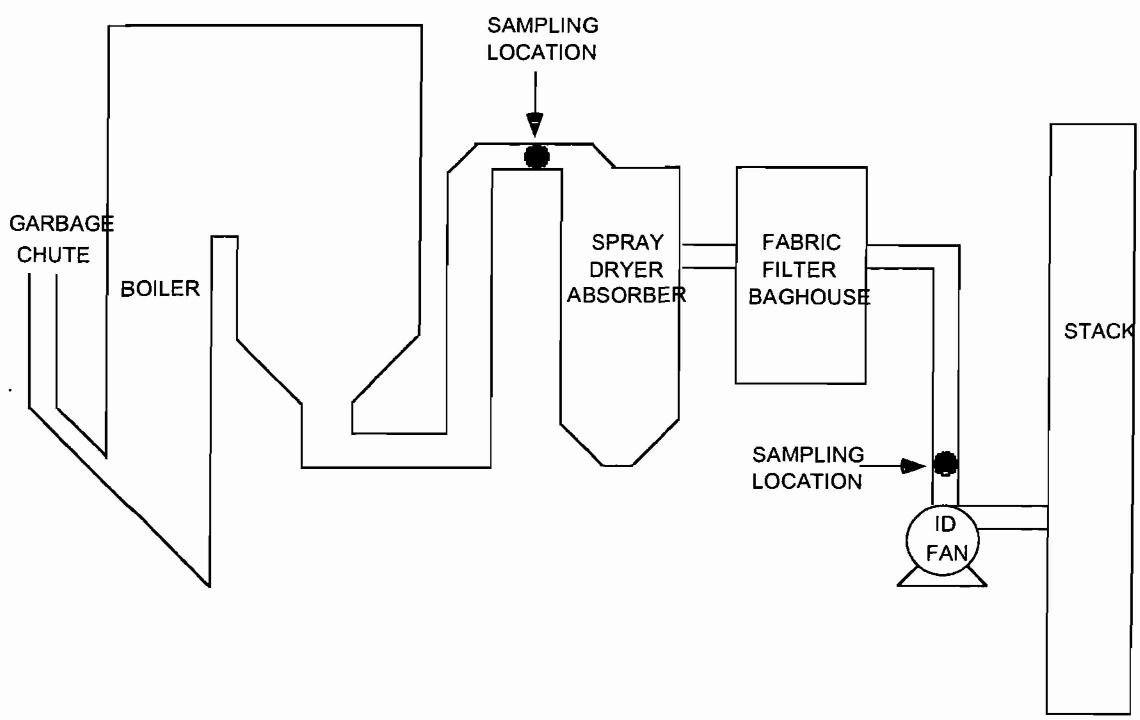


Figure 3-2: Process Schematic

DESCRIPTION OF INSTALLATION

Table 3-1:
Unit 1 Compliance Test Process Data

PLANT NAME: SOUTH BROWARD						Data from DCS Printouts						Calculated		Lime Feed Rate			
Test	Unit No.	Run No.	Date	Time Start	Time Stop	Steam Flow klbs/hr	FF Inlet Temp deg F	Fabric Filter Delta In. H2O	SDA Inlet Temp deg F	Total SDA Flow gpm	Diluton H2O flow gpm	Slurry Flow gpm	Slurry Conc. %	Slurry Specific Gravity	Slurry CaO Density lb/gal	CaO Flow 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
HCl		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		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	411.6	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		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	
		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	

Table 3-2:
Unit 2 Compliance Test Process Data

PLANT NAME: SOUTH BROWARD						Data From DCS Printouts						Calculated		Lime Feed Rate			
						Steam	FF Inlet	Fabric Filter	SDA Inlet	Total SDA	Diluton H2O	Slurry	Slurry	Slurry	Slurry CaO	CaO	
	Unit	Run		Time		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
HCl		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		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	
		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	
		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	
					Avg	184.9	318.2	7.0	508.1	36.8	30.9	5.9	18.9	1.093	0.974	344.1	

DESCRIPTION OF INSTALLATION

Table 3-3:
Unit 3 Compliance Test Process Data

PLANT NAME: SOUTH BROWARD						Data From DCS Printouts						Calculated		Lime Feed Rate			
Test	Unit No.	Run No.	Date	Time Start	Time Stop	Steam Flow klbs/hr	FF Inlet Temp deg F	Fabric Filter Delta In. H2O	SDA Inlet Temp deg F	Total SDA Flow gpm	Diluton H2O flow gpm	Slurry Flow gpm	Slurry Conc. %	Slurry Specific Gravity	Slurry CaO Density lb/gal	CaO Flow 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
HCl		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	
		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		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		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	
		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		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	
		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
Mercury		5	3/26/2008	0817	1030	184.0	315.1	6.4	488.8	39.2	31.8	7.4	19.2	1.094	0.985	438.5	
		6	3/26/2008	1055	1306	184.0	314.9	6.4	478.8	33.9	24.8	9.2	27.3	1.904	0.985	542.5	
					Avg	184.5		6.4	478.9	35.0	27.0	8.0	23.2	1.364	0.981	470.6	

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.

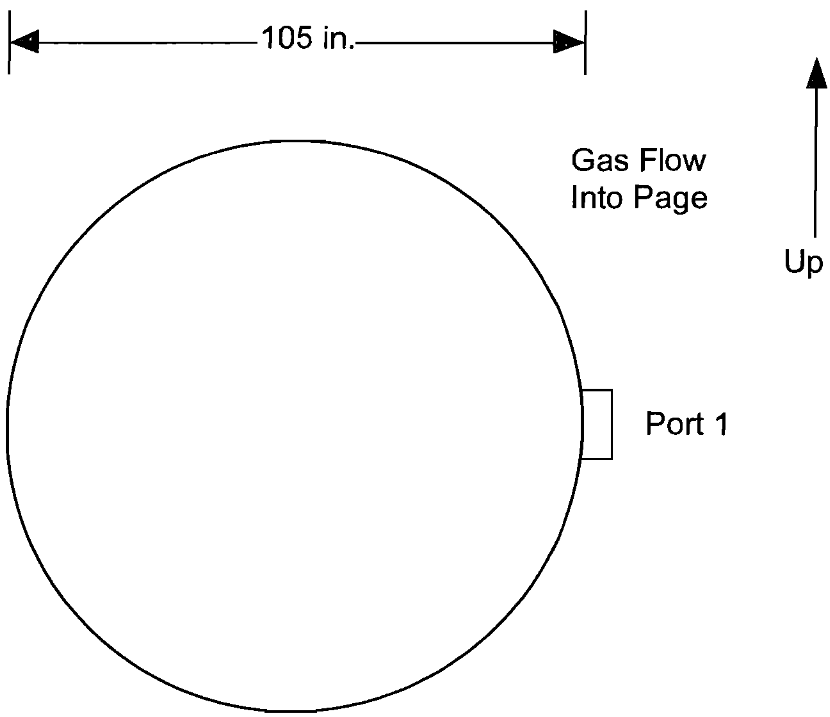
Table 3-4:
Sampling Points

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[1]	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[2]	1-3	5	5	5	125	3-5
	Hydrogen Chloride	26A[1]	1-3	1	1	60	60	NA
	Fluorides	13B	1-3	5	5	2.5	62.5	3-5
	PCDDs/PCDFs (Unit 1 only)	23	1-3	5	5	10	250	3-5

1 Hydrogen chloride inlet testing utilized a modification of EPA Method 26A (single point constant sampling rate).
2 FF Outlet metals testing was done in conjunction with EPA Method 5 particulate sampling.

DESCRIPTION OF INSTALLATION

DESCRIPTION OF SAMPLING LOCATIONS (CONTINUED)



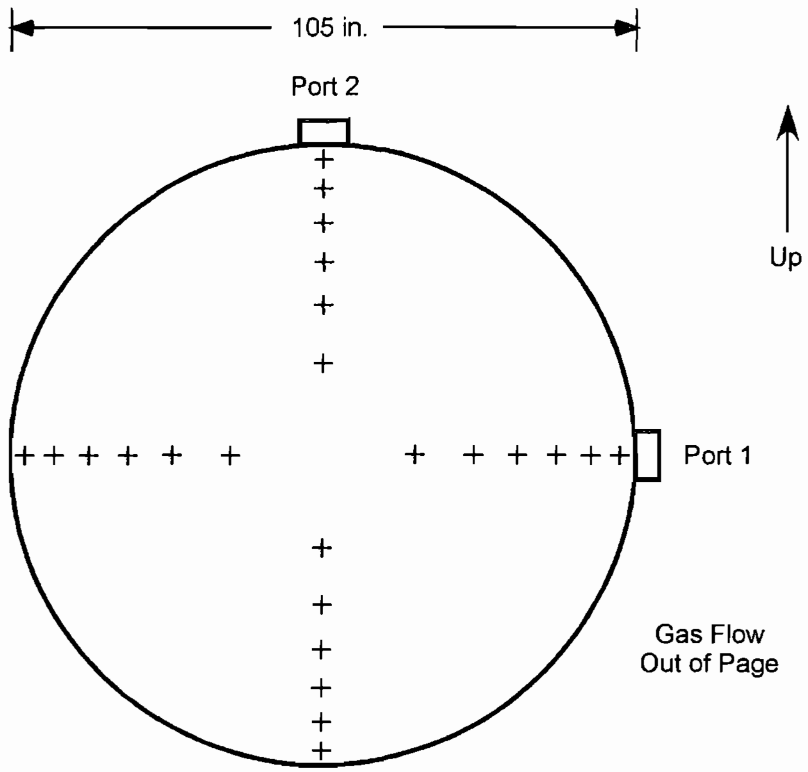
Sampling Point	Port to Point Distance (in.)
1	approximate center

Equivalent diameters to upstream disturbance: 2.0 Limit: 2.0
Equivalent diameters to downstream disturbance: 0.5 Limit: 0.5

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

DESCRIPTION OF INSTALLATION

SAMPLING POINT DETERMINATION (CONTINUED)

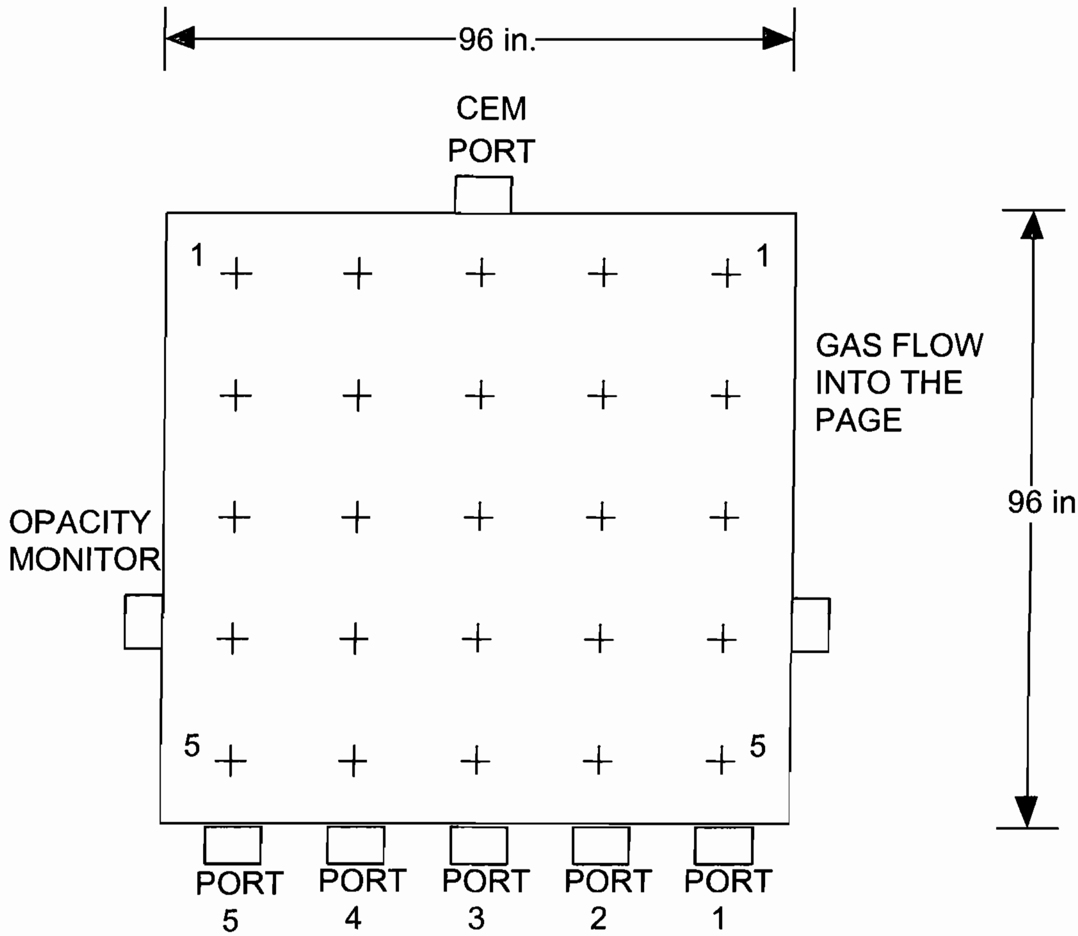


Sampling Point	Port to Point Distance (in.)
1	102.8
2	98.0
3	92.6
4	86.4
5	78.9
6	67.7
7	37.3
8	26.3
9	18.6
10	12.4
11	7.0
12	2.2

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)

DESCRIPTION OF SAMPLING LOCATIONS (CONTINUED)



Sampling Point	Port to Point Distance (in.)
1	86.4
2	67.2
3	48.0
4	28.8
5	9.6

Equivalent diameters to upstream disturbance: 2.0 Limit: 2.0
Equivalent diameters to downstream disturbance: 0.5 Limit: 0.5

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

End of Section 3 – Description of Installation

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

Title 40 CFR Part 60 Appendix A	
Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3	"Gas Analysis for the Determination of Dry Molecular Weight"
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 3B	"Gas Analysis for the Determination of Emission Rate Correction Factor or Excess Air"
Method 5	"Determination of Particulate Matter Emissions from Stationary Sources"
Method 9	"Visual Determination of the Opacity of Emissions from Stationary Sources"
Method 13B	"Determination of Total Fluoride Emissions from Stationary Sources (Specific Ion Electrode Method)"
Method 23	"Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Municipal Waste Conductors"
Method 22	"Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares"
Mod.Method 26A[1]	"Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method"
Method 29	"Determination of Metals Emissions from Stationary Sources"

[1] 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

APPENDIX

TEST METHOD SPECIFICATIONS

A

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Specification Sheet for EPA Method 5/29

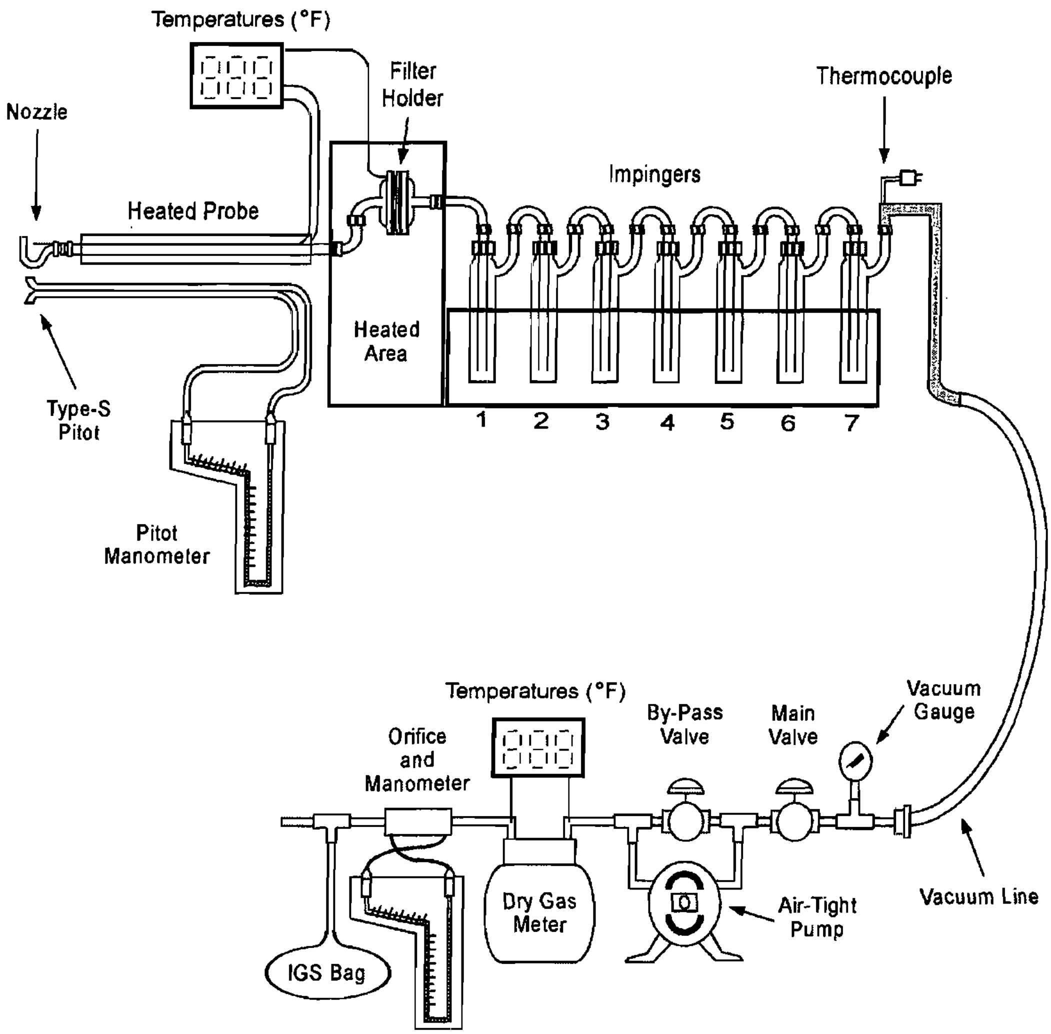
Source Location Name(s)	Units 1, 2 and 3 FF Outlets
Pollutant(s) to be Determined	Particulate Matter (PM) and Trace Metals (including Mercury)
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	125 minutes
No. of Sample Traverse Points	N/A	25
Sample Time per Point	N/A	5 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
Sampling Probe		
Nozzle Material	Borosilicate or Quartz 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
Velocity Measuring Equipment		
Pitot Tube Design	Type S	Type S
Pitot Tube Coefficient	N/A	0.812
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	Teflon (or other non-metallic material)	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	248°F±25°F	248°F±25°F
Filter Material	Quartz or Fiberglass Fiber	Quartz Fiber
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 5/29

	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 2	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 7	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Non-metallic swab or bristle	Teflon Mat
Probe Rinse Reagent	Acetone/0.1N Nitric Acid	Acetone/0.1N. Nitric Acid
Probe Rinse Wash Bottle Material	Glass or Teflon	Teflon
Probe Rinse Storage Container	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Filter Recovered?	Yes	Yes
Filter Storage Container	Petri Dish - Glass or Polystyrene	Glass
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Impinger Wash Bottle	Glass or Teflon	Teflon
Impinger Storage Container	See Recovery Flow Chart	See Recovery Flow Chart
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric and Volumetric
Filter Preparation Conditions	See Method 29 Analytical Flow Chart	For Metals Analysis
Front-Half Rinse Preparation	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Back-Half Analysis	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Additional Analysis	Gravimetric (EPA Method 5)	Gravimetric (EPA Method 5)

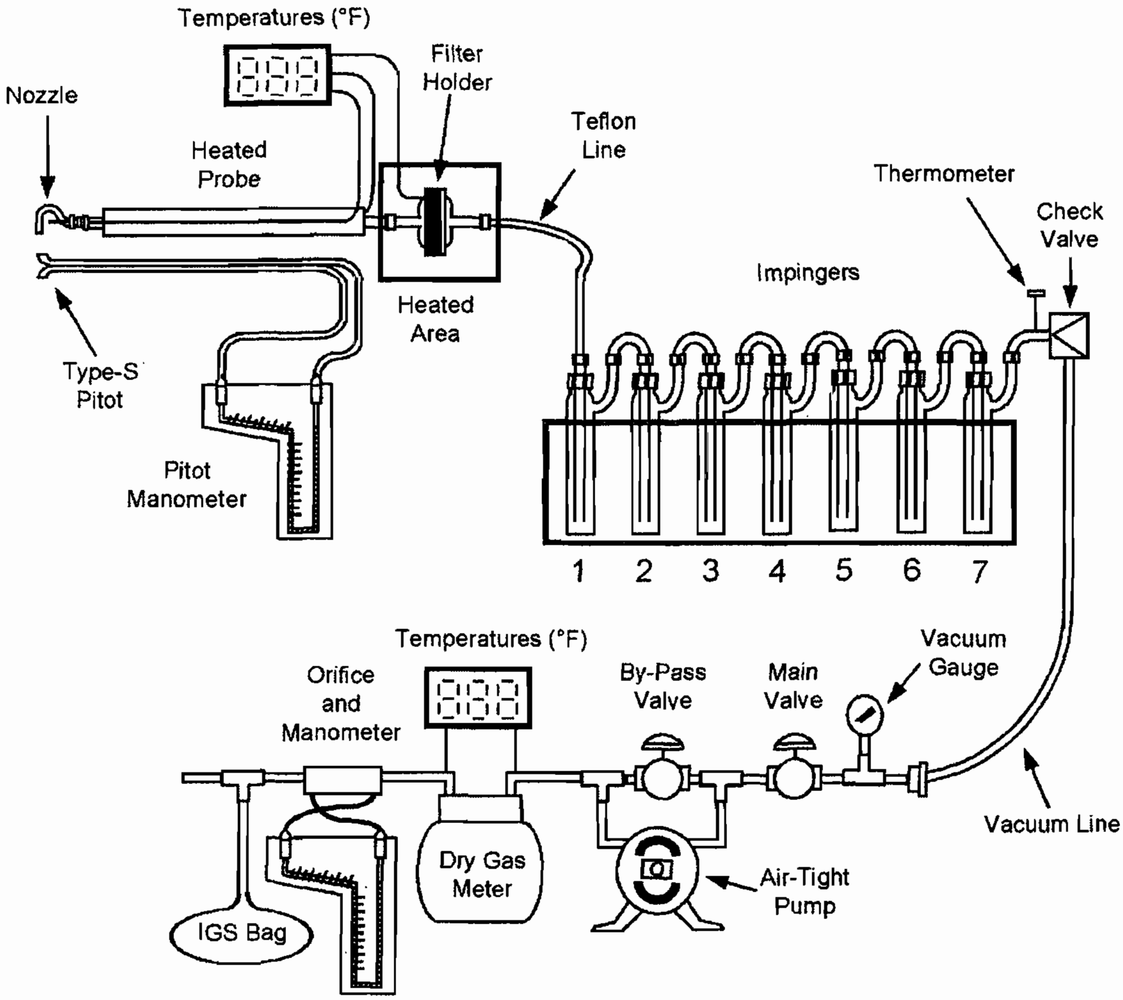
EPA Method 5/29
Sampling Train Configuration



<u>Impinger Contents</u>

Impinger 1	Empty
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2
Impinger 4	Empty
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4
Impinger 7	Silica Gel

EPA Method 29 SDA Inlet Sampling Train Configuration



Impinger	Impinger Contents
Impinger 1	Empty
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2
Impinger 4	Empty
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4
Impinger 7	Silica Gel

Specification Sheet for EPA Method 29

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

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	120 minutes
No. of Sample Traverse Points	N/A	24
Sample Time per Point	N/A	5 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
Sampling Probe		
Nozzle Material	Borosilicate or Quartz 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	10'
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
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	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

Specification Sheet for EPA Method 29

	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 2	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 7	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Non-metallic swab or bristle	Teflon Mat
Probe Rinse Reagent	0.1N Nitric Acid	0.1 N Nitric Acid
Probe Rinse Wash Bottle Material	Glass or Teflon	Teflon
Probe Rinse Storage Container	Polyethylene or glass	Polyethylene
Filter Recovered?	Yes	Yes
Filter Storage Container	Petri Dish - Glass or Polystyrene	Polyethylene
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Impinger Wash Bottle	Glass or Teflon	Teflon
Impinger Storage Container	See Recovery Flow Chart	See Recovery Flow Chart
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric and Volumetric
Filter Preparation Conditions	See Method 29 Analytical Flow Chart	For Metals Analysis
Front-Half Rinse Preparation	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Back-Half Analysis	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Additional Analysis	None	None

EPA Method 29
Glassware Preparation Procedures

Wash with soap and hot tap water

↓

Rinse 3X with hot tap water

↓

Rinse 3X with D.I. water

↓

Soak in 10% nitric acid bath for 4 hours

↓

Rinse 3X with D.I. water

↓

Rinse 3X with metals grade acetone

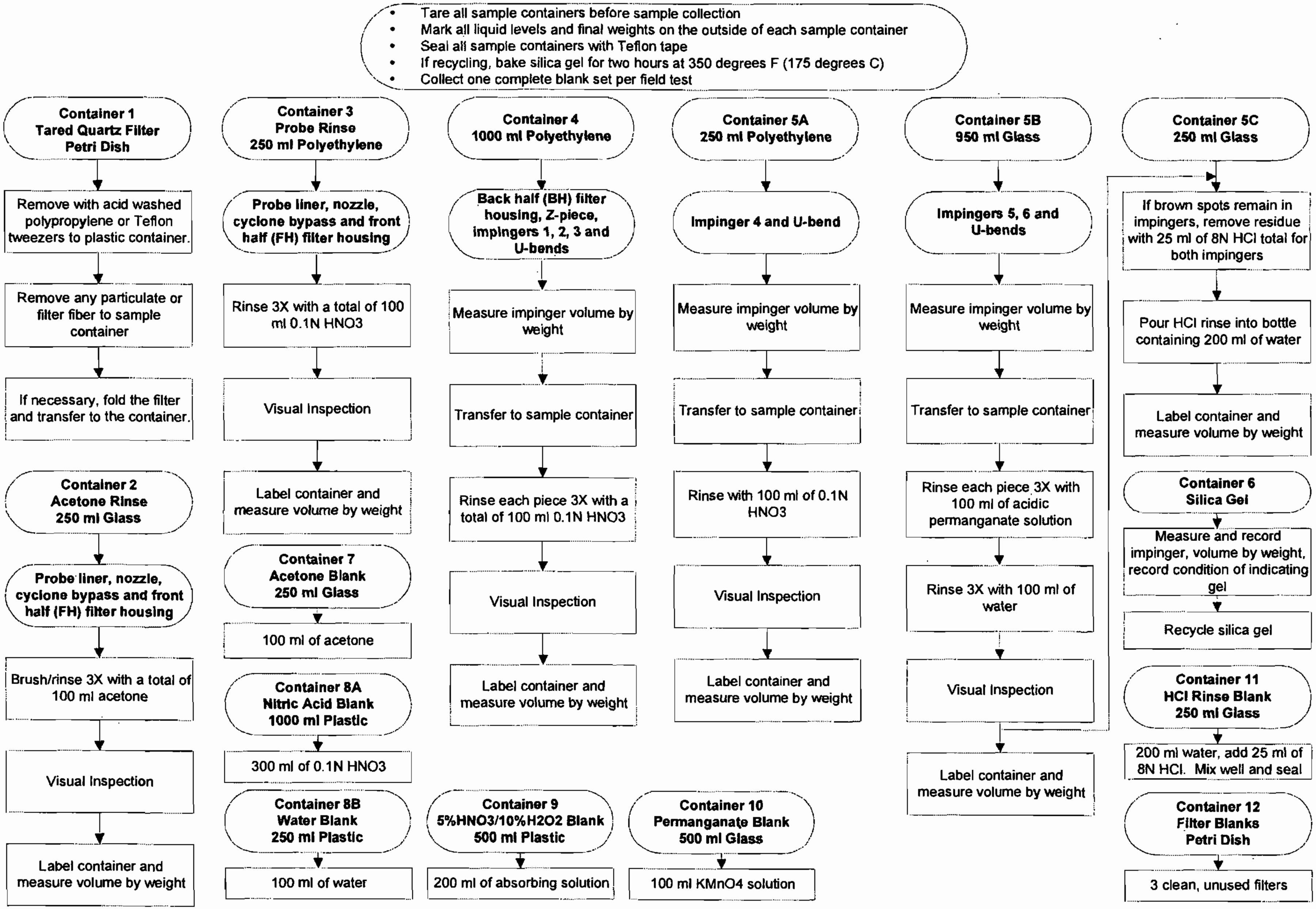
↓

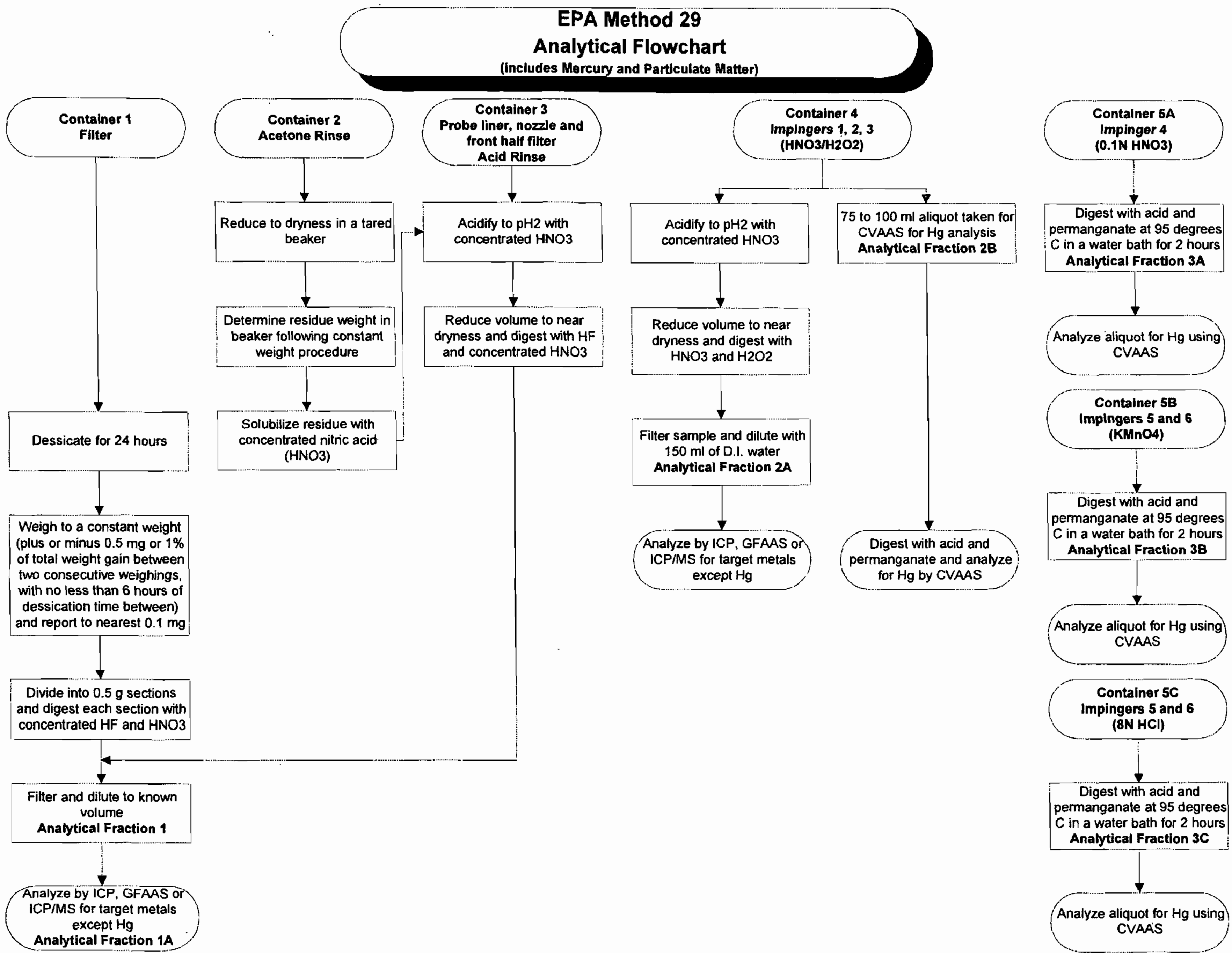
Allow to air dry

↓

Cover all openings with parafilm

EPA Method 29
Sample Recovery Flowchart
(includes Mercury and Particulate Matter)




EPA Method 29
Analytical Flowchart
(includes Mercury and Particulate Matter)
Container 1
Filter
Dessicate for 24 hours
Weigh to a constant weight (plus or minus 0.5 mg or 1% of total weight gain between two consecutive weighings, with no less than 6 hours of dessication time between) and report to nearest 0.1 mg
Divide into 0.5 g sections and digest each section with concentrated HF and HNO3
Filter and dilute to known volume
Analytical Fraction 1
Analyze by ICP, GFAAS or ICP/MS for target metals except Hg
Analytical Fraction 1A
Container 2
Acetone Rinse
Reduce to dryness in a tared beaker
Determine residue weight in beaker following constant weight procedure
Solubilize residue with concentrated nitric acid (HNO3)
Container 3
Probe liner, nozzle and front half filter
Acid Rinse
Acidify to pH2 with concentrated HNO3
Reduce volume to near dryness and digest with HF and concentrated HNO3
Container 4
Impingers 1, 2, 3
(HNO3/H2O2)
Acidify to pH2 with concentrated HNO3
Reduce volume to near dryness and digest with HNO3 and H2O2
Filter sample and dilute with 150 ml of D.I. water
Analytical Fraction 2A
Analyze by ICP, GFAAS or ICP/MS for target metals except Hg
75 to 100 ml aliquot taken for CVAAS for Hg analysis
Analytical Fraction 2B
Digest with acid and permanganate and analyze for Hg by CVAAS
Container 5A
Impinger 4
(0.1N HNO3)
Digest with acid and permanganate at 95 degrees C in a water bath for 2 hours
Analytical Fraction 3A
Analyze aliquot for Hg using CVAAS
Container 5B
Impingers 5 and 6
(KMnO4)
Digest with acid and permanganate at 95 degrees C in a water bath for 2 hours
Analytical Fraction 3B
Analyze aliquot for Hg using CVAAS
Container 5C
Impingers 5 and 6
(8N HCl)
Digest with acid and permanganate at 95 degrees C in a water bath for 2 hours
Analytical Fraction 3C
Analyze aliquot for Hg using CVAAS

Specification Sheet for EPA Method 13B

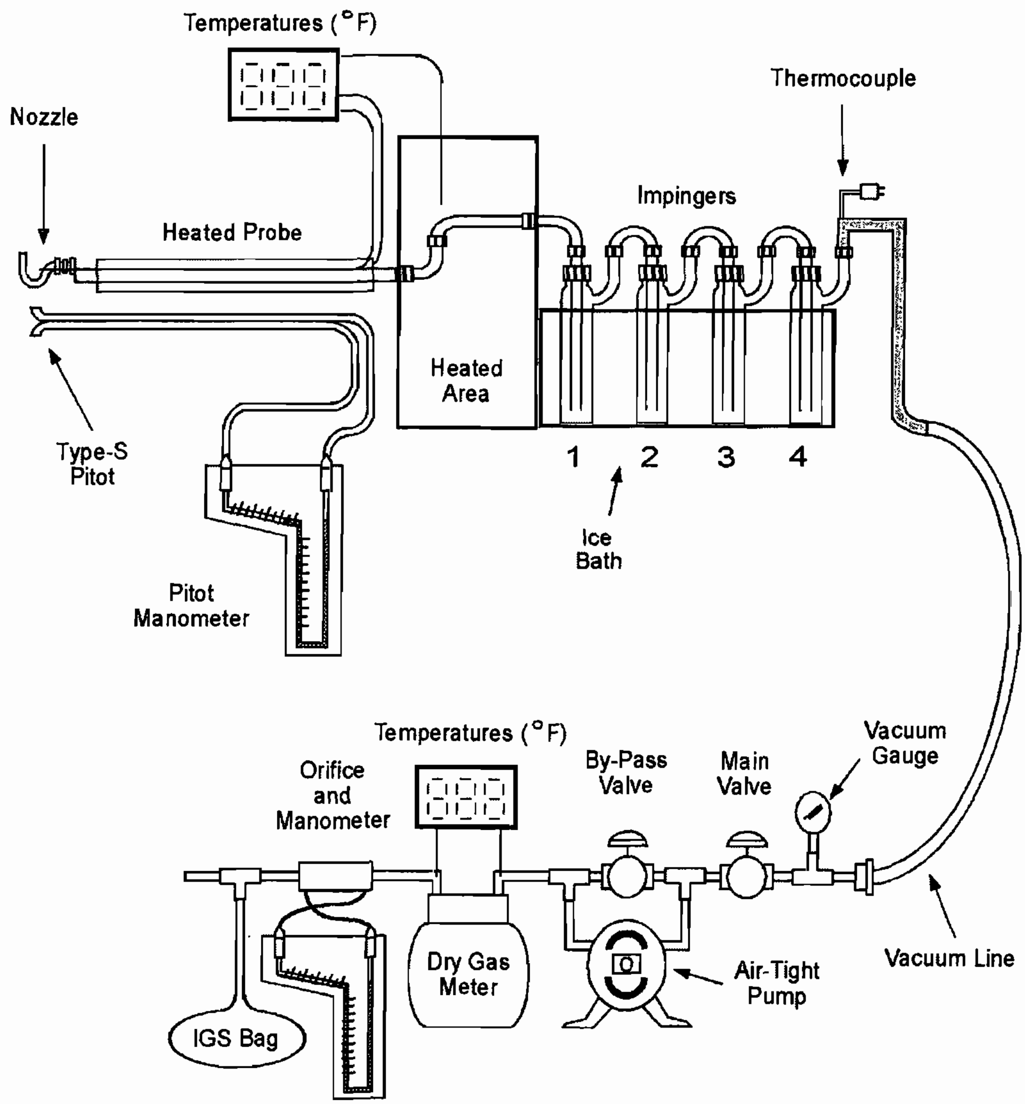
Source Location Name(s)	Units 1 ,2 and 3 FF Outlets
Pollutant(s) to be Determined	Total Fluoride (F)
Other Parameters to be Determined from Trai	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
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	Borosilicate Glass
Nozzle Design	Button-Hook or Elbow	Button-Hook
Probe Liner Material	Stainless Steel or Glass	Borosilicate Glass
Effective Probe Length	N/A	8 feet
Probe Temperature Set-Point	248°F±25°F (optional)	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		
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	Exit of Probe or Between 3rd and 4th impingers	Exit of Probe
Filter Holder Material	Borosilicate Glass or Stainless Steel	Borosilicate Glass
Filter Support Material	Stainless Steel if filter at probe exit; Glass Frit if filter 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
Filter Material	Low F Quartz or Fiberglass if after probe, Whatman 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

Specification Sheet for EPA Method 13B

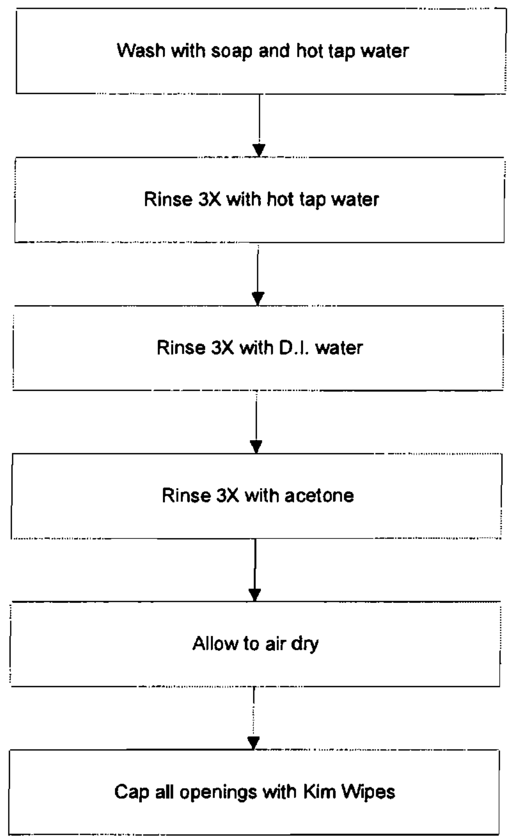
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	4	4
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 2	Greenburg-Smith	Greenburg-Smith
Impinger 3	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5		
Impinger 6		
Impinger 7		
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Nylon Bristle	Nylon Bristle
Probe Rinse Reagent	Deionized distilled water	Deionized Distilled Water
Probe Rinse Wash Bottle Material	Glass or Polyethylene	Teflon
Probe Rinse Storage Container	Polyethylene	Polyethylene
Filter Recovered?	Yes	Yes
Filter Storage Container	Polyethylene	Polyethylene
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	Deionized Distilled Water	Deionized Distilled Water
Impinger Wash Bottle	Glass or Polyethylene	Teflon
Impinger Storage Container	Polyethylene	Polyethylene
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric and Volumetric
Filter Preparation Conditions	See analytical flow chart	See Analytical Flow Chart
Front-Half Rinse Preparation	See analytical flow chart	See Analytical Flow Chart
Back-Half Analysis	Ion Specific Electrode	Ion Chromatography
Additional Analysis	N/A	None

EPA Method 13B
Sampling Train Configuration



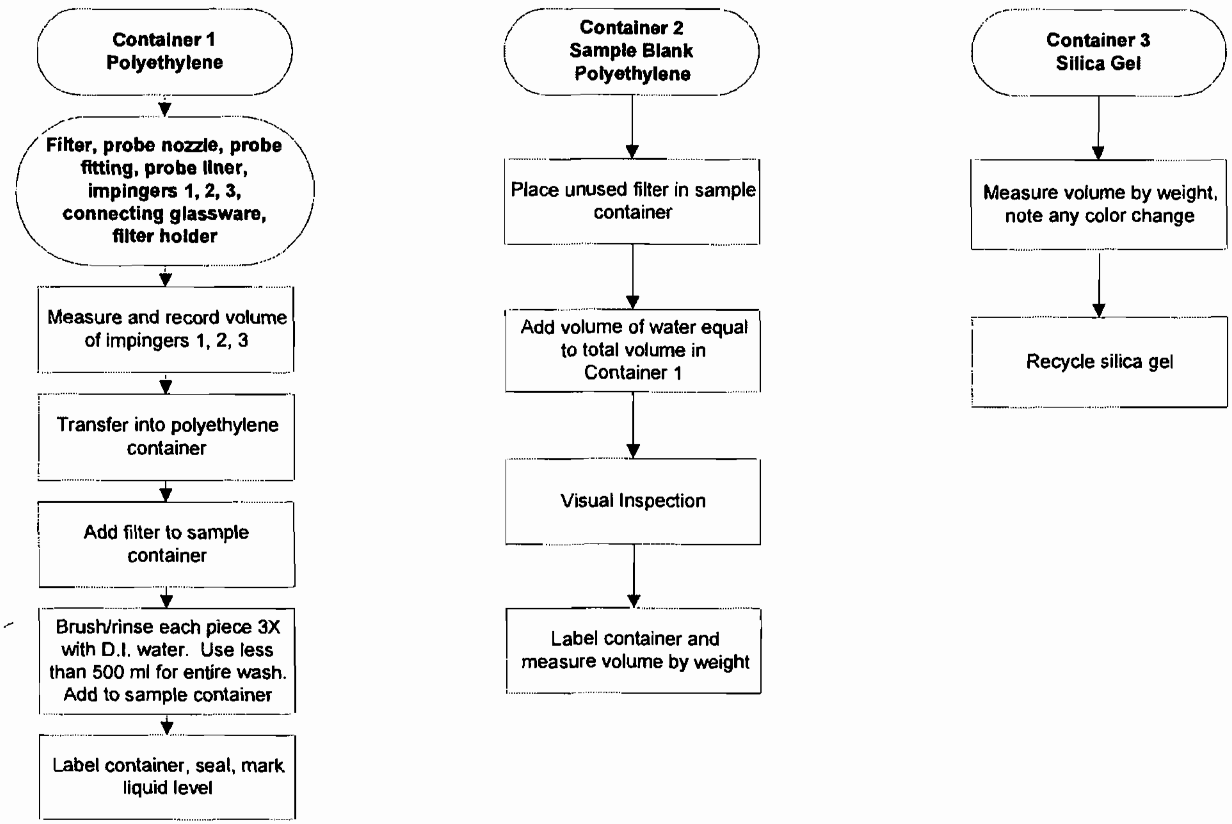
Impinger Contents	
Impinger 1	100 ml DI H_2O
Impinger 2	100 ml DI H_2O
Impinger 3	Empty
Impinger 4	Silica Gel

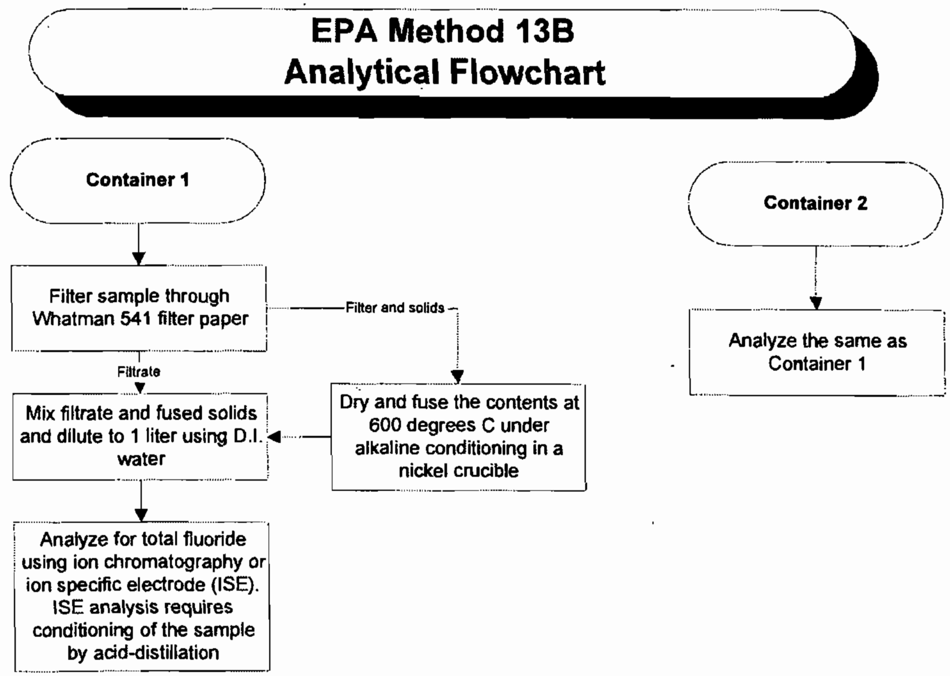
EPA Method 13B
Glassware Preparation Procedures



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 13B
Analytical Flowchart
Container 1
Filter sample through Whatman 541 filter paper
Filter and solids
Filtrate
Dry and fuse the contents at 600 degrees C under alkaline conditioning in a nickel crucible
Mix filtrate and fused solids and dilute to 1 liter using D.I. water
Analyze for total fluoride using ion chromatography or ion specific electrode (ISE). ISE analysis requires conditioning of the sample by acid-distillation
Container 2
Analyze the same as Container 1

Specification Sheet for EPA Method 23

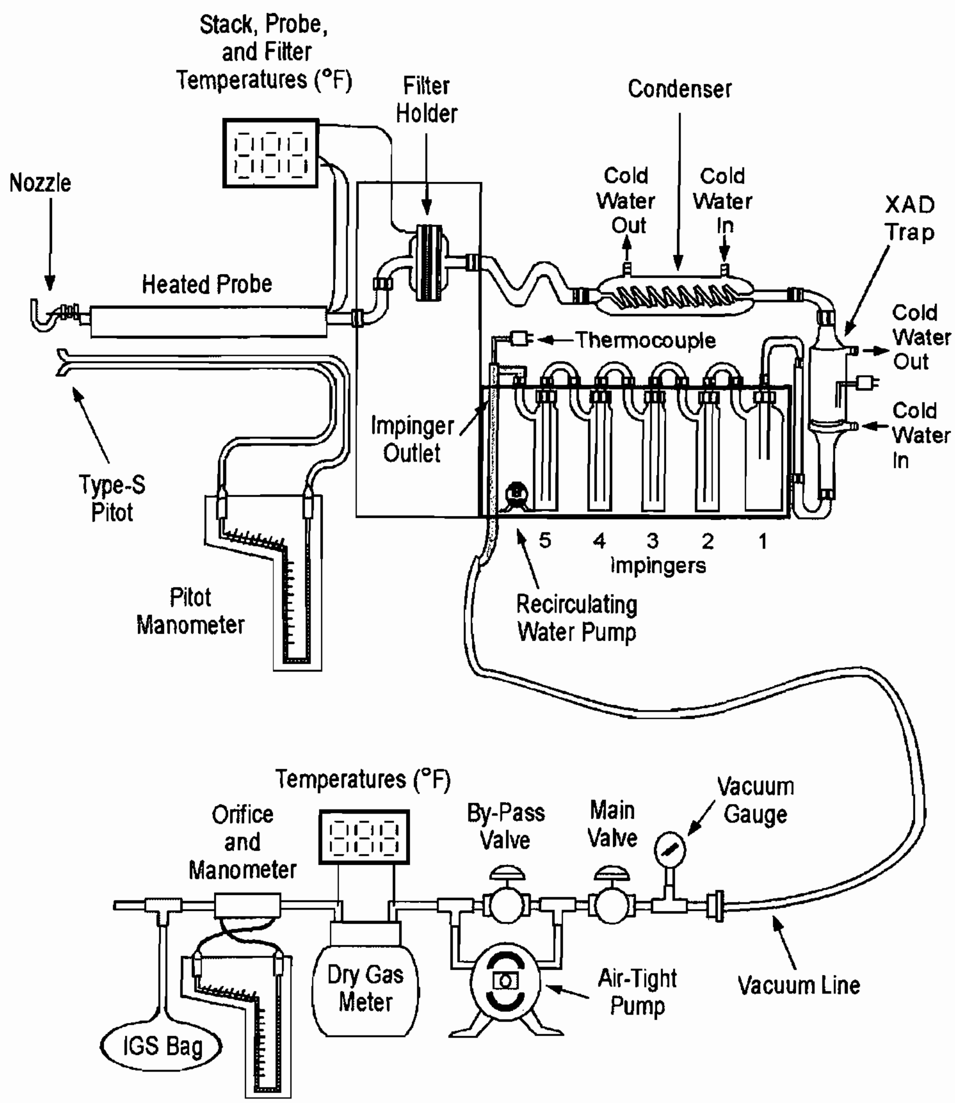
Source Location Name(s)	Unit 1 FF Outlet
Pollutant(s) to be Determined	Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans (PCDD/PCDF)
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	250 minutes
No. of Sample Traverse Points	N/A	25
Sample Time per Point	N/A	10 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
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
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

Specification Sheet for EPA Method 23

	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	5	5
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Shortened Stem (open tip)
Impinger 2	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6		
Impinger 7		
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Inert Bristle	Teflon Mat
Probe Rinse Reagent	Acetone/Methylene Chloride/Toluene	Acetone/Toluene (see Appendix J)
Probe Rinse Wash Bottle Material	Glass or Teflon	Teflon
Probe Rinse Storage Container	Glass	Glass
Filter Recovered?	Yes	Yes
Filter Storage Container	Petri Dish - Glass or Polystyrene	Glass
Impinger Contents Recovered?	No	Archived
Impinger Rinse Reagent	N/A	HPLC Water
Impinger Wash Bottle	N/A	Teflon
Impinger Storage Container	N/A	Polyethylene
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric
Filter Preparation Conditions	See Method 23 Analytical Flow Chart	For Organic Analysis
Front-Half Rinse Preparation	See Method 23 Analytical Flow Chart	Organic Analysis
Back-Half Analysis	N/A	Archive
Additional Analysis	None	None

EPA Method 23
Sampling Train Configuration



<u>Impinger Contents</u>

Impinger 1	Empty
Impinger 2	100 ml HPLC H_2O
Impinger 3	100 ml HPLC H_2O
Impinger 4	Empty
Impinger 5	Silica Gel

EPA Method 23
Glassware Preparation Procedures

Wash with soap and hot tap water

Rinse 3X with hot tap water

Rinse 3X with D.I. water

Oven dry at 450 degrees F for 2 hours

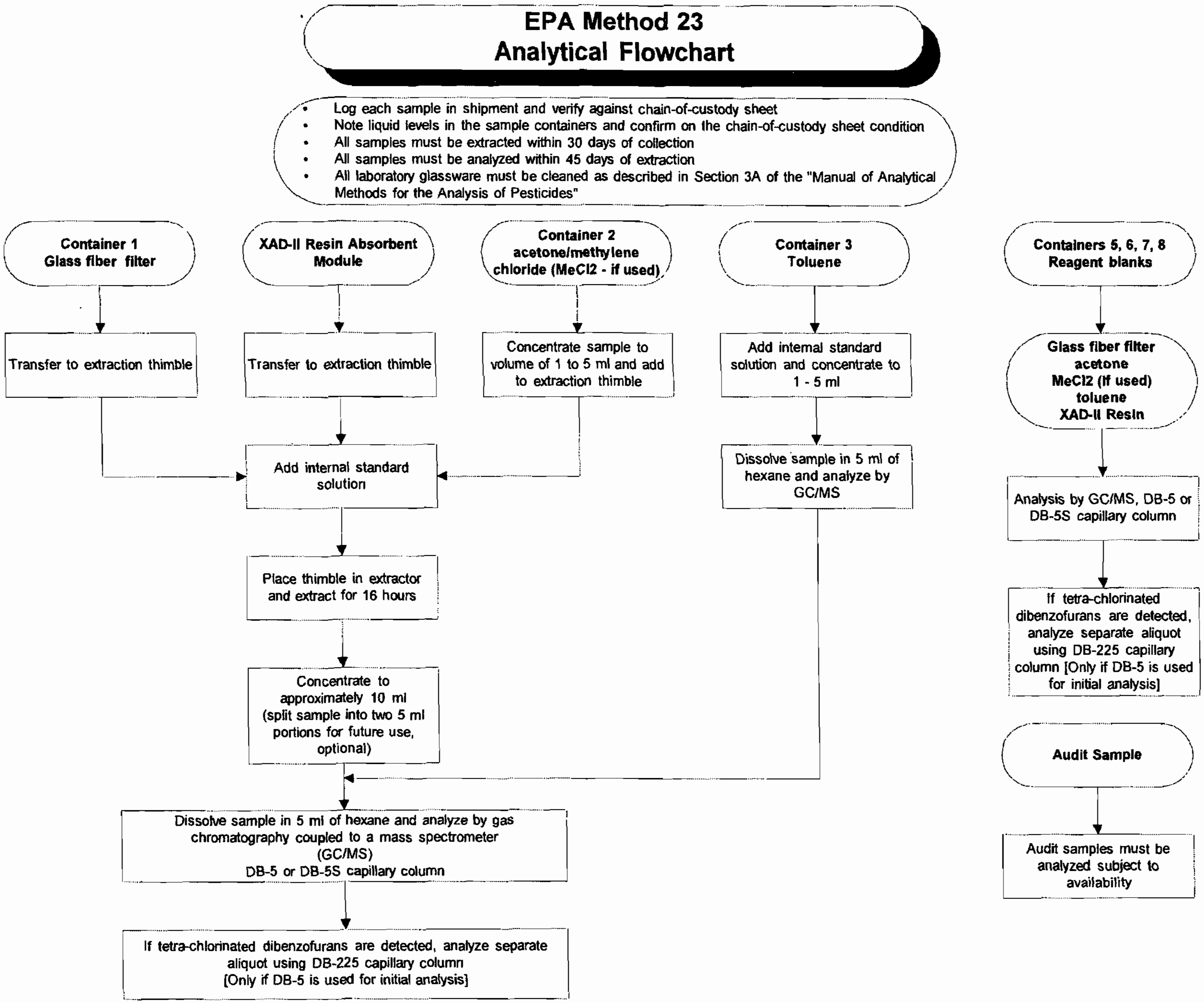
Rinse 3X with acetone

Rinse 3X with methylene chloride (MeCl2)

Allow to air dry

Cover all openings with MeCl2 cleaned aluminum foil

EPA Method 23
Sample Recovery Flowchart


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 Methods for the Analysis of Pesticides"
Container 1 Glass fiber filter
XAD-II Resin Absorbent Module
Container 2 acetone/methylene chloride (MeCl2 - if used)
Container 3 Toluene
Containers 5, 6, 7, 8 Reagent blanks
Transfer to extraction thimble
Transfer to extraction thimble
Concentrate sample to volume of 1 to 5 ml and add to extraction thimble
Add internal standard solution and concentrate to 1 - 5 ml
Glass fiber filter acetone MeCl2 (if used) toluene XAD-II Resin
Add internal standard solution
Dissolve sample in 5 ml of hexane and analyze by GC/MS
Analysis by GC/MS, DB-5 or DB-5S capillary column
Place thimble in extractor and extract for 16 hours
If tetra-chlorinated dibenzofurans are detected, analyze separate aliquot using DB-225 capillary column [Only if DB-5 is used for initial analysis]
Concentrate to approximately 10 ml (split sample into two 5 ml portions for future use, optional)
Audit Sample
Dissolve sample in 5 ml of hexane and analyze by gas chromatography coupled to a mass spectrometer (GC/MS) DB-5 or DB-5S capillary column
Audit samples must be analyzed subject to availability
If tetra-chlorinated dibenzofurans are detected, analyze separate aliquot using DB-225 capillary column [Only if DB-5 is used for initial analysis]

Specification Sheet for EPA Method 26A (modified)

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

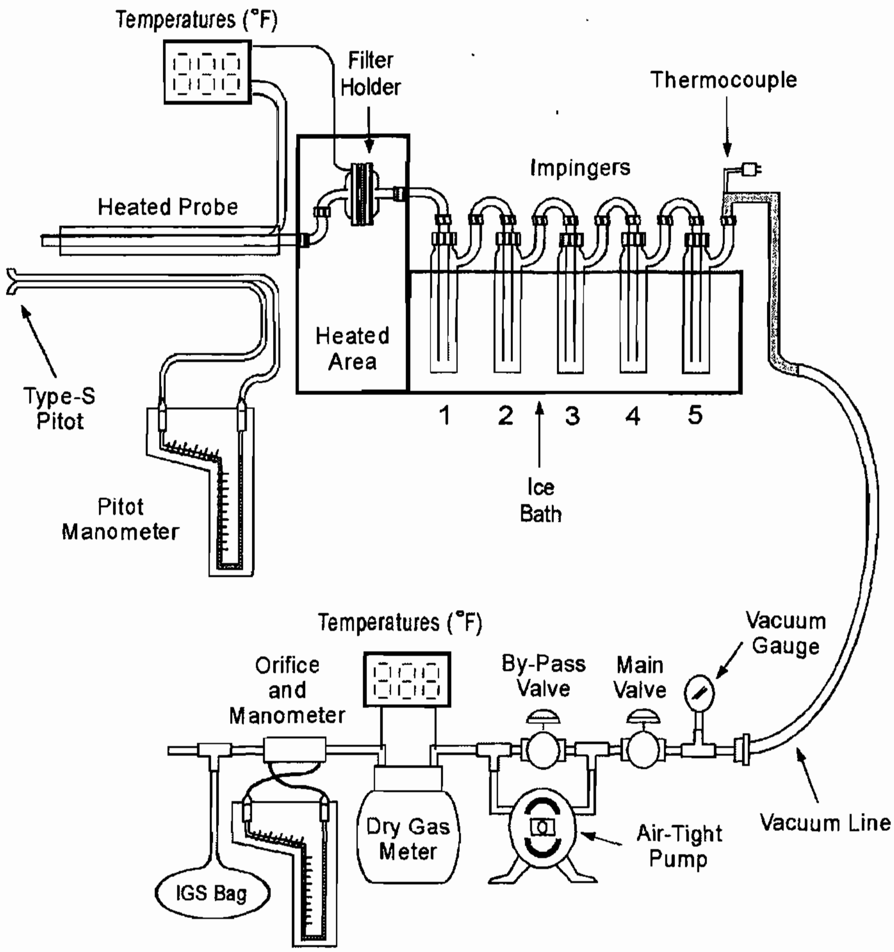
Source Location Name(s)	Units 1-3 SDA Inlets and Units 1-3 FF Outlets
Pollutant(s) to be Determined	Hydrogen Chloride (HCl)
Other Parameters to be Determined from Train	Gas Density, Moisture

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	60 minutes
No. of Sample Traverse Points	N/A	1
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	N/A	N/A
Probe Liner Material	Borosilicate Glass	Borosilicate Glass
Effective Probe Length	N/A	5 feet
Probe Temperature Set-Point	>248°F	350°F @ Inlet, Stack Temp @ FF Outlet
Velocity Measuring Equipment		
Pitot Tube Design	None	None
Pitot Tube Coefficient	N/A	N/A
Pitot Tube Calibration by	N/A	N/A
Pitot Tube Attachment	N/A	N/A
Metering System Console		
Meter Type	Dry Gas Meter or Critical Orifice	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	2 liters/minute	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter	Wet Test Meter
Pump Type	Diaphragm or equivalent	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	N/A	N/A
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	Teflon Frit	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	>248°F	350°F @ Inlet, Stack Temp @ FF Outlet
Filter Material	Teflon/Glass Mat (Quartz, Optional High Temp>410F)	Quartz Fiber @ Inlet, Teflon on Glass @ Outlet
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 26A (modified)

	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	5 or 6 (Midget Impingers)	5
Impinger Stem Types		
Impinger 1	Midget Shortened Stem	Shortened Stem (open tip)
Impinger 2	Midget Bubbler	Greenburg-Smith
Impinger 3	Midget Bubbler	Greenburg-Smith
Impinger 4	Midget Bubbler	Modified Greenburg-Smith
Impinger 5	Midget Bubbler	Modified Greenburg-Smith
Impinger 6	Mae West	
Impinger 7		
Impinger 8		
Gas Density Determination		
Sample Collection	N/A	Single Point Integrated
Sample Collection Medium	N/A	Vinyl Bag
Sample Analysis	N/A	CEM
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	No
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 by	N/A	Gravimetric
Filter Preparation Conditions	N/A	N/A
Front-Half Rinse Preparation	N/A	N/A
Back-Half Analysis	Ion Chromatography	Ion Chromatography
Additional Analysis	None	None

Modified EPA Method 26A
Sampling Train Configuration

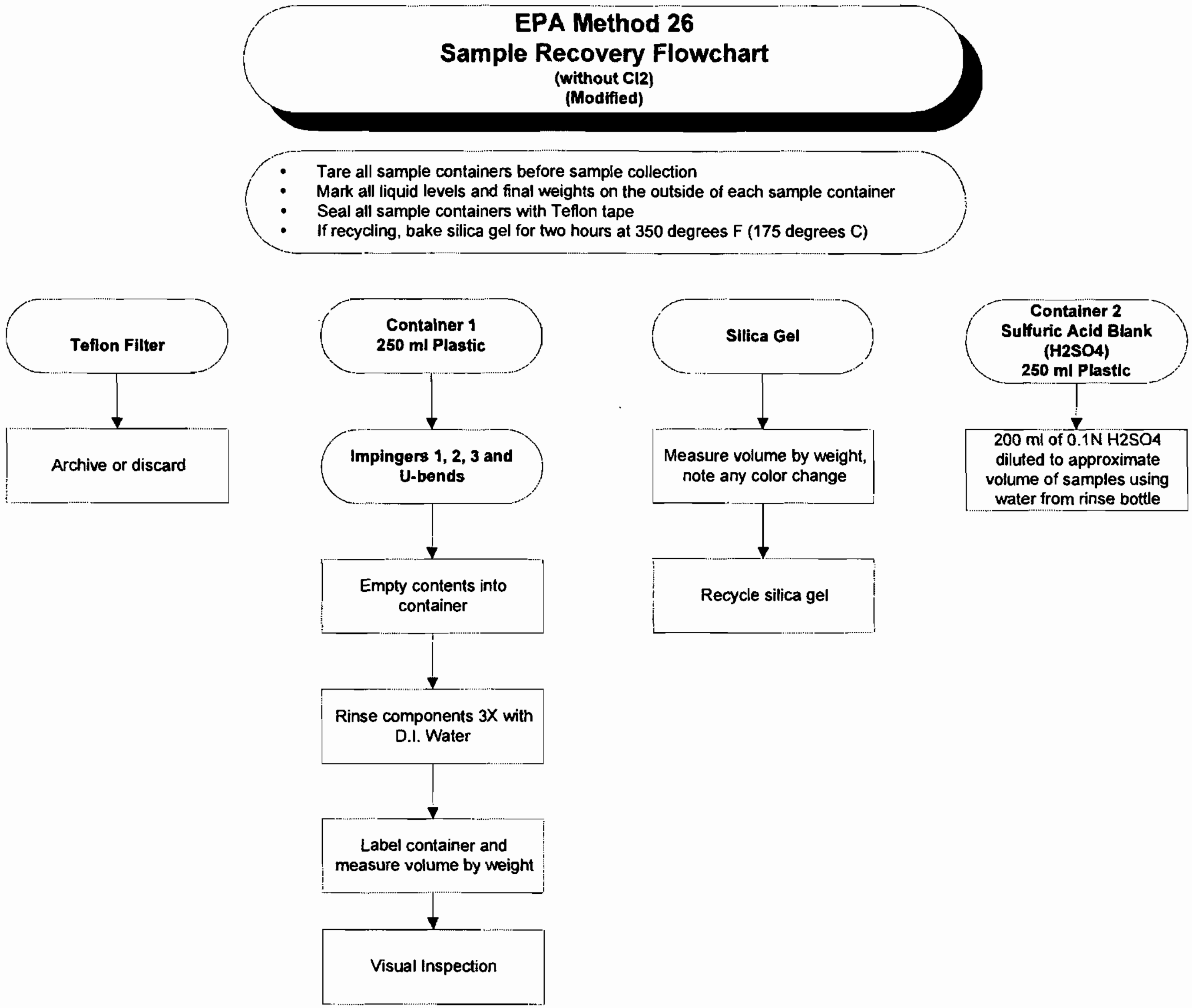


<u>Impinger Contents</u>

Impinger 1	50 ml 0.1 N H_2SO_4
Impinger 2	100 ml 0.1 N H_2SO_4
Impinger 3	100 ml 0.1 N H_2SO_4
Impinger 4	Empty
Impinger 5	Silica Gel

EPA Method 26A
Glassware Preparation Procedures

1. Wash with soap and hot tap water
2. Rinse 3X with hot tap water
3. Rinse 3X with D.I. water
4. Rinse 3X with acetone
5. Allow to air dry
6. Cap all openings with Kim Wipes


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)
Teflon Filter
Archive or discard
Container 1 250 ml Plastic
Impingers 1, 2, 3 and U-bends
Empty contents into container
Rinse components 3X with D.I. Water
Label container and measure volume by weight
Visual Inspection
Silica Gel
Measure volume by weight, note any color change
Recycle silica gel
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 Cl2)
(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

Container 1
Back half filter holder, Impingers 1, 2, 3 and connecting glassware

↓

Quantitatively transfer each sample to a volumetric flask and dilute with water

↓

Analyze by ion chromatography for total chloride

↓

Report results as HCl

Reagent Blanks

↓

Analyze by ion chromatography for total chloride

Audit Samples

↓

Audit samples must be analyzed the same as field samples

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SAMPLE CALCULATIONS

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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.

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L

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^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	13.26	ft^3

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_{bar}	= barometric pressure (in. Hg)	=	30.10	in. Hg
T_m	= average dry gas meter temperature (°F)	=	76.92	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	69.46	dcf
Y_d	= gas meter correction factor (dimensionless)	=	1.0079	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.05	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{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:

P_{bar}	= barometric pressure (in. Hg)	=	30.10	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-1.50	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.99	in. Hg

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Date ________

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

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

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

Where:

T_s	= average sample gas temperature (°F)	=	505.38	°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)	=	29.99	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)	=	29.99	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.99	in. Hg

6. Moisture measured in sample (% by volume)

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

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	69.410	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	13.26	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.1604	
		=	16.04	%

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Date ________

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)	=	29.99	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.99	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	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_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.7	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.33	%

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QA/QC ________
Date ________

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

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

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= 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_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.7	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.3	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	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_w	= proportion of water vapor in the gas stream by volume	=	0.1604	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	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)

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

Where:

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
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.651	$\sqrt{\text{in. } H_2O}$
460	= °F to °R conversion constant	=	460	
V_s	= 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^2)	=	60.13	ft^2
V_s	= 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:

Q_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)

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

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.1604	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	96,662	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	81,161	dscfm

16. Dry flow of sample gas corrected to 7%O_2 (dscfm)

$$Q_{std7} = (Q_{std})\left(\frac{20.9 - O_2}{20.9 - 7}\right)$$

Where:

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

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	81,161	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	4,869,674	dscf/hr

18. Metric Conversion of Gas Volumes (Q_{std} example)

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

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft^3/min)	=	81,161	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m^3/hr)	=	137,912	dry std m^3/hr

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

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

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m^3/hr)	=	137,912	dry std m^3/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm^3/hr)	=	128,509	dry Nm^3/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.275	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. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.048	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	29.98	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.020	√in. H_2O
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_2O/in. Hg)	=	13.6	in.H_2O/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 ($m_{Total-B}$) 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	$m_{Total-B}$ = Sum D, 1-5	$m_{Total-B}$ = Sum D	$m_{Total-B}$ = < Sum ND
ND=1x	$m_{Total-B}$ = Sum D, 1-5	$m_{Total-B}$ = Sum D	$m_{Total-B}$ = < Sum ND
ND=0.5x	$m_{Total-B}$ = Sum D, 1-5	$m_{Total-B}$ = Sum D	$m_{Total-B}$ = < 0.5 Sum ND

2. Logic for Determining Total Sample ($m_{Total-S}$) 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	$m_{Total-S}$ = Sum D, 1-5	$m_{Total-S}$ = Sum D	$m_{Total-S}$ = < Sum ND
ND=1x	$m_{Total-S}$ = Sum D, 1-5	$m_{Total-S}$ = < [Sum D + Sum ND]	$m_{Total-S}$ = < Sum ND
ND=0.5x	$m_{Total-S}$ = Sum D, 1-5	$m_{Total-S}$ = < [SumD+0.5 SumND	$m_{Total-S}$ = < 0.5 Sum ND

3. Logic for Determining Maximum Allowable Blank Correction ($m_{T-B-allow}$)

Rule	CASE 1 All 5 fractions are D. $m_{Total-B}$ = D	CASE 2 1 to 4 sample fractions are ND $m_{Total-B}$ = D	CASE 3 All 5 fractions are ND $m_{Total-B}$ = D	CASE 4 Any type of fractions $m_{Total-B}$ = ND
ND = 0	$m_{T-B-allow}$ = M29 Rule	$m_{T-B-allow}$ = M29 Rule*	$m_{T-B-allow}$ = 0	$m_{T-B-allow}$ = 0
ND=1x	$m_{T-B-allow}$ = M29 Rule	$m_{T-B-allow}$ = M29 Rule*	$m_{T-B-allow}$ = 0	$m_{T-B-allow}$ = 0
ND=0.5x	$m_{T-B-allow}$ = M29 Rule	$m_{T-B-allow}$ = M29 Rule*	$m_{T-B-allow}$ = 0	$m_{T-B-allow}$ = 0

* M29 rule using only detected sample quantities for logical comparisons.

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

Rule	CASE 1 All 5 fractions are D. $m_{Total-S} - m_{T-B-allow} \geq$ MIN(MDL)	CASE 2 1 to 4 sample fractions are ND $m_{Total-S} - m_{T-B-allow} \geq$ MIN(MDL)	CASE 3 All 5 fractions are ND $m_{Total-S}$ and $m_{T-B-allow}$ anything	CASE 4 Any type of fractions $m_{Total-S} - m_{T-B-allow} <$ MIN(MDL)
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 = < [$m_{Total-S} - m_{T-B-allow}$]	m_n = < $m_{Total-S}$	m_n = < MIN[MDL]
ND=0.5x	$m_n = m_{Total-S} - m_{T-B-allow}$	m_n = < [$m_{Total-S} - m_{T-B-allow}$]	m_n = < $m_{Total-S}$	m_n = < MIN[MDL]

Definitions and Notes

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.

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P

1. Total blank amount (µg)

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

Where:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	µg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.3000	µg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	µg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.5000	µg
m_{3c-B}	= mercury amount in blank for Fraction 3c	=	<0.4000	µg
$m_{total-B}$	= 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_{1b-S}	= mercury amount in sample for Fraction 1b	=	61.7408	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	39.5721	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.0200	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	0.7568	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	3.0567	µg
$m_{total-S}$	= total amount of mercury in sample	=	105.1263	µg

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:

$m_{total-B}$	= total amount of mercury in blank	=	<1.5000	µg
$m_{total-S}$	= total amount of mercury in sample	=	105.1263	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	5.2563	µg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg

NOTE: In this case, the second criteria applies.

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

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

Where:

$m_{total-S}$	= total amount of mercury in sample	=	105.1263	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	105.1263	µg

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

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USEPA Method 29
Mercury Sample Calculations

Sample data taken from Run 1

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L_P

1. Mercury concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	105.1263	µg
V_{mstd}	= volume metered, standard (dscf)	=	69.4099	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= mercury concentration (lb/dscf)	=	3.3396E-09	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)	=	105.1263	µg
V_{mstd}	= 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:

m_n	= mercury collected in sample (total µg)	=	105.1263	µg
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

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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_n	= mercury collected in sample (total µg)	=	105.1263	µg
V_{mstd}	= 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^3 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	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.7	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	4.1521E-09	lb/dscf @ x%O_2

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)	=	3.3396E-09	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.0	%
C_{sdy}	= mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	4.0277E-09	lb/dscf @ y%CO_2

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
Q_a	= volumetric flow rate at actual conditions (acfm)	=	176,323	acfm
C_a	= mercury concentration at actual gas conditions (lb/acf)	=	1.5372E-09	lb/acf

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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)	=	105.1263	µg
V_{mstd}	= volume metered, standard (dscf)	=	69.4099	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	1.6263E-02	lb/hr

9. Mercury emission rate (g/s)

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

Where:

m_n	= mercury collected in sample (total µg)	=	105.1263	µg
V_{mstd}	= volume metered, standard (dscf)	=	69.4099	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	81,161	dscfm
10^6	= 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)	=	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_n	= mercury collected in sample (total µg)	=	105.1263	µg
V_{mstd}	= volume metered, standard (dscf)	=	69.4099	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{T/yr}$	= mercury emission rate (Ton/yr)	=	7.1232E-02	Ton/yr

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

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(F_d)\left(\frac{20.9}{20.9-O_2}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	105.1263	µg
V_{mstd}	= volume metered, standard (dscf)	=	69.4099	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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_2	= proportion of oxygen in the gas stream by volume (%)	=	9.7	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	5.9747E-05	lb/MMBtu

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

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	105.1263	µg
V_{mstd}	= volume metered, standard (dscf)	=	69.4099	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	10.0	%
100	= conversion factor	=	100	
E_{Fc}	= mercury emission rate - Fc-based (lb/MMBtu)	=	6.1087E-05	lb/MMBtu

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

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^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	19.32	ft^3

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_{bar}	= barometric pressure (in. Hg)	=	30.10	in. Hg
T_m	= average dry gas meter temperature (°F)	=	75.96	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	70.02	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9886	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.05	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{mstd}	= 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. H_2O)	=	-12.00	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= 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)

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

Where:

T_s	= average sample gas temperature (°F)	=	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_v	= vapor pressure, actual (in. Hg)	=	29.22	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)	=	29.22	in. Hg
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_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	68.757	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	19.32	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2194	
		=	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_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2194	
B_w	= actual water vapor in gas	=	0.2194	
		=	21.94	%

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

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

Where:

CO_2	= 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	%
N_2+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)

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= 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_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= 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	%
N_2+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)

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

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2194	
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
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.37	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.81	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.37	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
T_s	= average sample gas temperature (°F)	=	296.00	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.652	$\sqrt{\text{in. } H_2O}$
460	= °F to °R conversion constant	=	460	
V_s	= 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^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	43.98	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= 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
T_s	= 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)

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

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%O_2 (dscfm)

$$Q_{std7} = (Q_{std})\left(\frac{20.9 - O_2}{20.9 - 7}\right)$$

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
O_2	= 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_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	74,201	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft³/min)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,395,281	dscf/hr

18. Metric Conversion of Gas Volumes (Q_{std} example)

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

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft³/min)	=	89,921	dscfm
35.31	= conversion factor (ft³/m³)	=	35.31	ft³/m³
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m³/hr)	=	152,798	dry std m³/hr

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

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

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m³/hr)	=	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	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm³/hr)	=	142,380	dry Nm³/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.268	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2194	
P_s	= absolute sample gas pressure (in. Hg)	=	29.22	in. Hg
T_s	= average sample gas temperature (°F)	=	296.0	°F
V_{mstd}	= 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	
I	= percent of isokinetic sampling (%)	=	100.00	%

21. Alternative Method 5 Post-Test Meter Calibration Factor

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

Where:

θ	= total sampling time (min)	=	125	min
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	70.02	dcf
T_m	= 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
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.048	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.01	lb/lb·mole
$\sqrt{\Delta H}_{avg}$	= average of square root of pressure drop across meter orifice	=	1.012	√in. H_2O
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_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
Y_{qa}	= 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:

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

2. Total particulate collected on filters (g)

$$m_{filter} = m_{fr} \text{ if } m_{fr} \geq 0$$
$$m_{filter} = 0 \quad \text{if } m_{fr} < 0$$

Where:

m_{fr}	= total filter residue from gravimetric analysis (g)	=	0.00080	g
m_{filter}	= total particulate collected on filters (g)	=	0.00080	g

3. Solvent rinse - sample residue mass (g)

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

Where:

			Acetone	
r_{ai}	= 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
r_{si}	= solvent rinse "i" - sample residue mass (g)	=	0.00010	g

4. Solvent rinse - blank residue (g)

$$m_{i-blank} = r_{ai-blank} \text{ if } r_{ai-blank} \geq 0$$
$$m_{i-blank} = 0 \quad \text{if } r_{ai-blank} < 0$$

Where:

			Acetone	
$r_{ai-blank}$	= blank residue for solvent "i" from gravimetric analysis (g)	=	0.00010	g
$m_{i-blank}$	= solvent rinse - blank residue (g)	=	0.00010	g

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

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

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

Where:

			Acetone	
$m_{i\text{-blank}}$	= solvent rinse - blank residue (g)	=	0.00010	g
v_{si}	= sample liquid volume for solvent rinse "i" (ml)	=	118.0	ml
$v_{ai\text{-blank}}$	= blank liquid volume for solvent rinse "i" (ml)	=	100.0	ml
0.00001	= EPA M5 fraction of total rinse that can be subtracted (g)	=	0.00001	g
ρ_i	= density of solvent rinse "i" (g/ml)	=	0.7845	g/ml
r_{si}	= solvent rinse "i" - sample residue mass (g)	=	0.00010	g
m_{bi}	= solvent rinse "i" - maximum allowable blank correction (g)	=	0.00000	g

6. Solvent rinse - net residue (g)

$$m_i = (r_{si} - m_{bi}) \text{ if } r_{si} \geq m_{bi}$$

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

Where:

			Acetone	
r_{si}	= solvent rinse "i" - sample residue mass (g)	=	0.00010	g
m_{bi}	= solvent rinse "i" - maximum allowable blank correction (g)	=	0.00000	g
m_i	= solvent rinse "i" - net residue (g)	=	0.00010	g

7. Total solvent residue - (g)

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

Where:

m_1	= solvent rinse "1" - net residue (g)	=	0.00010	g
m_2	= solvent rinse "2" - net residue (g)	=	N/A	g
m_3	= solvent rinse "3" - net residue (g)	=	N/A	g
m_s	= total solvent residue (g)	=	0.00010	g

8. Total gravimetric result (g)

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

Where:

m_{filter}	= total particulate collected on filters (g)	=	0.00080	g
m_s	= total solvent residue (g)	=	0.00010	g
m_T	= *total gravimetric result (g)*	=	*0.00090*	g

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9. Total gravimetric detection limit (g)

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

Where:

MDL_{filter}	= minimum detection limit for single filter analysis (g)	=	0.00010	g
n_f	= number of filters in analysis	=	1	
MDL_{rinse}	= minimum detection limit for single rinse analysis (g)	=	0.00010	g
n_r	= number of rinses in analysis	=	1	
m_D	= total gravimetric detection limit (g)	=	0.00020	g

10. Total particulate matter (g)

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

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

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USEPA Method 5/29
Filterable Particulate Sample Calculations

Sample data taken from Run 1

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1. Particulate concentration (lb/dscf)

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

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= 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	dscf
15.43	= conversion factor (gr/g)	=	15.43	gr/g
C_{sd}	= particulate concentration (gr/dscf)	=	0.00020	gr/dscf

3. Particulate concentration (mg/dscm)

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

Where:

m_n	= total particulate matter (g)	=	0.00090	g
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
C_{sd}	= particulate concentration (mg/dscm)	=	0.46219	mg/dscm

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4. Particulate concentration (mg/Nm^3 dry)

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

Where:

m_n	= total particulate matter (g)	=	0.00090	g
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^3 dry)	=	0.49601	mg/Nm^3 dry

5. Particulate concentration corrected to x% O_2 (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_2	= 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_2 (gr/dscf example)

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

Where:

C_{sd}	= particulate concentration (gr/dscf)	=	0.00020	gr/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}	= particulate concentration corrected to y%CO_2 (gr/dscf)	=	0.00024	gr/dscf @ y%CO_2

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_a	= particulate concentration at actual gas conditions (gr/acf)	=	0.00011	gr/acf

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8. Particulate rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)\left(Q_{std}\right)\left(60\right)$$

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= 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
$E_{lb/hr}$	= particulate rate (lb/hr)	=	0.1557	lb/hr

9. Particulate rate (kg/hr)

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

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
1,000	= conversion factor (g/kg)	=	1,000	g/kg
$E_{kg/hr}$	= particulate rate (kg/hr)	=	0.0706	kg/hr

10. Particulate rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)\left(Q_{std}\right)\left(60\right)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= 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
Cap	= 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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11. Particulate rate - F_d-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)\left(F_d\right)\left(\frac{20.9}{20.9-O_2}\right)$$

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= 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	%
E_{Fd}	= particulate rate - F_d - based (lb/MMBtu)	=	0.00050	lb/MMBtu

12. Particulate rate - F_c-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)\left(F_c\right)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	
E_{Fc}	= particulate rate - F_c - based (lb/MMBtu)	=	0.00052	lb/MMBtu

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

$$E_{Hi} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)\left(\frac{(Q_{std})(60)}{H_i}\right)$$

Where:

m_n	= total particulate matter (g)	=	0.00090	g
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= 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
H_i	= actual heat input (MMBtu/hr)	=		MMBtu/hr
E_{Hi}	= 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:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	μg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.3000	μg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	μg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.5000	μg
m_{3c-B}	= mercury amount in blank for Fraction 3c	=	<0.4000	μg
$m_{total-B}$	= 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_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	μg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	4.4126	μg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	μg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	μg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	μg
$m_{total-S}$	= total amount of mercury in sample	=	4.4126	μg

3. Allowable blank correction (μg)

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

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.5000	μg
$m_{total-S}$	= total amount of mercury in sample	=	4.4126	μg
$0.05 \times m_{total-S}$	= 5% of $m_{total-S}$	=	0.2206	μg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	μg

NOTE: In this case, the second criteria applies.

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

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

Where:

$m_{total-S}$	= total amount of mercury in sample	=	4.4126	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	4.4126	µg

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	= total mercury in sample corrected for allowable blank	=	4.4126	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	4.4126	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	4.4126	µg
m_{n-1b}	= mercury corrected for blank - prorated for Fraction 1b	=	<0.1000	µg
m_{n-2b}	= mercury corrected for blank - prorated for Fraction 2b	=	4.4126	µg
m_{n-3a}	= mercury corrected for blank - prorated for Fraction 3a	=	<0.2000	µg
m_{n-3b}	= mercury corrected for blank - prorated for Fraction 3b	=	<0.5000	µg
m_{n-3c}	= mercury corrected for blank - prorated for Fraction 3c	=	<0.4000	µg

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USEPA Method 5/29
Mercury Sample Calculations

Sample data taken from Run 1

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L_O

1. Mercury concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	4.4126	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= 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:

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
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= mercury concentration (mg/dscm)	=	2.2661E-03	mg/dscm

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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_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
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^3 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_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	1.7149E-10	lb/dscf @ x%O_2

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_2

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)	=	1.4151E-10	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_a	= mercury concentration at actual gas conditions (lb/acf)	=	7.5340E-11	lb/acf

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8. Mercury emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)$$

Where:

m_n	= mercury collected in sample (total µg)	=	4.4126	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	7.6349E-04	lb/hr

9. Mercury emission rate (g/s)

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

Where:

m_n	= mercury collected in sample (total µg)	=	4.4126	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
10^6	= 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)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	4.4126	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{T/yr}$	= mercury emission rate (Ton/yr)	=	3.3441E-03	Ton/yr

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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_n	= mercury collected in sample (total µg)	=	4.4126	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	2.4676E-06	lb/MMBtu

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

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

Where:

m_n	= mercury collected in sample (total µg)	=	4.4126	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	
E_{Fc}	= 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 ($m_{FB\text{-}allow}$)

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

2. Logic for Determining Blank-Corrected Front-Half Sample Amount (m_F)

	CASE 1	**CASE 2**
	$m_{FS} - m_{FB\text{-}allow} \geq$ MDL	$m_{FS} - m_{FB\text{-}allow} <$ MDL
Rule		
ND = 0	$m_F = m_{FS} - m_{FB\text{-}allow}$	m_F = < MDL
ND=1x	$m_F = m_{FS} - m_{FB\text{-}allow}$	m_F = < MDL
ND=0.5x	$m_F = m_{FS} - m_{FB\text{-}allow}$	m_F = < MDL

3. Logic for Determining Maximum Allowable Back-Half Blank Correction ($m_{BB\text{-}allow}$)

	CASE 1	**CASE 2**
	m_{BB} = D	m_{BB} = ND
Rule		
ND = 0	$m_{BB\text{-}allow}$ = M29 Rule	$m_{BB\text{-}allow} = 0$
ND=1x	$m_{BB\text{-}allow}$ = M29 Rule	$m_{BB\text{-}allow} = 0$
ND=0.5x	$m_{BB\text{-}allow}$ = M29 Rule	$m_{BB\text{-}allow} = 0$

4. Logic for Determining Blank-Corrected Back-Half Sample Amount (m_B)

	CASE 1	**CASE 2**
	$m_{BS} - m_{BB\text{-}allow} \geq$ MDL	$m_{BS} - m_{BB\text{-}allow} <$ MDL
Rule		
ND = 0	$m_B = m_{BS} - m_{BB\text{-}allow}$	m_B = < MDL
ND=1x	$m_B = m_{BS} - m_{BB\text{-}allow}$	m_B = < MDL
ND=0.5x	$m_B = m_{BS} - m_{BB\text{-}allow}$	m_B = < MDL

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

	CASE 1	**CASE 2**	**CASE 3**
	Both are D	One is D, other is ND	Both are ND
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 = < [D + ND]	m_n = < Sum ND
ND=0.5x	$m_n = m_F + m_B$	m_n = <[D + 0.5ND]	m_n = < 0.5 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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SS Metals-1 Version 2006-12a

USEPA Method 5/29
Beryllium Analyte Calculations

Sample data taken from Run 1

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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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P

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	$\mu g/in^2$
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	
A	= maximum front-half blank correction criteria	=	12.46	μg

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

$$m_{FB-allow} = m_{FB} \text{ if } m_{FB} \le A + 1$$

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

Where:

m_{FB}	= beryllium amount in combined front- and back-half blank	=	<0.0500	μg
m_{FS}	= beryllium amount in combined front- and back-half sample	=	<0.0500	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	=	<0.0025	μg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{FB-allow}$	= 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

QA/QC ________
Date ________

USEPA Method 5/29
Beryllium Sample Calculations

Sample data taken from Run 1

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L_P

1. Beryllium concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)$$

Where:

m_n	= beryllium collected in sample (total µg)	=	<0.0500	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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_{mstd}	= 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_{sd}	= beryllium concentration (mg/dscm)	=	<2.5677E-05	mg/dscm

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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^3 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:

C_{sd}	= beryllium concentration (lb/dscf)	=	<1.6035E-12	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= beryllium concentration corrected to x% oxygen (lb/dscf)	=	<1.9432E-12	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= beryllium concentration (lb/dscf)	=	<1.6035E-12	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}	= beryllium conc. corrected to y% carbon dioxide (lb/dscf)	=	<1.8883E-12	lb/dscf @ y%CO_2

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
Q_a	= volumetric flow rate at actual conditions (acfm)	=	168,899	acfm
C_a	= beryllium concentration at actual gas conditions (lb/acf)	=	<8.5369E-13	lb/acf

QA/QC ________
Date ________

8. Beryllium emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)$$

Where:

m_n	= beryllium collected in sample (total µg)	=	<0.0500	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
$E_{lb/hr}$	= beryllium emission rate (lb/hr)	=	<8.6512E-06	lb/hr

9. Beryllium emission rate (g/s)

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

Where:

m_n	= beryllium collected in sample (total µg)	=	<0.0500	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min
$E_{g/s}$	= beryllium emission rate (g/s)	=	<1.0898E-06	g/s

10. Beryllium emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= beryllium collected in sample (total µg)	=	<0.0500	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{Ton/yr}$	= beryllium emission rate (Ton/yr)	=	<3.7892E-05	Ton/yr

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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_n	= beryllium collected in sample (total µg)	=	<0.0500	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= 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_n	= beryllium collected in sample (total µg)	=	<0.0500	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	
E_{Fc}	= beryllium emission rate - Fc-based (lb/MMBtu)	=	<2.8639E-08	lb/MMBtu

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Date ________

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
P

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/in^2
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	
A	= maximum front-half blank correction criteria	=	12.46	µg

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

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

Where:

m_{FB}	= 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 x m_{FS}	= 5% of combined front- and back-half sample amount	=	0.0197	µg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{FB\text{-}allow}$	= allowable combined Cadmium 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}	= cadmium amount in combined front- and back-half sample	=	0.3934	µg
$m_{FB\text{-}allow}$	= allowable combined cadmium blank correction	=	0.0000	µg
m_n	= blank-corrected cadmium in combined sample	=	0.3934	µg

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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
L_P

1. Cadmium concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	0.3934	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= 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 µg)	=	0.3934	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= cadmium concentration (µg/dscm)	=	2.0203E-01	µg/dscm

3. Cadmium concentration (mg/dscm)

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

Where:

m_n	= 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
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= cadmium concentration (mg/dscm)	=	2.0203E-04	mg/dscm

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4. Cadmium 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	= 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^3 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_{sd}	= cadmium concentration (lb/dscf)	=	1.2616E-11	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= cadmium concentration corrected to x% oxygen (lb/dscf)	=	1.5289E-11	lb/dscf @ x%O_2

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

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

Where:

C_{sd}	= cadmium concentration (lb/dscf)	=	1.2616E-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_{sdy}	= cadmium conc. corrected to y% carbon dioxide (lb/dscf)	=	1.4857E-11	lb/dscf @ y%CO_2

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_a	= cadmium concentration at actual gas conditions (lb/acf)	=	6.7168E-12	lb/acf

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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_n	= cadmium collected in sample (total µg)	=	0.3934	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
$E_{lb/hr}$	= 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_n	= 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
10^6	= 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)

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

Where:

m_n	= cadmium collected in sample (total µg)	=	0.3934	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{Ton/yr}$	= cadmium emission rate (Ton/yr)	=	2.9814E-04	Ton/yr

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

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(F_d)\left(\frac{20.9}{20.9-O_2}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	0.3934	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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_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)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	0.3934	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= 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

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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
P

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/in^2
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	
A	= maximum front-half blank correction criteria	=	12.46	µg

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

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

Where:

m_{FB}	= lead amount in combined front- and back-half blank	=	<0.2000	µg
m_{FS}	= lead amount in combined front- and back-half sample	=	2.2834	µg
A+1	= max combined front- & back-half blank correction criteria	=	12.46	µg
0.05 x m_{FS}	= 5% of combined front- and back-half sample amount	=	0.1142	µg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{FB-allow}$	= allowable combined Lead 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}	= lead amount in combined front- and back-half sample	=	2.2834	µg
$m_{FB-allow}$	= allowable combined lead blank correction	=	0.0000	µg
m_n	= blank-corrected lead in combined sample	=	2.2834	µg

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Date ________

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
L_P

1. Lead concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)$$

Where:

m_n	= lead collected in sample (total µg)	=	2.2834	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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)

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

Where:

m_n	= 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
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:

m_n	= 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
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= lead concentration (mg/dscm)	=	1.1726E-03	mg/dscm

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Date ________

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_n	= 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^3 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	%
O_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_2

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_{sdy}	= lead conc. corrected to y% carbon dioxide (lb/dscf)	=	8.6234E-11	lb/dscf @ y%CO_2

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_a	= lead concentration at actual gas conditions (lb/acf)	=	3.8986E-11	lb/acf

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8. Lead emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)$$

Where:

m_n	= lead collected in sample (total µg)	=	2.2834	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
$E_{lb/hr}$	= lead emission rate (lb/hr)	=	3.9508E-04	lb/hr

9. Lead emission rate (g/s)

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

Where:

m_n	= lead collected in sample (total µg)	=	2.2834	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	89,921	dscfm
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min
$E_{g/s}$	= lead emission rate (g/s)	=	4.9771E-05	g/s

10. Lead emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= lead collected in sample (total µg)	=	2.2834	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{Ton/yr}$	= lead emission rate (Ton/yr)	=	1.7305E-03	Ton/yr

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

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(F_d)\left(\frac{20.9}{20.9-O_2}\right)$$

Where:

m_n	= lead collected in sample (total µg)	=	2.2834	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= 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_2	= proportion of oxygen in the gas stream by volume (%)	=	9.4	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= lead emission rate - Fd-based (lb/MMBtu)	=	1.2769E-06	lb/MMBtu

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

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= lead collected in sample (total µg)	=	2.2834	µg
V_{mstd}	= volume metered, standard (dscf)	=	68.7570	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	10.2	%
100	= conversion factor	=	100	
E_{Fc}	= lead emission rate - Fc-based (lb/MMBtu)	=	1.3079E-06	lb/MMBtu

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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

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)	=	817.5	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	38.47	ft^3

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_{bar}	= barometric pressure (in. Hg)	=	30.20	in. Hg
T_m	= average dry gas meter temperature (°F)	=	85.52	°F
V_m	= 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	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.13	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/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_2O)	=	-10.40	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= 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)

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

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)

$$P_v = P_s$$

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)

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

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	142.320	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	38.47	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2128	
		=	21.28	%

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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)	=	29.44	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.44	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2128	
B_w	= actual water vapor in gas	=	0.2128	
		=	21.28	%

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

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

Where:

CO_2	= 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	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.21	%

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Unit 1 FF Outlet

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

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= 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_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= 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_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.2	%
100	= conversion factor (%)	=	100	%
M_d	= 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_w	= proportion of water vapor in the gas stream by volume	=	0.2128	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.02	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.46	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= 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
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.665	$\sqrt{\text{in. } H_2O}$
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^2)	=	64.00	ft^2
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_a	= 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%O_2 (dscfm)

$$Q_{std7} = (Q_{std})\left(\frac{20.9-O_2}{20.9-7}\right)$$

Where:

Q_{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	%
7	= oxygen content of corrected gas (%)	=	7.0	%
Q_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	77,466	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	94,787	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,687,202	dscf/hr

18. Metric Conversion of Gas Volumes (Q_{std} example)

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

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft^3/min)	=	94,787	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m^3/hr)	=	161,065	dry std m^3/hr

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

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

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m^3/hr)	=	161,065	dry std m^3/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm^3/hr)	=	150,083	dry Nm^3/hr

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Clean Air Project No: 10735
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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.266	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2128	
P_s	= absolute sample gas pressure (in. Hg)	=	29.44	in. Hg
T_s	= average sample gas temperature (°F)	=	301.2	°F
V_{mstd}	= 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	
I	= percent of isokinetic sampling (%)	=	99.66	%

21. Alternative Method 5 Post-Test Meter Calibration Factor

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

Where:

θ	= total sampling time (min)	=	250	min
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	146.57	dcf
T_m	= average dry gas meter temperature (°F)	=	85.52	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8053	
P_{bar}	= barometric pressure (in. Hg)	=	30.20	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.128	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.02	lb/lb·mole
$\sqrt{\Delta H}_{avg}$	= average of square root of pressure drop across meter orifice	=	1.056	√in. H_2O
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_2O/in. Hg)	=	13.6	in.H_2O/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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1. TEQ concentration (ng/dscm)

$$C_{sd} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right) \times 35.31$$

Where:

			Normal Case (ND & EMPC = 0)		Maximum Case (ND & EMPC fully counted)	
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
C_{sd}	= PCDD/F TEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm

2. TEQ concentration (ng/Nm3 dry)

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

Where:

			Normal Case		Maximum Case	
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_{sd}	= PCDD/F TEQ concentration (ng/Nm3 dry)	=	3.5412E-02	ng/Nm^3 dry	3.6211E-02	ng/Nm^3 dry

3. TEQ concentration at actual gas conditions (ng/acm example)

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

Where:

			Normal Case		Maximum Case	
C_{sd}	= 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 m^3/hr	161,065	dry std m^3/hr
Q_a	= volumetric flow rate at actual conditions (acm/h)	=	299,827	actual m^3/hr	299,827	actual m^3/hr
C_a	= 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_{sd}	= PCDD/F TEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm
x	= oxygen content of corrected gas (%)	=	7.0	%	7.0	%
O_2	= 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_{sdx}	= PCDD/F TEQ concentration (ng/dscm corrected to x% O_2)	=	4.0376E-02	ng/dscm @ x% O_2	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:

C_{sd}	= PCDD/F TEQ concentration (ng/dscm)	=	3.2998E-02	ng/dscm	3.3742E-02	ng/dscm
y	= carbon dioxide content of corrected gas (%)	=	12.0	%	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.3	%	10.3	%
C_{sdy}	= PCDD/F TEQ concentration (ng/dscm corrected to y% CO_2)	=	3.8631E-02	ng/dscm @ y% CO_2	3.9503E-02	ng/dscm @ y% CO_2

6. TEQ Emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right)\left(2.205 \times 10^{-3}\right)\left(Q_{std}\right)\frac{(60)}{(10^9)}$$

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
2.205×10^{-3}	= 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
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
$E_{lb/hr}$	= PCDDF TEQ Emission rate (lb/hr)	=	1.1719E-08	lb/hr	1.1983E-08	lb/hr

7. TEQ Emission rate (g/sec)

$$E_{g/sec} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right)\left(\frac{Q_{std}}{60 \times 10^9}\right)$$

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
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,787	dscfm	94,787	dscfm
60	= conversion factor (sec/min)	=	60	sec/min	60	sec/min
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
$E_{g/sec}$	= PCDDF TEQ Emission rate (g/sec)	=	1.4763E-09	g/sec	1.5096E-09	g/sec

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8. TEQ emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^{9}}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

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
2.205×10^{-3}	= 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
Cap	= 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
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
$E_{T/yr}$	= PCDDF TEQ Emission rate (Ton/yr)	=	5.1329E-08	Ton/yr	5.2487E-08	Ton/yr

9. TEQ emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^{9}}\right)(F_d)\left(\frac{20.9}{20.9-O_2}\right)$$

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
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.5	%	9.5	%
20.9	= oxygen content of ambient air (%)	=	20.9	%	20.9	%
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E_{Fd}	= PCDDF TEQ Emission rate (lb/MMBtu)	=	3.6280E-11	lb/MMBtu	3.7099E-11	lb/MMBtu

10. TEQ emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_{n\_TEQ}}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^{9}}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

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
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu	1,820	dscf/MMBtu
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.3	%	10.3	%
100	= conversion factor	=	100		100	
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E_{Fc}	= PCDDF TEQ Emission rate (lb/MMBtu)	=	3.6588E-11	lb/MMBtu	3.7413E-11	lb/MMBtu

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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 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^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	10.38	ft^3

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_{bar}	= barometric pressure (in. Hg)	=	30.10	in. Hg
T_m	= average dry gas meter temperature (°F)	=	71.00	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	37.86	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9916	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.23	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{mstd}	= 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_{bar}	= barometric pressure (in. Hg)	=	30.10	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-12.00	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= 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)

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

Where:

T_s	= average sample gas temperature (°F)	=	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)

$$P_v = P_s$$

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

6. Moisture measured in sample (% by volume)

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

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	37.647	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	10.38	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2162	
		=	21.62	%

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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_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2162	
B_w	= actual water vapor in gas	=	0.2162	
		=	21.62	%

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

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

Where:

CO_2	= 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	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.41	%

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Clean Air Project No: 10735
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10. Molecular weight of dry gas stream (lb/lb·mole)

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= 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_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= 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	%
N_2+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)

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

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2162	
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
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.41	lb/lb·mole

12. Velocity of sample gas (ft/sec)

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

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.83	
M_s	= 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
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.679	$\sqrt{\text{in. } H_2O}$
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	46.42	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^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	46.42	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= 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_s	= 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_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,670	dscfm

16. Dry flow of sample gas corrected to 7%O_2 (dscfm)

$$Q_{std7} = (Q_{std})\left(\frac{20.9-O_2}{20.9-7}\right)$$

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,670	dscfm
O_2	= 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_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	79,426	dscfm

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

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

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	95,670	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,740,172	dscf/hr

18. Metric Conversion of Gas Volumes (Q_{std} example)

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

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft^3/min)	=	95,670	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m^3/hr)	=	162,565	dry std m^3/hr

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

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

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m^3/hr)	=	162,565	dry std m^3/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm^3/hr)	=	151,481	dry Nm^3/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.272	in.
B_w	= 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}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	37.647	dscf
V_s	= 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	
I	= 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_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	37.86	dcf
T_m	= average dry gas meter temperature (°F)	=	71.00	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8053	
P_{bar}	= barometric pressure (in. Hg)	=	30.10	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.231	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.01	lb/lb·mole
$\sqrt{\Delta H}_{avg}$	= average of square root of pressure drop across meter orifice	=	1.106	√in. H_2O
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_2O/in. Hg)	=	13.6	in.H_2O/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

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. Fluoride to HF conversion factor

$$K_{HF} = \frac{MW_{HF}}{n \times MW_{F^-}}$$

Where:

MW_{HF}	= molecular weight of HF (mg/mg-mole)	=	20.006	mg/mg-mole
MW_{F-}	= molecular weight of fluoride ion (mg/mg-mole)	=	18.998	mg/mg-mole
n	= molar ratio of fluoride to HF	=	1.0	mole F/mole HF
K_{HF}	= conversion factor to convert mass F^- to mass HF	=	1.053	

2. Total HF collected (mg)

$$m_{HF} = K_{HF} \times \frac{(S_{F-1}v_1 + S_{F-2}v_2)}{1000}$$

Where:

K_{HF}	= conversion factor to convert mass F^- to mass HF	=	1.053	
S_{F-1}	= fluoride concentration of sample fraction 1 (mg/liter)	=	<0.0060	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	959.0	ml
S_{F-2}	= 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_{HF}	= total HF collected in sample (mg)	=	<0.0061	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)

$$m_b = K_{HF} \times B_F \times \frac{(v_1 + v_2)}{1000}$$

$$m_b = 0 \quad \text{if } B_F < MDL$$

Where:

K_{HF}	= conversion factor to convert mass F^- to mass HF	=	1.053	
B_F	= fluoride concentration of blank (mg/liter)	=	<0.0060	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	959.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0.0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m_b	= allowable blank subtraction (mg)	=	0.0000	mg

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4. Total HF collected, corrected for blank (mg)

$$m_{nb} = m_{HF} - m_b$$

Where:

m_{HF}	= total HF collected in sample (mg)	=	<0.0061	mg
m_b	= allowable blank subtraction (mg)	=	0.0000	mg
m_{nb}	= 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_{HF}	= 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	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0.0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m_{MDL}	= minimum detectable HF (mg)	=	0.0010	mg

6. Total HF value used in emission calculations (mg)

$$m_n = MAXIMUM\ [m_{nb} \quad or \quad < m_{MDL}]$$

Where:

m_{nb}	= total HF collected, corrected for blank (mg)	=	<0.0061	mg
m_{MDL}	= minimum detectable HF (mg)	=	0.0010	mg
m_n	= 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:

K_{HF}	= conversion factor to convert mass F^- to mass HF	=	1.053	
S_{F-2}	= fluoride concentration of sample fraction 2 (mg/liter)	=	0.0000	mg/liter
v_2	= liquid volume of sample fraction 2 (ml)	=	0.0	ml
m_{HF}	= total HF collected in sample (mg)	=	<0.0061	mg
1000	= conversion factor (ml/liter)	=	1000	ml/liter
100	= conversion factor	=	100	%
EFF	= Collection QC check (% mass collected in second fraction)	=	0.00	%

QA/QC ________
Date ________

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.

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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:

m_n	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	mg
V_{mstd}	= volume metered, standard (dscf)	=	37.6474	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
C_{sd}	= 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:

m_n	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	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)	=	10^6	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_{sd}	= HF concentration (ppmdv)	=	<0.0068	ppmdv
B_w	= actual water vapor in gas (% v/v)	=	21.6150	% v/v
100	= conversion factor (%)	=	100	%
C_w	= HF concentration (ppmwv)	=	<0.0054	ppmwv

QA/QC ________
Date ________

4. HF concentration (mg/dscm)

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

Where:

m_n	= 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^3 dry)

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

Where:

m_n	= 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^3 dry)	=	<0.0061	mg/Nm^3 dry

6. HF concentration corrected to x% O_2 (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_2	= 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_2 (ppmdv example)

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

Where:

C_{sd}	= HF concentration (ppmdv)	=	<0.0068	ppmdv
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}	= HF concentration corrected to y%CO_2 (ppmdv)	=	<0.0080	ppmdv @ y%CO_2

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12. HF rate - F_d-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{1000}\right)(F_d)\left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m_n	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	mg
V_{mstd}	= volume metered, standard (dscf)	=	37.6474	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/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	%
E_{Fd}	= HF rate (lb/MMBtu)	=	<6.1507E-06	lb/MMBtu

13. HF rate - F_c-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_n	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	mg
V_{mstd}	= volume metered, standard (dscf)	=	37.6474	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= 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_n	= total HF collected, corrected for applicable blank (mg)	=	<0.0061	mg
V_{mstd}	= volume metered, standard (dscf)	=	37.6474	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	95,670	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
H_i	= actual heat input (MMBtu/hr)	=		MMBtu/hr
E_{Hi}	= HF rate (lb/MMBtu)	=	N/A	lb/MMBtu

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

USEPA Method 26A (HCl)
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)	=	157.0	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	7.39	ft^3

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_{bar}	= barometric pressure (in. Hg)	=	30.20	in. Hg
T_m	= average dry gas meter temperature (°F)	=	81.04	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	33.56	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9992	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.09	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/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:

P_{bar}	= barometric pressure (in. Hg)	=	30.20	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-1.30	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	30.10	in. Hg

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Clean Air Project No: 10735
Unit 1 SDA Inlet

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

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

Where:

T_s	= average sample gas temperature (°F)	=	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)

$$P_v = P_s$$

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

6. Moisture measured in sample (% by volume)

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

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	33.105	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	7.39	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.1825	
		=	18.25	%

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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_{ws}	= 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)

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.1825	
B_w	= actual water vapor in gas	=	0.1825	
		=	18.25	%

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

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

Where:

CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.4	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.0	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.59	%

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

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

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= 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_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.4	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.0	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.6	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.15	lb/lb·mole

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

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

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.1825	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.15	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.93	lb/lb·mole

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QA/QC ________
Date ________

USEPA Method 26A
HCl 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

$$K_{HCl} = \frac{MW_{HCl}}{n \times MW_{Cl^-}}$$

Where:

MW_{HCl}	= molecular weight of HCl (mg/mg-mole)	=	36.461	mg/mg-mole
MW_{Cl-}	= 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 HCl
K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	

2. Total HCl collected (mg)

$$m_{HCl} = K_{HCl} \times \frac{(S_{Cl-1} v_1 + S_{Cl-2} v_2)}{1000}$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	
S_{Cl-1}	= chloride concentration of sample fraction 1 (mg/liter)	=	818.0100	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	706.0	ml
S_{Cl-2}	= chloride 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_{HCl}	= 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)

$$m_b = K_{HCl} \times B_{Cl} \times \frac{(v_1 + v_2)}{1000}$$

$$m_b = 0 \quad \text{if } B_{Cl} < MDL$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.0280	
B_{Cl}	= chloride concentration of blank (mg/liter)	=	<0.1	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	706.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000.0000	ml/liter
m_b	= *allowable blank subtraction (mg)*	=	0.0000	mg

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4. Total HCl collected, corrected for blank (mg)

$$m_{nb} = m_{HCl} - m_b$$

Where:

m_{HCl}	= 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 HCl (mg)

$$m_{MDL} = K_{HCl} \times MDL \times \frac{(v_1 + v_2)}{1000}$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	
MDL	= minimum detectable chloride concentration	=	0.0	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	706.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m_{MDL}	= minimum detectable HCl (mg)	=	0.010160752	mg

6. Total HCl value used in emission calculations (mg)

$$m_n = MAXIMUM\ [m_{nb} \quad or \quad < m_{MDL}]$$

Where:

m_{nb}	= total HCl collected, corrected for blank (mg)	=	593.6855	mg
m_{MDL}	= minimum detectable HCl (mg)	=	0.010160752	mg
m_n	= 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_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.0280	
S_{Cl-2}	= chloride concentration of sample fraction 2 (mg/liter)	=	0.0	mg/liter
v_2	= liquid volume of sample fraction 2 (ml)	=	0.0000	ml
m_{HCl}	= total HCl collected in sample (mg)	=	594	mg
1000	= conversion factor (ml/liter)	=	1000	ml/liter
100	= conversion factor	=	100	%
EFF	= *Collection QC check (% mass collected in second fraction)*	=	0	%

QA/QC ________
Date ________

USEPA Method 26A
HCl 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:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	593.6855	mg
V_{mstd}	= volume metered, standard (dscf)	=	33.1054	dscf
2.205×10^{-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_n	= total HCl collected, corrected for applicable blank (mg)	=	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
10^6	= conversion factor (ppm)	=	10^6	ppm
C_{sd}	= HCl concentration (ppmdv)	=	418.0693	ppmdv

3. HCl concentration (ppmwv)

$$C_w = C_{sd}\left(1 - \frac{B_w}{100}\right)$$

Where:

C_{sd}	= HCl concentration (ppmdv)	=	418.0693	ppmdv
B_w	= actual water vapor in gas (% v/v)	=	18.2458	% v/v
100	= conversion factor (%)	=	100	%
C_w	= 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_n	= 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
C_{sd}	= HCl concentration (mg/dscm)	=	633.2215	mg/dscm

5. HCl concentration (mg/Nm^3 dry)

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

Where:

m_n	= 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^3 dry)	=	679.5548	mg/Nm^3 dry

6. HCl concentration corrected to x% O_2 (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
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.0	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= HCl concentration corrected to x%O_2 (ppmdv)	=	450.4778	ppmdv @ x%O_2

7. HCl concentration corrected to y% CO_2 (ppmdv example)

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

Where:

C_{sd}	= HCl concentration (ppmdv)	=	418.0693	ppmdv
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= 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_2

QA/QC ________
Date ________

8. HCl rate - F_d-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{1000}\right)(F_d)\left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	593.6855	mg
V_{mstd}	= volume metered, standard (dscf)	=	33.1054	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/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 (%)	=	8.0	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= HCl rate (lb/MMBtu)	=	6.1311E-01	lb/MMBtu

9. HCl rate - F_c-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_n	= total HCl collected, corrected for applicable blank (mg)	=	593.6855	mg
V_{mstd}	= volume metered, standard (dscf)	=	33.1054	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= 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

QA/QC ________
Date ________

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

EPA Modified Method 26A (HCl)
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)	=	248.4	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	11.69	ft^3

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_{bar}	= barometric pressure (in. Hg)	=	30.20	in. Hg
T_m	= average dry gas meter temperature (°F)	=	81.46	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	40.68	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9886	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.50	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	39.712	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_2O)	=	-10.40	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.44	in. Hg

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QA/QC ________
Date ________

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

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

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

Where:

T_s	= average sample gas temperature (°F)	=	304.08	°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)	=	29.44	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)

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

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	39.712	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	11.69	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2274	
		=	22.74	%

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QA/QC ________
Date ________

Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
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_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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

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

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2274	
B_w	= actual water vapor in gas	=	0.2274	
		=	22.74	%

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

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

Where:

CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.4	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.40	%

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QA/QC ________
Date ________

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

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

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= 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_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.4	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
N_2+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)	=	30.03	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_w	= proportion of water vapor in the gas stream by volume	=	0.2274	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.03	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.30	lb/lb·mole

Prepared by Clean Air Engineering Proprietary Software
SS ISOKINETIC Version 2006-13b

QA/QC ________
Date ________

EPA Modified Method 26A
HCl 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

$$K_{HCl} = \frac{MW_{HCl}}{n \times MW_{Cl^-}}$$

Where:

MW_{HCl}	= molecular weight of HCl (mg/mg-mole)	=	36.461	mg/mg-mole
MW_{Cl-}	= 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 HCl
K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	

2. Total HCl collected (mg)

$$m_{HCl} = K_{HCl} \times \frac{(S_{Cl-1}v_1 + S_{Cl-2}v_2)}{1000}$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	
S_{Cl-1}	= chloride concentration of sample fraction 1 (mg/liter)	=	18.2000	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	941.0	ml
S_{Cl-2}	= chloride 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_{HCl}	= 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 = 0).

3. Allowable blank subtraction (mg)

$$m_b = K_{HCl} \times B_{Cl} \times \frac{(v_1 + v_2)}{1000}$$

$$m_b = 0 \quad \text{if } B_{Cl} < MDL$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.0280	
B_{Cl}	= chloride concentration of blank (mg/liter)	=	<0.1	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	941.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000.0000	ml/liter
m_b	= *allowable blank subtraction (mg)*	=	0.0000	mg

QA/QC ________
Date ________

4. Total HCl collected, corrected for blank (mg)

$$m_{nb} = m_{HCl} - m_b$$

Where:

m_{HCl}	= total HCl collected in sample (mg)	=	17.6057	mg
m_b	= allowable blank subtraction (mg)	=	0.0000	mg
m_{nb}	= *total HCl collected, corrected for blank (mg)*	=	17.6057336	mg

5. Minimum detectable HCl (mg)

$$m_{MDL} = K_{HCl} \times MDL \times \frac{(v_1 + v_2)}{1000}$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	
MDL	= minimum detectable chloride concentration	=	0.0	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	941.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m_{MDL}	= minimum detectable HCl (mg)	=	0.013542872	mg

6. Total HCl value used in emission calculations (mg)

$$m_n = MAXIMUM \left[m_{nb} \quad or \quad < m_{MDL} \right]$$

Where:

m_{nb}	= total HCl collected, corrected for blank (mg)	=	17.6057	mg
m_{MDL}	= minimum detectable HCl (mg)	=	0.013542872	mg
m_n	= total HCl 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_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.0280	
S_{Cl-2}	= chloride concentration of sample fraction 2 (mg/liter)	=	0.0	mg/liter
v_2	= liquid volume of sample fraction 2 (ml)	=	0.0000	ml
m_{HCl}	= total HCl collected in sample (mg)	=	18	mg
1000	= conversion factor (ml/liter)	=	1000	ml/liter
100	= conversion factor	=	100	%
EFF	= *Collection QC check (% mass collected in second fraction)*	=	0	%

QA/QC ________
Date ________

EPA Modified Method 26A
HCl 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)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{1000}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V_{mstd}	= volume metered, standard (dscf)	=	39.7123	dscf
2.205×10^{-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)	=	9.7755E-07	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_n	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V_{mstd}	= volume metered, standard (dscf)	=	39.7123	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
10^6	= conversion factor (ppm)	=	10^6	ppm
C_{sd}	= HCl concentration (ppmdv)	=	10.3352	ppmdv

3. HCl concentration (ppmwv)

$$C_w = C_{sd}\left(1-\frac{B_w}{100}\right)$$

Where:

C_{sd}	= HCl concentration (ppmdv)	=	10.3352	ppmdv
B_w	= actual water vapor in gas (% v/v)	=	22.7417	% v/v
100	= conversion factor (%)	=	100	%
C_w	= HCl concentration (ppmwv)	=	7.9848	ppmwv

QA/QC ________
Date ________

4. HCl concentration (mg/dscm)

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

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V_{mstd}	= volume metered, standard (dscf)	=	39.7123	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= HCl concentration (mg/dscm)	=	15.6540	mg/dscm

5. HCl concentration (mg/Nm^3 dry)

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

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V_{mstd}	= 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^3 dry)	=	16.7995	mg/Nm^3 dry

6. HCl concentration corrected to x% O_2 (ppmdv example)

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

Where:

C_{sd}	= HCl concentration (ppmdv)	=	10.3352	ppmdv
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= HCl concentration corrected to x%O_2 (ppmdv)	=	12.2786	ppmdv @ x%O_2

7. HCl concentration corrected to y% CO_2 (ppmdv example)

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

Where:

C_{sd}	= HCl concentration (ppmdv)	=	10.3352	ppmdv
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.4	%
C_{sdy}	= HCl concentration corrected to y%CO2 (ppmdv)	=	11.9252	ppmdv @ y%CO_2

QA/QC ________
Date ________

8. HCl rate - F_d-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_n	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V_{mstd}	= volume metered, standard (dscf)	=	39.7123	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/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 (%)	=	9.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= HCl rate (lb/MMBtu)	=	1.6711E-02	lb/MMBtu

9. HCl rate - F_c-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{1000}\right)\left(F_c\right)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	17.6057	mg
V_{mstd}	= volume metered, standard (dscf)	=	39.7123	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	10.4	%
100	= conversion factor	=	100	
E_{Fc}	= HCl rate (lb/MMBtu)	=	1.7107E-02	lb/MMBtu

QA/QC ________
Date ________

PLANT DATA

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WHEELABRATOR SOUTH BROWARD
TONS OF REFUSE PROCESSED PER STACK TEST RUN LOG (2009)

UNIT #1

Date	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
3/16/2009	HCl	26A	1	184.7	1.00	31.8
3/16/2009	HCl	26A	2	184.7	1.00	31.8
3/16/2009	HCl	26A	3	183.5	1.00	31.6
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	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
3/17/2009	HCl	26A	1	182.6	1.00	31.5
3/17/2009	HCl	26A	2	185.2	1.00	31.9
3/17/2009	HCl	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	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
3/18/2009	HCl	26A	1	184.1	1.00	31.7
3/18/2009	HCl	26A	2	184.2	1.00	31.8
3/18/2009	HCl	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)

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 7:47:00
End Time: 9:58:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET 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
Unit 2		513.06	313.41	37.75	30.96	11.52	295.90	6.58	-10.40	183.97
Unit 3		485.28	313.15	35.73	25.48	12.47	294.50	6.84	-10.32	184.02

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
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
Unit 3	187.71	900.17	825.44	81.34	-0.11	398.06	1086.58	4.13	6.83	9.81

C - 5

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 10:25:00
End Time: 12:36:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET 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

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.37	910.69	824.75	86.78	-0.10	430.82	1120.26	5.60	6.15	9.11
Unit 2	184.36	908.61	821.40	89.12	-0.10	422.83	1097.96	4.38	6.27	9.61
Unit 3	187.30	900.31	822.37	80.81	-0.10	399.12	1106.64	5.30	6.43	9.57

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 13:18:00
End Time: 15:28:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1	5/29 run 3	520.38	304.96	38.62	32.73	13.78	287.20	6.35	-11.57	184.03
Unit 2		521.65	305.02	41.50	34.42	12.79	288.50	6.52	-10.12	183.79
Unit 3		490.41	304.96	37.48	31.68	15.17	287.67	6.72	-10.11	183.99

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.83	911.09	824.57	86.50	-0.11	430.54	1120.51	4.87	6.05	9.06
Unit 2	184.83	908.95	822.29	88.60	-0.10	421.91	1091.50	4.92	6.25	9.57
Unit 3	187.72	900.71	825.00	79.29	-0.10	393.10	1112.35	4.34	6.50	9.25

Plant Name: SBWD
General Average Report
Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1
Data Averaging Type: 6m

Time of Report: 03/18/09 14:46
Rolling Average Interval: 1

Date	Time	OPACITY1 (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	0
	08:18	0
	08:24	0
	08:30	0
	08:36	0
	08:42	0
	08:48	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

Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1

Data Averaging Type: 6m

Time of Report: 03/18/09 14:46

Rolling Average Interval: 1

Date	Time	OPACITY1 (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. =	0
Maximum =	0
Minimum =	0
Possible Values =	22
Included Values =	22
Total =	7

* - 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: 03/18/2009 to 03/18/2009

Site Name: UNIT1
Data Averaging Type: 6m

Time of Report: 03/18/09 14:46
Rolling Average Interval: 1

Date	Time	OPACITY1 (PERCENT)
03/18/09	12:12	0
	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
	13:18	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

General Average Report

Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1

Data Averaging Type: 1m

Time of Report: 03/18/09 14:43

Rolling Average Interval: 1

	CARFEED1 (LBS/HR)
Average =	7
Geometric Avg. =	6
Maximum =	8
Minimum =	3
Possible Values =	131
Included Values =	131
Total =	854

Plant Name: SBWD
General Average Report
Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1
Data Averaging Type: 1m

Time of Report: 03/18/09 14:43
Rolling Average Interval: 1

	CARFEED1 (LBS/HR)
Average =	6
Geometric Avg. =	6
Maximum =	8
Minimum =	3
Possible Values =	132
Included Values =	132
Total =	748

Plant Name: SBWD

General Average Report

Reporting Period: 03/18/2009 to 03/18/2009

Site Name: UNIT1

Data Averaging Type: 1m

Time of Report: 03/18/09 14:42

Rolling Average Interval: 1

	CARFEED1 (LBS/HR)
Average =	5
Geometric Avg. =	5
Maximum =	7
Minimum =	3
Possible Values =	132
Included Values =	132
Total =	703

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 7:36:00
End Time: 8:56:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	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
Unit 2		512.36	314.89	36.91	29.89	11.68	295.76	6.56	-10.45	184.49
Unit 3		485.11	314.84	35.23	24.64	12.27	294.45	6.88	-10.38	184.21

C - 13

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	185.61	908.72	822.60	86.90	-0.11	420.88	1080.94	3.40	5.99	9.48
Unit 3	187.86	900.24	824.94	81.22	-0.10	398.63	1086.04	4.07	6.79	9.88

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Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 9:08:00
End Time: 10:27:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
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

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG.	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	184.75	908.49	821.99	86.65	-0.10	421.70	1092.84	4.70	5.84	9.23
Unit 3	187.41	900.25	824.93	82.32	-0.11	397.83	1092.89	4.49	6.80	9.68

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 10:53:00
End Time: 12:07:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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	184.14

C - 15

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	184.65	908.78	820.98	89.87	-0.10	424.69	1096.18	5.24	6.27	9.63
Unit 3	187.10	900.37	821.24	80.85	-0.10	399.11	1108.12	5.15	6.32	9.50

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 12:13:00
End Time: 16:38:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 7:14:00
End Time: 11:33:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	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
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

C - 17

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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	9.57
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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 12:00:00
End Time: 16:24:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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	184.22
Unit 2		512.07	320.22	34.92	25.64	13.37	302.70	6.51	-9.44	184.38
Unit 3		498.57	314.95	39.29	32.38	11.40	301.26	6.86	-10.84	184.09

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.55	914.85	825.44	88.06	-0.10	430.81	1113.13	3.18	6.34	9.35
Unit 2	185.69	909.60	822.54	83.94	-0.10	415.96	1105.23	3.67	5.82	9.45
Unit 3	187.53	901.49	824.32	85.36	-0.10	400.47	1095.26	3.96	6.94	10.20

Plant Name: SBWD
General Average Report
Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT1
Data Averaging Type: 1m

Time of Report: 04/10/09 06:13
Rolling Average Interval: 1

	CARFEED1 (LBS/HR)
Average =	6
Geometric Avg. =	6
Maximum =	8
Minimum =	1
Possible Values =	266
Included Values =	266
Total =	1601

Plant Name: SBWD
General Average Report
Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT1
Data Averaging Type: 1m

Time of Report: 04/10/09 06:13
Rolling Average Interval: 1

	CARFEED1 (LBS/HR)
Average =	5
Geometric Avg. =	5
Maximum =	7
Minimum =	3
Possible Values =	260
Included Values =	260
Total =	1392

Plant Name: SBWD
General Average Report
Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT1
Data Averaging Type: 1m

Time of Report: 04/10/09 06:13
Rolling Average Interval: 1

	CARFEED1 (LBS/HR)
Average =	5
Geometric Avg. =	5
Maximum =	11
Minimum =	2
Possible Values =	265
Included Values =	265
Total =	1386

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 7:50:00
End Time: 8:50:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 2		521.24	314.68	41.20	33.47	15.35	299.39	6.50	-10.31	184.61
Unit 3		492.92	314.90	38.45	31.71	17.17	299.16	6.72	-10.46	184.33

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.65	912.97	826.42	86.66	-0.11	433.45	1105.81	5.37	6.24	9.28
Unit 2	185.57	909.35	822.43	84.62	-0.10	427.45	1091.56	5.14	6.38	9.85
Unit 3	187.85	901.00	824.02	84.91	-0.11	403.78	1033.21	6.69	6.88	9.69

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 9:28:00
End Time: 10:28:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 2		511.88	315.06	35.98	30.49	15.26	301.98	6.61	-9.94	183.32
Unit 3		490.25	315.09	36.06	30.19	16.36	298.11	6.71	-10.33	183.99

C - 23

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNGR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 3	187.47	900.81	822.07	83.64	-0.11	398.59	1043.18	4.20	6.46	9.82

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 10:56:00
End Time: 11:56:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 2		515.04	314.87	36.94	31.07	11.33	299.92	6.43	-9.78	184.50
Unit 3		496.40	315.03	38.24	32.91	10.94	297.17	6.84	-10.66	183.92

C - 24

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	185.20	909.20	820.31	85.78	-0.10	420.83	1095.10	2.91	6.31	9.76
Unit 3	187.37	901.17	824.25	82.38	-0.10	400.77	1035.70	2.42	7.04	10.23

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 8:02:00
End Time: 10:26:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 2	5/29 run 1	515.74	314.84	38.07	32.00	14.70	300.91	6.52	-10.02	184.11
Unit 3		491.42	315.05	37.00	31.05	16.12	299.12	6.74	-10.40	183.90

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 3	187.37	900.85	823.17	84.71	-0.11	400.89	1041.09	6.27	6.69	9.75

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 11:04:00
End Time: 13:15:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM 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
Unit 2 5/29 run 2	514.53	314.98	36.91	30.86	11.48	299.98	6.48	-9.75	184.93
Unit 3	497.44	314.99	38.47	33.39	11.00	298.17	6.77	-10.68	184.14

C - 26

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	185.99	909.48	821.69	84.06	-0.10	419.33	1098.78	3.33	6.33	9.75
Unit 3	187.43	901.38	824.30	81.71	-0.11	400.88	1050.18	2.99	7.13	10.28

C - 27

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 13:51:00
End Time: 16:05:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 2	5/29 run 3	517.96	315.01	37.61	31.20	11.96	301.28	6.58	-9.72	183.93
Unit 3		497.07	315.03	38.14	32.26	11.76	299.14	6.81	-10.63	184.03

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECOND OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
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

Plant Name: SBWD
General Average Report
Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2
Data Averaging Type: 6m

Time of Report: 03/17/09 07:26
Rolling Average Interval: 1

Date	Time	OPACITY2 (PERCENT)
03/16/09	12:48	0
	12:54	0
	13:00	0
	13:06	0
	13:12	0
	13:18	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
	14:24	0
	14:30	0
	14:36	0
	14:42	0
	14:48	0
	14:54	0

Average =	0
Geometric Avg. =	
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

Plant Name: SBWD
General Average Report
Reporting Period: 03/16/2009 to 03/16/2009

Site Name: UNIT2
Data Averaging Type: 6m

Time of Report: 03/17/09 07:26
Rolling Average Interval: 1

Date	Time	OPACITY2 (PERCENT)
03/16/09	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
	11:36	0
	11:42	0
	11:48	0
	11:54	0
	12:00	0
	12:06	0

Average =	0
Geometric Avg. =	
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

Plant Name: SBWD

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

Date	Time	OPACITY2 (PERCENT)
03/16/09	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	0
	08:18	0
	08:24	0
	08:30	0
	08:36	0
	08:42	0
	08:48	0
	08:54	0
	09:00	0
	09:06	0
	09:12	0
	09:18	0

Average =	0
Geometric Avg. =	
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 =	135
Included Values =	135
Total =	727

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

	CARFBED2 (LBS/HR)
Average =	7
Geometric Avg. =	6
Maximum =	11
Minimum =	3
Possible Values =	132
Included Values =	132
Total =	859

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 =	6
Geometric Avg. =	6
Maximum =	11
Minimum =	3
Possible Values =	145
Included Values =	145
Total =	942

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 12:50:00
End Time: 14:01:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 3		497.73	314.93	38.89	33.19	11.36	302.04	6.76	-10.77	184.25

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 14:21:00
End Time: 15:33:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
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
Unit 3		497.93	314.94	38.67	31.54	11.84	300.49	6.87	-10.75	183.92

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.39	914.81	822.32	89.72	-0.10	433.02	1111.50	3.47	6.55	9.57
Unit 2	186.09	909.69	823.22	81.89	-0.11	413.26	1102.63	2.92	5.59	9.27
Unit 3	187.67	901.35	823.61	85.17	-0.10	399.51	1090.93	3.49	6.75	10.07

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 15:46:00
End Time: 16:55:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		DEG F	DEG F	GPM	GPM	%	DEG F	" H2O	" H2O	KLBs/hr
Unit 1		517.36	319.95	34.09	28.01	13.71	300.34	6.37	-11.49	184.91
Unit 2	13B run 3	510.50	320.26	34.00	22.22	13.85	302.48	6.41	-9.49	183.85
Unit 3		502.00	314.96	40.36	31.23	11.71	299.86	6.87	-10.74	183.76

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	185.03	909.26	821.68	82.56	-0.10	413.42	1100.66	2.66	5.73	9.32
Unit 3	186.89	900.90	823.21	84.71	-0.10	401.14	1093.59	2.98	7.17	10.41

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 7:39:00
End Time: 8:39:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET 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
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

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	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	182.82	907.68	818.95	84.75	-0.10	417.05	1091.11	3.52	5.99	9.74
Unit 3	187.01	899.84	825.85	82.26	-0.11	399.19	1066.73	3.14	7.03	10.47

Wheelabrator

SOUTH BROWARD

Emission Test Log

Date: 3/17/2009
Start Time: 9:32:00
End Time: 10:32:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
	DEG F	DEG F	GPM	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
Unit 2 26A run 2	508.22	314.59	35.30	28.94	13.82	299.34	6.41	-9.77	185.20
Unit 3	489.40	314.97	37.08	30.74	10.82	300.03	6.74	-10.35	183.99

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 3	187.79	901.84	827.73	82.56	-0.11	399.79	1074.23	3.51	6.72	9.80

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 11:21:00
End Time: 12:21:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
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

C - 39

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
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
Unit 3	187.11	901.32	823.18	86.84	-0.10	403.03	1084.38	3.52	7.06	10.39

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 7:39:00
End Time: 9:48:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 10:21:00
End Time: 12:30:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM 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
Unit 2	514.47	318.04	37.22	28.92	13.41	300.25	6.60	-10.05	182.93
Unit 3 5/29 run 2	495.38	314.98	39.05	32.56	10.32	300.68	6.88	-10.82	183.99

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	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	183.76	908.63	819.96	86.94	-0.10	420.24	1101.90	4.75	6.21	9.85
Unit 3	187.22	901.02	822.71	85.79	-0.10	401.87	1084.81	3.76	6.88	10.22

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/17/2009
Start Time: 13:02:00
End Time: 15:13:00

	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET 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
Unit 2	511.17	319.79	34.70	25.90	13.03	302.12	6.46	-9.23	185.33
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 H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
Unit 2	186.52	909.89	822.52	83.25	-0.11	415.25	1108.20	3.64	5.66	9.29
Unit 3	187.43	901.65	825.01	85.90	-0.10	399.78	1095.52	3.69	6.95	10.16

Plant Name: SBWD

General Average Report

Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3

Data Averaging Type: 6m

Time of Report: 03/18/09 05:50

Rolling Average Interval: 1

Date	Time	OPACITY3 (PERCENT)
03/17/09	06:36	0
	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	0
	08:18	0
	08:24	0
	08:30	0
	08:36	0
	08:42	0

Average =	0
Geometric Avg. =	
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

Plant Name: SBWD

General Average Report

Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3

Data Averaging Type: 6m

Time of Report: 03/18/09 05:50

Rolling Average Interval: 1

Date	Time	OPACITY3 (PERCENT)
03/17/09	09:18	0
	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

Average =	0
Geometric Avg. =	
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 (FADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: SBWD
General Average Report
Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3
Data Averaging Type: 6m

Time of Report: 03/18/09 05:51
Rolling Average Interval: 1

Date	Time	OPACITY3 (PERCENT)
03/17/09	12:00	0
	12:06	0
	12:12	0
	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
	13:18	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

Average =	0
Geometric Avg. =	
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

Plant Name: SBWD
General Average Report
Reporting Period: 03/17/2009 to 03/17/2009

Site Name: UNIT3
Data Averaging Type: 1m

Time of Report: 03/18/09 05:49
Rolling Average Interval: 1

	CARFEED3 (LBS/HR)
Average =	6
Geometric Avg. =	6
Maximum =	10
Minimum =	3
Possible Values =	130
Included Values =	130
Total =	830

Plant Name: SBWD

General Average Report

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

	CARFEED3 (LBS/HR)
Average =	6
Geometric Avg. =	6
Maximum =	11
Minimum =	3
Possible Values =	130
Included Values =	130
Total =	763

Plant Name: SBWD

General Average Report

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

	CARFEED3 (LBS/HR)
Average =	5
Geometric Avg. =	5
Maximum =	9
Minimum =	3
Possible Values =	132
Included Values =	132
Total =	724

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 8:26:00
End Time: 9:44:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 2		516.11	314.55	37.99	32.30	14.27	300.83	6.45	-9.94	184.65
Unit 3	13B run 1	491.88	314.97	37.17	31.48	15.50	299.97	6.75	-10.42	184.20

C - 49

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	186.32	913.29	826.07	85.68	-0.11	433.05	1109.77	6.81	6.05	9.10
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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 10:36:00
End Time: 11:53:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
Unit 3	13B run 2	495.35	314.95	37.77	32.76	11.00	297.21	6.79	-10.57	183.97

C - 50

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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 2	184.67	908.84	818.83	86.20	-0.11	422.05	1093.87	3.63	6.37	9.82
Unit 3	187.29	900.94	823.08	82.53	-0.10	400.48	1037.18	2.55	6.93	10.19

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/16/2009
Start Time: 12:26:00
End Time: 13:47:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
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

C - 51

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.32	913.92	826.23	87.33	-0.10	430.88	1111.01	3.21	6.41	9.48
Unit 2	185.60	909.24	820.69	82.18	-0.10	418.24	1105.08	3.29	6.48	9.84
Unit 3	187.90	901.45	825.92	79.53	-0.11	399.63	1052.37	3.64	7.08	10.15

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 8:02:00
End Time: 9:02:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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	-11.75	183.94
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

C - 52

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECOND OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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
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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 10:19:00
End Time: 11:19:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
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

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	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

Wheelabrator
SOUTH BROWARD
Emission Test Log

Date: 3/18/2009
Start Time: 11:46:00
End Time: 12:46:00

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS	STEAM FLOW
		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
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

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	FURNACE O2	OUTLET O2
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	%	%
Unit 1	185.65	911.14	824.49	86.61	-0.09	430.59	1113.98	3.82	6.23	9.15
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

Ticket 716488

3/18/2009

In 9:06:25AM
Out 11:27:04AM

Account	623030
Customer	Chemical Lime Chemical Lime PO Box 7247-8945 Philadelphia, PA
Decal #	LIME1
Vehicle #	LIME1
Auto ID	0
Other	2357474
Product	9020 Lime
Qty	**25.38 Ton**
Origin	Wheelabrator So
Operator	Joyce Tate

Price/Ton	0.00
Fees	0.00
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

In 9:06:25AM
Out 11:27:04AM

Account	623030
Customer	Chemical Lime Chemical Lime PO Box 7247-8945 Philadelphia, PA
Decal #	LIME1
Vehicle #	LIME1
Auto ID	0
Other	2357474
Product	9020
Qty	**25.38 Ton**
Origin	Wheelabrator So
Operator	Joyce Tate

Price/Ton	0.00
Fees	0.00
Other	0.00
Total	0.00

	Pounds	Tons
Gross	78160	39.08
Tare	27400	13.70
Net	50760	25.38

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PARAMETERS

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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 Parameters

Run No.		1	2	3	Average
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	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0079	1.0079	1.0079	
C_p	Pitot tube coefficient	0.8200	0.8200	0.8200	
P_g	Static pressure (in. H_2O)	-1.5000	-1.7000	-1.5000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	30.10	30.10	30.10	**30.1000**
D_n	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O_2	Oxygen (dry volume %)	9.7200	8.8900	8.8500	**9.1533**
CO_2	Carbon dioxide (dry volume %)	9.9500	10.8300	10.8500	**10.5433**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.3300	80.2800	80.3000	**80.3033**
V_{lc}	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_m	Dry gas meter temperature (°F)	76.9167	73.0625	72.3333	
T_s	Sample temperature (°F)	505.3750	505.7500	507.9167	**506.3472**
ΔH	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 Results					
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_{ws}	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**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	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_s	Velocity of sample (ft/sec)	48.8711	48.2040	49.0932	**48.7228**
%I	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_{std}	Volumetric flow rate, dry standard (dscfm)	81,161	79,153	79,904	**80,073**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	65,279	68,391	69,269	**67,646**
Q_a	Volumetric flow rate, actual (acf/hr)	10,579,391	10,434,974	10,627,473	**10,547,279**
Q_s	Volumetric flow rate, standard (scf/hr)	5,799,748	5,715,552	5,810,809	**5,775,370**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,869,674	4,749,185	4,794,220	**4,804,360**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,615	295,525	300,976	**298,705**
Q_s	Volumetric flow rate, standard (m^3/hr)	164,252	161,868	164,566	**163,562**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	137,912	134,500	135,775	**136,062**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	110,925	116,212	117,704	**114,947**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	153,053	150,831	153,345	**152,410**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	128,509	125,329	126,518	**126,785**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	103,362	108,288	109,679	**107,110**

Comments:

Average includes 3 runs.

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LON@

Prepared by Clean Air Engineering Proprietary Software
SS ISOKINETIC Version 2006-13b

QA/QC ________
Date ________

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		**1**	**2**	**3**	**Average**
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	**183.7**
P_1	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_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 Conditions					
O_2	Oxygen (dry volume %)	9.7200	8.8900	8.8500	**9.1533**
CO_2	Carbon dioxide (dry volume %)	9.9500	10.8300	10.8500	**10.5433**
T_s	Sample temperature (°F)	505.3750	505.7500	507.9167	**506.3472**
B_w	Actual water vapor in gas (% by volume)	16.0365	16.9077	17.4948	**16.8130**
Gas Flow Rate					
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_{std}	Volumetric flow rate, dry standard (dscfm)	81,161	79,153	79,904	**80,073**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	65,279	68,391	69,269	**67,646**
Q_a	Volumetric flow rate, actual (acf/hr)	10,579,391	10,434,974	10,627,473	**10,547,279**
Q_s	Volumetric flow rate, standard (scf/hr)	5,799,748	5,715,552	5,810,809	**5,775,370**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,869,674	4,749,185	4,794,220	**4,804,360**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,615	295,525	300,976	**298,705**
Q_s	Volumetric flow rate, standard (m^3/hr)	164,252	161,868	164,566	**163,562**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	137,912	134,500	135,775	**136,062**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	110,925	116,212	117,704	**114,947**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	153,053	150,831	153,345	**152,410**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	128,509	125,329	126,518	**126,785**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	103,362	108,288	109,679	**107,110**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	69.4099	69.3132	69.7317	**69.4849**
%I	Isokinetic sampling (%)	103.9585	106.4474	106.0843	**105.4967**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	61.7408	61.4205	72.7139	
$m_{n\text{-}2b}$	Fraction 2B (µg)	39.5721	47.6470	37.0594	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.0200	<0.0200	<0.0200	
$m_{n\text{-}3b}$	Fraction 3B (µg)	0.7568	1.5232	1.0325	
$m_{n\text{-}3c}$	Fraction 3C (µg)	3.0567	6.2913	5.5174	
m_n	Total matter corrected for allowable blanks (µg)	105.1263	116.8821	116.3232	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	3.3396E-09	3.7183E-09	3.6783E-09	**3.5787E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	4.1521E-09	4.3034E-09	4.2430E-09	**4.2328E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	4.0277E-09	4.1200E-09	4.0681E-09	**4.0719E-09**
C_a	Concentration (lb/acf)	1.5372E-09	1.6923E-09	1.6593E-09	**1.6296E-09**
C_{sd}	Concentration (µg/dscm)	5.3480E+01	5.9543E+01	5.8902E+01	**5.7308E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	6.6491E+01	6.8913E+01	6.7946E+01	**6.7783E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	6.4498E+01	6.5975E+01	6.5146E+01	**6.5206E+01**
C_{sd}	Concentration (mg/dscm)	5.3480E-02	5.9543E-02	5.8902E-02	**5.7308E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	6.6491E-02	6.8913E-02	6.7946E-02	**6.7783E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	6.4498E-02	6.5975E-02	6.5146E-02	**6.5206E-02**
C_a	Concentration (µg/m^3 (actual,wet))	2.4617E+01	2.7099E+01	2.6572E+01	**2.6096E+01**
C_{sd}	Concentration (µg/Nm^3 dry)	5.7393E+01	6.3900E+01	6.3212E+01	**6.1502E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	7.1356E+01	7.3955E+01	7.2917E+01	**7.2743E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	6.9217E+01	7.0803E+01	6.9912E+01	**6.9978E+01**
$E_{lb/hr}$	Rate (lb/hr)	1.6263E-02	1.7659E-02	1.7634E-02	**1.7185E-02**
$E_{g/s}$	Rate (g/s)	2.0487E-03	2.2246E-03	2.2215E-03	**2.1650E-03**
$E_{T/yr}$	Rate (Ton/yr)	7.1232E-02	7.7345E-02	7.7239E-02	**7.5272E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	5.9747E-05	6.1924E-05	6.1054E-05	**6.0908E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	6.1087E-05	6.2486E-05	6.1700E-05	**6.1758E-05**

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

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		1	2	3	Average
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	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	1.9614E-09	1.9539E-09	2.2993E-09	**2.0715E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.4386E-09	2.2614E-09	2.6523E-09	**2.4508E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.3655E-09	2.1650E-09	2.5430E-09	**2.3578E-09**
C_a	Concentration (lb/acf)	9.0282E-10	8.8927E-10	1.0372E-09	**9.4311E-10**
C_{sd}	Concentration (µg/dscm)	3.1409E+01	3.1289E+01	3.6820E+01	**3.3173E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.9050E+01	3.6213E+01	4.2473E+01	**3.9245E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.7880E+01	3.4670E+01	4.0723E+01	**3.7757E+01**
C_{sd}	Concentration (mg/dscm)	3.1409E-02	3.1289E-02	3.6820E-02	**3.3173E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.9050E-02	3.6213E-02	4.2473E-02	**3.9245E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.7880E-02	3.4670E-02	4.0723E-02	**3.7757E-02**
C_a	Concentration (µg/m ^{3} (actual,wet))	1.4457E+01	1.4240E+01	1.6610E+01	**1.5103E+01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	3.3707E+01	3.3579E+01	3.9514E+01	**3.5600E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	4.1907E+01	3.8863E+01	4.5581E+01	**4.2117E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	4.0651E+01	3.7206E+01	4.3702E+01	**4.0520E+01**
$E_{lb/hr}$	Rate (lb/hr)	9.5512E-03	9.2795E-03	1.1023E-02	**9.9514E-03**
$E_{g/s}$	Rate (g/s)	1.2032E-03	1.1690E-03	1.3887E-03	**1.2536E-03**
$E_{T/yr}$	Rate (Ton/yr)	4.1834E-02	4.0644E-02	4.8282E-02	**4.3587E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.5089E-05	3.2540E-05	3.8165E-05	**3.5265E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.5876E-05	3.2836E-05	3.8569E-05	**3.5760E-05**

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

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	1.2571E-09	1.5158E-09	1.1719E-09	**1.3149E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.5630E-09	1.7543E-09	1.3518E-09	**1.5563E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.5161E-09	1.6795E-09	1.2961E-09	**1.4972E-09**
C_a	Concentration (lb/acf)	5.7865E-10	6.8985E-10	5.2865E-10	**5.9905E-10**
C_{sd}	Concentration (µg/dscm)	2.0131E+01	2.4273E+01	1.8766E+01	**2.1056E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.5029E+01	2.8092E+01	2.1647E+01	**2.4923E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.4279E+01	2.6895E+01	2.0755E+01	**2.3976E+01**
C_{sd}	Concentration (mg/dscm)	2.0131E-02	2.4273E-02	1.8766E-02	**2.1056E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.5029E-02	2.8092E-02	2.1647E-02	**2.4923E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.4279E-02	2.6895E-02	2.0755E-02	**2.3976E-02**
C_a	Concentration (µg/m ^{3} (actual,wet))	9.2663E+00	1.1047E+01	8.4655E+00	**9.5929E+00**
C_{sd}	Concentration (µg/Nm ^{3} dry)	2.1604E+01	2.6049E+01	2.0139E+01	**2.2597E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	2.6860E+01	3.0148E+01	2.3231E+01	**2.6746E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	2.6055E+01	2.8863E+01	2.2273E+01	**2.5730E+01**
$E_{lb/hr}$	Rate (lb/hr)	6.1218E-03	7.1986E-03	5.6182E-03	**6.3128E-03**
$E_{g/s}$	Rate (g/s)	7.7120E-04	9.0685E-04	7.0776E-04	**7.9527E-04**
$E_{T/yr}$	Rate (Ton/yr)	2.6813E-02	3.1530E-02	2.4608E-02	**2.7650E-02**
E_{Fd}	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 1 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<6.3536E-13	<6.3624E-13	<6.3242E-13	**<6.3467E-13**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.8993E-13	<7.3637E-13	<7.2952E-13	**<7.5194E-13**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.6626E-13	<7.0498E-13	<6.9945E-13	**<7.2356E-13**
C_a	Concentration (lb/acf)	<2.9245E-13	<2.8957E-13	<2.8530E-13	**<2.8911E-13**
C_{sd}	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_{sd12}	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_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.2650E-05	<1.1792E-05	<1.1682E-05	**<1.2041E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.2271E-05	<1.1289E-05	<1.1201E-05	**<1.1587E-05**
C_a	Concentration (μg/m ^{3} (actual,wet))	<4.6832E-03	<4.6370E-03	<4.5686E-03	**<4.6296E-03**
C_{sd}	Concentration (μg/Nm ^{3} dry)	<1.0919E-02	<1.0934E-02	<1.0868E-02	**<1.0907E-02**
C_{sd7}	Concentration @7% O_2 (μg/Nm ^{3} dry)	<1.3575E-02	<1.2655E-02	<1.2537E-02	**<1.2922E-02**
C_{sd12}	Concentration @12% CO_2 (μg/Nm ^{3} dry)	<1.3168E-02	<1.2115E-02	<1.2020E-02	**<1.2435E-02**
$E_{lb/hr}$	Rate (lb/hr)	<3.0940E-06	<3.0216E-06	<3.0320E-06	**<3.0492E-06**
$E_{g/s}$	Rate (g/s)	<3.8977E-07	<3.8065E-07	<3.8196E-07	**<3.8413E-07**
$E_{T/yr}$	Rate (Ton/yr)	<1.3552E-05	<1.3235E-05	<1.3280E-05	**<1.3355E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.1367E-08	<1.0596E-08	<1.0497E-08	**<1.0820E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1622E-08	<1.0692E-08	<1.0608E-08	**<1.0974E-08**

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

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	Average
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	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	2.4041E-11	4.8456E-11	3.2648E-11	**3.5048E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.9889E-11	5.6081E-11	3.7660E-11	**4.1210E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.8994E-11	5.3691E-11	3.6109E-11	**3.9598E-11**
C_a	Concentration (lb/acf)	1.1066E-11	2.2053E-11	1.4728E-11	**1.5949E-11**
C_{sd}	Concentration (µg/dscm)	3.8498E-01	7.7595E-01	5.2281E-01	**5.6125E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.7864E-01	8.9806E-01	6.0308E-01	**6.5993E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.6429E-01	8.5978E-01	5.7823E-01	**6.3410E-01**
C_{sd}	Concentration (mg/dscm)	3.8498E-04	7.7595E-04	5.2281E-04	**5.6125E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.7864E-04	8.9806E-04	6.0308E-04	**6.5993E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.6429E-04	8.5978E-04	5.7823E-04	**6.3410E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	1.7720E-01	3.5315E-01	2.3585E-01	**2.5540E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	4.1314E-01	8.3273E-01	5.6107E-01	**6.0231E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	5.1366E-01	9.6377E-01	6.4721E-01	**7.0821E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	4.9826E-01	9.2269E-01	6.2054E-01	**6.8050E-01**
$E_{lb/hr}$	Rate (lb/hr)	1.1707E-04	2.3013E-04	1.5652E-04	**1.6791E-04**
$E_{g/s}$	Rate (g/s)	1.4748E-05	2.8990E-05	1.9718E-05	**2.1152E-05**
$E_{T/yr}$	Rate (Ton/yr)	5.1276E-04	1.0079E-03	6.8557E-04	**7.3543E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.3009E-07	8.0698E-07	5.4191E-07	**5.9299E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	4.3974E-07	8.1431E-07	5.4765E-07	**6.0056E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	9.7103E-11	2.0014E-10	1.7447E-10	**1.5724E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.2073E-10	2.3164E-10	2.0125E-10	**1.8454E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.1711E-10	2.2176E-10	1.9296E-10	**1.7728E-10**
C_a	Concentration (lb/acf)	4.4697E-11	9.1088E-11	7.8705E-11	**7.1497E-11**
C_{sd}	Concentration (µg/dscm)	1.5550E+00	3.2050E+00	2.7938E+00	**2.5179E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.9333E+00	3.7093E+00	3.2228E+00	**2.9551E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	1.8753E+00	3.5512E+00	3.0900E+00	**2.8388E+00**
C_{sd}	Concentration (mg/dscm)	1.5550E-03	3.2050E-03	2.7938E-03	**2.5179E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.9333E-03	3.7093E-03	3.2228E-03	**2.9551E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.8753E-03	3.5512E-03	3.0900E-03	**2.8388E-03**
C_a	Concentration (µg/m ^{3} (actual,wet))	7.1575E-01	1.4587E+00	1.2603E+00	**1.1449E+00**
C_{sd}	Concentration (µg/Nm ^{3} dry)	1.6688E+00	3.4395E+00	2.9983E+00	**2.7022E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	2.0747E+00	3.9808E+00	3.4586E+00	**3.1714E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	2.0126E+00	3.8111E+00	3.3161E+00	**3.0466E+00**
$E_{lb/hr}$	Rate (lb/hr)	4.7286E-04	9.5051E-04	8.3643E-04	**7.5327E-04**
$E_{g/s}$	Rate (g/s)	5.9569E-05	1.1974E-04	1.0537E-04	**9.4894E-05**
$E_{T/yr}$	Rate (Ton/yr)	2.0711E-03	4.1632E-03	3.6636E-03	**3.2993E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.7372E-06	3.3331E-06	2.8959E-06	**2.6554E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.7762E-06	3.3634E-06	2.9265E-06	**2.6887E-06**

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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 (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	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9886	0.9886	0.9886	
C_p	Pitot tube coefficient	0.8120	0.8120	0.8120	
P_g	Static pressure (in. H_2O)	-12.0000	-12.0000	-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_2	Oxygen (dry volume %)	9.4300	9.1600	9.1600	**9.2500**
CO_2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	**10.4133**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.3800	80.2900	80.3400	**80.3367**
V_{lc}	Total Liquid collected (ml)	410.60	414.70	419.00	
V_m	Volume metered, meter conditions (ft ^{3})	70.0250	69.6650	69.5300	
T_m	Dry gas meter temperature (°F)	75.9600	82.2800	79.0000	
T_s	Sample temperature (°F)	296.0000	290.4000	290.4800	**292.2933**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.0480	1.0180	1.0220	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft ^{3})	19.3228	19.5158	19.7181	**19.5189**
V_{mstd}	Volume metered, standard (dscf)	68.7570	67.6014	67.8816	**68.0800**
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**
B_{wo}	Moisture measured in sample (% by volume)	21.9379	22.4018	22.5094	**22.2830**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.9379	22.4018	22.5094	**22.2830**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	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**
%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_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Q_{std7}	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 ^{3}/hr)	286,999	281,702	280,331	**283,011**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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 ^{3}/hr)	142,380	139,958	139,069	**140,469**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,489	118,209	117,458	**117,719**

Comments:

Average includes 3 runs.

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

USEPA Method 5/29
Filterable Particulate Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	**183.7**
P_1	Fabric Filter Inlet Temperature (°F)	313	305	305	**308**
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 Conditions					
O_2	Oxygen (dry volume %)	9.4300	9.1600	9.1600	**9.2500**
CO_2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	**10.4133**
T_s	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 Flow 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_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Q_{std7}	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^3/hr)	286,999	281,702	280,331	**283,011**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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^3/hr)	142,380	139,958	139,069	**140,469**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,489	118,209	117,458	**117,719**
Sampling Data					
V_{mstd}	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					
m_{filter}	Matter collected on filter(s) (g)	0.00080	0.00010	0.00010	
m_s	Matter collected in solvent rinse(s) (g)	0.00010	0.00380	0.00340	
m_n	Total particulate matter collected (g)	0.00090	0.00380	0.00340	
Filterable Particulate Results					
C_{sd}	Particulate Concentration (lb/dscf)	2.8863E-08	1.2395E-07	1.1044E-07	**8.7751E-08**
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	3.4977E-08	1.4675E-07	1.3076E-07	**1.0416E-07**
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	3.3989E-08	1.4098E-07	1.2622E-07	**1.0040E-07**
C_a	Particulate Concentration (lb/acf)	1.5366E-08	6.6087E-08	5.8798E-08	**4.6750E-08**
C_{sd}	Particulate Concentration (gr/dscf)	0.0002	0.0009	0.0008	**0.0006**
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0002	0.0010	0.0009	**0.0007**
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0002	0.0010	0.0009	**0.0007**
C_a	Particulate Concentration (gr/acf)	0.0001	0.0005	0.0004	**0.0003**
C_{sd}	Particulate Concentration (mg/dscm)	0.4622	1.9848	1.7686	**1.4052**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	0.5601	2.3500	2.0940	**1.6680**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	0.5443	2.2576	2.0212	**1.6077**
C_a	Particulate Concentration (mg/m^3 (actual,wet))	0.2461	1.0583	0.9416	**0.7486**
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	0.4960	2.1301	1.8980	**1.5080**
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	0.6011	2.5220	2.2472	**1.7901**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	0.5841	2.4228	2.1691	**1.7254**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.1557	0.6574	0.5820	**0.4650**
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.0706	0.2981	0.2640	**0.2109**
$E_{T/yr}$	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:

Average includes 3 runs.

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Date ________

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

USEPA Method 5/29
Mercury (Hg) Emission Parameters

Run No.		**1**	**2**	**3**	**Average**
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	**183.7**
P_1	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_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 Conditions					
O_2	Oxygen (dry volume %)	9.4300	9.1600	9.1600	**9.2500**
CO_2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	**10.4133**
T_s	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 Flow 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_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Q_{std7}	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^3/hr)	286,999	281,702	280,331	**283,011**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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^3/hr)	142,380	139,958	139,069	**140,469**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,489	118,209	117,458	**117,719**
Sampling Data					
V_{mstd}	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					
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	4.4126	3.1426	3.4661	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	4.4126	3.1426	3.4661	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.4151E-10	1.0250E-10	1.1259E-10	**1.1887E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.7149E-10	1.2136E-10	1.3331E-10	**1.4205E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.6665E-10	1.1659E-10	1.2867E-10	**1.3730E-10**
C_a	Concentration (lb/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_{sd7}	Concentration @7% O_2 (µg/dscm)	2.7462E+00	1.9435E+00	2.1347E+00	**2.2748E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.6686E+00	1.8671E+00	2.0605E+00	**2.1987E+00**
C_{sd}	Concentration (mg/dscm)	2.2661E-03	1.6415E-03	1.8030E-03	**1.9035E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.7462E-03	1.9435E-03	2.1347E-03	**2.2748E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.6686E-03	1.8671E-03	2.0605E-03	**2.1987E-03**
C_a	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_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	2.9471E+00	2.0857E+00	2.2909E+00	**2.4412E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	2.8639E+00	2.0037E+00	2.2113E+00	**2.3596E+00**
$E_{lb/hr}$	Rate (lb/hr)	7.6349E-04	5.4364E-04	5.9333E-04	**6.3349E-04**
$E_{g/s}$	Rate (g/s)	9.6181E-05	6.8485E-05	7.4746E-05	**7.9804E-05**
$E_{T/yr}$	Rate (Ton/yr)	3.3441E-03	2.3811E-03	2.5988E-03	**2.7747E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.4676E-06	1.7464E-06	1.9182E-06	**2.0441E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.5275E-08	1.7683E-06	1.9516E-06	**2.0825E-06**

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

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		**1**	**2**	**3**	**Average**
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	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	<3.2069E-12	<3.2618E-12	<3.2483E-12	**<3.2390E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.8864E-12	<3.8619E-12	<3.8459E-12	**<3.8647E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.7766E-12	<3.7101E-12	<3.7123E-12	**<3.7330E-12**
C_a	Concentration (lb/acf)	<1.7074E-12	<1.7391E-12	<1.7294E-12	**<1.7253E-12**
C_{sd}	Concentration (µg/dscm)	<5.1355E-02	<5.2233E-02	<5.2017E-02	**<5.1868E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<6.2235E-02	<6.1843E-02	<6.1587E-02	**<6.1888E-02**
C_{sd12}	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_{sd7}	Concentration @7% O_2 (mg/dscm)	<6.2235E-05	<6.1843E-05	<6.1587E-05	**<6.1888E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<6.0477E-05	<5.9412E-05	<5.9448E-05	**<5.9779E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.7341E-02	<2.7850E-02	<2.7693E-02	**<2.7628E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.5112E-02	<5.6055E-02	<5.5823E-02	**<5.5663E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<6.6788E-02	<6.6368E-02	<6.6094E-02	**<6.6417E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<6.4902E-02	<6.3759E-02	<6.3798E-02	**<6.4153E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.7302E-05	<1.7299E-05	<1.7118E-05	**<1.7240E-05**
$E_{g/s}$	Rate (g/s)	<2.1797E-06	<2.1792E-06	<2.1565E-06	**<2.1718E-06**
$E_{T/yr}$	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**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.7278E-08	<5.6269E-08	<5.6304E-08	**<5.6617E-08**

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Date ________

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

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	1.4151E-10	1.0250E-10	1.1259E-10	**1.1887E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.7149E-10	1.2136E-10	1.3331E-10	**1.4205E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.6665E-10	1.1659E-10	1.2867E-10	**1.3730E-10**
C_a	Concentration (lb/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_{sd7}	Concentration @7% O_2 (µg/dscm)	2.7462E+00	1.9435E+00	2.1347E+00	**2.2748E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.6686E+00	1.8671E+00	2.0605E+00	**2.1987E+00**
C_{sd}	Concentration (mg/dscm)	2.2661E-03	1.6415E-03	1.8030E-03	**1.9035E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.7462E-03	1.9435E-03	2.1347E-03	**2.2748E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.6686E-03	1.8671E-03	2.0605E-03	**2.1987E-03**
C_a	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_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	2.9471E+00	2.0857E+00	2.2909E+00	**2.4412E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	2.8639E+00	2.0037E+00	2.2113E+00	**2.3596E+00**
$E_{lb/hr}$	Rate (lb/hr)	7.6349E-04	5.4364E-04	5.9333E-04	**6.3349E-04**
$E_{g/s}$	Rate (g/s)	9.6181E-05	6.8485E-05	7.4746E-05	**7.9804E-05**
$E_{T/yr}$	Rate (Ton/yr)	3.3441E-03	2.3811E-03	2.5988E-03	**2.7747E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.4676E-06	1.7464E-06	1.9182E-06	**2.0441E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.5275E-06	1.7683E-06	1.9516E-06	**2.0825E-06**

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Date ________

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

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<6.4139E-12	<6.5235E-12	<6.4966E-12	**<6.4780E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.7727E-12	<7.7238E-12	<7.6919E-12	**<7.7295E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.5532E-12	<7.4201E-12	<7.4247E-12	**<7.4680E-12**
C_a	Concentration (lb/acf)	<3.4147E-12	<3.4782E-12	<3.4587E-12	**<3.4506E-12**
C_{sd}	Concentration (µg/dscm)	<1.0271E-01	<1.0447E-01	<1.0403E-01	**<1.0374E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.2447E-01	<1.2369E-01	<1.2317E-01	**<1.2378E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.2095E-01	<1.1882E-01	<1.1890E-01	**<1.1956E-01**
C_{sd}	Concentration (mg/dscm)	<1.0271E-04	<1.0447E-04	<1.0403E-04	**<1.0374E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.2447E-04	<1.2369E-04	<1.2317E-04	**<1.2378E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.2095E-04	<1.1882E-04	<1.1890E-04	**<1.1956E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.4682E-02	<5.5699E-02	<5.5386E-02	**<5.5256E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.1022E-01	<1.1211E-01	<1.1165E-01	**<1.1133E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.3358E-01	<1.3274E-01	<1.3219E-01	**<1.3283E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.2980E-01	<1.2752E-01	<1.2760E-01	**<1.2831E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4605E-05	<3.4598E-05	<3.4236E-05	**<3.4479E-05**
$E_{g/s}$	Rate (g/s)	<4.3594E-06	<4.3585E-06	<4.3129E-06	**<4.3436E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.5157E-04	<1.5154E-04	<1.4995E-04	**<1.5102E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.1184E-07	<1.1114E-07	<1.1068E-07	**<1.1122E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1456E-07	<1.1254E-07	<1.1261E-07	**<1.1323E-07**

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

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	***Average***
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	
Mercury 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_a	Concentration (lb/acf)	<8.5369E-12	<8.6956E-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_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.0238E-01	<2.9706E-01	<2.9724E-01	**<2.9889E-01**
C_{sd}	Concentration (mg/dscm)	<2.5677E-04	<2.6116E-04	<2.6009E-04	**<2.5934E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.1117E-04	<3.0921E-04	<3.0794E-04	**<3.0944E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.0238E-04	<2.9706E-04	<2.9724E-04	**<2.9889E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<1.3671E-01	<1.3925E-01	<1.3847E-01	**<1.3814E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<2.7556E-01	<2.8027E-01	<2.7912E-01	**<2.7832E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.3394E-01	<3.3184E-01	<3.3047E-01	**<3.3208E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.2451E-01	<3.1879E-01	<3.1899E-01	**<3.2076E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.6512E-05	<8.6494E-05	<8.5590E-05	**<8.6199E-05**
$E_{g/s}$	Rate (g/s)	<1.0898E-05	<1.0896E-05	<1.0782E-05	**<1.0859E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.7892E-04	<3.7884E-04	<3.7488E-04	**<3.7755E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.7961E-07	<2.7785E-07	<2.7670E-07	**<2.7806E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.8639E-07	<2.8135E-07	<2.8152E-07	**<2.8309E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	<1.2828E-11	<1.3047E-11	<1.2993E-11	**<1.2956E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.5545E-11	<1.5448E-11	<1.5384E-11	**<1.5459E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.5106E-11	<1.4840E-11	<1.4849E-11	**<1.4932E-11**
C_a	Concentration (lb/acf)	<6.8295E-12	<6.9565E-12	<6.9174E-12	**<6.9011E-12**
C_{sd}	Concentration (µg/dscm)	<2.0542E-01	<2.0893E-01	<2.0807E-01	**<2.0747E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.4894E-01	<2.4737E-01	<2.4635E-01	**<2.4755E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.4191E-01	<2.3765E-01	<2.3779E-01	**<2.3912E-01**
C_{sd}	Concentration (mg/dscm)	<2.0542E-04	<2.0893E-04	<2.0807E-04	**<2.0747E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.4894E-04	<2.4737E-04	<2.4635E-04	**<2.4755E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.4191E-04	<2.3765E-04	<2.3779E-04	**<2.3912E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<1.0936E-01	<1.1140E-01	<1.1077E-01	**<1.1051E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<2.2045E-01	<2.2422E-01	<2.2329E-01	**<2.2265E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.6715E-01	<2.6547E-01	<2.6438E-01	**<2.6567E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.5961E-01	<2.5504E-01	<2.5519E-01	**<2.5661E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.9210E-05	<6.9195E-05	<6.8472E-05	**<6.8959E-05**
$E_{g/s}$	Rate (g/s)	<8.7188E-06	<8.7170E-06	<8.6259E-06	**<8.6872E-06**
$E_{T/yr}$	Rate (Ton/yr)	<3.0314E-04	<3.0308E-04	<2.9991E-04	**<3.0204E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.2369E-07	<2.2228E-07	<2.2136E-07	**<2.2245E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.2911E-07	<2.2508E-07	<2.2522E-07	**<2.2647E-07**

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

USEPA Method 5/29
Beryllium (Be) Emission Parameters

	Run No.	1	2	3	Average
	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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	**183.7**
P_1	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_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 Conditions					
O_2	Oxygen (dry volume %)	9.4300	9.1600	9.1600	**9.2500**
CO_2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	**10.4133**
T_s	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 Flow 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_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Q_{std7}	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^3/hr)	286,999	281,702	280,331	**283,011**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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^3/hr)	142,380	139,958	139,069	**140,469**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,489	118,209	117,458	**117,719**
Sampling Data					
V_{mstd}	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					
m_n	Total matter corrected for allowable blanks (µg)	<0.0500	<0.0500	<0.0500	
Beryllium Results - Total					
C_{sd}	Concentration (lb/dscf)	<1.6035E-12	<1.6309E-12	<1.6242E-12	**<1.6195E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.9432E-12	<1.9309E-12	<1.9230E-12	**<1.9324E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.8883E-12	<1.8550E-12	<1.8562E-12	**<1.8665E-12**
C_a	Concentration (lb/acf)	<8.5369E-13	<8.6956E-13	<8.6468E-13	**<8.6264E-13**
C_{sd}	Concentration (µg/dscm)	<2.5677E-02	<2.6116E-02	<2.6009E-02	**<2.5934E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<3.1117E-02	<3.0921E-02	<3.0794E-02	**<3.0944E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.0238E-02	<2.9706E-02	<2.9724E-02	**<2.9889E-02**
C_{sd}	Concentration (mg/dscm)	<2.5677E-05	<2.6116E-05	<2.6009E-05	**<2.5934E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.1117E-05	<3.0921E-05	<3.0794E-05	**<3.0944E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.0238E-05	<2.9706E-05	<2.9724E-05	**<2.9889E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<1.3671E-02	<1.3925E-02	<1.3847E-02	**<1.3814E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.7556E-02	<2.8027E-02	<2.7912E-02	**<2.7832E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.3394E-02	<3.3184E-02	<3.3047E-02	**<3.3208E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.2451E-02	<3.1879E-02	<3.1899E-02	**<3.2076E-02**
$E_{lb/hr}$	Rate (lb/hr)	<8.6512E-06	<8.6494E-06	<8.5590E-06	**<8.6199E-06**
$E_{g/s}$	Rate (g/s)	<1.0898E-06	<1.0896E-06	<1.0782E-06	**<1.0859E-06**
$E_{T/yr}$	Rate (Ton/yr)	<3.7892E-05	<3.7884E-05	<3.7488E-05	**<3.7755E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.7961E-08	<2.7785E-08	<2.7670E-08	**<2.7806E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.8639E-08	<2.8135E-08	<2.8152E-08	**<2.8309E-08**

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

USEPA Method 5/29
Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	**183.7**
P_1	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_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 Conditions					
O_2	Oxygen (dry volume %)	9.4300	9.1600	9.1600	**9.2500**
CO_2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	**10.4133**
T_s	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 Flow 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_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Q_{std7}	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^3/hr)	286,999	281,702	280,331	**283,011**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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^3/hr)	142,380	139,958	139,069	**140,469**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,489	118,209	117,458	**117,719**
Sampling Data					
V_{mstd}	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					
m_n	Total matter corrected for allowable blanks (µg)	0.3934	0.3103	1.0930	
Cadmium Results - Total					
C_{sd}	Concentration (lb/dscf)	1.2616E-11	1.0120E-11	3.5504E-11	**1.9413E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.5289E-11	1.1982E-11	4.2036E-11	**2.3102E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.4857E-11	1.1511E-11	4.0576E-11	**2.2315E-11**
C_a	Concentration (lb/acf)	6.7168E-12	5.3960E-12	1.8902E-11	**1.0338E-11**
C_{sd}	Concentration (µg/dscm)	2.0203E-01	1.6206E-01	5.6854E-01	**3.1088E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.4483E-01	1.9188E-01	6.7315E-01	**3.6995E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.3792E-01	1.8434E-01	6.4976E-01	**3.5734E-01**
C_{sd}	Concentration (mg/dscm)	2.0203E-04	1.6206E-04	5.6854E-04	**3.1088E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.4483E-04	1.9188E-04	6.7315E-04	**3.6995E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.3792E-04	1.8434E-04	6.4976E-04	**3.5734E-04**
C_a	Concentration (µg/m^3 (actual,wet))	1.0756E-01	8.6409E-02	3.0269E-01	**1.6555E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	2.1681E-01	1.7392E-01	6.1014E-01	**3.3363E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	2.6275E-01	2.0592E-01	7.2240E-01	**3.9702E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	2.5532E-01	1.9783E-01	6.9731E-01	**3.8349E-01**
$E_{lb/hr}$	Rate (lb/hr)	6.8068E-05	5.3673E-05	1.8710E-04	**1.0295E-04**
$E_{g/s}$	Rate (g/s)	8.5749E-06	6.7616E-06	2.3570E-05	**1.2969E-05**
$E_{T/yr}$	Rate (Ton/yr)	2.9814E-04	2.3509E-04	8.1949E-04	**4.5091E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.2000E-07	1.7242E-07	6.0487E-07	**3.3243E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.2533E-07	1.7459E-07	6.1540E-07	**3.3844E-07**

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

USEPA Method 5/29
Lead (Pb) Emission Parameters

Run No.		**1**	**2**	**3**	**Average**
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	183.6	183.4	184.0	**183.7**
P_1	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_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 Conditions					
O_2	Oxygen (dry volume %)	9.4300	9.1600	9.1600	**9.2500**
CO_2	Carbon dioxide (dry volume %)	10.1900	10.5500	10.5000	**10.4133**
T_s	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 Flow 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_{std}	Volumetric flow rate, dry standard (dscfm)	89,921	88,392	87,831	**88,715**
Q_{std7}	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^3/hr)	286,999	281,702	280,331	**283,011**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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^3/hr)	142,380	139,958	139,069	**140,469**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	117,489	118,209	117,458	**117,719**
Sampling Data					
V_{mstd}	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					
m_n	Total matter corrected for allowable blanks (μg)	2.2834	1.3454	2.3089	
Lead Results - Total					
C_{sd}	Concentration (lb/dscf)	7.3227E-11	4.3885E-11	7.4999E-11	**6.4037E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	8.8741E-11	5.1959E-11	8.8798E-11	**7.6499E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	8.6234E-11	4.9916E-11	8.5713E-11	**7.3955E-11**
C_a	Concentration (lb/acf)	3.8986E-11	2.3398E-11	3.9929E-11	**3.4104E-11**
C_{sd}	Concentration (μg/dscm)	1.1726E+00	7.0275E-01	1.2010E+00	**1.0255E+00**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	1.4211E+00	8.3205E-01	1.4220E+00	**1.2250E+00**
C_{sd12}	Concentration @12% CO_2 (μg/dscm)	1.3809E+00	7.9934E-01	1.3726E+00	**1.1843E+00**
C_{sd}	Concentration (mg/dscm)	1.1726E-03	7.0275E-04	1.2010E-03	**1.0255E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.4211E-03	8.3205E-04	1.4220E-03	**1.2250E-03**
C_{sd12}	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_{sd}	Concentration (μg/Nm^3 dry)	1.2584E+00	7.5417E-01	1.2889E+00	**1.1005E+00**
C_{sd7}	Concentration @7% O_2 (μg/Nm^3 dry)	1.5250E+00	8.9293E-01	1.5260E+00	**1.3147E+00**
C_{sd12}	Concentration @12% CO_2 (μg/Nm^3 dry)	1.4820E+00	8.5782E-01	1.4730E+00	**1.2709E+00**
$E_{lb/hr}$	Rate (lb/hr)	3.9508E-04	2.3274E-04	3.9523E-04	**3.4102E-04**
$E_{g/s}$	Rate (g/s)	4.9771E-05	2.9320E-05	4.9790E-05	**4.2960E-05**
$E_{T/yr}$	Rate (Ton/yr)	1.7305E-03	1.0194E-03	1.7311E-03	**1.4937E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.2769E-06	7.4766E-07	1.2778E-06	**1.1008E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.3079E-06	7.5706E-07	1.3000E-06	**1.1216E-06**

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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 (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:38	08:06	09:47	
Stop Time (approx.)		07:50	09:21	11:00	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9916	0.9916	0.9916	
C_p	Pitot tube coefficient	0.8250	0.8250	0.8250	
P_g	Static pressure (in. H_2O)	-12.0000	-12.0000	-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.)	0.2720	0.2720	0.2720	
O_2	Oxygen (dry volume %)	9.3600	9.3000	10.1200	**9.5933**
CO_2	Carbon dioxide (dry volume %)	10.2300	10.3400	9.5600	**10.0433**
N_2+CO	*Nitrogen plus carbon monoxide (dry volume %)*	80.4100	80.3600	80.3200	**80.3633**
V_{lc}	Total Liquid collected (ml)	220.60	230.00	234.70	
V_m	Volume metered, meter conditions (ft^3)	37.8550	38.2900	38.4800	
T_m	Dry gas meter temperature (°F)	71.0000	75.6000	79.2200	
T_s	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 Results					
V_{wstd}	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**
B_{wo}	Moisture measured in sample (% by volume)	21.6150	22.2806	22.6630	**22.1862**
B_{ws}	*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**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	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**
V_s	Velocity of sample (ft/sec)	46.4230	46.9242	46.9747	**46.7740**
%I	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_s	Volumetric flow rate, standard (scfm)	122,051	123,875	124,513	**123,480**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	95,670	96,275	96,295	**96,080**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,426	80,345	74,680	**78,150**
Q_a	Volumetric flow rate, actual (acf/hr)	10,695,858	10,811,326	10,822,977	**10,776,721**
Q_s	Volumetric flow rate, standard (scf/hr)	7,323,052	7,432,506	7,470,798	**7,408,785**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,740,172	5,776,499	5,777,687	**5,764,786**
Q_a	Volumetric flow rate, actual (m^3/hr)	302,913	306,183	306,513	**305,203**
Q_s	Volumetric flow rate, standard (m^3/hr)	207,393	210,493	211,577	**209,821**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	162,565	163,594	163,628	**163,262**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	134,964	136,524	126,900	**132,796**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	193,253	196,141	197,152	**195,515**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	151,481	152,440	152,471	**152,131**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	125,762	127,216	118,247	**123,742**

Comments:
Average includes 3 runs.

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

USEPA Method 13B
HF Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:38	08:06	09:47	
Stop Time (approx.)		07:50	09:21	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 Conditions					
O_2	Oxygen (dry volume %)	9.3600	9.3000	10.1200	**9.5933**
CO_2	Carbon dioxide (dry volume %)	10.2300	10.3400	9.5600	**10.0433**
T_s	Sample temperature (°F)	293.0800	290.0000	286.9600	**290.0133**
B_w	Actual water vapor in gas (% by volume)	21.6150	22.2806	22.6630	**22.1862**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	178,264	180,189	180,383	**179,612**
Q_s	Volumetric flow rate, standard (scfm)	122,051	123,875	124,513	**123,480**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	95,670	96,275	96,295	**96,080**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,426	80,345	74,680	**78,150**
Q_a	Volumetric flow rate, actual (acf/hr)	10,695,858	10,811,326	10,822,977	**10,776,721**
Q_s	Volumetric flow rate, standard (scf/hr)	7,323,052	7,432,506	7,470,798	**7,408,785**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,740,172	5,776,499	5,777,687	**5,764,786**
Q_a	Volumetric flow rate, actual (m^3/hr)	302,913	306,183	306,513	**305,203**
Q_s	Volumetric flow rate, standard (m^3/hr)	207,393	210,493	211,577	**209,821**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	162,565	163,594	163,628	**163,262**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	134,964	136,524	126,900	**132,796**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	193,253	196,141	197,152	**195,515**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	151,481	152,440	152,471	**152,131**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	125,762	127,216	118,247	**123,742**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	37.6474	37.7557	37.6907	**37.6979**
%I	Isokinetic sampling (%)	99.9197	99.5770	99.3851	**99.6272**
Laboratory Data					
m_n	Total HF collected (mg)	<0.0061	<0.0055	<0.0060	
Hydrogen Fluoride (HF) Results					
C_{sd}	HF Concentration (lb/dscf)	<3.5487E-10	<3.1954E-10	<3.4929E-10	**<3.4123E-10**
C_{sd7}	HF Concentration @7% O_2 (lb/dscf)	<4.2745E-10	<3.8290E-10	<4.5038E-10	**<4.2024E-10**
C_{sd12}	HF Concentration @12% CO_2 (lb/dscf)	<4.1627E-10	<3.7084E-10	<4.3844E-10	**<4.0852E-10**
C_a	HF Concentration (lb/acf)	<1.9045E-10	<1.7073E-10	<1.8646E-10	**<1.8255E-10**
C_{sd}	HF Concentration (ppmdv)	<0.0068	<0.0062	<0.0067	**<0.0066**
C_{sd7}	HF Concentration @7% O_2 (ppmdv)	<0.0082	<0.0074	<0.0087	**<0.0081**
C_{sd12}	HF Concentration @12% CO_2 (ppmdv)	<0.0080	<0.0071	<0.0084	**<0.0079**
C_w	HF Concentration (ppmwv)	<0.0054	<0.0048	<0.0052	**<0.0051**
C_{sd}	HF Concentration (mg/dscm)	<0.0057	<0.0051	<0.0056	**<0.0055**
C_{sd7}	HF Concentration @7% O_2 (mg/dscm)	<0.0068	<0.0061	<0.0072	**<0.0067**
C_{sd12}	HF Concentration @12% CO_2 (mg/dscm)	<0.0067	<0.0059	<0.0070	**<0.0065**
C_a	HF Concentration (mg/m^3 (actual,wet))	<0.0030	<0.0027	<0.0030	**<0.0029**
C_{sd}	HF Concentration (mg/Nm^3 dry)	<0.0061	<0.0055	<0.0060	**<0.0059**
C_{sd7}	HF Concentration @7% O_2 (mg/Nm^3 dry)	<0.0073	<0.0066	<0.0077	**<0.0072**
C_{sd12}	HF Concentration @12% CO_2 (mg/Nm^3 dry)	<0.0072	<0.0064	<0.0075	**<0.0070**
$E_{lb/hr}$	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	<0.0000065	**<0.0000060**
E_{Fc}	HF Rate - Fc-based (lb/MMBtu)	<0.0000063	<0.0000056	<0.0000066	**<0.0000062**

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

USEPA Method 23 (PCDD/F)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 17	Mar 17	
Start Time (approx.)		11:07	06:08	10:54	
Stop Time (approx.)		15:32	10:27	15:18	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9916	0.9916	0.9916	
C_p	Pitot tube coefficient	0.8330	0.8330	0.8330	
P_g	Static pressure (in. H_2O)	-10.4000	-14.3000	-13.1000	
A_s	Sample location area (ft ^{2})	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	30.20	30.10	30.10	**30.1333**
D_n	Nozzle diameter (in.)	0.2660	0.2660	0.2660	
O_2	Oxygen (dry volume %)	9.5400	9.6600	9.4000	**9.5333**
CO_2	Carbon dioxide (dry volume %)	10.2500	9.9400	10.1700	**10.1200**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.2100	80.4000	80.4300	**80.3467**
V_{lc}	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_m	Dry gas meter temperature (°F)	85.5200	79.1800	89.2600	
T_s	Sample temperature (°F)	301.2000	300.7600	300.9600	**300.9733**
ΔH	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 Results					
V_{wstd}	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**
P_s	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_{wo}	Moisture measured in sample (% by volume)	21.2795	21.3263	21.0032	**21.2030**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.2795	21.3263	21.0032	**21.2030**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	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**
M_s	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**
%I	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_{std7}	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_s	Volumetric flow rate, standard (scf/hr)	7,224,546	7,361,399	7,115,194	**7,233,713**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,687,202	5,791,482	5,620,774	**5,699,820**
Q_a	Volumetric flow rate, actual (m ^{3}/hr)	299,827	309,395	298,220	**302,481**
Q_s	Volumetric flow rate, standard (m ^{3}/hr)	204,603	208,479	201,506	**204,863**
Q_{std}	Volumetric flow rate, dry standard (dry m ^{3}/hr)	161,065	164,018	159,184	**161,422**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	131,633	132,631	131,699	**131,987**
Q_s	Volumetric flow rate, normal (Nm ^{3}/hr)	190,653	194,265	187,767	**190,895**
Q_{std}	Volumetric flow rate, dry normal (Nm ^{3}/hr)	150,083	152,835	148,330	**150,416**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	122,658	123,588	122,719	**122,988**

Comments:

Average includes 3 runs.

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

USEPA Method 23 Parameters (NDs & EMPCs counted as Zero)
Total Tetra- through Octa-PCDD/F Results (using USEPA/INTL 1989 TEFs)

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 17	Mar 17	
Start Time (approx.)		11:07	06:08	10:54	
Stop Time (approx.)		15:32	10:27	15:18	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	183.4	184.2	183.9
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	320
P_2	Carbon Feed Rate (lb/hr)	6	5	5	5
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 Conditions					
O_2	Oxygen (dry volume %)	9.5400	9.6600	9.4000	9.5333
CO_2	Carbon dioxide (dry volume %)	10.2500	9.9400	10.1700	10.1200
T_s	Sample temperature (°F)	301.2	300.8	301.0	301.0
B_w	Actual water vapor in gas (% by volume)	21.2795	21.3263	21.0032	21.2030
Gas Flow Rate					
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_{std7}	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_s	Volumetric flow rate, standard (scf/hr)	7,224,546	7,361,399	7,115,194	7,233,713
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,687,202	5,791,482	5,620,774	5,699,820
Q_a	Volumetric flow rate, actual (m^3/hr)	299,827	309,395	298,220	302,481
Q_s	Volumetric flow rate, standard (m^3/hr)	204,603	208,479	201,506	204,863
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	161,065	164,018	159,184	161,422
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	131,633	132,631	131,699	131,987
Q_s	Volumetric flow rate, normal (Nm^3/hr)	190,653	194,265	187,767	190,895
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	150,083	152,835	148,330	150,416
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	122,658	123,588	122,719	122,988
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	142.3205	144.1278	138.8218	141.7567
%I	Isokinetic sampling (%)	99.6609	99.1092	98.3598	99.0433
Laboratory Data from USEPA Method 23					
	Total PCDDs (ng)	9.19300	9.08100	9.01300	
	Total PCDFs (ng)	3.47830	3.21770	3.28990	
m_n	Total PCDDs & PCDFs (ng)	12.70000	12.30000	12.30000	
m_{n_TEQ}	Total TEQ PCDDs & PCDFs (ng)	0.13300	0.12700	0.12900	
Total PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	3.1509E+00	3.0134E+00	3.1286E+00	3.0976E+00
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	3.8554E+00	3.7265E+00	3.7815E+00	3.7878E+00
C_{sd12}	PCDD/F Concentration @12% CO_2 (ng/dscm)	3.6889E+00	3.6379E+00	3.6915E+00	3.6728E+00
C_{sd}	PCDD/F Concentration (ng/Nm^3 dry)	3.3814E+00	3.2339E+00	3.3575E+00	3.3243E+00
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/Nm^3 dry)	4.1375E+00	3.9992E+00	4.0582E+00	4.0650E+00
C_{sd12}	PCDD/F Concentration @12% CO_2 (ng/Nm^3 dry)	3.9588E+00	3.9041E+00	3.9616E+00	3.9415E+00
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.1190E-06	1.0898E-06	1.0981E-06	1.1023E-06
$E_{g/s}$	PCDD/F Rate (g/s)	1.4097E-07	1.3729E-07	1.3834E-07	1.3887E-07
$E_{T/yr}$	PCDD/F Rate (Ton/yr)	4.9014E-06	4.7734E-06	4.8098E-06	4.8282E-06
E_{Fd}	PCDD/F Rate - F_d-based (lb/MMBtu)	3.4644E-09	3.3486E-09	3.3979E-09	3.4036E-09
E_{Fc}	PCDD/F Rate - F_c-based (lb/MMBtu)	3.4938E-09	3.4455E-09	3.4963E-09	3.4785E-09
Total PCDD/F TEQ Results (using USEPA/INTL 1989 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	3.2998E-02	3.1114E-02	3.2812E-02	3.2308E-02
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	4.0376E-02	3.8477E-02	3.9659E-02	3.9504E-02
$C_{sd12TEQ}$	TEQ Concentration @12% CO_2 (ng/dscm)	3.8631E-02	3.7562E-02	3.8716E-02	3.8303E-02
C_{sdTEQ}	TEQ Concentration (ng/Nm^3 dry)	3.5412E-02	3.3390E-02	3.5213E-02	3.4672E-02
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/Nm^3 dry)	4.3330E-02	4.1292E-02	4.2561E-02	4.2395E-02
$C_{sd12TEQ}$	TEQ Concentration @12% CO_2 (ng/Nm^3 dry)	4.1458E-02	4.0310E-02	4.1549E-02	4.1106E-02
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	1.1719E-08	1.1253E-08	1.1517E-08	1.1496E-08
$E_{g/sTEQ}$	TEQ Rate (g/sec)	1.4763E-09	1.4176E-09	1.4509E-09	1.4482E-09
$E_{T/yrTEQ}$	TEQ Rate (Ton/yr)	5.1329E-08	4.9287E-08	5.0444E-08	5.0353E-08
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.6280E-11	3.4575E-11	3.5637E-11	3.5497E-11
E_{FcTEQ}	TEQ Rate - F_c-based (lb/MMBtu)	3.6588E-11	3.5575E-11	3.6668E-11	3.6277E-11

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Wheelabrator South Broward, Inc. — Max

Clean Air Project No: 10735

Unit 1 FF Outlet

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 (2009)		Mar 16	Mar 17	Mar 17	
Start Time (approx.)		11:07	06:08	10:54	
Stop Time (approx.)		15:32	10:27	15:18	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	183.4	184.2	**183.9**
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	**320**
P_2	Carbon Feed Rate (lb/hr)	6	5	5	**5**
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 Conditions					
O_2	Oxygen (dry volume %)	9.5400	9.6600	9.4000	**9.5333**
CO_2	Carbon dioxide (dry volume %)	10.2500	9.9400	10.1700	**10.1200**
T_s	Sample temperature (°F)	301.2	300.8	301.0	**301.0**
B_w	Actual water vapor in gas (% by volume)	21.2795	21.3263	21.0032	**21.2030**
Gas Flow Rate					
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_{std7}	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_s	Volumetric flow rate, standard (scf/hr)	7,224,546	7,361,399	7,115,194	**7,233,713**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,687,202	5,791,482	5,620,774	**5,699,820**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,827	309,395	298,220	**302,481**
Q_s	Volumetric flow rate, standard (m^3/hr)	204,603	208,479	201,506	**204,863**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	161,065	164,018	159,184	**161,422**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	131,633	132,631	131,699	**131,987**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	190,653	194,265	187,767	**190,895**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	150,083	152,835	148,330	**150,416**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	122,658	123,588	122,719	**122,988**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	142.3205	144.1278	138.8218	**141.7567**
%I	Isokinetic sampling (%)	99.6609	99.1092	98.3598	**99.0433**
Laboratory Data from USEPA Method 23, including NDs and EMPCs					
m_n	Total PCDDs & PCDFs (ng)	12.70000	12.50000	12.40000	
m_{n_TEQ}	Total TEQ PCDDs & PCDFs (ng)	0.13600	0.13100	0.12900	
Total PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	3.1509E+00	3.0624E+00	3.1540E+00	**3.1224E+00**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	3.8554E+00	3.7871E+00	3.8122E+00	**3.8183E+00**
C_{sd12}	PCDD/F Concentration @12% CO_2 (ng/dscm)	3.6889E+00	3.6970E+00	3.7215E+00	**3.7025E+00**
C_{sd}	PCDD/F Concentration (ng/Nm^3 dry)	3.3814E+00	3.2865E+00	3.3848E+00	**3.3509E+00**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/Nm^3 dry)	4.1375E+00	4.0642E+00	4.0912E+00	**4.0976E+00**
C_{sd12}	PCDD/F Concentration @12% CO_2 (ng/Nm^3 dry)	3.9588E+00	3.9676E+00	3.9938E+00	**3.9734E+00**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.1190E-06	1.1075E-06	1.1071E-06	**1.1112E-06**
$E_{g/s}$	PCDD/F Rate (g/s)	1.4097E-07	1.3952E-07	1.3946E-07	**1.3999E-07**
$E_{T/yr}$	PCDD/F Rate (Ton/yr)	4.9014E-06	4.8510E-06	4.8489E-06	**4.8671E-06**
E_{Fd}	PCDD/F - F_d-based (lb/MMBtu)	3.4644E-09	3.4030E-09	3.4256E-09	**3.4310E-09**
E_{Fc}	PCDD/F Rate - F_c-based (lb/MMBtu)	3.4938E-09	3.5015E-09	3.5247E-09	**3.5067E-09**
E_{HI}	PCDD/F Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{Rp}	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 PCDD/F TEQ Results (using USEPA/INTL 1989 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	3.3742E-02	3.2094E-02	3.2812E-02	**3.2882E-02**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	4.1286E-02	3.9689E-02	3.9659E-02	**4.0212E-02**
$C_{sd12TEQ}$	TEQ Concentration @12% CO_2 (ng/dscm)	3.9503E-02	3.8745E-02	3.8716E-02	**3.8988E-02**
C_{sdTEQ}	TEQ Concentration (ng/Nm^3 dry)	3.6211E-02	3.4442E-02	3.5213E-02	**3.5289E-02**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/Nm^3 dry)	4.4307E-02	4.2593E-02	4.2561E-02	**4.3154E-02**
$C_{sd12TEQ}$	TEQ Concentration @12% CO_2 (ng/Nm^3 dry)	4.2393E-02	4.1580E-02	4.1549E-02	**4.1841E-02**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	1.1983E-08	1.1607E-08	1.1517E-08	**1.1702E-08**
$E_{g/sTEQ}$	TEQ Rate (g/sec)	1.5096E-09	1.4622E-09	1.4509E-09	**1.4742E-09**
$E_{T/yrTEQ}$	TEQ Rate (Ton/yr)	5.2487E-08	5.0839E-08	5.0444E-08	**5.1257E-08**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.7099E-11	3.5664E-11	3.5637E-11	**3.6133E-11**
E_{FcTEQ}	TEQ Rate - F_c-based (lb/MMBtu)	3.7413E-11	3.6696E-11	3.6668E-11	**3.6926E-11**
E_{HITEQ}	TEQ Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{RpTEQ}	TEQ Rate - Production-based (lb/xxxxx)	6.5127E-11	6.3288E-11	6.2524E-11	**6.3646E-11**
E_{RpTEQ}	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 (HCl)
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	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9992	0.9992	0.9992	
P_g	Static pressure (in. H_2O)	-1.3000	-1.3000	-1.3000	
A_s	Sample location area (ft^2)	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_2	Carbon dioxide (dry volume %)	11.4100	11.6800	10.9900	**11.3600**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.5900	80.5900	80.5600	**80.5800**
V_{lc}	Total Liquid collected (ml)	157.00	140.80	143.80	
V_m	Volume metered, meter conditions (ft^3)	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**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.0883	1.1833	1.1833	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 1 SDA Inlet

USEPA Method 26A
HCl 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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.7	184.7	183.5	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	**320**
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 Conditions					
O_2	Oxygen (dry volume %)	8.0000	7.7300	8.4500	**8.0600**
CO_2	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**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	33.1054	34.2376	33.9239	**33.7556**
Laboratory Data					
m_n	Total HCl collected (mg)	593.6855	508.7987	529.3518	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	3.9543E-05	3.2768E-05	3.4407E-05	**3.5573E-05**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	4.2608E-05	3.4584E-05	3.8414E-05	**3.8536E-05**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	4.1587E-05	3.3666E-05	3.7569E-05	**3.7607E-05**
C_{sd}	HCl Concentration (ppmdv)	418.0693	346.4440	363.7721	**376.0952**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	450.4778	365.6470	406.1392	**407.4213**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	439.6873	355.9356	397.2034	**397.6088**
C_w	HCl Concentration (ppmwv)	341.7892	290.2680	303.2742	**311.7771**
C_{sd}	HCl Concentration (mg/dscm)	633.2215	524.7354	550.9812	**569.6461**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	682.3085	553.8210	615.1517	**617.0937**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	665.9648	539.1118	601.6174	**602.2313**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	679.5548	563.1307	591.2969	**611.3275**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	732.2335	594.3445	660.1628	**662.2469**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 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}	HCl Rate - Fc-based (lb/MMBtu)	0.6307	0.5106	0.5698	**0.5704**

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

EPA Modified Method 26A (HCl)
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	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9886	0.9886	0.9886	
P_g	Static pressure (in. H_2O)	-10.4000	-10.4000	-10.5000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	30.20	30.20	30.20	**30.2000**
O_2	Oxygen (dry volume %)	9.2000	8.9700	9.5000	**9.2233**
CO_2	Carbon dioxide (dry volume %)	10.4000	10.5500	10.0700	**10.3400**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.4000	80.4800	80.4300	**80.4367**
V_{lc}	Total Liquid collected (ml)	248.40	228.20	213.90	
V_m	Volume metered, meter conditions (ft^3)	40.6800	40.4500	40.3900	
T_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_2O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	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_w	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 1 FF Outlet

EPA Modified Method 26A
HCl 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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.7	184.7	183.5	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	**320**
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 Conditions					
O_2	Oxygen (dry volume %)	9.2000	8.9700	9.5000	**9.2233**
CO_2	Carbon dioxide (dry volume %)	10.4000	10.5500	10.0700	**10.3400**
T_s	Sample temperature (°F)	304.0833	306.6667	305.5833	**305.4444**
B_w	Actual water vapor in gas (% by volume)	22.7417	21.5399	20.5886	**21.6234**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	39.7123	39.1175	38.8257	**39.2185**
Laboratory Data					
m_n	Total HCl collected (mg)	17.6057	20.2666	24.8532	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	9.7755E-07	1.1424E-06	1.4115E-06	**1.1771E-06**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	1.1614E-06	1.3310E-06	1.7210E-06	**1.4045E-06**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	1.1279E-06	1.2994E-06	1.6820E-06	**1.3698E-06**
C_{sd}	HCl Concentration (ppmdv)	10.3352	12.0781	14.9229	**12.4454**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	12.2786	14.0726	18.1955	**14.8489**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	11.9252	13.7381	17.7830	**14.4821**
C_w	HCl Concentration (ppmwv)	7.9848	9.4765	11.8505	**9.7706**
C_{sd}	HCl Concentration (mg/dscm)	15.6540	18.2939	22.6027	**18.8502**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	18.5975	21.3148	27.5595	**22.4906**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	18.0624	20.8082	26.9347	**21.9351**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	16.7995	19.6325	24.2566	**20.2295**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	19.9583	22.8744	29.5760	**24.1363**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	19.3840	22.3308	28.9056	**23.5401**
E_{Fd}	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

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	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0079	1.0079	1.0079	
C_p	Pitot tube coefficient	0.8200	0.8200	0.8200	
P_g	Static pressure (In. H_2O)	-1.9000	-1.7000	-1.8000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	30.20	30.20	30.20	**30.2000**
D_n	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O_2	Oxygen (dry volume %)	8.8300	9.2100	8.9800	**9.0067**
CO_2	Carbon dioxide (dry volume %)	10.7300	10.4900	10.7700	**10.6633**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.4400	80.3000	80.2500	**80.3300**
V_{lc}	Total Liquid collected (ml)	289.70	297.10	299.80	
V_m	Volume metered, meter conditions (ft^3)	73.9160	75.0900	75.0900	
T_m	Dry gas meter temperature (°F)	87.6250	96.7083	91.5417	
T_s	Sample temperature (°F)	513.1250	513.6250	513.9583	**513.5694**
ΔH	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 Results					
V_{wstd}	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_s	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_{wo}	Moisture measured in sample (% by volume)	15.7937	16.1416	16.1379	**16.0244**
B_{ws}	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**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	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_s	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**
%I	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_s	Volumetric flow rate, standard (scfm)	102,794	102,277	101,761	**102,277**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	86,559	85,767	85,339	**85,889**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	75,163	72,131	73,183	**73,492**
Q_a	Volumetric flow rate, actual (acf/hr)	11,314,177	11,257,482	11,207,359	**11,259,673**
Q_s	Volumetric flow rate, standard (scf/hr)	6,167,652	6,136,596	6,105,689	**6,136,646**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,193,550	5,146,048	5,120,359	**5,153,319**
Q_a	Volumetric flow rate, actual (m^3/hr)	320,424	318,819	317,399	**318,881**
Q_s	Volumetric flow rate, standard (m^3/hr)	174,672	173,792	172,917	**173,793**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	147,084	145,739	145,012	**145,945**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	127,720	122,568	124,355	**124,881**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	162,762	161,943	161,127	**161,944**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	137,056	135,802	135,124	**135,994**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,012	114,211	115,876	**116,366**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission 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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	5	7	6	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	8.8300	9.2100	8.9800	**9.0067**
CO_2	Carbon dioxide (dry volume %)	10.7300	10.4900	10.7700	**10.6633**
T_s	Sample temperature (°F)	513.1250	513.6250	513.9583	**513.5694**
B_w	Actual water vapor in gas (% by volume)	15.7937	16.1416	16.1379	**16.0244**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	188,570	187,625	186,789	**187,661**
Q_s	Volumetric flow rate, standard (scfm)	102,794	102,277	101,761	**102,277**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	86,559	85,767	85,339	**85,889**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	75,163	72,131	73,183	**73,492**
Q_a	Volumetric flow rate, actual (acf/hr)	11,314,177	11,257,482	11,207,359	**11,259,673**
Q_s	Volumetric flow rate, standard (scf/hr)	6,167,652	6,136,596	6,105,689	**6,136,646**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,193,550	5,146,048	5,120,359	**5,153,319**
Q_a	Volumetric flow rate, actual (m^3/hr)	320,424	318,819	317,399	**318,881**
Q_s	Volumetric flow rate, standard (m^3/hr)	174,672	173,792	172,917	**173,793**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	147,084	145,739	145,012	**145,945**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	127,720	122,568	124,355	**124,881**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	162,762	161,943	161,127	**161,944**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	137,056	135,802	135,124	**135,994**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,012	114,211	115,876	**116,366**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	72.6876	72.6362	73.3166	**72.8801**
%I	Isokinetic sampling (%)	102.0785	102.9480	104.4336	**103.1534**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	54.8752	57.1172	50.7188	
m_{n-2b}	Fraction 2B (µg)	7.4834	22.2673	5.7219	
m_{n-3a}	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m_{n-3b}	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m_{n-3c}	Fraction 3C (µg)	<0.4000	2.1075	0.5629	
m_n	Total matter corrected for allowable blanks (µg)	62.3587	81.4920	57.0036	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.8917E-09	2.4738E-09	1.7144E-09	**2.0266E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.1785E-09	2.9415E-09	1.9992E-09	**2.3730E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.1156E-09	2.8299E-09	1.9102E-09	**2.2852E-09**
C_a	Concentration (lb/acf)	8.6833E-10	1.1308E-09	7.8326E-10	**9.2748E-10**
C_{sd}	Concentration (µg/dscm)	3.0292E+01	3.9615E+01	2.7453E+01	**3.2454E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.4885E+01	4.7104E+01	3.2014E+01	**3.8001E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.3878E+01	4.5317E+01	3.0589E+01	**3.6595E+01**
C_{sd}	Concentration (mg/dscm)	3.0292E-02	3.9615E-02	2.7453E-02	**3.2454E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.4885E-02	4.7104E-02	3.2014E-02	**3.8001E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.3878E-02	4.5317E-02	3.0589E-02	**3.6595E-02**
C_a	Concentration (µg/m^3 (actual,wet))	1.3905E+01	1.8109E+01	1.2543E+01	**1.4852E+01**
C_{sd}	Concentration (µg/Nm^3 dry)	3.2509E+01	4.2514E+01	2.9462E+01	**3.4828E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	3.7438E+01	5.0551E+01	3.4356E+01	**4.0782E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	3.6357E+01	4.8633E+01	3.2827E+01	**3.9272E+01**
$E_{lb/hr}$	Rate (lb/hr)	9.8245E-03	1.2730E-02	8.7783E-03	**1.0444E-02**
$E_{g/s}$	Rate (g/s)	1.2377E-03	1.6037E-03	1.1059E-03	**1.3157E-03**
$E_{T/yr}$	Rate (Ton/yr)	4.3031E-02	5.5759E-02	3.8449E-02	**4.5747E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.1347E-05	4.2327E-05	2.8767E-05	**3.4147E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.2086E-05	4.2921E-05	2.8971E-05	**3.4659E-05**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

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 Time (approx.)		09:20	12:09	14:59	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	1.6647E-09	1.7339E-09	1.5254E-09	**1.6413E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.9170E-09	2.0617E-09	1.7787E-09	**1.9192E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.8617E-09	1.9835E-09	1.6996E-09	**1.8482E-09**
C_a	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_{sd7}	Concentration @7% O_2 (µg/dscm)	3.0699E+01	3.3015E+01	2.8484E+01	**3.0733E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.9812E+01	3.1763E+01	2.7216E+01	**2.9597E+01**
C_{sd}	Concentration (mg/dscm)	2.6657E-02	2.7766E-02	2.4427E-02	**2.6283E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.0699E-02	3.3015E-02	2.8484E-02	**3.0733E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.9812E-02	3.1763E-02	2.7216E-02	**2.9597E-02**
C_a	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_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	3.2945E+01	3.5431E+01	3.0568E+01	**3.2981E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	3.1994E+01	3.4087E+01	2.9208E+01	**3.1763E+01**
$E_{lb/hr}$	Rate (lb/hr)	8.6455E-03	8.9227E-03	7.8104E-03	**8.4595E-03**
$E_{g/s}$	Rate (g/s)	1.0891E-03	1.1240E-03	9.8393E-04	**1.0657E-03**
$E_{T/yr}$	Rate (Ton/yr)	3.7867E-02	3.9081E-02	3.4210E-02	**3.7053E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.7585E-05	2.9666E-05	2.5595E-05	**2.7616E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.8236E-05	3.0083E-05	2.5777E-05	**2.8032E-05**
E_{Hi}	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{Rp}	Rate - Production-based (lb/xxxxx)	4.6961E-05	4.8257E-05	4.2471E-05	**4.5896E-05**
E_{Rp}	Rate - Production-based (g/xxxxx)	2.1297E-02	2.1885E-02	1.9261E-02	**2.0815E-02**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 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 Time (approx.)		09:20	12:09	14:59	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	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_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.5388E-10	7.7327E-10	1.9174E-10	**4.0630E-10**
C_a	Concentration (lb/acf)	1.0421E-10	3.0900E-10	7.8622E-11	**1.6394E-10**
C_{sd}	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_{sd12}	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_{sd7}	Concentration @7% O_2 (mg/dscm)	4.1865E-03	1.2871E-02	3.2135E-03	**6.7570E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.0656E-03	1.2383E-02	3.0704E-03	**6.5063E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.6687E+00	4.9482E+00	1.2590E+00	**2.6253E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.9013E+00	1.1617E+01	2.9574E+00	**6.1584E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.4928E+00	1.3813E+01	3.4486E+00	**7.2514E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.3630E+00	1.3289E+01	3.2951E+00	**6.9823E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1790E-03	3.4785E-03	8.8115E-04	**1.8462E-03**
$E_{g/s}$	Rate (g/s)	1.4853E-04	4.3821E-04	1.1100E-04	**2.3258E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.1640E-03	1.5236E-02	3.8594E-03	**8.0865E-03**
E_{Fd}	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**
E_{Hi}	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**
E_{Rp}	Rate - Production-based (g/xxxxx)	2.9044E-03	8.5320E-03	2.1730E-03	**4.5365E-03**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 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 Time (approx.)		09:20	12:09	14:59	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<6.0671E-12	<6.0714E-12	<6.0150E-12	**<6.0511E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.9869E-12	<7.2191E-12	<7.0141E-12	**<7.0734E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.7852E-12	<6.9453E-12	<6.7020E-12	**<6.8108E-12**
C_a	Concentration (lb/acf)	<2.7850E-12	<2.7754E-12	<2.7481E-12	**<2.7695E-12**
C_{sd}	Concentration (μg/dscm)	<9.7156E-02	<9.7224E-02	<9.6322E-02	**<9.6901E-02**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	<1.1189E-01	<1.1560E-01	<1.1232E-01	**<1.1327E-01**
C_{sd12}	Concentration @12% CO_2 (μg/dscm)	<1.0865E-01	<1.1122E-01	<1.0732E-01	**<1.0907E-01**
C_{sd}	Concentration (mg/dscm)	<9.7156E-05	<9.7224E-05	<9.6322E-05	**<9.6901E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1189E-04	<1.1560E-04	<1.1232E-04	**<1.1327E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0865E-04	<1.1122E-04	<1.0732E-04	**<1.0907E-04**
C_a	Concentration (μg/m ^{3} (actual,wet))	<4.4597E-02	<4.4443E-02	<4.4007E-02	**<4.4349E-02**
C_{sd}	Concentration (μg/Nm ^{3} dry)	<1.0426E-01	<1.0434E-01	<1.0337E-01	**<1.0399E-01**
C_{sd7}	Concentration @7% O_2 (μg/Nm ^{3} dry)	<1.2007E-01	<1.2406E-01	<1.2054E-01	**<1.2156E-01**
C_{sd12}	Concentration @12% CO_2 (μg/Nm ^{3} dry)	<1.1661E-01	<1.1936E-01	<1.1518E-01	**<1.1705E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.1510E-05	<3.1243E-05	<3.0799E-05	**<3.1184E-05**
$E_{g/s}$	Rate (g/s)	<3.9695E-06	<3.9359E-06	<3.8799E-06	**<3.9284E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.3801E-04	<1.3685E-04	<1.3490E-04	**<1.3659E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0054E-07	<1.0388E-07	<1.0093E-07	**<1.0178E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0291E-07	<1.0534E-07	<1.0165E-07	**<1.0330E-07**
E_{HI}	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{Rp}	Rate - Production-based (lb/xxxxx)	<1.7115E-07	<1.6897E-07	<1.6748E-07	**<1.6920E-07**
E_{Rp}	Rate - Production-based (g/xxxxx)	<7.7621E-05	<7.6633E-05	<7.5953E-05	**<7.6736E-05**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 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 Time (approx.)		09:20	12:09	14:59	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	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_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.6963E-11	<1.7363E-11	<1.6755E-11	**<1.7027E-11**
C_a	Concentration (lb/acf)	<6.9624E-12	<6.9384E-12	<6.8703E-12	**<6.9237E-12**
C_{sd}	Concentration (µg/dscm)	<2.4289E-01	<2.4306E-01	<2.4081E-01	**<2.4225E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.7971E-01	<2.8901E-01	<2.8080E-01	**<2.8318E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.7164E-01	<2.7805E-01	<2.6831E-01	**<2.7266E-01**
C_{sd}	Concentration (mg/dscm)	<2.4289E-04	<2.4306E-04	<2.4081E-04	**<2.4225E-04**
C_{sd7}	Concentration @7% O_2 (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**
C_a	Concentration (µg/m ^{3} (actual,wet))	<1.1149E-01	<1.1111E-01	<1.1002E-01	**<1.1087E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<2.6066E-01	<2.6085E-01	<2.5842E-01	**<2.5998E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	<3.0018E-01	<3.1016E-01	<3.0135E-01	**<3.0390E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	<2.9151E-01	<2.9839E-01	<2.8794E-01	**<2.9262E-01**
$E_{lb/hr}$	Rate (lb/hr)	<7.8774E-05	<7.8109E-05	<7.6998E-05	**<7.7960E-05**
$E_{g/s}$	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**
E_{Hi}	Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{Rp}	Rate - Production-based (lb/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 - HCl Rinse + HCl/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_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.3570E-11	7.3186E-11	1.8862E-11	**<3.5206E-11**
C_a	Concentration (lb/acf)	<5.5699E-12	2.9245E-11	7.7341E-12	**<1.4183E-11**
C_{sd}	Concentration (µg/dscm)	<1.9431E-01	1.0245E+00	2.7108E-01	**<4.9663E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.2377E-01	1.2182E+00	3.1611E-01	**<5.8602E-01**
C_{sd12}	Concentration @12% CO_2 (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_{sd7}	Concentration @7% O_2 (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_a	Concentration (µg/m ^{3} (actual,wet))	<8.9195E-02	4.6832E-01	1.2385E-01	**<2.2712E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<2.0853E-01	1.0995E+00	2.9092E-01	**<5.3297E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	<2.4015E-01	1.3073E+00	3.3924E-01	**<6.2890E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	<2.3321E-01	1.2577E+00	3.2414E-01	**<6.0503E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.3019E-05	3.2923E-04	8.6679E-05	**<1.5964E-04**
$E_{g/s}$	Rate (g/s)	<7.9389E-06	4.1475E-05	1.0920E-05	**<2.0111E-05**
$E_{T/yr}$	Rate (Ton/yr)	<2.7602E-04	1.4420E-03	3.7965E-04	**<6.9923E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.0108E-07	1.0946E-06	2.8405E-07	**<5.2659E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.0582E-07	1.1100E-06	2.8607E-07	**<5.3398E-07**
E_{Hi}	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**
E_{Rp}	Rate - Production-based (g/xxxxx)	<1.5524E-04	8.0752E-04	2.1376E-04	**<3.9217E-04**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Sampling, Velocity and Moisture Parameters

Run No.		**1**	**2**	**3**	**Average**
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9897	0.9897	0.9897	
C_p	Pitot tube coefficient	0.8120	0.8120	0.8120	
P_g	Static pressure (in. H_2O)	-10.5000	-10.5000	-10.5000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	30.20	30.20	30.20	**30.2000**
D_n	Nozzle diameter (in.)	0.2680	0.2680	0.2680	
O_2	Oxygen (dry volume %)	9.8800	9.8700	9.8300	**9.8600**
CO_2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	**9.8167**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.4500	80.3000	80.2200	**80.3233**
V_{lc}	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_m	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 Results					
V_{wstd}	Volume of water collected (ft^3)	20.1558	19.0640	20.2593	**19.8264**
V_{mstd}	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	**73.9862**
P_s	Sample gas pressure, absolute (in. Hg)	29.4279	29.4279	29.4279	**29.4279**
P_v	Vapor pressure, actual (in. Hg)	29.4279	29.4279	29.4279	**29.4279**
B_{wo}	Moisture measured in sample (% by volume)	21.3445	20.6957	21.3500	**21.1301**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	**21.1301**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	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**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3934	27.4908	27.4264	**27.4368**
V_s	Velocity of sample (ft/sec)	46.5718	46.3552	46.9362	**46.6211**
%I	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_a	Volumetric flow rate, actual (m^3/hr)	303,884	302,471	306,262	**304,205**
Q_s	Volumetric flow rate, standard (m^3/hr)	208,283	207,369	209,846	**208,500**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	163,826	164,453	165,044	**164,441**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,882	130,497	131,442	**130,607**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,082	193,230	195,539	**194,284**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	152,656	153,240	153,791	**153,229**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,027	121,600	122,480	**121,702**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Filterable Particulate Parameters

Run No.		**1**	**2**	**3**	**Average**
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	**184.3**
P_1	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**
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 Conditions					
O_2	Oxygen (dry volume %)	9.8800	9.8700	9.8300	**9.8600**
CO_2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	**9.8167**
T_s	Sample temperature (°F)	297.6800	297.4800	297.9200	**297.6933**
B_w	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	**21.1301**
Gas Flow Rate					
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_a	Volumetric flow rate, actual (m^3/hr)	303,884	302,471	306,262	**304,205**
Q_s	Volumetric flow rate, standard (m^3/hr)	208,283	207,369	209,846	**208,500**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	163,826	164,453	165,044	**164,441**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,882	130,497	131,442	**130,607**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,082	193,230	195,539	**194,284**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	152,656	153,240	153,791	**153,229**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,027	121,600	122,480	**121,702**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	**73.9862**
%I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	**99.9826**
Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00060	0.00070	0.00070	
m_s	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	
Filterable Particulate Results					
C_{sd}	Particulate Concentration (lb/dscf)	5.9374E-08	3.0184E-08	9.4544E-08	**6.1367E-08**
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	7.4891E-08	3.8038E-08	1.1871E-07	**7.7214E-08**
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	7.3680E-08	3.6847E-08	1.1402E-07	**7.4850E-08**
C_a	Particulate Concentration (lb/acf)	3.2009E-08	1.6411E-08	5.0950E-08	**3.3123E-08**
C_{sd}	Particulate Concentration (gr/dscf)	0.0004	0.0002	0.0007	**0.0004**
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0005	0.0003	0.0008	**0.0005**
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0005	0.0003	0.0008	**0.0005**
C_a	Particulate Concentration (gr/acf)	0.0002	0.0001	0.0004	**0.0002**
C_{sd}	Particulate Concentration (mg/dscm)	0.9508	0.4834	1.5140	**0.9827**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	1.1993	0.6091	1.9010	**1.2365**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	1.1799	0.5901	1.8259	**1.1986**
C_a	Particulate Concentration (mg/m^3 (actual,wet))	0.5126	0.2628	0.8159	**0.5304**
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	1.0204	0.5187	1.6248	**1.0546**
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	1.2870	0.6537	2.0401	**1.3270**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	1.2662	0.6332	1.9595	**1.2863**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.3435	0.1753	0.5510	**0.3566**
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.1558	0.0795	0.2499	**0.1617**
$E_{T/yr}$	Particulate Rate (Ton/yr)	1.5044	0.7677	2.4133	**1.5618**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0011	0.0005	0.0017	**0.0011**
E_{Fc}	Particulate Rate - F_c-based (lb/MMBtu)	0.0011	0.0006	0.0017	**0.0011**

Comments:
Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	5	7	6	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	9.8800	9.8700	9.8300	**9.8600**
CO_2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	**9.8167**
T_s	Sample temperature (°F)	297.6800	297.4800	297.9200	**297.6933**
B_w	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	**21.1301**
Gas Flow Rate					
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_a	Volumetric flow rate, actual (m^3/hr)	303,884	302,471	306,262	**304,205**
Q_s	Volumetric flow rate, standard (m^3/hr)	208,283	207,369	209,846	**208,500**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	163,826	164,453	165,044	**164,441**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,882	130,497	131,442	**130,607**
Q_a	Volumetric flow rate, normal (Nm^3/hr)	194,082	193,230	195,539	**194,284**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	152,656	153,240	153,791	**153,229**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,027	121,600	122,480	**121,702**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	**73.9862**
%I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	**99.9826**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
m_{n-2b}	Fraction 2B (µg)	6.8700	6.5842	7.8493	
m_{n-3a}	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m_{n-3b}	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m_{n-3c}	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	6.8700	6.5842	7.8493	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.0395E-10	1.9874E-10	2.3191E-10	**2.1153E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5725E-10	2.5045E-10	2.9119E-10	**2.6630E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.5309E-10	2.4261E-10	2.7969E-10	**2.5846E-10**
C_a	Concentration (lb/acf)	1.0995E-10	1.0805E-10	1.2498E-10	**1.1433E-10**
C_{sd}	Concentration (µg/dscm)	3.2660E+00	3.1825E+00	3.7137E+00	**3.3874E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.1195E+00	4.0106E+00	4.6631E+00	**4.2644E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.0529E+00	3.8851E+00	4.4788E+00	**4.1389E+00**
C_{sd}	Concentration (mg/dscm)	3.2660E-03	3.1825E-03	3.7137E-03	**3.3874E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.1195E-03	4.0106E-03	4.6631E-03	**4.2644E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.0529E-03	3.8851E-03	4.4788E-03	**4.1389E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.7607E+00	1.7303E+00	2.0013E+00	**1.8308E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.5050E+00	3.4154E+00	3.9854E+00	**3.6353E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.4209E+00	4.3041E+00	5.0043E+00	**4.5764E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.3495E+00	4.1693E+00	4.8065E+00	**4.4418E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1798E-03	1.1540E-03	1.3515E-03	**1.2284E-03**
$E_{g/s}$	Rate (g/s)	1.4863E-04	1.4538E-04	1.7026E-04	**1.5475E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.1675E-03	5.0547E-03	5.9195E-03	**5.3806E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.7017E-06	3.6038E-06	4.1901E-06	**3.8319E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.8386E-06	3.6796E-06	4.2419E-06	**3.9200E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
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.)		06:56	09:58	12:45	
Stop Time (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_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.7445E-12	<3.8038E-12	<3.7098E-12	**<3.7527E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.6840E-12	<3.6847E-12	<3.5632E-12	**<3.6440E-12**
C_a	Concentration (lb/acf)	<1.6004E-12	<1.6411E-12	<1.5922E-12	**<1.6112E-12**
C_{sd}	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_{sd}	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_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.8994E-05	<5.9006E-05	<5.7060E-05	**<5.8353E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.5629E-02	<2.6280E-02	<2.5496E-02	**<2.5802E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.1018E-02	<5.1872E-02	<5.0774E-02	**<5.1221E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<6.4351E-02	<6.5370E-02	<6.3754E-02	**<6.4492E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<6.3311E-02	<6.3323E-02	<6.1235E-02	**<6.2623E-02**
$E_{lb/hr}$	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**
$E_{T/yr}$	Rate (Ton/yr)	<7.5218E-05	<7.6770E-05	<7.5415E-05	**<7.5801E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<5.3882E-08	<5.4735E-08	<5.3382E-08	**<5.3999E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.5874E-08	<5.5885E-08	<5.4042E-08	**<5.5267E-08**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	2.0395E-10	1.9874E-10	2.3191E-10	**2.1153E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5725E-10	2.5045E-10	2.9119E-10	**2.6630E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.5309E-10	2.4261E-10	2.7969E-10	**2.5846E-10**
C_a	Concentration (lb/acf)	1.0995E-10	1.0805E-10	1.2498E-10	**1.1433E-10**
C_{sd}	Concentration (µg/dscm)	3.2660E+00	3.1825E+00	3.7137E+00	**3.3874E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.1195E+00	4.0106E+00	4.6631E+00	**4.2644E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.0529E+00	3.8851E+00	4.4788E+00	**4.1389E+00**
C_{sd}	Concentration (mg/dscm)	3.2660E-03	3.1825E-03	3.7137E-03	**3.3874E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.1195E-03	4.0106E-03	4.6631E-03	**4.2644E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.0529E-03	3.8851E-03	4.4788E-03	**4.1389E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.7607E+00	1.7303E+00	2.0013E+00	**1.8308E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.5050E+00	3.4154E+00	3.9854E+00	**3.6353E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.4209E+00	4.3041E+00	5.0043E+00	**4.5764E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.3495E+00	4.1693E+00	4.8065E+00	**4.4418E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1798E-03	1.1540E-03	1.3515E-03	**1.2284E-03**
$E_{g/s}$	Rate (g/s)	1.4863E-04	1.4538E-04	1.7026E-04	**1.5475E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.1675E-03	5.0547E-03	5.9195E-03	**5.3806E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.7017E-06	3.6038E-06	4.1901E-06	**3.8319E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.8386E-06	3.6796E-06	4.2419E-06	**3.9200E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		**1**	**2**	**3**	**Average**
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (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_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.3680E-12	<7.3695E-12	<7.1264E-12	**<7.2880E-12**
C_a	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_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1993E-01	<1.2183E-01	<1.1881E-01	**<1.2019E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.1799E-01	<1.1801E-01	<1.1412E-01	**<1.1671E-01**
C_{sd}	Concentration (mg/dscm)	<9.5079E-05	<9.6671E-05	<9.4624E-05	**<9.5458E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1993E-04	<1.2183E-04	<1.1881E-04	**<1.2019E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.1799E-04	<1.1801E-04	<1.1412E-04	**<1.1671E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.1258E-02	<5.2560E-02	<5.0993E-02	**<5.1604E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.0204E-01	<1.0374E-01	<1.0155E-01	**<1.0244E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2870E-01	<1.3074E-01	<1.2751E-01	**<1.2898E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.2662E-01	<1.2665E-01	<1.2247E-01	**<1.2525E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4346E-05	<3.5055E-05	<3.4436E-05	**<3.4612E-05**
$E_{g/s}$	Rate (g/s)	<4.3268E-06	<4.4161E-06	<4.3381E-06	**<4.3603E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.5044E-04	<1.5354E-04	<1.5083E-04	**<1.5160E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0776E-07	<1.0947E-07	<1.0676E-07	**<1.0800E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1175E-07	<1.1177E-07	<1.0808E-07	**<1.1053E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

	Run No.	**1**	**2**	**3**	**Average**
	Date (2009)	Mar 16	Mar 16	Mar 16	
	Start Time (approx.)	06:56	09:58	12:45	
	Stop Time (approx.)	09:20	12:09	14:59	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.4843E-11	<1.5092E-11	<1.4772E-11	**<1.4903E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8723E-11	<1.9019E-11	<1.8549E-11	**<1.8764E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.8420E-11	<1.8424E-11	<1.7816E-11	**<1.8220E-11**
C_a	Concentration (lb/acf)	<8.0022E-12	<8.2055E-12	<7.9609E-12	**<8.0562E-12**
C_{sd}	Concentration (μg/dscm)	<2.3770E-01	<2.4168E-01	<2.3656E-01	**<2.3865E-01**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	<2.9982E-01	<3.0456E-01	<2.9704E-01	**<3.0047E-01**
C_{sd12}	Concentration @12% CO_2 (μg/dscm)	<2.9497E-01	<2.9503E-01	<2.8530E-01	**<2.9177E-01**
C_{sd}	Concentration (mg/dscm)	<2.3770E-04	<2.4168E-04	<2.3656E-04	**<2.3865E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.9982E-04	<3.0456E-04	<2.9704E-04	**<3.0047E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.9497E-04	<2.9503E-04	<2.8530E-04	**<2.9177E-04**
C_a	Concentration (μg/m ^{3} (actual,wet))	<1.2814E-01	<1.3140E-01	<1.2748E-01	**<1.2901E-01**
C_{sd}	Concentration (μg/Nm ^{3} dry)	<2.5509E-01	<2.5936E-01	<2.5387E-01	**<2.5611E-01**
C_{sd7}	Concentration @7% O_2 (μg/Nm ^{3} dry)	<3.2176E-01	<3.2685E-01	<3.1877E-01	**<3.2246E-01**
C_{sd12}	Concentration @12% CO_2 (μg/Nm ^{3} dry)	<3.1655E-01	<3.1662E-01	<3.0617E-01	**<3.1312E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.5865E-05	<8.7637E-05	<8.6090E-05	**<8.6531E-05**
$E_{g/s}$	Rate (g/s)	<1.0817E-05	<1.1040E-05	<1.0845E-05	**<1.0901E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.7609E-04	<3.8385E-04	<3.7707E-04	**<3.7900E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.6941E-07	<2.7367E-07	<2.6691E-07	**<2.7000E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.7937E-07	<2.7943E-07	<2.7021E-07	**<2.7634E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	<1.1875E-11	<1.2074E-11	<1.1818E-11	**<1.1922E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.4978E-11	<1.5215E-11	<1.4839E-11	**<1.5011E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.4736E-11	<1.4739E-11	<1.4253E-11	**<1.4576E-11**
C_a	Concentration (lb/acf)	<6.4018E-12	<6.5644E-12	<6.3687E-12	**<6.4450E-12**
C_{sd}	Concentration (μg/dscm)	<1.9016E-01	<1.9334E-01	<1.8925E-01	**<1.9092E-01**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	<2.3985E-01	<2.4365E-01	<2.3763E-01	**<2.4038E-01**
C_{sd12}	Concentration @12% CO_2 (μg/dscm)	<2.3598E-01	<2.3602E-01	<2.2824E-01	**<2.3341E-01**
C_{sd}	Concentration (mg/dscm)	<1.9016E-04	<1.9334E-04	<1.8925E-04	**<1.9092E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.3985E-04	<2.4365E-04	<2.3763E-04	**<2.4038E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.3598E-04	<2.3602E-04	<2.2824E-04	**<2.3341E-04**
C_a	Concentration (μg/m ^{3} (actual,wet))	<1.0252E-01	<1.0512E-01	<1.0199E-01	**<1.0321E-01**
C_{sd}	Concentration (μg/Nm ^{3} dry)	<2.0407E-01	<2.0749E-01	<2.0310E-01	**<2.0489E-01**
C_{sd7}	Concentration @7% O_2 (μg/Nm ^{3} dry)	<2.5740E-01	<2.6148E-01	<2.5502E-01	**<2.5797E-01**
C_{sd12}	Concentration @12% CO_2 (μg/Nm ^{3} dry)	<2.5324E-01	<2.5329E-01	<2.4494E-01	**<2.5049E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.8692E-05	<7.0110E-05	<6.8872E-05	**<6.9224E-05**
$E_{g/s}$	Rate (g/s)	<8.6536E-06	<8.8321E-06	<8.6762E-06	**<8.7206E-06**
$E_{T/yr}$	Rate (Ton/yr)	<3.0087E-04	<3.0708E-04	<3.0166E-04	**<3.0320E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.1553E-07	<2.1894E-07	<2.1353E-07	**<2.1600E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.2350E-07	<2.2354E-07	<2.1617E-07	**<2.2107E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Beryllium (Be) Emission Parameters

	Run No.	1	2	3	Average
	Date (2009)	Mar 16	Mar 16	Mar 16	
	Start Time (approx.)	06:56	09:58	12:45	
	Stop Time (approx.)	09:20	12:09	14:59	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	5	7	6	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	9.8800	9.8700	9.8300	**9.8600**
CO_2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	**9.8167**
T_s	Sample temperature (°F)	297.6800	297.4800	297.9200	**297.6933**
B_w	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	**21.1301**
Gas Flow Rate					
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_a	Volumetric flow rate, actual (m^3/hr)	303,884	302,471	306,262	**304,205**
Q_s	Volumetric flow rate, standard (m^3/hr)	208,283	207,369	209,846	**208,500**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	163,826	164,453	165,044	**164,441**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,882	130,497	131,442	**130,607**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,082	193,230	195,539	**194,284**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	152,656	153,240	153,791	**153,229**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,027	121,600	122,480	**121,702**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	**73.9862**
%I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	**99.9826**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	<0.0500	<0.0500	<0.0500	
Beryllium Results - Total					
C_{sd}	Concentration (lb/dscf)	<1.4843E-12	<1.5092E-12	<1.4772E-12	**<1.4903E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8723E-12	<1.9019E-12	<1.8549E-12	**<1.8764E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.8420E-12	<1.8424E-12	<1.7816E-12	**<1.8220E-12**
C_a	Concentration (lb/acf)	<8.0022E-13	<8.2055E-13	<7.9609E-13	**<8.0562E-13**
C_{sd}	Concentration (µg/dscm)	<2.3770E-02	<2.4168E-02	<2.3656E-02	**<2.3865E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.9982E-02	<3.0456E-02	<2.9704E-02	**<3.0047E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.9497E-02	<2.9503E-02	<2.8530E-02	**<2.9177E-02**
C_{sd}	Concentration (mg/dscm)	<2.3770E-05	<2.4168E-05	<2.3656E-05	**<2.3865E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.9982E-05	<3.0456E-05	<2.9704E-05	**<3.0047E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.9497E-05	<2.9503E-05	<2.8530E-05	**<2.9177E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<1.2814E-02	<1.3140E-02	<1.2748E-02	**<1.2901E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.5509E-02	<2.5936E-02	<2.5387E-02	**<2.5611E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.2176E-02	<3.2685E-02	<3.1877E-02	**<3.2246E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.1655E-02	<3.1662E-02	<3.0617E-02	**<3.1312E-02**
$E_{lb/hr}$	Rate (lb/hr)	<8.5865E-06	<8.7637E-06	<8.6090E-06	**<8.6531E-06**
$E_{g/s}$	Rate (g/s)	<1.0817E-06	<1.1040E-06	<1.0845E-06	**<1.0901E-06**
$E_{T/yr}$	Rate (Ton/yr)	<3.7609E-05	<3.8385E-05	<3.7707E-05	**<3.7900E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.6941E-08	<2.7367E-08	<2.6691E-08	**<2.7000E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.7937E-08	<2.7943E-08	<2.7021E-08	**<2.7634E-08**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	5	7	6	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	9.8800	9.8700	9.8300	**9.8600**
CO_2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	**9.8167**
T_s	Sample temperature (°F)	297.6800	297.4800	297.9200	**297.6933**
B_w	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	**21.1301**
Gas Flow Rate					
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_a	Volumetric flow rate, actual (m^3/hr)	303,884	302,471	306,262	**304,205**
Q_s	Volumetric flow rate, standard (m^3/hr)	208,283	207,369	209,846	**208,500**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	163,826	164,453	165,044	**164,441**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,882	130,497	131,442	**130,607**
Q_n	Volumetric flow rate, normal (Nm^3/hr)	194,082	193,230	195,539	**194,284**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	152,656	153,240	153,791	**153,229**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,027	121,600	122,480	121,702
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	**73.9862**
%I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	**99.9826**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	0.4125	0.3372	0.3416	
Cadmium Results - Total					
C_{sd}	Concentration (lb/dscf)	1.2246E-11	1.0179E-11	1.0093E-11	**1.0839E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.5446E-11	1.2827E-11	1.2673E-11	**1.3649E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.5197E-11	1.2426E-11	1.2172E-11	**1.3265E-11**
C_a	Concentration (lb/acf)	6.6019E-12	5.5341E-12	5.4390E-12	**5.8583E-12**
C_{sd}	Concentration (μg/dscm)	1.9610E-01	1.6300E-01	1.6162E-01	**1.7357E-01**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	2.4735E-01	2.0541E-01	2.0294E-01	**2.1857E-01**
C_{sd12}	Concentration @12% CO_2 (μg/dscm)	2.4335E-01	1.9898E-01	1.9492E-01	**2.1242E-01**
C_{sd}	Concentration (mg/dscm)	1.9610E-04	1.6300E-04	1.6162E-04	**1.7357E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.4735E-04	2.0541E-04	2.0294E-04	**2.1857E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.4335E-04	1.9898E-04	1.9492E-04	**2.1242E-04**
C_a	Concentration (μg/m^3 (actual,wet))	1.0572E-01	8.8621E-02	8.7097E-02	**9.3813E-02**
C_{sd}	Concentration (μg/Nm^3 dry)	2.1045E-01	1.7492E-01	1.7345E-01	**1.8627E-01**
C_{sd7}	Concentration @7% O_2 (μg/Nm^3 dry)	2.6545E-01	2.2044E-01	2.1779E-01	**2.3456E-01**
C_{sd12}	Concentration @12% CO_2 (μg/Nm^3 dry)	2.6116E-01	2.1354E-01	2.0918E-01	**2.2796E-01**
$E_{lb/hr}$	Rate (lb/hr)	7.0840E-05	5.9106E-05	5.8817E-05	**6.2921E-05**
$E_{g/s}$	Rate (g/s)	8.9241E-06	7.4459E-06	7.4096E-06	**7.9266E-06**
$E_{T/yr}$	Rate (Ton/yr)	3.1028E-04	2.5888E-04	2.5762E-04	**2.7559E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.2227E-07	1.8458E-07	1.8236E-07	**1.9640E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.3048E-07	1.8846E-07	1.8461E-07	**2.0118E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 5/29
Lead (Pb) Emission Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		06:56	09:58	12:45	
Stop Time (approx.)		09:20	12:09	14:59	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.1	184.9	183.9	**184.3**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	5	7	6	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	9.8800	9.8700	9.8300	**9.8600**
CO_2	Carbon dioxide (dry volume %)	9.6700	9.8300	9.9500	**9.8167**
T_s	Sample temperature (°F)	297.6800	297.4800	297.9200	**297.6933**
B_w	Actual water vapor in gas (% by volume)	21.3445	20.6957	21.3500	**21.1301**
Gas Flow Rate					
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_a	Volumetric flow rate, actual (m^3/hr)	303,884	302,471	306,262	**304,205**
Q_s	Volumetric flow rate, standard (m^3/hr)	208,283	207,369	209,846	**208,500**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	163,826	164,453	165,044	**164,441**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry·m^3/hr)	129,882	130,497	131,442	**130,607**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	194,082	193,230	195,539	**194,284**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	152,656	153,240	153,791	**153,229**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,027	121,600	122,480	**121,702**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.2751	73.0516	74.6320	**73.9862**
%I	Isokinetic sampling (%)	100.7493	98.7122	100.4864	**99.9826**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	1.9770	2.3462	2.5954	
Lead Results - Total					
C_{sd}	Concentration (lb/dscf)	5.8692E-11	7.0818E-11	7.6681E-11	**6.8730E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	7.4031E-11	8.9245E-11	9.6284E-11	**8.6520E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	7.2834E-11	8.6451E-11	9.2479E-11	**8.3922E-11**
C_a	Concentration (lb/acf)	3.1642E-11	3.8504E-11	4.1323E-11	**3.7156E-11**
C_{sd}	Concentration (µg/dscm)	9.3988E-01	1.1340E+00	1.2279E+00	**1.1006E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.1855E+00	1.4291E+00	1.5418E+00	**1.3855E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	1.1663E+00	1.3844E+00	1.4809E+00	**1.3439E+00**
C_{sd}	Concentration (mg/dscm)	9.3988E-04	1.1340E-03	1.2279E-03	**1.1006E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.1855E-03	1.4291E-03	1.5418E-03	**1.3855E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.1663E-03	1.3844E-03	1.4809E-03	**1.3439E-03**
C_a	Concentration (µg/m^3 (actual,wet))	5.0669E-01	6.1658E-01	6.6173E-01	**5.9500E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	1.0086E+00	1.2170E+00	1.3178E+00	**1.1812E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	1.2723E+00	1.5337E+00	1.6547E+00	**1.4869E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.2517E+00	1.4857E+00	1.5893E+00	**1.4422E+00**
$E_{lb/hr}$	Rate (lb/hr)	3.3952E-04	4.1123E-04	4.4687E-04	**3.9921E-04**
$E_{g/s}$	Rate (g/s)	4.2771E-05	5.1805E-05	5.6295E-05	**5.0290E-05**
$E_{T/yr}$	Rate (Ton/yr)	1.4871E-03	1.8012E-03	1.9573E-03	**1.7485E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.0653E-06	1.2842E-06	1.3855E-06	**1.2450E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.1047E-06	1.3112E-06	1.4026E-06	**1.2728E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 13B (Total Fluorides)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		11:43	13:15	14:40	
Stop Time (approx.)		12:55	14:27	15:49	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0028	1.0028	1.0028	
C_p	Pitot tube coefficient	0.8250	0.8250	0.8250	
P_g	Static pressure (in. H_2O)	-10.4000	-10.4000	-10.5000	
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.)	0.2720	0.2720	0.2720	
O_2	Oxygen (dry volume %)	9.5800	9.4500	9.3900	**9.4733**
CO_2	Carbon dioxide (dry volume %)	10.0900	10.2000	10.1800	**10.1567**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.3300	80.3500	80.4300	**80.3700**
V_{lc}	Total Liquid collected (ml)	224.30	218.20	216.30	
V_m	Volume metered, meter conditions (ft^3)	42.1400	41.4600	41.2600	
T_m	Dry gas meter temperature (°F)	87.6600	88.5400	84.8800	
T_s	Sample temperature (°F)	301.0800	301.4800	301.8800	**301.4800**
ΔH	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 Results					
V_{wstd}	Volume of water collected (ft^3)	10.5556	10.2685	10.1791	**10.3344**
V_{mstd}	Volume metered, standard (dscf)	41.1130	40.3780	40.4512	**40.6474**
P_s	Sample gas pressure, absolute (in. Hg)	29.3353	29.3353	29.3279	**29.3328**
P_v	Vapor pressure, actual (in. Hg)	29.3353	29.3353	29.3279	**29.3328**
B_{wo}	Moisture measured in sample (% by volume)	20.4294	20.2748	20.1047	**20.2696**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	20.4294	20.2748	20.1047	**20.2696**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	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**
M_s	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**
%I	Isokinetic sampling (%)	100.5485	102.4385	101.6221	**101.5363**
Q_a	Volumetric flow rate, actual (acfm)	191,827	184,660	186,228	**187,571**
Q_s	Volumetric flow rate, standard (scfm)	130,479	125,538	126,506	**127,508**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	103,823	100,086	101,073	**101,660**
Q_{std7}	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_{std}	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^3/hr)	325,959	313,780	316,445	**318,728**
Q_s	Volumetric flow rate, standard (m^3/hr)	221,715	213,319	214,964	**216,666**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	176,420	170,069	171,746	**172,745**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	164,391	158,474	160,036	**160,967**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	133,878	130,541	132,519	**132,313**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

USEPA Method 13B
HF Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		11:43	13:15	14:40	
Stop Time (approx.)		12:55	14:27	15:49	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	185.1	184.7	183.9	**184.6**
P_1	Fabric Filter Inlet Temperature (°F)	320	320	320	**320**
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 Conditions					
O_2	Oxygen (dry volume %)	9.5800	9.4500	9.3900	**9.4733**
CO_2	Carbon dioxide (dry volume %)	10.0900	10.2000	10.1800	**10.1567**
T_s	Sample temperature (°F)	301.0800	301.4800	301.8800	**301.4800**
B_w	Actual water vapor in gas (% by volume)	20.4294	20.2748	20.1047	**20.2696**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	191,827	184,660	186,228	**187,571**
Q_s	Volumetric flow rate, standard (scfm)	130,479	125,538	126,506	**127,508**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	103,823	100,086	101,073	**101,660**
Q_{std7}	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_{std}	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^3/hr)	325,959	313,780	316,445	**318,728**
Q_s	Volumetric flow rate, standard (m^3/hr)	221,715	213,319	214,964	**216,666**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	176,420	170,069	171,746	**172,745**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	164,391	158,474	160,036	**160,967**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	133,878	130,541	132,519	**132,313**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.1130	40.3780	40.4512	**40.6474**
%I	Isokinetic sampling (%)	100.5485	102.4385	101.6221	**101.5363**
Laboratory Data					
m_n	Total HF collected (mg)	<0.0060	<0.0058	<0.0056	
Hydrogen Fluoride (HF) Results					
C_{sd}	HF Concentration (lb/dscf)	<3.1988E-10	<3.1742E-10	<3.0307E-10	**<3.1345E-10**
C_{sd7}	HF Concentration @7% O_2 (lb/dscf)	<3.9278E-10	<3.8534E-10	<3.6600E-10	**<3.8137E-10**
C_{sd12}	HF Concentration @12% CO_2 (lb/dscf)	<3.8043E-10	<3.7343E-10	<3.5725E-10	**<3.7037E-10**
C_a	HF Concentration (lb/acf)	<1.7313E-10	<1.7204E-10	<1.6449E-10	**<1.6988E-10**
C_{sd}	HF Concentration (ppmdv)	<0.0062	<0.0061	<0.0058	**<0.0060**
C_{sd7}	HF Concentration @7% O_2 (ppmdv)	<0.0076	<0.0074	<0.0071	**<0.0073**
C_{sd12}	HF Concentration @12% CO_2 (ppmdv)	<0.0073	<0.0072	<0.0069	**<0.0071**
C_w	HF Concentration (ppmwv)	<0.0049	<0.0049	<0.0047	**<0.0048**
C_{sd}	HF Concentration (mg/dscm)	<0.0051	<0.0051	<0.0049	**<0.0050**
C_{sd7}	HF Concentration @7% O_2 (mg/dscm)	<0.0063	<0.0062	<0.0059	**<0.0061**
C_{sd12}	HF Concentration @12% CO_2 (mg/dscm)	<0.0061	<0.0060	<0.0057	**<0.0059**
C_a	HF Concentration (mg/m^3 (actual,wet))	<0.0028	<0.0028	<0.0026	**<0.0027**
C_{sd}	HF Concentration (mg/Nm^3 dry)	<0.0055	<0.0055	<0.0052	**<0.0054**
C_{sd7}	HF Concentration @7% O_2 (mg/Nm^3 dry)	<0.0068	<0.0066	<0.0063	**<0.0066**
C_{sd12}	HF Concentration @12% CO_2 (mg/Nm^3 dry)	<0.0065	<0.0064	<0.0061	**<0.0064**
$E_{lb/hr}$	HF Rate (lb/hr)	<0.0020	<0.0019	<0.0018	**<0.0019**
$E_{kg/hr}$	HF Rate (kg/hr)	<0.0009	<0.0009	<0.0008	**<0.0009**
$E_{T/yr}$	HF Rate (Ton/yr)	<0.0087	<0.0083	<0.0081	**<0.0084**
E_{Fd}	HF Rate - Fd-based (lb/MMBtu)	<0.0000057	<0.0000055	<0.0000053	**<0.0000055**
E_{Fc}	HF Rate - Fc-based (lb/MMBtu)	<0.0000058	<0.0000057	<0.0000054	**<0.0000056**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		06:33	08:26	10:15	
Stop Time (approx.)		07:33	09:26	11:15	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0079	1.0079	1.0079	
P_g	Static pressure (in. H_2O)	-1.7000	-1.7000	-1.7000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	30.10	30.10	30.10	**30.1000**
O_2	Oxygen (dry volume %)	8.3200	8.3000	8.5600	**8.3933**
CO_2	Carbon dioxide (dry volume %)	11.2500	11.3100	10.9100	**11.1567**
N_2+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^3)	32.9500	34.2700	36.1500	
T_m	Dry gas meter temperature (°F)	78.7500	94.1250	101.7500	
T_s	Sample temperature (°F)	505.8333	505.9167	518.3333	**510.0278**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.0158	1.0908	1.1467	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	6.4660	6.7625	6.3719	**6.5335**
V_{mstd}	Volume metered, standard (dscf)	32.8116	33.1852	34.5352	**33.5107**
P_s	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_s	MW of sample gas, wet (lb/lb-mole)	28.1354	28.0862	28.2051	**28.1423**

<u>Comments:</u>

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 26A
HCl Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		06:33	08:26	10:15	
Stop Time (approx.)		07:33	09:26	11:15	
Process 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	9,570	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 Conditions					
O_2	Oxygen (dry volume %)	8.3200	8.3000	8.5600	**8.3933**
CO_2	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**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	32.8116	33.1852	34.5352	**33.5107**
Laboratory Data					
m_n	Total HCl collected (mg)	503.5662	598.0783	603.5410	
Hydrogen Chloride (HCl) 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_2 (lb/dscf)	3.7391E-05	4.3840E-05	4.3406E-05	**4.1546E-05**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	3.6097E-05	4.2164E-05	4.2385E-05	**4.0215E-05**
C_{sd}	HCl Concentration (ppmdv)	357.7832	420.1494	407.4127	**395.1151**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	395.3248	463.4982	458.9170	**439.2467**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	381.6354	445.7819	448.1166	**425.1779**
C_w	HCl Concentration (ppmwv)	298.8834	349.0247	343.9519	**330.6200**
C_{sd}	HCl Concentration (mg/dscm)	541.9101	636.3721	617.0806	**598.4543**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	598.7719	702.0295	695.0908	**665.2974**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	578.0375	675.1958	678.7321	**643.9885**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	581.5621	682.9359	662.2329	**642.2436**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	642.5845	753.3975	745.9511	**713.9777**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	620.3329	724.6004	728.3955	**691.1096**
E_{Fd}	HCl 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 (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		06:33	08:26	10:15	
Stop Time (approx.)		07:33	09:26	11:15	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9897	0.9897	0.9897	
P_g	Static pressure (in. H_2O)	-10.5000	-10.4000	-10.5000	
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**
O_2	Oxygen (dry volume %)	9.7300	9.1000	9.4600	**9.4300**
CO_2	Carbon dioxide (dry volume %)	10.0000	10.6000	10.6000	**10.4000**
N_2+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^3)	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**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2083	1.1750	1.3500	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 FF Outlet

EPA Modified Method 26A
HCl Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 17	Mar 17	Mar 17	
Start Time (approx.)		06:33	08:26	10:15	
Stop Time (approx.)		07:33	09:26	11:15	
Process 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	9,570	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 Conditions					
O_2	Oxygen (dry volume %)	9.7300	9.1000	9.4600	**9.4300**
CO_2	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_w	Actual water vapor in gas (% by volume)	20.1708	21.4191	20.4764	**20.6888**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	35.8341	34.3228	36.3886	**35.5152**
Laboratory Data					
m_n	Total HCl collected (mg)	29.5404	25.8516	34.0382	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	1.8177E-06	1.6608E-06	2.0626E-06	**1.8470E-06**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	2.2620E-06	1.9563E-06	2.5061E-06	**2.2415E-06**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	2.1813E-06	1.8801E-06	2.3350E-06	**2.1321E-06**
C_a	HCl Concentration (lb/acf)	9.9416E-07	8.9326E-07	1.1185E-06	**1.0020E-06**
C_{sd}	HCl Concentration (ppmdv)	19.2181	17.5588	21.8068	**19.5279**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	23.9150	20.6837	26.4960	**23.6982**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	23.0617	19.8779	24.6869	**22.5421**
C_w	HCl Concentration (ppmwv)	15.3416	13.7979	17.3415	**15.4937**
C_{sd}	HCl Concentration (mg/dscm)	29.1083	26.5951	33.0292	**29.5776**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	36.2225	31.3282	40.1317	**35.8941**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	34.9300	30.1077	37.3916	**34.1431**
C_a	HCl Concentration (mg/m^3 (actual,wet))	15.9201	14.3044	17.9105	**16.0450**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	31.2382	28.5411	35.4460	**31.7418**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	38.8729	33.6205	43.0681	**38.5205**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	37.4858	32.3107	40.1275	**36.6414**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.0325	0.0282	0.0361	**0.0323**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.0331	0.0285	0.0354	**0.0323**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29 (Mercury)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
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	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9992	0.9992	0.9992	
C_p	Pitot tube coefficient	0.8200	0.8200	0.8200	
P_g	Static pressure (in. H_2O)	-1.8000	-1.7000	-1.7000	
A_s	Sample location area (ft ^{2})	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	30.10	30.10	30.10	**30.1000**
D_n	Nozzle diameter (in.)	0.2750	0.2750	0.2750	
O_2	Oxygen (dry volume %)	9.5700	9.4900	9.5500	**9.5367**
CO_2	Carbon dioxide (dry volume %)	10.1500	10.0700	10.0000	**10.0733**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.2800	80.4400	80.4500	**80.3900**
V_{lc}	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_m	Dry gas meter temperature (°F)	88.1042	102.0000	99.5208	
T_s	Sample temperature (°F)	488.2917	490.0417	493.3333	**490.5556**
ΔH	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 Results					
V_{wstd}	Volume of water collected (ft ^{3})	14.3957	13.6898	13.5015	**13.8623**
V_{mstd}	Volume metered, standard (dscf)	74.1401	71.8717	72.1525	**72.7214**
P_s	Sample gas pressure, absolute (in. Hg)	29.9676	29.9750	29.9750	**29.9725**
P_v	Vapor pressure, actual (in. Hg)	29.9676	29.9750	29.9750	**29.9725**
B_{wo}	Moisture measured in sample (% by volume)	16.2597	15.9999	15.7628	**16.0075**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	16.2597	15.9999	15.7628	**16.0075**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{\text{in. } H_2O}$)	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**
M_s	MW of sample gas, wet (lb/lb-mole)	28.0545	28.0723	28.0933	**28.0734**
V_s	Velocity of sample (ft/sec)	54.3914	53.4527	52.8961	**53.5801**
%I	Isokinetic sampling (%)	98.3413	96.8610	98.3258	**97.8427**
Q_a	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_{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 ^{3}/hr)	185,962	182,461	179,937	**182,787**
Q_{std}	Volumetric flow rate, dry standard (dry m ^{3}/hr)	155,725	153,267	151,574	**153,522**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	126,933	125,811	123,767	**125,504**
Q_s	Volumetric flow rate, normal (Nm ^{3}/hr)	173,283	170,020	167,669	**170,324**
Q_{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 (Nm^3/hr)	118,278	117,233	115,329	**116,947**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	6	6	5	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	9.5700	9.4900	9.5500	**9.5367**
CO_2	Carbon dioxide (dry volume %)	10.1500	10.0700	10.0000	**10.0733**
T_s	Sample temperature (°F)	488.2917	490.0417	493.3333	**490.5556**
B_w	Actual water vapor in gas (% by volume)	16.2597	15.9999	15.7628	**16.0075**
Gas Flow Rate					
Q_a	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_{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^3/hr)	185,962	182,461	179,937	**182,787**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	155,725	153,267	151,574	**153,522**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	126,933	125,811	123,767	**125,504**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	173,283	170,020	167,669	**170,324**
Q_{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 (Nm^3/hr)	118,278	117,233	115,329	**116,947**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.1401	71.8717	72.1525	**72.7214**
%I	Isokinetic sampling (%)	98.3413	96.8610	98.3258	**97.8427**
Laboratory Data					
m_{n-1b}	Fraction 1B (µg)	51.7021	62.7160	78.8613	
m_{n-2b}	Fraction 2B (µg)	23.1328	26.8916	14.6764	
m_{n-3a}	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
m_{n-3b}	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
m_{n-3c}	Fraction 3C (µg)	1.8885	<0.4000	1.5492	
m_n	Total matter corrected for allowable blanks (µg)	76.7234	89.6076	95.0869	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.2818E-09	2.7491E-09	2.9059E-09	**2.6456E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.7994E-09	3.3491E-09	3.5587E-09	**3.2357E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.6977E-09	3.2760E-09	3.4871E-09	**3.1536E-09**
C_a	Concentration (lb/acf)	1.0656E-09	1.2858E-09	1.3582E-09	**1.2365E-09**
C_{sd}	Concentration (µg/dscm)	3.6540E+01	4.4024E+01	4.6534E+01	**4.2366E+01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.4829E+01	5.3631E+01	5.6988E+01	**5.1816E+01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.3200E+01	5.2461E+01	5.5840E+01	**5.0501E+01**
C_{sd}	Concentration (mg/dscm)	3.6540E-02	4.4024E-02	4.6534E-02	**4.2366E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.4829E-02	5.3631E-02	5.6988E-02	**5.1816E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.3200E-02	5.2461E-02	5.5840E-02	**5.0501E-02**
C_a	Concentration (µg/m^3 (actual,wet))	1.7064E+01	2.0590E+01	2.1750E+01	**1.9801E+01**
C_{sd}	Concentration (µg/Nm^3 dry)	3.9214E+01	4.7245E+01	4.9939E+01	**4.5466E+01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.8109E+01	5.7555E+01	6.1158E+01	**5.5607E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.6361E+01	5.6300E+01	5.9926E+01	**5.4196E+01**
$E_{lb/hr}$	Rate (lb/hr)	1.2547E-02	1.4878E-02	1.5553E-02	**1.4326E-02**
$E_{g/s}$	Rate (g/s)	1.5806E-03	1.8743E-03	1.9592E-03	**1.8047E-03**
$E_{T/yr}$	Rate (Ton/yr)	5.4956E-02	6.5165E-02	6.8120E-02	**6.2747E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.0282E-05	4.8191E-05	5.1208E-05	**4.6561E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	4.0916E-05	4.9686E-05	5.2887E-05	**4.7830E-05**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		1	2	3	Average
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	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	1.5377E-09	1.9241E-09	2.4100E-09	**1.9573E-09**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.8865E-09	2.3440E-09	2.9515E-09	**2.3940E-09**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.8179E-09	2.2929E-09	2.8920E-09	**2.3343E-09**
C_a	Concentration (lb/acf)	7.1809E-10	8.9991E-10	1.1264E-09	**9.1482E-10**
C_{sd}	Concentration (μg/dscm)	2.4624E+01	3.0812E+01	3.8593E+01	**3.1343E+01**
C_{sd7}	Concentration @7% O_2 (μg/dscm)	3.0209E+01	3.7536E+01	4.7264E+01	**3.8336E+01**
C_{sd12}	Concentration @12% CO_2 (μg/dscm)	2.9112E+01	3.6717E+01	4.6312E+01	**3.7380E+01**
C_{sd}	Concentration (mg/dscm)	2.4624E-02	3.0812E-02	3.8593E-02	**3.1343E-02**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.0209E-02	3.7536E-02	4.7264E-02	**3.8336E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.9112E-02	3.6717E-02	4.6312E-02	**3.7380E-02**
C_a	Concentration (μg/m^3 (actual,wet))	1.1499E+01	1.4411E+01	1.8038E+01	**1.4650E+01**
C_{sd}	Concentration (μg/Nm^3 dry)	2.6425E+01	3.3066E+01	4.1417E+01	**3.3636E+01**
C_{sd7}	Concentration @7% O_2 (μg/Nm^3 dry)	3.2419E+01	4.0282E+01	5.0722E+01	**4.1141E+01**
C_{sd12}	Concentration @12% CO_2 (μg/Nm^3 dry)	3.1242E+01	3.9404E+01	4.9700E+01	**4.0115E+01**
$E_{lb/hr}$	Rate (lb/hr)	8.4551E-03	1.0413E-02	1.2899E-02	**1.0589E-02**
$E_{g/s}$	Rate (g/s)	1.0651E-03	1.3118E-03	1.6249E-03	**1.3340E-03**
$E_{T/yr}$	Rate (Ton/yr)	3.7033E-02	4.5609E-02	5.6496E-02	**4.6379E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.7145E-05	3.3729E-05	4.2470E-05	**3.4448E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.7572E-05	3.4775E-05	4.3862E-05	**3.5403E-05**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	**Average**
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	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	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_{sd12}	Concentration @12% CO_2 (lb/dscf)	8.1339E-10	9.8315E-10	5.3822E-10	**7.7825E-10**
C_a	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_{sd7}	Concentration @7% O_2 (µg/dscm)	1.3516E+01	1.6095E+01	8.7960E+00	**1.2802E+01**
C_{sd12}	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_{sd7}	Concentration @7% O_2 (mg/dscm)	1.3516E-02	1.6095E-02	8.7960E-03	**1.2802E-02**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.3025E-02	1.5744E-02	8.6188E-03	**1.2463E-02**
C_a	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/Nm^3 dry)	1.4505E+01	1.7272E+01	9.4396E+00	**1.3739E+01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.3978E+01	1.6896E+01	9.2495E+00	**1.3375E+01**
$E_{lb/hr}$	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**
$E_{T/yr}$	Rate (Ton/yr)	1.6570E-02	1.9556E-02	1.0514E-02	**1.5547E-02**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.2145E-05	1.4462E-05	7.9039E-06	**1.1504E-05**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.2336E-05	1.4911E-05	8.1630E-06	**1.1804E-05**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.9482E-12	<6.1359E-12	<6.1121E-12	**<6.0654E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.2974E-12	<7.4750E-12	<7.4852E-12	**<7.4192E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.0324E-12	<7.3119E-12	<7.3345E-12	**<7.2263E-12**
C_a	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_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1686E-01	<1.1970E-01	<1.1987E-01	**<1.1881E-01**
C_{sd12}	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_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.1261E-04	<1.1709E-04	<1.1745E-04	**<1.1572E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<4.4483E-02	<4.5956E-02	<4.5747E-02	**<4.5395E-02**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<1.0222E-01	<1.0545E-01	<1.0504E-01	**<1.0424E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	<1.2541E-01	<1.2846E-01	<1.2864E-01	**<1.2750E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	<1.2085E-01	<1.2566E-01	<1.2605E-01	**<1.2419E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.2707E-05	<3.3207E-05	<3.2712E-05	**<3.2875E-05**
$E_{g/s}$	Rate (g/s)	<4.1203E-06	<4.1833E-06	<4.1210E-06	**<4.1415E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4326E-04	<1.4545E-04	<1.4328E-04	**<1.4399E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0501E-07	<1.0756E-07	<1.0771E-07	**<1.0676E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0666E-07	<1.1090E-07	<1.1124E-07	**<1.0960E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	Average
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	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.4870E-11	<1.5340E-11	<1.5280E-11	**<1.5163E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8244E-11	<1.8687E-11	<1.8713E-11	**<1.8548E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.7581E-11	<1.8280E-11	<1.8336E-11	**<1.8066E-11**
C_a	Concentration (lb/acf)	<6.9445E-12	<7.1745E-12	<7.1420E-12	**<7.0870E-12**
C_{sd}	Concentration (µg/dscm)	<2.3813E-01	<2.4565E-01	<2.4469E-01	**<2.4282E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.9215E-01	<2.9925E-01	<2.9966E-01	**<2.9702E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.8153E-01	<2.9273E-01	<2.9363E-01	**<2.8930E-01**
C_{sd}	Concentration (mg/dscm)	<2.3813E-04	<2.4565E-04	<2.4469E-04	**<2.4282E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.9215E-04	<2.9925E-04	<2.9966E-04	**<2.9702E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.8153E-04	<2.9273E-04	<2.9363E-04	**<2.8930E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<1.1121E-01	<1.1489E-01	<1.1437E-01	**<1.1349E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<2.5555E-01	<2.6362E-01	<2.6259E-01	**<2.6059E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.1352E-01	<3.2115E-01	<3.2159E-01	**<3.1875E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.0213E-01	<3.1415E-01	<3.1511E-01	**<3.1046E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.1768E-05	<8.3017E-05	<8.1780E-05	**<8.2188E-05**
$E_{g/s}$	Rate (g/s)	<1.0301E-05	<1.0458E-05	<1.0302E-05	**<1.0354E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.5814E-04	<3.6362E-04	<3.5820E-04	**<3.5999E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.6251E-07	<2.6890E-07	<2.6927E-07	**<2.6690E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.6664E-07	<2.7724E-07	<2.7810E-07	**<2.7400E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	5.6165E-11	<1.2272E-11	4.7345E-11	**<3.8594E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	6.8905E-11	<1.4950E-11	5.7982E-11	**<4.7279E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	6.6402E-11	<1.4624E-11	5.6814E-11	**<4.5947E-11**
C_a	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_2 (µg/dscm)	1.1034E+00	<2.3940E-01	9.2850E-01	**<7.5711E-01**
C_{sd12}	Concentration @12% CO_2 (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_{sd7}	Concentration @7% O_2 (mg/dscm)	1.1034E-03	<2.3940E-04	9.2850E-04	**<7.5711E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.0633E-03	<2.3418E-04	9.0980E-04	**<7.3577E-04**
C_a	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_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	1.1842E+00	<2.5692E-01	9.9644E-01	**<8.1251E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.1411E+00	<2.5132E-01	9.7637E-01	**<7.8961E-01**
$E_{lb/hr}$	Rate (lb/hr)	3.0883E-04	<6.6414E-05	2.5339E-04	**<2.0955E-04**
$E_{g/s}$	Rate (g/s)	3.8906E-05	<8.3666E-06	3.1922E-05	**<2.6398E-05**
$E_{T/yr}$	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-07	**<6.8032E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.0071E-06	<2.2180E-07	8.6168E-07	**<6.9686E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
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	
Sampling 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	-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_2	Oxygen (dry volume %)	10.6500	10.3500	10.3200	**10.4400**
CO_2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	**9.2400**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.2500	80.4500	80.2600	**80.3200**
V_{lc}	Total Liquid collected (ml)	416.60	411.10	397.60	
V_m	Volume metered, meter conditions (ft^3)	80.9450	80.6450	78.6700	
T_m	Dry gas meter temperature (°F)	79.9400	93.1200	93.7800	
T_s	Sample temperature (°F)	295.1200	295.7600	295.9200	**295.6000**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2892	1.2464	1.1972	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	19.6052	19.3464	18.7111	**19.2209**
V_{mstd}	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	**77.2270**
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**
B_{wo}	Moisture measured in sample (% by volume)	19.8128	20.0465	19.9300	**19.9298**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	19.8128	20.0465	19.9300	**19.9298**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.7222	0.7099	0.6891	**0.7071**
M_d	MW of sample gas, dry (lb/lb-mole)	29.8820	29.8860	29.9200	**29.8960**
M_s	MW of sample gas, wet (lb/lb-mole)	27.5278	27.5033	27.5443	**27.5252**
V_s	Velocity of sample (ft/sec)	48.5799	47.7918	46.3604	**47.5773**
%I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	**101.1690**
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_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 (m^3/hr)	316,987	311,845	302,504	**310,445**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	161,726	158,504	153,948	**158,059**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,258	120,303	117,178	**118,913**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Filterable Particulate Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	**184.0**
P_1	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**
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 Conditions					
O_2	Oxygen (dry volume %)	10.6500	10.3500	10.3200	**10.4400**
CO_2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	**9.2400**
T_s	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 Flow 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_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 (m^3/hr)	316,987	311,845	302,504	**310,445**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	161,726	158,504	153,948	**158,059**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,258	120,303	117,178	**118,913**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	**77.2270**
%I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	**101.1690**
Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00010	0.00090	0.00010	
m_s	Matter collected in solvent rinse(s) (g)	0.00360	0.00150	0.00080	
m_n	Total particulate matter collected (g)	0.00360	0.00240	0.00080	
Filterable Particulate Results					
C_{sd}	Particulate Concentration (lb/dscf)	1.0004E-07	6.8584E-08	2.3466E-08	**6.4030E-08**
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	1.3567E-07	9.0361E-08	3.0830E-08	**8.5619E-08**
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	1.3192E-07	8.9457E-08	2.9893E-08	**8.3758E-08**
C_a	Particulate Concentration (lb/acf)	5.4776E-08	3.7410E-08	1.2816E-08	**3.5001E-08**
C_{sd}	Particulate Concentration (gr/dscf)	0.0007	0.0005	0.0002	**0.0004**
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0009	0.0006	0.0002	**0.0006**
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0009	0.0006	0.0002	**0.0006**
C_a	Particulate Concentration (gr/acf)	0.0004	0.0003	0.0001	**0.0002**
C_{sd}	Particulate Concentration (mg/dscm)	1.6020	1.0983	0.3758	**1.0254**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	2.1725	1.4470	0.4937	**1.3711**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	2.1126	1.4325	0.4787	**1.3413**
C_a	Particulate Concentration (mg/m^3 (actual,wet))	0.8772	0.5991	0.2052	**0.5605**
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	1.7192	1.1786	0.4033	**1.1004**
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	2.3315	1.5529	0.5298	**1.4714**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	2.2671	1.5373	0.5137	**1.4394**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.6131	0.4119	0.1369	**0.3873**
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.2780	0.1868	0.0621	**0.1756**
$E_{T/yr}$	Particulate Rate (Ton/yr)	2.6853	1.8043	0.5996	**1.6964**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0020	0.0013	0.0004	**0.0012**
E_{Fc}	Particulate Rate - F_c-based (lb/MMBtu)	0.0020	0.0014	0.0005	**0.0013**

Comments:
Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters

	Run No.	1	2	3	Average
	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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	6	6	5	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	10.6500	10.3500	10.3200	**10.4400**
CO_2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	**9.2400**
T_s	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 Flow 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_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 (m^3/hr)	316,987	311,845	302,504	**310,445**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	161,726	158,504	153,948	**158,059**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,258	120,303	117,178	**118,913**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	**77.2270**
%I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	**101.1690**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	6.6466	7.0201	6.5708	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	6.6466	7.0201	6.5708	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	1.8470E-10	2.0061E-10	1.9274E-10	**1.9268E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5048E-10	2.6431E-10	2.5322E-10	**2.5600E-10**
C_{sd12}	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_{sd}	Concentration (µg/dscm)	2.9578E+00	3.2125E+00	3.0864E+00	**3.0856E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.0110E+00	4.2326E+00	4.0549E+00	**4.0995E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.9004E+00	4.1902E+00	3.9317E+00	**4.0074E+00**
C_{sd}	Concentration (mg/dscm)	2.9578E-03	3.2125E-03	3.0864E-03	**3.0856E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.0110E-03	4.2326E-03	4.0549E-03	**4.0995E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.9004E-03	4.1902E-03	3.9317E-03	**4.0074E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.6195E+00	1.7523E+00	1.6856E+00	**1.6858E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.1742E+00	3.4476E+00	3.3122E+00	**3.3113E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.3045E+00	4.5423E+00	4.3516E+00	**4.3995E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.1858E+00	4.4968E+00	4.2194E+00	**4.3007E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1319E-03	1.2049E-03	1.1244E-03	**1.1537E-03**
$E_{g/s}$	Rate (g/s)	1.4260E-04	1.5179E-04	1.4164E-04	**1.4534E-04**
$E_{T/yr}$	Rate (Ton/yr)	4.9579E-03	5.2776E-03	4.9247E-03	**5.0534E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.6042E-06	3.8033E-06	3.6437E-06	**3.6837E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.6941E-06	3.9686E-06	3.7238E-06	**3.7955E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		**1**	**2**	**3**	**Average**
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	
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_2 (lb/dscf)	<3.7685E-12	<3.7651E-12	<3.8537E-12	**<3.7958E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.6645E-12	<3.7274E-12	<3.7366E-12	**<3.7095E-12**
C_a	Concentration (lb/acf)	<1.5215E-12	<1.5588E-12	<1.6020E-12	**<1.5608E-12**
C_{sd}	Concentration (µg/dscm)	<4.4501E-02	<4.5761E-02	<4.6972E-02	**<4.5745E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<6.0347E-02	<6.0292E-02	<6.1712E-02	**<6.0784E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.8682E-02	<5.9689E-02	<5.9837E-02	**<5.9403E-02**
C_{sd}	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_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.8682E-05	<5.9689E-05	<5.9837E-05	**<5.9403E-05**
C_a	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_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	<6.4763E-02	<6.4704E-02	<6.6227E-02	**<6.5231E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	<6.2976E-02	<6.4056E-02	<6.4215E-02	**<6.3749E-02**
$E_{lb/hr}$	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**
$E_{T/yr}$	Rate (Ton/yr)	<7.4593E-05	<7.5178E-05	<7.4948E-05	**<7.4906E-05**
E_{Fd}	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	<5.6532E-08	<5.6672E-08	**<5.6261E-08**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	1.8470E-10	2.0061E-10	1.9274E-10	**1.9268E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.5048E-10	2.6431E-10	2.5322E-10	**2.5600E-10**
C_{sd12}	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_{sd}	Concentration (µg/dscm)	2.9578E+00	3.2125E+00	3.0864E+00	**3.0856E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.0110E+00	4.2326E+00	4.0549E+00	**4.0995E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.9004E+00	4.1902E+00	3.9317E+00	**4.0074E+00**
C_{sd}	Concentration (mg/dscm)	2.9578E-03	3.2125E-03	3.0864E-03	**3.0856E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.0110E-03	4.2326E-03	4.0549E-03	**4.0995E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.9004E-03	4.1902E-03	3.9317E-03	**4.0074E-03**
C_a	Concentration (µg/m ^{3} (actual,wet))	1.6195E+00	1.7523E+00	1.6856E+00	**1.6858E+00**
C_{sd}	Concentration (µg/Nm ^{3} dry)	3.1742E+00	3.4476E+00	3.3122E+00	**3.3113E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	4.3045E+00	4.5423E+00	4.3516E+00	**4.3995E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	4.1858E+00	4.4968E+00	4.2194E+00	**4.3007E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1319E-03	1.2049E-03	1.1244E-03	**1.1537E-03**
$E_{g/s}$	Rate (g/s)	1.4260E-04	1.5179E-04	1.4164E-04	**1.4534E-04**
$E_{T/yr}$	Rate (Ton/yr)	4.9579E-03	5.2776E-03	4.9247E-03	**5.0534E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.6042E-06	3.8033E-06	3.6437E-06	**3.6837E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.6941E-06	3.9686E-06	3.7238E-06	**3.7955E-06**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	Average
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	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.5579E-12	<5.7153E-12	<5.8665E-12	**<5.7132E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.5370E-12	<7.5301E-12	<7.7074E-12	**<7.5915E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.3291E-12	<7.4548E-12	<7.4732E-12	**<7.4190E-12**
C_a	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_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.2069E-01	<1.2058E-01	<1.2342E-01	**<1.2157E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.1736E-01	<1.1938E-01	<1.1967E-01	**<1.1881E-01**
C_{sd}	Concentration (mg/dscm)	<8.9001E-05	<9.1523E-05	<9.3944E-05	**<9.1489E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.2069E-04	<1.2058E-04	<1.2342E-04	**<1.2157E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.1736E-04	<1.1938E-04	<1.1967E-04	**<1.1881E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<4.8731E-02	<4.9923E-02	<5.1307E-02	**<4.9987E-02**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<9.5514E-02	<9.8220E-02	<1.0082E-01	**<9.8184E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm ^{3} dry)	<1.2953E-01	<1.2941E-01	<1.3245E-01	**<1.3046E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm ^{3} dry)	<1.2595E-01	<1.2811E-01	<1.2843E-01	**<1.2750E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4061E-05	<3.4328E-05	<3.4223E-05	**<3.4204E-05**
$E_{g/s}$	Rate (g/s)	<4.2908E-06	<4.3245E-06	<4.3113E-06	**<4.3089E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4919E-04	<1.5036E-04	<1.4990E-04	**<1.4981E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0845E-07	<1.0835E-07	<1.1090E-07	**<1.0924E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1116E-07	<1.1306E-07	<1.1334E-07	**<1.1252E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	Average
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	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.3895E-11	<1.4288E-11	<1.4666E-11	**<1.4283E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8843E-11	<1.8825E-11	<1.9268E-11	**<1.8979E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.8323E-11	<1.8637E-11	<1.8683E-11	**<1.8548E-11**
C_a	Concentration (lb/acf)	<7.6077E-12	<7.7938E-12	<8.0099E-12	**<7.8038E-12**
C_{sd}	Concentration (µg/dscm)	<2.2250E-01	<2.2881E-01	<2.3486E-01	**<2.2872E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<3.0174E-01	<3.0146E-01	<3.0856E-01	**<3.0392E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.9341E-01	<2.9844E-01	<2.9918E-01	**<2.9701E-01**
C_{sd}	Concentration (mg/dscm)	<2.2250E-04	<2.2881E-04	<2.3486E-04	**<2.2872E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.0174E-04	<3.0146E-04	<3.0856E-04	**<3.0392E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.9341E-04	<2.9844E-04	<2.9918E-04	**<2.9701E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<1.2183E-01	<1.2481E-01	<1.2827E-01	**<1.2497E-01**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<2.3878E-01	<2.4555E-01	<2.5204E-01	**<2.4546E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.2382E-01	<3.2352E-01	<3.3114E-01	**<3.2616E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.1488E-01	<3.2028E-01	<3.2107E-01	**<3.1875E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.5152E-05	<8.5820E-05	<8.5558E-05	**<8.5510E-05**
$E_{g/s}$	Rate (g/s)	<1.0727E-05	<1.0811E-05	<1.0778E-05	**<1.0772E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.7296E-04	<3.7589E-04	<3.7474E-04	**<3.7453E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.7113E-07	<2.7089E-07	<2.7726E-07	**<2.7309E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.7789E-07	<2.8266E-07	<2.8336E-07	**<2.8130E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	<1.1116E-11	<1.1431E-11	<1.1733E-11	**<1.1426E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.5074E-11	<1.5060E-11	<1.5415E-11	**<1.5183E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.4658E-11	<1.4910E-11	<1.4946E-11	**<1.4838E-11**
C_a	Concentration (lb/acf)	<6.0862E-12	<6.2351E-12	<6.4080E-12	**<6.2431E-12**
C_{sd}	Concentration (µg/dscm)	<1.7800E-01	<1.8305E-01	<1.8789E-01	**<1.8298E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.4139E-01	<2.4117E-01	<2.4685E-01	**<2.4313E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.3473E-01	<2.3875E-01	<2.3935E-01	**<2.3761E-01**
C_{sd}	Concentration (mg/dscm)	<1.7800E-04	<1.8305E-04	<1.8789E-04	**<1.8298E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.4139E-04	<2.4117E-04	<2.4685E-04	**<2.4313E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.3473E-04	<2.3875E-04	<2.3935E-04	**<2.3761E-04**
C_a	Concentration (µg/m ^{3} (actual,wet))	<9.7462E-02	<9.9846E-02	<1.0261E-01	**<9.9974E-02**
C_{sd}	Concentration (µg/Nm ^{3} dry)	<1.9103E-01	<1.9644E-01	<2.0164E-01	**<1.9637E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.5905E-01	<2.5882E-01	<2.6491E-01	**<2.6093E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.5190E-01	<2.5622E-01	<2.5686E-01	**<2.5500E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.8121E-05	<6.8656E-05	<6.8446E-05	**<6.8408E-05**
$E_{g/s}$	Rate (g/s)	<8.5817E-06	<8.6490E-06	<8.6226E-06	**<8.6178E-06**
$E_{T/yr}$	Rate (Ton/yr)	<2.9837E-04	<3.0071E-04	<2.9979E-04	**<2.9963E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.1691E-07	<2.1671E-07	<2.2181E-07	**<2.1847E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.2231E-07	<2.2613E-07	<2.2669E-07	**<2.2504E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Beryllium (Be) Emission Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	6	6	5	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	10.6500	10.3500	10.3200	**10.4400**
CO_2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	**9.2400**
T_s	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 Flow 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_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 (m^3/hr)	316,987	311,845	302,504	**310,445**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	161,726	158,504	153,948	**158,059**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,258	120,303	117,178	**118,913**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	**77.2270**
%I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	**101.1690**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (μg)	<0.0500	<0.0500	<0.0500	
Beryllium Results - Total					
C_{sd}	Concentration (lb/dscf)	<1.3895E-12	<1.4288E-12	<1.4666E-12	**<1.4283E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8843E-12	<1.8825E-12	<1.9268E-12	**<1.8979E-12**
C_{sd12}	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_2 (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_{sd}	Concentration (mg/dscm)	<2.2250E-05	<2.2881E-05	<2.3486E-05	**<2.2872E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<3.0174E-05	<3.0146E-05	<3.0856E-05	**<3.0392E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.9341E-05	<2.9844E-05	<2.9918E-05	**<2.9701E-05**
C_a	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_{sd7}	Concentration @7% O_2 (μg/Nm^3 dry)	<3.2382E-02	<3.2352E-02	<3.3114E-02	**<3.2616E-02**
C_{sd12}	Concentration @12% CO_2 (μg/Nm^3 dry)	<3.1488E-02	<3.2028E-02	<3.2107E-02	**<3.1875E-02**
$E_{lb/hr}$	Rate (lb/hr)	<8.5152E-06	<8.5820E-06	<8.5558E-06	**<8.5510E-06**
$E_{g/s}$	Rate (g/s)	<1.0727E-06	<1.0811E-06	<1.0778E-06	**<1.0772E-06**
$E_{T/yr}$	Rate (Ton/yr)	<3.7296E-05	<3.7589E-05	<3.7474E-05	**<3.7453E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.7113E-08	<2.7089E-08	<2.7726E-08	**<2.7309E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.7789E-08	<2.8266E-08	<2.8336E-08	**<2.8130E-08**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	6	6	5	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	10.6500	10.3500	10.3200	**10.4400**
CO_2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	**9.2400**
T_s	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 Flow 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_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 (m^3/hr)	316,987	311,845	302,504	**310,445**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	161,726	158,504	153,948	**158,059**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,258	120,303	117,178	**118,913**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	**77.2270**
%I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	**101.1690**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	<0.2000	0.2333	0.2845	
Cadmium Results - Total					
C_{sd}	Concentration (lb/dscf)	<5.5579E-12	6.6657E-12	8.3454E-12	**<6.8563E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.5370E-12	8.7822E-12	1.0964E-11	**<9.0945E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.3291E-12	8.6943E-12	1.0631E-11	**<8.8848E-12**
C_a	Concentration (lb/acf)	<3.0431E-12	3.6359E-12	4.5578E-12	**<3.7456E-12**
C_{sd}	Concentration (µg/dscm)	<8.9001E-02	1.0674E-01	1.3364E-01	**<1.0979E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.2069E-01	1.4064E-01	1.7558E-01	**<1.4564E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.1736E-01	1.3923E-01	1.7024E-01	**<1.4228E-01**
C_{sd}	Concentration (mg/dscm)	<8.9001E-05	1.0674E-04	1.3364E-04	**<1.0979E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.2069E-04	1.4064E-04	1.7558E-04	**<1.4564E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.1736E-04	1.3923E-04	1.7024E-04	**<1.4228E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.8731E-02	5.8224E-02	7.2987E-02	**<5.9981E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<9.5514E-02	1.1455E-01	1.4342E-01	**<1.1783E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2953E-01	1.5093E-01	1.8842E-01	**<1.5629E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.2595E-01	1.4941E-01	1.8270E-01	**<1.5269E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4061E-05	4.0036E-05	4.8684E-05	**<4.0927E-05**
$E_{g/s}$	Rate (g/s)	<4.2908E-06	5.0436E-06	6.1330E-06	**<5.1558E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4919E-04	1.7536E-04	2.1324E-04	**<1.7926E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0845E-07	1.2637E-07	1.5777E-07	**<1.3086E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1116E-07	1.3186E-07	1.6124E-07	**<1.3475E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 5/29
Lead (Pb) Emission Parameters

Run No.		1	2	3	Average
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	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.0	184.0	184.1	**184.0**
P_1	Fabric Filter Inlet Temperature (°F)	315	315	315	**315**
P_2	Carbon Feed rate (lb/hr)	6	6	5	**6**
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 Conditions					
O_2	Oxygen (dry volume %)	10.6500	10.3500	10.3200	**10.4400**
CO_2	Carbon dioxide (dry volume %)	9.1000	9.2000	9.4200	**9.2400**
T_s	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 Flow 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_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 (m^3/hr)	316,987	311,845	302,504	**310,445**
Q_s	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_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/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_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	161,726	158,504	153,948	**158,059**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	119,258	120,303	117,178	**118,913**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	79.3470	77.1612	75.1728	**77.2270**
%I	Isokinetic sampling (%)	101.5932	100.8025	101.1112	**101.1690**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	0.6091	1.6247	1.0876	
Lead Results - Total					
C_{sd}	Concentration (lb/dscf)	1.6928E-11	4.6427E-11	3.1901E-11	**3.1752E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.2955E-11	6.1169E-11	4.1912E-11	**4.2012E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.2322E-11	6.0557E-11	4.0638E-11	**4.1173E-11**
C_a	Concentration (lb/acf)	9.2683E-12	2.5325E-11	1.7423E-11	**1.7339E-11**
C_{sd}	Concentration (µg/dscm)	2.7107E-01	7.4346E-01	5.1085E-01	**5.0846E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.6760E-01	9.7954E-01	6.7116E-01	**6.7277E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.5746E-01	9.6974E-01	6.5077E-01	**6.5932E-01**
C_{sd}	Concentration (mg/dscm)	2.7107E-04	7.4346E-04	5.1085E-04	**5.0846E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.6760E-04	9.7954E-04	6.7116E-04	**6.7277E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.5746E-04	9.6974E-04	6.5077E-04	**6.5932E-04**
C_a	Concentration (µg/m^3 (actual,wet))	1.4842E-01	4.0554E-01	2.7900E-01	**2.7765E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	2.9091E-01	7.9786E-01	5.4823E-01	**5.4567E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	3.9450E-01	1.0512E+00	7.2027E-01	**7.2199E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	3.8361E-01	1.0407E+00	6.9839E-01	**7.0756E-01**
$E_{lb/hr}$	Rate (lb/hr)	1.0374E-04	2.7885E-04	1.8610E-04	**1.8956E-04**
$E_{g/s}$	Rate (g/s)	1.3069E-05	3.5129E-05	2.3444E-05	**2.3881E-05**
$E_{T/yr}$	Rate (Ton/yr)	4.5437E-04	1.2214E-03	8.1512E-04	**8.3029E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.3031E-07	8.8019E-07	6.0309E-07	**6.0453E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.3855E-07	9.1845E-07	6.1635E-07	**6.2445E-07**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 13B (Total Fluorides)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		07:20	09:30	11:20	
Stop Time (approx.)		00:00	10:47	12:41	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9937	0.9937	0.9937	
C_p	Pitot tube coefficient	0.8250	0.8250	0.8250	
P_g	Static pressure (in. H_2O)	-13.0000	-11.4000	-10.8000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	30.20	30.20	30.20	**30.2000**
D_n	Nozzle diameter (in.)	0.2720	0.2720	0.2720	
O_2	Oxygen (dry volume %)	9.7400	11.0500	10.3200	**10.3700**
CO_2	Carbon dioxide (dry volume %)	9.7800	8.4800	9.2600	**9.1733**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.4800	80.4700	80.4200	**80.4567**
V_{lc}	Total Liquid collected (ml)	237.60	217.50	218.60	
V_m	Volume metered, meter conditions (ft^3)	42.6500	42.9500	43.1150	
T_m	Dry gas meter temperature (°F)	82.3600	88.7200	89.4400	
T_s	Sample temperature (°F)	296.3600	294.1600	293.6000	**294.7067**
ΔH	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 Results					
V_{wstd}	Volume of water collected (ft^3)	11.1815	10.2356	10.2873	**10.5681**
V_{mstd}	Volume metered, standard (dscf)	41.7748	41.5803	41.6868	**41.6806**
P_s	Sample gas pressure, absolute (in. Hg)	29.2441	29.3618	29.4059	**29.3373**
P_v	Vapor pressure, actual (in. Hg)	29.2441	29.3618	29.4059	**29.3373**
B_{wo}	Moisture measured in sample (% by volume)	21.1145	19.7537	19.7932	**20.2205**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.1145	19.7537	19.7932	**20.2205**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.7353	0.7357	0.7349	**0.7353**
M_d	MW of sample gas, dry (lb/lb-mole)	29.9544	29.7988	29.8944	**29.8825**
M_s	MW of sample gas, wet (lb/lb-mole)	27.4303	27.4681	27.5401	**27.4795**
V_s	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_a	Volumetric flow rate, actual (acfm)	193,361	192,674	191,991	**192,675**
Q_s	Volumetric flow rate, standard (scfm)	131,932	132,378	132,205	**132,172**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	104,075	106,228	106,037	**105,447**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	83,560	75,277	80,710	**79,849**
Q_a	Volumetric flow rate, actual (acf/hr)	11,601,662	11,560,447	11,519,481	**11,560,530**
Q_s	Volumetric flow rate, standard (scf/hr)	7,915,940	7,942,653	7,932,290	**7,930,294**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	6,244,528	6,373,684	6,362,240	**6,326,817**
Q_a	Volumetric flow rate, actual (m^3/hr)	328,566	327,399	326,238	**327,401**
Q_s	Volumetric flow rate, standard (m^3/hr)	224,184	224,941	224,647	**224,591**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	176,849	180,506	180,182	**179,179**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	141,988	127,913	137,146	**135,682**
Q_s	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_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	132,307	119,192	127,795	**126,431**

Comments:

Average includes 3 runs.

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

USEPA Method 13B
HF Parameters

		1	2	3	Average
Run No.		**1**	**2**	**3**	**Average**
Date (2009)		Mar 16	Mar 16	Mar 16	
Start Time (approx.)		07:20	09:30	11:20	
Stop Time (approx.)		00:00	10:47	12:41	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	184.2	184.0	184.4	**184.2**
P_1	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**
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 Conditions					
O_2	Oxygen (dry volume %)	9.7400	11.0500	10.3200	**10.3700**
CO_2	Carbon dioxide (dry volume %)	9.7800	8.4800	9.2600	**9.1733**
T_s	Sample temperature (°F)	296.3600	294.1600	293.6000	**294.7067**
B_w	Actual water vapor in gas (% by volume)	21.1145	19.7537	19.7932	**20.2205**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	193,361	192,674	191,991	**192,675**
Q_s	Volumetric flow rate, standard (scfm)	131,932	132,378	132,205	**132,172**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	104,075	106,228	106,037	**105,447**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	83,560	75,277	80,710	**79,849**
Q_a	Volumetric flow rate, actual (acf/hr)	11,601,662	11,560,447	11,519,481	**11,560,530**
Q_s	Volumetric flow rate, standard (scf/hr)	7,915,940	7,942,653	7,932,290	**7,930,294**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	6,244,528	6,373,684	6,362,240	**6,326,817**
Q_a	Volumetric flow rate, actual (m^3/hr)	328,566	327,399	326,238	**327,401**
Q_s	Volumetric flow rate, standard (m^3/hr)	224,184	224,941	224,647	**224,591**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	176,849	180,506	180,182	**179,179**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	141,988	127,913	137,146	**135,682**
Q_s	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_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	132,307	119,192	127,795	**126,431**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.7748	41.5803	41.6868	**41.6806**
%I	Isokinetic sampling (%)	101.9192	99.3890	99.8229	**100.3770**
Laboratory Data					
m_n	Total HF collected (mg)	<0.0061	<0.0055	<0.0056	
Hydrogen Fluoride (HF) Results					
C_{sd}	HF Concentration (lb/dscf)	<3.2448E-10	<2.8981E-10	<2.9642E-10	**<3.0357E-10**
C_{sd7}	HF Concentration @7% O_2 (lb/dscf)	<4.0415E-10	<4.0897E-10	<3.8944E-10	**<4.0085E-10**
C_{sd12}	HF Concentration @12% CO_2 (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_{sd7}	HF Concentration @7% O_2 (ppmdv)	<0.0078	<0.0079	<0.0075	**<0.0077**
C_{sd12}	HF Concentration @12% CO_2 (ppmdv)	<0.0077	<0.0079	<0.0074	**<0.0077**
C_w	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_{sd7}	HF Concentration @7% O_2 (mg/dscm)	<0.0065	<0.0065	<0.0062	**<0.0064**
C_{sd12}	HF Concentration @12% CO_2 (mg/dscm)	<0.0064	<0.0066	<0.0062	**<0.0064**
C_a	HF Concentration (mg/m^3 (actual,wet))	<0.0028	<0.0026	<0.0026	**<0.0027**
C_{sd}	HF Concentration (mg/Nm^3 dry)	<0.0056	<0.0050	<0.0051	**<0.0052**
C_{sd7}	HF Concentration @7% O_2 (mg/Nm^3 dry)	<0.0069	<0.0070	<0.0067	**<0.0069**
C_{sd12}	HF Concentration @12% CO_2 (mg/Nm^3 dry)	<0.0068	<0.0070	<0.0066	**<0.0068**
$E_{lb/hr}$	HF Rate (lb/hr)	<0.0020	<0.0018	<0.0019	**<0.0019**
$E_{kg/hr}$	HF Rate (kg/hr)	<0.0009	<0.0008	<0.0009	**<0.0009**
$E_{T/yr}$	HF Rate (Ton/yr)	<0.0089	<0.0081	<0.0083	**<0.0084**
E_{Fd}	HF Rate - Fd-based (lb/MMBtu)	<0.0000058	<0.0000059	<0.0000056	**<0.0000058**
E_{Fc}	HF Rate - Fc-based (lb/MMBtu)	<0.0000060	<0.0000062	<0.0000058	**<0.0000060**

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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:56	09:13	10:40	
Stop Time (approx.)		07:56	10:13	11:40	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9992	0.9992	0.9992	
P_g	Static pressure (in. H_2O)	-1.2000	-1.2000	-1.2000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	30.10	30.10	30.10	**30.1000**
O_2	Oxygen (dry volume %)	9.7500	9.7300	9.7100	**9.7300**
CO_2	Carbon dioxide (dry volume %)	9.7900	10.0600	9.8400	**9.8967**
N_2+CO	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 (ft^3)	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**
ΔH	Meter box orifice pressure drop (in. H_2O)	0.9992	1.0817	1.1150	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	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
HCl Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:56	09:13	10:40	
Stop Time (approx.)		07:56	10:13	11:40	
Process 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**
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 Conditions					
O_2	Oxygen (dry volume %)	9.7500	9.7300	9.7100	**9.7300**
CO_2	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**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	32.0423	33.2198	33.3034	**32.8552**
Laboratory Data					
m_n	Total HCl collected (mg)	617.4202	601.5257	646.3785	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	4.2488E-05	3.9927E-05	4.2796E-05	**4.1737E-05**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	5.2967E-05	4.9685E-05	5.3161E-05	**5.1938E-05**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	5.2079E-05	4.7626E-05	5.2191E-05	**5.0632E-05**
C_{sd}	HCl Concentration (ppmdv)	449.2078	422.1308	452.4687	**441.2691**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	559.9990	525.3015	562.0478	**549.1161**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	550.6122	503.5358	551.7911	**535.3130**
C_w	HCl Concentration (ppmwv)	376.4484	356.4809	377.1620	**370.0304**
C_{sd}	HCl Concentration (mg/dscm)	680.3849	639.3732	685.3240	**668.3607**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	848.1928	795.6390	851.2961	**831.7093**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	833.9754	762.6718	835.7609	**810.8027**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	730.1692	686.1566	735.4696	**717.2651**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	910.2557	853.8564	913.5860	**892.5661**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	894.9980	818.4770	896.9142	**870.1297**
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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

EPA Modified Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:56	09:13	10:40	
Stop Time (approx.)		07:56	10:13	11:40	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9937	0.9937	0.9937	
P_g	Static pressure (in. H_2O)	-10.6000	-10.5000	-10.4000	
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**
O_2	Oxygen (dry volume %)	10.2800	9.8500	9.7300	**9.9533**
CO_2	Carbon dioxide (dry volume %)	9.4000	9.7600	9.9300	**9.6967**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.3200	80.3900	80.3400	**80.3500**
V_{lc}	Total Liquid collected (ml)	210.90	245.50	236.50	
V_m	Volume metered, meter conditions (ft^3)	41.8900	41.8200	41.6400	
T_m	Dry gas meter temperature (°F)	75.3333	76.7917	79.1250	
T_s	Sample temperature (°F)	292.4167	285.7500	283.5833	**287.2500**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 FF Outlet

EPA Modified Method 26A
HCl Parameters

Run No.		1	2	3	Average
Date (2009)		Mar 18	Mar 18	Mar 18	
Start Time (approx.)		06:56	09:13	10:40	
Stop Time (approx.)		07:56	10:13	11:40	
Process 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**
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 Conditions					
O_2	Oxygen (dry volume %)	10.2800	9.8500	9.7300	**9.9533**
CO_2	Carbon dioxide (dry volume %)	9.4000	9.7600	9.9300	**9.6967**
T_s	Sample temperature (°F)	292.4167	285.7500	283.5833	**287.2500**
B_w	Actual water vapor in gas (% by volume)	19.3233	21.8773	21.3908	**20.8638**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.4376	41.2560	40.9006	**41.1981**
Laboratory Data					
m_n	Total HCl collected (mg)	41.0379	22.1246	34.7200	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	2.1837E-06	1.1825E-06	1.8718E-06	**1.7460E-06**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	2.8582E-06	1.4875E-06	2.3293E-06	**2.2250E-06**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	2.7877E-06	1.4539E-06	2.2620E-06	**2.1679E-06**
C_{sd}	HCl Concentration (ppmdv)	23.0877	12.5020	19.7897	**18.4598**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	30.2184	15.7265	24.6264	**23.5238**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	29.4737	15.3713	23.9151	**22.9200**
C_w	HCl Concentration (ppmwv)	18.6264	9.7669	15.5565	**14.6499**
C_{sd}	HCl Concentration (mg/dscm)	34.9694	18.9359	29.9742	**27.9598**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	45.7697	23.8198	37.3000	**35.6299**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	44.6418	23.2819	36.2226	**34.7154**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	37.5281	20.3215	32.1674	**30.0057**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	49.1188	25.5627	40.0293	**38.2369**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 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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Wheelabrator North Broward, Inc.
CleanAir Project No. 10735
Lime Silo

Visible Emission Parameters

Run	1
Date (2009)	Mar 18
Start Time	9:30

Time (min)	Time (sec) 15	30	45	60
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Time (min)	Time (sec) 15	30	45	60
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				

Average Opacity	**0**
Minimum Reading	**0**
Maximum Reading	**0**
No. of Readings >5%	**0**

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End of Appendix

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.	**1**	**2**	**3**	
	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	
	Total Duration of Test Run (min.)	131	131	130	
	Net Sampling Time (min.)	120	120	120	
	Sampling 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	
	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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	Average of Square Root of ΔH (in. W.C.)	1.0196	1.0084	1.0120	
Y_{qa}	Alternative Meter Calibration Factor	0.9740	0.9663	0.9646	**Average**
	Variation from full-test Y_d (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	
%I	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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Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 1 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
QA/QC Results

	Run No.	**1**	**2**	**3**
	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
	Total Duration of Test Run (min.)	131	131	130
	Net Sampling Time (min.)	125	125	125
	Sampling 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:	61-7	61-7	61-7
Y_d	Meter Box Yd - Field Sheet	0.9886	0.9886	0.9886
	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 ALT-009)			
$\sqrt{\Delta H}_{avg}$	Average of Square Root of ΔH (in. W.C.)	1.0120	0.9987	1.0015
Y_{qa}	Alternative Meter Calibration Factor	1.0014	0.9984	1.0002
	Variation from full-test Y_d (average ≤ ±5%)	1.3%	1.0%	1.2%
	Mean Isokinetic 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

Average
1.1%

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QA/QC ________
Date ________

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

USEPA Method 13B (Total Fluorides)
QA/QC Results

	Run No.	1	2	3	
	Date (2009)	Mar 18	Mar 18	Mar 18	
	Start Time (approx.)	06:38	08:06	09:47	
	Stop Time (approx.)	07:50	09:21	11:00	
	Total Duration of Test Run (min.)	72	75	73	
	Net Sampling Time (min.)	63	63	63	
	Sampling 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:	66-6	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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	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_d (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	
%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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QA/QC ________
Date ________

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

USEPA Method 23 (PCDD/F)
QA/QC Results

Run No.		1	2	3	
	Date (2009)	Mar 16	Mar 17	Mar 17	
	Start Time (approx.)	11:07	06:08	10:54	
	Stop Time (approx.)	15:32	10:27	15:18	
	Total Duration of Test Run (min.)	265	259	264	
	Net Sampling Time (min.)	250	250	250	
Sampling 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_p	Pitot Coefficient:	0.8330	0.8330	0.8330	
	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 $\Delta H@$ - Field Sheet	1.8053	1.8053	1.8053	
	Meter Box $\Delta H@$ - Database	1.8053	1.8053	1.8053	
QA/QC					
	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	0.0080	
	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 ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.0563	1.0657	1.0403	
Y_{qa}	Alternative Meter Calibration Factor	0.9984	0.9995	1.0032	**Average**
	Variation from full-test Y_d (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	
%I	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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QA/QC ________
Date ________

Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 2 SDA Inlet

USEPA Method 29 (Mercury)
QA/QC Results

	Run No.	**1**	**2**	**3**	
	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	
	Total Duration of Test Run (min.)	142	131	134	
	Net Sampling Time (min.)	120	120	120	
	Sampling 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	
	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)	0.0246	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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	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_d (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	
%I	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 ________
Date ________

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 (2009)	Mar 16	Mar 16	Mar 16	
	Start Time (approx.)	06:56	09:58	12:45	
	Stop Time (approx.)	09:20	12:09	14:59	
	Total Duration of Test Run (min.)	144	131	134	
	Net Sampling Time (min.)	125	125	125	
Sampling 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:	66-11	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 ΔH@ - Field Sheet	1.8958	1.8958	1.8958	
	Meter Box ΔH@ - 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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	Average of Square Root of ΔH (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_d (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	
%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%	0	0	0	
	Number of points >120%	0	0	0	

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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.		1	2	3	
	Date (2009)	Mar 17	Mar 17	Mar 17	
	Start Time (approx.)	11:43	13:15	14:40	
	Stop Time (approx.)	12:55	14:27	15:49	
	Total Duration of Test Run (min.)	72	72	69	
	Net Sampling Time (min.)	63	63	63	
Sampling 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 ΔH@ - Field Sheet	1.7673	1.7673	1.7673	
	Meter Box ΔH@ - 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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	Average of Square Root of ΔH (in. W.C.)	1.1956	1.1659	1.1583	
Y_{qa}	Alternative Meter Calibration Factor	0.9968	0.9886	0.9838	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	-0.6%	-1.4%	-1.9%	**-1.3%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	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 ________
Date ________

Wheelabrator South Broward, Inc.
Clean Air Project No: 10735
Unit 3 SDA Inlet

USEPA Method 29 (Mercury)
QA/QC Results

	Run No.	**1**	**2**	**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	
	Total Duration of Test Run (min.)	129	129	131	
	Net Sampling Time (min.)	120	120	120	
	Sampling 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	
	Meter Box ID. No:	66-16	66-16	66-16	
Y_d	Meter Box Yd - Field Sheet	0.9992	0.9992	0.9992	
	Meter Box Yd - Database	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				
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0255	0.0253	0.0253	
	(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)	74.140	71.872	72.153	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H}_{avg}$	Average of Square Root of ΔH (in. W.C.)	1.1419	1.1192	1.1209	
Y_{qa}	Alternative Meter Calibration Factor	1.0180	1.0166	1.0166	**Average**
	Variation from full-test Y_d (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	
%I	Actual Variation (%)	98.34	96.86	98.33	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	0	0	0	
	Number of points >110%	0	1	0	
	Number of points <80%	0	0	0	
	Number of points >120%	0	0	0	

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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 (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	
	Total Duration of Test Run (min.)	129	129	131	
	Net Sampling Time (min.)	125	125	125	
Sampling 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 ΔH@ - Field Sheet	1.7498	1.7498	1.7498	
	Meter Box ΔH@ - 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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	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_d (average ≤ ±5%)	-1.4%	-1.1%	-0.7%	**-1.1%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%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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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 (2009)	Mar 16	Mar 16	Mar 16	
	Start Time (approx.)	07:20	09:30	11:20	
	Stop Time (approx.)	00:00	10:47	12:41	
	Total Duration of Test Run (min.)	1000	77	81	
	Net Sampling Time (min.)	63	63	63	
	Sampling 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:	66-22	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 ΔH@ - Field Sheet	1.7498	1.7498	1.7498	
	Meter Box ΔH@ - 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 ALT-009)				
$\sqrt{\Delta H}_{avg}$	Average of Square Root of ΔH (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_d (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	
%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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Nozzle Calibration Sheet

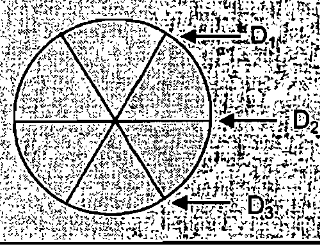
Client	Wheelabrator N/S Broward	Project Number	10735
Calibrated by		Unit	1-3
Date	3/10-18/2009	Runs	1-3

	Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
5/29	0.268-1	0.269	0.267	0.268	0.002	0.268
13B	0.272-1	0.272	0.272	0.272	0.000	0.272
23	0.266-1	0.265	0.266	0.266	0.001	0.266
29.in	0.275-1	0.275	0.275	0.275	0.000	0.275

D_1, D_2, D_3 = three nozzle diameter measurements

ΔD = maximum difference between any two diameters
ΔD = 0.004 inches*

D_{ave} = average of D_1, D_2, D_3



* (40 CFR 60, Appendix A, Method 5, Section 5.1)

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Date_________

CDS005A-Nozzle.xls, August 2004

Meter Box Full Test Calibration

Meter Box No: 61-6

Date of Calibration: 7/23/2008

Meter Box Y_d: 0.9875

Calibration Conducted by: OLEG

Meter Box $\Delta H@$: 1.6981

Barometric Pressure: 29.34

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	$\Delta H@$
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

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft^3)
- V_{ds} Standard Meter Volume - Dry (ft^3)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \le Y_{avg} \pm 0.02$
- Y_{ds} Standard Meter Correction Factor (unitless)
- $\Delta H@$ Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H_2O) $\Delta H@_i \le \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P/13.6}{P_b + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.8	5.0
10.6	10.0
15.8	15.0
20.4	20.0
25.6	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 61-6

Office:

Calibrated by: OLEG

Client:

Date: 7/23/08

Job No:

Temperature Scale Used: Fahrenheit

Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	50	48	52				
100	100	98	102				
150	150	148	152				
200	201	198	202				
250	251	248	252				
300	300	298	302				
350	350	348	352				
400	400	398	401				
450	450	449	452				
500	501	500	501				
550	550	549	551				
600	600	599	601				

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

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10735	Meter No.	61-6	Orifice	A-2
Location	warehouse	Meter Yd	0.9875	Orifice K'	0.4506
Test Date	03/25/09	Meter ΔH@	1.6981	Orifice Cal. Date	01/21/09
Operator	r. vicere	Full Test Cal. Date	07/23/08		

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.94 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH_i (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	0.0	838.10	71	68								
1	5.0	841.08	72	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%
										Average Y_i	0.9788	
										Cal. Error	-0.9%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H / 13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CleanAir Engineering

Meter Box Full Test Calibration

Meter Box No: 61-7

Date of Calibration: 11/17/2008

Meter Box Y_d: 0.9886

Calibration Conducted by: OLEG LAVROV

Meter Box ΔH@: 1.7796

Barometric Pressure: 29.42

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
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
																Averages	0.98863	1.77958

Nomenclature

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft^3)
- V_{ds} Standard Meter Volume - Dry (ft^3)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \leq Y_{avg} \pm 0.02$
- Y_{ds} 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_2O) $\Delta H@_i \leq \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d+460}{T_{ds}+460}\right]\left[\frac{P_b+\Delta P/13.6}{P_b+\Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o+460)}\left[\frac{(T_{ds}+460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds}+460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.3	5.0
10.3	10.0
15.0	15.0
19.7	20.0
24.8	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 61-7 Office:

Calibrated by: OLEG LAVROV Client:

Date: 11/17/08 Job No:

Temperature Scale Used: Fahrenheit Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	50	48	49				
100	100	98	99				
150	150	148	149				
200	200	198	199				
250	250	248	248				
300	300	298	299				
350	350	348	349				
400	400	398	399				
450	450	448	449				
500	500	498	499				
550	550	548	549				
600	600	598	599				

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

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10735	Meter No.	61-7	Orifice	B-3
Location	warehouse	Meter Yd	0.9886	Orifice K'	0.4534
Test Date	03/25/09	Meter ΔH@	1.7796	Orifice Cal. Date	02/13/09
Operator	r. vicere	Full Test Cal. Date	11/17/08		

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.94 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation ΔY_i
	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_i 1.0242	
											Cal. Error 3.6%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H / 13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y_i}}{\overline{Y_i}} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y_i} - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 61-8

Date of Calibration: 10/10/2008

Meter Box Y_d: 1.0079

Calibration Conducted by: OLEG LAVROV

Meter Box $\Delta H@$: 1.7934

Barometric Pressure: 29.41

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	$\Delta H@$
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	241.649	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	
P_b	Barometric Pressure (in. Hg)
Q	Flow Rate (cfm)
ΔH	Orifice Pressure differential (in. H_2O)
ΔP	Inlet Pressure Differential (in. H_2O)
V_d	Gas Meter Volume - Dry (ft^3)
V_{ds}	Standard Meter Volume - Dry (ft^3)
T_d	Average Meter Box Temperature (°F)
T_o	Outlet Meter Box Temperature (°F)
T_{ds}	Average Standard Meter Temperature (°F)
Y_d	Meter Correction Factor (unitless), $Y_i \le Y_{avg} \pm 0.02$
Y_{ds}	Standard Meter Correction Factor (unitless)
$\Delta H@$	Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H_2O) $\Delta H@_i \le \Delta H@_{avg} \pm 0.2$
Θ	Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P / 13.6}{P_b + \Delta H / 13.6}\right]$$

$$\Delta H @ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.2	5.0
9.7	10.0
14.3	15.0
19.7	20.0
24.1	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 61-8 Office: ______

Calibrated by: OLEG LAVROV Client: ______

Date: 10/10/08 Job No: ______

Temperature Scale Used: Fahrenheit Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	49	50	50				
100	99	100	100				
150	149	150	150				
200	199	200	200				
250	249	250	250				
300	299	300	300				
350	349	350	350				
400	399	400	400				
450	449	450	450				
500	499	500	500				
550	549	550	551				
600	599	600	601				

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

CDS005C-Meter Full, April 2004a

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10735	Meter No.	61-8	Orifice	A-4
Location	warehouse	Meter Yd	1.0079	Orifice K'	0.4959
Test Date	03/25/09	Meter ΔH@	1.7934	Orifice Cal. Date	01/21/09
Operator	r. vicere	Full Test Cal. Date	10/10/08		

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.94 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp - T_{amb} (°F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	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%
										Average Y_i	0.9740	
										Cal. Error	-3.4%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H/13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y_i}}{\overline{Y_i}} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y_i} - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-6

Date of Calibration: 2/23/2009

Meter Box Y_d: 0.9916

Calibration Conducted by: M. Vaquero

Meter Box $\Delta H@$: 1.8053

Barometric Pressure: 29.88

				Standard Meter Gas Volume (ft³)			Meter Box Gas Volume (ft³)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
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
																Averages	0.99165	1.80528

Nomenclature

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft³)
- V_{ds} Standard Meter Volume - Dry (ft³)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \le Y_{avg} \pm 0.02$
- Y_{ds} 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_2O) $\Delta H@_i \le \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P/13.6}{P_b + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.0	5.0
10.2	10.0
15.2	15.0
20.0	20.0
24.4	24.5

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No:	66-6	Office:	
Calibrated by:	M. Vaquero	Client:	
Date:	2/23/09	Job No:	
Temperature Scale Used:	Fahrenheit	Type of Calibration:	Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	48	48	49				
100	98	98	99				
150	148	148	149				
200	198	199	199				
250	248	249	249				
300	298	298	299				
350	348	349	349				
400	398	399	399				
450	448	449	449				
500	498	499	499				
550	548	549	549				
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		

CDS005C-Meter Full, April 2004a

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10735	Meter No.	66-6	Orifice	A-4
Location	warehouse	Meter Yd	0.9916	Orifice K'	0.4959
Test Date	03/24/09	Meter ΔH@	1.8053	Orifice Cal. Date	01/21/09
Operator	r. vicere	Full Test Cal. Date	02/23/09		

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.95 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp - T_{amb} (°F)	Orifice ΔH (in W.C.)	Vacuum (in Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	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_i	0.9750	
										Cal. Error	-1.7%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \frac{\Delta H}{13.6}\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y_i}}{\overline{Y_i}} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y_i} - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CDS005B-Meter Post-CO, February 2004

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-7

Date of Calibration: 2/20/2009

Meter Box Y_d: 1.0028

Calibration Conducted by: Martin Vaquero

Meter Box $\Delta H@$: 1.7673

Barometric Pressure: 29.36

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
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
																Averages	1.00282	1.76732

Nomenclature

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft^3)
- V_{ds} Standard Meter Volume - Dry (ft^3)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \leq Y_{avg} \pm 0.02$
- Y_{ds} 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_2O) $\Delta H@_i \leq \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P/13.6}{P_b + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.0	5.0
10.2	10.0
15.2	15.0
19.8	20.0
25.2	25.0

CleanAir Engineering

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 66-7 Office: ______

Calibrated by: Martin Vaquero Client: ______

Date: 2/20/09 Job No: ______

Temperature Scale Used: Fahrenheit Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	51	51	51				
100	100	100	101				
150	151	151	151				
200	201	201	201				
250	252	250	251				
300	302	301	301				
350	352	351	351				
400	401	400	401				
450	450	450	451				
500	500	500	501				
550	550	550	551				
600	601	600	601				

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
Test Date 03/25/09
Operator r. vicere

Meter No. 66-7
Meter Yd 1.0028
Meter ΔH@ 1.7673
Full Test Cal. Date 02/20/09

Orifice B-5
Orifice K' 0.5612
Orifice Cal. Date 02/13/09

Leak Checks

Negative Pressure
No movement of manometer in one-minute ☑ Pass

Positive Pressure
No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.94 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	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_i	1.0257	
										Cal. Error	2.3%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H/13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CDS005B-Meter Post-CO, February 2004

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-11

Date of Calibration: 10/29/2008

Meter Box Y_d: 0.9897

Calibration Conducted by: OLEG LAVROV

Meter Box ΔH@: 1.8958

Barometric Pressure: 29.38

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
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
																Averages	0.98974	1.89577

Nomenclature

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft^3)
- V_{ds} Standard Meter Volume - Dry (ft^3)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \le Y_{avg} \pm 0.02$
- Y_{ds} 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_2O) $\Delta H@_i \le \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P/13.6}{P_b + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
4.5	5.0
9.7	10.0
14.9	15.0
20.3	20.0
25.3	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 66-11

Office:

Calibrated by: OLEG LAVROV

Client:

Date: 10/29/08

Job No:

Temperature Scale Used: Fahrenheit

Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	49	50	50				
100	99	100	100				
150	149	150	150				
200	199	200	200				
250	249	250	250				
300	299	300	300				
350	349	350	350				
400	399	400	399				
450	449	450	449				
500	499	499	499				
550	549	549	549				
600	599	600	599				

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

CDS005C-Meter Full, April 2004a

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10715	Meter No.	66-11	Orifice	A-2		
Location	warehouse	Meter Yd	0.9897	Orifice K'	0.4506		
Test Date	03/26/09	Meter ΔH@	1.8958	Orifice Cal. Date	01/21/09		
Operator	r. vicere	Full Test Cal. Date	10/29/08				

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 29.07 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation ΔY_i
	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_i	0.9812	
										Cal. Error	-0.9%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H/13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-16

Date of Calibration: 9/13/2008

Meter Box Y_d: 0.9992

Calibration Conducted by: OLEG

Meter Box ΔH@: 1.7371

Barometric Pressure: 29.17

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
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

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft^3)
- V_{ds} Standard Meter Volume - Dry (ft^3)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \le Y_{avg} \pm 0.02$
- Y_{ds} 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_2O) $\Delta H@_i \le \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d+460}{T_{ds}+460}\right]\left[\frac{P_b+\Delta P/13.6}{P_b+\Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o+460)}\left[\frac{(T_{ds}+460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds}+460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.3	5.0
9.9	10.0
15.3	15.0
20.3	20.0
24.8	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 66-16 | Office:

Calibrated by: OLEG | Client:

Date: 9/13/08 | Job No:

Temperature Scale Used: Fahrenheit | Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	49	49	51				
100	99	100	101				
150	149	150	150				
200	199	200	200				
250	249	250	250				
300	299	300	300				
350	349	350	350				
400	399	400	400				
450	449	450	450				
500	499	500	500				
550	549	550	550				
600	599	600	600				

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

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10735	Meter No.	66-16	Orifice	B-3
Location	warehouse	Meter Yd	0.9992	Orifice K'	0.4534
Test Date	03/24/09	Meter ΔH@	1.7371	Orifice Cal. Date	02/13/09
Operator	r. vicere	Full Test Cal. Date	09/13/08		

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.95 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	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	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%
										Average Y_i	1.0332	
										Cal. Error	3.4%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H/13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y_i}}{\overline{Y_i}} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y_i} - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CleanAir ENGINEERING

Meter Box Full Test Calibration

Meter Box No: 66-22

Date of Calibration: 11/13/2008

Meter Box Y_d: 0.9937

Calibration Conducted by: Martin Vaquero

Meter Box $\Delta H@$: 1.7498

Barometric Pressure: 29.01

				Standard Meter Gas Volume (ft³)			Meter Box Gas Volume (ft³)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
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	80.0	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
																Averages	0.99374	1.74982

Nomenclature

- P_b Barometric Pressure (in. Hg)
- Q Flow Rate (cfm)
- ΔH Orifice Pressure differential (in. H_2O)
- ΔP Inlet Pressure Differential (in. H_2O)
- V_d Gas Meter Volume - Dry (ft³)
- V_{ds} Standard Meter Volume - Dry (ft³)
- T_d Average Meter Box Temperature (°F)
- T_o Outlet Meter Box Temperature (°F)
- T_{ds} Average Standard Meter Temperature (°F)
- Y_d Meter Correction Factor (unitless), $Y_i \leq Y_{avg} \pm 0.02$
- Y_{ds} 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_2O) $\Delta H@_i \leq \Delta H@_{avg} \pm 0.2$
- Θ Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d+460}{T_{ds}+460}\right]\left[\frac{P_b+\Delta P/13.6}{P_b+\Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o+460)}\left[\frac{(T_{ds}+460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds}+460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
5.0	5.0
10.1	10.0
14.7	15.0
19.3	20.0
24.0	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 66-22

Office:

Calibrated by: Martin Vaquero

Client:

Date: 11/13/08

Job No:

Temperature Scale Used: Fahrenheit

Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	49	49	49				
100	99	99	99				
150	149	149	149				
200	199	199	199				
250	249	249	249				
300	299	299	299				
350	349	349	349				
400	399	399	399				
450	449	449	449				
500	499	499	499				
550	549	549	549				
600	599	599	599				

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

CleanAir ENGINEERING

Meter Box Critical Orifice Post-Test Calibration Data

Project No. 10735

Location warehouse

Test Date 03/24/09

Operator r. vicere

Meter No. 66-22

Meter Yd 0.9937

Meter ΔH@ 1.7498

Full Test Cal. Date 11/13/08

Orifice A-2

Orifice K' 0.4506

Orifice Cal. Date 01/21/09

Leak Checks

Negative Pressure

No movement of manometer in one-minute ☑ Pass

Positive Pressure

No movement of manometer in one-minute ☑ Pass

Important: All leak checks must pass in order for calibration to be valid.

Barom. Press. (P_b) 28.95 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature Inlet (°F)	Meter Temperature Outlet (°F)	Ambient Temp. - T_{amb} (°F)	Orifice ΔH (in. W.C.)	Vacuum (in. Hg)	Net Run Time - θ (minutes)	Net Meter Volume for Run - V_m (dcf)	Avg Meter Temp. for Run T_m (°F)	DGM Calibration Factor - Y_i	Percent Variation - ΔY_i
	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_i	0.9829	
										Cal. Error	-1.1%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H/13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

CleanAir ENGINEERING

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-8-4
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	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? → YES

Pitot Tube Calibration (Wind Tunnel Method @ 60 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(s)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
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' Average Probe $C_{p(A)}$=	0.8085	0.0053

Specification: Avg. C_p Deviations ≤ 0.01

Pitot Side 'B' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(s)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
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' Average Probe $C_{p(B)}$=	0.8157	0.0039

Specification: Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.809	−	0.816	=	-0.007	|Difference| ≤ 0.01

Does assembly meet specifications? YES → If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}}$$

$$^{**}\,Deviation = \left|C_{P(S)} - \overline{C}_{P\,(\text{A or B})}\right|$$

All specifications are from EPA-600/9-76-005, section 3.1

Probe Cp= 0.812 Calibrated by: W. Berry Date: 01/06/2009

CleanAir ENGINEERING

CDS002C-Pitot_TNL, Dec 2008

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **I.D. Number:** 67-8-4
Project Number:

Thermocouple Calibration

Reference Type: Thermometer 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					
2	200°F-250°F					

* Based on Absolute Temperature (Rankine) %Difference ≤ 1.5

Geometric Pitot Calibration

Is pitot assembly in good repair? ◉ Yes ○ No If no, explain:

"S" Pitot

	Dimensions		Dimensions	Specifications	Within Spec?
$\alpha 1=$	2	$\alpha 2=$	1	<=10 °	YES
$\beta 1=$	0	$\beta 2=$	0	<=5°	YES
$\gamma=$	1	$\theta=$	2	None	N/A
A=	0.713			None	N/A
Dt=	0.244			0.1875"<=Dt<=0.375"	YES

	Calculations	Specifications	Within Spec?
A/2=Pa=Pb=	0.357 inches	None	N/A
Pa/Dt=Pb/Dt=	1.461 inches	1.05<P/Dt<1.5	YES
$z = A \sin \gamma$ =	0.012 inches	<=0.125"	YES
$w = A \sin \theta$ =	0.025 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		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: Danial Luckhard Date: 1/6/2009

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **I.D. Number:** 67-8-7
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	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

Pitot Tube Calibration (Wind Tunnel Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A':

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
1	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 $C_{p(A)}$=	0.8281	0.0057

Specification
Avg. C_p Deviations ≤ 0.01

Pitot Side 'B':

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
1	0.573	0.822	0.827	0.005
2	0.574	0.832	0.822	0.001
3	0.570	0.839	0.816	0.006
		Side 'B' Average Probe $C_{p(B)}$=	0.8216	0.0040

Specification
Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.828	−	0.822	=	0.006	|Difference| ≤ 0.01

Does assembly meet specifications? YES ⟶ **If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.**

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}}$$

$$^{**}Deviation = \left|C_{P(S)} - \overline{C}_{P\,(\text{A or B})}\right|$$

All specifications are from EPA-600/9-76-005, section 3.1

Probe Cp= 0.825 Calibrated by: W. Berry Date: 03/05/2009

CleanAir. ENGINEERING

CDS002C-Pitot_TNL, Dec 2008

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-8-7

Project Number: 10735

Thermocouple Calibration

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

* Based on Absolute Temperature (Rankine) %Difference ≤ 1.5

YES

Geometric Pitot Calibration

Is pitot assembly in good repair? (●) Yes ( ) No If no, explain:

"S" Pitot

Dimensions		Dimensions		Specifications	Within Spec?
$\alpha 1=$	2	$\alpha 2=$	1	<=10 °	YES
$\beta 1=$	2	$\beta 2=$	1	<=5°	YES
$\gamma=$	2	$\theta=$	1	None	N/A
A=	0.716			None	N/A
Dt=	0.250			0.1875"<=Dt<=0.375"	YES

	Calculations	Specifications	Within Spec?
A/2=Pa=Pb=	0.358 inches	None	N/A
Pa/Dt=Pb/Dt=	1.432 inches	1.05<P/Dt<1.5	YES
$z = A \sin \gamma =$	0.025 inches	<=0.125"	YES
$w = A \sin \theta =$	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		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: N. Hitchins Date: 3/4/2009

CDS002D-Pitot_Geo. Feb 2004

CleanAir.

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **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

* Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? → **YES**

Pitot Tube Calibration (Wind Tunnel Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
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' Average Probe $C_{p(A)}$=	0.8381	0.0039

Specification
Avg. C_p Deviations ≤ 0.01

Pitot Side 'B' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
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' Average Probe $C_{p(B)}$=	0.8288	0.0007

Specification
Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.838	−	0.829	=	0.009	|Difference| ≤ 0.01

Does assembly meet specifications? YES → **If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.**

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}}$$

$$^{**}\,Deviation = \left|C_{P(S)} - \overline{C}_{P\,(\text{A or B})}\right|$$

All specifications are from EPA-600/9-76-005, section 3.1.

Probe Cp= 0.833 Calibrated by: W. Berry Date: 03/05/2009

CleanAir ENGINEERING

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-8-17
Project Number: 10735

Thermocouple Calibration

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 Absolute Temperature (Rankine) %Difference ≤ 1.5

YES

Geometric Pitot Calibration

Is pitot assembly in good repair? ◉ Yes ○ No If no, explain:

"S" Pitot

Dimensions		Dimensions		Specifications	Within Spec?
α1=	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	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		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: N. Hitchins Date: 3/4/2009

CDS002D-Pitot_Geo, Feb 2004

CleanAir.

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-4-1

Project Number:

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	68.0	71.0	-3	0.57%	
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? → **YES**

Pitot Tube Calibration (Wind Tunnel Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
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' Average Probe $C_{p(A)}$=	0.8265	0.0021

Specification
Avg. C_p Deviations ≤ 0.01

Pitot Side 'B' :

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
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' Average Probe $C_{p(B)}$=	0.8193	0.0023

Specification
Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.827	−	0.819	=	0.008	|Difference| ≤ 0.01

Does assembly meet specifications? YES → **If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.**

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}}$$

$$^{**}Deviation = \left|C_{P(S)} - \overline{C}_{P\,(\text{A or B})}\right|$$

All specifications are from EPA-600/9-76-005, section 3.1.

Probe Cp= 0.823 Calibrated by: W. Berry Date: 03/04/2009

CleanAir. ENGINEERING

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **I.D. Number:** 67-4-1
Project Number: 10735

Thermocouple Calibration

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 Absolute Temperature (Rankine) %Difference ≤ 1.5
YES

Geometric Pitot Calibration

Is pitot assembly in good repair? ◉ Yes ○ No If no, explain:

"S" Pitot

Dimensions		Dimensions		Specifications	Within Spec?
$\alpha 1=$	1	$\alpha 2=$	1	<=10 °	YES
$\beta 1=$	2	$\beta 2=$	1	<=5°	YES
$\gamma=$	1	$\theta=$	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	YES
$z = A \sin \gamma =$	0.012 inches	<=0.125"	YES
$w = A \sin \theta =$	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		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: N. Hitchins Date: 3/4/2009

CDS002D-Pitot_Geo, Feb 2004

CleanAir.

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-4-4
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	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? → **YES**

Pitot Tube Calibration (Wind Tunnel Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel Reference Pitot Cp: 0.99

Pitot Side 'A':

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
1	0.561	0.822	0.818	0.002
2	0.568	0.822	0.823	0.003
3	0.564	0.822	0.820	0.001
		Side 'A' Average Probe $C_{p(A)}$=	0.8204	0.0020

Specification
Avg. C_p Deviations ≤ 0.01

Pitot Side 'B':

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
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' Average Probe $C_{p(B)}$=	0.8249	0.0015

Specification
Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.820	−	0.825	=	-0.005	|Difference| ≤ 0.01

Does assembly meet specifications? YES → **If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.**

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad ^{**}Deviation = \left|C_{P(S)} - \overline{C}_{P\,(\text{A or B})}\right|$$

All specifications are from EPA-600/9-76-005, section 3.1

Probe Cp= 0.823 Calibrated by: W. Berry Date: 03/04/2009

CleanAir
ENGINEERING

CDS002C-Pitot_TNL, Dec 2008

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-4-4
Project Number: 10735

Thermocouple Calibration

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 Absolute Temperature (Rankine) %Difference ≤ 1.5

YES

Geometric Pitot Calibration

Is pitot assembly in good repair? (●) Yes ( ) No If no, explain:

"S" Pitot

	Dimensions		Dimensions	Specifications	Within Spec?
$\alpha1=$	2	$\alpha2=$	1	<=10 °	YES
$\beta1=$	0	$\beta2=$	2	<=5°	YES
$\gamma=$	2	$\theta=$	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	YES
$z = A \sin \gamma =$	0.025 inches	<=0.125"	YES
$w = A \sin \theta =$	0.013 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		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: N. Hitchins Date: 3/4/2009

CDS002D-Pitot_Geo. Feb 2004

CleanAir.

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot   I.D. Number: 67-10-5
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	69.0	75.0	-6	1.13%	
2	200°F-250°F	207.0	216.0	-9	1.35%	%Difference ≤ 1.5

* Based on Absolute Temperature (Rankine)

Does thermocouple assembly meet specifications? → **YES**

Pitot Tube Calibration (Wind Tunnel Method @ 50 ft/sec)

Reference Pitot I.D. No: Wind Tunnel   Reference Pitot Cp: 0.99

Pitot Side 'A':

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(A)}$**
1	0.565	0.830	0.817	0.002
2	0.565	0.820	0.822	0.003
3	0.559	0.819	0.818	0.001
		Side 'A' Average Probe $C_{p(A)}$=	0.8190	0.0019

Specification
Avg. C_p Deviations ≤ 0.01

Pitot Side 'B':

Trial No.	Reference ΔP	Probe ΔP	Probe $C_{p(S)}$*	Abs. Deviation from Avg. $C_{p(B)}$**
1	0.567	0.828	0.819	0.001
2	0.566	0.822	0.821	0.001
3	0.559	0.814	0.821	0.000
		Side 'B' Average Probe $C_{p(B)}$=	0.8205	0.0009

Specification
Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.819	−	0.820	=	-0.001	|Difference| ≤ 0.01

Does assembly meet specifications? YES → **If "Yes", C_p= Average of Side 'A' and 'B' Cp values. If "No", Pitot must be replaced.**

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad ^{**}Deviation = \left|C_{P(S)} - \overline{C}_{P\,(\mathrm{A\,or\,B})}\right|$$

All specifications are from EPA-600/9-76-005 section 3.1

Probe Cp= 0.820   Calibrated by: W. Berry   Date: 03/05/2009

CleanAir ENGINEERING

CDS002C-Pitot_TNL, Dec 2008

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot

I.D. Number: 67-10-5
Project Number: 10735

Thermocouple Calibration

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 Absolute Temperature (Rankine)   %Difference ≤ 1.5

YES

Geometric Pitot Calibration

Is pitot assembly in good repair? (●) Yes ( ) No   If no, explain:

"S" Pitot

Dimensions		Dimensions		Specifications	Within Spec?
$\alpha 1=$	0	$\alpha 2=$	0	<=10 °	YES
$\beta 1=$	1	$\beta 2=$	1	<=5°	YES
$\gamma=$	1	$\theta=$	0	None	N/A
A=	0.726			None	N/A
Dt=	0.250			0.1875"<=Dt<=0.375"	YES

	Calculations	Specifications	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	YES
$z = A \sin \gamma$ =	0.013 inches	<=0.125"	YES
$w = A \sin \theta$ =	0.000 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		
Static Hole I.D.		within 10% of (0.1*O.D.)		
Tip to Static		>=6*O.D.		
Static to Bend		>=8*O.D.		

Pitot Cp=

Calibrated by: N. Hitchins   Date: 3/4/2009

CDS002D-Pitot_Geo, Feb 2004

CleanAir.

AIR LIQUIDE Air Liquide America Specialty Gases LLC SCOTT™

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
AIR LIQUIDE AMERICA SPECIALTY GASES LLC Project No.: 05-72060-003
1290 COMBERMERE STREET
TROY, MI 48083

Customer

CLEAN AIR ENGINEERING
DON ALLEN
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 ACCURACY**	TRACEABILITY
CARBON DIOXIDE	14.0	%	+/- 1%	Direct NIST and NMi
OXYGEN	6.05	%	+/- 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 2000	01Jul2009	K026898	5.006 %	CARBON DIOXIDE
NTRM 2350	01Dec2011	K016398	23.20 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
PIR/2000/609015	13Jan2009	NDIR
CAI/110P/V03018	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	
Z1=0.00000	R1=39.30000	T1=83.10000
R2=39.40000	Z2=0.00000	T2=83.10000
Z3=0.00000	T3=83.10000	R3=39.40000
Avg. Concentration:	14.00	%

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

Date: 13Jan2008	Response Unit:%	
Z1=0.00000	R1=23.20000	T1=6.06000
R2=23.20000	Z2=0.00000	T2=6.06000
Z3=0.00000	T3=6.06000	R3=23.20000
Avg. Concentration:	6.053	%

Concentration=A+Bx+Cx2+Dx3+Ex4
r=0.999999
Constants: A=-0.00558057
B=0.999821643 C=0
D=0 E=0

APPROVED BY: JEFF GROTEAU

RATA CLASS

Scott Specialty Gases

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

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 55647-71-65000
Project No.: 05-53475-001

Customer

CLEAN AIR ENGINEERING
DON ALLEN
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: AAL9828 **Certification Date:** 05Apr2007 **Exp. Date:** 04Apr2010
Cylinder Pressure***: 1900 PSIG

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#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN/3400/10693	04Apr2007	THERMAL CONDUCTIVITY
CALIFORNIA/110P/S02041	05Apr2007	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: 04Apr2007	Response Unit:AREA	
Z1=0.00000	R1=1165892.	T1=305456.0
R2=1166031.	Z2=0.00000	T2=305856.0
Z3=0.00000	T3=305949.0	R3=1166669.
Avg. Concentration:	6.054	%

Concentration=A+Bx+Cx2+Dx3+Ex4
r=0.999996
Constants: A=0.010560
B=0.000020 C=0
D=0 E=0

OXYGEN

Date: 05Apr2007	Response Unit:%	
Z1=0.00000	R1=23.48000	T1=14.03000
R2=23.48000	Z2=0.00000	T2=14.03000
Z3=0.00000	T3=14.02000	R3=23.49000
Avg. Concentration:	14.02	%

Concentration=A+Bx+Cx2+Dx3+Ex4
r=0.999999
Constants: A=-0.002923
B=0.999759 C=0
D=0 E=0

APPROVED BY: [signature]

AIR LIQUIDE

Scott Specialty Gases
Air Liquide America Specialty Gases LLC

Shipped From: 1290 COMBERMERE STREET
TROY MI 48083
Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ANALYSIS

WAREHOUSE/STOCK
WAREHOUSE/STOCK/
CHICAGO WAREHOUSE
868 SIVERT
WOOD DALE IL 60191

PROJECT #: 05-69004-002
PO#: GENERAL STOCK
ITEM #: 0501813 AL
DATE: 15Sep2008

CYLINDER #: ALM061790
FILL PRESSURE: 02000 PSIG

PURE MATERIAL: NITROGEN

CAS# 7727-37-9

GRADE: ZERO GAS

PURITY: 99.998%

IMPURITY	MAXIMUM CONCENTRATIONS
THC	0.5 PPM

ANALYST: [signature]

End of Appendix