Wheelabrator South Broward Inc.
A Waste Management Company
4400 South State Road 7
Ft. Lauderdale, FL 33314

May 8, 2013

UPS# 1Z2AW7390197438931

Mr. Joe Lurix
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
2013 Annual Compliance Stack Test and RATA Reports

Dear Mr. Lurix:

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 25-27 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,

Scott McIlvaine
Plant Manager

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section (with) UPS#1Z2AW7390196354363

FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, (with) UPS#1Z2AW7390196615143

Broward County Department of Planning and Environmental Protection, Air Quality Division (with) UPS#1Z2AW7390195194958

Nicole Turnbull (with)
Ram Tewari – BCWRS (without)
Tim Porter (without)
Rob French – MPI (with)

CleanAir

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

REPORT ON COMPLIANCE TESTING

Performed for:

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

Client Reference No: Service Agreement
CleanAir Project No: 12218-3
Revision 0: May 8, 2013

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. Clean Air Engineering operates in conformance with the requirements of ASTM D7036-04 Standard Practice for Competence of Air Emission Testing Bodies.

Submitted by,

Scott Brown
Project Manager
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Reviewed by,

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REVISION HISTORY

REPORT ON COMPLIANCE TESTING

DRAFT REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
D0a	04/26/13	All	Draft version of original document.

FINAL REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
0	05/08/13	All	Final version of original document.

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VOLUME I

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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 (DEP). Wheelabrator South Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program.

The Lime Silo Fabric Filter (FF) Vent was observed for visual emissions (VEs) and the Ash Handling System was observed for fugitive emissions. The VEs were determined by the facility's continuous opacity monitor system (COMS) data, as allowed under 40 CFR 60.11(e)(5). Testing was conducted in accordance with the Wheelabrator North and South Broward Protocol on Compliance, dated February 3, 2012, 40 CFR 60, Subpart Cb, and applicable sections of the facility's Title V Permit No. 0112119-015-AV.

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

Key Project Participants

Individuals responsible for coordinating and conducting the test program were:

C. Faller – Wheelabrator South Broward, Inc.
S. Brown – CleanAir

Various personnel from the DEP were present for portions of the test program.

The CleanAir test crew consisted of the following individuals:

H. Nguyen
D. Luckhard
P. Bihun
A. Obuchowski
W. Berry
S. Joint

The names of the laboratory employees that performed each specific analysis, along with the respective laboratory reports, are presented in Appendix I of this report.

Test Program Parameters

The sampling was conducted at the Units 1, 2 and 3 Spray Dryer Absorption (SDA) Inlet, FF Outlets, Ash Handling System and Lime Silo Vent from March 25 through 27, 2013, and included the following emissions measurements:

- filterable particulate matter (FPM)
- polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/F); Unit 2 only
- hydrogen chloride (HCl)
- mercury (Hg)
- cadmium (Cd)
- lead (Pb)
- flue gas composition (e.g., O_2, CO_2, H_2O)
- flue gas flow rate
- flue gas temperature
- fugitive emissions
- visible emissions (VEs)

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 2 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/25/13	07:59	10:11
1	Unit 1 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/25/13	08:00	09:00
2	Unit 1 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/25/13	09:23	10:34
2	Unit 2 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/25/13	10:32	12:45
3	Unit 1 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/25/13	10:54	11:54
1	Unit 1 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/25/13	12:26	14:40
3	Unit 2 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/25/13	13:04	15:17
2	Unit 1 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/26/13	07:51	10:03
1	Unit 3 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/26/13	08:00	09:00
2	Unit 2 FF Outlet	USEPA Method 23	PCDD/F	03/26/13	08:03	12:49
NA	Lime Silo	USEPA Method 9	Visible Emissions	03/26/13	08:55	10:46
2	Unit 3 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/26/13	09:21	10:21
3	Unit 1 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/26/13	10:25	12:36
3	Unit 3 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/26/13	10:46	11:46
1	Unit 3 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/26/13	12:11	14:24
4	Unit 1 FF Outlet	USEPA Method 29	Mercury	03/26/13	12:59	15:11
3	Unit 2 FF Outlet	USEPA Method 23	PCDD/F	03/26/13	13:09	17:25
4	Unit 2 FF Outlet	USEPA Method 23	PCDD/F	03/27/13	07:21	11:39
2	Unit 3 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/27/13	07:28	09:41
1	Unit 2 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/27/13	07:47	08:47
NA	Ash Handling System	USEPA Method 22	Fugitive Emissions	03/27/13	07:55	13:40
2	Unit 2 SDA Inlet / FF Outlet	USEPA Method 26A	HCl	03/27/13	09:08	10:08
3	Unit 3 FF Outlet	USEPA Method 5/29	Particulate/Metals	03/27/13	09:59	12:11
3	Unit 2 FF Outlet	USEPA Method 26A	HCl	03/27/13	10:27	11:27
4	Unit 2 FF Outlet	USEPA Method 29	Mercury	03/27/13	12:07	14:22
4	Unit 3 FF Outlet	USEPA Method 29	Mercury	03/27/13	12:29	14:41

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 2-21 on pages 2-1 through 2-19. 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)	2.6	5.9	12	25 (27)
Visual Emissions (%, by COMS)[2]	0	0	0	10
Total PCCD/PCDF (ng/dscm @ 7% O_2)	NA	4.6	NA	30
Hydrogen Chloride (ppmdv @ 7% O_2) or	1.0	6.6	9.9	29
Hydrogen Chloride Removal (%)[3]	99.8%	98.8%	98.1%	>95
Cadmium (mg/dscm @ 7% O_2)	<0.00012	0.0012	0.0028	0.035 (0.040)
Lead (mg/dscm @ 7% O_2)	<0.00017	0.0091	0.0211	0.40 (0.44)
Mercury (µg/dscm @ 7% O_2)	<0.41	0.61	1.6	50 (70)
Carbon Feed Rate (lbs/hr)[4]	6	6	6	NA
Average Steam Flow (Klbs/hr)[4]	186.0	186.7	187.1	192
Average FF Inlet Temperature (^{O}F)[4]	319	320	315	NA

[1] Limits obtained from facilities Title V Permit 0112119-015-AV. If a second limit is shown that limit is being implemented by the EPA as of April 28, 2009. Respective PSD limits are presented in parenthesis.

[2] Visual Emissions (opacity) was obtained from the facilities COMS data as allowed under 40CFR60.11(e)(5).

[3] Removal for hydrogen chloride calculated in the unit of its standard. The hydrogen chloride limit is 29 ppmdv @ 7% O2 or 85% removal, whichever is less stringent.

[4] From all compliance test runs.

Table 1-3:
Subpart Cb- Required Operating Data

Process Condition	
Unit 1 Maximum Demonstrated Combustor Load (Klbs/hr)[1]	188.4 [2]
Unit 2 Maximum Demonstrated Combustor Load (Klbs/hr)[1]	187.1
Unit 3 Maximum Demonstrated Combustor Load (Klbs/hr)[1]	183.6 [3]
Unit 1 Maximum Particulate Control Device Inlet Temperature (°F)[4]	321 [2]
Unit 2 Maximum Particulate Control Device Inlet Temperature (°F)[4]	321
Unit 3 Maximum Particulate Control Device Inlet Temperature (°F)[4]	315 [3]
Unit 1 Carbon Feed Rate (lbs/hr)[5]	6
Unit 2 Carbon Feed Rate (lbs/hr)[5]	6
Unit 3 Carbon Feed rate (lbs/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 May 2, 2012.
[3] From CleanAir Cb test report dated May 11, 2011.
[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 feed 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 Results

Source / Constituent	Sampling Method	Results	Permit Limit[1]
Ash Handling System[2]			
Fugitive Emissions (%)	EPA M22	0.12	5% of observation time
Fugitive Emissions (minutes)		0.22	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 with the exception of mercury, which had a fourth run performed on each unit. All data that is reported in the units of lb/MMBTU utilized the Fd of 9,570, as per EPA Method 19.

All equipment utilized for compliance testing was manufactured by CleanAir, except for the Servomex O_2/CO_2 analyzer utilized for all of the integrated gas sample (IGS) bag analyses.

During the compliance testing, all three (3) boilers were operated within 10% of the 192,000 lb/hr maximum steam flow rating. The boilers and air pollution control equipment are in a well-maintained operating condition. Normal operating parameters for the fabric filters are a pressure drop of 2 to 7 inches of water and scrubber dilution water flow varies from 0 to 40 gallons per minute (gpm). The equipment operated within these ranges during compliance testing. The results tables present each boiler's steam output for every test run.

Dan Luckhard performed the fugitive emission readings, per EPA Method 22, on the Ash Handling System and the VE readings, per EPA Method 9, on the Lime Silo during one (1) entire truck unloading. Mr. Luckhard's VE evaluation certificate is presented in Appendix J of this report.

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 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 Methods 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 and field blanks are presented in Table 2-18 on page 2-17, as well as Appendix I of this report. 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 meet 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 are presented in Appendix I.

The Method 23 results for Run 1 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.

Methylene chloride was omitted in the Method 23 sample recovery, per approved Alternative Test Method 052 (ALT-052).

Chuck Faller of Wheelabrator provided the process (operating) data. This data is presented in its entirety in Appendix D of this report. All process data and CleanAir run times are based on Bailey Computer Time which is the same as Eastern Standard Time (EST). The Lime Silo initial and final truck weights were recorded using EST.

IGS's were collected in a vinyl sample bag from every sample train. The contents of the bag were then analyzed for oxygen (O_2) and carbon dioxide (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 H of this report.

One (1) eight-hour greenhouse gas (GHG) sample was collected in accordance with ASTM Method D7459-08 and analyzed by Beta Analytic, Inc. in Miami, Florida, in accordance with ASTM D6866-08. The ASTM D6866-08 sample bag was obtained from the Method 23 Unit 1, Runs 2 and 3 (four hours per run). The results of analysis are presented in Appendix A of this report.

The eight-hour samples were collected within 10% of the initial sample rate from the isokinetic sample train's IGS. The IGS bags were leak-checked prior to use, and all collected within 10% of the initial sample rate using the orifice off of the dry gas meter in conjunction with a rotometer. The IGS bag contents were then combined proportionally into a 3L Tedlar® bag. Both four-hour samples met the two (2) times relative standard deviation (2RSD) criteria by stack flow rate (<30%).

The Ash Handling System fugitive emission readings were made for 90 minutes at three (3) locations. Since for a majority of the time all the doors associated with the ash handling system were closed, notations were made on the data sheets to record the length of time that the doors were open. During the entire three-hour (180 minutes) observation period, there were open doors for 13 minutes, which would allow fugitive emission to occur. There was a brief fugitive emission for 13 seconds observed at the ash unloading area.

Problems Encountered

The first Method 23 test run field data entry was performed using an electronic data sheet. At the conclusion of the test run, the Field Technician inadvertently wrote over the raw test run data with a blank data sheet. The raw Run 1 data was not able to be recovered and three (3) Method 23 test runs (Runs 2, 3 and 4) were performed.

The IGS bag collected at the Unit 2 SDA Inlet Run 1 did not have enough volume to get an accurate O_2/CO_2 concentration. An average of the Unit 2 SDA Inlet Runs 2 and 3 IGS bags was used for Run 1 molecular weight and correction to 7% O_2 calculations.

During the Method 26A SDA Inlet Run 3, one (1) of the impingers developed a crack which allowed ice water to be drawn into the impingers and contaminate the HCl sample. Since the FF Outlet concentrations were well below the permit limits, it was decided not to perform another HCl test run. The removal efficiency presented in Tables 1-2 and 2-7 are based on Runs 1 and 2 only.

Test Method Modifications

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."

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). Method 26A was modified to a single-point constant sampling rate at all test locations.

End of Section 1 – Project Overview

RESULTS

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

Run No.		1	2	3	Average
Date (2013)		Mar 25	Mar 26	Mar 26	
Start Time (approx.)		12:26	07:51	10:25	
Stop Time (approx.)		14:40	10:03	12:36	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hr)	186.4	187.2	187.9	**187.1**
P_1	Fabric Filter Inlet Temperature - (°F)	323	315	315	**318**
P_2	Carbon Injection Rate - (lb/hr)	7	6	6	**6**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.3	8.3	7.7	**8.1**
CO_2	Carbon dioxide (dry volume %)	10.9	10.7	11.1	**10.9**
T_s	Sample temperature (°F)	311	302	302	**305**
B_w	Actual water vapor in gas (% by volume)	23.4	21.5	22.6	**22.5**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,000	160,000	154,000	**163,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,700	85,100	81,000	**85,300**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	76.92	67.79	66.12	**70.28**
%I	Isokinetic sampling (%)	105.7	100.8	103.2	**103.3**
Particulate Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00220	0.00190	0.00190	
m_s	Matter collected in solvent rinse(s) (g)	0.00418	0.00238	0.00164	
m_n	Total FPM (g)	0.00638	0.00428	0.00354	
FPM Results					
C_{sd}	Particulate Concentration (mg/dscm)	2.9	2.2	1.9	**2.4**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	3.2	2.5	2.0	**2.6**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.98	0.71	0.57	**0.76**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0029	0.0022	0.0018	**0.0023**
Cadmium Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	0.2729	<0.2000	<0.2000	
Cadmium Results - Total					
C_{sd}	Concentration (mg/dscm)	0.00013	<0.00010	<0.00011	**<0.00011**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.00014	<0.00012	<0.00011	**<0.00012**
$E_{lb/hr}$	Rate (lb/hr)	4.2E-05	<3.3E-05	<3.2E-05	**<3.6E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.2E-07	<1.0E-07	<1.0E-07	**<1.1E-07**
Lead Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	0.5297	0.2245	<0.2000	
Lead Results - Total					
C_{sd}	Concentration (mg/dscm)	0.00024	0.00012	<0.00011	**<0.00016**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.00027	0.00013	<0.00011	**<0.00017**
$E_{lb/hr}$	Rate (lb/hr)	8.2E-05	3.7E-05	<3.2E-05	**<5.0E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.4E-07	1.2E-07	<1.0E-07	**<1.5E-07**

RESULTS

Table 2-2:
Unit 1 FF Outlet – Mercury

Run No.		1	2	3	4	Average
Date (2013)		Mar 25	Mar 26	Mar 26	Mar 26	
Start Time (approx.)		12:26	07:51	10:25	12:59	
Stop Time (approx.)		14:40	10:03	12:36	15:11	
Process Conditions						
R_P	Steam Production Rate - (Klbs/hour)	186.4	187.2	187.9	185.9	**186.8**
P_1	Fabric Filter Inlet Temperature - (°F)	323	315	315	319	**318**
P_2	Carbon Feed Rate - (lbs/hr)	7	6	6	6	**6**
Gas Conditions						
O_2	Oxygen (dry volume %)	8.3	8.3	7.7	8.6	**8.2**
CO_2	Carbon dioxide (dry volume %)	10.9	10.7	11.1	10.6	**10.8**
T_s	Sample temperature (°F)	311	302	302	305	**305**
B_w	Actual water vapor in gas (% by volume)	23.4	21.5	22.6	22.4	**22.5**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	176,000	160,000	154,000	164,000	**163,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	89,700	85,100	81,000	85,900	**85,400**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	76.92	67.79	66.12	70.46	**70.32**
%I	Isokinetic sampling (%)	105.7	100.8	103.2	103.7	**103.4**
Laboratory Data						
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.100	<0.100	<0.100	<0.100	
$m_{n\text{-}2b}$	Fraction 2B (µg)	<0.800	<0.800	<0.700	<0.700	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.200	<0.200	<0.200	<0.200	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.500	<0.500	<0.500	<0.500	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.400	<0.400	<0.400	<0.400	
m_n	Total matter corrected for allowable blanks (µg)	<0.800	<0.800	<0.700	<0.700	
Mercury Results - Total						
C_{sd}	Concentration (µg/dscm)	<0.37	<0.4	<0.37	<0.35	**<0.38**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<0.4	<0.5	<0.4	<0.4	**<0.4**
$E_{lb/hr}$	Rate (lb/hr)	<1.2E-04	<1.3E-04	<1.1E-04	<1.1E-04	**<1.2E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<3.6E-07	<4.1E-07	<3.5E-07	<3.6E-07	**<3.7E-07**

RESULTS

Table 2-3:
Unit 1 FF Outlet and SDA Inlet – Hydrogen Chloride

Run No.		1	2	3	Average
Date (2013)		Mar 25	Mar 25	Mar 25	
Start Time (approx.)		08:00	09:23	10:54	
Stop Time (approx.)		09:00	10:34	11:54	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	185.9	183.2	185.8	**185.0**
P_1	Fabric Filter Inlet Temperature - (°F)	320	319	321	**320**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	7.9	7.7	8.1	**7.9**
CO_2	Carbon dioxide (dry volume %)	11.1	11.3	11.0	**11.1**
T_s	Sample temperature (°F)	502	491	493	**495**
B_w	Actual water vapor in gas (% by volume)	19.2	21.2	20.3	**20.2**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	34.01	34.80	34.70	**34.50**
SDA Inlet Laboratory Data					
m_n	Total HCl collected (mg)	748.672	653.161	636.272	
SDA Inlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	513	438	427	**459**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	548	460	463	**490**
C_{sd}	HCl Concentration (mg/dscm)	777	663	647	**696**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	829	697	701	**743**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.75	0.63	0.63	**0.67**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.2	7.8	8.5	**8.5**
CO_2	Carbon dioxide (dry volume %)	9.9	11.3	10.6	**10.6**
T_s	Sample temperature (°F)	302	303	306	**304**
B_w	Actual water vapor in gas (% by volume)	23.3	25.0	23.3	**23.9**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	39.45	39.52	39.53	**39.50**
FF Outlet Laboratory Data					
m_n	Total HCl collected (mg)	0.890	0.886	2.941	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	0.53	0.52	1.7	**0.93**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	0.63	0.55	1.9	**1.0**
C_{sd}	HCl Concentration (mg/dscm)	0.80	0.79	2.6	**1.4**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	0.95	0.84	3.0	**1.6**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.0009	0.0008	0.0027	**0.0014**
RE	Reduction Efficiency (% Removal)	99.9%	99.9%	99.6%	**99.8%**

RESULTS

Table 2-4:
Unit 2 FF Outlet – Particulate and Metals

Run No.		1	2	3	Average
Date (2013)		Mar 25	Mar 25	Mar 25	
Start Time (approx.)		07:59	10:32	13:04	
Stop Time (approx.)		10:11	12:45	15:17	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hr)	185.9	187.2	187.6	**186.9**
P_1	Fabric Filter Inlet Temperature - (°F)	320	321	322	**321**
P_2	Carbon Feed Rate - (lb/hr)	6	6	6	**6**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.6	8.4	8.6	**8.5**
CO_2	Carbon dioxide (dry volume %)	10.4	10.7	10.7	**10.6**
T_s	Sample temperature (°F)	299	299	301	**300**
B_w	Actual water vapor in gas (% by volume)	23.2	22.4	22.0	**22.5**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	166,000	163,000	162,000	**164,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	85,200	85,100	84,800	**85,000**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	68.03	66.49	66.39	**66.97**
%I	Isokinetic sampling (%)	101.0	98.9	99.0	**99.7**
Particulate Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00480	0.00440	0.00530	
m_s	Matter collected in solvent rinse(s) (g)	0.00679	0.00466	0.00377	
m_n	Total FPM (g)	0.01159	0.00906	0.00907	
FPM Results					
C_{sd}	Particulate Concentration (mg/dscm)	6.0	4.8	4.8	**5.2**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	6.8	5.3	5.4	**5.9**
$E_{lb/hr}$	Particulate Rate (lb/hr)	1.9	1.5	1.5	**1.7**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0061	0.0048	0.0049	**0.0053**
Cadmium Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	2.0285	2.0936	1.7367	
Cadmium Results - Total					
C_{sd}	Concentration (mg/dscm)	0.0011	0.0011	0.00092	**0.0010**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.0012	0.0012	0.0010	**0.0012**
$E_{lb/hr}$	Rate (lb/hr)	3.4E-04	3.5E-04	2.9E-04	**3.3E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.1E-06	1.1E-06	9.4E-07	**1.0E-06**
Lead Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	11.2882	16.0733	18.8891	
Lead Results - Total					
C_{sd}	Concentration (mg/dscm)	0.0059	0.0085	0.010	**0.0081**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.0066	0.0095	0.011	**0.0091**
$E_{lb/hr}$	Rate (lb/hr)	1.9E-03	2.7E-03	3.2E-03	**2.6E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	5.9E-06	8.5E-06	1.0E-05	**8.2E-06**

RESULTS

Table 2-5:
Unit 2 FF Outlet – Mercury

Run No.		1	2	3	4	Average
Date (2013)		Mar 25	Mar 25	Mar 25	Mar 27	
Start Time (approx.)		07:59	10:32	13:04	12:07	
Stop Time (approx.)		10:11	12:45	15:17	14:22	
Process Conditions						
R_P	Steam Production Rate - (Klbs/hour)	185.9	187.2	187.6	187.2	**187.0**
P_1	Fabric Filter Inlet Temperature - (°F)	320	321	322	320	**320**
P_2	Carbon Feed Rate - (lbs/hr)	6	6	6	6	**6**
Gas Conditions						
O_2	Oxygen (dry volume %)	8.6	8.4	8.6	9.4	**8.7**
CO_2	Carbon dioxide (dry volume %)	10.4	10.7	10.7	10.0	**10.4**
T_s	Sample temperature (°F)	299	299	301	299	**299**
B_w	Actual water vapor in gas (% by volume)	23.2	22.4	22.0	20.3	**22.0**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	166,000	163,000	162,000	163,000	**163,000**
Q_s	Volumetric flow rate, standard (scfm)	111,000	110,000	109,000	110,000	**110,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	85,200	85,100	84,800	88,000	**85,800**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	68.03	66.49	66.39	69.97	**67.72**
%I	Isokinetic sampling (%)	101.0	98.9	99.0	100.6	**99.9**
Laboratory Data						
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.100	<0.100	<0.100	<0.100	
$m_{n\text{-}2b}$	Fraction 2B (µg)	0.881	1.033	1.037	1.119	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.200	<0.200	<0.200	<0.200	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.500	<0.500	<0.500	<0.500	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.400	<0.400	<0.400	<0.400	
m_n	Total matter corrected for allowable blanks (µg)	0.881	1.033	1.037	1.119	
Mercury Results - Total						
C_{sd}	Concentration (µg/dscm)	0.46	0.55	0.55	0.56	**0.53**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	0.51	0.61	0.62	0.68	**0.61**
$E_{lb/hr}$	Rate (lb/hr)	1.5E-04	1.7E-04	1.8E-04	1.9E-04	**1.7E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.6E-07	5.5E-07	5.6E-07	6.1E-07	**5.5E-07**

RESULTS

Table 2-6:
Unit 2 FF Outlet – PCDD/PCDF

Run No.		2	3	4	Average
Date (2013)		Mar 26	Mar 26	Mar 27	
Start Time (approx.)		08:03	13:09	07:21	
Stop Time (approx.)		12:49	17:25	11:39	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	183.2	186.3	187.1	**185.5**
P_1	Fabric Filter Inlet Temperature - (°F)	317	319	321	**319**
P_2	Carbon Feed Rate - (lbs/hr)	6	7	6	**6**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.6	9.5	9.1	**9.1**
CO_2	Carbon dioxide (dry volume %)	10.3	9.8	10.1	**10.1**
T_s	Sample temperature (°F)	296	298	296	**297**
B_w	Actual water vapor in gas (% by volume)	21.0	19.7	20.4	**20.3**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	159,000	161,000	164,000	**161,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	85,700	87,700	89,000	**87,500**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	136.4	138.1	142.5	**139.0**
%I	Isokinetic sampling (%)	100.9	99.7	101.4	**100.7**
Results (ND and EMPC = 0)					
Laboratory Data from USEPA Method 23 (PCDD/F)					
m_n	Total PCDDs & PCDFs (ng)	14.6000	15.1000	16.3000	
m_{n_TEQ}	Total TEQ PCDDs & PCDFs (ng)	0.1000	0.1170	0.1230	
Total PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	3.8	3.9	4.0	**3.9**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	4.3	4.7	4.8	**4.6**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.2E-06	1.3E-06	1.3E-06	**1.3E-06**
E_{Fd}	PCDD/F Rate - F_d-based (lb/MMBtu)	3.8E-09	4.2E-09	4.3E-09	**4.1E-09**
Total PCDD/F TEQ Results (using USEPA/INTL 2005 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	0.026	0.030	0.030	**0.029**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	0.029	0.036	0.036	**0.034**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	8.3E-09	9.8E-09	1.0E-08	**9.4E-09**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	2.6E-11	3.3E-11	3.2E-11	**3.0E-11**
Results (ND and EMPC = actual value)					
Total PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	3.8	3.9	4.0	**3.9**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	4.3	4.7	4.8	**4.6**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.2E-06	1.3E-06	1.3E-06	**1.3E-06**
E_{Fd}	PCDD/F Rate - F_d-based (lb/MMBtu)	3.9E-09	4.2E-09	4.3E-09	**4.1E-09**
Total PCDD/F TEQ Results (using USEPA/INTL 2005 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	0.029	0.030	0.030	**0.030**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	0.033	0.036	0.036	**0.035**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	9.3E-09	9.8E-09	1.0E-08	**9.8E-09**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.0E-11	3.3E-11	3.2E-11	**3.2E-11**

RESULTS

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

Run No.		1	2	3	Average
Date (2013)		Mar 27	Mar 27	Mar 27	
Start Time (approx.)		07:47	09:08	10:27	
Stop Time (approx.)		08:47	10:08	11:27	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	188.8	185.4	188.1	**187.4**
P_1	Fabric Filter Inlet Temperature - (°F)	322	320	321	**321**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	8.2	8.4		**8.3**
CO_2	Carbon dioxide (dry volume %)	11.0	11.0		**11.0**
T_s	Sample temperature (°F)	491	496		**494**
B_w	Actual water vapor in gas (% by volume)	17.7	16.4		**17.0**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	36.31	35.68		**35.99**
SDA Inlet Laboratory Data					
m_n	Total HCl collected (mg)	819.835	747.685		
SDA Inlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	526	489		**507**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	577	542		**560**
C_{sd}	HCl Concentration (mg/dscm)	797	740		**769**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	875	822		**848**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.79	0.74		**0.76**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	8.8	8.9	9.7	**9.1**
CO_2	Carbon dioxide (dry volume %)	10.5	10.5	9.7	**10.2**
T_s	Sample temperature (°F)	296	294	297	**296**
B_w	Actual water vapor in gas (% by volume)	20.2	20.5	20.9	**20.6**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	41.05	40.90	40.50	**40.81**
FF Outlet Laboratory Data					
m_n	Total HCl collected (mg)	10.192	9.657	9.447	
FF Outlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	5.8	5.5	5.4	**5.6**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	6.6	6.4	6.7	**6.6**
C_{sd}	HCl Concentration (mg/dscm)	8.8	8.3	8.2	**8.4**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	10	9.6	10	**10**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.0090	0.0087	0.0092	**0.0090**
RE	Reduction Efficiency (% Removal)	98.9%	98.8%		**98.8%**

The SDA Inlet averages as well as the removal efficiency average are based on 2 runs.

RESULTS

Table 2-8:
Unit 3 FF Outlet – Particulate and Metals

Run No.		1	2	3	Average
Date (2013)		Mar 26	Mar 27	Mar 27	
Start Time (approx.)		12:11	07:28	09:59	
Stop Time (approx.)		14:24	09:41	12:11	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hr)	187.1	187.2	187.2	**187.2**
P_1	Fabric Filter Inlet Temperature - (°F)	315	316	318	**316**
P_2	Carbon Feed Rate - (lb/hr)	6	6	6	**6**
Gas Conditions					
O_2	Oxygen (dry volume %)	9.8	9.2	9.7	**9.6**
CO_2	Carbon dioxide (dry volume %)	9.4	10.1	9.6	**9.7**
T_s	Sample temperature (°F)	294	326	330	**317**
B_w	Actual water vapor in gas (% by volume)	20.2	19.4	18.4	**19.3**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	154,000	162,000	167,000	**161,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	83,800	86,300	89,000	**86,400**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	65.65	68.92	69.34	**67.97**
%I	Isokinetic sampling (%)	99.1	101.0	98.5	**99.5**
Particulate Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00940	0.01080	0.00930	
m_s	Matter collected in solvent rinse(s) (g)	0.00614	0.00878	0.01299	
m_n	Total FPM (g)	0.01554	0.01958	0.02229	
FPM Results					
C_{sd}	Particulate Concentration (mg/dscm)	8.4	10	11	**9.9**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	10	12	14	**12**
$E_{lb/hr}$	Particulate Rate (lb/hr)	2.6	3.2	3.8	**3.2**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00940	0.01074	0.01266	**0.01093**
Cadmium Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	5.2617	3.6665	4.1661	
Cadmium Results - Total					
C_{sd}	Concentration (mg/dscm)	0.0028	0.0019	0.0021	**0.0023**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.0035	0.0022	0.0026	**0.0028**
$E_{lb/hr}$	Rate (lb/hr)	8.9E-04	6.1E-04	7.1E-04	**7.3E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.2E-06	2.0E-06	2.4E-06	**2.5E-06**
Lead Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	39.7396	27.0566	31.8773	
Lead Results - Total					
C_{sd}	Concentration (mg/dscm)	0.021	0.014	0.016	**0.017**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	0.027	0.017	0.020	**0.021**
$E_{lb/hr}$	Rate (lb/hr)	6.7E-03	4.5E-03	5.4E-03	**5.5E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.4E-05	1.5E-05	1.8E-05	**1.9E-05**

RESULTS

Table 2-9:
Unit 3 FF Outlet – Mercury

Run No.		1	2	3	4	Average
Date (2013)		Mar 26	Mar 27	Mar 27	Mar 27	
Start Time (approx.)		12:11	07:28	09:59	12:29	
Stop Time (approx.)		14:24	09:41	12:11	14:41	
Process Conditions						
R_P	Steam Production Rate - (Klbs/hour)	187.1	187.2	187.2	186.8	**187.1**
P_1	Fabric Filter Inlet Temperature - (°F)	315	316	318	312	**315**
P_2	Carbon Feed Rate - (lbs/hr)	6	6	6	6	**6**
Gas Conditions						
O_2	Oxygen (dry volume %)	9.8	9.2	9.7	10.0	**9.7**
CO_2	Carbon dioxide (dry volume %)	9.4	10.1	9.6	9.4	**9.6**
T_s	Sample temperature (°F)	294	326	330	324	**319**
B_w	Actual water vapor in gas (% by volume)	20.2	19.4	18.4	18.6	**19.1**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	154,000	162,000	167,000	171,000	**163,000**
Q_s	Volumetric flow rate, standard (scfm)	105,000	107,000	109,000	113,000	**109,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	83,800	86,300	89,000	92,000	**87,800**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	65.65	68.92	69.34	73.41	**69.33**
%I	Isokinetic sampling (%)	99.1	101.0	98.5	100.9	**99.9**
Laboratory Data						
$m_{n\text{-}1b}$	Fraction 1B Prorated (µg)	<0.100	0.147	<0.100	0.155	
$m_{n\text{-}2b}$	Fraction 2B Prorated (µg)	1.345	3.171	3.269	2.413	
$m_{n\text{-}3a}$	Fraction 3A Prorated (µg)	<0.200	<0.200	<0.200	<0.200	
$m_{n\text{-}3b}$	Fraction 3B Prorated (µg)	<0.500	<0.500	<0.500	<0.500	
$m_{n\text{-}3c}$	Fraction 3C Prorated (µg)	<0.400	<0.400	<0.400	<0.400	
m_n	Total matter corrected for allowable blanks (µg)	1.345	3.318	3.269	2.568	
Mercury Results - Total						
C_{sd}	Concentration (µg/dscm)	0.72	1.7	1.7	1.2	**1.3**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	0.91	2.0	2.1	1.6	**1.6**
$E_{lb/hr}$	Rate (lb/hr)	2.3E-04	5.5E-04	5.6E-04	4.3E-04	**4.4E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	8.1E-07	1.8E-06	1.9E-06	1.4E-06	**1.5E-06**

RESULTS

Table 2-10:
Unit 3 FF Outlet and SDA Inlet – Hydrogen Chloride

Run No.		1	2	3	Average
Date (2013)		Mar 26	Mar 26	Mar 26	
Start Time (approx.)		08:00	09:21	10:46	
Stop Time (approx.)		09:00	10:21	11:46	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	186.8	187.3	187.0	**187.0**
P_1	Fabric Filter Inlet Temperature - (°F)	315	318	315	**316**
SDA Inlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.8	10.2	9.1	**9.7**
CO_2	Carbon dioxide (dry volume %)	9.4	9.0	10.3	**9.6**
T_s	Sample temperature (°F)	482	487	479	**483**
B_w	Actual water vapor in gas (% by volume)	15.1	15.8	16.0	**15.7**
SDA Inlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	35.38	36.21	35.21	**35.60**
SDA Inlet Laboratory Data					
m_n	Total HCl collected (mg)	631.603	643.091	624.907	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	416	414	414	**415**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	523	535	486	**515**
C_{sd}	HCl Concentration (mg/dscm)	630	627	627	**628**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	792	811	736	**780**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.71	0.73	0.66	**0.70**
FF Outlet Gas Conditions					
O_2	Oxygen (dry volume %)	9.9	9.6	9.6	**9.7**
CO_2	Carbon dioxide (dry volume %)	9.5	9.8	9.8	**9.7**
T_s	Sample temperature (°F)	295	297	293	**295**
B_w	Actual water vapor in gas (% by volume)	19.5	20.8	19.9	**20.1**
FF Outlet Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	38.84	38.65	38.30	**38.59**
FF Outlet Laboratory Data					
m_n	Total HCl collected (mg)	12.872	13.205	13.731	
FF Outlet Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (ppmdv)	7.7	8.0	8.4	**8.0**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	9.7	9.8	10	**9.9**
C_{sd}	HCl Concentration (mg/dscm)	12	12	13	**12**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	15	15	16	**15**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.013	0.013	0.014	**0.013**
RE	Reduction Efficiency (% Removal)	98.1%	98.2%	97.9%	**98.1%**

RESULTS

Table 2-11:
Units 1, 2 and 3 FF Outlets – Opacity by COMS

Run No.	1	2	3	Average
Unit 1				
Date (2013)	Mar 25	Mar 26	Mar 26	
Start Time (approx.)	12:26	07:51	10:25	
Stop Time (approx.)	14:40	10:03	12:36	
Visible Emissions (%)[1]				
Average Opacity	0	0	0	**0**
Maximum Reading	0	0	0	**0**
Minimum Reading	0	0	0	**0**
Unit 2				
Date (2013)	Mar 25	Mar 25	Mar 25	
Start Time (approx.)	07:59	10:32	13:04	
Stop Time (approx.)	10:11	12:45	15:17	
Visible Emissions (%)[1]				
Average Opacity	0	0	0	**0**
Maximum Reading	0	0	0	**0**
Minimum Reading	0	0	0	**0**
Unit 3				
Date (2013)	Mar 26	Mar 27	Mar 27	
Start Time (approx.)	12:11	07:28	09:59	
Stop Time (approx.)	14:24	09:41	12:11	
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)(5) and coincide with Method 5/29 test runs.

RESULTS

Table 2-12:
Ash Handling System – Fugitive Emissions

Source / Constituent	Date (2013)	Start Time (approx.)	Stop Time (approx.)	Observation Duration (minutes)	Accumulated Emission Duration (seconds)	
Ash Unloading Area						
Visual Opacity (%)	March 27	7:55	9:05	60	13	
Door to Baghouse / Ash Unloading						
Visual Opacity (%)	March 27	10:20	11:30	60	0	
Rolling Door/Door to Baghouse						
Visual Opacity (%)	March 27	12:30	13:40	60	0	Permit Limit
				Total (% of observation time) = 0.12		< 5% of observation Time
				Total (minutes) = 0.22		< 9 minutes

Table 2-13:
Lime Silo Fabric Filter Outlet – Visible Emissions

Run No.	**1**
Date (2013)	Mar 26
Start Time (approx.)	08:55
Stop Time (approx.)	10:46
Process Conditions	
Total lime unloaded (tons)	25.25
Rate of unloading (tons/hr)	13.5
Visible Emissions	
Average (percent opacity)	0
Maximum reading (percent opacity)	0

RESULTS

Table 2-14:
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	3/25/2013	12:26-14:40	186.4	311	176,000	8.3	10.9	89,700	81,624
1-O-M5/29-2	3/26/2013	07:51-10:03	187.2	302	160,000	8.3	10.7	85,100	76,981
1-O-M5/29-3	3/26/2013	10:25-12:36	187.9	302	154,000	7.7	11.1	81,000	76,781
1-O-M29-4	3/26/2013	12:59-15:11	185.9	305	164,000	8.6	10.6	85,900	75,984
		Average	**186.8**	**305**	**163,500**	**8.2**	**10.8**	**85,425**	**77,843**
2-O-M5/29-1	3/25/2013	07:59-10:11	185.9	299	166,000	8.6	10.4	85,200	75,600
2-O-M5/29-2	3/25/2013	10:32-12:45	187.2	299	163,000	8.4	10.7	85,100	76,749
2-O-M5/29-3	3/25/2013	13:04-15:17	187.6	301	162,000	8.6	10.7	84,800	75,144
2-O-M29-4	3/27/2013	12:07-14:22	187.2	299	163,000	9.4	10.0	88,000	72,874
2-O-M23-2	3/26/2013	08:03-12:49	183.2	296	159,000	8.6	10.3	85,700	75,625
2-O-M23-3	3/26/2013	13:09-17:25	186.3	298	161,000	9.5	9.8	87,700	72,093
2-O-M23-4	3/27/2013	07:21-11:39	187.1	296	164,000	9.1	10.1	89,000	75,454
		Average	**186.3**	**299**	**162,571**	**8.9**	**10.3**	**86,500**	**74,791**
3-O-M5/29-1	3/26/2013	12:11-14:24	187.1	294	154,000	9.8	9.4	83,800	66,923
3-O-M5/29-2	3/27/2013	07:28--9:41	187.2	326	162,000	9.2	10.1	86,300	72,464
3-O-M5/29-3	3/27/2013	09:59-12:11	187.2	330	167,000	9.7	9.6	89,000	71,743
3-O-M29-4	3/27/2013	12:29-14:41	186.8	324	171,000	10.0	9.4	92,000	72,050
		Average	**187.1**	**319**	**163,500**	**9.7**	**9.6**	**87,775**	**70,795**
Facility Average			**186.7**	**307**	**163,190**	**8.9**	**10.3**	**86,567**	**74,476**

Table 2-15:
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
Method Blank A5342	87.3	92.1	89.2	89.1	93.5	89.8	83.8
Unit 2 FF Outlet - Field Blan	82.1	86.3	83.9	79.7	83.4	78.6	75.5
Unit 2 FF Outlet - Run 2	85.8	90	84.5	81.1	85.1	80.7	78.2
Unit 2 FF Outlet - Run 3	78	80	72.1	73.7	74.8	71.9	68
Unit 2 FF Outlet - Run 4	92.6	97.7	95.2	90	95.1	92.5	88.5
Average	85	89	85	83	86	83	79
SD	5	7	9	7	8	8	8
Min	78	80	72.1	73.7	74.8	71.9	68
Max	92.6	97.7	95.2	90	95.1	92.5	88.5
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
Method Blank A5342	92	93.1	94.1	89.4	90.6	88.8	90.1	87.6	89.1	83.4
Unit 2 FF Outlet - Field Blan	89	89.9	90.7	82.1	83.1	83	76.7	79.5	79.2	74
Unit 2 FF Outlet - Run 2	88.9	89.3	92.3	83.6	84.9	84.2	81.2	79.9	79.7	76.4
Unit 2 FF Outlet - Run 3	78.6	79.3	79.8	73.3	73.7	73.2	72.4	68.8	70.9	68
Unit 2 FF Outlet - Run 4	97.8	99.5	102	92.9	93.2	94.9	89.2	85.8	89.8	88.4
	89	90	92	84	85	85	82	80	82	78
	7	7	8	8	8	8	8	7	8	8
	78.6	79.3	79.8	73.3	73.7	73.2	72.4	68.8	70.9	68
	97.8	99.5	102	92.9	93.2	94.9	90.1	87.6	89.8	88.4

Table 2-16:
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
Method Blank A5342	-	-	-	-	-
Unit 2 FF Outlet - Field B	118	121	114	118	116
Unit 2 FF Outlet - Run 2	117	117	116	118	120
Unit 2 FF Outlet - Run 3	119	117	116	119	121
Unit 2 FF Outlet - Run 4	121	118	114	122	125
Average	119	118	115	119	121
SD	2	2	1	2	4
Min	117	117	114	118	116
Max	121	121	116	122	125

Table 2-17:
Quality Control and Quality Assurance – Metals

	RPD RESULTS				
Run Number	FH Front Half	BH H_2O_2/HNO_3	A Empty Impinger	B $KMnO_4$	C HCl
U1 FF Outlet R1	NA	NA	NA	NA	NA
U1 FF Outlet R2	NA	NA	NA	NA	NA
U1 FF Outlet R3	NA	NA	NA	NA	NA
U1 FF Outlet R4	NA	NA	NA	NA	NA
U2 FF Outlet R1	NA	1.9%	NA	NA	NA
U2 FF Outlet R2	NA	1.8%	NA	NA	NA
U2 FF Outlet R3	NA	0.6%	NA	NA	NA
U2 FF Outlet R4	NA	2.0%	NA	NA	NA
U3 FF Outlet R1	NA	1.5%	NA	NA	NA
U3 FF Outlet R2	1.0%	0.2%	NA	NA	NA
U3 FF Outlet R3	NA	0.6%	NA	NA	NA
U3 FF Outlet R4	2.3%	1.3%	NA	NA	NA
Field Blank	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Element	U1-FF Outlet-R2 RPD 20241-2	U2-FF Outlet-R2 RPD 20241-6	U3-FF Outlet-R2 RPD 20241-10
Cadmium	NA	1.1%	1.1%
Lead	4.1%	0.6%	0.9%

Table 2-17 (Continued):
Quality Control and Quality Assurance – Metals

Sample Spike and Recovery

Run Number		FH Front Half	BH H_2O_2/HNO_3	A Empty Impinger	B $KMnO_4$	C HCl
U1 FF Outlet R3	**#1**	88%	98%	93%	86%	102%
	#2	87%	97%	92%	86%	102%
U2 FF Outlet R3	**#1**	99%	93%	95%	85%	101%
	#2	100%	94%	95%	85%	100%
U3 FF Outlet R3	**#1**	103%	81%	96%	89%	103%
	#2	104%	80%	95%	88%	102%

Element	U1-FF Outlet-R2 Recovery 20241-3	U2-FF Outlet-R2 Recovery 20241-7	U3-FF Outlet-R2 Recovery 20241-11
Cadmium	95%	113%	102%
Lead	95%	114%	106%

Second Source Calibration Verification

Element	1 ppb QC Std 2	50 ppb QC Std 5	100 ppb QC Std 4	250 ppb QC Std 3
Cadmium	105%	99%	99%	100%
Lead	97%	92%	99%	101%

Table 2-18:
Quality Control and Quality Assurance – Method and Field Blanks

Method 23	Method Blank A5342 pg	Unit 2 FF Outlet - Field Blank pg
2,3,7,8-TCDD	(1.47)	(2.21)
1,2,3,7,8-PeCDD	(1.51)	(2.09)
1,2,3,4,7,8-HxCDD	(1.18)	(2.21)
1,2,3,6,7,8-HxCDD	(1.19)	(2.18)
1,2,3,7,8,9-HxCDD	(1.29)	(2.46)
1,2,3,4,6,7,8-HpCDD	7.16	9.17
OCDD	[17.5]	19.4
2,3,7,8-TCDF	(1.01)	(1.54)
1,2,3,7,8-PeCDF	(0.942)	(1.86)
2,3,4,7,8-PeCDF	(0.85)	(1.76)
1,2,3,4,7,8-HxCDF	(1.14)	(1.29)
1,2,3,6,7,8-HxCDF	(1.08)	(1.26)
2,3,4,6,7,8-HxCDF	(1.13)	(1.29)
1,2,3,7,8,9-HxCDF	(1.56)	(1.95)
1,2,3,4,6,7,8-HpCDF	2.28	(1.15)
1,2,3,4,7,8,9-HpCDF	(1.76)	(1.93)
OCDF	8.03	14.8
ITEF TEQ (ND=0; EMPC=0)	**0.102**	**0.126**
ITEF TEQ (ND=0; EMPC=EMPC)	**0.12**	**0.126**
ITEF TEQ (ND=DL/2; EMPC=0)	**1.94**	**2.97**
ITEF TEQ (ND=DL/2; EMPC=EMPC)	**1.96**	**2.97**
ITEF TEQ (ND=DL; EMPC=EMPC)	**3.8**	**5.8**

Metals Run Number		Average Total Catch ug	FH Front Half	BH H_2O_2/HNO_3	A Empty Impinger	B $KMnO_4$	C HCl
Field 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
Reagent 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

Element	Field Blank Total µg	Reagent Blank Total µg
Cadmium	< 0.2	< 0.2
Lead	0.461	0.326

RESULTS

Table 2-19:
Metals Reagent Blank Correction Summary

Sample Number and Analytical Parameter	Catch Weight, ug	Reagent Blank Catch, ug	Maximum Allowable,	Corrected Catch Weight, ug
1-FFO-M29-1				
Cadmuim	0.273	<0.2	12.46	0.273
Lead	0.856	0.326	12.46	0.530
1-FFO-M29-2				
Cadmuim	<0.2	<0.2	12.46	<0.2
Lead	0.551	0.326	12.46	0.225
1-FFO-M29-3				
Cadmuim	<0.2	<0.2	12.46	<0.2
Lead	0.524	0.326	12.46	<0.2
2-FFO-M29-1				
Cadmuim	2.03	<0.2	12.46	2.03
Lead	11.6	0.326	12.46	11.3
2-FFO-M29-2				
Cadmuim	2.09	<0.2	12.46	2.09
Lead	16.4	0.326	12.46	16.1
2-FFO-M29-3				
Cadmuim	1.74	<0.2	12.46	1.74
Lead	19.2	0.326	12.46	18.9
3-FFO-M29-1				
Cadmuim	5.26	<0.2	12.46	5.26
Lead	40.1	0.326	12.46	39.7
3-FFO-M29-2				
Cadmuim	3.7	<0.2	12.46	3.67
Lead	27.4	0.326	12.46	27.1
3-FFO-M29-3				
Cadmuim	4.17	<0.2	12.46	4.17
Lead	32.2	0.326	12.46	31.9

Table 2-20:
Quality Control and Quality Assurance – Miscellaneous

Blanks	Result	
Acetone (g)	0.0004	
HCl DI H_2O (mg/l)	<0.041	
HCl 0.1 N H_2SO_4 (mg/l)	<0.041	
Meters - Post Cal	**Result**	**Limit**
61-11	1.4%	≤ ± 5%
66-6	-2.6%	≤ ± 5%
66-11	-1.0%	≤ ± 5%
66-14	-1.3%	≤ ± 5%
66-18	-1.3%	≤ ± 5%
66-22	-1.5%	≤ ± 5%
85-2	-3.5%	≤ ± 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 the following air pollution controls (APCs): a Selective Non-Catalytic Reduction (SNCR) for nitrogen oxides (NO_X) control, Spray Dry Absorber (SDA) for acid gas removal, powdered activated carbon injection for enhanced control of mercury and dioxin and a Fabric Filter (FF) for the control of particulate emissions.

Each FF is followed by an induced draft (ID) fan that directs the flue gas to a dedicated flue in a common stack. The APC equipment is manufactured by Wheelabrator Air Pollution Control, Inc. All APC equipment is generally in excellent condition. Each boiler is also equipped with a continuous emission monitoring (CEM) system to demonstrate the compliance with sulfur dioxide (SO_2), nitrogen oxides (NO_X) and carbon monoxide (CO) limits.

Figure 3-1 shows a general schematic of the facility.

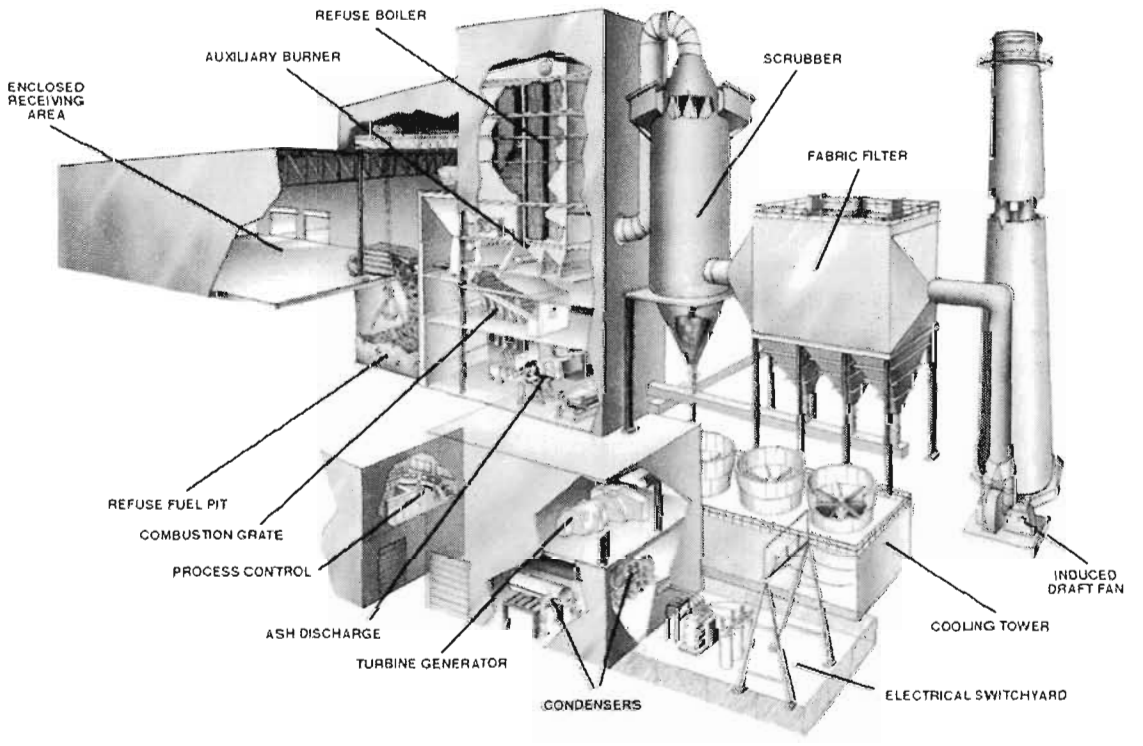


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

The general sampling locations for the Units 1, 2 and 3 SDA Inlets and FF Outlets are shown in Figure 3-2.

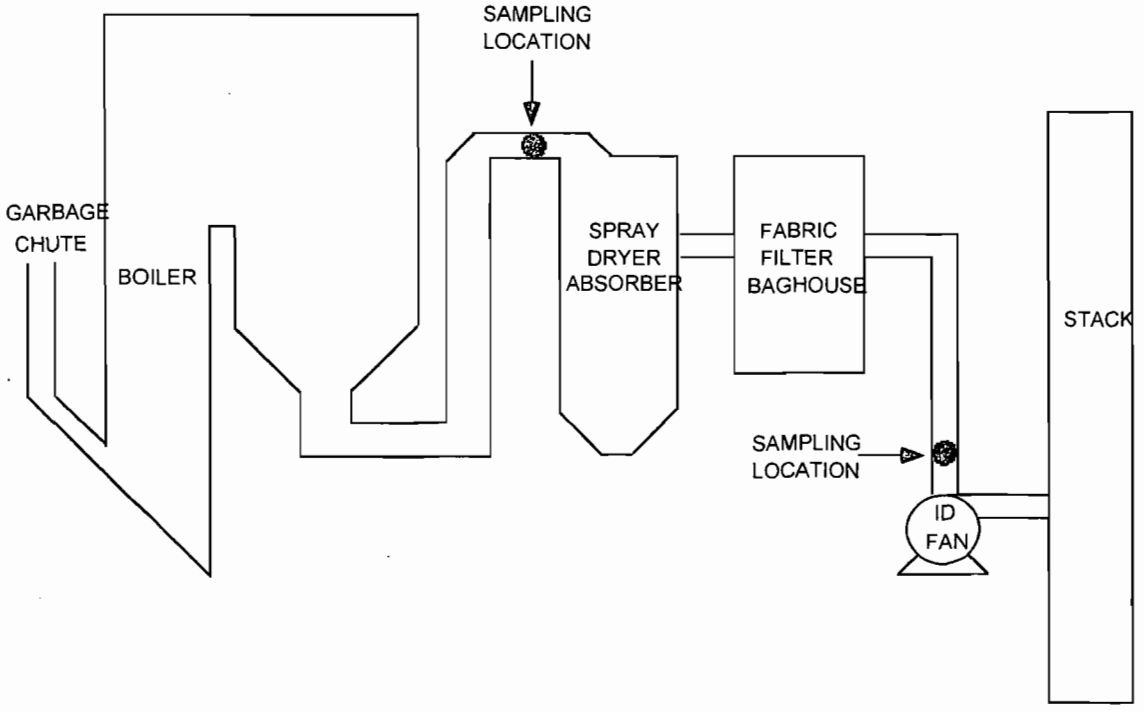


Figure 3-2: Sampling Locations

DESCRIPTION OF INSTALLATION

Table 3-1:
Unit 1 Compliance Test Process Data

PLANT NAME: SOUTH BROWARD 2013						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	Carbon Feed lb/hr	Test Run Comments
M-26A	1	1	3/25/2013	0800	0900	185.9	319.8	5.9	493.2	37.7	21.2	16.5	21.3	1.100	1.045	1037.1	NA	All times based on DCS time
HCl		2	3/25/2013	0923	1034	183.2	319.2	5.4	485.2	33.1	21.0	12.1	25.8	1.097	1.013	736.7	NA	
		3	3/25/2013	1054	1154	185.8	321.0	5.3	484.0	32.5	21.5	11.0	28.2	1.093	0.973	639.8	NA	
					Avg	185.0	320.0	5.5	487.5	34.4	21.2	13.2	25.1	1.097	1.010	804.5	NA	
M-5/29	1	1	3/25/2013	12:26	14:40	186.4	322.8	5.1	489.1	33.3	21.3	12.0	28.7	1.091	0.950	681.2	7	All times based on DCS time
Metals		2	3/26/2013	0751	1003	187.2	315.2	4.7	479.4	30.7	19.4	11.3	35.6	1.082	0.854	580.0	6	
PM		3	3/26/2013	1025	1236	187.9	315.0	4.4	477.3	29.3	18.3	11.0	37.8	1.081	0.846	555.8	6	
		4 (Hg)	3/26/2013	1259	1511	185.9	318.7	4.7	492.0	34.2	21.2	13.0	27.1	1.092	0.967	754.3	6	
					Avg	186.8	317.9	4.7	484.5	31.9	20.1	11.8	32.3	1.087	0.904	642.8	6	

DESCRIPTION OF INSTALLATION

Table 3-2:
Unit 2 Compliance Test Process Data

PLANT NAME: SOUTH BROWARD 2013						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	Carbon Feed lb/hr	Test Run Comments
M-26A	2	1	3/27/2013	0747	0847	188.8	322.1	7.2	489.0	29.3	18.9	10.4	27.6	1.102	1.074	670.8	NA	All times based on DCS time
HCl		2	3/27/2013	0908	1008	185.4	320.5	7.4	492.9	31.6	22.2	9.4	27.1	1.097	1.017	572.4	NA	
		3	3/27/2013	1027	1127	188.1	320.8	7.9	508.1	37.5	25.5	11.9	23.6	1.095	0.991	710.0	NA	
					Avg	187.4	321.1	7.5	496.7	32.8	22.2	10.6	26.1	1.098	1.027	651.0	NA	
M-29/5	2	1	3/25/2013	0759	1011	185.9	320.0	7.6	485.1	31.5	20.5	11.0	26.3	1.098	1.033	681.2	6	All times based on DCS time
		2	3/25/2013	10:32	12:45	187.2	320.5	7.3	482.1	29.7	20.4	9.3	31.5	1.093	0.970	539.5	6	
Metals		3	3/25/2013	1304	1517	187.6	321.7	7.4	482.3	28.6	19.3	9.3	34.4	1.090	0.946	527.9	6	
PM		4 (Hg)	3/27/2013	1207	1422	187.2	319.7	7.4	496.5	31.9	22.4	9.5	26.0	1.099	1.034	590.0	6	
					Avg	187.0	320.5	7.4	486.5	30.4	20.6	9.8	29.6	1.095	0.996	584.6	6	
M-23	2	2	3/26/2013	0803	1249	183.2	317.4	7.3	478.8	28.9	18.7	10.2	39.5	1.082	0.854	522.1	6	Run 1 excluded
dioxins		3	3/26/2013	1309	1725	186.3	318.8	7.4	486.4	30.4	20.3	10.1	30.7	1.093	0.978	592.7	7	See section 1 for details
		4	3/27/2013	0721	1139	187.1	320.8	7.5	495.7	32.5	22.0	10.5	26.1	1.099	1.038	653.9	6	
					Avg	185.5	319.0	7.4	486.9	30.6	20.3	10.3	32.1	1.091	0.957	589.6	6	

DESCRIPTION OF INSTALLATION

Table 3-3:
Unit 3 Compliance Test Process Data

PLANT NAME: SOUTH BROWARD 2013						Data From DCS Printouts						Calculated		Lime Feed Rate				
				Time		Steam Flow	FF Inlet Temp	Fabric Filter Delta	SDA Inlet Temp	Total SDA Flow	Diluton H2O flow	Slurry Flow	Slurry Conc.	Slurry Specific	Slurry CaO Density	CaO Flow	Carbon Feed	
Test	Unit No.	Run No.	Date	Start	Stop	klbs/hr	deg F	In. H2O	deg F	gpm	gpm	gpm	%	Gravity	lb/gal	lbs/hr	lb/hr	Test Run Comments
M-26A	3	1	3/26/2013	0800	0900	186.8	315.2	7.1	480.6	33.8	20.5	13.2	32.9	1.081	0.844	670.0	NA	All times based on DCS time
HCl		2	3/26/2013	0921	1021	187.3	317.5	6.9	485.5	33.7	20.5	13.3	32.8	1.083	0.867	689.3	NA	
		3	3/26/2013	1046	1146	187.0	314.8	6.7	479.4	32.1	22.5	9.5	36.1	1.080	0.833	476.8	NA	
					Avg	187.0	315.9	6.9	481.8	33.2	21.2	12.0	33.9	1.081	0.848	612.0	NA	
M-5/29	3	1	3/26/2013	1211	1424	187.1	315.4	6.9	479.5	32.4	22.0	10.4	30.7	1.089	0.931	578.7	6	All times based on DCS time
		2	3/27/2013	0728	0941	187.2	315.9	7.1	492.1	27.9	15.3	12.6	29.4	1.102	1.066	803.3	6	
Metals		3	3/27/2013	0959	1211	187.2	317.7	7.1	491.8	27.2	14.8	12.4	32.7	1.096	1.005	749.5	6	
PM		4 (Hg)	3/27/2013	1229	1441	186.8	311.8	7.2	493.8	29.4	18.7	10.7	28.6	1.098	1.029	663.1	6	
					Avg	187.1	315.2	7.1	489.3	29.2	17.7	11.5	30.3	1.096	1.008	698.7	6	

DESCRIPTION OF SAMPLING LOCATIONS

Sampling point locations were determined according to EPA Method 1.

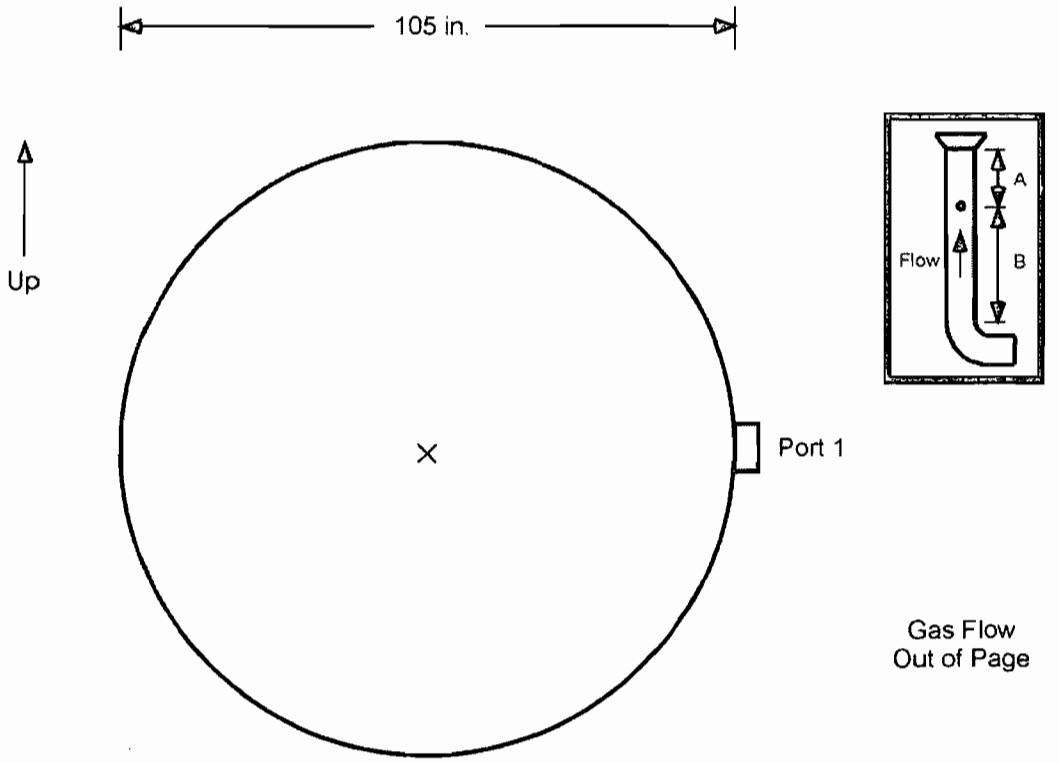
Table 3-4 outlines the sampling point configurations. Figures 3-3 through 3-5 (on pages 3-7 through 3-9) illustrate the sampling points and orientation of sampling ports for each of the sources that were tested in the program.

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
Units 1, 2 and 3 FF Outlets								
	Particulate, Cd, Pb and Hg	5/29[2]	1-3/4[3]	5	5	5	125	3-4
	PCDDs/PCDFs (Unit 2 only)	23	2-4	5	5	10	250	3-4
	Hydrogen Chloride	26A[1]	1-3	1	1	60	60	3-5

[1] Hydrogen chloride inlet testing utilized a modification of EPA Method 26A (single point constant sampling rate).
[2] Metals testing was done in conjunction with EPA Method 5 particulate sampling.
[3] A fourth run for mercury only was performed on all three (3) units.

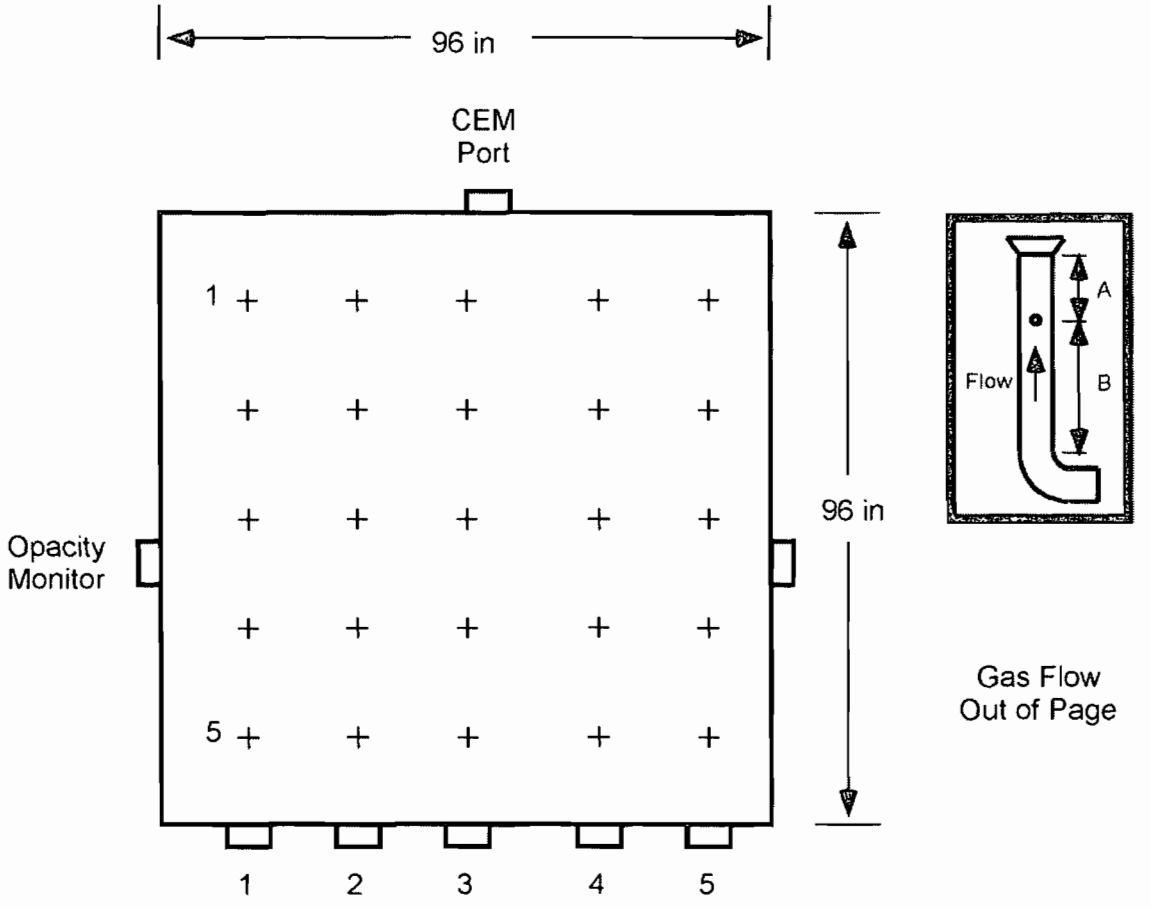
DESCRIPTION OF INSTALLATION



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

Diameters upstream from flow disturbance (A):	>0.5	Limit: 0.5
Diameters downstream from flow disturbance (B):	>2.0	Limit: 2.0

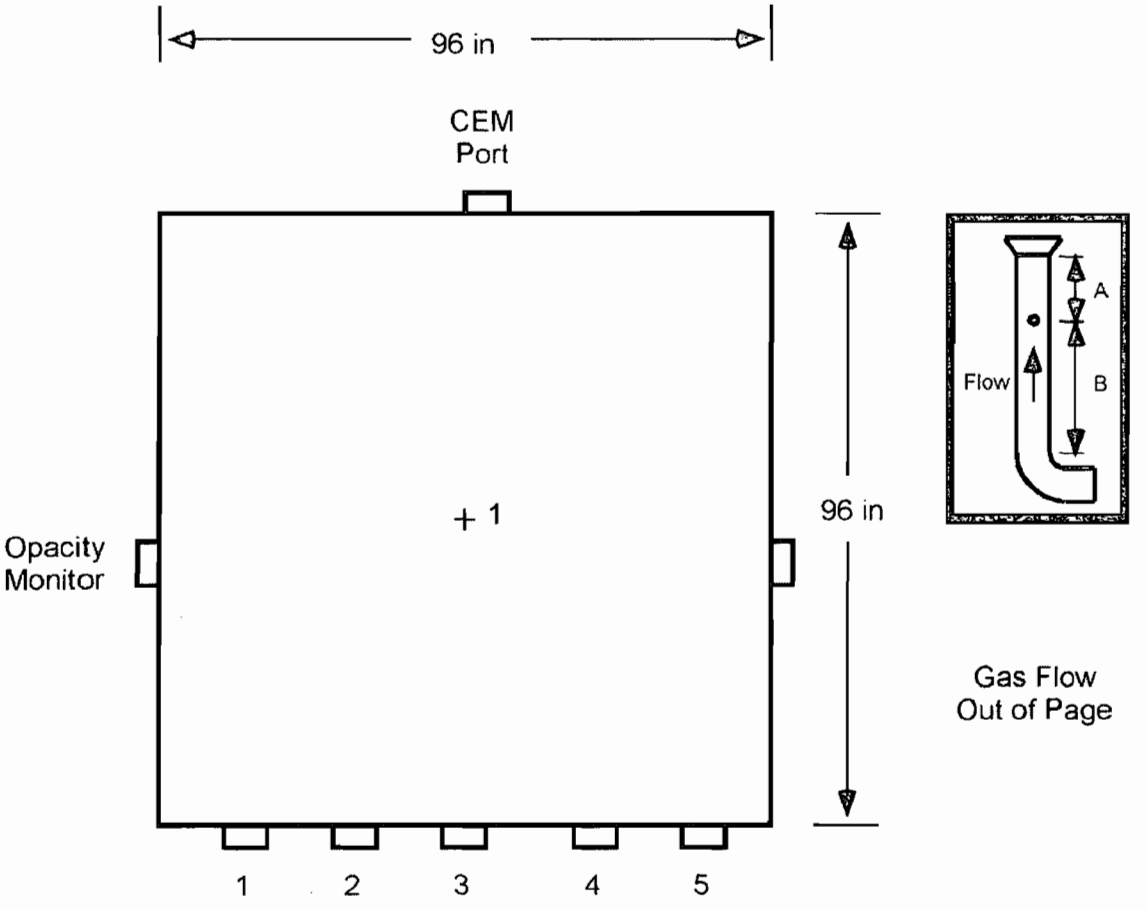
Figure 3-3: SDA Inlets – Sampling Point Determination – HCl Sampling (Units 1, 2 and 3 are identical)



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

Equivalent Duct diameters upstream from flow disturbance (A):	>0.5	Limit: 0.5
Equivalent Duct diameters downstream from flow disturbance (B):	>2.0	Limit: 2.0

Figure 3-4: FF Outlet Isokinetic Sampling Point Determination (EPA Method 1)
(Units 1, 2 and 3 are identical)



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

Equivalent Duct diameters upstream from flow disturbance (A):	>0.5	Limit: 0.5
Equivalent Duct diameters downstream from flow disturbance (B):	>2.0	Limit: 2.0

Figure 3-5: FF Outlet HCl Sampling Point Determination (EPA Method 1)
(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, 22, 23, modified 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 4	"Determination of Moisture Content in Stack Gases"
Method 5	"Determination of Particulate Matter Emissions from Stationary Sources"
Method 9	"Visual Determination of the Opacity of Emissions from Stationary Sources"
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] Hydrogen chloride testing utilized a modification of EPA Method 26A (single point constant sampling rate) at the inlet and outlet sampling locations.

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR) and are located on the internet at http://ecfr.gpoaccess.gov.

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

CleanAir followed specific quality assurance and quality control (QA/QC) procedures as outlined in the individual methods and as prescribed in CleanAir's internal Quality Manual. Results of all QA/QC activities performed by CleanAir are summarized in Appendix F of this report.

End of Section 4 – Methodology

APPENDIX

ASTM D 6866-08 AND 7459-08 CO_2 SAMPLING/ANALYSIS RESULTS

A

I herby certify that all pages contained within this Appendix have been reviewed and, to the best of my ability, verified as accurate.

QA/QC Initials: NB

Date: 5/6/13

CleanAir.

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ISO-17025 Accredited Testing Laboratory

PJLA ISO/IEC 17025:2005 Testing Accreditation# 59423

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Summary of Results : Biogenic CO2 Determination using ASTM-D6866-08

Submitter:	Mr. Scott A. Brown	**Date Received**	March 28, 2013
Company:	Clean Air Engineering	**Date Reported**	April 01, 2013

Laboratory Number	Submitter Label	Material	Mean Biogenic CO2 Content*
Beta-345582	Wheelabrator South Broward 3/26/2013	Biogenic CO2	61 %

Package received -labeling COC

View of content

* ASTM-D6866 cites precision on the Mean Biogenic CO2 Content as +/- 3% (absolute). This is the most conservative estimate of error in the measurement of complex biomass containing solids and liquids based on empirical results. Real precision for readily combustible and homogenous materials (e.g. gasoline) and especially samples recieved as CO2 (e.g. flue gas or CEMS exhaust) can be as low as +/- 0.5-2%. The result only applies to the analyzed material. Fluctuations in carbon content within a batch of product, gasoline or flue gas must be determined separately (e.g. averaged measurements of multiple solids or liquids, and single measurement of the combination of gas aliquots collected over time). The accuracy of the result as it applies to the analyzed product, fuel, or flue gas relies upon all the carbon in the analyzed material originating from either recently respired atmospheric carbon dioxide (within the last decade) or fossil carbon (more than 50,000 years old). "Percent biomass" specifically relates % renewable (or fossil) carbon to total carbon, not to total mass or molecular weight. Mean Biogenic CO2 estimates greater than 100% are assigned a value of 100% for simplification.

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Summary of Results : Biogenic CO2 Determination using ASTM-D6866-08

Submitter: Mr. Scott A. Brown **Date received** March 28, 2013

Company: Clean Air Engineering **Date reported** April 01, 2013

Submitter label	Material	Laboratory Number	Percent modern carbon (pmc)	Atmospheric correction factor
Wheelabrator South Broward 3/26/2013	Biogenic CO2	Beta-345582	66.0 +/- 0.2 pMC	x 0.93

* ASTM-D6866 cites precision on the Mean Biogenic CO2 Content as +/- 3% (absolute). This is the most conservative estimate of error in the measurement of complex biomass containing solids and liquids based on empirical results. Real precision for readily combustible and homogenous materials (e.g. gasoline) and especially samples recieved as CO2 (e.g. flue gas or CEMS exhaust) can be as low as +/- 0.5-2%. The result only applies to the analyzed material. Fluctuations in carbon content within a batch of product, gasoline or flue gas must be determined separately (e.g. averaged measurements of multiple solids or liquids, and single measurement of the combination of gas aliquots collected over time). The accuracy of the result as it applies to the analyzed product, fuel, or flue gas relies upon all the carbon in the analyzed material originating from either recently respired atmospheric carbon dioxide (within the last decade) or fossil carbon (more than 50,000 years old). "Percent biomass" specifically relates % renewable (or fossil) carbon to total carbon, not to total mass or molecular weight. Mean Biogenic CO2 estimates greater than 100% are assigned a value of 100% for simplification.

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Report of Biogenic CO2 Content Analysis using ASTM-D6866-08

Submitter: Clean Air Engineering

Submitter Label: Wheelabrator South Broward 3/26/2013

Laboratory Number: Beta-345582

Material: Biogenic CO2

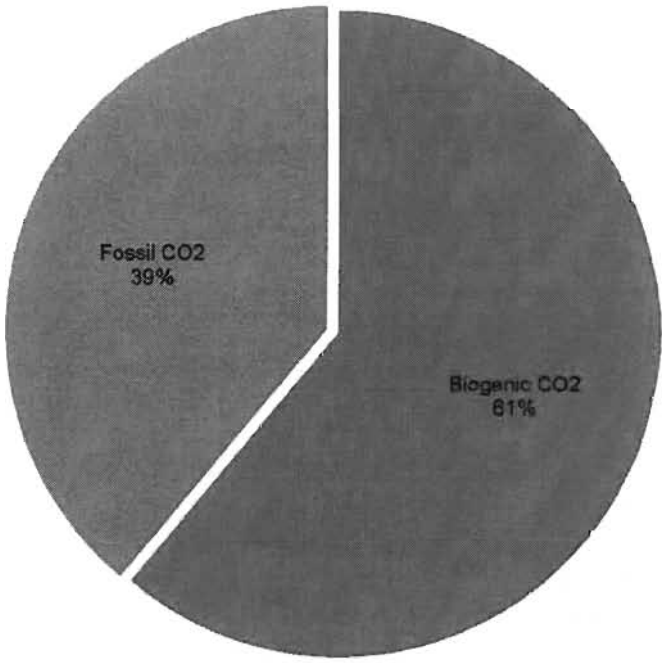
Date Received: March 28, 2013

Date Reported: April 01, 2013

Biogenic CO2 : 61 % *

(carbon-neutral CO2) (renewable carbon to total carbon)

Proportions Biogenic CO2 vs. Fossil CO2 indicated by C14 content



* ASTM-D6866 cites precision on the Mean Biogenic CO2 Content as +/- 3% (absolute). This is the most conservative estimate of error in the measurement of complex biomass containing solids and liquids based on empirical results. Real precision for readily combustible and homogenous materials (e.g. gasoline) and especially samples recieved as CO2 (e.g. flue gas or CEMS exhaust) can be as low as +/- 0.5-2%. The result only applies to the analyzed material. Fluctuations in carbon content within a batch of product, gasoline or flue gas must be determined separately (e.g. averaged measurements of multiple solids or liquids, and single measurement of the combination of gas aliquots collected over time). The accuracy of the result as it applies to the analyzed product, fuel, or flue gas relies upon all the carbon in the analyzed material originating from either recently respired atmospheric carbon dioxide (within the last decade) or fossil carbon (more than 50,000 years old). "Percent biomass" specifically relates % renewable (or fossil) carbon to total carbon, not to total mass or molecular weight. Mean Biogenic CO2 estimates greater than 100% are assigned a value of 100% for simplification.

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Explanation of Results

Biomass Analysis using ASTM-D6866

The application of ASTM-D6866 to derive a "Biogenic CO2 content" for carbon dioxide effluents is built upon the same concepts as those used by the US Department of Agriculture to derive the biobased content of manufactured products containing biomass carbon. It is done by comparing a relative amount of radiocarbon (C14) in an unknown sample to that of a modern reference standard. The ratio in contemporary biomass will be 100% and the ratio in fossil materials will be zero. Carbon dioxide derived from combustion of a mixture of present day biomass and fossil carbon will yield an ASTM-D6866 result that directly correlates to the amount of biomass carbon combusted and carbon-neutral CO2 generated.

The modern reference standard is a National Institute of Standards and Technology (NIST) standard with a defined radiocarbon content of 100% contemporary carbon for the year AD 1950. AD 1950 was chosen since it represented a time prior to thermo-nuclear weapons testing which introduced large amounts of excess radiocarbon into the atmosphere with each explosion (termed "bomb carbon"). This was a logical point in time to use as a reference since this excess bomb carbon would change with increased or decreased weapons testing. A fixed correction for this effect is applied per the ASTM-D6866 requirements, applying specifically to carbon removed from the atmospheric CO2 reservoir since about 1996. Carbon removed prior to about 1996 will contain elevated radiocarbon signatures, not directly applicable to the ASTM-D6866 correction. Typical areas to which the correction may not apply are landfills more than 5-10 years old and to trees which began to grow more than 10 years ago.

Carbon dioxide effluent derived from combustion of 100% present day biomass will yield results of 100% renewable content. Carbon dioxide effluent derived from the combustion of 100% fossil fuel will yield results of 0% renewable content. Carbon dioxide produced from mixed fuels (biomass plus fossil fuel) will yield a percentage result in direct proportion to the biomass carbon consumed vs. fossil carbon consumed in the combustion. The final result is referred to as the MEAN BIOMASS CO2 CONTENT and assumes all the carbon in the carbon dioxide was derived from either present day living or fossil sources.

The results provided in this report involved materials provided without any source information. This situation is highly probable in a real life situation. The MEAN VALUE quoted in this report encompasses an absolute range of 6% (plus and minus 3% on either side of the MEAN BIOGENIC CO2 CONTENT to account for variations in end component radiocarbon signatures (a conservative approximation). It is presumed that all materials are present day or fossil in origin and that the desired result is the amount of biomass component "present" in the material, not the amount of biomass material "used" in the manufacturing process. The most conservative interpretation of the reported percentages is as maximum values.

ASTM-D6866 results relate directly to the percentage carbon-neutral CO2 in an incineration effluent. A value of 71% renewable content measured on CO2 effluent would indicate that 71% of the exhausted CO2 was from biomass (29% from fossil fuel). It does not represent the weight of biomass combusted or the weight of fossil fuel combusted. This is advantageous since the weight of the fuels only indirectly relate to the up-take of carbon dioxide from the atmosphere. The respiration uptake compound was carbon dioxide and the combustion effluent was carbon dioxide. The ASTM-D6866 result directly and specifically relates to the amount of carbon-neutral CO2 consumed and expelled.

ASTM-D6866 results presume all the carbon in the analyte was either present day or fossil. This assumption does not apply well to landfills older than 5-10 years since they will include excess bomb carbon from perhaps 20-40 years ago, or to older trees that began growing more than 20 years ago. The "present day" end-component is ambiguous in such cases. The method best applies to high concentration CO2 effluents from combustion sources. Results obtained which are greater than 100 % are reported as 100% for simplification.

CLIENT Wheelabrator

PLANT South Broward

PROJECT MANAGER S. Brown

PROJECT 12218SB

DEPT 66

66-12216SB-

CleanAir
500 West Wood Street
Palatine, IL 60067
602-627-0933 (phone)
847-991-3365 (fax)

ANALYTICAL METHOD	CONTAINER NUMBER	SAMPLE FRACTION
ASTM-D6866	1	Tedlar Bag

FORWARDING LAB
Beta Analytic Inc
4985 SW 74 Court
Miami, FL 33155
305-667-5167

LAB ID NUMBER	RUN NUMBER	TEST LOCATION	DATE (2013)	SAMPLE MATRIX	NUMBER OF CONTAINERS	CONTAINER SEALED? LIQUID LEVEL MARKED?	ANALYSIS REQUESTED: ASTM-D6866	ANALYSIS REQUESTED: Archive	ADDITIONAL INFORMATION
	1	Wheelabrator South Broward	3/26	Tedlar Bag	1		X		
		3/26/2013							
									Please return Tedlar Bag to:
									Cleanair
									500 West Wood Street
									Palatine, IL 60067
									Attn: Scott Brown

Relinquished By: (signature)	Date / Time	Relinquished By: (signature)	Date / Time	Relinquished By: (signature)	Date / Time	This form completed by:
S. Brown	3/27/2013 17:00					S. Brown
Received By: (signature)	**Date / Time**	**Received By: (signature)**	**Date / Time**	**Relinquished By: (signature)**	**Date / Time**	**Signature / Date**
M. Fadt	3/28/13 10am					Scott Brown 3/27/13

Run Number	Run Date	Run Time	Steam Flow Klbs/hour	Flue Gas Temp Deg F	Air Flow ACFM	O_2 %	CO_2 %	CO_2 Sample Rate (lpm)[1]	Stack Flow 2RSD (%)	Air Flow, DSCFM	Air Flow, DSCFM@ 7%O_2
2-O-M23-2	3/26/2013	08:03-12:49	183.2	296	159,000	8.6	10.3	0.2	4.3%	85,700	75,625
2-O-M23-3	3/26/2013	13:09-17:25	186.3	298	161,000	9.5	9.8	0.2	6.0%	87,700	72,093
		Average	184.7	297	160,000	9.1	10.1	0.2	5.1%	86,700	73,859

[1] CO_2 gas sample flow rate was within 10% of initial flow rate throughout all test runs.