Wheelabrator North Broward Inc.
A Waste Management Company

2600 N.W. 48th Street
Pompano Beach, FL 33073
(954) 971-8701
(954) 971-8703 Fax

July 29, 2009

CERTIFIED MAIL #70080500000147115236

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 North Broward
F.A.C. 62-296.416 Quarterly Mercury Stack Testing
Second Quarter of 2009, Report Submittal

Dear Mr. Anderson:

As required by F.A.C. 62-296.416, please find enclosed the 2009second quarter report on mercury stack testing which was conducted on Unit #1.

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) 971-8701.

Sincerely,

Scott McIlvaine
Plant Manager

cc: USEPA, Region IV, Pesticides and Toxics Management Division, Air & EPCRA Enforcement Branch, Air Enforcement Section CERTIFIED MAIL #70080500000147115182
FDEP, Tallahassee, Bureau of Air Regulation, New Source Review Section, CERTIFIED MAIL #70080500000147115199
Broward County Department of Planning and Environmental Protection, Air Quality Division CERTIFIED MAIL #70080500000147115205
Chuck Faller (with)
Tim Porter (without)
Rob French – MPI - (with)
Ram Tewari – BCWRS (without)

WASTE MANAGEMENT

CleanAir.

CleanAir Engineering
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Palatine, IL 60067-4975
800-627-0033
www.cleanair.com

Wheelabrator North Broward, Inc.
2600 NW 48th Street
Pompano Beach, FL 33073

REPORT ON MERCURY TESTING

Performed for:
WHEELABRATOR NORTH BROWARD, INC.
UNIT 1 FF OUTLET
POMPANO BEACH, FL

CleanAir Project No: 10735-5
Revision 0: July 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
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Reviewed by,

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Project Manager
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REVISION HISTORY

REPORT ON MERCURY TESTING

DRAFT REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
D0a	07/21/09	All	Draft version of original document.

FINAL REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
0	07/28/09	All	Final version of original document.

CONTENTS

PROJECT OVERVIEW

Wheelabrator North Broward, Inc. operates a refuse-to-energy facility, located in Pompano Beach, Florida. The facility's emission levels are regulated by the Florida Department of Environmental Protection (FDEP). Wheelabrator North Broward, Inc. contracted Clean Air Engineering (CleanAir) to perform a compliance test program at its municipal waste combustor (MWC) facility in Pompano Beach, Florida. Testing was conducted in accordance with 40 CFR 60, Subpart Cb, and applicable sections of PSD-FL-112(B) and PA86-22. The sampling was conducted at the Unit 1 Fabric Filter (FF) Outlet on June 24, 2009.

The testing included the determination of the following constituents:

- moisture (H_2O)
- oxygen (O_2)
- carbon dioxide (CO_2)
- total flow (dscfm)
- mercury (Hg)

Coordinating and observing the field portion of the program were:

C. Faller	- Wheelabrator North Broward, Inc.
B. Wiltse	- CleanAir
P. Bihun	- CleanAir

Chuck Faller of Wheelabrator North Broward Inc. provided all the process (operating) data. This data is presented in its entirety in Appendix H.

All equipment utilized for testing was manufactured by Clean Air Engineering

Table 1-1 outlines the schedule adhered to during the test program. Table 1-2 (on page 1-2) summarizes the results of the test program.

Table 1-1:
Schedule of Activities

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	Unit 1 FF Outlet	USEPA Method 29	Mercury	06/24/09	08:00	10:21
2	Unit 1 FF Outlet	USEPA Method 29	Mercury	06/24/09	10:44	12:55
3	Unit 1 FF Outlet	USEPA Method 29	Mercury	06/24/09	13:17	15:27

Table 1-2:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit[1]
Unit 1 FF Outlet			
Mercury (µg/dscm @7% O_2)	EPA M29	6	50

[1] Limit obtained from 40 Code of Federal Register part 60 Subpart Cb - Emission Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994 published in Federal Register as 62 FR 45123 on December 19, 1995 as modified on April 28, 2009, 40 CFR 60.33b (a) (3), Rule 62-296.416 (3) (b) and and PSD-FL-112.

The test conditions and results of analysis are presented in Table 2-1 (on page 2-1) and the quality control and quality assurance results are shown in Table 2-2 (on page 2-2).

End of Section 1 – Project Overview

RESULTS

Table 2-1:
Unit 1 FF Outlet – Mercury

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Process Conditions					
R_P	Steam Production Rate (Klbs/hour)	185	184	184	**184**
P_1	SDA Outlet Temperature (°F)	309	310	310	**310**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.9	8.5	9.2	**8.9**
CO_2	Carbon dioxide (dry volume %)	10.7	11.0	10.4	**10.7**
T_s	Sample temperature (°F)	294	295	295	**294**
B_w	Actual water vapor in gas (% by volume)	23.4	23.6	23.8	**23.6**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	182,252	181,961	183,200	**182,471**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	94,560	94,076	94,502	**94,379**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.260	72.240	73.460	**73.320**
%I	Isokinetic sampling (%)	102.7	100.4	100.2	**101.1**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	0.5625	
$m_{n\text{-}2b}$	Fraction 2B (µg)	9.5093	9.4341	11.2172	
$m_{n\text{-}3a}$	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)	0.4561	0.5362	0.7710	
m_n	Total matter corrected for allowable blanks (µg)	9.9654	9.9703	12.5508	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	3.0E-10	3.0E-10	3.8E-10	**3.3E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	3.4E-10	3.4E-10	4.5E-10	**3.8E-10**
C_{sd}	Concentration (µg/dscm)	4.7	4.9	6.0	**5.2**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	5.5	5.5	7.2	**6.0**
$E_{lb/hr}$	Rate (lb/hr)	0.0017	0.0017	0.0021	**0.0018**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.9E-06	4.9E-06	6.4E-06	**5.4E-06**

RESULTS

Table 2-2:
Quality Assurance and Quality Control

		RPD RESULTS				
		FH	BH	A	B	C
Run Number		Front Half	H_2O_2/HNO_4	Empty Impinger	$KMnO_4$	HCl
U1 FF Outlet R1		NA	0.5%	NA	NA	0.2%
U1 FF Outlet R2		NA	0.3%	NA	NA	1.4%
U1 FF Outlet R3		0.7%	0.3%	NA	NA	1.8%
Field Blank		NA	NA	NA	NA	NA
Reagent Blank		NA	NA	NA	NA	NA
		Sample Spike and Recovery				
U1 FF Outlet R3	**#1**	97%	90%	114%	108%	98%
	#2	98%	88%	113%	106%	97%

Meter Post Test Calibration Results = - 0.9% **Limit = +/- 5%**

End of Section 2 – Results

DESCRIPTION OF INSTALLATION

PROCESS DESCRIPTION

The North Broward Resource Recovery facility operates three (3) 750 tons-per-day municipal refuse-fired, water-wall boiler trains. The trains were manufactured by Babcock & Wilcox to produce electricity for sale to a local utility company. Each boiler is equipped with a spray dryer absorber (SDA) for acid gas removal, followed by a fabric filter (FF) baghouse for the control of particulate emissions. Wheelabrator Air Pollution Control, Inc. supplies the control equipment. 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 for the facility. The testing occurred at the Unit 1 FF Outlet as shown in Figure 3-2 (on page 3-2).

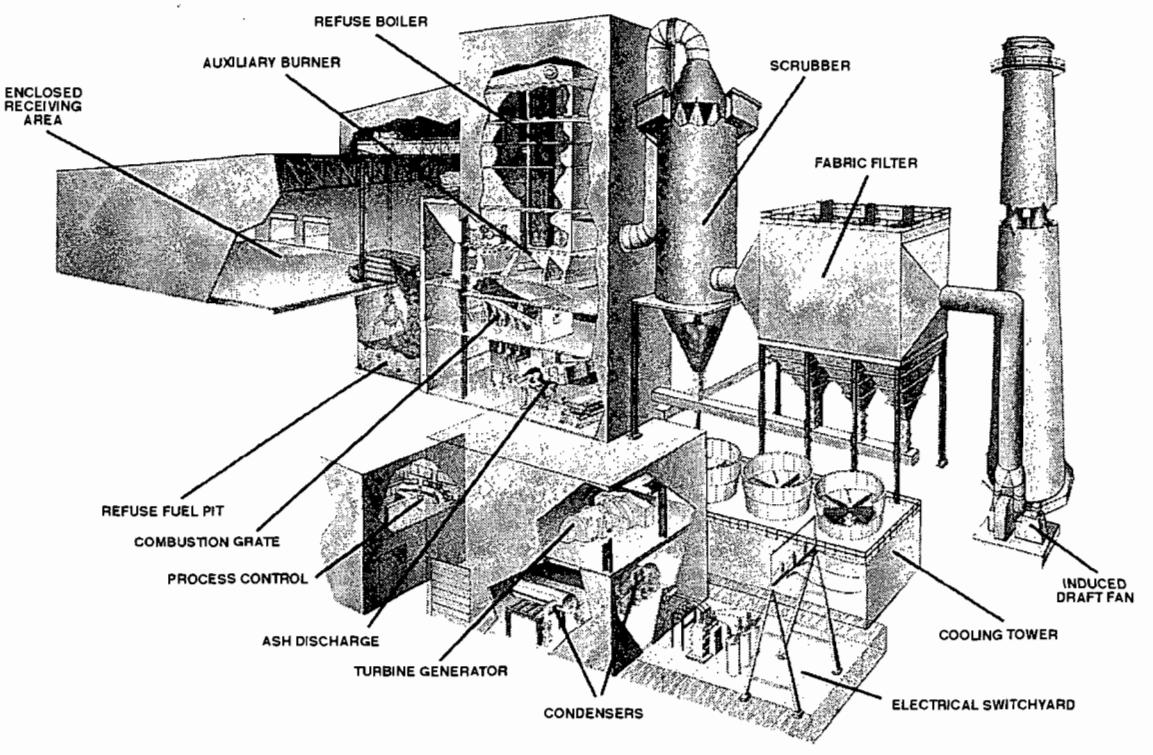


Figure 3-1: General Process Schematic

DESCRIPTION OF INSTALLATION

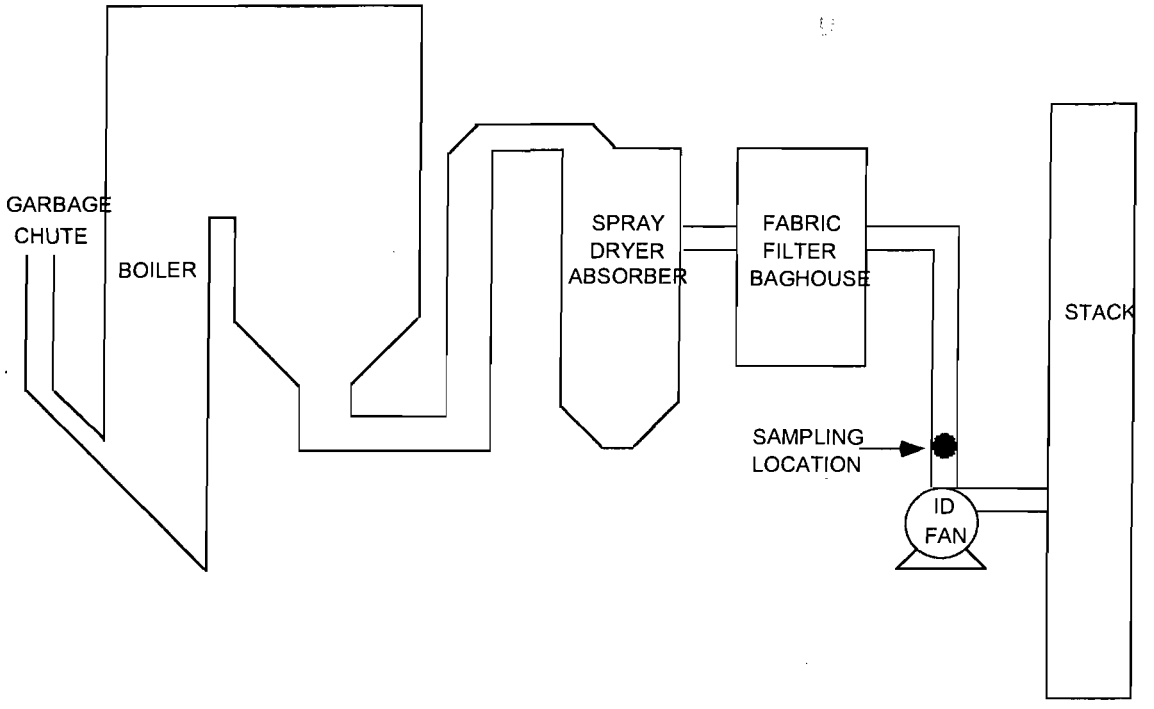


Figure 3-2: Process Schematic

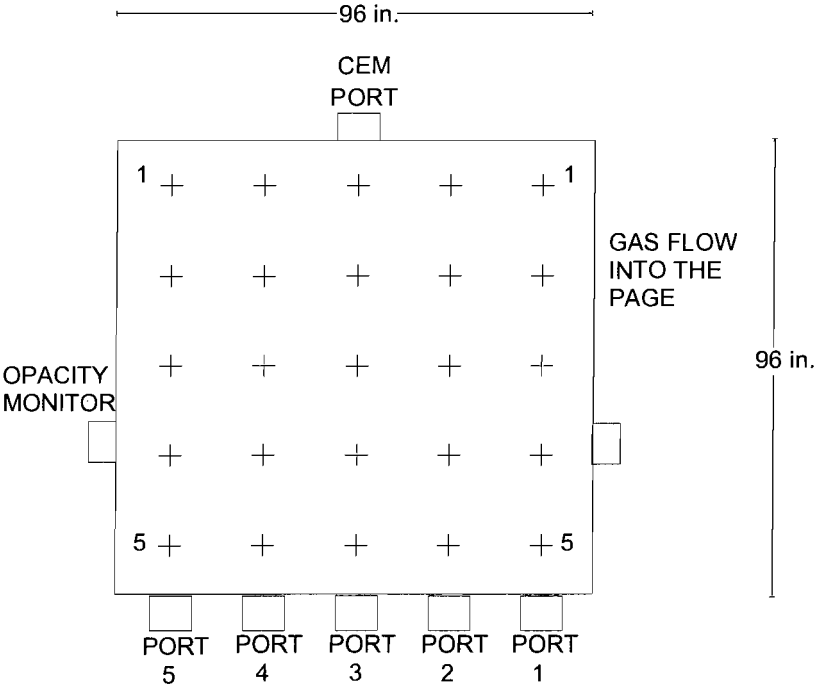
DESCRIPTION OF INSTALLATION

DESCRIPTION OF SAMPLING LOCATION(S)

Sampling point locations were determined according to EPA Method 1. Table 3-1 outlines the sampling point configurations. Figure 3-3 illustrates the sampling points and orientation of sampling ports for the source tested in the program.

Table 3-1:
Sampling Points

Location	Constituent	Method	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
Unit 1 FF Outlet	Mercury	29	1-3	5	5	5	125	3-3



Sampling 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 3-3: Unit 1 FF Outlet Sampling Point Determination (EPA Method 1)

End of Section 3 – Description of Installation

METHODOLOGY

Clean Air Engineering followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3, 3B, 4 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 3B	"Gas Analysis for the Determination of Emission Rate Correction Factor or Excess Air"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 29	"Determination of Metals Emissions from Stationary Sources"

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 D.

End of Section 4 –Methodology

APPENDIX

TEST METHOD SPECIFICATIONS

A

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Specification Sheet for EPA Method 29

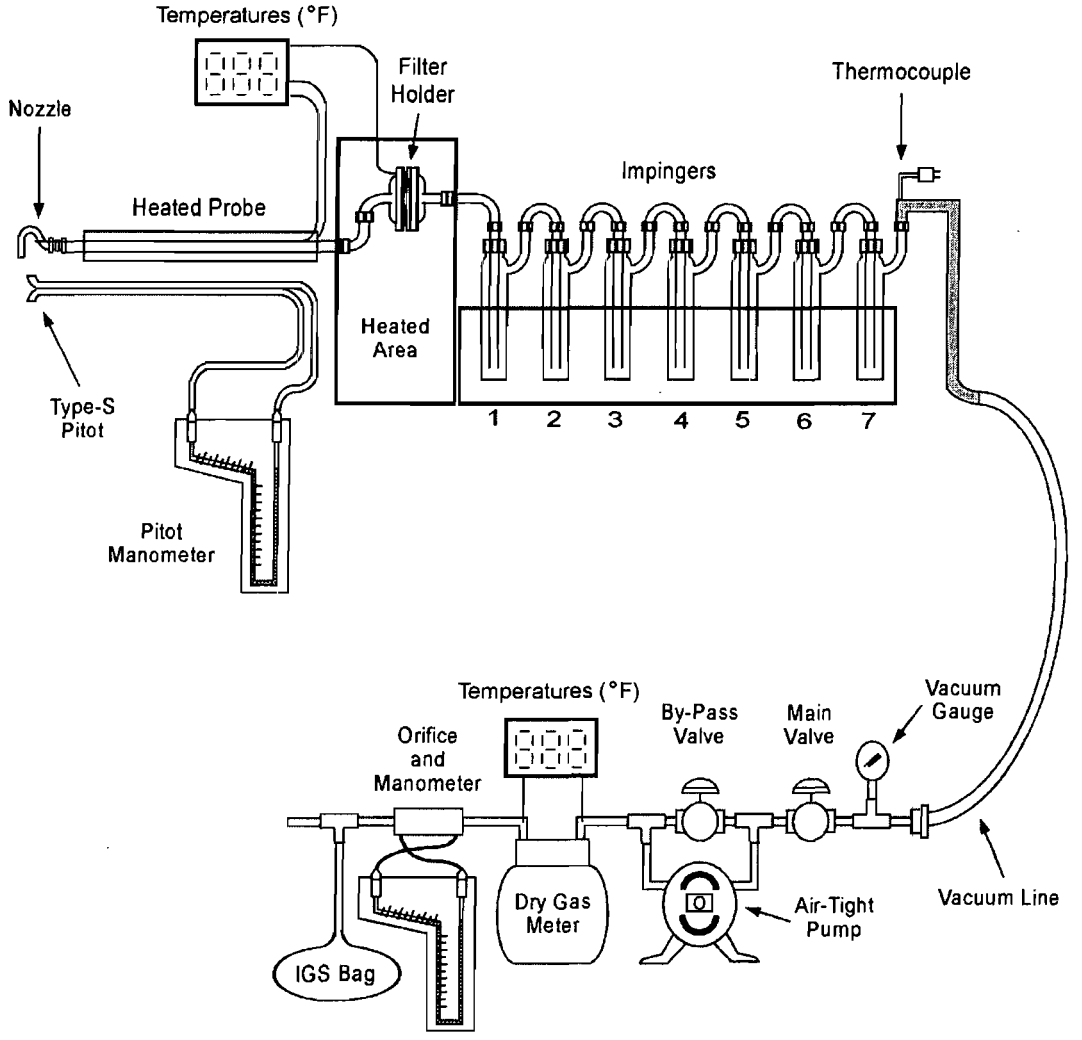
Source Location Name(s)	Unit 1 FF Outlet
Pollutant(s) to be Determined	Mercury
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	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	0.834
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

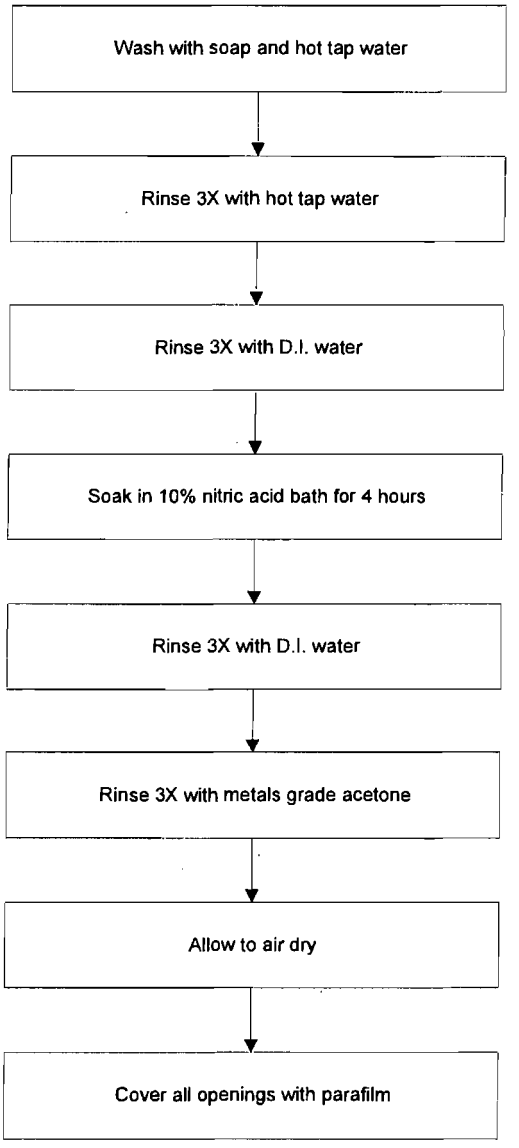
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
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	Orsat
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
Sampling Train Configuration



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

EPA Method 29
Glassware Preparation Procedures



EPA Method 29
Sample Recovery Flowchart
(Includes Mercury)

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

Container 1
Tared Quartz Filter
Petri Dish

Remove with acid washed polypropylene or Teflon tweezers to plastic container.

Remove any particulate or filter fiber to sample container

If necessary, fold the filter and transfer to the container.

Container 3
Probe Rinse
250 ml Polyethylene

Probe liner, nozzle, cyclone bypass and front half (FH) filter housing

Brush/rinse 3X with a total of 100 ml 0.1N HNO3

Visual Inspection

Label container and measure volume by weight

Container 4
1000 ml Polyethylene

Back half (BH) filter housing, Z-piece, impingers 1, 2, 3 and U-bends

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with a total of 100 ml 0.1N HNO3

Visual Inspection

Label container and measure volume by weight

Container 5A
250 ml Polyethylene

Impinger 4 and U-bend

Measure impinger volume by weight to within 0.5 ml

Transfer to sample container

Rinse with 100 ml of 0.1N HNO3

Visual Inspection

Label container and measure volume by weight

Container 5B
950 ml Glass

Impingers 5, 6 and U-bends

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with 100 ml of acidic permanganate solution

Rinse 3X with 100 ml of water

Visual Inspection

Label container and measure volume by weight

Container 6
Silica Gel

Measure and record impinger, volume by weight, record condition of indicating gel

Recycle silica gel

Container 5C
250 ml Glass

If brown spots remain in impingers, remove residue with 25 ml of 8N HCl total for both impingers

Pour HCl rinse into bottle containing 200 ml of water

Label container and measure volume by weight

Container 8A
Nitric Acid Blank
1000 ml Plastic

300 ml of 0.1N HNO3

Container 8B
Water Blank
250 ml Plastic

100 ml of water

Container 9
5%HNO3/10%H2O2 Blank
500 ml Plastic

200 ml of absorbing solution

Container 10*
Permanganate Blank
500 ml Glass

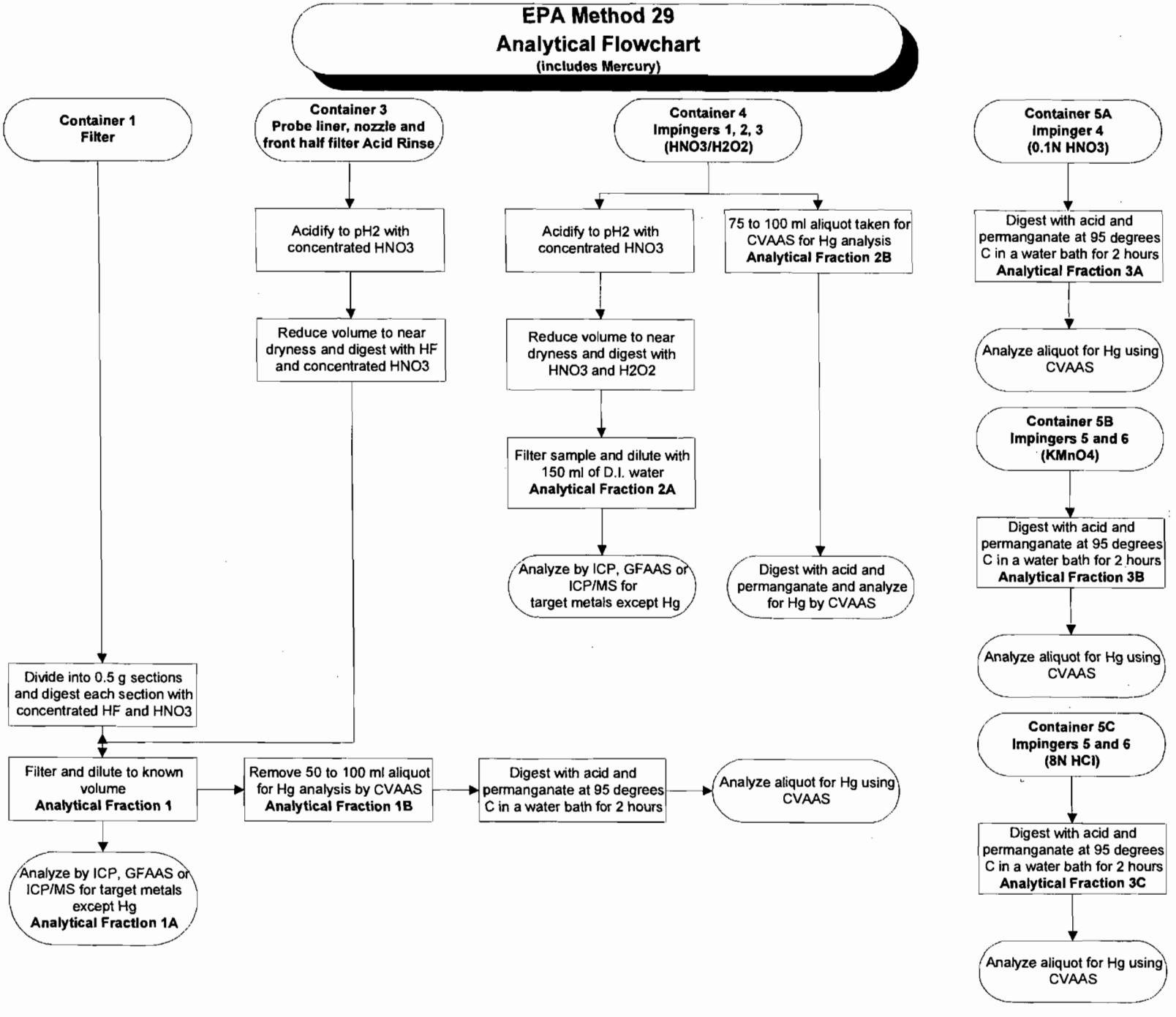
100 ml KMnO4 solution

Container 11
HCl Rinse Blank
250 ml Glass

200 ml water, add 25 ml of 8N HCl. Mix well and seal

Container 12
Filter Blanks
Petri Dish

3 clean, unused filters


EPA Method 29
Analytical Flowchart
(includes Mercury)
Container 1
Filter
Container 3
Probe liner, nozzle and
front half filter Acid Rinse
Container 4
Impingers 1, 2, 3
(HNO3/H2O2)
Container 5A
Impinger 4
(0.1N HNO3)
Acidify to pH2 with
concentrated HNO3
Acidify to pH2 with
concentrated HNO3
75 to 100 ml aliquot taken for
CVAAS for Hg analysis
Analytical Fraction 2B
Digest with acid and
permanganate at 95 degrees
C in a water bath for 2 hours
Analytical Fraction 3A
Reduce volume to near
dryness and digest with HF
and concentrated HNO3
Reduce volume to near
dryness and digest with
HNO3 and H2O2
Analyze aliquot for Hg using
CVAAS
Container 5B
Impingers 5 and 6
(KMnO4)
Filter sample and dilute with
150 ml of D.I. water
Analytical Fraction 2A
Digest with acid and
permanganate at 95 degrees
C in a water bath for 2 hours
Analytical Fraction 3B
Analyze by ICP, GFAAS or
ICP/MS for
target metals except Hg
Digest with acid and
permanganate and analyze
for Hg by CVAAS
Analyze aliquot for Hg using
CVAAS
Divide into 0.5 g sections
and digest each section with
concentrated HF and HNO3
Container 5C
Impingers 5 and 6
(8N HCl)
Filter and dilute to known
volume
Analytical Fraction 1
Remove 50 to 100 ml aliquot
for Hg analysis by CVAAS
Analytical Fraction 1B
Digest with acid and
permanganate at 95 degrees
C in a water bath for 2 hours
Analyze aliquot for Hg using
CVAAS
Digest with acid and
permanganate at 95 degrees
C in a water bath for 2 hours
Analytical Fraction 3C
Analyze by ICP, GFAAS or
ICP/MS for target metals
except Hg
Analytical Fraction 1A
Analyze aliquot for Hg using
CVAAS

SAMPLE CALCULATIONS

B

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USEPA Method 29 (Trace 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.

071609 113040
N

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)	=	483.3	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)	=	22.74	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)	=	29.70	in. Hg
T_m	= average dry gas meter temperature (°F)	=	83.30	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	77.75	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9876	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.17	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)	=	74.260	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)	=	29.70	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-10.30	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)	=	28.94	in. Hg

QA/QC _____
Date _____

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)	=	293.60	°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)	=	28.94	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)	=	28.94	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	28.94	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)	=	74.260	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	22.74	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2345	
		=	23.45	%

7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_v}{P_s}$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	28.94	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	28.94	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

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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	=	0.2345	
B_w	= actual water vapor in gas	=	0.2345	
		=	23.45	%

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 (%)	=	10.7	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.9	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.40	%

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 (%)	=	10.7	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.9	%
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)	=	30.07	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	=	0.2345	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.07	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)	=	27.24	lb/lb·mole

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12. Velocity of sample gas (ft/sec)

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

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)	=	27.24	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	28.94	in. Hg
T_s	= average sample gas temperature (°F)	=	293.60	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.681	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	47.46	ft/sec

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)	=	47.46	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	182,252	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)	=	182,252	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	28.94	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	293.6	°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)	=	123,522	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	=	0.2345	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	123,522	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,560	dscfm

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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)	=	94,560	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.9	%
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)	=	81,634	dscfm

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)	=	94,560	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	5,673,597	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)	=	94,560	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)	=	160,680	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)	=	160,680	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)	=	149,724	dry Nm^3/hr

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20. Percent isokinetic (%)

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

Where:

D_n	= diameter of nozzle (in)	=	0.268	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2345	
P_s	= absolute sample gas pressure (in. Hg)	=	28.94	in. Hg
T_s	= average sample gas temperature (°F)	=	293.6	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	74.260	dscf
V_s	= sample gas velocity (ft/sec)	=	47.46	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 (%)	=	102.70	%

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)	=	77.75	dcf
T_m	= average dry gas meter temperature (°F)	=	83.30	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.7721	
P_{bar}	= barometric pressure (in. Hg)	=	29.70	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.170	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.07	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	1.076	√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	=	0.9724	

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LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

1. Logic for Determining Total Blank ($m_{Total-B}$) from 5 Fractions

	CASE 1 All 5 fractions are D.	**CASE 2** 1 to 4 fractions are ND	**CASE 3** All 5 fractions are ND
Rule			
ND = 0	$m_{Total-B}$ = 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

	CASE 1 All 5 fractions are D.	**CASE 2** 1 to 4 fractions are ND	**CASE 3** All 5 fractions are ND
Rule			
ND = 0	$m_{Total-S}$ = 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 ($m_{T-B-allow}$)

	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
Rule				
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)

	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)
Rule				
ND = 0	$m_n = m_{Total-S} - m_{T-B-allow}$	$m_n = m_{Total-S} - m_{T-B-allow}$	m_n = < $m_{Total-S}$	m_n = < MIN[MDL]
ND=1x	$m_n = m_{Total-S} - m_{T-B-allow}$	m_n = < [$m_{Total-S} - m_{T-B-allow}$]	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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M

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	=	9.5093	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	=	0.4561	µg
$m_{total-S}$	= total amount of mercury in sample	=	9.9654	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	=	9.9654	µg
$0.05 \times m_{total-S}$	= 5% of $m_{total-S}$	=	0.4983	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	=	9.9654	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	9.9654	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	=	9.9654	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	9.5093	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	=	0.4561	µg
$m_{total-S}$	= total amount of mercury in sample	=	9.9654	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	=	9.5093	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	=	0.4561	µg

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USEPA Method 29
Mercury Sample Calculations

Sample data taken from Run 1

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N_M

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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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)	=	2.9590E-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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= mercury concentration (µg/dscm)	=	4.7385E+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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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)	=	4.7385E-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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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)	=	5.0852E+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)	=	2.9590E-10	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	8.9	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	3.4275E-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)	=	2.9590E-10	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	10.7	%
C_{sdy}	= mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	3.3185E-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)	=	2.9590E-10	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,560	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	182,252	acfm
C_a	= mercury concentration at actual gas conditions (lb/acf)	=	1.5353E-10	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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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)	=	94,560	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	1.6788E-03	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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	94,560	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)	=	2.1149E-04	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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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)	=	94,560	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)	=	7.3533E-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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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 (%)	=	8.9	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	4.9320E-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)	=	9.9654	µg
V_{mstd}	= volume metered, standard (dscf)	=	74.2596	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 (%)	=	10.7	%
100	= conversion factor	=	100	
E_{Fc}	= mercury emission rate - Fc-based (lb/MMBtu)	=	5.0331E-06	lb/MMBtu

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

USEPA Method 29 (Trace Metals)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9876	0.9876	0.9876	
C_p	Pitot tube coefficient	0.8340	0.8340	0.8340	
P_g	Static pressure (in. H_2O)	-10.3000	-10.3000	-10.3000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.70	29.70	29.70	**29.7000**
D_n	Nozzle diameter (in.)	0.2680	0.2680	0.2700	
O_2	Oxygen (dry volume %)	8.9000	8.5000	9.2000	**8.8667**
CO_2	Carbon dioxide (dry volume %)	10.7000	11.0000	10.4000	**10.7000**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.4000	80.5000	80.4000	**80.4333**
V_{lc}	Total Liquid collected (ml)	483.30	474.80	486.80	
V_m	Volume metered, meter conditions (ft^3)	77.7500	76.5100	78.4250	
T_m	Dry gas meter temperature (°F)	83.3000	89.5200	94.0000	
T_s	Sample temperature (°F)	293.6000	294.5200	294.7600	**294.2933**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.1696	1.1236	1.1816	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	22.7441	22.3441	22.9088	**22.6657**
V_{mstd}	Volume metered, standard (dscf)	74.2596	72.2399	73.4598	**73.3198**
P_s	Sample gas pressure, absolute (in. Hg)	28.9426	28.9426	28.9426	**28.9426**
P_v	Vapor pressure, actual (in. Hg)	28.9426	28.9426	28.9426	**28.9426**
B_{wo}	Moisture measured in sample (% by volume)	23.4466	23.6235	23.7721	**23.6141**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	23.4466	23.6235	23.7721	**23.6141**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{in.}$ H_2O)	0.6808	0.6794	0.6830	**0.6811**
M_d	MW of sample gas, dry (lb/lb-mole)	30.0680	30.1000	30.0320	**30.0667**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2385	27.2416	27.1717	**27.2173**
V_s	Velocity of sample (ft/sec)	47.4616	47.3857	47.7083	**47.5185**
%I	Isokinetic sampling (%)	102.7008	100.4218	100.1565	**101.0930**
Q_a	Volumetric flow rate, actual (acfm)	182,252	181,961	183,200	**182,471**
Q_s	Volumetric flow rate, standard (scfm)	123,522	123,174	123,973	**123,556**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	94,560	94,076	94,502	**94,379**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	81,634	83,924	79,545	**81,701**
Q_a	Volumetric flow rate, actual (acf/hr)	10,935,144	10,917,661	10,991,986	**10,948,263**
Q_s	Volumetric flow rate, standard (scf/hr)	7,411,296	7,390,425	7,438,371	**7,413,364**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,673,597	5,644,545	5,670,116	**5,662,753**
Q_a	Volumetric flow rate, actual (m^3/hr)	309,690	309,195	311,300	**310,061**
Q_s	Volumetric flow rate, standard (m^3/hr)	209,892	209,301	210,659	**209,951**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	160,680	159,857	160,581	**160,372**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	138,716	142,606	135,165	**138,829**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	195,581	195,031	196,296	**195,636**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	149,724	148,958	149,632	**149,438**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	129,258	132,883	125,950	**129,364**

Comments:

Average includes 3 runs.

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

USEPA Method 29
Mercury (Hg) Emission Parameters

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	185	184	184	**184**
P_1	SDA Outlet Temperature - (°F)	309	310	310	**310**
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 %)	8.9000	8.5000	9.2000	**8.8667**
CO_2	Carbon dioxide (dry volume %)	10.7000	11.0000	10.4000	**10.7000**
T_s	Sample temperature (°F)	293.6000	294.5200	294.7600	**294.2933**
B_w	Actual water vapor in gas (% by volume)	23.4466	23.6235	23.7721	**23.6141**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	182,252	181,961	183,200	**182,471**
Q_s	Volumetric flow rate, standard (scfm)	123,522	123,174	123,973	**123,556**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	94,560	94,076	94,502	**94,379**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	81,634	83,924	79,545	**81,701**
Q_a	Volumetric flow rate, actual (acf/hr)	10,935,144	10,917,661	10,991,986	**10,948,263**
Q_s	Volumetric flow rate, standard (scf/hr)	7,411,296	7,390,425	7,438,371	**7,413,364**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,673,597	5,644,545	5,670,116	**5,662,753**
Q_a	Volumetric flow rate, actual (m^3/hr)	309,690	309,195	311,300	**310,061**
Q_s	Volumetric flow rate, standard (m^3/hr)	209,892	209,301	210,659	**209,951**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	160,680	159,857	160,581	**160,372**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	138,716	142,606	135,165	**138,829**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	195,581	195,031	196,296	**195,636**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	149,724	148,958	149,632	**149,438**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	129,258	132,883	125,950	**129,364**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.2596	72.2399	73.4598	**73.3198**
%I	Isokinetic sampling (%)	102.7008	100.4218	100.1565	**101.0930**
Laboratory Data					
$m_{n\text{-}1b}$	Fraction 1B Prorated (µg)	<0.1000	<0.1000	0.5625	
$m_{n\text{-}2b}$	Fraction 2B Prorated (µg)	9.5093	9.4341	11.2172	
$m_{n\text{-}3a}$	Fraction 3A Prorated (µg)	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B Prorated (µg)	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C Prorated (µg)	0.4561	0.5362	0.7710	
m_n	Total matter corrected for allowable blanks (µg)	9.9654	9.9703	12.5508	
Mercury Results - Total					
C_{sd}	Concentration (lb/dscf)	2.9590E-10	3.0433E-10	3.7673E-10	**3.2565E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	3.4275E-10	3.4114E-10	4.4757E-10	**3.7715E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	3.3185E-10	3.3199E-10	4.3469E-10	**3.6618E-10**
C_a	Concentration (lb/acf)	1.5353E-10	1.5734E-10	1.9433E-10	**1.6840E-10**
C_{sd}	Concentration (µg/dscm)	4.7385E+00	4.8734E+00	6.0328E+00	**5.2149E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	5.4887E+00	5.4629E+00	7.1672E+00	**6.0396E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	5.3142E+00	5.3164E+00	6.9609E+00	**5.8638E+00**
C_{sd}	Concentration (mg/dscm)	4.7385E-03	4.8734E-03	6.0328E-03	**5.2149E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	5.4887E-03	5.4629E-03	7.1672E-03	**6.0396E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	5.3142E-03	5.3164E-03	6.9609E-03	**5.8638E-03**
C_a	Concentration (µg/m^3 (actual,wet))	2.4585E+00	2.5196E+00	3.1120E+00	**2.6967E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	5.0852E+00	5.2299E+00	6.4742E+00	**5.5965E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	5.8903E+00	5.8626E+00	7.6916E+00	**6.4815E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	5.7030E+00	5.7054E+00	7.4702E+00	**6.2929E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.6788E-03	1.7178E-03	2.1361E-03	**1.8442E-03**
$E_{g/s}$	Rate (g/s)	2.1149E-04	2.1640E-04	2.6910E-04	**2.3233E-04**
$E_{T/yr}$	Rate (Ton/yr)	7.3533E-03	7.5239E-03	9.3561E-03	**8.0778E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.9320E-06	4.9088E-06	6.4402E-06	**5.4270E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	5.0331E-06	5.0352E-06	6.5928E-06	**5.5537E-06**

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

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

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Mercury Results - Front Half					
C_{sd}	Concentration (lb/dscf)	<2.9693E-12	<3.0523E-12	1.6884E-11	**<7.6352E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.4395E-12	<3.4216E-12	2.0059E-11	**<8.9733E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.3301E-12	<3.3298E-12	1.9482E-11	**<8.7138E-12**
C_a	Concentration (lb/acf)	<1.5406E-12	<1.5781E-12	8.7095E-12	**<3.9427E-12**
C_{sd}	Concentration (µg/dscm)	<4.7549E-02	<4.8879E-02	2.7037E-01	**<1.2227E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.5078E-02	<5.4792E-02	3.2121E-01	**<1.4369E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.3326E-02	<5.3322E-02	3.1197E-01	**<1.3954E-01**
C_{sd}	Concentration (mg/dscm)	<4.7549E-05	<4.8879E-05	2.7037E-04	**<1.2227E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.5078E-05	<5.4792E-05	3.2121E-04	**<1.4369E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.3326E-05	<5.3322E-05	3.1197E-04	**<1.3954E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<2.4671E-02	<2.5271E-02	1.3947E-01	**<6.3137E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.1029E-02	<5.2455E-02	2.9016E-01	**<1.3121E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<5.9108E-02	<5.8801E-02	3.4472E-01	**<1.5421E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<5.7228E-02	<5.7224E-02	3.3480E-01	**<1.4975E-01**
$E_{lb/hr}$	Rate (lb/hr)	<1.6847E-05	<1.7229E-05	9.5734E-05	**<4.3270E-05**
$E_{g/s}$	Rate (g/s)	<2.1223E-06	<2.1704E-06	1.2060E-05	**<5.4510E-06**
$E_{T/yr}$	Rate (Ton/yr)	<7.3788E-05	<7.5463E-05	4.1932E-04	**<1.8952E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<4.9492E-08	<4.9234E-08	2.8863E-07	**<1.2912E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.0506E-08	<5.0502E-08	2.9547E-07	**<1.3216E-07**

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

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

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Mercury Results - Impingers 1-3 Solution					
C_{sd}	Concentration (lb/dscf)	2.8236E-10	2.8796E-10	3.3670E-10	**3.0234E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	3.2707E-10	3.2279E-10	4.0001E-10	**3.4996E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	3.1667E-10	3.1414E-10	3.8850E-10	**3.3977E-10**
C_a	Concentration (lb/acf)	1.4650E-10	1.4888E-10	1.7368E-10	**1.5635E-10**
C_{sd}	Concentration (µg/dscm)	4.5216E+00	4.6113E+00	5.3918E+00	**4.8416E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	5.2375E+00	5.1691E+00	6.4056E+00	**5.6041E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	5.0710E+00	5.0305E+00	6.2213E+00	**5.4409E+00**
C_{sd}	Concentration (mg/dscm)	4.5216E-03	4.6113E-03	5.3918E-03	**4.8416E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	5.2375E-03	5.1691E-03	6.4056E-03	**5.6041E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	5.0710E-03	5.0305E-03	6.2213E-03	**5.4409E-03**
C_a	Concentration (µg/m^3 (actual,wet))	2.3460E+00	2.3841E+00	2.7813E+00	**2.5038E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	4.8524E+00	4.9487E+00	5.7863E+00	**5.1958E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	5.6208E+00	5.5473E+00	6.8744E+00	**6.0141E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	5.4420E+00	5.3986E+00	6.6765E+00	**5.8390E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.6020E-03	1.6254E-03	1.9091E-03	**1.7122E-03**
$E_{g/s}$	Rate (g/s)	2.0181E-04	2.0476E-04	2.4051E-04	**2.1569E-04**
$E_{T/yr}$	Rate (Ton/yr)	7.0167E-03	7.1193E-03	8.3620E-03	**7.4994E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	4.7063E-06	4.6448E-06	5.7560E-06	**5.0357E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	4.8028E-06	4.7644E-06	5.8923E-06	**5.1532E-06**

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

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

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Mercury Results - Impinger 4 Solution					
C_{sd}	Concentration (lb/dscf)	<5.9386E-12	<6.1047E-12	<6.0033E-12	**<6.0155E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.8789E-12	<6.8431E-12	<7.1321E-12	**<6.9514E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.6601E-12	<6.6596E-12	<6.9269E-12	**<6.7489E-12**
C_a	Concentration (lb/acf)	<3.0812E-12	<3.1562E-12	<3.0967E-12	**<3.1114E-12**
C_{sd}	Concentration (µg/dscm)	<9.5099E-02	<9.7758E-02	<9.6134E-02	**<9.6330E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1016E-01	<1.0958E-01	<1.1421E-01	**<1.1132E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.0665E-01	<1.0664E-01	<1.1092E-01	**<1.0807E-01**
C_{sd}	Concentration (mg/dscm)	<9.5099E-05	<9.7758E-05	<9.6134E-05	**<9.6330E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1016E-04	<1.0958E-04	<1.1421E-04	**<1.1132E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0665E-04	<1.0664E-04	<1.1092E-04	**<1.0807E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.9341E-02	<5.0542E-02	<4.9590E-02	**<4.9824E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.0206E-01	<1.0491E-01	<1.0317E-01	**<1.0338E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.1822E-01	<1.1760E-01	<1.2257E-01	**<1.1946E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.1446E-01	<1.1445E-01	<1.1904E-01	**<1.1598E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.3693E-05	<3.4458E-05	<3.4039E-05	**<3.4064E-05**
$E_{g/s}$	Rate (g/s)	<4.2446E-06	<4.3409E-06	<4.2882E-06	**<4.2912E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4758E-04	<1.5093E-04	<1.4909E-04	**<1.4920E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<9.8984E-08	<9.8469E-08	<1.0263E-07	**<1.0003E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0101E-07	<1.0100E-07	<1.0506E-07	**<1.0236E-07**

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

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

Run No.		1	2	3	Average
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Mercury Results - Filtered Permanganate Solution					
C_{sd}	Concentration (lb/dscf)	<1.4847E-11	<1.5262E-11	<1.5008E-11	**<1.5039E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.7197E-11	<1.7108E-11	<1.7830E-11	**<1.7378E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.6650E-11	<1.6649E-11	<1.7317E-11	**<1.6872E-11**
C_a	Concentration (lb/acf)	<7.7030E-12	<7.8904E-12	<7.7419E-12	**<7.7784E-12**
C_{sd}	Concentration (µg/dscm)	<2.3775E-01	<2.4439E-01	<2.4034E-01	**<2.4083E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.7539E-01	<2.7396E-01	<2.8553E-01	**<2.7829E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.6663E-01	<2.6661E-01	<2.7731E-01	**<2.7018E-01**
C_{sd}	Concentration (mg/dscm)	<2.3775E-04	<2.4439E-04	<2.4034E-04	**<2.4083E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.7539E-04	<2.7396E-04	<2.8553E-04	**<2.7829E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.6663E-04	<2.6661E-04	<2.7731E-04	**<2.7018E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.2335E-01	<1.2635E-01	<1.2397E-01	**<1.2456E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.5514E-01	<2.6228E-01	<2.5792E-01	**<2.5845E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.9554E-01	<2.9400E-01	<3.0642E-01	**<2.9865E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.8614E-01	<2.8612E-01	<2.9760E-01	**<2.8995E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.4233E-05	<8.6145E-05	<8.5098E-05	**<8.5159E-05**
$E_{g/s}$	Rate (g/s)	<1.0611E-05	<1.0852E-05	<1.0720E-05	**<1.0728E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.6894E-04	<3.7732E-04	<3.7273E-04	**<3.7300E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.4746E-07	<2.4617E-07	<2.5657E-07	**<2.5007E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.5253E-07	<2.5251E-07	<2.6264E-07	**<2.5590E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate					
C_{sd}	Concentration (lb/dscf)	1.3543E-11	1.6365E-11	2.3143E-11	**1.7684E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.5687E-11	1.8345E-11	2.7495E-11	**2.0509E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.5189E-11	1.7853E-11	2.6704E-11	**1.9915E-11**
C_a	Concentration (lb/acf)	7.0267E-12	8.4611E-12	1.1938E-11	**9.1420E-12**
C_{sd}	Concentration (µg/dscm)	2.1687E-01	2.6207E-01	3.7061E-01	**2.8318E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	2.5121E-01	2.9377E-01	4.4030E-01	**3.2843E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	2.4322E-01	2.8589E-01	4.2763E-01	**3.1891E-01**
C_{sd}	Concentration (mg/dscm)	2.1687E-04	2.6207E-04	3.7061E-04	**2.8318E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	2.5121E-04	2.9377E-04	4.4030E-04	**3.2843E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	2.4322E-04	2.8589E-04	4.2763E-04	**3.1891E-04**
C_a	Concentration (µg/m^3 (actual,wet))	1.1252E-01	1.3549E-01	1.9118E-01	**1.4640E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	2.3274E-01	2.8124E-01	3.9773E-01	**3.0390E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	2.6959E-01	3.1527E-01	4.7251E-01	**3.5246E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	2.6102E-01	3.0681E-01	4.5892E-01	**3.4225E-01**
$E_{lb/hr}$	Rate (lb/hr)	7.6838E-05	9.2375E-05	1.3123E-04	**1.0015E-04**
$E_{g/s}$	Rate (g/s)	9.6798E-06	1.1637E-05	1.6531E-05	**1.2616E-05**
$E_{T/yr}$	Rate (Ton/yr)	3.3655E-04	4.0460E-04	5.7477E-04	**4.3864E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.2573E-07	2.6397E-07	3.9564E-07	**2.9512E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	2.3036E-07	2.7077E-07	4.0501E-07	**3.0205E-07**

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QA/QC DATA

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

USEPA Method 29 (Trace Metals)
QA/QC Results

Run No.		1	2	3	
Date (2009)		Jun 24	Jun 24	Jun 24	
Start Time (approx.)		08:00	10:44	13:17	
Stop Time (approx.)		10:21	12:55	15:27	
Total Duration of Test Run (min.)		141	131	130	
Net Sampling Time (min.)		125	125	125	
Sampling System Calibration Summary					
	Nozzle ID No:	268-1	268-1	270-1	
D_n	Nozzle Diameter (in):	0.268	0.268	0.270	
	Probe ID No:	67-8-19	67-8-19	67-8-19	
C_p	Pitot Coefficient:	0.8340	0.8340	0.8340	
	Meter Box ID. No:	85-4	85-4	85-4	
Y_d	Meter Box Yd - Field Sheet	0.9876	0.9876	0.9876	
	Meter Box Yd - Database	0.9876	0.9876	0.9876	
	Meter Box ΔH@ - Field Sheet	1.7721	1.7721	1.7721	
	Meter Box ΔH@ - Database	1.7721	1.7721	1.7721	
QA/QC					
	Final Leak Check				
	(a) 4% of Sampling Rate (cfm)	0.0249	0.0245	0.0251	
	(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	0.0030	0.0030	
	Sample Volume				
	Minimum Volume Required (dscf)	60.00	60.00	60.00	
V_{mstd}	Actual Sample Volume (dscf)	74.260	72.240	73.460	
	Alternative Method 5 Post-Test Calibration (EPA ALT-009)				
$\sqrt{\Delta H_{avg}}$	Average of Square Root of ΔH (in. W.C.)	1.0755	1.0553	1.0833	
Y_{qa}	Alternative Meter Calibration Factor	0.9724	0.9747	0.9811	**Average**
	Variation from full-test Y_d (average ≤ ±5%)	-1.5%	-1.3%	-0.7%	**-1.2%**
	Mean Isokinetic Sampling Rate Variation				
	Minimum Allowable (%)	90	90	90	
	Maximum Allowable (%)	110	110	110	
%I	Actual Variation (%)	102.70	100.42	100.16	
	Point-by-Point Isokinetic Variation				
	Number of points <90%	1	0	0	
	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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Date _____

Nozzle Calibration Sheet

Client	Wheelabrator	Project Number	10735
Calibrated by	B. Witte	Unit	1
Date	6/24/09	Runs	1-3

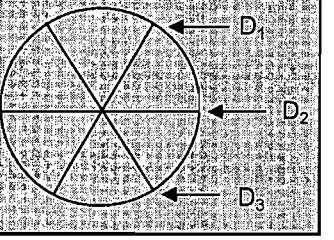
Nozzle Identification	D_1 (inches)	D_2 (inches)	D_3 (inches)	ΔD (inches)	D_{ave} (inches)
0.268	0.268	0.268	0.268	0.0	0.268
0.270	0.270	0.270	0.270	0.0	0.270

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)

QA/QC BW
Date 6/24/09

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Meter Box Full Test Calibration

Meter Box No: 85-4

Date of Calibration: 11/7/2008

Meter Box Y_d: 0.9876

Calibration Conducted by: OLEG LAVROV

Meter Box ΔH@: 1.7721

Barometric Pressure: 28.86

				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@
0.945	3.00	-1.70	1.0000	0.000	10.000	10.000	195.284	205.502	10.218	68.0	68.0	68.00	81.0	76.0	78.50	10.20	0.9863	1.7944
0.942	3.00	-1.70	1.0000	0.000	10.000	10.000	205.502	215.734	10.232	68.0	68.0	68.00	82.0	76.0	79.00	10.24	0.9858	1.8085
0.382	0.50	-1.10	1.0000	0.000	5.000	5.000	220.253	225.360	5.107	68.5	68.5	68.50	77.0	76.0	76.50	12.60	0.9898	1.8289
0.389	0.50	-1.10	1.0000	0.000	5.000	5.000	225.360	230.466	5.106	69.0	69.0	69.00	76.0	76.0	76.00	12.38	0.9882	1.7689
0.683	1.50	-1.30	1.0000	0.000	10.000	10.000	235.645	245.858	10.213	69.0	69.0	69.00	80.0	76.0	78.00	14.09	0.9887	1.7185
0.684	1.50	-1.30	1.0000	0.000	10.000	10.000	245.858	256.092	10.234	69.0	69.0	69.00	80.0	76.0	78.00	14.07	0.9867	1.7136
															Averages		0.98758	1.77215

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)
4.9	5.0
10.0	10.0
15.0	15.0
20.2	20.0
25.3	25.0

CleanAir ENGINEERING

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 85-4 Office: _____

Calibrated by: OLEG LAVROV Client: _____

Date: 11/7/08 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	48	52	49				
100	98	102	99				
150	148	151	149				
200	198	201	199				
250	248	251	249				
300	298	301	299				
350	348	351	349				
400	398	401	399				
450	448	451	449				
500	498	501	499				
550	548	551	549				
600	598	601	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 : 10/19/2009

Calibration Report No: R044701

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Meter Box Critical Orifice Post-Test Calibration Data

Project No.	10735	Meter No.	85-4	Orifice	C-4
Location	warehouse	Meter Yd	0.9876	Orifice K'	0.4763
Test Date	06/30/09	Meter ΔH@	1.7721	Orifice Cal. Date	02/24/09
Operator	r. vicere	Full Test Cal. Date	11/07/08		

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) 29.66 in. Hg

Run	Elapsed Time (minutes)	Meter Volume (dcf)	Meter Temperature		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
			Inlet (°F)	Outlet (°F)								
	0.0	21.60	72	70								
1	5.0	24.76	74	70	76	1.20	20	5.0	3.16	71.5	0.9779	-0.1%
2	10.0	27.92	74	70	77	1.20	20	5.0	3.16	72.0	0.9779	-0.1%
3	15.0	31.07	74	71	78	1.20	20	5.0	3.15	72.3	0.9806	0.2%
										Average Y_i	0.9788	
										Cal. Error	-0.9%	

Calculations and Specifications

$$Y_i = \frac{K' \times P_b \times (T_m + 460) \times \theta}{17.64 \times V_m \times \left(P_b + \Delta H / 13.6\right) \times \sqrt{T_{amb} + 460}}$$

$$\Delta Y_i = \frac{Y_i - \overline{Y}_i}{\overline{Y}_i} \times 100 \qquad \text{Spec.: } \Delta Y_i \le \pm 2\%$$

$$Cal.Error = \frac{\overline{Y}_i - Y_d}{Y_d} \times 100 \qquad \text{Spec.: } Cal.Error \le \pm 5\%$$

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Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **I.D. Number:** 67-8-19
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	78.0	80.0	-2	0.37%	
2	200°F-250°F	238.0	234.0	4	0.57%	%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	0.559	0.777	0.840	0.002
2	0.555	0.784	0.833	0.005
3	0.566	0.784	0.841	0.003
		Side 'A' Average Probe $C_{p(A)}$=	0.8380	0.0032

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	0.570	0.804	0.833	0.002
2	0.569	0.814	0.828	0.003
3	0.564	0.799	0.832	0.001
		Side 'B' Average Probe $C_{p(B)}$=	0.8309	0.0022

Specification: Avg. C_p Deviations ≤ 0.01

'A' Average C_p		'B' Average C_p		Difference	Specification
0.838	—	0.831	=	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.**

$$^{*}C_{P(S)} = C_{P(STD)}\sqrt{\frac{\Delta p_{(STD)}}{\Delta p_{(S)}}} \qquad ^{**}Deviation = \left|C_{P(S)} - \overline{C}_{P\,(A\text{ or }B)}\right|$$

All specifications are from EPA-600/9-76-005, section 3.1

Probe Cp= 0.834 Calibrated by: W. Berry Date: 03/05/2009

CleanAir ENGINEERING

Sample Probe Calibration

Probe Type: M5 with S-Type Pitot **I.D. Number:** 67-8-19

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	78.0	80.0	-2.0	0.37%	YES
2	200°F-250°F	238.0	234.0	4.0	0.57%	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=	0	α2=	0	<=10 °	YES
β1=	1	β2=	1	<=5°	YES
γ=	2	θ=	0	None	N/A
A=	0.684			None	N/A
Dt=	0.250			0.1875"<=Dt<=0.375"	YES

	Calculations	Specifications	Within Spec?
A/2=Pa=Pb=	0.342 inches	None	N/A
Pa/Dt=Pb/Dt=	1.368 inches	1.05<P/Dt<1.5	YES
z = A sin γ =	0.024 inches	<=0.125"	YES
w = A sin θ =	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

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FIELD DATA

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TEST LOCATION: FF outlet Mercury **TESTING METHOD:** 29 **PAGE** 1 **OF** 2

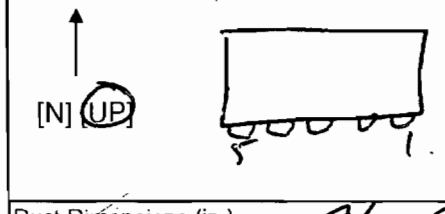
UNIT: 1 **RUN:** 1

FIELD DATA SHEET

Client	Wheelabrator	Project No.	10735
Plant	N. Brownfield	Date	6/24/09
Meter Operator	P. Bihun		
Probe Operator	P. Bihun		

Meter Box	85-4	Sample Box No.	MF
Meter Y_d	0.9876	Meter $\Delta H_@$	1.772
K Factor	2.48	Pitot C_p	0.834
Leak Rate Before	0.003 [cfm] [Lpm]	@	5 (in. Hg)
Leak Rate After	0.002 [cfm] [Lpm]	@	10 (in. Hg)
Pitot Leak Check Before: ☒	After: Good ☒	Bad ☐	

Cross-Section of Test Location



Duct Dimensions (in.)	96 x 56		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]
-10.3	10.0		

Amb. Temp. (°F)	77	Bar. Press	29.70 [in. Hg] [mbar]
Probe I.D. No.	~~Glass~~ 0062-8-19		
Liner Material	Glass		

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	~~0.244~~ 0.268 BW	Nozzle I.D.	~~244-1~~ 268-1 BW
Start Time:	8:00	Stop Time:	10:21

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
				728.331		250	250						O_2
5-1	5	0.39	0.97	736.11	293	252	262	66	78	76	4.0	N/A	9.1
2	10	0.43	1.1	739.12	293	252	254	59	77	77	5		9.3
3	15	0.51	1.3	742.43	294	252	252	57	79	77	6		9.3
4	20	0.60	1.5	745.96	295	251	250	56	81	77	4.5		9.6
5	25	0.59	1.5	749.490	295	251	251	60	83	78	6.5		9.7
4-1	30	0.45	1.1	752.57	292	248	249	61	83	79	5		9.6
2	35	0.43	1.1	755.60	293	249	249	62	84	80	5		9.4
3	40	0.46	1.1	758.84	294	249	249	61	85	80	5		9.4
4	45	0.55	1.4	762.31	294	251	253	62	84	81	6		9.6
5	50	0.59	1.5	765.820	295	252	249	60	86	81	6.5		9.4
3-1	55	0.526	1.4	769.28	294	250	250	62	86	82	6		9.6
2	60	0.43	1.1	772.33	295	250	249	63	85	82	5		9.7
			53	77.750									
	Total	*		~~77.750~~									
	Average	0.6808	1.0536	78.1950	293.6000					83.3000			

Sum of square roots. Circle correct bracketed units on data sheet.

QA/QC PB
Date 6/24/09

FDS005-General.xls, Feb 2002

CleanAir ENGINEERING

E-3

TEST LOCATION: FF Outlet Mercury TESTING METHOD: 29 PAGE 2 OF 2

UNIT: 1 RUN: 1

FIELD DATA SHEET

Client Wheelabrator	Project No. 1073-
Plant N. Branford	Date 6/24/09
Meter Operator	P. Bishop
Probe Operator	P. Bishop

Meter Box	Sample Box No.
Meter Y_d	Meter $\Delta H_@$
K Factor	Pitot C_p
Leak Rate Before [cfm] [Lpm] @ (in. Hg)	
Leak Rate After [cfm] [Lpm] @ (in. Hg)	
Pitot Leak Check Before: ☐	After: Good ☐ Bad ☐

Cross-Section of Test Location

[N] [UP]

Duct Dimensions (in.)

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]

Amb. Temp. (°F)	Bar. Press. [in. Hg] [mbar]
Probe I.D. No.	
Liner Material	

Filter No.		
Thimble No.		
Nozzle Diameter	Nozzle I.D.	

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. (ft³) [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 280	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_i (°F)	Notes 02
3	61	0.41	1.1	825.37	295	250	250	64	86	83	5		8.5
4	70	0.55	1.4	828.95	291	250	250	64	86	83	6		9.5
5	75	0.55	1.4	832.330	295	251	251	58	86	83	6		9.0
2-1	80	0.55	1.4	835.80	294	249	249	58	86	83	6		9.4
2	85	0.39	0.97	838.62	294	249	250	56	88	84	5		9.5
3	90	0.35	0.87	841.27	293	250	251	57	88	84	4.5		9.6
4	95	0.49	1.2	844.47	294	250	250	57	87	85	5.5		9.5
5	100	0.50	1.2	847.675	294	251	250	57	87	85	5.5		9.3
1-1	105	0.21	0.52	849.76	293	250	250	61	86	84	3.5		9.7
2	110	0.41	1.0	852.61	293	250	249	62	86	85	5		9.8
3	115	0.39	0.97	855.46	288	250	250	61	88	85	5		9.7
4	120	0.38	0.94	858.22	292	250	250	62	88	85	5		9.6
5	125	0.50	1.2	861.460	293	251	250	62	88	85	6		9.7
	Total	*											
	Average												

0.03 0.045

* Sum of square roots.

Circle correct bracketed units on data sheet.

2224

QA/QC PB

Date 6/24/09

CleanAir ENGINEERING

TEST LOCATION: FF Outlet — Mercury **TESTING METHOD:** 29 **PAGE** 1 **OF** 2

UNIT: 1 **RUN:** 2

FIELD DATA SHEET

Client	Wheelabrator
Plant	N. Brevard
Meter Operator	R. Bihun
Probe Operator	R. Bihun
Project No.	10735
Date	6/24/09

Cross-Section of Test Location

Amb. Temp. (°F)	88	Bar. Press.	29.70 [in. Hg] mbar
Probe I.D. No.		67-S-19	
Liner Material		316S	

Meter Box	S5-4	Sample Box No.	M1
Meter Y_d	0.9876	Meter $\Delta H_@$	1.7721
K Factor	2.47	Pitot C_p	0.839 0.84936
Leak Rate Before	0.003 [cfm] [Lpm]	@	13 (in. Hg)
Leak Rate After	0.003 [cfm] [Lpm]	@	10 (in. Hg)
Pitot Leak Check Before:	☒	After: Good ☒	Bad ☐

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.247 0.268 BW	Nozzle I.D.	247-1 268-1 BW

Duct Dimensions (in.)	96 x 96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [IN] [Out] of page	First point all the way [In] [Out]
-10.3	10.0	[IN]	[In]

Start Time:	10:44	Stop Time:	12:57

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] 846.860	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
1-1	5	0.25	0.62	846.14	293	253	255	66	86	86	3.0	N/A	10.4
2	10	0.39	0.97	856.93	294	254	255	66	87	87	4.0		9.3
3	15	0.38	0.94	869.71	292	253	251	65	88	87	4.0		9.8
4	20	0.38	0.94	872.46	293	249	249	61	89	87	4.0		10.5
5	25	0.58	1.4	875.920	294	251	251	59	89	88	5.5		10.4 k=2.40
2-1	30	0.59	1.4	879.37	297	250	249	61	89	87	5.5		875.960 -0.040
2	35	0.39	0.94	882.16	297	251	250	62	90	87	4.0		
3	40	0.38	0.91	884.89	295	249	250	63	90	88	4.0		
4	45	0.49	1.2	888.05	295	250	251	63	90	88	5.0		Dry Knob was bumped
5	50	2.60	6.4	891.565	295	250	250	63	91	89	5.5		891.600
3-1	55	0.38	0.91	894.34	292	250	250	64	90	89	4.0		0.035
2	60	0.41	0.98	897.17	294	250	249	64	90	89	4.0		
				76.510									
	Total	*		76.6100									
	Average	0.1794	1.1236		294.5200				89.5200				

* Sum of square roots: 12.61 BW 28 3531 2121

Circle correct bracketed units on data sheet.

QA/QC PB

Date 6/24/09

CleanAir ENGINEERING

TEST LOCATION: FT-outlet Mercury TESTING METHOD: 29 PAGE 2 OF 2

UNIT: 1 RUN: 2

FIELD DATA SHEET

Client: Wheelabrator	Project No.: 60735
Plant: N. Braunfels	Date: 9/24/09
Meter Operator: P. Bihun	
Probe Operator: P. Bihun	

Cross-Section of Test Location

[N] [UP]

Amb. Temp. (°F)	Bar. Press. (in. Hg) [mbar]
Probe I.D. No.	
Liner Material	

Meter Box	Sample Box No.
Meter Y_d	Meter $\Delta H_@$
K Factor	Pitot C_p
Leak Rate Before [cfm] [Lpm] @ (in. Hg)	
Leak Rate After [cfm] [Lpm] @ (in. Hg)	
Pitot Leak Check Before: ☐	After: Good ☐ Bad ☐

Duct Dimensions (in.)

Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]

Filter No.		
Thimble No.		
Nozzle Diameter	Nozzle I.D.	

Start Time:	Stop Time:

Traverse Point Number	Min/pt / Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points	Filter T_f (°F) Set Points	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes
						250	250						O_2
3	65	0.44	1.1	900.22	291	251	250	64	90	89	5	N/A	
4	70	0.54	1.3	903.58	291	250	249	56	92	89	5		
5	75	0.58	1.4	907.040	295	250	250	54	91	89	5.5		907.040
4-1	80	0.43	1.0	909.96	294	249	250	58	89	89	4		-0.045
2	85	0.41	0.98	912.77	295	249	250	57	90	89	4.5		
3	90	0.44	1.1	915.81	295	250	250	58	90	89	5		
4	95	0.57	1.3	919.15	295	250	250	58	92	89	5.5		
5	100	0.57	1.4	922.670	291	250	250	59	93	90	6		922.710
5-1	105	0.42	1.0	925.57	292	250	251	63	92	90	4.5		-0.04
2	110	0.45	1.1	928.59	295	250	250	62	90	90	5		
3	115	0.51	1.2	931.84	291	250	250	64	93	90	5.5		
4	120	0.55	1.3	935.19	296	251	250	65	94	91	5.5		
5	125	0.54	1.3	938.530	295	250	251	65	94	91	5.5	✓	
	Total	*											
	Average												

* Sum of square roots. 15.48

Circle correct bracketed units on data sheet.

QA/QC FB

Date 9/24/09

CleanAir ENGINEERING

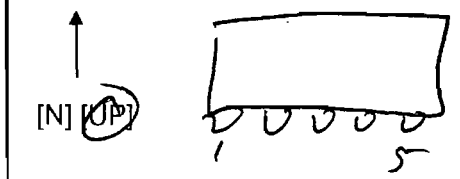
TEST LOCATION: FF Outlet Mercury TESTING METHOD: 29 PAGE 1 OF 2

UNIT: 1 RUN: 3

FIELD DATA SHEET

Client	Wheelabrator	Project No.	6735
Plant	N. Broward	Date	6/24/09
Meter Operator	R. Bilgen		
Probe Operator	R. Bilgen		

Cross-Section of Test Location



Amb. Temp. (°F)	90	Bar. Press.	29.70 [in. Hg] [mbar]
Probe I.D. No.	67-F-13		
Liner Material	Glass		

Meter Box	5-4	Sample Box No.	M8
Meter Y_d	0.9976	Meter $\Delta H_@$	1.7721
K Factor	7.50	Pitot C_p	0.834 0.84 SB
Leak Rate Before	0.003 [cfm] [Lpm]	@	13 (in. Hg)
Leak Rate After	0.003 [cfm] [Lpm]	@	12 (in. Hg)
Pitot Leak Check Before:	☒	After: Good ☒ Bad ☐	

Duct Dimensions (in.)	96 x 96		
Static Pres (in. H_2O)	Port Len. (in.)	Gas Flow [IN] [Out] of page	First point all the way [In] [Out]
-10.3	10.0		

Filter No.	N/A		
Thimble No.	N/A		
Nozzle Diameter	0.247 0.270 PB	Nozzle I.D.	247-1 PB 270-1

Start Time:	13:17	Stop Time:	15:27

Traverse Point Number	Min/pt Elapsed Time	Velocity Head ΔP (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Gas Sample Volume V_m Init. Vol. [ft³] [L] 940.655	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 250	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes O2
5-1	5	0.46	1.2	943.86	295	255	255	65	90	92	5	N/A	10.3
2	10	0.40	1.0	946.73	295	254	255	65	90	91	4		10.4
3	15	0.48	1.2	949.91	295	254	256	63	91	92	5		10.5
4	20	0.61	1.5	953.41	296	250	251	60	92	93	6		10.1
5	25	0.58	1.5	956.975	296	250	251	59	92	92	6		10.2 957.910
4-1	30	0.40	1.0	959.85	293	250	250	62	94	93	4		10.3 -0.03 SB
2	35	0.39	0.98	962.73	295	250	249	63	94	93	4		9.8
3	40	0.49	1.2	965.88	296	250	250	64	93	93	5		10.4
4	45	0.53	1.3	969.23	296	251	252	63	94	93	5		9.3
5	50	0.55	1.4	972.705	295	250	252	63	93	93	5.5		9.6 972.738
3-1	55	0.41	1.0	975.59	295	250	250	65	94	93	4		10.4 -0.03
2	60	0.39	0.98	978.476	295	250	249	65	94	94	4.5		10.5
	Total	17.0756		78.425									
	Average	0.6630	1.1816	78.425	294.7600					94.0000			

Sum of square roots: 14.26 78.595 38

Circle correct bracketed units on data sheet. 354 QA/QC PB Date 6/24/09

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CleanAir ENGINEERING

TEST LOCATION: FF Outlet — Mercury **TESTING** **METHOD:** 29 **PAGE** 2 **OF** 2

UNIT: 1 **RUN:** 3

FIELD DATA SHEET

Client	Weyerhaeuser	Project No.	10755
Plant	Ft. Bragg	Date	6/24/09
Meter Operator	R. Bilyeu		
Probe Operator	R. Bilyeu		

Cross-Section of Test Location

[N] [UP]

Amb. Temp. (°F)	Bar. Press. [in. Hg] [mbar]
Probe I.D. No.	
Liner Material	

Meter Box		Sample Box No.	
Meter Y_d		Meter $\Delta H_@$	
K Factor		Pitot C_p	
Leak Rate Before	[cfm] [Lpm] @		(in. Hg)
Leak Rate After	[cfm] [Lpm] @		(in. Hg)
Pitot Leak Check Before: ☐	After: Good ☐ Bad ☐		

Filter No.			
Thimble No.			
Nozzle Diameter	Nozzle I.D.		

Duct Dimensions (in.)

Static Pres ($in. H_2O$)	Port Len. (in.)	Gas Flow [In] [Out] of page	First point all the way [In] [Out]

Start Time:	Stop Time:

Traverse Point Number	Min/pt 5 Elapsed Time	Velocity Head ΔP ($in. H_2O$)	Orifice Setting ΔH ($in. H_2O$)	Gas Sample Volume V_m Init. Vol. (ft³) [L]	Stack Temp. Ts (°F)	Probe T_p (°F) Set Points 210	Filter T_f (°F) Set Points 250	Cond. Temp. T_c (°F)	DGM Inlet $T_{m\,in}$ (°F)	DGM Outlet $T_{m\,out}$ (°F)	Pump Vacuum (in.Hg)	XAD Trap Temp. T_t (°F)	Notes O_2
3	65	0.45	1.1	981.45	296	250	249	66	95	94	5	N/A	10.0
4	70	0.52	1.3	984.79	291	251	250	62	95	94	5.5		10.6
5	75	0.55	1.4	988.260	296	250	250	59	96	94	5.5		9.8
2-1	80	0.55	1.4	991.76	294	250	250	61	94	95	6.0		10.5 (-0.01)
2	85	0.38	0.95	994.52	295	250	250	61	94	94	4.5		9.2
3	90	0.36	0.90	997.26	294	251	249	63	96	95	4.5		10.1
4	95	0.48	1.2	1000.50	294	250	249	64	97	95	5.5		9.4
5	100	0.57	1.4	1004.015	291	251	251	65	98	96	6		10.0
1-1	105	0.42	1.1	1007.66	293	250	250	64	95	96	5		10.8 (-0.01)
2	110	0.39	0.95	1009.89	291	250	250	64	95	96	5		9.9
3	115	0.38	0.95	1012.78	290	250	249	65	96	96	4.5		10.6
4	120	0.42	1.1	1015.69	294	250	250	64	96	96	5		10.2
5	125	0.58	1.5	1019.250	294	250	250	64	94	95	6		10.1
	Total	*											
	Average												

* Sum of squares roots.

Circle correct bracketed units on data sheet.

2477

QA/QC RB

Date 6/24/09

FDS005 General.xls, Feb 2002

CleanAir ENGINEERING

Impinger Weight Sheet

Client: Wheelabrator		Unit Name / Location: unit 1 out	
Plant: N. Broward	Job No: 10735	Method:	29

Run No: 1	Filter Type: Quartz		Sample Box No:	M8	
Date: 6/24/09	Lot No: NA		pH:	NA	
Analyst: B. Wilbe	Filter No: NA		Rinse:	NA	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	empty	747.1	438.9	308.2	
Impinger 2	5% HNO_3 10% H_2O_2	657.0	538.6	118.4	QA/QC: BW
Impinger 3	"	673.9	647.7	26.2	Date: 6/24/09
Impinger 4	empty	472.4	464.7	7.7	
Impinger 5	4% $KMnO_4$ 10% H_2SO_4	557.0	554.7	2.3	Total Weight (gm)
Impinger 6	"	561.9	562.1	-0.2	462.6
Impinger 7	Silica gel	723.5	~~709.1~~ 702.8	20.7	483.3

Run No: 2	Filter Type: Quartz		Sample Box No:	M5	
Date: 6/24/09	Lot No: NA		pH:	NA	
Analyst: BW	Filter No: NA		Rinse:	NA	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	empty	798.5	440.6	357.9	
Impinger 2	5% 10%	630.8	544.7	86.1	QA/QC: BW
Impinger 3	"	546.3	537.4	8.9	Date: 6/24/09
Impinger 4	empty	473.1	470.3	2.8	
Impinger 5	4% 10%	548.5	548.3	0.2	Total Weight (gm)
Impinger 6	"	538.7	538.4	0.3	456.2
Impinger 7	Silica Gel	747.7	729.1	18.6	474.8

Run No: 3	Filter Type: Quartz		Sample Box No:	M8	
Date: 6/24/09	Lot No: NA		pH:	NA	
Analyst: BW	Filter No: NA		Rinse:	NA	

	Contents	Gross Weight (gm)	Tare Weight (gm)	Net Weight Gain (gm)	
Impinger 1	empty	811.6	441.1	370.5	
Impinger 2	5% 10%	630.4	545.2	85.2	QA/QC: BW
Impinger 3	"	657.4	650.4	7.0	Date: 6/24/09
Impinger 4	empty	469.2	465.9	3.3	
Impinger 5	4% 10%	556.7	556.2	0.5	Total Weight (gm)
Impinger 6	"	564.5	563.9	0.6	467.1
Impinger 7	Silica gel	737.3	717.6	19.7	486.8

CleanAir. ENGINEERING

QA/QC: SD
Date: 7/16

ORSAT READINGS

TEST LOCATION: Unit 1 Out **PAGE** 1 **OF** 1

Client	Wheelabrator	Project Number	10735	$Fo = \frac{20.9 - \%O_2}{\%CO_2}$
Plant	N. Broward's	Unit	1	
Orsat ID		Fuel Type	Waste	Leak Check Passed ☑

Run Number	Method Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	F_O	Analyst	Analysis Date	Analysis Time
1	29	1	10.7	19.6	8.9	1.1215	B. Wilkie	6/24/09	1125
		2	10.7	19.6	8.9				
		3	10.7	19.6	8.9				
		Avg.	10.7	19.6	8.9				
2	29	1	11.0	19.5	8.5	1.1273	BW	6/24/09	1329
		2	11.0	19.5	8.5				
		3	11.0	19.5	8.5				
		Avg.	11.0	19.5	8.5				
3	29	1	10.4	19.6	9.2	1.1250	BW	6/24/09	1610
		2	10.4	19.6	9.2				
		3	10.4	19.6	9.2				
		Avg.	10.4	19.6	9.2				
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							
		1							
		2							
		3							
		Avg.							

Repeat the analysis procedure until the results of any three analyses differ by no more than 0.2 percent by volume
Average the three acceptable values and report the results to the nearest 0.1 percent. Calculate$_O$ to verify results

Acceptable ranges for F_O:

Coal:	Anthracite and Lignite	1.016-1.130	Gas:	Natural	1.600-1.836
	Bituminous	1.083-1.230		Propane	1.434-1.586
Oil:	Distillate	1.260-1.413		Butane	1.405-1.553
	Residual	1.210-1.370	Wood		1.000-1.120
Municipal Solid Waste		1.030-1.300	Wood Bark		1.003-1.130

QA/QC BW
Date 6/24/09

FIELD DATA PRINTOUTS

F

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Field Data Printout

Test Method: **USEPA Method 29**
Analyte: **Trace Metals**

Location: Unit 1 Outlet
Test Run: 1
Client: Wheelabrator
Project No: 10735
Source Area (ft²): 64.00000
Meter Operator: P. Bihun 505
Probe Operator: P. Bihun 505
Test Date: 6/24/09
Start Time: 08:00
Stop Time: 10:21
Leak Rate Before: 0.003 cfm @ 15 "Hg
Leak Rate After: 0.002 cfm @ 10 "Hg

Bar. Press. (in. Hg): 29.70
Static P: -10.3
O_2 (dry volume %): 8.90
CO_2 (dry volume %): 10.70
N_2+CO (dry volume %): 80.40
H_2O (condensate, ml or gm): 462.6
H_2O (silica, g): 20.7
Actual Moisture (%): 23.45

Nozzle ID No: 268-1
Nozzle Diameter (D_n): 0.268
Probe ID No: 67-8-19
Pitot C_p: 0.8340
Pitot Leak Check: ☑ Pass ☐ Fail
Meter Box ID. No: 85-4
Meter ΔH@: 1.77210
Meter Y_d: 0.98760

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter $T_{m\text{-}in}$ (°F)	Dry Gas Meter $T_{m\text{-}out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{in.\ H_2O}$)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			783.335						
5-01	5.0	0.39	0.97	786.110	293	78	76	0.62	2.77	101.0
5-02	10.0	0.43	1.10	789.120	293	77	77	0.66	3.01	104.4
5-03	15.0	0.51	1.30	792.430	294	79	77	0.71	3.31	105.3
5-04	20.0	0.60	1.50	795.960	295	81	77	0.77	3.53	103.5
5-05	25.0	0.59	1.50	799.490	295	83	78	0.77	3.53	104.0
Leak Check				799.550						
4-01	30.0	0.45	1.10	802.570	292	83	79	0.67	3.02	101.5
4-02	35.0	0.43	1.10	805.600	293	84	80	0.66	3.03	104.1
4-02	36.0	0.43	1.10	806.310	293	84	80	0.66	0.71	121.9*
Leak Check				806.515						
4-03	40.0	0.46	1.10	808.840	294	85	80	0.68	2.33	77.2*
4-04	45.0	0.55	1.40	812.310	294	84	81	0.74	3.47	105.4
4-05	50.0	0.59	1.50	815.820	295	86	81	0.77	3.51	102.9
Leak Check				815.850						
3-01	55.0	0.56	1.40	819.250	294	86	82	0.75	3.40	102.1
3-02	60.0	0.43	1.10	822.330	295	85	82	0.66	3.08	105.6
3-03	65.0	0.45	1.10	825.370	295	86	83	0.67	3.04	101.7
3-04	70.0	0.55	1.40	828.950	295	86	83	0.74	3.58	108.5
3-05	75.0	0.55	1.40	832.330	295	86	83	0.74	3.38	102.4
Leak Check				832.365						
2-01	80.0	0.55	1.40	835.800	294	86	83	0.74	3.43	104.0
2-02	85.0	0.39	0.97	838.620	294	88	84	0.62	2.82	101.0
2-03	90.0	0.35	0.87	841.270	293	88	84	0.59	2.65	100.1
2-04	95.0	0.49	1.20	844.470	294	87	85	0.70	3.20	102.3
2-05	100.0	0.50	1.20	847.675	294	87	85	0.71	3.20	101.4
Leak Check				847.720						
1-01	105.0	0.21	0.52	849.760	293	86	84	0.46	2.04	99.6
1-02	110.0	0.41	1.00	852.610	293	86	85	0.64	2.85	99.6
1-03	115.0	0.39	0.97	855.460	288	88	85	0.62	2.85	101.6
1-04	120.0	0.38	0.94	858.220	292	88	85	0.62	2.76	99.9
1-05	125.0	0.50	1.20	861.460	293	88	85	0.71	3.24	102.4
Final	125.0		1.16960	77.75000	293.60000	83.30000		0.68085	77.75000	
25 points sampled		Sq:Rt.ΔP								
QC-Check: Field Averages			1.1696	77.7500	293.6000	83.3000				
		☐Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Field Data Printout

Test Method: USEPA Method 29
Analyte: Trace Metals

Location: Unit 1 Outlet
Test Run: 2
Client: Wheelabrator
Project No: 10735
Source Area (ft²): 64.00000
Meter Operator: P. Bihun 505
Probe Operator: P. Bihun 505
Test Date: 6/24/09
Start Time: 10:44
Stop Time: 12:55
Leak Rate Before: 0.003 cfm @ 13 "Hg
Leak Rate After: 0.003 cfm @ 10 "Hg

Bar. Press. (in. Hg): 29.70
Static P: -10.3
O_2 (dry volume %): 8.50
CO_2 (dry volume %): 11.00
N_2+CO (dry volume %): 80.50

H_2O (condensate, ml or gm): 456.2
H_2O (silica, g): 18.6
Actual Moisture (%): 23.62

Nozzle ID No: 268-1
Nozzle Diameter (D_n): 0.268
Probe ID No: 67-8-19
Pitot C_p: 0.8340
Pitot Leak Check: ☑ Pass ☐ Fail

Meter Box ID. No: 85-4
Meter ΔH@: 1.77210
Meter Y_d: 0.98760

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter $T_{m\text{-}in}$ (°F)	Dry Gas Meter $T_{m\text{-}out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{}$in. H_2O)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			861.860						
1-01	5.0	0.25	0.62	864.140	293	86	86	0.50	2.28	102.1
1-02	10.0	0.39	0.97	866.930	294	87	87	0.62	2.79	100.0
1-03	15.0	0.38	0.94	869.710	292	88	87	0.62	2.78	100.7
1-04	20.0	0.38	0.94	872.460	293	89	87	0.62	2.75	99.6
1-05	25.0	0.58	1.40	875.920	294	89	88	0.76	3.46	101.5
Leak Check				875.960						
2-01	30.0	0.59	1.40	879.370	297	89	87	0.77	3.41	99.5
2-02	35.0	0.39	0.94	882.160	297	90	87	0.62	2.79	99.9
2-03	40.0	0.38	0.91	884.890	295	90	88	0.62	2.73	98.8
2-04	45.0	0.49	1.20	888.080	295	90	88	0.70	3.19	101.7
2-05	50.0	0.60	1.40	891.565	295	91	89	0.77	3.49	100.3
Leak Check				891.600						
3-01	55.0	0.38	0.91	894.340	292	90	89	0.62	2.74	98.9
3-02	60.0	0.41	0.98	897.170	294	90	89	0.64	2.83	98.5
3-03	65.0	0.44	1.10	900.220	295	90	89	0.66	3.05	102.5
3-04	70.0	0.54	1.30	903.580	295	92	89	0.73	3.36	101.8
3-05	75.0	0.58	1.40	907.040	295	91	89	0.76	3.46	101.3
Leak Check				907.085						
4-01	80.0	0.43	1.00	909.960	294	89	89	0.66	2.88	97.8
4-02	85.0	0.41	0.98	912.770	295	90	89	0.64	2.81	97.8
4-03	90.0	0.44	1.10	915.810	295	90	89	0.66	3.04	102.2
4-04	95.0	0.55	1.30	919.150	295	92	89	0.74	3.34	100.3
4-05	100.0	0.57	1.40	922.670	295	93	90	0.75	3.52	103.7
Leak Check				922.710						
5-01	105.0	0.42	1.00	925.570	292	92	90	0.65	2.86	97.9
5-02	110.0	0.45	1.10	928.590	295	90	90	0.67	3.02	100.3
5-03	115.0	0.51	1.20	931.840	295	93	90	0.71	3.25	101.1
5-04	120.0	0.55	1.30	935.190	296	94	91	0.74	3.35	100.3
5-05	125.0	0.54	1.30	938.530	295	94	91	0.73	3.34	100.9
Final	125.0		1.12360	76.51000	294.52000	89.52000		0.67938	76.51000	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Fisld Averages			1.1236	76.5100	294.5200	89.5200				
		☐ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK	☑ Avg. OK				

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Field Data Printout

Test Method: **USEPA Method 29**
Analyte: **Trace Metals**

Location: Unit 1 Outlet
Test Run: 3
Client: Wheelabrator
Project No: 10735
Source Area (ft²): 64.00000

Meter Operator:		P. Bihun	505
Probe Operator:		P. Bihun	505

Test Date: 6/24/09
Start Time: 13:17
Stop Time: 15:27
Leak Rate Before: 0.003 cfm @ 13 "Hg
Leak Rate After: 0.003 cfm @ 12 "Hg

Bar. Press. (in. Hg): 29.70
Static P: -10.3
O_2 (dry volume %): 9.20
CO_2 (dry volume %): 10.40
N_2+CO (dry volume %): 80.40

H_2O (condensate, ml or gm): 467.1
H_2O (silica, g): 19.7
Actual Moisture (%): 23.77

Nozzle ID No: 270-1
Nozzle Diameter (D_n): 0.270
Probe ID No: 67-8-19
Pitot C_p: 0.8340
Pitot Leak Check: ☑Pass ☐Fail

Meter Box ID. No: 85-4
Meter ΔH@: 1.77210
Meter Y_d: 0.98760

Traverse Point	Run Time 5.0 min/read	Pitot ΔP_s (in. H_2O)	Sample ΔH (in. H_2O)	Metered (dcf)	Stack T_s (°F)	Dry Gas Meter $T_{m\text{-}in}$ (°F)	Dry Gas Meter $T_{m\text{-}out}$ (°F)	$\sqrt{\Delta P_s}$ (calculated) ($\sqrt{}$in. H_2O)	Volume (calculated) (ft^3)	Isokinetics (calculated) (%)
	0.0			940.655						
5-01	5.0	0.46	1.20	943.860	295	90	92	0.68	3.21	103.6
5-02	10.0	0.40	1.00	946.730	295	90	91	0.63	2.87	99.6
5-03	15.0	0.48	1.20	949.900	295	91	92	0.69	3.17	100.3
5-04	20.0	0.61	1.50	953.450	296	92	93	0.78	3.55	99.5
5-05	25.0	0.58	1.50	956.975	296	92	92	0.76	3.52	101.5
				957.010						
4-01	30.0	0.40	1.00	959.850	293	94	93	0.63	2.84	97.9
4-02	35.0	0.39	0.98	962.730	295	94	93	0.62	2.88	100.6
4-03	40.0	0.49	1.20	965.880	296	93	93	0.70	3.15	98.4
4-04	45.0	0.53	1.30	969.230	296	94	93	0.73	3.35	100.6
4-05	50.0	0.55	1.40	972.705	295	93	93	0.74	3.48	102.4
				972.735						
3-01	55.0	0.41	1.00	975.590	295	94	93	0.64	2.86	97.3
3-02	60.0	0.39	0.98	978.460	295	94	94	0.62	2.87	100.2
3-03	65.0	0.45	1.10	981.450	296	95	94	0.67	2.99	97.2
3-04	70.0	0.52	1.30	984.790	295	95	94	0.72	3.34	101.0
3-05	75.0	0.55	1.40	988.260	296	96	94	0.74	3.47	102.0
				988.315						
2-01	80.0	0.55	1.40	991.760	294	94	95	0.74	3.44	101.2
2-02	85.0	0.38	0.95	994.560	295	94	94	0.62	2.80	99.0
2-03	90.0	0.36	0.90	997.260	294	96	95	0.60	2.70	97.8
2-04	95.0	0.48	1.20	1000.500	296	97	95	0.69	3.24	101.7
2-05	100.0	0.57	1.40	1004.015	295	98	96	0.75	3.51	101.1
				1004.065						
1-01	105.0	0.42	1.10	1007.060	293	95	96	0.65	2.99	100.4
1-02	110.0	0.39	0.98	1009.890	295	95	96	0.62	2.83	98.5
1-03	115.0	0.38	0.95	1012.780	290	96	96	0.62	2.89	101.5
1-04	120.0	0.42	1.10	1015.690	294	96	96	0.65	2.91	97.5
1-05	125.0	0.58	1.50	1019.250	294	94	95	0.76	3.56	101.9
Final	125.0		1.18160	78.42500	294.76000	94.00000		0.68302	78.42500	
25 points sampled		Sq.Rt.ΔP								
QC-Check: Field Averages			1.1816	78.4250	294.7600	94.0000				
		☐Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK	☑Avg. OK				

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Date _____

USEPA Method 4 Laboratory Data

Location: Unit 1 Outlet
Client: Wheelabrator
Project No: 10735

Test Method: **USEPA Method 29**
Analyte: **Trace Metals**
Analyst: B. Wiltse
Analyst Emp No: 561

Test Run: 1

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	747.1	438.9	308.2
Impinger 2	5%HNO3/10%H2O2	657.0	538.6	118.4
Impinger 3	5%HNO3/10%H2O2	673.9	647.7	26.2
Impinger 4	Empty	472.4	464.7	7.7
Impinger 5	4%KMnO4/10%H2SO4	557.0	554.7	2.3
Impinger 6	4%KMnO4/10%H2SO4	561.9	562.1	-0.2
Impinger 7	Silica Gel	723.5	702.8	20.7
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
462.6	Liquid (gm)		
0.0	less rinse (gm)		
462.6	Net Liquid (gm)	462.6	☑QA/QC OK
+ 20.7	Silica Gel (gm)	20.7	☑QA/QC OK
483.3	Total Vlc (gm)	483.3	☑QA/QC OK

Test Run: 2

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	798.5	440.6	357.9
Impinger 2	5%HNO3/10%H2O2	630.8	544.7	86.1
Impinger 3	5%HNO3/10%H2O2	546.3	537.4	8.9
Impinger 4	Empty	473.1	470.3	2.8
Impinger 5	4%KMnO4/10%H2SO4	548.5	548.3	0.2
Impinger 6	4%KMnO4/10%H2SO4	538.7	538.4	0.3
Impinger 7	Silica Gel	747.7	729.1	18.6
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
456.2	Liquid (gm)		
0.0	less rinse (gm)		
456.2	Net Liquid (gm)	456.2	☑QA/QC OK
+ 18.6	Silica Gel (gm)	18.6	☑QA/QC OK
474.8	Total Vlc (gm)	474.8	☑QA/QC OK

Test Run: 3

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty	811.6	441.1	370.5
Impinger 2	5%HNO3/10%H2O2	630.4	545.2	85.2
Impinger 3	5%HNO3/10%H2O2	657.4	650.4	7.0
Impinger 4	Empty	469.2	465.9	3.3
Impinger 5	4%KMnO4/10%H2SO4	556.7	556.2	0.5
Impinger 6	4%KMnO4/10%H2SO4	564.5	563.9	0.6
Impinger 7	Silica Gel	737.3	717.6	19.7
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
467.1	Liquid (gm)		
0.0	less rinse (gm)		
467.1	Net Liquid (gm)	467.1	☑QA/QC OK
+ 19.7	Silica Gel (gm)	19.7	☑QA/QC OK
486.8	Total Vlc (gm)	486.8	☑QA/QC OK

Test Run:

	Contents	Gross (gm)	Tare (gm)	Net (gm)
Impinger 1	Empty			
Impinger 2	5%HNO3/10%H2O2			
Impinger 3	5%HNO3/10%H2O2			
Impinger 4	Empty			
Impinger 5	4%KMnO4/10%H2SO4			
Impinger 6	4%KMnO4/10%H2SO4			
Impinger 7	Silica Gel			
Impinger 8				

Rinse: (ml or gm)

		Field Data Check	
	Liquid (gm)		
	less rinse (gm)		
	Net Liquid (gm)		☐QA/QC OK
	Silica Gel (gm)		☐QA/QC OK
	Total Vlc (gm)		☐QA/QC OK

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USEPA Method 3 Laboratory Data

Location: Unit 1 Outlet
Client: Wheelabrator
Project No: 10735
Method: EPA Method 3A
Fuel Type: Municipal Waste
F_o for Fuel: 1.03 to 1.3

Test Method: **USEPA Method 29**
Analyte: **Trace Metals**

Analyst: B. Wiltse
Analyst Emp No: 561

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
1	1	10.7	19.6	8.9	80.4	30.07		
	2	10.7	19.6	8.9	80.4	30.07		
	3	10.7	19.6	8.9	80.4	30.07		
	Avg.	10.70000		8.90000	80.40000	30.07	1.12150	
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
2	1	11.0	19.5	8.5	80.5	30.10		
	2	11.0	19.5	8.5	80.5	30.10		
	3	11.0	19.5	8.5	80.5	30.10		
	Avg.	11.00000		8.50000	80.50000	30.10	1.12727	
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis: Orsat
3	1	10.4	19.6	9.2	80.4	30.03		
	2	10.4	19.6	9.2	80.4	30.03		
	3	10.4	19.6	9.2	80.4	30.03		
	Avg.	10.40000		9.20000	80.40000	30.03	1.12500	
CEM or Other Avg:								☑ Fo value within expected range.

Run Number	Trial	Percent CO_2	Percent O_2+CO_2	Percent O_2	Percent N_2	Dry Mol. Weight	F_o	Method of Analysis:
	1							
	2							
	3							
	Avg.							
CEM or Other Avg:								☐ Fo value within expected range.

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LABORATORY DATA

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Wheelabrator
Clean Air Project No: 10735
Unit 1 Outlet

USEPA Method 29
Mercury (Hg) Laboratory Parameters

Blank Analysis				
m_{1b-B}	Fraction 1B Blank (µg)	<0.1000		
m_{2b-B}	Fraction 2B Blank (µg)	<0.3000		
m_{3a-B}	Fraction 3A Blank (µg)	<0.2000		
m_{3b-B}	Fraction 3B Blank (µg)	<0.5000		
m_{3c-B}	Fraction 3C Blank (µg)	<0.4000		
$m_{total-B}$	Total Blank Amount (µg)	<1.5000		
Run No.		**1**	**2**	**3**
Date (2009)		Jun 24	Jun 24	Jun 24
Start Time (approx.)		08:00	10:44	13:17
Stop Time (approx.)		10:21	12:55	15:27
Sample Analysis				
m_{1b-S}	Fraction 1B Sample (µg)	<0.1000	<0.1000	0.5625
m_{2b-S}	Fraction 2B Sample (µg)	9.5093	9.4341	11.2172
m_{3a-S}	Fraction 3A Sample (µg)	<0.2000	<0.2000	<0.2000
m_{3b-S}	Fraction 3B Sample (µg)	<0.5000	<0.5000	<0.5000
m_{3c-S}	Fraction 3C Sample (µg)	0.4561	0.5362	0.7710
$m_{total-S}$	Total Sample Amount (µg)	9.9654	9.9703	12.5508
Allowable Blank				
$m_{T-B-allow}$	Total Allowable Blank (µg)	0.0000	0.0000	0.0000
Sample Corrected for Blank				
m_n	Total Sample Amount (µg)	9.9654	9.9703	12.5508
Sample Corrected for Blank				
m_{n-1b}	Fraction 1B (µg)	<0.1000	<0.1000	0.5625
m_{n-2b}	Fraction 2B (µg)	9.5093	9.4341	11.2172
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)	0.4561	0.5362	0.7710

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Date _____

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Clean Air Engineering, Inc.

500 West Wood Street
Palatine, IL 60067

Project Number: 10735

Mercury

EPA Method 29 Analysis

Analytical Report
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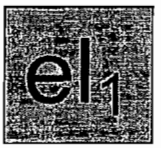

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com

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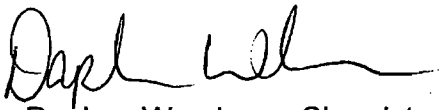
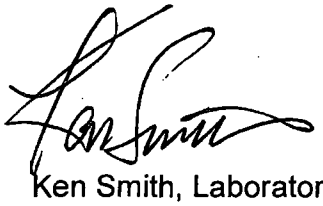
The following data for Analytical Report 12714
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:



Daphne Woodman, Chemist
July 3, 2009

Report Reviewed and Finalized By:



Ken Smith, Laboratory Director
July 3, 2009

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SUMMARY OF RESULTS

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Summary of Analysis

Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front half µg	H_2O_2 /HNO_3 µg	Empty Impinger µg	$KMnO_4$ µg	HCl µg
U1 FF Outlet R1	#1	10.0	< 0.1	9.49	< 0.2	< 0.5	0.457
	#2		< 0.1	9.53	< 0.2	< 0.5	0.456
U1 FF Outlet R2	#1	10.0	< 0.1	9.45	< 0.2	< 0.5	0.532
	#2		< 0.1	9.42	< 0.2	< 0.5	0.540
U1 FF Outlet R3	#1	12.6	0.564	11.2	< 0.2	< 0.5	0.778
	#2		0.561	11.2	< 0.2	< 0.5	0.764
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	< 0.3	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.3	< 0.2	< 0.5	< 0.4

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ANALYTICAL NARRATIVE

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Element One Analytical Narrative

Client:	Clean Air, IL	Element One #:	12714
Client ID:	10735/North Broward	Analyst:	ESS
Method:	Method 29	Dates Received:	06/25/09
Analytes:	Hg	Dates Analyzed:	06/29/09-07/01/09

Summary of Analysis

The Method 29 samples were digested, prepared, and analyzed according to Method 29 protocol. Samples were analyzed for mercury on a PerkinElmer FIMS-100 CVAA mercury analyzer.

Detection Limits

The FIMS-100 CVAA instrument reporting limit for mercury was 0.004 µg per aliquot analyzed.

Analysis QA/QC

Duplicate analyses relative percent difference (RPD) and spike sample recovery data are summarized in the Quality Control Section. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values.

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QUALITY CONTROL SUMMARY

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Summary of Quality Control Data

Mercury Duplicate Analysis RPD

(Method 29 QC limits: < %10 for RPD)

Run Number	Front half	H_2O_2/HNO_3	Empty Imp	$KMnO_4$	HCl
U1 FF Outlet R1	NA	0.5%	NA	NA	0.2%
U1 FF Outlet R2	NA	0.3%	NA	NA	1.4%
U1 FF Outlet R3	0.7%	0.3%	NA	NA	1.8%
Field Blank	NA	NA	NA	NA	NA
Reagent Blank	NA	NA	NA	NA	NA

Mercury Spike Recoveries

(Method 29 QC limits: ±25% for Spike Recoveries)

Run Number		Front half	H2O2/HNO4	Empty Imp	KMnO4	HCl
U1 FF Outlet R3	#1	97%	90%	114%	108%	98%
	#2	98%	88%	113%	106%	97%

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SAMPLE CUSTODY

CHAIN OF CUSTODY FORM

e12714 201391

CLIENT Weyerhaeuser | PROJECT NO. 10735 | PAGE 1 OF 3
PLANT N. Brawards | DEPT. 66 | REVISION NO. ____
PROJECT MANAGER S. Brown | RECOVERY PERSON: B. Wiltse
JOB LEADER B. Wiltse

CAE LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Metals including Hg	ADDITIONAL INFORMATION
	0	Unit 1 Outlet	6/24/09	Field Blank Imp 5-6	1		X	
	1			Imp 5-6 Knockdowns	1		X	
	2			↓	1		X	
	3			↓	1		X	
	NA			Reagent Blank 4% HNO3 10% HCl	1		X	
	0			Field Blank Filter	1		X	
	1			Filter	1		X	
	2			Filter	1		X	
	3			Filter	1		X	
	NA	↓	↓	Reagent Blank Filters	1		X	

Relinquished by:(Signature)	Date/Time	Received by:(Signature)	Date/Time	Relinquished by:(Signature)	Date/Time
Courier:	Date/Time	Relinquished by:(Signature)	Date/Time	Rec'd for Analysis by: Paul Smith	Date/Time 6.25.09 1053

Special Handling Instructions

Forwarding Lab: Element One

PO Number:

This form was completed by: B. Wiltse

Signature B. Wiltse Date 6/24/09

All samples for CAE 10735 received in Good Condition via Fed Ex

Clean Air Engineering
500 West Wood Street
Palatine, IL 60067
800-627-0033 Fax (847) 991-3385

DS COC Palatine
EXCL.R0-6/7/96

CHAIN OF CUSTODY FORM

e12714

201392

CLIENT Wheelabrator
PLANT N. Broward
PROJECT MANAGER S. Brown
JOB LEADER B. Wiltse

PROJECT NO. 10735
DEPT. 66
RECOVERY PERSON: B. Wiltse

PAGE 2 OF 3
REVISION NO. ____
ADDITIONAL INFORMATION

CAE LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	Metals including Hg	ANALYSIS REQUESTED			
	0	WTF Outlet	6/24/09	SN rinse field blank	1		X				
	1			SN rinse	1		X				
	2			SN rinse	1		X				
	3			SN rinse	1		X				
	0			Field blank Imp 4 rinse	1		X				
	1			Imp. 4 rinse	1		X				
	2			Imp 4 rinse	1		X				
	3			Imp 4 rinse	1		X				
	NA			reagent blank 5N HCl	1		X				
	NA			reagent blank 0.1 N HNO3	1		X				
	NA			reagent blank DI H2O	1		X				

Relinquished by:(Signature)	Date/Time	Received by:(Signature)	Date/Time	Relinquished by:(Signature)	Date/Time
Courier:	Date/Time	Relinquished by:(Signature)	Date/Time	Rec'd for Analysis by: Paul Smith	Date/Time 6-25-09 1053

Special Handling Instructions

Forwarding Lab: ElementOne

PO Number:

This form was completed by: B. Wiltse

Signature B. Wiltse Date 6/24/09

Vic Fed Ex

Clean Air Engineering
500 West Wood Street
Palatine, IL 60067
800-627-0033 Fax (847) 991-3385

DS COC Palatine
EXCLR0-6/7/96

CHAIN OF CUSTODY FORM

e12714

201393

CLIENT Wheelabrator
PLANT N. Browards
PROJECT MANAGER S. Brown
JOB LEADER B. Wilkse

PROJECT NO. 10735
DEPT. 66
RECOVERY PERSON: B. Wilkse

PAGE 3 OF 3
REVISION NO. ____
ADDITIONAL INFORMATION

CAE LAB NO.	RUN NO.	TEST LOCATION	DATE	SAMPLE MATRIX	NO. OF CONTAINERS	ORIGINAL VOLUME	ANALYSIS REQUESTED: Metals (Method 29)			
	0	Unit 1 outlet	6/24/09	Field Blank Imp 1-3 rinse	1		X			
	1			Imp 1-3 rinse	1		X			
	2			Imp 1-3 rinse	1		X			
	3			Imp 1-3 rinse	1		X			
	NA			5% HNO3 w/ 10% H2O2 Reg. Wash	1		X			
	0			Field Blank FH HNO3	1		X			
	1			FH rinse	1		X			
	2			FH rinse	1		X			
	3			FH rinse	1		X			

Relinquished by:(Signature)	Date/Time	Received by:(Signature)	Date/Time	Relinquished by:(Signature)	Date/Time
Courier:	Date/Time	Relinquished by:(Signature)	Date/Time	Rec'd for Analysis by: Paula Smith	Date/Time 6-25-09 1053

Special Handling Instructions

Forwarding Lab: Element One

PO Number:

This form was completed by: B. Wilkse

Signature: B. Wilkse Date: 4/24/09

Via FedEx

Clean Air Engineering
500 West Wood Street
Palatine, IL 60067
800-627-0033 Fax (847) 991-3385

DS COC Palatine
EXCL.F0-6/7/99

ANALYTICAL DATA

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Analytical Calculations

Mercury-

$$\textbf{Mercury Results (µg)} = \frac{\textbf{CVAA Results (µg)}}{\textbf{Aliquot (ml)}} * \textbf{Final Volume (ml)}$$

Where-

CVAA Results= Raw sample reading (µg)--*Hg-Data Sheet*

Aliquot= Sample Aliquot (Alq.)--*Hg-Data Sheet*

Final Volume=Final Volume (FV)*--*Sample Submission*
* With the exception of the BH fraction where-
=Received Volume (BV)--*Sample Submission*

Analytical Calculations

Spike Recovery-

$$\text{Spike (\%)} = \frac{\text{(Spiked Result (µg/L) – Sample Result (µg/L))}}{\text{Spike Amount (µg/L)}} \quad \text{X100}$$

Where-

Spike Result = Raw sample concentration (ppb)--*ICP-Data Sheet*

Sample Result = Raw sample concentration (ppb)--*ICP-Data Sheet*

Spike Amount--*ICP-MS Spike Table*

Duplicate Analysis RPD-

$$\text{RPD (\%)} = \frac{\text{(Duplicate Result (µg/L) - Sample Result (µg/L))}}{\text{Average (µg/L)}} \quad \text{X100}$$

Where-

Sample Result and Duplicate Results=Raw sample concentration (ppb)--*ICP-Data Sheet*

$$\text{Average} = \frac{\text{(Duplicate + Sample Results)}}{2}$$

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 12714**

Analysis Due Date 07.03.09
QA/QC/Report Due Date 07.08.09

Client	Clean Air IL
Project No	10735

Date Rec	06.25.09
Time Rec	1053

HNO_3 Lot: 1103080	HF Lot: 5108040	HCl Lot: 4108108	**Ref. Method: 29 / 5**
Volume Marked (Y) N	Volume Loss Y / (N) ?		

Sample Identification

1	U1 FF Outlet R1	4	Field Blank		
2	U1 FF Outlet R2	5	Reagent Blank		
	U1 FF Outlet R2 Duplicate				
3	U1 FF Outlet R3				
	U1 FF Outlet R3 Spike				

Analyses Requested	Samples 1-5 Hg

Runs / FB	Fil / Ace (FH)		HNO_3 (FH)		5% HNO_3/10% H_2O_2 (BH)			HNO_3 (A)		$KMnO_4$ (B)		HCl (C)	
	pH <2.0 Y / N		pH <2.0 (Y) / N		pH <2.0 (Y) / N			pH <2.0 (Y) N		pH <2.0 (Y) N		pH <2.0 Y / N	
Lab ID	Fil ID	BV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
1			170	100	740			108	260	440	500	220	400
2.D			150		740			110		395		360	
3.S			148		740			104		390		220	
4			140		300		350	184		390		220	

M-29 Reagent Blank

Lab ID			Fraction	BV, ml	FV, ml	Comments
5	C-7	FH	Acetone Blank			
	C-8A	FH	0.1N HNO_3	350		
	C-8A	A	0.1N HNO_3			
	C-8B	B	DI H_2O			DI H_2O was received. BV = 163 ml
	C-9	BH	5% HNO_3/10% H_2O_2	250		
	C-10	B	4% $KMnO_4$/10%H_2SO_4	205	~~500~~	133 100ml used
	C-11	C	8N HCl DI H_2O	~~205~~ 230	400	
	C-12	FH	Filter			

Lab Communications

SS Page1 of 1
6/25/2009 2:45:09 PM
SS by KLB
Labeled By/Date CMC 06/25/09

FH Prep By/Date ES 6.29.09
BH Prep By/Date ES 6.29.09
BH/FH Prep By/Date —
PM Prep By / Date —

A Prep By/Date EMD 6-24-09
B Prep By/Date EMD 6.24.09
C Prep By/Date EMD 6-29-09
ID Verification By/Date RLC 6/26/09

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
Calib Blank	6/29/2009	12:09:44	0.0005595			µg			0.0005595					
STD1=.004ug	6/29/2009	12:10:59	0.00110694			µg			0.00110694					
STD2=.04ug	6/29/2009	12:12:15	0.01121716			µg			0.01121716					
STD3=.08ug	6/29/2009	12:13:32	0.0222484			µg			0.0222484					
STD4=.16ug	6/29/2009	12:14:51	0.04433038			µg			0.04433038					
STD5=.2ug	6/29/2009	12:16:10	0.05446698			µg			0.05446698					
0.004ug = DL	6/29/2009	12:19:13	0.00115598	0.00420843	0.00420843	µg			0.00115598	0.00420843	0.00420843			
0.080ug = STD.2	6/29/2009	12:20:30	0.02277943	0.08292999	0.08292999	µg			0.02277943	0.08292999	0.08292999			
0.080ug = QC STD 3	6/29/2009	12:21:50	0.02246205	0.08177453	0.08177453	µg			0.02246205	0.08177453	0.08177453			
0.004ug = DL	6/29/2009	14:59:34	0.00105323	0.00383436	0.00383436	µg	4	200	0.00105323	0.00383436	0.00383436			
0.080ug = STD.2	6/29/2009	15:00:51	0.02214019	0.0806028	0.0806028	µg	4	200	0.02214019	0.0806028	0.0806028			
REAGENT BLANK	6/29/2009	15:02:08	-0.0001131	-0.0004119	-0.0004119	µg	4	200	-0.0001131	-0.0004119	-0.0004119			
12714-1a	6/29/2009	15:07:23	0.00043054	0.00156741	0.07837053	µg	4	200	0.00044425	0.00161733	0.08086681	0.00041682	0.00151748	0.07587426
12714-2a	6/29/2009	15:09:08	0.00044083	0.00160487	0.0802438	µg	4	200	0.00042613	0.00155135	0.07756798	0.00045553	0.00165839	0.08291961
12714-2a dup	6/29/2009	15:10:53	0.00035462	0.00129104	0.06455222	µg	4	200	0.00037629	0.00136993	0.06849676	0.00033295	0.00121215	0.06060767
12714-3a	6/29/2009	15:12:40	0.00043355	0.00157837	0.07891865	µg	4	200	0.00041586	0.00151397	0.07569884	0.00045124	0.00164276	0.08213845
12714-3a spk	6/29/2009	15:14:26	0.024988	0.09097043	4.54852198	µg	4	200	0.02514054	0.09152575	4.57628762	0.02483547	0.09041512	4.52075635
12714-4a	6/29/2009	15:16:13	0.00025168	0.00091629	0.04581455	µg	4	200	0.00023057	0.00083942	0.04197114	0.0002728	0.00099315	0.04965796
12714-5a	6/29/2009	15:18:00	0.00018942	0.00068962	0.03448126	µg	4	200	0.00017069	0.00062141	0.03107065	0.00020816	0.00075783	0.03789186
0.004ug = DL	6/29/2009	15:21:03	0.0011468	0.004175	0.004175	µg	4	200	0.0011468	0.004175	0.004175			
0.080ug = STD.2	6/29/2009	15:22:21	0.02240677	0.0815733	0.0815733	µg	4	200	0.02240677	0.0815733	0.0815733			
REAGENT BLANK	6/29/2009	15:23:38	-0.0001243	-0.0004525	-0.0004525	µg	4	200	-0.0001243	-0.0004525	-0.0004525			
Calib Blank	6/30/2009	12:44:35	0.0004791			µg			0.0004791					
STD1=.004ug	6/30/2009	12:45:49	0.00107744			µg			0.00107744					
STD2=.04ug	6/30/2009	12:47:02	0.01126914			µg			0.01126914					
STD3=.08ug	6/30/2009	12:48:19	0.02274588			µg			0.02274588					
STD4=.16ug	6/30/2009	12:49:36	0.0445793			µg			0.0445793					
STD5=.2ug	6/30/2009	12:50:54	0.05566622			µg			0.05566622					
0.004ug = DL	6/30/2009	12:53:53	0.00107909	0.00386723	0.00386723	µg			0.00107909	0.00386723	0.00386723			
0.080ug = STD.2	6/30/2009	12:55:09	0.02192206	0.07856379	0.07856379	µg			0.02192206	0.07856379	0.07856379			
0.080ug = QC STD 3	6/30/2009	12:56:28	0.02059734	0.07381628	0.07381628	µg			0.02059734	0.07381628	0.07381628			
12714-1b	6/30/2009	12:59:28	0.00031173	0.00111719	0.13964979	µg	4	500	0.00032576	0.00116747	0.14593407	0.0002977	0.00106692	0.13336551
12714-2b	6/30/2009	13:01:11	0.00035941	0.00128805	0.16100653	µg	4	500	0.00033493	0.00120033	0.15004214	0.00038388	0.00137576	0.17197091
12714-2b dup	6/30/2009	13:02:56	0.00027153	0.00097312	0.12164088	µg	4	500	0.00025614	0.00091796	0.11474605	0.00028692	0.00102828	0.12853572
12714-3b	6/30/2009	13:04:42	0.0004598	0.00164784	0.20598113	µg	4	500	0.00050583	0.00181281	0.22660161	0.00041377	0.00148288	0.18536066
12714-4b	6/30/2009	13:08:18	0.00042663	0.00152896	0.19112103	µg	4	500	0.00044573	0.00159741	0.19967708	0.00040753	0.00146051	0.18256499
12714-5b	6/30/2009	13:10:06	0.00031763	0.00113832	0.14229052	µg	4	500	0.00033201	0.00118988	0.1487355	0.00030324	0.00108676	0.13584[illegible]
12714-1bh	6/30/2009	13:11:56	0.01434281	0.05140144	9.50926646	µg	4	740	0.01430687	0.05127192	9.4853057	0.01437895	0.05153095	9.533227[illegible]
0.004ug = DL	6/30/2009	13:16:38	0.00106396	0.00381299	0.00381299	µg	4	740	0.00106396	0.00381299	0.00381299			
0.080ug = STD.2	6/30/2009	13:17:55	0.02061423	0.07387681	0.07387681	µg	4	740	0.02061423	0.07387681	0.07387681			
REAGENT BLANK	6/30/2009	13:19:10	-0.0000632	-0.0002267	-0.0002267	µg	4	740	-0.0000832	-0.0002267	-0.0002267			
12714-4bh	6/30/2009	13:24:24	-0.0004158	-0.0014904	-0.1117858	µg	4	300	-0.0003823	-0.0013703	-0.1027743	-0.0004494	-0.0016106	-0.1207973
12714-5bh	6/30/2009	13:26:10	0.00026042	0.00093331	0.05833229	µg	4	250	0.00027665	0.00099147	0.06196691	0.0002442	0.00087516	0.05469767
12714-1fh	6/30/2009	13:31:28	-0.0004735	-0.0016972	-0.0424311	µg	4	100	-0.0004865	-0.0017437	-0.0435933	-0.0004606	-0.0016507	-0.0412689
12714-2fh	6/30/2009	13:33:16	0.00020219	0.0007246	0.0181152	µg	4	100	0.00022605	0.00081014	0.02025357	0.00017832	0.00063907	0.01597683
12714-2fh dup	6/30/2009	13:35:03	0.00042719	0.00153097	0.03827427	µg	4	100	0.00048761	0.0017475	0.04368761	0.00036677	0.00131443	0.03288094
12714-3fh	6/30/2009	13:36:51	0.00627821	0.02249971	0.56249287	µg	4	100	0.00630015	0.02257834	0.56445873	0.00625627	0.02242108	0.56052702
0.004ug = DL	6/30/2009	13:38:07	0.00106527	0.0038177	0.0038177	µg	4	100	0.00106527	0.0038177	0.0038177			
0.080ug = STD.2	6/30/2009	13:39:21	0.02077673	0.07445919	0.07445919	µg	4	100	0.02077673	0.07445919	0.07445919			
REAGENT BLANK	6/30/2009	13:40:38	0.00010101	0.00036201	0.00038201	µg	4	100	0.00010101	0.00036201	0.00036201			
12714-3fh spk	6/30/2009	13:42:24	0.02811446	0.10075599	2.5188998	µg	4	100	0.02802414	0.10043229	2.51080725	0.02820479	0.10107969	2.52699236
12714-4fh	6/30/2009	13:44:13	0.00026023	0.0009326	0.02331516	µg	4	100	0.00026139	0.00093679	0.02341982	0.00025906	0.00092842	0.0232105
12714-5fh	6/30/2009	13:48:03	0.00033366	0.00119578	0.02989464	µg	4	100	0.00030692	0.00109993	0.02749849	0.00036041	0.00129163	0.03229079
0.004ug = DL	6/30/2009	13:59:26	0.00103979	0.00372639	0.00372639	µg	4	200	0.00103979	0.00372639	0.00372639			
0.080ug = STD.2	6/30/2009	14:00:43	0.02039172	0.07307938	0.07307938	µg	4	200	0.02039172	0.07307938	0.07307938			
REAGENT BLANK	6/30/2009	14:01:58	-0.0000275	-0.0000988	-0.0000988	µg	4	200	-0.0000275	-0.0000988	-0.0000988			
Calib Blank	6/30/2009	15:45:03	0.0004655			µg	4	200	0.0004655					
STD1=.004ug	6/30/2009	15:46:17	0.00103996			µg	4	200	0.00103996					
STD2=.04ug	6/30/2009	15:47:30	0.01036073			µg	4	200	0.01036073					
STD3=.08ug	6/30/2009	15:48:47	0.02103719			µg	4	200	0.02103719					
STD4=.16ug	6/30/2009	15:50:04	0.04169392			µg	4	200	0.04169392					
STD5=.2ug	6/30/2009	15:51:22	0.05270512			µg	4	200	0.05270512					
Reagent Blank	6/30/2009	15:53:08	0.0000039	0.00001488	0.00001488	µg	4	200	0.00000531	0.00002024	0.00002024	0.0000025	0.00000953	0.00000953
0.004ug = DL	6/30/2009	15:54:21	0.00105591	0.00402461	0.00402461	µg	4	200	0.00105591	0.00402461	0.00402461			
0.080ug = STD.2	6/30/2009	15:55:37	0.0208957	0.07964387	0.07964387	µg	4	200	0.0208957	0.07964387	0.07964387			
REAGENT BLANK	6/30/2009	15:56:54	0.00002494	0.00009508	0.00009508	µg	4	200	0.00002494	0.00009508	0.00009508			
0.080ug = STD.2	6/30/2009	15:58:10	0.02095076	0.07985372	0.07985372	µg	4	200	0.02095076	0.07985372	0.07985372			
0.080ug = QC STD 3	6/30/2009	15:59:29	0.01990902	0.07588312	0.07588312	µg	4	200	0.01990902	0.07588312	0.07588312			
REAGENT BLANK	6/30/2009	16:00:45	0.00000333	0.00001272	0.00001272	µg	4	200	0.00000333	0.00001272	0.00001272			
12714-3b spk	6/30/2009	16:02:30	0.02249081	0.08572361	10.7154512	µg	4	500	0.0226318	0.08626099	10.7826241	0.02234982	0.08518622	10.6482784
12714-2bh	6/30/2009	16:06:05	0.01337934	0.05099531	9.4341336	µg	4	740	0.01339825	0.05106737	9.44746461	0.01336044	0.05092325	9.42080258
12714-2bh dup	6/30/2009	16:07:48	0.01332515	0.05078873	9.3959166	µg	4	740	0.01323485	0.05044456	9.33224525	0.01341544	0.0511329	9.45958795
12714-3bh	6/30/2009	16:09:32	0.01548949	0.0590381	11.2172399	µg	4	760	0.01551197	0.05912381	11.2335245	0.015467	0.05895239	11.2009553
12714-3bh spk	6/30/2009	16:11:16	0.03423202	0.13047517	24.7902833	µg	4	760	0.03440767	0.13114464	24.9174817	0.03405638	0.12980571	24.66308
12714-4bh	6/30/2009	16:13:01	0.00023958	0.00091316	0.06848747	µg	4	300	0.00025693	0.0009793	0.0734475	0.00022223	0.00084703	0.06352744
12714-lrb	6/30/2009	16:14:46	0.00013736	0.00052357	0.01308949	µg	4	100	0.00014254	0.00054332	0.01358304	0.00013218	0.00050383	0.01259594

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
12714-lrb spk	6/30/2009	16:16:32	0.01544137	0.0588547	1.47136752	µg	4	100	0.01545778	0.05891728	1.47293153	0.01542495	0.05879214	1.46980351
0.004ug = DL	6/30/2009	16:19:32	0.00106094	0.00404377	0.00404377	µg	4	100	0.00106094	0.00404377	0.00404377			
0.080ug = STD.2	6/30/2009	16:20:47	0.02116306	0.0806629	0.0806629	µg	4	100	0.02116306	0.0806629	0.0806629			
REAGENT BLANK	6/30/2009	16:22:03	0.00004052	0.00015444	0.00015444	µg	4	100	0.00004052	0.00015444	0.00015444			
Calib Blank	7/1/2009	12:02:53	0.00074603			µg			0.00074603					
STD1=.004ug	7/1/2009	12:04:08	0.0013006			µg			0.0013006					
STD2=.04ug	7/1/2009	12:05:25	0.01227802			µg			0.01227802					
STD3=.08ug	7/1/2009	12:08:42	0.02404965			µg			0.02404965					
STD4=.16ug	7/1/2009	12:08:00	0.04877304			µg			0.04877304					
STD5=.2ug	7/1/2009	12:09:19	0.05985421			µg			0.05985421					
0.004ug = DL	7/1/2009	12:12:21	0.00126102	0.00418222	0.00418222	µg			0.00126102	0.00418222	0.00418222			
0.080ug = STD.2	7/1/2009	12:13:38	0.02563012	0.0850033	0.0850033	µg			0.02563012	0.0850033	0.0850033			
0.080ug = QC STD 3	7/1/2009	12:18:53	0.02555233	0.08474532	0.08474532	µg			0.02555233	0.08474532	0.08474532			
12714-1c	7/1/2009	12:21:56	0.00137523	0.00458102	0.45610229	µg	4	400	0.00137687	0.00456646	0.45664673	0.00137359	0.00455557	0.45555786
12714-3c	7/1/2009	12:27:17	0.00232478	0.00771024	0.77102431	µg	4	400	0.00234576	0.00777982	0.77798261	0.0023038	0.00764066	0.76406601
12714-3c spk	7/1/2009	12:29:06	0.0259072	0.08592227	8.59222778	µg	4	400	0.02598916	0.0861941	8.61941017	0.02582524	0.08565045	8.58504538
12714-4c	7/1/2009	12:30:55	0.00111739	0.00370588	0.37058869	µg	4	400	0.00106472	0.0035312	0.35312003	0.00117006	0.00388057	0.38805735
12714-5c	7/1/2009	12:32:46	0.00079378	0.00263261	0.26326177	µg	4	400	0.00076361	0.00253256	0.25325646	0.00082395	0.00273267	0.27326708
0.004ug = DL	7/1/2009	12:39:26	0.00130762	0.00433678	0.00433678	µg	4	400	0.00130762	0.00433678	0.00433678			
0.080ug = STD.2	7/1/2009	12:40:43	0.02587911	0.08582909	0.08582909	µg	4	400	0.02587911	0.08582909	0.08582909			
REAGENT BLANK	7/1/2009	12:42:00	-0.0000127	-0.0000423	-0.0000423	µg	4	400	-0.0000127	-0.0000423	-0.0000423			
Calib Blank	7/1/2009	14:10:58	0.00109986			µg	4	610	0.00109986					
STD1=.004ug	7/1/2009	14:12:13	0.00105519			µg	4	610	0.00105519					
STD2=.04ug	7/1/2009	14:13:29	0.01234325			µg	4	610	0.01234325					
STD3=.08ug	7/1/2009	14:14:46	0.02497113			µg	4	610	0.02497113					
STD4=.16ug	7/1/2009	14:16:04	0.04971791			µg	4	610	0.04971791					
STD5=.2ug	7/1/2009	14:17:23	0.05926516			µg	4	610	0.05926516					
Reagent Blank	7/1/2009	14:19:11	-0.0000781	-0.0002577	-0.0002577	µg	4	610	-0.000106	-0.0003499	-0.0003499	-0.0000501	-0.0001655	-0.0001655
0.004ug = DL	7/1/2009	14:21:39	0.0011801	0.00389284	0.00389284	µg	4	610	0.0011801	0.00389284	0.00389284			
0.080ug = STD.2	7/1/2009	14:22:56	0.02600699	0.08578995	0.08578995	µg	4	610	0.02600699	0.08578995	0.08578995			
REAGENT BLANK	7/1/2009	14:24:13	-0.0001516	-0.0005001	-0.0005001	µg	4	610	-0.0001516	-0.0005001	-0.0005001			
0.080ug = STD.2	7/1/2009	14:25:30	0.02569102	0.08474767	0.08474767	µg	4	610	0.02569102	0.08474767	0.08474767			
REAGENT BLANK	7/1/2009	14:26:47	-0.0001553	-0.0005123	-0.0005123	µg	4	610	-0.0001553	-0.0005123	-0.0005123			
0.004ug = DL	7/1/2009	17:10:34	0.00116389	0.00383938	0.00383936	µg	1	1	0.00116389	0.00383936	0.00383936			
0.080ug = STD.2	7/1/2009	17:11:51	0.02475452	0.0816584	0.0816584	µg	1	1	0.02475452	0.0816584	0.0816584			
0.080ug = QC STD 3	7/1/2009	17:13:11	0.02430943	0.08019017	0.08019017	µg	1	1	0.02430943	0.08019017	0.08019017			
REAGENT BLANK	7/1/2009	17:14:28	-0.0000268	-0.0000884	-0.0000884	µg	1	1	-0.0000268	-0.0000884	-0.0000884			
12714-2c	7/1/2009	17:16:14	0.00164636	0.00543091	0.54309115	µg	4	400	0.00167126	0.00551303	0.55130359	0.00162147	0.00534878	0.53487872
12714-2c dup	7/1/2009	17:18:02	0.00162535	0.00536158	0.53615894	µg	4	400	0.00161416	0.00532467	0.53246744	0.00163654	0.0053985	0.53985043
0.004ug = DL	7/1/2009	17:35:05	0.00126246	0.00416451	0.00416451	µg	4	1000	0.00126246	0.00416451	0.00416451			
0.080ug = QC STD 3	7/1/2009	17:36:21	0.02411245	0.0795404	0.0795404	µg	4	1000	0.02411245	0.0795404	0.0795404			
REAGENT BLANK	7/1/2009	17:37:39	-0.0010809	-0.0035658	-0.0035658	µg	4	1000	-0.0010809	-0.0035658	-0.0035658			

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PLANT DATA

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WHEELABRATOR NORTH BROWARD
TONS OF REFUSE PROCESSED PER STACK TEST RUN LOG

UNIT #1

Date	Test	Method #	Run #	Steam (Kpph)	Run Length (hr)	Trash Processed (tons)
6/24/2009	Mercury	29	1	184.7	2.35	81.3
6/24/2009	Mercury	29	2	184.2	2.18	75.2
6/24/2009	Mercury	29	3	184.1	2.17	74.8

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 06/24/09
Start Time: 8:00
End Time: 10:21

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	29 run 1	508.71	309.22	42.46	34.79	7.66	14.04	292.33	6.43	-10.43
Unit 2		531.37	309.05	31.53	24.28	7.25	18.95	283.38	6.55	-12.20
Unit 3		538.55	310.10	44.08	33.56	10.52	13.55	302.21	6.21	-8.50

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	187.83	895.60	831.68	81.09	-0.14	273.32	1141.99	4.07	184.65
Unit 2	189.01	884.90	830.61	78.30	-0.10	272.92	1207.82	10.08	184.60
Unit 3	190.21	897.74	830.10	76.89	-0.10	279.92	1254.77	7.63	183.79

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 06/24/09
Start Time: 10:44
End Time: 12:55

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	29 run 2	510.18	310.11	42.79	32.46	10.33	13.93	293.00	6.44	-10.33
Unit 2		536.55	310.32	33.52	28.27	5.24	17.83	285.44	6.62	-12.39
Unit 3		545.01	310.00	47.08	33.99	13.08	12.65	302.88	6.25	-8.61

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.62	895.25	830.55	80.38	-0.14	273.85	1143.12	4.55	184.20
Unit 2	188.01	884.18	830.65	79.99	-0.09	273.54	1201.02	5.78	183.64
Unit 3	190.21	897.09	827.07	79.50	-0.10	280.58	1248.28	6.52	183.98

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 06/24/09
Start Time: 13:17
End Time: 15:27

		SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	29 run 3	509.32	310.00	42.34	32.11	10.22	14.08	293.14	6.42	-10.14
Unit 2		544.93	312.87	36.72	30.89	5.84	16.22	287.98	6.63	-12.61
Unit 3		544.85	311.23	48.25	32.94	15.31	12.36	304.23	6.12	-8.51

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.25	895.09	827.32	78.94	-0.14	273.62	1161.10	6.27	184.13
Unit 2	187.93	883.54	827.08	81.47	-0.10	273.28	1209.70	8.86	183.79
Unit 3	190.89	896.19	831.39	78.59	-0.10	280.43	1259.50	7.31	183.83